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OnApp 4.1 Administration Guide

This guide provides an overview of OnApp's cloud deployment and management software, and explains in detail how to configure and manage your cloud using the OnApp Control Panel interface.

Key to interface and icons

This guide refers to various elements of the OnApp interface, including Menu items, Tabs, Icons and Buttons. These are illustrated below. The specific functions available depend on the permissions assigned to the user currently logged in.

This guide is aimed at Administrators and Users with limited permissions will not be able to access all functionality, or may be denied access to functions they can see.

The following icons are referred to in this guide:

- Add
- Edit
- Delete

- Statistics
- Actions
- Power status

- Hide menu
- Full screen
- Build

- Tools menu
- Switch on/off

Document Revisions
OnApp 4.1

Added

- Added Applications chapter
- Added Application Servers chapter
- Added Boot from ISO section
- Added Customer Networks section
- Added Instance Types chapter
- Added Raw logs section
- Added Track Daemon Process Activity section

Updated

- Updated Create Virtual Server
- Updated Delete User section
- Updated Virtual Server IP Addresses section
- Updated List of all OnApp Permissions section with the new permissions on Application servers, Instance types, and HA Clusters.
- Updated List of Default Permissions for Admin Role section
- Updated the Sysadmin Tools section with the info on HA services statuses
- Updated Delete Virtual Server section
- Updated Set Billing Plan Prices And Resource Limits section with the details on Instance types limits
- Updated Edit System Configuration section with the new parameters on Instance type look&feel and maximum upload size for VVs.
- Updated User Profile section
- Updated View User Account Details section
- Updated Create New Role section
- Updated Billing Plan Configuration Workflow section
- Updated Edit Virtual Server section
- Updated Virtual Server Creation Workflow section
- Updated Create Smart Server section
- Updated Edit Smart Server section
- Updated Billing Calculation section with the info on Instance types

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What's New in OnApp Cloud 4.1

The OnApp Cloud 4.1 release contains the following changes and new features:

Changes to terminology and the user interface

The following terminology changes have been made in the 4.1 version of the OnApp Cloud: hypervisors have been renamed as compute resources and hypervisor zones - as compute zones. Compute resources is a collective name for hypervisors, vCloud hypervisors and other hypervisor types.

New Cloud Components

Application Servers

Now you can install different applications (like Drupal, Joomla, WordPress etc.) on a server using web interface. This is implemented by means of application server. Application Server is a regular VS based on default CentOS template with pre-installed additional software. For more info, refer to Application Servers section of this guide. Application servers will be free to use until 1st November 2015, please contact your account manager.
for full pricing information.

Instance Types

Added possibility to use instance types during VS creation process. Instance types are preconfigured CPU/RAM/Disk/Bandwidth packages. You can add multiple instance types specifying different values for the parameters to suit your customer's needs.

Raw logs

The raw logs functionality allows you to send logs associated with your CDN resources to your distant server in real time. The raw log allows customers to understand, analyze, and debug files delivered via OnApp CDN, or can be served as audit trailed.

User Profile

User profile UI was updated. Now at the Overview tab you can see user's details at the left side of the page and billing details, prices and backups at the right side of the page.

Java 8 Console Support

Added support for Java 8 integrated console for appliances.

Federation and vCloud Integration Improvements

For the list of improvements, refer to Federation and OnApp and vCloud Director Configuration guides.

Document Conventions

The following document conventions are used in this guide.

<table>
<thead>
<tr>
<th><strong>Bold</strong></th>
<th>Label or button names in the Control Panel, often clickable. For example: On the VS's screen, click the <strong>Tools</strong> button, then select <strong>Delete Virtual Server</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Italics</strong></td>
<td>Parameters and field labels in the UI. For example: <strong>Password</strong> - set password for remote Vyatta management.</td>
</tr>
</tbody>
</table>
| **code block** | Source code. For example:  

```
alter if not: eth0 = public interface
eth1 = CP Communication interface
eth2 = VLAN communication interface
```

In some cases, code examples can be preformatted. For example:  

Run the following commands:  

```
echo "cp <LOCATION OF vnc.xml> /etc/vmware/firewall/vnc.xml" >> /etc/rc.local
```

```
echo "localcli network firewall refresh" >> /etc/rc.local
```

```
echo "esxcli network firewall refresh" >> /etc/rc.local
```

| **A menu selection** | For example:  

Go to **Settings** -> **Networks** -> **Add New Network** |
OnApp Cloud Overview

OnApp Cloud software enables service providers to turn their existing infrastructure (or any commodity hardware) into a single pool of resources - "a cloud" - which can then be sold to end users on a utility basis. It's a complete cloud deployment and management platform that's designed to make it easy for service providers to sell a wide range of cloud services.

OnApp Cloud can also be used by enterprise IT departments and MSPs to deliver cloud services to end users. For more information, see http://onapp.com/platform/.

This guide explains how to configure and use OnApp Cloud through the OnApp Control Panel management user interface. Depending on your OnApp Cloud license type (free or full), and how your cloud is configured, you can use the Control Panel to set up your own distributed SAN, DNS services and CDN services too, using OnApp's companion products, OnApp Storage and OnApp CDN. All of these functions are covered in this guide.

Main Components & Features

OnApp Cloud handles cloud deployment, VS deployment, VS management & resource allocation, Compute resource and SAN management, failover, user management, billing, self-provisioning, CDN and DNS, and other associated functions. Here's a brief description of the main components and features of the OnApp installation:

Servers

There are two required server types in an OnApp configuration – Compute resource servers and the Control Panel server. OnApp also requires storage devices for templates, virtual servers and backups.

Control Panel server

The Control Panel server (sometimes known as the Base server) hosts the OnApp user interface and manages all the processes controlled by OnApp.

The Control Panel server:

- Provides a web-based user interface
- Assigns a virtual server to a Compute resource
- Creates/starts/stops/deletes virtual servers
- Resizes CPU and storage
- Manages virtual servers through a console session
- Creates backups of virtual servers
- Allows virtual servers to be restored from a backup
- Allows the creation of custom templates from virtual server backups, for future deployment of new virtual servers
- Displays your CPU usage and network utilization
Compute resources

Compute resources are Xen, KVM, or VMware ESXi/vSphere 5.0 -powered servers running on bare metal, with CentOS Linux as the management operating system. This ensures highly efficient use of available hardware, and complete isolation of virtual server processes. The management OS controls virtual servers as well as handling network/disk connectivity, monitoring, IP address anti-spoofing and more.

Compute resources:

- Provide system resources such as CPU, memory, and network
- Control the virtual differentiation of entities such as virtual servers and application data being delivered to cloud-hosted applications
- Take care of secure virtualization and channeling of storage, data communications and server processing
- Can be located at different geographical zones
- Can have different CPU and RAM

OnApp Cloud supports three Compute resource virtualization platforms:

- Xen - OnApp supports Xen 3 and Xen 4
- KVM
- VMware

VMware Compute resources operate in a slightly different way. With Xen/KVM OnApp controls Compute resources directly. With VMware, OnApp controls the VMware vCenter. This allows vCenter to control the VSs with the full range of VMware functionality including DRS and vMotion to ensure that the operation is optimal.

CloudBoot Compute resources

CloudBoot functionality is a method of Compute resource installation without the presence of a local disk or other local storage, utilizing the PXE and DHCP servers. To start using CloudBoot, you must have Integrated Storage configured and the CloudBoot enabled in the system configuration first. See CloudBoot Compute Resources section for details. CloudBoot Compute resources are used for smart and baremetal server provisioning.

Virtual Servers

OnApp gives you complete control of your virtual servers (VSs), and all files and processes running on those servers. You can start, stop, reboot and delete virtual servers. You can move VSs between Compute resources with no downtime. OnApp also lets you perform automatic and manual backups, and restore VSs in case of failure.

When creating a virtual server, you can choose a Compute resource server with data store attached if you wish. If not, the system will search for Compute resources available that have sufficient RAM and storage for that virtual server, and choose the one with the lowest (but sufficient) amount of RAM available.

You can monitor the CPU usage of each virtual server, and the network utilization of each network interface. This helps you decide if and when to change the resources available to each VS. OnApp also provides detailed logs of all tasks which are running, pending, have failed or have been completed.

Smart Servers

Smart servers are dedicated entities based on CloudBoot Compute resources with passthrough enabled. Smart servers are created and managed exactly the same as virtual servers, except only one smart server can be deployed per Compute resource. Smart servers can be organized into zones to create different tiers of service - for example, by setting up different zones for smart appliances, with limits and prices specified per zone. Smart appliance zones can also be used to create private clouds for specific users.

Baremetal Servers

Baremetal servers are physical servers that reside directly on the hardware without the virtualization layer. Namely, baremetal server is a Compute resource that runs on the OS installed. Baremetal Compute resources can not have more than one baremetal server located on it.

Storage devices

For VS template and backup storage we recommend that you set up a separate server with SSH (preferred) or NFS (for high end NAS). However, in a CloudBoot environment or for a small scale installation you can use the Control Panel server to host the templates and backups. You will also need a storage platform for virtual server disk storage. OnApp provides an integrated storage platform that enables you to expose local storage drives across Compute resources as a distributed block SAN with full redundancy and failover properties. Additionally, you can use any block based storage platform, such as local disks in Compute resources, an Ethernet SAN such as iSCSI or AoE, or hardware (fiber) SAN. Storage Area Networks are core segments of the cloud system, and OnApp can control their physical and virtual routing. This control enables seamless SAN failover management, including SAN testing, emergency migration and data backup.
Networks

With OnApp you can create complex networks between virtual servers residing on a single host, or across multiple installations of OnApp. You can configure each virtual server with one or more virtual NICs, each with its own IP and MAC address, to make them act like physical servers. OnApp ensures that each customer has their own dedicated virtual network, isolated and secure. They can only see their traffic, even if they share the same physical server as another customer. OnApp enables you to modify network configurations without changing actual cabling and switch setups.

Templates

An OnApp template is a pre-configured OS image that is used to build virtual servers. There are two types of templates for virtual server deployment in OnApp: downloadable templates provided by OnApp, and custom templates you create from existing virtual servers. The OnApp template library includes a wide range of VS templates for various distributions of Windows and Linux, both 32- and 64-bit.

At present OnApp does not support VSs/templates with Active Directory Domain Controllers.

Scalability

OnApp is a highly scalable cloud deployment and management tool that allows you to add and remove Compute resources, data stores and resources at any time to meet your changing needs. You can add more CPUs and memory to a specific virtual server to increase its capacity, and increase the total available RAM and CPU by adding new Compute resources.

High availability

OnApp provides high reliability and availability in a number of ways:

- **Compute resource failover management system** — If a Compute resource fails, OnApp's self-healing architecture automatically moves virtual servers to another box. Compute resources regularly update the control panel with their status. If they do not return valid data for a period of time, they are marked as offline, and an appropriate new Compute resource is selected for a virtual server to boot there. This process is fully automatic but may take several minutes. When the crashed Compute resource comes online, it will be again available, but virtual servers previously migrated from it will not be migrated back.

- **Virtual servers** — OnApp keeps virtual servers running even if the Control Panel server goes offline. In such an event, you won't be able to perform any actions to virtual servers until access to the Control Panel server has been restored.

- **Backup mechanisms** — There is storage security provided by the backup mechanisms on both virtual and physical storage. Both automatic and manual backups provide the ability to capture the current state of a virtual server. You can always restore the virtual server from a backup if needed. There are also emergency mySQL backups as part of the disaster recovery system.

- **Database replication (planned feature)** — OnApp will feature database replication which includes the creation and maintenance of multiple copies of the same database. Database replication improves availability: when your main database becomes unavailable, the slave copy will take over.

- **High Availability Control Panel** — OnApp High Availability feature brings new opportunity to deploy more than one Control Panel within one cloud. This allows to improve cloud load balancing, minimize server downtime in case of CP issues and enhance scalability of the whole infrastructure.

Security

OnApp provides multiple layers of security:

- **Compute resource** — OnApp is a multi-Compute resource cloud system that currently supports Xen, KVM and VMware (Hyper-V and other Compute resources will be added in future releases). The first layer of security is provided by the Compute resource itself. For example, Xen provides full isolation between virtual servers and allows each virtual server to access its own disk only. When a virtual server makes a request for data, it gets redirected to its correct disk. Xen dictates which virtual servers and resources are allowed to run or be accessed at any given time.

- **Firewall** — In addition to the Compute resource security mechanism, there is also an anti-spoof firewall which resides on the server where you store virtual servers. The firewall enables the management operating system of the Compute resource to examine packets entering and leaving the virtual server. It blocks packets that do not belong to the virtual server and accepts those meeting the rules. The firewall prevents IP spoofing and packet sniffing.

- **Control Panel** — Virtual servers in OnApp are completely controlled by the administrator. Administrators have full root (Linux) or Administrator (Windows) access to accounts and servers. The Control Panel also lets you assign different levels of user access to virtual servers, Compute resources, consoles and disks.

- **Network Security** is provided by completely isolating virtual servers from each other using VLANs. Each customer can be assigned their own VLAN, so using their private IP they can only access addresses within that VLAN. Using a public IP, they can only access those boxes which are manually specified, using the Integrated Console.
API and Integrations

Our comprehensive RESTful xml and JSON API enables full integration of OnApp with third party applications.

OnApp integrates with popular billing applications like HostBill, Ubersmith and WHMCS, and with PHP applications via a wrapper (integration modules are available from the OnApp website: Downloads).

The API makes integration straightforward for other applications too, including other control panels, CRM, support and billing systems.

For a detailed API guide with code samples, see OnApp 4.1 API Guide.

Hardware & Software Requirements

An OnApp installation requires at least two physical machines – one for the Control Panel server, and the other for the Compute resource server. You can have as many Compute resource servers as you need. You will also need storage for your virtual servers (a data store), and we recommend that you set up a separate server for storing backups and templates.

These are the minimum requirements for a small cloud. For a larger deployment, OnApp's technical team will advise you on the best possible setup.

Server Requirements

<table>
<thead>
<tr>
<th>Compute resource servers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• x64 platform with AMD-V/VT-x hardware virtualization support enabled</td>
</tr>
<tr>
<td>• Quad Core 2Ghz+ CPU</td>
</tr>
<tr>
<td>• 8GB+ RAM</td>
</tr>
<tr>
<td>• 3x Gig network interface cards (4 recommended)</td>
</tr>
<tr>
<td>• 30 GB of free disk space (SSD Recommended)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Panel server</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Dual or Quad Core 2Ghz+ CPU</td>
</tr>
<tr>
<td>• 8GB RAM (16GB+ recommended)</td>
</tr>
<tr>
<td>• 100GB Raid 1</td>
</tr>
<tr>
<td>• 2x Gig network interface cards</td>
</tr>
</tbody>
</table>

Additional Server Recommendations

<table>
<thead>
<tr>
<th>Backup server</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 1GB RAM</td>
</tr>
<tr>
<td>• 2TB+ NAS (alternatively, a large hard disk can be used on the Control Panel server for backups)</td>
</tr>
</tbody>
</table>

Storage Requirements

<table>
<thead>
<tr>
<th>Integrated Storage Platform</th>
<th>Local Storage Only</th>
<th>Enterprise SAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Any number of integrated storage drives can be grouped together across any Compute resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SSD drives recommended for best performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• at least 1 dedicated NIC assigned per Compute resource for the SAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• multiple NICs bonded or 10Gbit/s ethernet recommended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Minimum 1 dedicated partition in each Compute resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• separate disk from the primary OS drive recommended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Centralised Block Storage SAN (iSCSI, ATA over Ethernet or Fibre Channel) accessible to every Compute resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• at least 1 dedicated 1Gbit/s NIC assigned per Compute resource for the SAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• multiple NICs bonded or 10Gbit/s ethernet recommended</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Architecture

OnApp software transforms your server and storage hardware into a virtual network system that employs a Xen Compute resource virtualization architecture to control virtual protocols and security. With this infrastructure in place, OnApp users can host a multitude of secure cloud servers with more fluidity and control. A schematic of the OnApp architecture is shown below.
Network Configurations

There are several supported network configurations:

- Cloud Only (Xen & KVM)
- Basic Backup Scheme
- Advanced Backup Scheme

*Cloud only Network Diagram (BBS)*
Cloud & Storage
This allows you to use OnApp Integrated Storage.
Data Protection is restricted to Basic Backup Scheme

Cloud and Storage Network Diagram (BBS)
Cloud Only (VMware)

Cloud only Network Diagram (VMware)
Dashboard

The OnApp dashboard is displayed after logging into the system. It provides three main views of usage and activity: Statistics, Cloud and Account. Click the icons by the silver dial to change the view.

Statistics

This is the default view, showing the Memory (sum total of all Compute resources' RAM resources), total Storage (sum total of all data store capacities) and IOPS in the cloud, along with the space remaining. Storage space and RAM for a normal user are set by the billing plan limits. For administrators, the bars show:

- **CPU usage**, with the following details:
  - total cores - total physical cores on all Compute resources which are configured in OnApp
  - used cores - total virtual cores assigned to running VSs (may be higher than active cores if overselling)

- **Storage usage** (sum total of all VS disks capacities + orphan disks capacities)

- **Memory usage** (sum total of RAM allocated to VSs + RAM allocated to orphaned VSs) of the entire cloud.
- **IOPS/h usage** - the input/output requests for the last hour for the entire cloud.
- **Baremetal servers** - the amount of baremetal servers created in the cloud.
- **Smart servers** - the amount of smart servers created in the cloud.

Cloud

Clicking this icon shows details of the entire cloud:

- For normal users, it shows the total number of virtual servers, RAM, data stores, backups and disk space they're using.
- For administrators, it shows the total number of virtual servers, Compute resources, data stores and backups in the entire cloud.
**Account**

Clicking this icon shows details of your account: user's name, CDN status, license type, validity and key, number of cores on license, the date of the last sync with the licensing server.

**Activity log**

At the bottom of the screen in each case is a record of recent transactions. To view details of a transaction, click its Ref number.

- Normal users see recent transactions for their virtual servers.
- Administrators see recent transactions for the entire cloud.

**Additional Navigation**

**Build** – in the upper right corner, click the **Build** button to create new virtual server, application server, load balancer, edge server, storage server or new blueprint.

Click the **Arrow** button to hide the Control Panel's menu.

Use the **Search** tool for global search across the cloud.

To hide the infobox on a particular page, click the **Close** button in the upper-right corner of the infobox. For more infobox settings, refer to User Profile section.

**API Key**

The API Key is used instead of the normal username/password credentials during API operations. A key is generated for each user by the system when the user account is created. To change the key, click the **Regenerate Key** button. A new key will be generated, and you'll be taken back to the main **Dashboard** screen.

**Login Screen**

To access your Control Panel, you must first provide a username and password. Authentication means identifying a user and verifying that this user is allowed to access the OnApp Control Panel.

Check the **Remember me** box to have the CP remember your login details for one month. You will have to enter your login credentials again after you log out or clear your browser cookies.

If you have forgotten your password, press the **Forgot your password?** link and specify email to which your reset password instructions will be sent.
User Profile

Click your account name at the top of the Control Panel screen to view tabs with the details of the user account you're currently logged in with. It also includes infobox options and API Key information. Administrators can view details of all account profiles through the Control Panel's Users & Groups menu. For details, refer to the Users And Groups chapter.

This chapter contains information on the following tabs that comprise the user profile:

- Overview
- Payments
- Billing Plan
- White List
- Backups
- Customer Networks
- iFrame

Overview

This tab contains information on the user's login, user roles, billing plan, prices and other.
User Details

These are the settings which are specified at user creation process.

- **User's avatar** (this feature is available if the Use gravatar option is enabled - Create User).
- **User's name and surname.**
- **User's email.**
- **Last Access Log** - click to see information on the IP addresses that logged in to your account, and the time and date of access.
- **Drop Other Sessions** - click if you want all other IPs that are logged in to your account to be logged out. The only IP address that will still be logged in to the account will be the one you are currently using.
- **Login** - user's screen name.
- **User Roles** - the roles assigned for the user. The roles are set at user creation process.
- **User Group** - the group to which this user is assigned. The user groups are set at user creation process.
- **Time Zone** - time zone set for this user.
- **Locale** - locales set for this user.
- **System Theme** - the color scheme: light or dark.
- **Display infoboxes** – whether infoboxes are displayed or not for this user.
- **Restore infoboxes** - click this button to display infoboxes for the user (this option may be disabled depending on the user's permissions).

Amazon Web Services

Shows the the status of the Amazon Web Services: disconnected or connected. For more information, see Enable/disable AWS.

Here you can also connect Amazon Web Services:

1. Click the (Connect) icon.
2. On the following page provide your AWS credentials: AWS access key ID and AWS secret access key.
3. Click Submit to connect AWS to your account.

Additional Info

User Additional Fields allow administrators to create custom fields and use them with the API or a third party system. These fields will vary for different users, depending on the information the administrator wants them to fill in.

For more information, see User Additional Fields.

Oauth Authentication

OAuth - open standard for authorization - enables users to log into OnApp using their Google and Facebook accounts. For users to access this feature, it should be enabled by the Cloud Administrator.

- **Facebook** - click Connect to set up this option. If it is configured correctly, you will be able to log in to your account by entering your Facebook login details.
- **Google** - click Connect to set up this option. If it is configured correctly, you will be able to log in to your account by entering your Google login details.

For more information, see OAuth.

API Info

- **API key** - click the Regenerate Key button to generate a new API key.

For more information, see API Key.

Billing Details

- **Price per hour** - shows the price for VSs, Load Balancers, and other resources per hour.
- **Billing plan** - the billing plan this user is assigned to. Click the plan label to see its details.
- **Outstanding amount** - the total amount of money owned by this user since it has been created, for all resources, minus the amount of Payments. The sum is displayed for the period since a user has been created until the last 24hrs.
- **Monthly fee** - a set monthly price for a billing plan.
- **Total cost** - the sum of used resources cost and virtual servers cost.
- **Payments** - the total amount of payments made.
- **Virtual Server Hourly Statistic** - clicking this link will generate billing statistics for all virtual servers owned by this user. For more information, see Virtual Server Billing Statistics.
- **User Statistic** - clicking this link will generate user's resource usage statistics. For more information, see User Billing Statistics.
- **Monthly Bills** - clicking this link will generate the bills list that shows the total due per each month of the year. To view billing statistics, select a year from the drop-down list and click Apply. The list that appears displays a particular month of the selected year and the cost of used resources for that month. At the bottom of the list there is the total amount of money which was to be paid for the selected period.

Prices
The list of all used resources and their price per hour for two states: server powered ON and server powered OFF.

**Servers**

Shows the list of all virtual servers, load balancers, edge servers, smart servers, application servers in the cloud with their prices for server on and off.

**Backups**

- *Backups Count* - the price per hour for the quantity of the user's backups.
- *Templates Count* - the price per hour for the quantity of the user's templates.
- *ISOs Count* - the price per hour for the quantity of the user's ISOs.
- *Templates, ISOs & Backups Disk Size* - the price per hour for the disk space user's /ISOs/backups/templates occupy.
- *Autoscaling Monitor Fee* - the price per hour for autoscaling monitors.
- *Backup Server Groups* - the price per hour for the resources consumed by backup server groups.

**Edit Profile**

To edit the details of the user profile, click the edit button in the upper right corner. You will then be redirected to a page where you can change the details of your profile. Besides the details described above, you can also change the password and auto suspending settings.

**Payments**

This tab contains the list of your paid invoices. Once you have paid an invoice, you can add it to the system:

1. Clicking *Create Payment* or +.
2. On the following page indicate the invoice number and the amount of money paid.
3. Click *Save* and the invoice will be added to the list of payments.

**Billing Plan**

This tab contains the details of the billing plan assigned to the user. The following sections are displayed:

- *User VS limit*
- *Limits for Template Store*
- *Limits for Recipe Groups*
- *Limits & Pricing for Compute resource Zones*
- *Limits & Pricing for Data Store Zones*
- *Limits & Pricing for Network Zones*
- *Limits for Edge groups*
- *Limits & Pricing for Backup server Zones*
- *Limits for guaranteed minIOPS*
- *Limits for Instance Types*

For more information, see [Set Billing Plan Prices and Resource Limits](#).

**White List**

This tab includes the list of IPs from which this user can log in to the Control Panel. For each of the IPs, the following details are displayed:

- *IP* - the IP you want to add to the white list.
- *Description* - the description of that IP.
- *Actions* - you can edit or delete the chosen IP address.

To add a white list IP:

1. Click *Create White List IP* or +.
2. On the following page fill in the IP and description of the new IP.
3. Click *Save IP* and the new IP address will be added to the White List.

You can also delete all IPs from the White List by clicking *Clear White List IPs*.

For more information, see [User Whitelist IPs](#).

**Backups**
This tab contains the list of the user's backups. For each backup the following details are displayed:

- **Date** - the date when the backup was made.
- **Target** - target for which the backup was taken - either a disk (for normal backups) or a virtual server (for incremental backups).
- **Status** - the status of the backup, whether it was built or not.
- **Backup Size** - the size of the backup in MB.
- **Initiated** - how the backup was launched - either manually or automatically on a periodic basis - annual, monthly, weekly or daily.
- **Backup Server** - the backup server where the backup is stored.
- **Note** - an arbitrary note to the backup.
- **VS** - the virtual server for which the backup was taken.
- **Customer** - the customer this backup refers to.
- **Actions** - you can perform the following actions:
  - convert the backup to template
  - restore the system from the chosen backup
  - view Virtual Server backups for this particular VS
  - delete the backup
  - add or edit the backup's note.

### Customer Networks

This tab contains the list of user's customer networks. Customer networks are used for isolation of customer's virtual servers from other customers' VSs via VLAN.

For each customer network, the following details are displayed:

- **Name** - the name of the customer network.
- **Network address** - the network address of this customer network.
- **Default outside IP address** - the default outside IP address of this customer network.
- **VLAN** - a group of virtual servers functioning as if they're connected to a single network (even if they are not, in fact).
- **Actions** - you can delete the customer network.

You can add new customer networks to the profile:

1. Click **New Customer Network** or +.
2. On the following page provide the following details of the new customer network:
   - **Label** - the label of the new customer network.
   - **Compute resource** - select the VMware Compute resource to associate the customer network with.
   - **IP Address Pool** - a range of NAT IP addresses.
   - **Network Zone** - specify the network zone to which the customer network will be assigned.
   - **Prefix Size (CIDR)** - the prefix size should be in the range 24-30 and is used to set the subnet size.
   - **Is nated** - select this check box to use NAT for translating the traffic from Vyatta's single eternal IP to local customer network IPs. Leave this box unchecked if you are using your own firewall with external IP address.
3. Click **Create Customer Network** and the new network will be added to the customer networks list.

If you decide not to add a new network and want to return to the previous page - click **Back**.

For more information, see [Customer vCenter Networks](#).

### iFrame

This tab is iFrame show page. The title of this tab is set by the user when configuring this option. If required you can integrate an iFrame into OnApp which will display a web page within the user OnApp Control Panel. By default, the possibility to configure an iFrame is disabled. To enable, use the **Enable iFrame Window** permission.

For more information, see [iFrame Configuration](#).

### Cloud Search Tool

The search tool in the upper right corner allows you to search your cloud for:

- IP addresses
- Usernames
- Users full names (first or last name, in any order)
- VS labels
- VS identifiers
Appliances

Appliances is a collective name for all virtual and physical devices that can be provisioned in the cloud. The term **appliance** seizes the following cloud components:

- Virtual Servers
- VMware vCenter Virtual Servers (of vCenter Implementation guide)
- Smart Servers
- Baremetal Servers
- Load Balancers
- Compute Resources
- Assets

OnApp Cloud gives you high-end cloud management features for the following appliances including:

<table>
<thead>
<tr>
<th>Server Options</th>
<th>Virtual Servers</th>
<th>Smart Servers</th>
<th>Application Servers</th>
<th>Baremetal Servers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edit</td>
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Virtual server IP addresses
Display network speed for network interfaces
Edit network speed

Disks
Create disks
Edit disks
Migrate disks
Delete disks

Backups
View
Convert to template
Restore backup
Delete backup
Edit backup note

Backup Schedules
View schedules
Create schedule
Edit schedule
Delete schedule

Statistics
CPU utilization
Billing statistics
Network interface statistics
Disk IOPS statistics

Recipes
Recipes
Custom variables

Virtual Servers

Virtual servers are based on templates and are deployed on Compute resources. Compute resources give them access to CPU, disk and network resources. OnApp Cloud gives you high-end cloud management features including:

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OnApp supports two kinds of storage for virtual servers: traditional centralized SANs, and the new distributed block storage functionality introduced with OnApp Storage, in which local disks in Compute resources provide the physical storage space allocated to virtual servers. In each case, the OnApp platform creates virtual data stores from the physical resources, and uses these to provide virtual servers with virtual disks.

Administrators in OnApp have full control over the lifecycle of virtual servers. Virtual servers can be in the following states:

- **Created** - A server is created when you successfully Create Virtual Server from the Virtual servers menu, having selected its template and set its properties, resources and network requirements.
- **Build** - A virtual server must be built after it is created. Building is the process of actually allocating the physical resources specified during its creation. This can be done manually, or automatically if you check the Build Virtual Server Automatically box during the creation process.
- **Powered on** - A power on starts the virtual server, its operating system and processes.
- **Powered off** - If the operating system cannot be stopped, it will be forcefully terminated.
- **Shut down** - A shut down will attempt to gracefully stop a virtual server and its operating system, which typically involves terminating all running applications.
- **Rebooted** - Rebooted means a virtual server has been shut down, and then powered on again.
- **Deleted** - When a virtual server is deleted, its backups are still stored on the server and can be restored if required.
- **Re-built** - To rebuild a virtual server means to reinstall the template and reconfigure the resources and network. All data will be lost.
- **Failed** - A failed virtual server is one that is down, for example because of hardware or network problems. You will have to start the server manually when those problems have been solved.

**View Virtual Servers**

To view all virtual servers deployed in the cloud:

1. Go to your Control Panel’s Virtual Servers menu to see an overview of all virtual servers in the cloud.
2. The page that loads will show the list of VSs together with their:
   - operating system
   - label. Click the label to see the VS details.
   - VIP status (enabled or disabled). Click the icon to enable/disable VIP status of a particular VS.
   - IP addresses
   - allocated disk size
   - RAM
   - backups - the number of backups and the space these backups take.
   - user - the owner of this VS. Click the user name to see the owner details.
   - power status. Click the on/off buttons to change the status.
3. Click the Actions button next to the VS for the quick access to the list of VS actions (the list of actions displayed depends on the VS status):
   - Reboot a VS
   - Recovery reboot
   - Power off a VS
   - CPU usage
   - Backups
   - Shutdown
   - Start up
   - Recovery start up
   - Unlock

To search for a particular virtual server, click the Search icon at the top of the VS list. When the search box appears, type the text you want to search for and click the Search button:

![Search Virtual Server](image)

**View Virtual Server Details**

To view details of a specific virtual server:

1. Go to your Control Panel’s Virtual Servers menu.
2. Click the label of the virtual server you’re interested in.
3. The screen that appears loads the VS properties, notes, activity log and tools for managing your VS.
**VS Properties**

VS properties page gives general overview of the VS details:

- Template this VS is built on
- Power status & On/Off/Reboot buttons.

**Clicking the OFF button performs graceful shutdown and then powers off the virtual server after the timeout set in Configuration settings.**

- Hostname
- Compute resource. Click the Compute resource name to see its details
- Login credentials
- Owner. Click the owner name to see its details.
- VIP status (on/off). Click the icon to change the status.
- Price per hour

**Please pay attention that when you resize a VS or change its pricing in the billing plan, the change is not applied immediately. It takes about 5 minutes to take effect. Meanwhile, a loading spinner is showing next to the price.**

- Memory
- CPU(s)
- CPU priority or CPU units
- Disk Size
- Disk backups
- Network Speed
- IP Addresses. Only the first five IP addresses are displayed on the virtual server properties page. To view the list of all virtual server IP addresses, mouse over IP addresses area or go to the Networking > IP addresses tab.
- Autoscale - move the slider to enable/disable the autoscaling rules set for this VS.
- Auto-backups - move the slider to enable/disable automatic backups for this VS. If the incremental backups are enabled in your cloud, you can set auto-backups per VS rather than per disk.

**If the automation options weren’t enabled during this virtual server creation, you’ll be redirected to the form where you can configure them.**

*Notes*
The Notes section lists brief comments or reminders for a VS. You can add either Admin's or User's notes. The Admin's note will be available to cloud administrators. Click the Actions button in the Notes section of the page to add admin's or user's note.

**VS Management**

- Click the Tools button to expand the Tools menu with the VS management options.
- Use the top menu to manage your virtual servers' statistics/networking/storage options.

**Create Virtual Server**

Virtual servers are created from templates. To create a virtual server:

1. Go to your Control Panel's Virtual Servers menu and click the "+" button, or click the Create Virtual Server button at the bottom of the screen. This will start a VS creation wizard.
2. Fill in the wizard step by step. Each of these steps is described in the corresponding sections below.
3. Click the Create Virtual Server button to start the creation process. You will be taken to the virtual server details screen.

On this page:

- Step 1 of 6. Cloud Locations
- Step 2 of 6. Templates
- Step 3 of 6. Virtual Server Properties
- Step 4 of 6. Resources
- Step 5 of 6. Recipes
- Step 6 of 6. Confirmation

OnApp must be configured properly before VSs can be created. You must have:

- At least one data store configured and assigned to a data store zone
- At least one network configured and assigned to a network zone
- At least one Compute resource configured and online
- At least one Compute resource assigned to a Compute zone
- At least one data store attached to a Compute resource
- At least one network attached to a Compute resource
- Assigned a billing plan to the user creating the VS

**Step 1 of 6. Cloud Locations**

The Cloud Locations step applies to those users who have Compute zones assigned to location groups in their billing plan.

If the user's billing plan has several Compute zones, some of which are assigned to location groups, whereas others are not - the cloud locations screen will not be available in the wizard. In this case the wizard will start with the Templates step.

Indicate your virtual server's cloud location:

- **Country** - choose the country, where the cloud is located, from the drop-down menu.
- **City** - specify the city, where the cloud is located, from the drop-down menu.

Click Next to proceed to the following step of the wizard to specify the virtual server templates.
At this step, specify the template from which your virtual server will be built. Greyed out templates mean that there are not enough resources to build a VS from this template.

To choose a template:

1. Click the required **Operating system** label (Windows, Linux or FreeBSD) to expand the list of template groups
2. **Distribution** - choose a template Distribution
3. **Template** - select the template
4. Click **Next**

**Windows Licensing Type**

This option only appears if your billing plan allows it, and if the relevant licensing options have been configured for the template group this template belongs to. If this option is available, choose the license type you require:

- For the KMS type, choose the licensing server
- For your own license, type your license key

If you don’t specify the licensing type, MAK licensing will be set by default.

Consider the following when creating a VS on Windows templates:

- It is possible to deploy Windows virtual servers without running sysprep. To do so, you need to disable the **Run Sysprep** option for the Compute zone the virtual server will be built on. See **Create Compute Zone** section for details.
- If there are several virtual servers simply deployed from the same template in the cloud, they will have identical SIDS. This will result in the system conflict.
- It is not possible to select KMS or own licensing type when creating a Windows virtual server from custom template. As a workaround, you can create a virtual server from the template used for **custom template creation**.

Template extraction is performed during server provisioning or taking a backup when using a particular template. To prevent template from being used in other transactions during extraction, template is locked during the extraction and unlocked on accomplishment. If other transaction tries to use the locked template, it will fail after 5 minutes of standby. Transaction which locked template and failed, means that extracted template is broken.

**Storing scheme:**

- template /onapp/templates/your_template.tgz
- extracted template /onapp/backups/templates/your_template
- locked template /onapp/backups/templates/your_template.lock

Proceed to the following step of the wizard and specify the virtual server properties.

**Step 3 of 6. Virtual Server Properties**

At this step you need to indicate your virtual server’s properties, such as label, Compute resource, password and other. You can create a virtual server having specified only the required parameters and configure it later.

Specify the following virtual server properties:

- **Label** - the label of the virtual server. The required parameter.
- **Hostname** - the hostname of the virtual server. The required parameter. The hostname should consist of letters [A-Z a-z], digits [0-9] and dash [ - ]. For more info on hostname validation, refer to **RFC standard documentation**.

**Particular characters are not allowed for Windows-based virtual servers:**

- percent sign [%]
- double quotation marks ['"]
- brackets [<,>]
- vertical bar [|]
- caret ['^']
- ampersand [%]
- parentheses [(,)]

- **Time zone** - set the time zone for the virtual server. This parameter is applicable only to Windows XEN and KVM virtual servers.
Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows VS manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a VS after starting it if time synchronization is not completed for some reason.

- **Compute Zone** - the Compute zone to build the VS on.
- **Compute resource** - the specific Compute resource to build the VS on. Compute resource may be selected automatically according to the set [provisioning type](#).
- **Password** - a secure password for the VS. It can consist of 6-99 characters, letters [A-Za-z], digits [0-9], dash [-] and lower dash [ _ ]. You can use both lower- and uppercase letters.
- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.

When the **Show Compute resources on Virtual Machine creation** permission is disabled (so that user cannot select the Compute resource, but can choose the virtualization type), the Compute resource that meets the virtualization type and the resources set will be automatically selected. The data store will be set according to the compute zone selected.

Click **Next** to proceed to the following step of the wizard to specify the virtual server resources.

**Step 4 of 6. Resources**

At this step, you can choose to create the virtual server either by selecting a predefined instance type or by setting your virtual server's resources, such as disk size, network configuration and other manually.

Depending on the permissions, this step will display either **Instance Types** or **Create your own** tabs, or both of them.

You are forwarded to the next step from the tab you are currently on. If you select an instance type and then click on the **Create Your Own** tab and proceed to the next step the system will set the resources from the **Create Your Own** tab even if you did not configure any resources there.

**Resources**

**Instance Types**

If the user selects a compute zone that does not have enough resources during virtual server creation, they will see all instance types available to them, but those that have resources incompatible with the chosen compute zone will be greyed out. Greyed out instance types cannot be selected.

From this tab, you can choose one of the predefined **Instance Types** for your virtual server. For each of the instance types the following details are displayed:

- **Memory** - the RAM size (GB) available in the instance type
- **CPUs** - the number of CPU cores available in this instance type
- **Disk Size** - the disk size available in this instance type
- **Bandwidth** - the bandwidth available in this instance type
- **Price per Hour**:
  - **Mode ON** - hourly instance type price for the VS powered on
  - **Mode OFF** - hourly instance type price for the VS powered off
- **Price per Month**:
  - **Mode ON** - monthly instance type price for the VS powered on
  - **Mode OFF** - monthly instance type price for the VS powered on

Click the instance type to select it. After that, the instance type you have chosen will be highlighted in green.

Virtual servers created using instance types do not support autoscaling.

**Create Your Own**
Using this tab you can define the resources for your virtual server manually:

- **RAM** - set the amount of virtual server’s RAM.
- **CPU Cores** - set the amount of virtual server’s CPU cores. For KVM Compute resources, this parameter sets CPU sockets by default, unless CPU topology is enabled.
- **CPU Priority** (or **CPU Units**) - set virtual server’s CPU priority. If the CPU units are switched on in the billing plan for this user, then CPU priority is replaced with CPU units. Refer to **Billing Calculation** section for details on CPU units and CPU priority. Do not use CPU Units for KVM Compute resources running on CentOS5.

The following options are available for VSs based on KVM Compute resources only, providing the Enable CPU topology permission is switched on for the user.

- **Use CPU Topology** - move the slider to the right, to set the following parameters:
  - **CPU Sockets** - set the amount of sockets.
  - **CPU Threads** - set the amount of threads per core.

CPU topology (CPU sockets and CPU threads) is the Labs feature preview. Pay attention that setting CPU sockets and CPU threads are at your own risk only!

You may face the following problems when setting CPU topology:

- Currently you cannot set CPU sockets and threads parameters for existing VSs.
- After setting, the new parameters won’t be shown at the VS details screen.
- Some Linux VSs fail to boot up.
- When sockets and threads are set incorrectly, you may face huge load on Compute resource’s under CentOS 5.x.

**Primary Disk**

- **Data Store Zone** - choose a data store zone for VS’s primary disk.
- **Primary disk size** - set the primary disk size.

**Swap Disk**

- **Data Store Zone** - choose a data store zone for VS’s swap disk.
- **Swap disk size** - set the swap disk size. There is no swap disk for Windows-based VSs. In all other cases, swap disk size must be greater than zero.

**Network Configuration**

- **Network Zone** - choose a network zone from the drop-down box.
- **Show only my IP address** - tick this checkbox to view only own IP addresses in the IP addresses dropbox.
- **Show IP address selection for new VS** - if the option is available, you can also assign an IP address for the VS from the drop-down menu. Indicate Compute resource and network to have the list of available IPs.

**Show IP address selection for new VS** option is enabled via the “Specify a network address on new VS page” checkbox on the Settings > Configuration settings screen (under the System tab).

You can’t select unlimited port speed if the Network Zone is not selected. In this case the port speed will be 1 by default.

It’s possible to create virtual server with unlimited network speed without selecting a network zone only if you have only one Network Zone assigned to your billing plan.

- **Port Speed** - set the port speed for this VS

Click **Next** to proceed to the following step of the wizard where you can specify the virtual server recipes.

**Step 5 of 6. Recipes**

At this step you need to indicate the recipes you want to assign to your virtual server. This step is optional. You can create a virtual server without choosing recipes and add them later if required.

1. Choose a recipe you want to assign to this virtual server by dragging the required recipe to the **Assigned recipes** pane.
2. To add a custom variable, click the “*” button next to the **Custom recipe variables** title bar, then specify variable details:
   - Specify the recipe name and its value.
   - Move the **Enabled** slider to the right to allow use of this variable.
3. Click **Next** to proceed to the next step of the wizard that completes the virtual server creation process.
Step 6 of 6. Confirmation

At this step, configure the automation settings. This is the final step of the virtual server creation wizard.

- Move the **Enable Automated Backup** slider to the right if you want this VS to be backed up automatically (according to the backup settings configured in the Settings/Auto-backup Presets menu)
- Move the **Build Virtual Server** slider to the right if you want the system to automatically build the VS. If you leave this box blank, you will have to build your server manually after it is created.
- Move the **Boot Virtual Server** slider to the right if you want the virtual server to be started up automatically.
- Move the **Enable Autoscale** slider to the right to set autoscaling rules for this VS.

After you set up these parameters, click the **Create Virtual Server** button to start the creation process.

Virtual Server Creation Workflow

The following scheme describes the steps required to create a virtual server:
User wants to create a virtual server

User fills in the VS creation form

Step 1: Cloud Locations
- Choose the country, where the cloud is located
- Specify the city where the cloud is located

Step 2: Templates
- Choose the required OS
- For Windows-based templates, specify the licensing details

Step 3: VS Properties
- Specify the VS label and hostname
- Choose a hypervisor zone and a hypervisor
- Set the password

Step 4: Resources
- Configure RAM, CPU cores, CPU priority or CPU units
- Set the disk space
- Specify network configuration
- OR
  - Choose one of the predefined instance types

Step 5: Recipes
- Choose a recipe
- Assign a custom variable

Step 6: Confirmation
- If required:
  - Enable Automated Backup
  - Build Virtual Server
  - Startup Virtual Server Automatically
  - Enable Autoscale
Edit Virtual Server

The Edit Virtual Server screen will differ depending on the way the VS resources were selected: either manually or using an instance type.

To adjust VS resources:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the server you want to resize, to show its details screen.
3. Click the Tools button and select the Edit VS link.

You can edit resources for all VSs. Depending on the OS it is built on, some VSs can have their CPU and RAM resized without needing to be powered off ("resize without reboot").

Windows virtual servers cannot be resized without reboot.

If the VS template allows resize without reboot, the resize should be completed automatically: you will be returned to the VS details screen and see a message indicating the resize was successful. If the template does not allow this, you will be asked to confirm that the VS will need rebooting so that the resize can take place.

You can also edit the Time Zone parameter for all Windows KVM and Xen virtual servers.

For virtual servers built by selecting resources manually:
- Change CPU cores, CPU priority/units and RAM values.

For virtual servers built using instance types:
- Choose the new instance type for your virtual server. Click the instance type to select it. After that, the instance type you have chosen will be highlighted in green.

Those instance types that have resources incompatible with the compute zone, on which the VS is built, will be greyed out. Greyed out instance types cannot be selected.

You can only choose from those instance types that offer more disk size than the VS currently uses.

After you select a new instance type you can use the extra disk size to create a new disk for the VS or make the existing VS disk larger.

4. Click the Save Virtual Server button.

Rebuild/BUILD Virtual Server Manually

To build/rebuild virtual server build/rebuild virtual server must be enabled. This is a new permission which manages build/rebuild functionality independently from update virtual server permission which used to regulate the build/rebuild options in the previous versions.

If you haven't checked the Build Virtual Server option during the VS creation process, you will have to do this manually after the VS has been
created. Building a virtual server is the process of allocating physical resources to that VS.

To build a virtual server manually or rebuild the VS on the same (or another) template:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you’re interested in.
3. On the screen that appears, click the **Tools** button and then click **Rebuild Virtual Server**.
4. On the screen that pops up, use the drop-down menu to choose a template with which to build the VS.

It is not possible to rebuild a Linux-based virtual server to FreeBSD templates.

5. Move the **Start VS after rebuild** slider to the right if you want to have your VS started automatically after it is built.
6. Select the following options if you selected Windows or Linux
   **Windows**
   - **Windows Licensing type** - KMS, MAK, or OWN
   - **Licensing key** - input license if you selected OWN licensing type
   - **Select Server for KMS licensing type**
7. Click the **Rebuild Virtual Server** button to finish.

After you rebuild your template all data will be lost!

**Migrate Virtual Server**

OnApp allows hot and cold migration of virtual servers between Compute resources that share common data stores (or data store zones). Hot migration means moving virtual servers that are running, while cold migration means moving virtual servers that are shut down.

To check if your Windows template supports hot migration, see [http://templates.repo.onapp.com/Windows_templates.html](http://templates.repo.onapp.com/Windows_templates.html)

To hot migrate a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you want to migrate.
3. Click the **Tools** button and press the **Migrate Virtual Server** link.
4. In the window that appears, choose the target Compute resource from the drop-down menu.
5. Move the **Cold-migrate when hot-migration fails** slider to the right if you want to apply cold migration in case of hot migration failure.
6. Click the **Start Migration** button.

After migration, the power status of your virtual server remains the same as before the migration. If you migrate a virtual server that's running, the whole process is almost unnoticeable.

OnApp administrators can control user access over virtual server migration. Using OnApp permissions, you can allow/forbid users to perform migration of all virtual servers, or their own servers only. This is handled via the Control Panel's **Roles and Sets** menu.

**Autoscale Virtual Server**

VS autoscaling allows you to change the RAM, CPU and disk size settings of a virtual server automatically. VS resources scaling is based on rules you specify. For example, you can set up a rule that will add 1000MB of memory to a VS if RAM usage has been above 90% for the last 10 minutes - but add no more than 5000MB in total in 24 hours. You can set autoscaling down settings alongside with autoscaling up.

- For Linux-based VSs only.
- If the VS is based on a template that allows resizing without reboot - see the **Edit Virtual Server** section – then virtual server RAM and CPU will be increased without rebooting the VS. Disk space autoscaling requires a VS reboot.
- If you autoscale a VS's memory to a value greater than current VS RAM x 16 (which is a max. memory parameter in a configuration file and database), the VS will be rebooted anyway, regardless of the template it is built on.
- Make sure a VS can be reached via SSH. Otherwise, the autoscaling client installation will fail.

To configure autoscaling settings:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the appropriate VS.
3. On the page that follows, click the **Overview** tab, and then click **Autoscaling**.
4. Press the required tab - **Memory Usage, Disk Usage or CPU Usage** - to see the statistics for each type of resources.
5. Below you will see UP and DOWN autoscaling options. Move the slider to the right to add the autoscaling rule or move it to the left to remove the rule.
6. Add autoscaling rules as explained below:

Set autoscale up options:
- If RAM usage is above X% for a specific time period, add Y MB – but no more than Z MB in a 24 hour period.
- If CPU usage is above X% for a specific time period, add Y% - but no more than Z% in a 24 hour period.
- If disk usage is above X% for a specific time period, add Y GB - but no more than Z GB in a 24 hour period.

Set autoscale down options:
- If RAM usage is below X% for a specific time period, remove Y MB.
- If CPU usage is below X% for a specific time period, remove Y%.
- If disk usage is below X% for a specific time period, remove Y GB.

7. Click Apply.

Set VIP Status for Virtual Server

If a Compute resource fails or reboots, the system migrates virtual servers to another Compute resource, one VS at a time. The order VSSs are migrated in is random. However, you can give a virtual server “VIP” status, and this will give that VS priority in the migration queue.

To set or remove VIP status for a VS:
1. Go to your Control Panel's Virtual Servers menu.
2. Use the VIP button next to a required virtual server to change its VIP status.

Segregate Virtual Server

If required, you can instruct OnApp to make sure a VS is never booted on the same Compute resource as another specific VS. This may be important if, for example, you have two name servers or a load balanced web server, and you need to keep VSSs on separate physical servers.

To isolate one VS from another:
1. Go to your Control Panel’s Virtual Servers menu.
2. Click the label of the virtual server you want to segregate.
3. On the screen that appears, click the Tools button, then click Segregate Virtual Server.
4. In the dialogue box that pops up, use the drop-down menu to choose a VS you want to keep away from.
5. Click the Segregate VS button to finish.

Delete Virtual Server

Shut down the virtual server before destroying it. If you are deleting a VS that is running, the VS will be deleted after the time set in Timeout Before Shutting Down VSs configuration parameter.

To remove the virtual server from the cloud:
1. Go to your Control Panel’s Virtual Servers menu.
2. On the screen that appears, you’ll see the list of all virtual servers in the cloud. Click the label of the virtual server you want to delete.
3. On the virtual server's screen, click the Tools button, then select Delete Virtual Server.
4. Move the Move Last Backup to My Templates if it is present slider to the right if you want to save the last VS's backup as a template.
5. Move the Destroy All Existing Backups slider to the right if you want to remove all existing backups of this virtual server.

IMPORTANT:
- You won't be able to restore a virtual server after deleting it.
- Deleting a virtual server removes all data stored on that virtual server. To save the data stored on the virtual server, back up your virtual server and tick the Destroy All Existing Backups box when following the instructions described in this section.
- To delete a virtual server together with its backups, the user needs to have the Destroy any backup or Destroy own backup per mission enabled. Otherwise, the backups of the VS deleted by the user will remain in the system.

Virtual Server Power Options

To manage a virtual server power options:
1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the required virtual server.
Click the **Tools** button on the VS’s screen to expand the **Tools** menu.

**Tools** menu enables you to perform the following power actions on VSs (the exact list shown depends on the VS status):

- **Reboot Virtual Server** - powers off and then restarts the VS.
- **Reboot in Recovery** - powers off and then restarts the VS in the recovery mode.

For VSs with *enabled* encryption the temporary login is “root” and password is “recovery”.

For VSs with password encryption *disabled*, the **VS root password** will be used to reboot in recovery.

Windows virtual servers boot from the Linux-based recovery template in a recovery mode. You need to log in as admin via SSH or VNC console, then mount a Windows system disk manually.

```
You cannot work with the “whole” disk (like `mount -t ntfs-3g /dev/sdb1`) while mounting and checking block devices inside the recovery image, as Windows disk is split into partitions.
```

- **Suspend** - stops a VS, changes its status to suspended and disables all the other actions on VS, unless unsuspended.
- **Shut Down Virtual Server** – pops up a dialogue box, where you can either Shut Down VS (terminates the VS gracefully), or Power Off VS (terminates the VS forcefully).
- **Startup Virtual Server** - queues a start-up action for a VS that's currently powered off.
- **Startup on Recovery** - starts the VS in recovery mode with a temporary login ("root") and password ("recovery").
- **Boot from ISO** - boots the VS from an ISO. You can boot virtual servers from your own ISOS or the ISOS that are uploaded and made publicly available by other users. If you boot a VS from an ISO with the RAM requirement larger than the VS’s RAM, the transaction will fail. Make sure that you have enabled the **Any power action on own virtual servers** and **Allow own virtual servers to boot from ISO** permissions for the user to have access to this feature.

As soon as you boot a VS from the installation ISO, OnApp may lose control of any components (backups, networks, disks) !!! The only available actions will be start and stop a VS. Be aware, that all the contents of the disk may be also deleted.

---

### Virtual Server Administrative Options

To manage a virtual server power options:

1. Go to your Control Panel’s **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Tools** button on the VS’s screen to expand the VS Tools menu.
4. The **Tools** menu enables you to perform the following administrative actions on VSs:

   - **Reset Root Password** - resets the root password for this VS (the password is displayed in VS Information).

#### Particular characters are not allowed for Windows-based virtual servers:

- percent sign [%]
- double quotation marks [“]
- brackets [<,>]
- vertical bar [|]
- caret [^]
- ampersand [&]
- parentheses [(,)]

- **Change Owner** - pops up a dialogue box with a drop-down of all users on the system, enabling you to pass ownership of the VS to the user selected from the list. If you have any recipes or backups for this VS, you will be also prompted to confirm if the recipe/backup should be moved to another user.

Note that you cannot change the ownership of a recipe which you do not own, even if it is assigned to your virtual server.
Set SSH keys – assigns SSH keys of the admin and a VS owner to the VS. If a VS owner does not have any SSH keys, the system will only assign admin keys.

Virtual Server Networks

The Networking menu in the Virtual Servers menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for virtual servers.

Configure Virtual Server Network Interface

The Networking > Network Interfaces menu shows the virtual network interfaces allocated to this VS. Network interfaces join the physical network to the VS.

When you create a VS a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default.

OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a VS's primary network interface.

To see the list of all network interfaces allocated to the VS:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. On the page that follows you will see the following fields:
   - Interface – optional label of the network interface.
   - Network join – name of the network and a Compute resource or Compute zone this network is joined to.
   - Port speed – the speed set to the interface.
   - Primary interface – indication whether the interface is primary or not.

Here you can also view Interface Usage, Edit and Delete network interface (using icon controls) and Add a new network interface using the button at the bottom of the screen.

To add a network interface:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. Click the **Add New Network Interface** button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the Compute resource/Compute zone on which the VS runs).
   - **Port speed** – set port speed in Mbps, or make it unlimited.
6. Click the **Submit** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click **Edit** icon next to the appropriate network interface. After editing the port speed, the virtual server should be power cycled for the change to take effect.

To delete a network interface, click the **Delete** icon next to the interface you want to delete.

### Rebuild Virtual Server Network

To rebuild a network join, added to the virtual server (required after allocating new IP addresses):

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of a required VS.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.
4. In the pop-up window, move the **Force Reboot** slider to the right, then select the VS shutdown type.

During rebuild network, the system tries to reach VS's network interface without rebooting virtual server. Then, if it is not possible, transaction will quit. Force reboot action allows to rebuild VS network with reboot action if live rebuild is impossible. In case the force reboot option is disabled and system can not enter the virtual server, the network rebuild operation will fail.

5. Move the **Required Startup** slider to the right to start up a VS when you're rebuilding network of a powered off VS.
6. Click the **Rebuild Network** button.

In case of network interface replacement for Windows VSs running on Xen Compute resources, the user has to add new network interface, rebuild network, then remove the old network interface and perform network rebuild again.

### Set Virtual Server Firewall Rules

With OnApp you can set firewall rules for the network interfaces of virtual servers. There are two types of firewall rule:

- **ACCEPT** – defines the packets that will be accepted by the firewall
- **DROP** – defines the packets that will be rejected by the firewall

You cannot apply firewall rules to virtual servers which are parts of a blueprint.

To configure a firewall rule:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the VS for which you want to configure a firewall rule.
3. Click the **Networking** tab, then click **Firewall**.
4. On the page that appears, set the following:
   a. Choose the network interface.
   b. Specify if the rule defines requests that should be accepted or dropped.
   c. Set the IP address for which this rule is active.
      - Leave the empty field to apply this rule to all IPs.
• Enter hyphen-separated IPs to apply the rule to an IP range (e.g. 192.168.1.1-192.168.1.10)
• Enter the IPs with slash to apply the rule to CIDR (e.g. 192.168.1.1/24)
• Set the port for which this rule is effective.
  • Leave the empty field to apply the rule to all ports
  • Enter colon-separated ports to apply the rule to a port range (e.g. 1024:1028)
  • Enter comma-separated ports to apply the rule to the list of ports (e.g. 80,443,21)
• Choose the protocol (TCP, UDP or ICMP).

5. Save the rule by clicking the Add Rule button. The rule will be saved in the UI, but the transaction won’t be started until you click the Apply Firewall Rules button.

6. To start the transaction which runs firewall rules for a VS, click Apply firewall rules button.

7. Use Up and Down arrow buttons in the left column to change firewall rule position.

Example:
The Int1 ACCEPT 122.158.111.21 22 TCP firewall rule means that the Int1 network interface will accept all requests and packets addressed from 122.158.111.21 using the TCP protocol on port 22.
The Int2 DROP 122.158.111.21 22 UDP firewall rule means that the Int2 network interface will reject all requests and packets from 122.158.111.21 using the UDP protocol on port 22.

If you reboot a Xen-based VS from the console, the firewall rules for this VS will be lost, and you will need to update the firewall rules again.

Virtual Server IP Addresses

In the Networking -> IP Addresses tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.

To allocate a new IP Address to the VS:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking tab > IP Addresses.
4. Click the Allocate New IP Address Assignment button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the VS will be available). The IP Address will be allocated automatically.

6. (Not available for federated VSs) As an alternative you can manually select an IP address from the IP Pool associated with the network interface. To enable this option move the Specify IP Address slider to the right and choose IP Address from the drop-down list. You may select an IP address that's already assigned to a VS, but only one VS should be online at a time. Use Please show me used IP Pool, Show only my IPs and Show only IPv6 checkboxes to narrow the list of IP in the drop-down list.
7. Click the Add IP Address Assignment button.
8. Click the Rebuild Network button to rebuild the network.

You must rebuild the network after making changes to IP address allocations.

To remove an IP address from a VS:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Networking > IP Addresses tab.
4. Click the Delete icon next to the IP address you want to delete.
5. In the pop up window that appears:
  • Choose Delete with Reboot option if you want to reboot a VS and rebuild the network immediately after deleting the IP address. After choosing the Delete with Reboot option you will be redirected to the VS's Overview page.
  • Choose Delete without Reboot option if you don’t want to reboot a VS. In this case to apply the changes, you will have to the reboot the VS additionally.

You can’t delete an IP address that is in use.

Display Network Speed for Network Interfaces on Virtual Server Page
The main **Virtual Servers** screen displays the network speed of each VS's primary network interface. To see the speed of all interfaces assigned to a VS:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you are interested in.
3. Click the **Networking > Network Interfaces** tab.
4. On the screen that appears, the **Port Speed** column shows the network speed of the network interface.

**Edit Virtual Server Network Speed**

To edit a virtual server's network speed:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you want to change.
3. Go to the **Networking > Network Interfaces** tab.
4. In the **Actions** column click the **Edit** button.
5. Change the port speed.
6. Click the **Submit** button to save changes.

**Virtual Server Disks**

Virtual server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific virtual server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).

You can also utilize incremental backups. For details, see **Virtual Server Backups** section of this guide.

Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual virtual servers are managed through the Control Panel's **Virtual Servers** menu, where you can:

- See the list of disks allocated to this VS
- Add a new disk
- Resize a disk
- Migrate a disk
- Check disk usage statistics (IOPS)
- Delete a disk
- Back up disks
- View disk backup schedules
- Schedule disk for backups

---

Creating multiple partitions on one disk is forbidden for all virtual servers.

**Add Disks to Virtual Servers**

Adding a disk to a virtual server will require that VS should be rebooted. If a VS is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click a VS's label to open its details screen.
3. Click the **Storage** tab -> **Disks**.
4. Click the “+” button or the **Create Disk** button.
5. Fill in the details:

   - Specify disk label.
   - Choose the data store to create a disk on from the drop-down list.
   - Move the slider to the right to specify the desired disk size.
   - Move the **Hot Attach** slider to the right if you want to enable disk hot attaching. In this case virtual server will not be stopped when adding a disk. Hot attach option is only available for KVM 6/ CentOS 6 virtual servers.
   - Move the **Swap Space** slider to the right if this disk is swap space.
   - Move the **Require Format Disk** slider to the right if this disk requires formatting.
   - Move the **Add to Linux FSTAB** slider to the right if the disk should be added to Linux FSTAB (for Linux virtual servers).
   - Specify its mount point. The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed. If the mount point is not specified the default mount point will be used.

The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger than 2 TB.
Tick the **Add to FreeBSD FSTAB** checkbox if the disk should be added to FreeBSD FSTAB (for FreeBSD virtual servers).
- Indicate the **file system** - ext3 or ext4 - for Linux based VS.

6. Click the **Add Disk** button to finish.

**Restrictions:**
- If you choose a Solidfire data store, the minimum disk size will be regulated by Solidfire Data Store Zone settings.
- If virtual server and the control panel server belong to different networks, the hot attach transaction will fail.
- If an additional disk has been created without the **require format disk** option and formatted/partitioned in another way, resize disk action may work incorrectly. Use the **require format disk** option when creating an additional disk, otherwise use disk resize option at your own risk.
- To be able to take incremental backups for virtual server's disk, you must mount this disk to FSTAB (either Linux or FreeBSD) and specify the proper mount point manually.
- You cannot back up Swap disks.
- When you add a new disk to a virtual server, it automatically becomes available to that server.

**Edit Virtual Server Disks**

**Primary and Swap disks**

For primary and swap (Linux, FreeBSD) disks you may only change the label and the size. You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your VS.

To change disk size:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the **Storage** tab -> **Disks**.
4. Click the **Actions** button next to the disk you want to change, then click the **Edit** link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the **Save Disk** button.

- You cannot decrease size of Integrated Storage data store disks.
- You cannot decrease disk size for Windows-based and FreeBSD-based virtual servers. Only the increase disk size option is available.
- You cannot resize the primary disk for FreeBSD-based virtual servers.
- Decreasing disk size for Linux-based virtual servers may lead to filesystem inconsistencies. Make sure you have current backups before proceeding.

**New disks**

For new disks - those which were added after the virtual server was created - you can edit the following:

<table>
<thead>
<tr>
<th>Linux</th>
<th>Windows</th>
<th>FreeBSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>Label</td>
<td>Label</td>
</tr>
<tr>
<td>Size</td>
<td>Size</td>
<td>Size</td>
</tr>
<tr>
<td>Require format</td>
<td>Require format</td>
<td>Require format</td>
</tr>
<tr>
<td>Add to Linux fstab</td>
<td>Add to FreeBSD fstab</td>
<td></td>
</tr>
<tr>
<td>Mount point</td>
<td>Mount point</td>
<td></td>
</tr>
<tr>
<td>File system</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Migrate Virtual Server Disks

You can migrate disks of your virtual servers to other data stores, which are allocated to the same Compute resource. Unlike VS migration – disk migration requires reboot of the VS (despite the template it is based on).

To migrate a disk:

1. Go to your Control Panel's Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage tab >> Disks.
4. Click the Actions button next to the disk you want to move to another data store, then click the Migrate button.
5. On the screen that appears, select a target data store from a drop-down box.
6. Click Start Migrate.

- You can only migrate disks to data stores in data store zones assigned to your billing plan.
- You cannot migrate a disk to a data store with less capacity than the disk size.
- Thin provisioning disks become thick provisioned after a disk migration. For example, if you use thin storage and move a 850GB disk between aggregates with 10GB actual usage, the 'dd' image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero 'd space which may not be able to be recovered.

Delete Virtual Server Disks

To delete a disk:

1. Go to your Control Panel's Virtual Servers menu.
2. Make sure your virtual server is powered off, then click its label to open its details screen.
3. Click the Storage >> Disks tab.
4. Click the Actions button next to the disk you want to delete, then click Delete.
5. In the pop-up window, move the Force Reboot slider to the right, then select the VS shutdown type.
6. Move the Required Startup slider to the right to start up the VS automatically after the network is rebuilt.

Steps 5 and 6 apply to disks of VSs that are on.

7. Click the Destroy Disk button.

This will schedule the "destroy disk" transaction.

Virtual Server Backups

Backups are used for copying and archiving target data (target is either a disk or a virtual server as a single whole of all disks used).

- Images menu lists normal backups of a virtual server
- Files menu list virtual server's incremental backups
- Schedules menu allows you to schedule automatic backups for virtual server. See Schedules Settings section of this guide for details.
OnApp supports two backup types: normal and incremental:

- **Normal** - simple method of taking backups by making full copy of target data and storing it in an archive.

  Ensure that you do not use XFS or other filesystems not supported by OnApp for Linux backups as OnApp will address them as ext3/4 filesystems.

- **Incremental** - advanced method of taking backups. During the incremental backup, only the changes made after the last backup are archived instead of backing up the whole target. You must have dedicated backup servers configured in your cloud to be able to utilize the incremental backups functionality. Incremental backups are enabled via Settings > Configuration > Backups/Templates menu.

  It is not possible to take incremental backups if you are using location group functionality without a backup server added to the group - the following error message will appear:

  "Backup cannot be made at this time: This disk cannot be backed up, check Location Group settings."

  This issue will be fixed in next releases. As a workaround, add an empty backup server zone to your location group.

Each backup type can be taken in two ways:

- **Manually** - the user logs into OnApp CP and clicks the "Take backup" button.
- **Automatically** - the user enables backup schedule (daily, weekly, monthly, yearly). To enable auto-backups for virtual servers that support incremental backups which used auto-backups option before the upgrade, re-enable automatic backups by switching them off and on again.

  If you are using incremental backups option, you should either enable dedicated backup servers in your cloud or share the backups and templates folders (paths) between your Compute resources. SSH file transfer option will be skipped for virtual servers using incremental backups. Existing full backups will be still accessible via Backups > Images menu.

How do incremental backups work?

For example, we have a disk with three files:

- File1 - 4Gb
- File2 - 2Gb
- File3 - 3Gb

The first incremental backup will be 9 GB (sum of all files). If you decide to take another incremental backup soon thereafter, the backup size will be equal to 0, as the files have not been changed since the first backup (if your backup has complicated directory structure, it could be more than 0, as file system could store some system data).

Then:

- If the user decides to delete File2, the target size will now be 7Gb. The subsequent incremental backup size will be 0, as new data has not been added.
- If the user adds File4 of 4 GB size, the subsequent incremental backup will equal 4 GB (the size of new data added).
- If the user increases File3 disk size to 6 GB, the subsequent incremental backup size will equal 6 GB, although the target is increased by 3 GB. This happens because the incremental system takes the update of the existing file as the deletion of the existing file and adding the new file with the same name (the first version of File3 has been deleted and the new one with 6GB size has been added).

Backups can be saved either to a Compute resource or to a dedicated backup server. When saving a backup, the system calculates if user has enough physical/billing plan resources to save a backup in the selected destination.

When saving a backup to a Compute resource, the system does not check if Compute resource has enough disk space to save a backup and only checks if user has enough billing plan limits.

When saving a backup to a dedicated backup server, the system checks both disk space and billing plan limits.

Free disk size on a target must be at least equal to the disk’s size for which the backup is taken (or to a size of all VS disk for incremental backup). In some cases (for example, if a user has scheduled several disk backups simultaneously but there’s only free space/billing limits for the first one) the system may allow taking all the backups but will not be able to save them. This will result in a system error and over-billing.

**Backup Support by VM / Virtualization / OS**
<table>
<thead>
<tr>
<th>System Type</th>
<th>Normal backup</th>
<th>Incremental backup</th>
<th>Convert to template</th>
</tr>
</thead>
<tbody>
<tr>
<td>BaremetalServer</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>EdgeServer</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>StorageServer</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>LoadBalancer</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>SmartServer</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>KVM, XEN</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>VMware</td>
<td>snapshot</td>
<td>no</td>
<td>no</td>
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<td>Windows</td>
<td>yes</td>
<td>no</td>
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<td>yes</td>
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</tr>
<tr>
<td>CloudBoot / IS</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>SolidFire</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

View Virtual Server Backups

To view the list of virtual server's backups:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, you'll see a list of virtual server backups sorted by category.
5. Click the label of the required virtual server backup to see the following tools - restore backup, delete backup, convert it to template and add/edit note:

Take Virtual Server Backup

To take an incremental backup:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the server you want to back up.
3. Click the Backups tab, then select Files. You'll see a list of the disks allocated to that virtual server.
4. Click the Actions icon next to a disk you want to take a backup of, then click Backup. You'll see a list of all the backups taken and pending for that virtual server sorted by category.
5. To take a backup, click the Take a Backup button at the end of the list.

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a virtual server. To view the list of user backups, refer to View User Backups section.

Template extraction is performed during server provisioning or taking a backup when using a particular template. To prevent template from being used in other transactions during extraction, template is locked during the extraction and unlocked on accomplishment. If
other transaction tries to use the locked template, it will fail after 5 minutes of standby. Transaction which locked template and failed, means that extracted template is broken.

Storing scheme:
- template /onapp/templates/your_template.tgz
- extracted template /onapp/backups/templates/your_template
- locked template /onapp/backups/templates/your_template.lock

### Take Virtual Server Disk Backup

To back up a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the server you want to back up.
3. Click the **Storage tab** -> **Disks**. You'll see a list of the disks allocated to that virtual server.
4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You'll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.
   - To make a backup, click the **Take a Backup** button at the end of the list. You may add a note and also **Force Windows Backup**.

   This option for Windows virtual servers is designed as a last resort, when the backup cannot be taken due to NTFS file system problems. Switching this option will bring up a dialog box with the following message: "If you enable this option there is no guarantee that backup will be consistent."

   Select "Yes" to proceed.

   - To restore a backup, click the **Restore** link next to the backup you want to revert to.
   - To convert a backup into the custom template, click **Convert to Template** link next to the backup (see **Create custom templates**).

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a virtual server. To view the list of user backups, refer to **View User Backups** section.

### Convert Virtual Server Backup to Template

To convert virtual server backup to template:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the **Actions** icon next to the backup and choose the **Convert to Template** (see **Create custom templates**).

### Restore Virtual Server Backup

To restore a backup:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the required virtual server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the **Actions** icon next to the backup you want to revert to and choose **Restore**.

### Delete Virtual Server Backup
To delete a backup:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to remove and choose Delete.

Add Virtual Server Backup Note

To edit virtual server backup's note:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the required virtual server.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions icon next to the required backup and choose Add Note. Make necessary changes and click Submit.

Virtual Server Backup Schedules

Schedules screen lists virtual servers' scheduled backup. Depending on the backup type set in your cloud settings, schedules are created either per virtual server or per disk. To view all backup schedules in the cloud, see Schedules Settings.

View Virtual Server Backup Schedules

To view the list of backup schedules for a particular virtual server:

If normal backup options is selected for the cloud:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that appears, you will see the list of backup schedules along with their details:
   - Date - time when the schedule was created
   - Target - server or disk for which the schedule was created (depending on the backup type)
   - Action - scheduled action
   - Frequency - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years
   - Rotation period - number of backups after which the first backup will be deleted
   - Next Start - the date and the hour of the next backup
   - User - user who created the backup schedule
   - Status - schedule status

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

If incremental backup option is selected for the cloud

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules along with their details:
   - Date - time when the schedule was created
   - Target - server or disk for which the schedule was created (depending on the backup type)
   - Action - scheduled action
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years
   - Rotation period - number of backups after which the first backup will be deleted
Create Virtual Server Backup Schedule

In addition to the system auto-backup presets, you can schedule backups of virtual servers (VS disks) as required. For example, you can set up a schedule to back up your disks once a week.

The combination of Scheduled VS backups and Auto-backup Presets provides a great deal of flexibility in the way backups are handled for the cloud, and for individual VSs. Auto-backup Presets can be applied to all new VSs added to the cloud. Scheduled VS backups enable specific backups to be scheduled for individual VSs, outside of the auto-backup pattern.

Depending on your cloud settings, you can schedule either normal or incremental backup schedules:

- Adding normal backup schedule
- Adding incremental backup schedule

Adding a normal backup schedule

To add a normal backup schedule:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that follows, click the New Schedule button.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.
   - Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
7. Click the Save button to finish.

Adding an incremental backup schedule

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you want to schedule a backup for.
3. Click the Storage tab, then choose Schedules, or click Auto-backups under the Options menu to view incremental backup schedules only.
4. Click the New Schedule button.
5. On the screen that appears, specify new schedule's details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.
   - Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
6. Click the Save button to finish.

Edit Virtual Server Backup Schedule

To edit a normal backup schedule:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. Click the Edit icon next to a schedule to change its details.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of
days will take a backup every 2 days

- **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
- **Rotation period** - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

- **Enabled** - move the slider to enable or disable the schedule

7. Click the Save button to finish.

To edit an incremental backup schedule:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options menu to view incremental backup schedules only.
4. Click the Edit icon next to a schedule to change its details:

- **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
- **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
- **Rotation period** - number of backups after which the first backup will be deleted. This parameter is for incremental backup schedules only.
- **Enabled** - move the slider to enable or disable the schedule

5. Click the Save button to save your changes.

Delete Virtual Server Backup Schedule

To delete a normal backup schedule:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk with a backup schedule, then select Schedule for Backups.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

To delete an incremental backup schedule:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

Virtual Server Statistics

For your convenience, the system tracks VS performance and generates statistics on:

- Virtual Server CPU Utilization
- VS Billing statistics
- Interface Usage
- Virtual Server Disk IOPS Statistics

Virtual Server CPU Utilization

OnApp tracks CPU usage for virtual servers and generates charts that help analyze VS performance. The charts show the total CPU usage for all the cores of this particular VS for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Overview tab > CPU Usage.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there less data available, the chart will show utilization for the time available.
5. Move the Show in My Timezone slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.

---

**Virtual Server Billing Statistics**

OnApp has a record of all the charges applied to your VSs for the last three month period. If a virtual server was created less than three months ago, statistics are recorded for the VS's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Overview -> Billing Statistics** tab.
4. Set Start and End time. By default the statistics are generated for the last three months or the actual VS existence period.
5. Move the **Show in my Timezone** slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. On the page that appears:
   - **Date** – particular date and time for the generated statistics
   - **Users** – the virtual server owner. Click the owner name to see the User Profile (user details)
   - **Virtual Servers** – the virtual server name with the total due for VS resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - **Network Interfaces Usage** – the total due for the network interfaces used by this VS for the point of time specified in the Date column. Click the network interface name to see its details.
   - **Disks Usage** – the list of disks assigned to this VS with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
   - **Costs** – the total due for the Virtual Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

**Virtual Server Network Interface Statistics**

OnApp tracks network usage for virtual servers and generates charts that help analyze network performance. To see network utilization statistics for a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Networking -> Network Interfaces** tab.
4. Click the **Statistics** (chart) icon next to the network you're interested in.
5. On the screen that appears, the top chart shows bandwidth usage for the last 24 hours. The bottom chart shows usage for the last three months.
6. To zoom into a time period, click and drag in a chart. Click the **Reset zoom** button to zoom out again.

**Virtual Server Disk IOPS Statistics**

The system tracks IOPS (Input/Output Operations per Second) for virtual servers and generates charts that help analyze VS disk performance. To see IOPS for a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. Click the **Storage -> Disks** tab.
4. Click the **Actions** button next to the required disk, and then choose **IOPS**.
5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read for the last 24 hours
   - Data written/read for the last hour

6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

**Virtual Server Integrated Console**

OnApp includes an integrated VNC console that gives users direct access to their virtual servers through the OnApp Control Panel, if their user role permits. Administrators can access all virtual server consoles for support and troubleshooting purposes. The console connects the user's browser to the VNC port made available via the Compute resource for the guest console. Both the administrator and the end user web UIs offer a console connection, regardless of the OS.

To access the virtual server VNC console via the control panel interface:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. On the screen that appears, click the **Console** button in the upper menu.

For HTML5 console, use the Re-connect button if the connection got lost:

- If console running in normal state, pressing re-connect button will cause disconnect, and it will be re-connected automatically after 1.5 seconds.
- If console got stuck, pressing re-connect button will send all the information once again and will re-connect without page reload.
- If console got disconnected with any status code, and red lane with error message revealed, it will be re-connected automatically after 1.5 seconds.

To switch from HTML5 to Java console, go to **Settings > Configuration** menu.

**Virtual Server Transactions and Logs**

The system records a detailed log of all the transactions happening to your virtual servers. The list of transactions logged by the system includes:

- Provision virtual server
- Startup virtual server
- Stop virtual server
- Resize virtual server without reboot
- Configure Operating System
- Build disk
- Resize disk
- Format disk
- Destroy disk
- Take backup
- Convert backup
- Restore backup
- Destroy backups
- Destroy virtual server
- Destroy template
- Download template
- Update firewall

To view transactions for a virtual server:

1. Go to your Control Panel's **Virtual Servers** menu.
2. Click the label of the virtual server you're interested in.
3. The details screen for that virtual server shows recent transactions in the **Activity Log** section.

To cancel pending tasks, click the **Cancel All Pending Tasks for this virtual server** button.

You can also view the details of a particular log item by clicking its Ref number. The page that loads shows the log output and the following
Virtual Server Recipes

To manage virtual server recipes:

1. Go to your Control Panel's Virtual Servers menu.
2. Click the label of the server you're interested in.
3. Click the Overview tab, then choose Recipes.
4. The screen that follows shows details of all the recipes in the cloud:
   - The left pane shows the list of available recipes organized into recipe groups.
   - The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

Assign recipe

Use drag and drop feature to assign recipe to a desired event.

You can assign virtual server recipes to the following events:
- **VM provisioning** - run the recipe during VM provisioning
- **VM network rebuild** - run the recipe when rebuilding a network
- **VM disk added** - run the recipe when adding a disk
- **VM network interface added** - run the recipe when adding a network interface
- **VM disk resized** - run the recipe when resizing a VM disk
- **VM resize** - run the recipe when resizing a VM

To use drag and drop:

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

Remove recipe

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

Virtual Server Recipe Custom Variables

You can define custom variables for particular virtual servers. Each custom variable is a name-value set that can be used during the virtual server recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the virtual server creation or via the virtual server Overview menu.

To create a new custom variable:

1. Go to your Control Panel's Virtual Servers menu.
2. You'll see a list of all virtual servers in your cloud. Click the name of a virtual server for which you want to create a variable.
3. On the virtual server details screen, click the Overview tab, then choose Recipes Variables.
4. On the screen that appears, click the "+" button.
5. Specify the recipe name and its value.
6. Move the Enabled slider to the right to allow use of this recipe.
7. Click Save.

To edit a custom variable, click the Edit icon next to the required variable and change its details.

To delete a custom variable, click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for virtual servers. Note: virtual server custom variables will always overlay template custom variables.
Smart Servers

Smart servers are dedicated entities based on KVM CloudBoot Compute resources with passthrough enabled. Smart servers are created and managed exactly the same as virtual servers, the only difference is that only one smart server can be created per Compute resource. Using a smart server feature, you can create and manage servers on smart appliances with passthrough enabled. You can set the minimum specifications for the smart servers (minimum size, resource price, etc) in the same way as for virtual servers.

Smart servers can be organized into zones to create different tiers of service - for example, by setting up different zones for smart appliances, with limits and prices specified per zone. Smart Compute zones can also be used to create private clouds for specific users.

Smart servers required IOMMU support:
- Intel-based Servers => Vt-d
- AMD-based servers => AMD-Vi

Smart servers are based on templates and are deployed on Compute resources. Compute resources give them access to CPU, disk and network resources. OnApp Cloud gives you high-end cloud management features including:

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The following options are not available for smart servers:
- hot migration
- segregation
- VIP status
- firewall rules
- Network interface statistics
- Edit network speed

Also, VLANs are not configured automatically on smart servers. You need to configure them manually in accordance with your OS and hardware settings.

- smart servers support LVM and integrated storage types.
- the Passthrough to Guest must be enabled for one of the smart server’s network interfaces.
- all conventional PCI devices behind a PCIe-to PCI/PCI-X bridge or conventional PCI bridge can only be collectively assigned to the same guest. PCIe devices do not have this restriction.
- limits and prices are specified individually for each smart appliance zone assigned to the billing plan.

If the smart Compute resource (where the smart server will be deployed) has a NIC device that features multiple ports, make sure the appliance NIC can perform a FLR reset:
1. Log in as root to a Compute resource where it is deployed
2. Run the following command:
   
   # lspci -vv|egrep "Ethernet|FLR" --color-always
   
   If it returns the FLReset- you need to install another NIC if possible. If not - the smart server cannot be deployed on this Compute resource.

View Smart Servers

To view the list of smart servers deployed in the cloud:
1. Go to your Control Panel's **Smart Servers** menu to see an overview of all smart servers in the cloud with their details:
   - OS
   - Label
   - IP addresses
   - Disk size
   - RAM
   - CPU cores
   - CPU priority
   - Backups
   - Power status

2. Click the **Actions** button next to the server for the quick access to the list of available actions (the list of actions displayed depends on the server status).
3. To change the smart server power status, click the required status icon.
4. To **view a particular smart server details**, click the label of a required server.
5. To add a new smart server, press "+" or click the **Add New Smart Server** button.

### View Smart Server Details

To view details of a specific server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the smart server you're interested in.
3. The screen that appears loads the **Smart server properties**, **notes**, **activity log** and **tools for managing** your smart server.

#### Smart Server Properties

Smart server properties page gives general overview of the smart server details:

- Template this smart server is built on
- Power status & On/Off/Reboot buttons.

   **Clicking the OFF button performs graceful shutdown and then powers off the virtual server after the timeout set in Configuration settings.**

- Hostname
- Smart Compute resource
- Login credentials
- Owner
- Price per hour

   **Please pay attention that when you resize a smart server or change its pricing in the billing plan, the change is not applied immediately. It takes about 5 minutes to take effect. Meanwhile, a loading spinner is showing next to the price.**

- Memory
- CPU(s)
- CPU priority
- Disk Size
- Disk backups
- Network Speed
- IP Addresses
- Auto-backups
- Notes
- Activity log

   **Autoscaling and VIP status options are not available for smart servers.**

### Notes

The Notes section lists brief comments or reminders for a Smart server. You can add either Admin's or User's notes. The Admin's note will be available to cloud administrators. Click the **Actions** button in the Notes section of the page to add admin's or user's note.

### Smart Server Management

- Click the **Tools** button to expand the Tools menu with the Smart Server management options.
Create Smart Server

You need to add and configure a smart Cloudbot Compute resource before you can create a smart server. See the Create Cloudbot Compute Resource section for details.

To create a smart server:

1. Go to your Control Panel's Smart Servers menu.
2. On the screen that appears, press "+" button or click the Add New Smart Server button underneath the list of servers on the screen.
3. Complete the smart server creation form.

On this page:

- Step 1 of 5. Templates
- Step 2 of 5. Properties
- Step 3 of 5. Resources
- Step 4 of 5. Recipes
- Step 5. Confirmation

It is possible to deploy Windows smart servers without running sysprep. To do so, you need to disable the Run Sysprep option for the Compute zone where the smart server will be built. See Create Compute Zone section for details. When provisioning smart server with simple deploy option, make sure that the template you use has all the necessary drivers inside it, otherwise the smart server network settings will not be configured.

Before creating a Windows-based smart server, make sure that the appropriate drivers were added to the /data folder on CP.

Step 2 of 5. Properties

- **Label** - choose a label for the Smart Server.
- **Hostname** - choose a hostname for the Smart Server. The hostname may consist of letters [A-Z a-z], digits [0-9] and dash [-].
- **Time zone** - set the time zone set for the smart server. This parameter is applicable only to Windows smart servers.
- **Compute Zone** - choose a smart Compute zone to build the smart server on.
- **Compute resource** - choose a specific smart Compute resource to reside the smart server on. Please note: you can only reside your smart server on cloud booted KVM Compute resources.
- **Password** - Give your smart server a secure password.
- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.
- **Click Next**.

Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows smart server manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a smart server after starting it if time synchronization is not completed for some reason.

Step 3 of 5. Resources
Set the resources needed for this smart server:

- **RAM** - set the amount of virtual server’s RAM.
- **CPU Cores** - set the amount of virtual server’s CPU cores. For KVM Compute resources, this parameter sets CPU sockets by default, unless CPU topology is enabled.
- The following options are available for smart servers based on KVM Compute resources only, providing the *Enable CPU topology permission* is switched on for the user.
  - **Use CPU Topology** - move the slider to the right, to set the following parameters:
    - **CPU Sockets** - set the amount of sockets.
    - **CPU Threads** - set the amount of threads per core.
- **Data Store Zone** - choose a data store zone for the smart server’s primary disk.
- **Primary disk size** - set the primary disk size.
- **Data Store Zone** - choose a data store zone for this server’s swap disk.
- **Swap disk size** - set the swap disk size.
- **Network Zone** - choose a network zone from the drop-down box.
- **Show only my IP addresses** - if the option is available, you can also assign an IP address for the smart server.
- **Selected IP address** - IP address for this smart server.
- **Click Next**.

**CPU topology (CPU sockets and CPU threads) is the Labs feature preview. Pay attention that setting CPU sockets and CPU threads are at your own risk only!**

You may face the following problems when setting CPU topology:

1. Currently you cannot set CPU sockets and threads parameters for existing smart servers.
2. After setting, the new parameters won't be shown at the smart servers details screen.
3. Some Linux VSs fail to boot up.
4. When socket s and threads are set incorrectly, you may face huge load on Compute resource’s under CentOS 5.x.

---

**Step 4 of 5. Recipes**

1. Choose a recipe you want to assign to this smart server by dragging the required recipe from the *Available recipes* pane to the *Assigned for provisioning* pane.
2. To add a custom variable, click the "+" button next to the *Custom recipe variables* title bar, then specify the variable details:
   - Specify the recipe name and its value.
   - Move the *Enabled* slider to the right to allow the use of this variable.
3. **Click Next**.

---

**Step 5. Confirmation**

- **Move the Enable Automated Backup slider to the right if you want this server to be backed up automatically (according to the backup settings configured in the Settings/Auto-backup Presets menu)**
- **Move the Build Smart Server slider to the right if you want the system to automatically build the server. If you leave this box blank, you will have to build your server manually after it is created.**
- **Move the Boot Smart Server slider to the right if you want the server to be started up automatically.** Move the *Enable Autoscale* slider to the right to set autoscaling rules for this smart server.

Click **Submit** button. The smart server will be added to the system. You can view it under the **Smart Servers** menu.
Smart Server Creation Workflow

The following scheme describes the steps required to create a smart server:
Rebuild/Build Smart Server Manually

To build/rebuild virtual server build/rebuild virtual server must be enabled. This is a new permission which manages build/rebuild functionality independently from update virtual server permission which used to regulate the build/rebuild options in the previous
If you haven't checked the Build Smart Server option during the smart server creation process, you will have to do this manually after the SS has been created. Building a smart server is the process of allocating physical resources to that smart server.

To build a smart server manually or rebuild the server on the same (or another) template:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the server you're interested in.
3. On the screen that appears, click the Tools button and then click Rebuild Smart Server.
4. On the screen that pops up, use the drop-down menu to choose a template with which to build the server.
5. Move the Start VS after rebuild slider to the right if you want to have your server started automatically after it is built.
6. Click the Rebuild Virtual Server button to finish.

After you rebuild your template all data will be lost!

Edit Smart Server

To edit smart Compute resource settings:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the server you want to edit.
3. Click the Tools button and select the Edit smart server link. You can edit the label, pricing, CPU, RAM, CPU priority resources for all smart servers. You can also edit the time zone for Windows smart servers.

After you edit the server's time zone, you need to stop and then start up the smart server.

Currently, the time zone is set at the Compute resource side only. Therefore, users need to set the target time zone inside a Windows smart server manually. Setting correct time zone at the Compute resource side helps to keep correct time inside a smart server after starting it if time synchronization is not completed for some reason.

Depending on the OS it is built on, some smart servers can have their CPU and RAM resized without needing to be powered off (“resize without reboot”).

4. Click the Save button to save your changes.

If the smart server template allows resize without reboot, the resize should be completed automatically: you will be returned to the server details screen and see a message indicating the resize was successful. If the template does not allow this, you will be asked to confirm that the smart server will need rebooting so that the resize can take place.

Delete Smart Server

Shut down the smart server before destroying it. If you are deleting a smart server that is running, the server will be deleted after the time set in Timeout Before Shutting Down configuration parameter.

To remove the smart server from the cloud:

1. Go to your Control Panel's Smart Servers menu.
2. On the screen that appears, you'll see the list of all servers in the cloud. Click the label of the smart server you want to delete.
3. On the server screen, click the Tools button, then select Delete Smart Server.
4. Confirm the deletion.

Autoscale Smart Server

Smart server autoscaling allows you to change the RAM, CPU and disk size settings of a smart server automatically. Smart server resources scaling is based on rules you specify. For example, you can set up a rule that will add 1000MB of memory to a smart server if RAM usage has been above 90% for the last 10 minutes - but add no more than 5000MB in total in 24 hours. You can set autoscaling down settings alongside with autoscaling up.

- For Linux-based smart servers only.
- If the smart server is based on a template that allows resizing without reboot - see the Edit smart server section – then smart server RAM and CPU will be increased without rebooting the server. Disk space autoscaling requires a smart server reboot.
- If you autoscale a smart server's memory to a value greater than current smart server RAM x 16 (which is a max_memory parameter in a configuration file and database), the smart server will be rebooted anyway, regardless of the template it is built on.
To configure autoscaling settings:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the appropriate smart server.
3. On the page that follows, click the **Overview** tab, and then click **Autoscaling**.
4. Press the required tab to set the autoscaling options for: **Memory Usage, Disk Usage or CPU Usage**.
5. Add autoscaling rules as explained below:

   **Set autoscale up options:**
   - If RAM usage is above X% for a specific time period, add Y MB – but no more than Z MB in a 24 hour period.
   - If CPU usage is above X% for a specific time period, add Y% - but no more than Z% in a 24 hour period.
   - If disk usage is above X% for a specific time period, add Y GB - but no more than Z GB in a 24 hour period.
   - Move the **Allow decreasing** slider to the right to enable autoscaling down

   **Set autoscale down options:**
   - If RAM usage is below X% for a specific time period, remove Y MB – but no more than Z MB in a 24 hour period.
   - If CPU usage is below X% for a specific time period, remove Y% - but no more than Z% in a 24 hour period.
   - If disk usage is below X% for a specific time period, remove Y GB - but no more than Z GB in a 24 hour period.
   - Move the **Allow decreasing** slider to the right to enable autoscaling down.
6. Click **Apply**.

To delete an autoscaling rule:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the appropriate smart server.
3. On the page that follows, click the **Overview** tab, and then click **Autoscaling**.
4. Click **Delete**. This will delete all autoscaling rules.

---

**Migrate Smart Server**

To migrate Smart Servers between different Compute resources the network interface configuration of those Compute resources should be identical.

OnApp allows cold migration of smart servers between hosts that share common data stores (or data store zones). Cold migration means moving smart servers that are shut down.

To migrate a smart server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Shut down the smart server you want to migrate.
3. Click the **Tools** button and press the **Migrate Smart Server** link.
4. In the window that appears, choose the target smart server from the drop-down menu.
5. Click the **Start Migration** button.

OnApp administrators can control user access over smart server migration. Using OnApp permissions, you can allow/forbid users to perform migration of all smart servers, or their own servers only. This is handled in the Control Panel's **Roles and Sets** menu.

**Smart Server Power Options**

To manage a smart server power options:

1. Go to your Control Panel's **Smart Server** menu.
2. Click the label of the smart server in question.
3. Click the **Tools** button on the Smart server’s screen to expand the Tools menu.
4. The **Tools** menu enables you to perform the following power actions on smart servers (the exact list shown depends on the smart server status):
   - **Reboot Smart Server** - powers off and then restarts the smart server.
   - **Reboot in Recovery** - powers off and then restarts the Smart Server Recovery mode with a temporary login (“root”) and password (“recovery”) for servers where password encryption is enabled. For servers with password encryption disabled, the root password will be used to reboot in recovery.
Windows smart servers boot from the Linux-based recovery template in a recovery mode. You need to log in as admin via SSH or VNC console, then mount a Windows system disk manually.

You cannot work with the "whole" disk (like `mount -t ntfs-3g /dev/sdb1`) while mounting and checking block devices inside the recovery image, as Windows disk is split into partitions.

- **Suspend Smart Server** - stops a smart server, changes its status to suspended and disables all the other actions on SS, unless unsuspended.
- **Shut Down Smart Server** – pops up a dialog box, where you can either Shut Down SS (terminates the SS gracefully), or Power Off SS (terminates the SS forcefully).
- **Startup Smart Server** - queues a start-up action for a SS that's currently powered off.
- **Startup on Recovery** - starts the SS in recovery mode with a temporary login ("root") and password ("recovery").
- **Boot from ISO** - boots the VS from an ISO. You can boot virtual servers from your own ISOs or the ISOs that are uploaded and made publicly available by other users.

If you boot a VS from an ISO with the RAM requirement larger than the VS's RAM, the transaction will fail. Make sure that you have enabled the **Any power action on own virtual servers** and **Allow own virtual servers to boot from ISO permissions** for the user to have access to this feature.

As soon as you boot a VS from the ISO, OnApp cannot control any components (backups, networks, disks) !!! The only available actions will be start and stop a VS. Be aware, that all the contents of the disk will be deleted.

---

**Smart Server Administrative Options**

To manage a smart server power options:

1. Go to your Control Panel's **Smart Server** menu.
2. Click the label of the smart server in question.
3. Click the **Tools** button on the smart server's screen to expand the Tools menu.
4. The **Tools** menu enables you to perform the following administrative actions on smart servers:
   - **Reset Root Password** - resets the root password for this SS (the password is displayed in SS Information).
   - **Change Owner** - pops up a dialogue box with a drop-down of all users on the system, enabling you to pass ownership of the SS to the user selected from the list.
   - **Set SSH keys** - assigns SSH keys of the admin and a SS owner to the SS. If a SS owner does not have any SSH keys, the system will only assign admin keys.

---

**Smart Server Networks**

The Networking menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for smart servers.

**Configure Smart Server Network Interfaces**

The Networking -> Network Interfaces menu shows the virtual network interfaces allocated to the smart server. Network interfaces join the physical network to the smart server.

When you create a smart server, a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default.

OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a smart server primary network interface.

To see the list of all network interfaces allocated to the smart server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the smart server you're interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. On the page that follows you will see the following fields:
   - **Interface** – optional label of the network interface.
   - **Network join** – name of the network and a Compute resource or Compute zone this network is joined to.
   - **Port speed** – the speed set to the interface.
   - **Primary interface** – indication whether the interface is primary or not.

Here you can edit and delete network interfaces (using icon controls) and add a new network interface using the button at the bottom of the screen.

To add a network interface:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the smart server you're interested in.
3. Click the **Networking** tab, then click **Network Interfaces**.
4. Click the **Add New Network Interface** button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the Compute resource/Compute zone on which the smart server runs).
6. Click the **Submit** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click the **Edit** icon next to the appropriate network interface. After editing the port speed, the smart server should be power cycled for the change to take effect.

To delete a network interface, click the **Delete** icon next to the interface you want to delete.

---

**To run the smart server, at least one network interface with an assigned IP address (or addresses) is required!**

To allocate another physical network, add a new network interface.

---

**Rebuild Smart Server Network**

To rebuild a network join, added to the smart server (required after allocating new IP addresses):

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the required smart server.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.
4. In the pop-up window, move the **Force Reboot** slider to the right, then select the smart server shutdown type:
   - Power OFF smart server
   - Shutdown smart server
   - Gracefully shutdown smart server

   Smart servers are rebooted by default after rebuilding the network.

5. Move the **Required Startup** slider to the right to start up the smart server automatically after the network is rebuilt.

6. Click the **Rebuild Network** button.

---

**Allocate/Remove Smart Server IP Addresses**

In the **Networking -> IP Addresses** tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network. To allocate a new IP Address to the smart server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Networking** tab, then click **IP Addresses**.
4. Click the **Allocate New IP Address Assignment** button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the smart server will be available)
6. Select an IP address from the IP Pool associated with the network interface.
7. Click the **Add IP Address Assignment** button.
8. Click the **Rebuild Network** button to rebuild the network.

   You must rebuild the network after making changes to IP address allocations.

To remove an IP address from a smart server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Networking -> IP Addresses** tab.
4. Click the **Delete** icon next to the IP address you want to delete.
5. In the pop-up window that appears:
   - Choose **Delete and rebuild the network** option if you want to reboot a smart server and rebuild the network immediately after deleting the IP address. After choosing the **Delete and rebuild the network** option you will be redirected to the smart server **Overview** page.
   - Choose **Delete without rebuilding the network** option if you don't want to reboot a smart server. In this case to apply the changes, you will have to reboot the smart server additionally.

   You can't delete an IP address that is in use.
Display Network Speed for Network Interfaces on Smart Server Page

The main Smart Servers screen displays the network speed of each smart server primary network interface. To see the speed of all interfaces assigned to a smart server:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the smart server you are interested in.
3. Click the Networking > Network Interfaces tab.
4. On the screen that appears, the Port Speed column shows the network speed of the network interface.

Smart Server Disks

Smart server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific smart server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).

It is possible to use incremental backups. For details, see Smart Server Backups section of this guide. Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual smart servers are managed through the Control Panel's Smart Servers menu, where you can:

- See the list of disks allocated to this Smart Server
- Add a new disk
- Resize a disk
- Migrate a disk
- Set backup schedules
- Delete a disk
- Back up disks
- View disk backup schedules

PLEASE NOTE: Creating multiple partitions on one disk is forbidden for Windows-based virtual servers.

Add Disks to Smart Server

Adding a disk to a smart server will require that server to be rebooted. If a smart server is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to a smart server:

1. Go to your Control Panel's Smart Servers menu.
2. Click a smart server label to open its details screen.
3. Click the Storage tab -> Disks.
4. Click the "+" button or the Create Disk button.
5. Fill in the details:

- Specify disk's label
- Choose the data store to create a disk on from the drop-down menu.
- Set the desired disk size.

The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger than 2 TB.

- Specify if this disk is swap space, and requires formatting.
- Specify whether the disk should be added to Linux FSTAB, and its mount point. The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed. If the mount point is not specified the default mount point will be used:

  /mnt/onapp-disk-#{disk.identifier}

To be able to take incremental backups for virtual server's disk, you must mount this disk to FSTAB (either Linux or FreeBSD) and specify the proper mount point manually.

Swap disks are not backed up.
6. Click the **Add Disk** button to finish.

---

**Edit Smart Server Disks**

You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your smart server.

To change disk size:

1. Go to your Control Panel's **Smart Servers** menu.
2. Make sure your smart server is powered off, then click its label to open its details screen.
3. Click the **Storage** tab -> **Disks**.
4. Click the **Actions** button next to the disk you want to change, then click the **Edit** link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the **Save Disk** button.

---

**Migrate Smart Server Disks**

You can migrate disks of your smart servers to other data stores, which are allocated to the same smart Compute resource or smart Compute zone. Disk migration requires reboot of the smart server (despite the template it is based on).

To migrate a disk:

1. Go to your Control Panel's **Smart Servers** menu.
2. Make sure your smart server is powered off, then click its label to open its details screen.
3. Click the **Storage** tab -> **Disks**.
4. Click the **Actions** button next to the disk you want to move to another data store, then click the **Migrate** button.
5. On the screen that appears, select a target data store from a drop-down box.
6. Click **Start Migrate**.

- You can only migrate disks to data stores in data store zones assigned to your billing plan.
- You cannot migrate a disk to a data store with less capacity than the disk size.
- Thin provisioning disks become thick provisioned after a disk migration. For example, if you use thin storage and move a 850GB disk between aggregates with 10GB actual usage, the ‘dd’ image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero ‘d’ space which may not be able to be recovered.

---

**Delete Smart Server Disks**

To delete a disk:

1. Go to your Control Panel's **Smart Servers** menu.
2. Make sure your smart server is powered off, then click its label to open its details screen.
3. Click the **Storage** > **Disks** tab.
4. Click the **Actions** button next to the disk you want to delete, then click **Delete**.

---

**Smart Server Backups**

Backups are used for copying and archiving target data (target is either a disk or a smart server as a single whole of all disks used).

OnApp supports two backup types: normal and incremental:

- **Normal backup** - simple method of taking backups by making full copy of target data and storing it in an archive.
- **Incremental** - advanced method of taking backups. During the incremental backup, only the changes made after the last backup are archived instead of backing up the whole target. **You must have dedicated backup servers configured in your cloud to be able to utilize the incremental backups functionality.** Incremental backups are enabled via **Settings > Configuration > Backups/Templates** menu.

It is not possible to take incremental backups if you are using location group functionality without a backup server added to the group - the following error message will appear:
Each backup type can be taken in two ways:

- Manually - the user logs into OnApp CP and clicks the "Take backup" button.
- Automatically - the user enables automatic backup option (daily, weekly, monthly, yearly). To enable auto-backups for virtual servers that support incremental backups which used auto-backups option before the upgrade, re-enable automatic backups by switching them off and on again.

If you are using incremental backups option, you should either enable dedicated backup servers in your cloud or share the backups and templates folders (paths) between your Compute resources. SSH file transfer option will be skipped for virtual servers using incremental backups. Existing full backups will be still accessible via **Backups > Images** menu.

**How do incremental backups work?**

For example, we have a disk with three files:

- File1 - 4Gb
- File2 - 2Gb
- File3 - 3Gb

The first incremental backup will be 9 GB (sum of all files). If you decide to take another incremental backup soon thereafter, the backup size will be equal to 0, as the files have not been changed since the first backup (if your backup has complicated directory structure, it could be more than 0, as file system could store some system data).

Then:

- If the user decides to delete File2, the target size will now be 7Gb. The subsequent incremental backup size will be 0, as new data has not been added.
- If the user adds File4 of 4 GB size, the subsequent incremental backup will equal 4 GB (the size of new data added).
- If the user increases File3 disk size to 6 GB, the subsequent incremental backup size will equal 6 GB, although the target is increased by 3 GB. This happens because the incremental system takes the update of the existing file as the deletion of the existing file and adding the new file with the same name (the first version of File3 has been deleted and the new one with 6GB size has been added).

Backups can be saved either to a Compute resource or to a dedicated backup server. When saving a backup, the system calculates if user has enough physical/billing plan resources to save a backup in the selected destination.

When saving a backup to a Compute resource, the system does not check if Compute resource has enough disk space to save a backup and only checks if user has enough billing plan limits.

When saving a backup to a dedicated backup server, the system checks both disk space and billing plan limits.

Free disk size on a target must be at least equal to the disk’s size for which the backup is taken (or to a size of all VS disk for incremental backup).

In some cases (for example, if a user has scheduled several disk backups simultaneously but there’s only free space/billing limits for the first one) the system may allow taking all the backups but will not be able to save them. This will result in a system error and over-billing.

**Backup Support by VM / Virtualization / OS**

<table>
<thead>
<tr>
<th></th>
<th>Normal backup</th>
<th>Incremental backup</th>
<th>Convert to template</th>
</tr>
</thead>
<tbody>
<tr>
<td>BaremetalServer</td>
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<td>no</td>
<td>no</td>
</tr>
<tr>
<td>EdgeServer</td>
<td>no</td>
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</tr>
<tr>
<td>StorageServer</td>
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</tr>
<tr>
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<td>SmartServer</td>
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<td>yes</td>
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<td>yes</td>
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</tr>
<tr>
<td>VMware</td>
<td>snapshot</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>
### View Smart Server Backups

To view the list of smart server's backups:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the required smart server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, you'll see a list of smart server backups sorted by category.
5. Click the label of the required smart server backup to see the following tools - restore backup, delete backup, convert it to template and add note:

![Smart Server Backups](image)

### Take Smart Server Backup

To take an incremental backup:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the server you want to back up.
3. Click the **Backups** tab, then select **Files**. You'll see a list of the disks allocated to that smart server.
4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You'll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.
5. To take a backup, click the **Take a Backup** button at the end of the list.

---

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a smart server. To view the list of user backups, refer to **View User Backups** section.

Template extraction is performed during server provisioning or taking a backup when using a particular template. To prevent template from being used in other transactions during extraction, template is locked during the extraction and unlocked on accomplishment. If other transaction tries to use the locked template, it will fail after 5 minutes of standby.

Transaction which locked template and failed, means that extracted template is broken.

Storing scheme:
- *template* /onapp/templates/your_template.tgz
- extracted template /onapp/backups/templates/your_template
- locked template /onapp/backups/templates/your_template.lock

### Take Smart Server Disk Backup

To back up a smart server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the appliance you want to back up.
3. Click the **Storage tab -> Disks**. You’ll see a list of the disks allocated to that smart server.
4. Click the **Actions** icon next to a disk you want to take a backup of, then click **Backup**. You’ll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.
5. To take a backup, click the **Take a Backup** button at the end of the list.

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with a smart server. To view the list of user backups, refer to View User Backups section.

**Convert Smart Server Backup to Template**

To convert smart server backup to template:

1. Go to your Control Panel’s **Smart Servers** menu.
2. Click the label of the required smart server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the **Actions** icon next to the backup and choose the **Convert to Template** (see Create custom templates).

**Restore Smart Server Backup**

To restore a backup:

1. Go to your Control Panel’s **Smart Servers** menu.
2. Click the label of the required smart server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the **Actions** icon next to the backup you want to revert to and choose **Restore**.

**Delete Smart Server Backup**

To delete a backup:

1. Go to your Control Panel’s **Smart Servers** menu.
2. Click the label of the required smart server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the **Actions** icon next to the backup you want to remove and choose **Delete**.

**Edit Smart Server Backup Note**

To edit smart server backup’s note:

1. Go to your Control Panel’s **Smart Servers** menu.
2. Click the label of the required smart server.
3. Click the **Backups** tab, then select the appropriate backup type:
   - **Images** - full backups
   - **Files** - incremental backups
4. On the screen that appears, click the **Actions** icon next to the required backup and choose **Add Note**. Make necessary changes and click **Submit**.

**Smart Server Backup Schedules**

Schedules screen lists smart servers’ scheduled backup. Depending on the backup type set in your cloud settings, schedules are created either per smart server or per disk. To view all backup schedules in the cloud, see Schedules Settings.

**View Smart Server Backup Schedules**

To view the list of backup schedules for a particular Smart Server:
If normal backup options is selected for the cloud:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

- **Next Start** - the date and the hour of the next backup
- **User** - user who created the backup schedule
- **Status** - schedule status

If incremental backup option is selected for the cloud

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted
   - **Next Start** - the date and the hour of the next backup
   - **User** - user who created the backup schedule
   - **Status** - schedule status

Create Smart Server Backups Schedule

In addition to the system auto-backup presets, you can schedule backups of Smart Servers (VS disks) as required. For example, you can set up a schedule to back up your disks once a week.

The combination of Scheduled VS backups and Auto-backup Presets provides a great deal of flexibility in the way backups are handled for the cloud, and for individual VSs. Auto-backup Presets can be applied to all new VSs added to the cloud. Scheduled VS backups enable specific backups to be scheduled for individual VSs, outside of the auto-backup pattern.

Depending on your cloud settings, you can schedule either normal or incremental backup schedules:

- Adding normal backup schedule
- Adding incremental backup schedule

Adding a normal backup schedule

To add a normal backup schedule:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that follows, click the New Schedule button.
6. Specify schedule details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.
Adding an incremental backup schedule

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you want to schedule a backup for.
3. Click the Backups tab, then choose Schedules, or click Auto-backups under the Options menu to view incremental backup schedules only.
4. Click the New Schedule button.
5. On the screen that appears, specify new schedule's details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.
   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first). (This parameter is for incremental backup schedules only.)

6. Click the Save button to finish.

Edit Smart Server Backup Schedule

To edit a normal backup schedule:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. Click the Edit icon next to a schedule to change its details.
6. Specify schedule details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted.
   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first). (This parameter is for normal auto-backups with specific frequency, period and target.)
   - **Enabled** - move the slider to enable or disable the schedule

7. Click the Save button to finish.

To edit an incremental backup schedule:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options menu to view incremental backup schedules only.
4. Click the Edit icon next to a schedule to change its details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted. This parameter is for incremental backup schedules only.
   - **Start time** - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first). (This parameter is for incremental backup schedules only.)
   - **Enabled** - move the slider to enable or disable the schedule

5. Click the Save button to save your changes.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.
Delete Smart Server Backup Schedule

To delete a normal backup schedule:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk with a backup schedule, then select Schedule for Backups.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

To delete an incremental backup schedule:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the Smart Server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

Smart Server Statistics

For your convenience, the system tracks smart server performance and generates statistics on:

- Smart Server CPU Utilization
- Smart server billing statistics
- Smart Server Disk IOPS Statistics

Smart Server CPU Utilization

OnApp tracks CPU usage for smart servers and generates charts that help analyze smart server performance. The charts show the total CPU usage for all the cores of this particular smart server for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the virtual server you're interested in.
3. Click the Overview tab -> CPU Usage.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there less data available, the chart will show utilization for the time available.
5. Move the Show in My Timezone slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.

To see what percentage of Compute resource CPU resource a smart server takes, go to your Control Panel's Smart Servers menu and click the label of the smart server you're interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this smart server.

Smart Server Billing Statistics

OnApp has a record of all the charges applied to your smart servers for the last three month period. If a smart server was created less than three months ago, statistics are recorded for the smart server's existence to date. You can view all statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a smart server:

1. Go to your Control Panel's Smart Servers menu.
2. Click the label of the smart server you're interested in.
3. Click the Overview -> Billing Statistics tab.
4. Set Start and End time. By default the statistics are generated for the last three months or the actual smart server existence period.
5. Move the Show in my Timezone box to slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. On the page that appears:
   - Date – particular date and time for the generated statistics
- **Users** – the server owner. Click the owner name to see the User Profile (user details)
- **Virtual Servers** – the server name with the total due for smart server resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
- **Disks Usage** – the list of disks assigned to this smart server with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
- **Costs** – the total due for the smart server, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

**Smart Server Disk IOPS Statistics**

The system tracks IOPS (Input/Output Operations per Second) for smart servers and generates charts that help analyze smart server disk performance. To see IOPS for a smart server:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Storage -> Disks** tab.
4. Click the **Actions** button next to the required disk, and then choose **IOPS**.
5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read for the last 24 hours
   - Data written/read for the last hour

6. To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

**Smart Server Integrated Console**

OnApp includes an integrated VNC console that gives users direct access to their smart servers through the OnApp Control Panel, if their user role permits. Administrators can access all smart servers consoles for support and troubleshooting purposes. The console connects the user's browser to the VNC port made available via the Compute resource for the guest console. Both the administrator and the end user web UIs offer a console connection, regardless of the OS.

To access the smart servers VNC console via the control panel interface:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the smart server you're interested in.
3. On the screen that appears, click the **Console** button in the upper menu.

We recommend using Java 1.7, since OnApp VNC console was not tested with Java 1.8.

**Smart Server Transactions and Logs**

The system records a detailed log of all the transactions happening to your smart servers. The list of transactions logged by the system includes:

- Provision smart server
- Startup smart server
- Stop smart server
- Resize smart server without reboot
- Configure Operating System
- Build disk
- Resize disk
- Format disk
- Destroy disk
- Take backup
- Convert backup
- Restore backup
- Destroy backups
- Destroy virtual server
- Destroy template
- Download template
- Update firewall

To view transactions for a smartserver:
1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. The details screen for that server shows recent transactions in the **Activity Log** section.

To cancel pending tasks, click the **Cancel All Pending Tasks for this Smart Server** button.

### Smart Server Recipes

To manage smart server recipes:

1. Go to your Control Panel's **Smart Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Overview** tab, then choose **Recipes**.
4. The screen that follows shows details of all the recipes in the cloud:
   - The left pane shows the list of available recipes organized into recipe groups.
   - The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

**Assign recipe**

Drag and drop recipe to assign it to a desired event.

You can assign virtual server recipes to the following events:

- **VS provisioning** - run the recipe during VS provisioning
- **VS network rebuild** - run the recipe when rebuilding a network
- **VS disk added** - run the recipe when adding a disk
- **VS network interface added** - run the recipe when adding a network interface
- **VS disk resized** - run the recipe when resizing a VS disk
- **VS resize** - run the recipe when resizing a VS

**To use drag and drop:**

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

**Remove recipe**

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the **Delete** icon next to the recipe you want to remove.

### Smart Server Recipe Custom Variables

You can define custom variables for particular smart servers. Each custom variable is a name-value set that can be used during the smart server recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the smart server creation or via the smart server **Overview** menu.

To create a new custom variable:

1. Go to your Control Panel's **Smart Servers** menu.
2. You'll see a list of all smart servers in your cloud. Click the name of a smart server for which you want to create a variable.
3. On the smart server details screen, click the **Overview** tab, then choose **Recipes Variables**.
4. On the screen that appears, click the **"+"** button.
5. Specify the recipe name and its value.
6. Move the **Enabled** slider to the right to allow the use of this recipe.
7. Click **Save**.

To edit a custom variable, click the **Edit** icon next to the required variable and change its details.

To delete a custom variable, click the **Delete** icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for smart servers. Note: smart server custom variables will always overlay template custom variables.

### Smart Server Billing

Smart servers are billed the same way as virtual servers. You can set limits and prices for CPU/CPU share/memory.

To charge for smart server resources:
1. Create a smart Compute zone.
2. Attach smart Compute resources to this zone.
3. Add this Compute zone (smart server type) to a billing plan and set the CPU/CPU share/memory limits.
4. Assign user to this billing plan.
5. Create a smart server under this user's account, and allocate the required smart server on a Compute zone that you've just added to the billing plan.

Smart servers are also charged for IP addresses and the maximum port speed value (set in Settings > Defaults configuration).

Baremetal Servers

Baremetal Compute resources are physical servers, reside directly on the hardware without the virtualization layer. Baremetal Compute resources are hosted on dedicated baremetal Compute resources, deployed for a single user. Utilization of baremetal servers allows locating customer's servers on a single piece of hardware. Use of baremetal servers in the cloud makes hardware resource utilization more efficient.

The advantages of baremetal servers:

- full access to the entire server
- tight security

Baremetal servers are hosted on Xen CloudBoot Compute resources, that can be then organized into zones to create different tiers of service - for example, by setting up different zones for baremetal servers, with limits and prices specified per zone. Baremetal Compute zones can also be used to create private clouds for specific users. Limits and prices are specified individually for each baremetal Compute zone assigned to the billing plan.

You can enable recovery mode for baremetal servers. For details, see Enable Recovery Mode for Baremetal Servers. For 3.2.0 version, see Baremetal Server Recovery Mode Patch Guide.

- Autoscale, Segregate and VIP status options are not available for baremetal servers. Also, it's not possible to wipe disks, as OnApp cloud administrators do not have access to baremetal server disks.
- VLANs are not configured automatically on baremetal servers. You need to configure them manually in accordance with your OS and hardware settings.

View the List of Baremetal Servers

To view the list of all baremetal servers deployed in the cloud:

1. Go to your Control Panel's Baremetal servers menu to see an overview of all baremetal servers in the cloud with their details: OS, label, IP addresses, etc.
2. Click the Actions button next to the server for the quick access to the list of available actions (the list of actions displayed depends on the server status).
3. To view a particular baremetal server details, click the label of a required server.
4. To add new baremetal server, press “+” or click the Add New Baremetal Server button.

View Baremetal Server Details

To view details of a specific baremetal server:

1. Click the label of the server you're interested in.
2. On the screen that appears, you'll see the baremetal server properties and activity log:
   - Hostname
   - Baremetal Compute resource group the server belongs to.
   - Login credentials
   - Owner
   - Price per hour

Please pay attention that when you resize a baremetal server or change its pricing in the billing plan, the change is not applied immediately. It takes about 5 minutes to take effect. Meanwhile, a loading spinner is showing next to the price.

- IP Addresses
- Notes
- Activity log
To remove all pending tasks from the log, click the **Clean all pending tasks for this Baremetal Server** button at the bottom of the screen.

**Create Baremetal Server**

In order to add and configure a baremetal server you need a baremetal compute zone and a baremetal compute resource.

To create a baremetal CloudBoot compute resource go to the **Compute resources** page under **Settings**. Select **Add new CloudBoot Compute resource**. On the next page select Xen as the HV type and then choose baremetal as the server type. See the **Create CloudBoot Compute Resource** section for details.

To create a baremetal Compute zone go to the **Compute Zones** under **Settings**. Then on the **Add New Compute Zone** page select “baremetal” from the Server type. See the **Create Compute Zone** page for details. Once the Compute Zone is created set up networking as for any other Compute Zone.

Once you have created a compute resource then you are ready to create a baremetal server.

To create a baremetal server:

1. Go to your Control Panel’s **Baremetal Servers** menu.
2. On the screen that appears, press “+” button or click the **Add New Baremetal Server** button on underneath the list of servers on the screen.
3. Complete the baremetal server creation form:

   - **Label** - the label of the virtual server.
   - **Hostname** - the hostname of the virtual server. The hostname may consist of letters [A-Z a-z], digits [0-9] and dash [- ]
   - **Compute Zone** - choose a baremetal Compute zone to build the baremetal server

The management network should be disconnected during the baremetal server deployment.
- **Compute resource** - Choose a specific baremetal Compute resource to reside the baremetal server on. Please note: you can only reside your baremetal server on cloud booted Xen Compute resources.
- **Password** - a secure password for the Baremetal Server.
- **Password confirmation** - repeat the password to confirm it.
- **Encrypt password** - move the Encrypt Password slider to the right, to encrypt your password, then enter an encryption key in the field that appears.
- **Click Next.**

**Step 3 of 4. Resources**

- **Network Zone** - choose a network zone from the drop-down list.
- **Show only my IP addresses** - tick this checkbox to view only own IP addresses in the IP addresses dropbox.
- **Selected IP address** - the Baremetal Server's selected IP address.
- **Click Next.**

**Step 4. Recipes**

- Choose a recipe you want to assign to this baremetal server by dragging the required recipe to the **Assigned for provisioning** pane.
- To add a custom variable, click the "+" button next to the **Custom recipe variables** title bar, then specify variable details:
  - Specify the recipe name and its value.
  - Move the **Enabled** slider to the right to allow use of this variable.

Click **Submit** button. The baremetal server will be added to the system. You can view it under the **Baremetal Servers** menu.

Once the baremetal server has booted you should detach the compute resource from the management network. The server will now be accessible via the IP address specified above. If at any point in future you need to recreate the baremetal server you will need to reconnect it to the management network.

You can find the list of templates for baremetal server creation under the following links (marked by "Yes" in column "Baremetal"):

http://templates.repo.onapp.com/Linux_templates.html

The image templates for provisioning the baremetal servers are stored in the following locations depending on the configuration:

1. If **Use SSH File transfer** CP configuration option is enabled in **Control Panel Settings > Configuration menu**, then the image template will be fetched from the specified server.

2. If **Use SSH File transfer** option is disabled, the image templates are located at/onapp/templates, which is mounted from server specified in **Static Config target CP configuration option** (Control Panel's **Settings > Configuration** menu). Usually this is set to Control Panel server IP, but you can change it to be any other server.

### Baremetal Server Creation Workflow

The following scheme describes the steps required to create a baremetal server:
Edit Baremetal Server

You can edit baremetal server details via the Control Panel's Baremetal Servers menu.
To edit the baremetal server details:

1. Go to your Control Panel's Baremetal Servers menu. On the screen that appears you'll see the list of all baremetal servers.
2. Click the required server name (label).
3. Click the Actions button, then click Edit.
4. On the screen that follows, change the server details.
5. Click the Save button to save your changes.

Delete Baremetal Server

To remove a baremetal server from the cloud:

1. Go to your Control Panel's Baremetal Servers menu.
2. On the screen that appears, you'll see the list of all baremetal servers in the cloud. Click the label of the server you want to delete.
3. On the baremetal server screen, click the Tools button, then choose Delete Baremetal Server.

After a user has been deleted a baremetal server, OnApp administrator receives an email notification. After that, administrator must reclaim a baremetal Compute resource by manually rebooting it, to make it available for new baremetal server creation.

Manage Baremetal Server Recipes

To manage baremetal server recipes:

1. Go to your Control Panel's Baremetal Servers menu.
2. Click the label of the server you're interested in.
3. Click the Tools tab, then choose Recipes.
4. The screen that follows shows details of the available recipes the cloud:
   - The left pane shows the list of available recipes organized into recipe groups.
   - The right pane displays the list of events to which the recipes can be assigned to. Click the arrow button next to event to expand the list of recipes assigned to it.

Assign recipe

Drag and drop recipe to assign it to a desired event.

You can assign baremetal server recipes to the following events:

- VS provisioning - run the recipe during baremetal server provisioning

To use drag and drop:

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

Remove recipe

To remove recipe:
1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

**Manage Baremetal Server Recipe Custom Variables**

You can define custom variables for particular baremetal servers. Each custom variable is a name-value set that can be used during the recipe implementation. Custom variables are set on a per server basis. You can create custom variables during the baremetal server creation or via the baremetal server Tools menu.

To create a new custom variable:

1. Go to your Control Panel's Baremetal Servers menu.
2. You'll see a list of all baremetal servers in your cloud. Click the name of a server for which you want to create a variable.
3. On the baremetal server details screen, click the Tools tab, then choose Custom Recipe Variables.
4. On the screen that appears, click the "+" button.
5. Specify the recipe name and its value.
6. Move the Enabled slider to the right to allow use of this recipe.
7. Click Save.

To edit a custom variable, click the Edit icon next to the required variable and change its details.

To delete a custom variable, click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

---

**Baremetal Server Billing**

Baremetal servers are billed in a slightly different way than other server types. You can only set IP address and template limits and prices for your baremetal servers.

To charge for baremetal server resources:

1. Create a baremetal server Compute zone and attach baremetal Compute resources to this zone.
2. Create a billing plan and set the monthly fee for it.
3. Add this Compute zone (baremetal server type) to the billing plan.
4. Add a network zone to the billing plan.
5. Set the IP address limits for VSs powered off. Each server deployed will take an IP from the network zone added to the billing plan, and will be billed for each IP address taken. For more information, see Set Billing Plan Prices And Resource Limits.
6. Go to Template Store menu and set the template prices. Each time a baremetal server is built on the specific template, the user will be charged the amount set. For more details, see Template Store.
7. Add the required template store to the billing plan.
8. Assign user to this billing plan.
9. Create a baremetal server under this user's account based on the baremetal Compute resource in a Compute zone that you've just added to the billing plan.

---

Do not set any other limits except the ones described above.

**Baremetal Server Recovery Mode**

To reboot baremetal server in the recovery mode:

1. Go to your Control Panel's Baremetal Servers menu.
2. On the screen that appears, click the label of the baremetal server you want to reboot in the recovery mode.
3. On the baremetal server screen, click the Tools button, then choose Enable Recovery Mode.

To disable recovery mode for a baremetal server:

1. Go to your Control Panel's Baremetal Servers menu.
2. On the screen that appears, click the label of the required baremetal server.
3. On the baremetal server screen, click the Tools button, then choose Disable Recovery Mode.

**Application Servers**

Application Server is a regular VS based on default CentOS template with pre-installed additional software. This software allows you to install and have up & running various PHP/Perl/Python frameworks (like Drupal, Joomla, Wordpress etc.) on a server using web interface.

- Application servers will be free to use until 1st November 2015, please contact your account manager for full pricing.
Application Server gives you high-end cloud management features including:

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The following options are not available for application servers:

- Reset Root Password
- Set SSH keys
- Integrated console
- Convert backup to template
- Recipes
- Recipe Custom Variables

**View Application Servers**

To view an application:

1. Go to your Control Panel's Application Servers menu.
2. The page that loads will show the list of application servers together with their:
   - Operating system
   - Label. Click the label to see details.
   - IP Addresses
   - Disk Size
   - RAM
   - Backups - the number of backups and the space these backups take.
   - User - the owner of this application server. Click the user name to see the owner details.
   - Power status. Click the on/off buttons to change the status

3. Click the Actions button next to the application server for the quick access to the list of application server actions (the list of actions displayed depends on the application server status):
   - Reboot
   - Recovery reboot
   - Shutdown
   - Startup
   - Recovery startup
   - Unlock

To search for a particular application server, click the Search icon at the top of the application server list. When the search box appears, type the text you want to search for and click the Search button:
To view details of a specific application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. The screen that appears loads the application server properties, application list, notes, activity log and tools for managing your application server.

Application Server Properties

Application server properties page gives general overview of the server details:

- Template this server is built on
- Power status & On/Off/Reboot buttons.

Clicking the OFF button performs graceful shutdown and then powers off the application server after the timeout set in Configuration settings.

- Hostname
- Compute resource. Click the compute resource name to see its details
- Login credentials
- Owner. Click the owner name to see its details.
- Price per hour
- Memory
- CPU(s)
- CPU priority or CPU units
- Disk Size
- Disk backups
- Network Speed
- IP Addresses. Only the first five IP addresses are displayed on the application server properties page. To view the list of all application server IP addresses, mouse over IP addresses area or go to the Networking > IP addresses tab.
- Auto-backups - move the slider to enable/disable automatic backups for this application server. If the incremental backups are enabled in your cloud, you can set auto-backups per application server rather than per disk.
Applications

In this section you can see the list of all applications deployed on this server.

Notes

The Notes section lists brief comments or reminders for an application server. You can add either Admin's or User's notes. The Admin's note will be available to cloud administrators. Click the Actions button in the Notes section of the page to add admin's or user's note.

Application Server Management

- Click the Tools button to expand the Tools menu with the application server management options.
- Use the top menu to manage your application servers' statistics/networking/storage options.

Create Application Server

Application server creation process is similar to virtual server creation. The difference is that a specific default template is used automatically during application server creation. For more information refer to the Application Server Billing section of this guide.

To create an Application Server:

1. Go to your Control Panel’s Application Servers menu.
2. On the screen that appears, press “+” button or click the Create ApplicationServer button underneath the list of servers on the screen.
3. Complete the application server creation form:

On this page:

- Step 1 of 4. Cloud Locations
- Step 2 of 4. Properties
- Step 3 of 4. Resources
- Step 4. Confirmation

Step 1 of 4. Cloud Locations

The Cloud Locations step applies to those users who have compute zones assigned to location groups in their billing plan.

If the user’s billing plan has several compute zones, some of which are assigned to location groups, whereas others are not - the cloud locations screen will not be available in the wizard. In this case the wizard will start with the Properties step.

Indicate your application server’s cloud location:

- Country - choose the country, where the cloud is located, from the drop-down menu.
- City - specify the city, where the cloud is located, from the drop-down menu.

Click Next to proceed to the following step of the wizard to specify the application server properties.

Step 2 of 4. Properties
Specify the following application server properties:

- **Label** - the label of the application server. The required parameter.
- **Hostname** - the hostname of the application server. The required parameter. The hostname should consist of letters [A-Z a-z], digits [0-9] and dash [-].

<table>
<thead>
<tr>
<th>Particular characters are not allowed in hostnames for Windows-based application servers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent sign [%]</td>
</tr>
<tr>
<td>double quotation marks ['&quot;]</td>
</tr>
<tr>
<td>brackets [&lt;,&gt;], vertical bar [], caret [^]</td>
</tr>
<tr>
<td>ampersand [&amp;], parentheses [(),]</td>
</tr>
</tbody>
</table>

- **Compute Zone** - the compute zone to build the application server on.
- **Compute resource** - the specific compute resource to build the application server on. Compute resource may be selected automatically according to the set provisioning type.

Click **Next** to proceed to the following step of the wizard to specify the application server resources.

**Step 3 of 4. Resources**

At this step, you can set your application server's resources, such as disk size, network configuration and other.

**Resources**

- **RAM** - set the amount of application server's RAM.
- **CPU Cores** - set the amount of application server's CPU cores. For KVM compute resources, this parameter sets CPU sockets by default, unless CPU topology is enabled.
- **CPU Priority (or CPU Units)** - set application server's CPU priority. If the CPU units are switched on in the billing plan for this user, then CPU priority is replaced with CPU units. Refer to **Billing Calculation** section for details on CPU units and CPU priority. Do not use CPU Units for KVM compute resources running on CentOS5.

The following options are available for application servers based on KVM compute resources only, providing the **Enable CPU topology permission** is switched on for the user.

- **Use CPU Topology** - move the slider to the right, to set the following parameters:
  - **CPU Sockets** - set the amount of sockets.
  - **CPU Threads** - set the amount of threads per core.

  **CPU topology (CPU sockets and CPU threads) is the Labs feature preview. Pay attention that setting CPU sockets and CPU threads are at your own risk only!**

  You may face the following problems when setting CPU topology:
  1. Currently you cannot set CPU sockets and threads parameters for existing application servers.
  2. After setting, the new parameters won't be shown at the application server details screen.
  3. Some Linux application servers fail to boot up.
  4. When sockets and threads are set incorrectly, you may face huge load on HV's under CentOS 5.x.

**Primary Disk**

- **Data Store Zone** - choose a data store zone for application server's primary disk.
- **Primary disk size** - set the primary disk size.

**Swap Disk**

- **Data Store Zone** - choose a data store zone for application server's swap disk.
- **Swap disk size** - set the swap disk size. There is no swap disk for Windows-based application servers. In all other cases, swap disk size must be greater than zero.

**Network Configuration**

- **Network Zone** - choose a network zone from the drop-down box.
• *Selected IP address* - assign an IP address for the application server from the drop-down menu. Indicate compute resource and network to have the list of available IPs.
• *Show only my IP address* - tick this checkbox to view only own IP addresses in the IP addresses dropbox.
• *Port Speed* - set the port speed for this application server

**Show IP address selection for new application server** option is enabled via the "Specify a network address on new application server page" checkbox on the Settings > Configuration settings screen (under the System tab).

You can't select unlimited port speed if the Network Zone is not selected. In this case the port speed will be 1 by default. It's possible to create application server with unlimited network speed without selecting a network zone only if you have only one Network Zone assigned to your billing plan.

Click Next to proceed to the following step of the wizard that completes the application server creation process.

**Step 4. Confirmation**

At this step, configure the automation settings. This is the final step of the application server creation wizard.

• Move the Build Virtual Server slider to the right if you want the system to automatically build the application server. If you leave this box blank, you will have to build your server manually after it is created.

After you set up these parameters, click the Create Application Server button to start the creation process.

**Edit Application Server**

You can edit CPU and RAM resources for application servers. To adjust CPU & RAM resources:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you want to resize, to show its details screen.
3. Click the Tools button and select the Edit Application Server link.
4. Change label, CPU cores, CPU priority/units and RAM values, and click the Save button.

**Rebuild/Build Application Server Manually**

If you haven't checked the Build Application Server option during the application server creation process, you will have to do this manually after the application server has been created. Building an application server is the process of allocating physical resources to that application server.

To build an application server manually or rebuild the application server on the same (or another) template:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. On the screen that appears, click the Tools button and then click Rebuild Application Server.
4. On the screen that pops up, use the drop-down menu to choose a template with which to build the application server.
5. Move the Start AS after rebuild slider to the right if you want to have your application server started automatically after it is built.
6. Click the Rebuild Application Server button to finish.

After you rebuild your template all data will be lost!

**Migrate Application Server**

OnApp allows hot and cold migration of application servers between compute resources that share common data stores (or data store zones). Hot
migrant means moving application servers that are running, while cold migration means moving application servers that are shut down.

To hot migrate an application server:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the application server you want to migrate.
3. Click the Tools button and press the Migrate Application Server link.
4. In the window that appears, choose the target compute resource from the drop-down menu.
5. Move the Cold-migrate when hot-migration fails slider to the right if you want to apply cold migration in case of hot migration failure.
6. Click the Start Migration button.

After migration, the power status of your application server remains the same as before the migration. If you migrate an application server that’s running, the whole process is almost unnoticeable.

**Autoscale Application Server**

Application server autoscaling allows you to change the RAM, CPU and disk size settings of an application server automatically. Application server resources scaling is based on rules you specify. For example, you can set up a rule that will add 1000MB of memory to an application server if RAM usage has been above 90% for the last 10 minutes - but add no more than 5000MB in total in 24 hours. You can set autoscaling down settings alongside with autoscaling up.

- For Linux-based application servers only.
- If you autoscale an application server’s memory to a value greater than current application server RAM x 16 (which is a max_memory parameter in a configuration file and database), the application server will be rebooted anyway, regardless of the template it is built on.
- Make sure an application server can be reached via SSH. Otherwise, the autoscaling client installation will fail.

To configure autoscaling settings:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the appropriate application server.
3. On the page that follows, click the Overview tab, and then click Autoscaling.
4. Press the required tab - Memory Usage, Disk Usage or CPU Usage - to see the statistics for each type of resources.
5. Below you will see UP and DOWN autoscaling options. Move the slider to the right to add the autoscaling rule or move it to the left to remove the rule.
6. Add autoscaling rules as explained below:

   **Set autoscale up options:**
   - If RAM usage is above X% for a specific time period, add Y MB – but no more than Z MB in a 24 hour period.
   - If CPU usage is above X% for a specific time period, add Y% - but no more than Z% in a 24 hour period.
   - If disk usage is above X% for a specific time period, add Y GB - but no more than Z GB in a 24 hour period.

   **Set autoscale down options:**
   - If RAM usage is below X% for a specific time period, remove Y MB.
   - If CPU usage is below X% for a specific time period, remove Y%.
   - If disk usage is below X% for a specific time period, remove Y GB.

7. Click Apply.

**Set VIP Status for Application Server**

If a Compute resource fails or reboots, the system migrates application servers to another Compute resource, one server at a time. The order servers are migrated in is random. However, you can give an application server “VIP” status, and this will give that server priority in the migration queue.

To set or remove VIP status for an application server:

1. Go to your Control Panel’s Application Servers menu.
2. Use the VIP button next to a required application server to change its VIP status.

**Segregate Application Server**
To isolate one application server from another:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you want to segregate.
3. On the screen that appears, click the Tools button, then click Segregate Application Server.
4. In the dialogue box that pops up, use the drop-down menu to choose an application server you want to keep away from.
5. Click the Segregate VS button to finish.

Delete Application Server

Shut down the application server before destroying it. If you are deleting an application server that is running, the application server will be deleted after the time set in Timeout Before Shutting Down application servers configuration parameter.

To remove the application server from the cloud:

1. Go to your Control Panel's Application Servers menu.
2. On the screen that appears, you'll see the list of all application servers in the cloud. Click the label of the application server you want to delete.
3. On the application server's screen, click the Tools button, then select Delete Application Server.
4. Move the Move Last Backup to My Templates if it is present slider to the right if you want to save the last application server's backup as a template.
5. Move the Destroy All Existing Backups slider to the right if you want to remove all existing backups of this application server.

IMPORTANT:

- You won't be able to restore a application server after deleting it.
- Deleting an application server removes all data stored on that application server. To save the data stored on the application server, back up your application server and tick the Destroy All Existing Backups box when following the instructions described in this section.

6. Press the Destroy button.

Application Server Power Options

To manage an application server power options:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the required application server.
3. Click the Tools button on the application server's screen to expand the Tools menu.
4. The Tools menu enables you to perform the following power actions on application servers (the exact list shown depends on the application server status):
   
   - Reboot Application Server - powers off and then restarts the application server.
   - Suspend - stops an application server, changes its status to suspended and disables all the other actions on application server, unless unsuspended.
   - Shut Down Application Server – pops up a dialogue box, where you can either Shut Down application server (terminates the application server gracefully), or Power Off application server (terminates the application server forcefully).
   - Startup Application Server - queues a start-up action for a application server that's currently powered off.

Application Server Administrative Options

To manage an application server power options:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the required application server.
3. Click the Tools button on the application server's screen to expand the application server Tools menu.
4. The Tools menu enables you to perform the following administrative actions on application servers:

   - Change Owner - pops up a dialogue box with a drop-down of all users on the system, enabling you to pass ownership of the application server to the user selected from the list. If you have any backups for this application server, you will be also prompted to confirm if the backup should be moved to another user.
Application Server Networks

The Networking menu in the Application Servers menu enables you to manage network interfaces, allocate IP addresses and set firewall rules for application servers.

Configure Application Server Network Interface

The Networking > Network Interfaces menu shows the virtual network interfaces allocated to this application server. Network interfaces join the physical network to the application server. When you create an application server a network interface is added automatically. This network interface will be assigned to the existing physical network using a spare IP (IPv4) and will be set primary by default. OnApp supports IPv4 and IPv6. Since not every application supports IPv6, at least one IPv4 address must be allocated to a application server's primary network interface.

To see the list of all network interfaces allocated to the application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. On the page that follows you will see the following fields:
   - **Interface** – optional label of the network interface.
   - **Network join** – name of the network and a compute resource or compute zone this network is joined to.
   - **Port speed** – the speed set to the interface.
   - **Primary interface** – indication whether the interface is primary or not.

Here you can also view Interface Usage, Edit and Delete network interface (using icon controls) and Add a new network interface using the button at the bottom of the screen.

To add a network interface:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Networking tab, then click Network Interfaces.
4. Click the **Add New Network Interface** button at the bottom of the screen.
5. On the screen that appears, input values for the following parameters:
   - **Label** – a human-friendly name for the new interface.
   - **Physical Network** – choose a network join from the drop-down menu, which lists network joins assigned to the compute resource/compute zone on which the application server runs.
   - **Port speed** – set port speed in Mbps, or make it unlimited.

6. Click the **Submit** button.

To edit network interface label, port speed or set it as primary (if none is marked as primary), click **Edit** icon next to the appropriate network interface. After editing the port speed, the application server should be power cycled for the change to take effect.
To delete a network interface, click the **Delete** icon next to the interface you want to delete.

- To run the application server, at least one network interface with an assigned IP address (or addresses) is required!
- To allocate another physical network, add a new network interface.
- In case of network interface replacement for Windows application servers running on Xen compute resources, the user has to add new network interface, rebuild network, then remove the old network interface and perform network rebuild again.

### Rebuild Application Server Network

To rebuild a network join, added to the application server (required after allocating new IP addresses):

1. Go to your Control Panel's **Application Servers** menu.
2. Click the label of a required application server.
3. On the screen that appears, click the **Tools** button, then click **Rebuild Network**.
4. In the pop-up window, move the **Force Reboot** slider to the right, then select the application server shutdown type.

During rebuild network, the system tries to reach application server's network interface without rebooting application server. Then, if it is not possible, transaction will quit. Force reboot action allows to rebuild application server network with reboot action if live rebuild is impossible. In case the force reboot option is disabled and system can not enter the application server, the network rebuild operation will fail.

5. Move the **Required Startup** slider to the right to start up an application server when you're rebuilding network of a powered off application server.
6. Click the **Rebuild Network** button.

In case of network interface replacement for Windows application servers running on Xen compute resources, the user has to add new network interface, rebuild network, then remove the old network interface and perform network rebuild again.

### Set Application Server Firewall Rules

With OnApp you can set firewall rules for the network interfaces of application servers. There are two types of firewall rule:

- **ACCEPT** – defines the packets that will be accepted by the firewall
- **DROP** – defines the packets that will be rejected by the firewall

You cannot apply firewall rules to application servers which are parts of a blueprint.

To configure a firewall rule:

1. Go to your Control Panel's **Application Servers** menu.
2. Click the label of the application server for which you want to configure a firewall rule.
3. On the screen that appears, click the **Tools** button, then click **Edit Firewall Rules**.
4. On the page that appears, set the following:
   a. Choose the network interface.
   b. Specify if the rule defines requests that should be accepted or dropped.
   c. Set the IP address for which this rule is active.
      - Leave the empty field to apply this rule to all IPs
      - Enter hyphen-separated IPs to apply the rule to an IP range (e.g. 192.168.1.1-192.168.1.10)
      - Enter the IPs with slash to apply the rule to CIDR (e.g. 192.168.1.1/24)
   d. Set the port for which this rule is effective.
      - Leave the empty field to apply the rule to all ports
      - Enter colon-separated ports to apply the rule to a port range (e.g. 1024:1028)
      - Enter comma-separated ports to apply the rule to the list of ports (e.g. 80,443,21)
   e. Choose the protocol (TCP, UDP or ICMP).
5. Save the rule by clicking the **Add Rule** button. The rule will be saved in the UI, but the transaction won’t be started until you click the **Apply Firewall Rules** button.
6. To start the transaction which runs firewall rules for an application server, click **Apply Firewall Rules** button.
7. Use **Up** and **Down** arrow buttons in the left column to change firewall rule position.

**Example:**

To run the application server, at least one network interface with an assigned IP address (or addresses) is required! To allocate another physical network, add a new network interface. In case of network interface replacement for Windows application servers running on Xen compute resources, the user has to add new network interface, rebuild network, then remove the old network interface and perform network rebuild again.
The `Int1 ACCEPT 122.158.111.21 22 TCP` firewall rule means that the `Int1` network interface will accept all requests and packets addressed from 122.158.111.21 using the TCP protocol on port 22.

The `Int2 DROP 122.158.111.21 22 UDP` firewall rule means that the `Int2` network interface will reject all requests and packets from 122.158.111.21 using the UDP protocol on port 22.

**Application Server IP Addresses**

In the Networking -> IP Addresses tab you can find the list of assigned IP addresses, allocate new IP addresses and rebuild a network.

To allocate a new IP Address to the application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Networking tab, then click IP Addresses.
4. Click the Allocate New IP Address Assignment button.
5. Select a network interface from the drop-down menu (only the network interfaces you added to the application server will be available).
6. Select an IP address from the IP Pool associated with the network interface. You may select an IP address that’s already assigned to an application server, but only one application server should be online at a time.

   - Use Please show me used IP Pool, Show only my IPs and Show only IPv6 checkboxes to narrow the list of IP in the drop-down list.
7. Click the Add IP Address Assignment button.
8. Click the Rebuild Network button to rebuild the network.

---

**Display Network Speed for Network Interfaces on Application Server Page**

The main Application Servers screen displays the network speed of each application server's primary network interface. To see the speed of all interfaces assigned to an application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you are interested in.
3. Click the Networking > Network Interfaces tab.
4. On the screen that appears, the Port Speed column shows the network speed of the network interface.

**Edit Application Server Network Speed**

To edit an application server's network speed:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you want to change.
3. Go to the Network tab -> Network Interfaces.
4. In the Actions column click the Edit button.
5. Change the port speed.
6. Click the Submit button to save changes.

**Application Server Disks**

Application server storage is provided by disks. A disk is a partition of a data store that is allocated to a specific application server. Disks can be assigned as standard or swap disks (there are no swap disks for Windows based templates). They can also be set as primary (that is, the disk from which an OS will boot).
You can also utilize incremental backups. For details, see Application Server Backups section of this guide. Managing disks for the entire cloud is handled through the Control Panel's Settings menu. Disks for individual application servers are managed through the Control Panel's Application Servers menu, where you can:

- See the list of disks allocated to this application server
- Add a new disk
- Resize a disk
- Migrate a disk
- Check disk usage statistics (IOPS)
- Delete a disk
- Back up disks
- View disk backup schedules
- Schedule disk for backups

Creating multiple partitions on one disk is forbidden for all application servers.

Add Disks to Application Servers

Adding a disk to an application server will require that application server should be rebooted. If an application server is running when you try to add a new disk to it, you'll be asked to confirm the reboot. To add a disk to an application server:

1. Go to your Control Panel's Application Servers menu.
2. Click an application server's label to open its details screen.
3. Click the Storage tab > Disks.
4. Click the "+" button or the Create Disk button.
5. Fill in the details:
   - Specify disk label.
   - Choose the data store to create a disk on from the drop-down list.
   - Move the slider to the right to specify the desired disk size.
   - Move the slider to the right if you want to enable disk hot attaching. In this case application server will not be stopped when adding a disk. Hot attach option is only available for KVM 6/ CentOS 6 application servers.
   - Move the Swap Space slider to the right if this disk is swap space.
   - Move the Require Format Disk slider to the right if this disk requires formatting.
   - Move the Add to Linux FSTAB slider to the right if the disk should be added to Linux FSTAB (for Linux application servers).
   - Specify its mount point. The maximum length of a Mount Point is 256 characters. Spaces are not allowed. No more than one slash is allowed. If the mount point is not specified the default mount point will be used:
     /mnt/onapp-disk-#{disk.identifier}
   - Tick the Add to FreeBSD FSTAB checkbox if the disk should be added to FreeBSD FSTAB (for FreeBSD application servers).
   - Indicate the file system - ext3 or ext4 - for Linux based application server.
6. Click the Add Disk button to finish.

Restrictions:

- If you choose a Solidfire data store, the minimum disk size will be regulated by Solidfire Data Store Zone settings.
- If application server and the control panel server belong to different networks, the hot attach transaction will fail.
- If an additional disk has been created without the require format disk option and formatted/partitioned in another way, resize disk action may work incorrectly. Use the require format disk option when creating an additional disk, otherwise use disk resize option at your own risk.
- To be able to take incremental backups for application server's disk, you must mount this disk to FSTAB (either Linux or FreeBSD) and specify the proper mount point manually.
- You cannot back up Swap disks.

Edit Application Server Disks

Primary and Swap disks
For primary and swap (Linux, FreeBSD) disks you may only change the label and the size. You can easily resize disks when needed. The resize will fail if your current usage is greater than the new size you request. Note, that any changes on disk size will lead to reboot of your application server.

To change disk size:

1. Go to your Control Panel's **Application Servers** menu.
2. Make sure your application server is powered off, then click its label to open its details screen.
3. Click the **Storage** tab -> **Disks**.
4. Click the **Actions** button next to the disk you want to change, then click the **Edit** link.
5. Enter a new disk label and size in GB in the fields provided.
6. Click the **Save Disk** button.

- You cannot decrease size of Integrated Storage data store disks.
- You cannot decrease disk size for Windows-based and FreeBSD-based application servers. Only the increase disk size option is available.
- You cannot resize the primary disk for FreeBSD-based application servers.
- Decreasing disk size for Linux-based application servers may lead to filesystem inconsistencies. Make sure you have current backups before proceeding.

**New disks**

For new disks - those which were added after the application server was created - you can edit the following:

<table>
<thead>
<tr>
<th>Linux</th>
<th>Windows</th>
<th>FreeBSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Label</td>
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<td>• Require format</td>
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<td>• Add to Linux fstab</td>
<td>• Add to FreeBSD fstab</td>
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</tr>
<tr>
<td>• Mount point</td>
<td>• Mount point</td>
<td></td>
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<tr>
<td>• File system</td>
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</table>

**Migrate Application Server Disks**

You can migrate disks of your application servers to other data stores, which are allocated to the same compute resource. Unlike application server migration – disk migration requires reboot of the application server (despite the template it is based on).

To migrate a disk:

1. Go to your Control Panel's **Application Servers** menu.
2. Make sure your application server is powered off, then click its label to open its details screen.
3. Click the **Storage** tab > **Disks**.
4. Click the **Actions** button next to the disk you want to move to another data store, then click the **Migrate** button.
5. On the screen that appears, select a target data store from a drop-down box.
6. Click **Start Migrate**.

- You can only migrate disks to data stores in data store zones assigned to your billing plan.
- You cannot migrate a disk to a data store with less capacity than the disk size.
- Thin provisioning disks become thick provisioned after a disk migration. For example, if you use thin storage and move a 850GB disk between aggregates with 10GB actual usage, the ‘dd’ image of the local volume manager will take 850GB space, because the entire local volume manager is copied, including zero ‘d space which may not be able to be recovered.

**Delete Application Server Disks**

To delete a disk:

1. Go to your Control Panel's **Application Servers** menu.
2. Make sure your application server is powered off, then click its label to open its details screen.
3. Click the **Storage** -> **Disks** tab.
4. Click the **Actions** button next to the disk you want to delete, then click **Delete**.
5. In the pop-up window, move the **Force Reboot** slider to the right, then select the application server shutdown type.
6. Move the **Required Startup** slider to the right to start up the application server automatically after the network is rebuilt.

Steps 5 and 6 apply to disks of application servers that are on.

7. Click the **Destroy Disk** button.

**Application Server Backups**

It is strongly recommended that you take backups while an application server is not running. Make sure that your application server is stopped before taking any backups.

Backups are used for copying and archiving target data (target is either a disk or an application server as a single whole of all disks used).

- **Images** menu lists normal backups of an application server
- **Files** menu list application server's incremental backups
- **Schedules** menu allows you to schedule automatic backups for application server. See Schedules Settings section of this guide for details.

OnApp supports two backup types: normal and incremental:

- **Normal** - simple method of taking backups by making full copy of target data and storing it in an archive.

  Ensure that you do not use XFS or other filesystems not supported by OnApp for Linux backups as OnApp will address them as ext3/4 filesystems.

- **Incremental** - advanced method of taking backups. During the incremental backup, only the changes made after the last backup are archived instead of backing up the whole target. You must have dedicated backup servers configured in your cloud to be able to utilize the incremental backups functionality. Incremental backups are enabled via **Settings > Configuration > Backups/Templates** menu.

  It is not possible to take incremental backups if you are using location group functionality without a backup server added to the group - the following error message will appear:

  "Backup cannot be made at this time: This disk cannot be backed up, check Location Group settings."

  This issue will be fixed in next releases. As a workaround, add an empty backup server zone to your location group.

Each backup type can be taken in two ways:

- Manually - the user logs into OnApp CP and clicks the "Take backup" button.
- Automatically - the user enables backup schedule (daily, weekly, monthly, yearly). To enable auto-backups for application servers that support incremental backups which used auto-backups option before the upgrade, re-enable automatic backups by switching them off and on again.

If you are using incremental backups option, you should either enable dedicated backup servers in your cloud or share the backups and templates folders (paths) between your compute resources. SSH file transfer option will be skipped for application servers using incremental backups. Existing full backups will be still accessible via **Backups > Images** menu.
How do incremental backups work?

For example, we have a disk with three files:

- File1 - 4Gb
- File2 - 2Gb
- File3 - 3Gb

The first incremental backup will be 9 GB (sum of all files). If you decide to take another incremental backup soon thereafter, the backup size will be equal to 0, as the files have not been changed since the first backup (if your backup has complicated directory structure, it could be more than 0, as file system could store some system data).

Then:

- If the user decides to delete File2, the target size will now be 7Gb. The subsequent incremental backup size will be 0, as new data has not been added.
- If the user adds File4 of 4 GB size, the subsequent incremental backup will equal 4 GB (the size of new data added).
- If the user increases File3 disk size to 6 GB, the subsequent incremental backup size will equal 6 GB, although the target is increased by 3 GB. This happens because the incremental system takes the update of the existing file as the deletion of the existing file and adding the new file with the same name (the first version of File3 has been deleted and the new one with 6GB size has been added).

Backups can be saved either to a compute resource or to a dedicated backup server. When saving a backup, the system calculates if user has enough physical/ billing plan resources to save a backup in the selected destination.

When saving a backup to a compute resource, the system does not check if compute resource has enough disk space to save a backup and only checks if user has enough billing plan limits.

When saving a backup to a dedicated backup server, the system checks both disk space and billing plan limits.

Free disk size on a target must be at least equal to the disk’s size for which the backup is taken (or to a size of all application server disk for incremental backup).

In some cases (for example, if a user has scheduled several disk backups simultaneously but there’s only free space/billing limits for the first one) the system may allow taking all the backups but will not be able to save them. This will result in a system error and over-billing.

View Application Server Backups

To view the list of application server's backups:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the required application server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, you'll see a list of application server backups sorted by category.
5. Click the label of the required application server backup to see the following tools - restore backup, delete backup and add/edit note:
Take Application Server Backup

To take an incremental backup:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you want to back up.
3. Click the Backups tab, then select Files.
4. To take a backup, click the Take a Backup button at the end of the list.

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with an application server. To view the list of user backups, refer to View User Backups section.
Take Application Server Disk Backup

To back up an application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you want to back up.
3. Click the Storage tab -> Disks. You'll see a list of the disks allocated to that application server.
4. Click the Actions icon next to a disk you want to take a backup of, then click Backup. You'll see a list of all the backups taken and pending for that disk, along with the tools to restore backups, delete them, and convert them to templates.
   - To make a backup, click the Take a Backup button at the end of the list. You may add a note and also Force Windows Backup.

   ![Backup Instructions]

   This option for Windows application servers is designed as a last resort, when the backup cannot be taken due to NTFS file system problems. Switching this option will bring up a dialog box with the following message: "If you enable this option there is no guarantee that backup will be consistent.*

   Select "Yes" to proceed

   - To restore a backup, click the Restore link next to the backup you want to revert to.

Backups in the OnApp Control Panel are associated with a particular user instead of being associated with an application server. To view the list of user backups, refer to View User Backups section.

Restore Application Server Backup

To restore a backup:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the required application server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to revert to and choose Restore.

Delete Application Server Backup

To delete a backup:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the required Application server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the backup you want to remove and choose Delete.

Add Application Server Backup Note

To edit application server backup's note:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the required application server.
3. Click the Backups tab, then select the appropriate backup type:
   - Images - full backups
   - Files - incremental backups
4. On the screen that appears, click the Actions icon next to the required backup and choose Add Note. Make necessary changes and click Submit.

Application Server Backup Schedules

Schedules screen lists application servers’ scheduled backup. Depending on the backup type set in your cloud settings, schedules are created either per application server or per disk. To view all backup schedules in the cloud, see Schedules Settings.

View Application Server Backup Schedules

To view the list of backup schedules for a particular application server:

If normal backup options is selected for the cloud:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that appears, you will see the list of backup schedules along with their details:
   - Date - time when the schedule was created
   - Target - server or disk for which the schedule was created (depending on the backup type)
   - Action - scheduled action
   - Frequency - how frequently the backup will take place according to the period set. For example, frequency of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years
   - Rotation period - number of backups after which the first backup will be deleted
   - Next Start - the date and the hour of the next backup
   - Status - schedule status

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

If incremental backup option is selected for the cloud

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules along with their details:
   - Date - time when the schedule was created
   - Target - server or disk for which the schedule was created (depending on the backup type)
   - Action - scheduled action
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years
   - Rotation period - number of backups after which the first backup will be deleted
   - Next Start - the date and the hour of the next backup
   - Status - schedule status

Create Application Server Backup Schedule

In addition to the system auto-backup presets, you can schedule backups of application servers (application server disks) as required. For example, you can set up a schedule to back up your disks once a week.

The combination of Scheduled application server backups and Auto-backup Presets provides a great deal of flexibility in the way backups are handled for the cloud, and for individual application servers. Auto-backup Presets can be applied to all new application servers added to the cloud. Scheduled application server backups enable specific backups to be scheduled for individual application servers, outside of the auto-backup pattern.

Depending on your cloud settings, you can schedule either normal or incremental backup schedules:

- Adding normal backup schedule
Adding incrementnal backup schedule

Adding a normal backup schedule

To add a normal backup schedule:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. On the screen that follows, click the New Schedule button.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
7. Click the Save button to finish.

Adding an incremental backup schedule

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you want to schedule a backup for.
3. Click the Backups tab, then choose Schedules, or click Auto-backups under the Options menu to view incremental backup schedules only.
4. Click the New Schedule button.
5. On the screen that appears, specify new schedule's details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.
   - Start time - set the exact time of creating the transaction for backups scheduling. The transaction will be created at the specified time but run according to the queue (the transactions created earlier or with higher priority will be launched first).
6. Click the Save button to finish.

Edit Application Server Backup Schedule

To edit a normal backup schedule:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you want to schedule a backup for.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk you want to back up, then select Schedule for Backups.
5. Click the Edit icon next to a schedule to change its details.
6. Specify schedule details:
   - Frequency - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - Period - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - Rotation period - number of backups after which the first backup will be deleted.

Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - Enabled - move the slider to enable or disable the schedule
7. Click the Save button to finish.

To edit an incremental backup schedule:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options menu to view incremental backup schedules only.
4. Click the Edit icon next to a schedule to change its details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years. Period must be unique for each backup target (disk or server).
   - **Rotation period** - number of backups after which the first backup will be deleted. This parameter is for incremental backup schedules only.
   - **Enabled** - move the slider to enable or disable the schedule
5. Click the Save button to save your changes.

### Delete Application Server Backup Schedule

#### To delete a normal backup schedule:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Storage tab, then select Disks.
4. On the screen that appears, click the Actions button next to the disk with a backup schedule, then select Schedule for Backups.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

#### To delete an incremental backup schedule:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Select Backups > Schedules tab, or click Auto-backups under the Options section to view incremental backups schedules only.
4. On the screen that appears, you will see the list of backup schedules.
5. Click the Actions icon next to the schedule you want to remove, then choose Delete.

### Application Server Statistics

For your convenience, the system tracks application server performance and generates statistics on:

- Application Server CPU Utilization
- Application Server Billing Statistics
- Interface Usage
- Application Server Disk IOPS Statistics

#### Application Server CPU Utilization

OnApp tracks CPU usage for application servers and generates charts that help analyze application server performance.

The charts show the total CPU usage for all the cores of this particular application server for a specified time period.

The vertical axis shows the CPU usage percentage (CPU percentage is the core-independent quantity). The horizontal axis defines a time period.

To see CPU usage statistics:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Overview tab > CPU Usage.
4. On the screen that appears, the top chart shows CPU usage for the last 24 hours. The bottom chart shows usage for the last three months (if there is enough data). If there's less data available, the chart will show utilization for the time available.
5. Move the Show in My Timezone slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.

To see what percentage of compute resource CPU resource an application server takes, go to your Control Panel's Application Servers menu and click the label of the application server you're interested in. On the screen that appears, the CPU(s)/Shares parameter displays the amount of CPU resource given to this application server.

#### Application Server Billing Statistics

OnApp has a record of all the charges applied to your application servers for the last three month period. If an application server was created less than three months ago, statistics are recorded for the application server's existence to date. You can view all statistics available, or those for a
shorter period by setting a Start and End time.

To view billing statistics for an application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Overview -> Billing Statistics tab.
4. Set Start and End time. By default the statistics are generated for the last three months or the actual application server existence period.
5. Move the Show in my Timezone slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. On the page that appears:
   - Date – particular date and time for the generated statistics
   - Users – the application server owner. Click the owner name to see the User Profile (user details)
   - Virtual Servers – the application server name with the total due for application server resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - Network Interfaces Usage – the total due for the network interfaces used by this application server for the point of time specified in the Date column. Click the network interface name to see its details.
   - Disks Usage – the list of disks assigned to this application server with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
   - Costs – the total due for the Application Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

Application Server Network Interface Statistics

OnApp tracks network usage for application servers and generates charts that help analyze network performance. To see network utilization statistics for an application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Networking -> Network Interfaces tab.
4. Click the Statistics (chart) icon next to the network you're interested in.
5. On the screen that appears, the top chart shows bandwidth usage for the last 24 hours. The bottom chart shows usage for the last three months.
6. To zoom into a time period, click and drag in a chart. Click the Reset zoom button to zoom out again.

Application Server Disk IOPS Statistics

The system tracks IOPS (Input/Output Operations per Second) for application servers and generates charts that help analyze application server disk performance. To see IOPS for an application server:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the application server you're interested in.
3. Click the Storage -> Disks tab.
4. Click the Actions button next to the required disk, and then choose IOPS.
5. There are four charts on the screen that appears:
   - IOPS for the last hour
   - IOPS for the last 24 hours
   - Data written/read for the last 24 hours
   - Data written/read for the last hour
6. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.

The OnApp API allows you to limit the Hourly IOPS and Hourly data by setting the limit=N parameter, where the N variable is the number of hours for which the charts will display the info.

Application Server Transactions and Logs

The system records a detailed log of all the transactions happening to your application servers. The list of transactions logged by the system includes:

- Provision application server
- Startup application server
- Stop application server
- Resize application server without reboot
- Configure Operating System
- Build disk
- Resize disk
• Format disk
• Destroy disk
• Take backup
• Convert backup
• Restore backup
• Destroy backups
• Destroy application server
• Destroy template
• Download template
• Update firewall

To view transactions for an application server:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the application server you’re interested in.
3. The details screen for that application server shows recent transactions in the Activity Log section.

To cancel pending tasks, click the Cancel Pending button.

You can also view the details of a particular log item by clicking its Ref number. The page that loads shows the log output and the following details:

- date - time in the [YYYY][MM][DD][Thh][mm][ss]Z format
- action - the action name
- status - the action status (Complete, Warn, Pending, or Failed)
- ref - the log item’s Ref number
- target - the action target
- started at - the time when the action was started
- completed at - the time when the action was completed

Application Server Billing

Applications are deployed on application servers, which are created based on the default Application Server template. This Application Server template is provided as a system template. Based on this, you can arrange applications as a paid resource for your end-users. For this, set the price per Application Server template per hour in Template store. So each server deployed on this template will be billed according to the price set.

To charge for application server:

1. Add Application Server template to required template group.
2. Indicate price per template. Each time an application server is built on this specific template, the user will be charged the amount set per server per hour.

3. Add mentioned above template group to limits for template store in the billing plan of appropriate user.
4. When the relevant template group is added to the billing plan, user can deploy an application server.

Load Balancers

Load Balancers, both autoscaling clusters and load balancer clusters, can only be created on the basis of Virtual Servers, and are not available for Smart Servers, Baremetal Servers, or VMware Virtual Servers.

Load balancing aids application availability and scalability. There are two load balancing options in OnApp:

- **Load balancer clusters**
  
  With this option, you specify which VSs (nodes) will participate in a load balancer cluster. Incoming traffic is distributed evenly between all the VSs added to a cluster – you still present a single host name to end users, but they actually access the cluster of VSs rather than a single end point. This helps application availability: if one VS fails, traffic is automatically routed to another in the cluster. You can add and remove cluster VSs as required.

- **Autoscaling clusters**
  
  VS Autoscaling increases or decreases your VS capacity by automatically adding or removing nodes to a cluster. The cluster is scaled in (decreased) or out (increased) based on rules you specify in the Control panel. This aids application performance and scalability.

  For instance, you can create a rule that will add 3 more nodes to a cluster if CPU usage has been more than 90% for the last 5 minutes; or rules that remove a node if there has been more than 256 MB RAM free for the last 20 minutes.
View Load Balancer Details

Load balancers are also virtual servers, so you can perform the same basic actions on them as for other VSs. To view load balancer details:

1. Go to your Control Panel's Load Balancers menu.
2. Click the label of the load balancer you are interested in.
3. The screen that appears loads the load balancer properties, billing statistics and tools for managing your load balancer.

Load balancer overview

Load balancer properties page gives general overview of the load balancer details:

- Compute resource
- Owner
- Prices per hour
- Power status & On/Off buttons
- Allocated memory
- CPUs
- Disk size
- IP addresses
- Network speed
- IPs
- Hostname and login
- Administrator's/user's notes
- List of cluster nodes
- Activity log

Add admin's or user's note to create a brief comment or reminder.

To expand the load balancer Tools menu, click the Tools button on the load balancer's details screen. Tools menu enables you to perform the following actions on load balancers (the exact list shown depends on the load balancer status):

Tools

The exact list of load balancer tools shown depends on the load balancer status:

Power options

- **Startup Balancer** - queues a start-up action for a balancer that's currently powered off.
- **Reboot Balancer** - powers off and then restarts the balancer.
- **Shut Down Balancer** - terminates the balancer forcefully.
- **Suspend Balancer** - stops a balancer, and changes its status to suspended.

LB options

- **Delete Balancer** - removes the balancer from the system.
- **Edit Balancer** - redirects to the edit load balancer details page.
- **Migrate Balancer** - pops up the balancer migration dialogue, enabling you to move the balancer to a different Compute resource.
- **Rebuild Balancer** - pops up the balancer rebuild dialogue, where you can rebuild the balancer on the same (or another) template. All data will be lost!

Cluster Nodes

This is the list of the nodes which form the load balancer. Here you can:

- **Power on/off** the node.
- **Delete** a node from a cluster.

To view load balancer's billing statistics or autoscaling monitors, click the appropriate tab.

Create Load Balancer Cluster

In this scheme, load balancers manage incoming requests one by one, rotating them between the servers added to a cluster (a round-robin method).

OnApp load balancers are based on Layer 4 load balancing which means that requests are
distributed at the transport layer, such as TCP or UDP transport protocols. To add an LB cluster:

1. Go to your Control Panel’s Load Balancers menu.
2. Click the Add New Balancer button.
3. On the page that follows, fill in the form that appears:

### On this page:

- **Configuration**
- **Cluster Nodes**

#### Configuration

**Cluster Configuration**

- **Port** - specify the port for this load balancer to run on (e.g. 9090, 8080, 9008 etc.)

To add multiple load balancer ports, click the “+” button next to the first port.

**Load Balancer Instance**

- **Label** – give a name to your load balancer instance.
- **Hostname** – specify a host name that will identify your load balancer.
- **Compute zone** – choose a Compute zone.
- **Compute resource** – select a Compute resource that will be enabled for the cluster.
- **Network zone** – choose a network zone for this load balancer.
- **Port Speed** – use the slider to set a port speed or tick the **Unlimited** box if required.

**Load Balancer Type**

- **Load Balancer Type** - choose the **Cluster** option and click **Next**.

#### Cluster Nodes

This is where you add and configure the nodes in this load balancing cluster. A node is a combination of a VS and an IP address. The only VSs you can add to a cluster are those which are based on the selected Compute resource/Compute zone, have an IP in the defined network zone and are located in the same IP range.

- **Virtual Server** - select a virtual server from the drop-down box and click the **Add Node** button.

Click **Save** to create the load balancer cluster.

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Enabled anti-spoofing would prevent adding Windows-based virtual servers as nodes to the load balancer cluster. To disable anti-spoofing reboot Windows-based nodes from Control Panel after they are added to the cluster.

### Create Autoscaling Cluster

To add an autoscaling cluster to your cloud:

1. Go to your Control Panel’s Load Balancers menu.
2. Click the **Add a Balancer** button.
   
   On the page that follows, fill in the form that appears:

---

### See also:

- Create Autoscaling Cluster
- Edit Load Balancer
- Delete Load Balancer
Configuration

Cluster Configuration

- **Port** - specify the port for this load balancer to run on (e.g. 9090, 8080)

Load Balancer Instance

- **Label** – give a name for your load balancer instance.
- **Hostname** – specify a host name which will identify your load balancer.
- **Compute zone** – choose a Compute zone.
- **Compute resource** – select a Compute resource that will be enabled for the cluster.
- **Network zone** – choose a network zone for this load balancer.
- **Port Speed** – use the slider to set a port speed or tick the Unlimited box if required.

Load Balancer Type

- **Load balancer type** - choose the **Autoscaling** option and click **Next**.

Cluster Nodes

These settings configure the nodes that will be added to your cluster.

Nodes network

- **Nodes network group** - the nodes network group for the cluster nodes.

Cluster Node Template

- **Image template** – choose a template from the drop-down box: nodes will be built on this template
- **Min node amount** – the minimum number of nodes in this cluster.
- **Max node amount** – the maximum number of nodes in this cluster.

Cluster Node Parameters

These are the settings for each node of a cluster. Each node added to a cluster will have the following parameters:

- **Memory** – set the amount of memory allocated per node in MB.
- **CPUs** – the number CPUs which will form each node.
- **CPU Priority** – specify CPU priority. For more info on CPU priority, refer to **Create VVs** section.
- **Rate Limit** – set the port speed for a node.

Autoscale Out Parameters

Example: if you set Min node amount = 2 and Max node amount = 5, then the system will scale out the cluster up to 5 nodes, and scale in to 2 nodes if required.

The only templates you can add to a cluster are those based on the selected Compute resource/Compute zone.
Set the rules defining when the system should add more nodes to your autoscaling cluster. The system will add nodes until the limit set in the Max node amount field is reached.

**Autoscale In Parameters**
Set the rules defining when the system should remove the nodes from your autoscaling cluster. The system will remove nodes until the limit set in the Min node amount field is reached.

Click **Save** to create the autoscaling cluster.

**Edit Load Balancer**

To edit a load balancer:
1. Go to your Control Panel’s **Load Balancers** menu.
2. Click the **Actions** icon next to a required load balancer, then choose **Edit Cluster**.
3. When the page loads, edit necessary parameters and click **Save**.

When you increase the RAM of the nodes of a load balancer (autoscaling type) to a value greater than the current node RAMx16 (which is a max_mem parameter in a configuration file and database), the load balancer will be cold resized. When deleting load balancer ports, you can remove all but the first port.

**Delete Load Balancer**

To delete a load balancer:
1. Go to your Control Panel’s **Load Balancers** menu.
2. Click the **Delete** icon next to a required load balancer.
3. Click **OK** to confirm the deletion.

**View Load Balancer Billing Statistics**

To view billing statistics for a load balancer:
1. Go to your Control Panel’s **Load Balancers** menu.
2. Click the label of the balancer you’re interested in.
3. Click the **Billing Statistics** tab.
4. Set Start and End time. By default the statistics are generated for the last three months or the actual VS existence period.
5. Move the **Show in my Timezone** slider to the right if you want to show bandwidth statistics according to your profile's timezone settings.
6. On the page that appears:
   - **Date** – particular date and time for the generated statistics
   - **Users** – the load balancer owner. Click the owner name to see the User Profile (user details)
   - **Virtual Servers** – the virtual server name with the total due for LB resources (CPU priority, CPUs, memory and template resources) for the point of time specified in the Date column.
   - **Network Interfaces Usage** – the total due for the network interfaces used by this LB for the point of time specified in the Date column. Click the network interface name to see its details.
   - **Disks Usage** – the list of disks assigned to this LB with the total due for the disk space resources (disk size, data read/written, reads/writes completed) for the point of time specified in the Date column. Click the disk name to see its details.
   - **Costs** – the total due for the Virtual Servers, Network Interfaces and Disks resources at the point of time specified in the Date column.

Scroll down to see Total Amount (the total due for the whole billing statistics period).

**View Load Balancer Autoscaling Monitors**

Autoscaling monitors provide information about the cluster load.

To view the load balancer's autoscaling monitors:
1. Go to your Control Panel's **Load Balancers** menu.
2. Click the label of the balancer you're interested in.
3. Click the **Autoscaling Monitors** tab.
4. On the screen that appears, you will see the list of autoscaling monitors along with the following details:
   - monitor name
   - virtual server label

Click the label of a monitor you are interested in to view its details.
Depending on the monitor type, the monitor details screen page will show the following info:

- **memory monitor details screen**
- **CPU monitor details screen**

### Memory monitor

**Memory monitor info:**

- Name of the memory test - test label
- IP of the device agent - IP address of the agent running on the server
- Platform - OS platform
- The name of the agent - virtual server identifier
- Free memory limit - free memory limit in MB
- Free swap limit - free swap limit in MB

**Memory last results:**

- Free memory - free virtual server memory in MB
- Total memory - total virtual server memory in MB
- Free swap - free swap disk size in MB
- Total swap (MB)
- Buffered memory (MB)
- Cached memory (MB)
- Status - monitor status: OK, if the monitor is correct or NOK, if the autoscaling configuration does not match. Monitor status is refreshed once in 5 minutes.

### CPU Monitor

**CPU monitor info**

- Name of the CPU test - CPU test label
- IP of the device agent - virtual server IP address
- Max value for kernel - maximum CPU value for kernel
- Max value for iowait - maximum CPU value for iowait
- Platform - virtual server OS
- Max allowed value for user - maximum CPU value for user processes
- The name of the agent - virtual server identifier
- Tag of the CPU test - CPU test tag
- Min allowed value for idle - minimum CPU value for idle mode
- Max allowed value for nice - maximum CPU value for nice

Max value is a CPU priority set during the server creation.

**CPU last results**

- CPU index - CPU number
- User Value - percentage of CPU used in user mode
- Kernel Value - percentage of CPU used by kernel
- Nice Value - percentage of CPU time occupied by processes with positive CPU value
- Idle Value - percentage of CPU used in idle mode
- IO Wait Value - percentage of time the CPU was idle during the IO request

Status - monitor status: OK, if the monitor is correct or NOK, if the autoscaling configuration does not match. Monitor status is refreshed once in 5 minutes.
Compute Resources

Compute resources are Xen or KVM platforms running on bare metal with CentOS Linux as the management operating system, or VMWare ESXi servers. They are used to provide hardware resources for virtual servers, ensuring highly efficient use of available hardware, and complete isolation of virtual server processes. Each virtual server in the cloud is hosted by a specific physical Compute resource server, from which it receives CPU time, RAM and storage capacity from the data stores attached to that Compute resource. OnApp supports multiple Compute resource platforms including Xen, KVM and VMware.

We strongly recommend that you avoid adding CloudBoot and static boot Compute resources to one Compute zone.

Compute resource features

Compute resources:

- Provide system resources such as CPU, memory, and network to virtual servers
- Control the virtual differentiation of entities such as virtual servers and application data being delivered to cloud-based applications
- Take care of secure virtualization and channelling of storage, data communications and server processing
- Can be located at different geographical zones
- Can have different CPU and RAM

Compute resources can also be organized into Compute zones, which make it easy to offer tiered service levels and create private clouds for specific users.

Compute resources can be dynamically booted over the network using the CloudBoot technology, or statically installed from a CentOS base. Note that enabling the OnApp storage platform requires Compute resources to be provisioned using the CloudBoot interface. Refer to the CloudBoot section for details.

When a Compute resource is inaccessible for a period of time, commands queued during that period of time will be marked as failed. This is an an expected OnApp behavior.

Compute resource management

The main Compute resources section in the left Control Panel menu provides access to basic tools for viewing, editing and rebooting Compute resources.

Tools for advanced Compute resource management and controlling Compute zones are located in the Control Panel's Settings menu (Settings > Compute resources, and Settings > Compute resource Zones). For details, refer to the Compute resource Settings section of this guide.

Compute Resource Matrix

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<th>Xen 4</th>
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<th>KVM 6</th>
<th>VMware</th>
<th>vCloud</th>
<th>AWS</th>
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<tr>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Cloudboot</td>
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<td></td>
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<td>N</td>
<td></td>
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<td>Recipes</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<tr>
<td>Host CDN Edge</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<tr>
<td>Storage</td>
<td>OnApp Integrated Storage</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<td>Local Storage</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>SAN</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Availability</td>
<td>Automatic Failover</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Integrated Backup</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<td>Incremental Backup</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
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<td>Snapshot Capability</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>see VMware VS Snapshots</td>
<td>see Virtual Server Snapshots</td>
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<td>Networking</td>
<td>Load balancing clusters</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<tr>
<td>Firewall rules</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>presented with publishing rules</td>
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<tr>
<td>Manage Network Interfaces</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Virtual server management</td>
<td>Autoscaling</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Hot RAM resize without reboot**</td>
<td>Y</td>
<td>Y</td>
<td>Y**</td>
<td>Y**</td>
<td>Windows 2008 and Windows 7 VSs</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Hot CPU cores resize without reboot</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Windows 2008 and Windows 7 VSs. Some Linux distributions</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Cold migration</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>VMware utilizes vMotion to ensure that the VSs are optimally placed on the Compute resources</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Disk hot attachment / detachment</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Available for Linux VSs (Virtio templates)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Disk resize (increase/decrease)</td>
<td>Available for Linux VSs. FreeBSD - increase only is available. Disk size decrease is available for non-primary FreeBSD disks. Disk size decrease is not available for Integrated Storage.</td>
<td>Available for Linux VSs. FreeBSD - increase only is available. Disk size decrease is available for non-primary FreeBSD disks.</td>
<td>Available for Linux VSs. FreeBSD - increase only is available. Disk size decrease is available for non-primary FreeBSD disks.</td>
<td>Available for Linux VSs. FreeBSD - increase only is available. Disk size decrease is available for non-primary FreeBSD disks.</td>
<td>Y - Increase only. Reboot is required.</td>
<td>Y - cold</td>
<td>N</td>
</tr>
<tr>
<td>IPv6 support ***</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Reboot in recovery</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Segregate</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>VIP status</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<td>Change owner</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>CPU Topology</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Power on/off/reboot vApp</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Power on/off/reboot VS</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Build vApp from template</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Build VS from template</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Integrated VS into vApp</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>
Deleting a vApp:

- N

Deleting a VS:

- Y
- N

Resetting root password:

- Y
- N

Setting SSH keys:

- Y
- N

Editing vs resources:

- Y

Statistics:

- CPU Stats
  - Y
  - Y
- Disk IOPS Stats
  - Y
  - Y
- Network Interface Stats
  - Y

Console:

- HTML 5 Console
  - Y
- VMRC Console
  - N

Smart servers:

- N
- Y

Edge servers:

- Y
- Y

Baloooning release resource type for Compute zones:

- N
- N

CPU Units:

- Y

**It is not possible to exceed the server's max_memory when increasing RAM on KVM Compute resources. Detailed info about RAM resize without reboot and hot-migrate abilities per template is available at:**

- http://templates.repo.onapp.com/Linux_templates.html
- http://templates.repo.onapp.com/FreeBSD_templates.html

*** At least one IPv4 address must be allocated to a virtual server's primary network interface, as some applications do not support IPv6.

### CloudBoot Compute Resources

CloudBoot functionality is a method of Compute resource installation without the presence of a local disk or other local storage, utilizing the PXE and DHCP servers. This allows users to both lower their hardware requirements on the Compute resources (no local storage is required to boot a Compute resource) as well as make the process of adding new Compute resources to the cloud more efficient:

- No manual admin work required to boot Compute resources
- No local storage needed to boot Compute resources
- Self discovery of new Compute resources added to the cloud
- Ability to move Compute resources quickly between zones
- Ability to move quickly between Compute resource KVM and XEN types

To start using CloudBoot, you must enable CloudBoot and Storage in the system configuration first (Settings > Configuration > CloudBoot). Visit Configuration Settings chapter for more details.

It's recommended that you create a separate network for Compute resources when using the CloudBoot system to prevent errors of other servers (not Compute resources) on the cloud to boot into the CloudBoot network. All Compute resources must reside on the same VLAN (this concerns Compute resources only, not the VS's themselves).

The following CloudBoot features are not currently available (they will be introduced in future releases):

- Bonded NICs for the management/boot interface

For details how to create a CloudBoot Compute resource, refer to the Create CloudBoot Compute Resource section.

### VMware Compute Resources

VMware Compute resource is a combination of all ESXi Compute resources at the vCenter displayed as a single combined Compute resource with a sum of the CPU, RAM and Disk resources rather than individual Compute resources.

VMware Compute resources behave differently from Xen or KVM: with Xen/KVM the control is made directly upon the Compute resources, while with VMware OnApp directly controls the VMware vCenter. This allows vCenter to control the VSs with the full range of VMware functionality including DRS and vMotion to ensure that the operation is optimal.

For details how to create a VMware Compute resource, refer to the Create VMware Compute resource section of the vCenter Implementation Guide.

### VCloud Compute Resources
VCloud Compute resource is used to integrate OnApp and VMWare vCloud director so that enable existing vCloud Director installations to use the OnApp CP as their front-end UI.

For details how to create a vCloud Compute resource, refer to the Create vCloud Compute resource section of the OnApp and vCloud Director Configuration Guide.

View Compute Resources

The Control Panel provides a quick way to see Compute resources and Compute zones in the cloud, along with a summary of their resources.

Click your Control Panel's main Compute resources menu to see a list of all Compute resources in your cloud, and a quick overview of their details:

- **Label**
- **IP address**
- **Type (Xen, KVM etc)**
- **Zone**
- **Location Group**
- **Failover**
- **VS - number of total VS hosted**
- **CPU**
  - **Cores**
  - **Used**
  - **Available**
  - **MHZ**
- **RAM**
  - **Total**
  - **Free**

Click the Compute resource's label to view the list of virtual servers controlled by that Compute resource.

View Compute Resource Details

You can drill into a specific Compute resource to see details of all virtual servers controlled by that Compute resource, and their resources. To do so:

1. Go to your Control Panel's Compute resources menu (or click a Compute zone's name underneath it). On the screen that appears you'll see a list of Compute resources.
2. Click a Compute resource's name (label) to see its details screen.
3. On the screen that appears, you'll see a list of all virtual servers hosted on that Compute resource, along with their IP address, power status, disk and RAM resources.
4. To drill into a specific VS, click its label.
5. To edit or reboot the Compute resource, click the Tools button next to required Compute resource and select the proper action.

Edit Compute Resource Details

You can edit Compute resource details (its label, type, IP address and so on) via the Compute resource details screen, or through the Control Panel's Settings > Compute resources menu (see Compute resources Settings section for details: the editing functionality is the same whichever method you choose.)

To edit Compute resource details:

1. Go to your Control Panel's Compute resources menu (or click a Compute zone name underneath it). On the screen that appears you'll see a list of Compute resources.
2. Click a Compute resource's name (label).
3. Click the Tools button, then click Edit Compute resource.
4. On the screen that follows, change details as required:
   - The Compute resource's name (label)
   - Its IP address
   - Compute resource type
   - Backup IP address
   - CPU units
   - Whether it's enabled or not (Compute resources that are not enabled cannot be used to host VSs)
   - Move the slider to the right to collect statistics for the Compute resource.
   - Move the slider to the right to disable failover. Compute resource failover means VS migration to another Compute resource if the Compute resource on which it is running goes offline.

   - When you assign Compute resource to the new Compute zone without any Compute resources, the disable failover zone's parameter automatically takes the value of the Compute resource.
   - When all Compute resources within the zone have the same value, the Compute zone's disable failover status
5. Click the **Save** button to save your changes.

You can also edit your Compute resources in the Control Panel's **Settings** menu. Refer to the **Settings** section of this guide for more details.

### Reboot Compute Resource

To reboot a Compute resource:

1. Go to your Control Panel's **Compute resources** menu (or click a Compute zone name underneath the main Compute resource menu link).
2. Click the label (name) of the Compute resource you want to reboot.
3. On the Compute resource details screen that follows, click the **Tools** button, then click **Reboot Compute resource**.
4. A new screen will open asking for confirmation (via three checkboxes) before reboot:

   - **Start running virtual servers after reboot?** If this option enabled the system will initiate the failover process.

     The failover process will be initiated despite the **Disable failover** configuration for **Compute resource** or **Compute zone**.

   - **Stop all virtual servers that cannot be migrated to another Hypervisor?** Check this box if you want VSs that cannot be migrated to be powered off. When a Compute resource is scheduled for a reboot, OnApp will first attempt to hot migrate all VSs it hosts. If hot migration is not possible for a VS, OnApp will attempt to cold migrate that VS. With this box checked, if cold migration fails, the VS will be stopped so the reboot may proceed. If you don't check this box, OnApp will attempt to hot and then cold migrate all VSs hosted by the Compute resource being rebooted – but will stop the migration process if any VS cannot be migrated.

   - **Are you sure you want to reboot this Compute resource?** A simple confirmation to confirm that you want the Compute resource to reboot.

5. When you’re certain you want to proceed with the reboot, click the **Reboot** button.

---

If your backups disappear after rebooting the CloudBoot Compute resource with LVM storage which is used as a backup server, add mount command to CloudBoot backup server custom config after the reboot. This is a known issue which will be fixed in the future release.

To fix your custom config settings, use one of the following options provided in the examples below (you will have to specify your own device names):

1. If you have a separate partition for backups and templates (/dev/sda1 and /dev/sda2)
   ```bash
   mkdir -p /onapp/backups
   ```
Assets

Assets are the Compute resources that are connected to the Control Panel server, but are either not configured or not assigned to the Compute zone.

Compute resources that are not configured yet are accessed via the Settings > Assets menu.

Compute resources that are already created but not assigned to the Compute resource group are managed via the Control Panel's Assets menu. They are managed exactly the same as Compute resources.

Click your Control Panel's main Assets menu to see the list of all unassigned Compute resources in your cloud, and a quick overview of their details:

- Label
- IP address
- Type (Xen, KVM etc)
- Zone
- Location Group
- Failover status
- VSs
- CPU cores
- CPU resources used
- CPU resources available
- CPU speed
- Total RAM
- Free RAM

You can drill into a specific asset to add virtual servers to that Compute resource, edit resources, or reboot an asset. To do so:

1. Go to your Control Panel's Assets menu. On the screen that appears you'll see the list of assets.
2. Click an asset's name (label) to see its details screen.
3. On the screen that appears:
   - click the "+" sign to add a VS to this Compute resource. You'll be prompted to a VS Creation Wizard.
   - click Tools > Edit Compute resource to change its details and resources.
   - click Tools > Reboot Compute resource to reboot an asset.

Servers

Virtual servers are based on templates and are deployed on Compute resources. Compute resources give them access to CPU, disk and network resources. OnApp Cloud gives you high-end cloud management features including:

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<td>Boot from ISO</td>
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<td>Startup on Recovery</td>
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<td>Change owner</td>
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<td>Set SSH keys</td>
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<tr>
<td>Edit Administrator's note</td>
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<td>Integrated console</td>
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<td>Transactions and logs</td>
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<td><strong>Networks</strong></td>
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<td>Configure network interface</td>
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<td>Rebuild network</td>
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<td>Set firewall rules</td>
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<td>Virtual server IP addresses</td>
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<td>Display network speed for network interfaces</td>
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<td>Edit network speed</td>
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<td><strong>Disks</strong></td>
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<td>Create disks</td>
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<td>Migrate disks</td>
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<td>Delete disks</td>
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<tr>
<td><strong>Backups</strong></td>
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<td>View</td>
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<tr>
<td>Convert to template</td>
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<tr>
<td>Restore backup</td>
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<td>Delete backup</td>
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<tr>
<td>Edit backup note</td>
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<tr>
<td><strong>Backup Schedules</strong></td>
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<tr>
<td>View schedules</td>
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<td>Create schedule</td>
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<td>Edit schedule</td>
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<td>Delete schedule</td>
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<tr>
<td><strong>Statistics</strong></td>
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<td>CPU utilization</td>
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<tr>
<td>Billing statistics</td>
<td></td>
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</tr>
</tbody>
</table>
OnApp supports two kinds of storage for virtual servers: traditional centralized SANs, and the new distributed block storage functionality introduced with OnApp Storage, in which local disks in Compute resources provide the physical storage space allocated to virtual servers. In each case, the OnApp platform creates virtual data stores from the physical resources, and uses these to provide virtual servers with virtual disks.

Administrators in OnApp have full control over the lifecycle of virtual servers. Virtual servers can be in the following states:

- **Created** - A server is created when you successfully Create Virtual Server from the Virtual servers menu, having selected its template and set its properties, resources and network requirements.
- **Build** - A virtual server must be built after it is created. Building is the process of actually allocating the physical resources specified during its creation. This can be done manually, or automatically if you check the Build Virtual Server Automatically box during the creation process.
- **Powered on** - A power on starts the virtual server, its operating system and processes.
- **Powered off** - If the operating system cannot be stopped, it will be forcefully terminated.
- **Shut down** - A shut down will attempt to gracefully stop a virtual server and its operating system, which typically involves terminating all running applications.
- **Rebooted** - Rebooted means a virtual server has been shut down, and then powered on again.
- **Deleted** - When a virtual server is deleted, its backups are still stored on the server and can be restored if required.
- **Re-built** - To rebuild a virtual server means to reinstall the template and reconfigure the resources and network. All data will be lost.
- **Failed** - A failed virtual server is one that is down, for example because of hardware or network problems. You will have to start the server manually when those problems have been solved.

Applications

Application is a piece of software that brings additional features into the basic functionality. OnApp allows you to deploy a wide range of applications by means of additional software. To install different applications on your Cloud you should create an Application Server first. Application Server is a regular VS based on CentOS Application Server template but with pre-installed software. Then you can install the applications on that server (like Drupal, Joomla, Wordpress etc.) using web interface. As an administrator you can charge for the template (by means of Template store) on which the application server has been built.

You can perform the following actions with the applications:

- view
- create
- backup
- delete

For more details, refer to the appropriate sections.

See also:
- Application Servers - the information on managing application servers
- Create Application Server - the instructions on creating an application server
- Application Server Billing - the info on how you can charge your customers for applications
- Applications (API) - the list of available API requests

View Applications

To view an application:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > Applications.
4. The page that loads will show the list of applications together with their:
   - application name - the name of application installed on this application server
   - software version - the version of application software
   - software URL - this URL is a link to application itself
   - Admin URL - this URL is a link for administrator, where he can enter credentials to log into application
   - Actions - click the Actions icon to perform the following procedures with the application:
     - backup application
     - remove application
There is one more possibility to view an application:

1. Go to your Control Panel's **Application Servers** menu.
2. Click the label of the server you're interested in.
3. On the screen that appears, under statistic data, you can see the list of all applications, deployed on this application server.

---

**Create Application**

Application Servers allow you to install various applications (like Drupal, Joomla, Wordpress etc.) on a server using web interface.

To create an application:

1. Go to your Control Panel's **Application Servers** menu.
2. Click the label of the server you're interested in.
3. Click the **Applications** tab ➔ **Applications**.
4. On the screen that appears, press "+" button.
5. Complete the application creation form:

   **Application Select**

   **Popular Applications**

   In this section you can see the logos of the most popular applications. Choose one of them by clicking the appropriate logo.

   **Application catalog**

   *Category* - choose the application category from the drop-down list (cms, blogs, ecommerce, forums etc.)

   *Application* - choose the application from the drop-down list
Application Description

The following page will provide you with the description of application, which you have chosen from the catalog, its features and screenshots.
6. Click Proceed.
7. On the screen that appears the following application settings will be specified:

- Click the Proceed button on the screen.
- The following application settings will be specified:

**Settings Description**

- **Overview**
  - Images as a web-based PHP and HTML for displaying images on the Internet. Images can be configured through an administration area. Images supports apart from the typical image formats like JPEG, GIF and PNG, other data formats.
  - Furthermore Images includes a template system to modify the design of the gallery. An external language file allows for easy translation into other languages.

- **Features**
  - Extensive, password-protected administration
  - Database backup function
  - Multi-language support
  - Easy to use installer for Images
  - RSS-Feeds
  - Unlimited categories and subcategories
  - Logging and statistics of clicks for each category or subcategory
  - Title and description optional for every category
  - Number of visits per subcategory plus categories can be defined

**Software Setup**

- **Directory** - the name of directory, where application is stored (for example, "drupal" for Drupal application)
- **Database** - the name of database, used by application

**Site Settings**

Settings are filled in automatically. In case you want to change automatic settings, fill in the appropriate field with your alternative settings.

Settings vary depending on every application. The field Directory will be present in every case, while the field Database, for example, is relevant only for those applications, which require databases for their functioning.
Site name - name of the application site
Site description - description of the application site

Database Settings
Table prefix - prefix, that is used for database tables
Import sample data - choose language type from the drop-down list

Admin account
Admin username - username of administrator
Admin password - password of administrator
Real name - real name of administrator
Admin email - email of administrator

Choose language
Select language - choose application language from the drop-down list

8. Click the Install button.

There is one more possibility to create an application:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. On the screen that appears, under statistic data, you can see the list of all applications, deployed on this application server. Press "+" button in the upper right corner and complete the application creation form as described above in step 5.
Delete Application

To delete an application:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > Applications.
4. The page that loads will show the list of applications. Click the Actions button next to a required application and choose the Remove button.
5. Move the Remove directory slider to the right if you want to remove the directory.
6. Move the Remove database slider to the right if you want to remove the database.
7. Move the Remove database user slider to the right if you want to remove the database user.
8. Click Remove.

Application Backups

To back up an application means to put it in an archive. Single application could have multiple backups taken. Application backups are used for copying and archiving applications in order not to lose important information. You can view/create/edit/restore or delete application backup.

View Application Backups

To view an application backup:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > Applications.
4. The page that loads will show the list of application backups together with their:
   - application name
   - size
   - software version
   - software URL
   - Backup note
   - Actions (restore, remove)

Create Application Backup

To back up an application:

1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > Applications.
4. The page that loads will show the list of applications. Click the Actions button next to a required application and choose the Backup button.
5. Move the Backup directory slider to the right if you want to back up the directory.
6. Move the Backup database slider to the right if you want to back up the database.
7. Click the Backup button.
To restore an application backup:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the server you’re interested in.
3. Click the Applications tab > Backups.
4. The page that loads will show the list of application backups. Click the Actions button next to a required backup and choose the Restore button.
5. Move the Restore directory slider to the right if you want to restore the directory.
6. Move the Restore database slider to the right if you want to restore the database.
7. Press the Restore button.

To delete an application backup:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the server you’re interested in.
3. Click the Applications tab > Backups.
4. The page that loads will show the list of application backups. Click the Actions button next to a required backup and choose the Remove button.
5. You will be asked for confirmation before the application backup is deleted. Press the Remove button.

Application server users can transfer images and other files to and from an application server by means of FTP. To enable this function you should create FTP user accounts. You can view, create and delete FTP users of an application server.

**On this page:**

- View FTP users
- Create FTP user
- Delete FTP user

**See also:**

- Applications - the information on managing applications
- Application Backups - the information about application backups
- Application Servers - the information on managing application servers

View FTP users
To view FTP users:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > FTP Users.
4. The page that loads will show the list of FTP users together with their:
   - **Login** - the user's login name
   - **Path** - the route to FTP folder
   - **Usage** - the amount of FTP folder space, used by this user (in MB)
   - **Actions** - click the Actions icon to perform the following procedures with FTP users:
     - remove FTP user

Create FTP user

To create an FTP user:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > FTP Users.
4. On the screen that appears, click "+".
5. Complete the creation form:
   - **Login** - provide user's login name
   - **Password** - create user's password
   - **Password confirmation** - enter user's password one more time
   - **Path** - indicate the route to FTP folder
6. Click **Submit**.

Delete FTP user

To delete a FTP user:
1. Go to your Control Panel's Application Servers menu.
2. Click the label of the server you're interested in.
3. Click the Applications tab > FTP Users.
4. The page that loads will show the list of FTP users. Click the Actions button next to a required FTP user and choose the Remove button.
5. You will be asked to confirm the deletion. Click **Remove**.

Manage Domains

There is a possibility to add domains to resolve the application server IP address. You can view, create and delete application domains.

See also:
- Applications - the information on managing applications
- Application Backups - the information about application backups
- Application Servers - the information on managing application servers

On this page:
- View Domains
- Create Domain
- Delete Domain

View Domains
To view domains:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the server you’re interested in.
3. Click the Applications tab > Domains.
4. The page that loads will show the list of domains together with their:
   - Name - the domain name
   - Path to Application - the route to application
   - Type - whether domain is addon or parked
   - Actions - click the Actions icon to perform the following procedures with domains:
     - remove domain

Create Domain

To create a domain:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the server you’re interested in.
3. Click the Applications tab > Domains.
4. On the screen that appears, press “+” button.
5. Complete the creation form:
   - Domain - enter domain name
   - Choose domain path using one of the following tabs:
     - Application - choose application-based path from the drop-down menu
     - Addon - enter domain path manually
     - Parked - /home/onapp/public_html directory is chosen by default
6. Click the Submit button.

Delete Domain

To delete a domain:

1. Go to your Control Panel’s Application Servers menu.
2. Click the label of the server you’re interested in.
3. Click the Applications tab > Domains.
4. The page that loads will show the list of domains. Click the Actions button next to a required domain and choose the Remove button.
5. You will be asked to confirm the deletion. Click Remove.

DNS

The full version of OnApp Cloud (with CDN enabled) now gives you access to our free Anycast DNS service. Instead of managing your own DNS servers you can use our fully redundant global DNS, hosted at multiple datacenters around the world, and manage it through your OnApp Control Panel.

You can use our DNS service with domains registered anywhere on a third party domain registrar. The Control Panel lets you set up hostnames, manage DNS records, aliases, Mail Exchange, TXT and SRV records.

Using DNS has two main steps: setting up DNS hostnames, and managing DNS zones.

DNS Setup

DNS setup allows you to create a DNS hostname. After you create a DNS hostname, you get access to creating and managing DNS zones. To set up a new DNS, make sure that:

- CDN is enabled
- You have dns_zone or dns_zone.setup permission to access this page.

You can create only one DNS domain. Once created, a DNS domain can’t be deleted, only updated.

If an administrator uses the same license for two different Control Panels, they can use the same DNS domain for CP1 and CP2. To do this, administrator should set the same DNS domain settings for both Control Panels.
To add a DNS domain:

1. Go to your Control Panel's Settings menu.
2. Click the DNS Setup button.
3. On the screen that appears, type your fully qualified domain name. Mind that you won't be able to use a domain name that is already registered with OnApp DNS.

   The domains of the following kind are forbidden:
   - google
   - microsoft
   - domain.com
   - onapp.com
   - facebook.com
   - gmail.com
   - googlemail.com
   - yahoo

4. Click the Save button.

After the DNS domain is added, the DNS service will be available to users. If you have added a domain, but still face some issues or the "Unable to get DNS Zone Setup: CDN service is temporarily unavailable" error occurs, contact support.

Make sure your domain name registrar has designated your domain to the following glue records:

- ns1: 69.168.228.2
- ns2: 69.168.229.2
- ns3: 69.168.230.2
- ns4: 69.168.231.2

Edit DNS Domain

To edit your DNS domain:

1. Go to your Control Panel's Settings menu, and click the DNS Setup icon.
2. Type a new fully qualified domain name to replace your existing domain
3. Click the Save button to save changes.

If DNS domain is updated, all NS records for all DNS zones under this user will be updated.

DNS Zones

OnApp DNS Zone feature allows you to manage your and your clients’ domain DNS. Each time DNS zone, record or setup settings are refreshed, the DNS configuration is immediately updated on the DNS vendor server.

Create DNS Zone

To add a new DNS zone:

1. Go to your Control Panel's DNS menu.
2. Click the Create DNS Zone button.
3. Fill in your domain name. At the domain registrar, point your domain to the following name servers:

   - ns1.yourdomain.com
   - ns2.yourdomain.com
   - ns3.yourdomain.com
   - ns4.yourdomain.com

Where yourdomain.com is your fully qualified domain name, which you have specified at DNS setup.

1. Move the Auto Populate With Existing DNS record slider to the right if you want to automatically import your existing DNS settings, or skip this step to start from scratch. Note that this option may not import all existing settings, so you should check your new record for any missing entries.
2. Click the Submit button.
3. On the page that appears, click the Add icons next to the DNS records you want to add. You can add and manage the following DNS records:
   - SOA (Start of Authority) – change the start of authority time to live value (TTL). To change a SOA TTL, click the TTL cell next to the SOA record and type a new value.
- **NS** (Name Server) – change the TTL of the existing name servers or add new name servers. To change a name server's TTL, click the TTL cell next to the name server record and type a new value.

- **A** (Host) – point your domain name to a static IP address. To create a new A record, enter the following parameters into the cells:
  - Host: enter a host name or use the "@" sign to represent your current host.
  - Point to: enter the IP address to which the user would be sent for this host name.

  A record example: ftp 192.168.0.1 86400

  Where: ftp is the host; 192.168.0.1 is the IP; 86400 is TTL value.

  So your ftp.yourdomain.com will resolve to 192.168.0.1 IP address and the TTL value = 86400 seconds.

- **AAAA** (Host) –To create a new AAAA record, fill in the following cells:
  - Host: enter a host name or use the "@" sign to represent your current host.
  - Point to: enter the IP address to which the user would be sent for this host name.

  AAAA record example:

  ftp 2a00:1450:400b:c00::68 86400

  Where: ftp is the host, 2a00:1450:400b:c00 is IPv6 address, 86400 is the TTL value.

  So your ftp.yourdomain.com will resolve to 2a00:1450:400b:c00 IPv6 address.

- **CNAME** (Alias) – alias domain records to your domain.

  It is possible to use underscore character in the CNAME records.

  To add a CNAME record, fill in the following cells:
  - Host: enter the host name or use the "@" sign to represent your current host.
  - Point to: enter an alias you want to assign to your domain.

  CNAME record example:

  www example.com 86400

  Where: www is an alias, example.com is a valid domain name, 86400 is TTL value.

  To add the aliases, make sure an A record is added to this domain.

- **MX** (Mail Exchange) - identify the mail server for your domain name.

  To add a MX record, fill in the following cells:
  - Priority: set the MX priority to specify the routing order (lower value means higher priority).
  - Host: enter the hostname to which the emails should go.
  - Goes to: enter the valid domain name.

  MX record example:

  10 mail example.com 86400

  Where: 10 is priority, mail is the host, example.com is a domain, 86400 is TTL.

- **TXT** – add additional information about the DNS zone.

  To add a TXT record, enter the following cells parameters:

  - Host: enter the valid host name
  - Value: any free text you want within a TXT record. Maximum 1300 characters.

  TXT record example:

  @ v=spf1 a mx ptr ip4:192.168.1.1 ~all 86400

  Where: @ is the host name, v=spf1 a mx ptr ip4:192.168.1.1 ~all is valid, 86400 is TTL.

- **SRV** (Service) – specify services that you have on your domain.

  To add a SRV record, enter the following cells parameters:
Host – type the host for which this record is valid.
Priority – set the host priority. Lower value means more preferred.
Weight – the approximate weight for relative records with the same priority.
Port – the port on which the service can be found.
Points to – enter the domain name.
TTL – set the time to live value.

SRV record example:
xmpp._tcp 0 1 5222 jabber.example.com 86400
Where: xmpp._tcp is a host, 0 is priority, 1 is weight, 5222 is port, jabber.example.com is a points to value, 86400 is TTL.

Wildcards
In the OnApp version 3.0 it is possible to use wildcards in all DNS records. The table below explains the rules of wildcard use.

<table>
<thead>
<tr>
<th>DNS record type</th>
<th>Allowed</th>
<th>Disallowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>*.example.com</td>
<td>abc.*example.com</td>
</tr>
<tr>
<td></td>
<td>**.example.com</td>
<td><em>.</em>.example.com</td>
</tr>
<tr>
<td></td>
<td>*.abc.example.com</td>
<td>sub.*.example.com</td>
</tr>
<tr>
<td></td>
<td></td>
<td>abc.<em>.</em>.example.com</td>
</tr>
<tr>
<td></td>
<td>• Note: multiple '<em>' will be changed to single '</em>'. E.g. ****.example.com will be changed to <em>.</em>.example.com</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can only be prefixed for domain.</td>
<td></td>
</tr>
<tr>
<td>AAAAA</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td>MX</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td>CNAME</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td></td>
<td>Note: NAME wildcard record can not coexist with A record.</td>
<td></td>
</tr>
<tr>
<td>TXT</td>
<td>*.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td><em>.</em>.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td>sub.*.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td>sub.<em>.</em>.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td><em>sub</em>.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td>Note: Wildcards are valid in any position, as long as the domain remains DNS zone’s subdomain.</td>
<td></td>
</tr>
</tbody>
</table>

It is not possible to use wildcards for NS, SOA and SRV records because of PowerDNS limitations.

Underscore characters
In the OnApp version 3.0 it is possible to use wildcards in all DNS records. The table below explains the rules of underscore use.

<table>
<thead>
<tr>
<th>DNS Record type</th>
<th>Allowed</th>
<th>Disallowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>_abc.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td>_abc.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td><em>abc_abc</em>.example.com</td>
<td>abc._example.com</td>
</tr>
<tr>
<td></td>
<td>• Note: Multiple '_' will not be changed to a single underscore, unless stated.</td>
<td></td>
</tr>
<tr>
<td>AAAAA</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td>MX</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td>CNAME</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Note: NAME record with underscore can not coexist with A record.</td>
<td></td>
</tr>
<tr>
<td>NS</td>
<td>Same to A record</td>
<td>Same to A record</td>
</tr>
<tr>
<td>SRV</td>
<td>_xmpp._tcp.example.com</td>
<td>All except examples in the <strong>Allowed</strong> column.</td>
</tr>
<tr>
<td></td>
<td>_xmpp.__tcp.example.com</td>
<td></td>
</tr>
<tr>
<td></td>
<td>_xmpp._tcp._example.com</td>
<td></td>
</tr>
<tr>
<td></td>
<td>_xmpp._tcp._abc.example.com</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Note: Multiple ‘_’ e.g. ‘_____’ will be changed to a single underscore character.</td>
<td></td>
</tr>
<tr>
<td>TXT</td>
<td>All except examples in the <strong>Disallowed</strong> column.</td>
<td>example.com</td>
</tr>
<tr>
<td></td>
<td></td>
<td>abc.example.com</td>
</tr>
<tr>
<td></td>
<td></td>
<td>example.com_</td>
</tr>
<tr>
<td></td>
<td></td>
<td>example_.com</td>
</tr>
</tbody>
</table>

### Edit DNS Zone

When you edit a DNS Zone, you manage the records assigned to this zone. The changes are instantly updated on DNS.

**To edit a DNS zone:**

1. Go to your Control Panel's DNS menu. On the screen that appears, the list of DNS zones will be displayed.
2. Click the **Actions** button next to the domain zone you want to change, then choose **Edit**.
3. On the screen that appears, edit the DNS records as required:
   - **SOA** (Start of Authority) – change the start of authority TTL.
   - **NS** (Name Server) – change the TTL of the existing name servers or add a new name server.
   - **A** (Host) – change the A host record properties:
     - In the **Host** text box, type the name for a host.
     - In the **Point to** text box, type the IP address for the new host.
     - Set the TTL value.
   - **AAAA** (Host) – change the AAAA record properties as described for the A record.
   - **CNAME** (Alias) – canonical name properties.
   - **MX** (Mail Exchange) - - change the mail server properties for your domain name.
   - **SRV** (Service) - specify services that you have on your domain.

### Delete DNS Zone

To delete a domain zone:

1. Go to your Control Panel's DNS menu.
2. Click the **Actions** button next to the domain zone you want to delete, then click **Delete**.
3. Click **OK** to confirm the deletion.

### User DNS Zones

User DNS zones tab allows you to manage your clients' DNS zones. Use the **Actions** button next to the required user DNS zone to edit/delete it. The changes will be instantly updated on our DNS.

### Set End-User Access to DNS Service

To set end-users' access to DNS service:

1. Go to your Control Panel's **Roles and Sets** menu.
2. Click the **Actions** button next to the required user, then click **Edit**.
3. On the screen that follows, choose the **DNS Zone** group in the **Groups** field.
4. The following list of DNS permissions will appear:
   - Any action on DNS zone
   - Create a new DNS zone
   - Destroy any DNS zone
   - Destroy own DNS zone
   - See all DNS zones
   - See own DNS zones
   - Create a new DNS record
   - Destroy any DNS record
Any action on DNS record
See all DNS records
See own DNS records
Update any DNS records
Update own DNS records
DNS Setup

5. Tick the required boxes.
6. Click the Save button.

View User DNS Zones

To view existing clients' DNS zones:
1. Go to your Control Panel's DNS menu.
2. Click the User DNS Zones tab. On the screen that appears, you'll see a list of all clients' DNS zones.

Edit User DNS Zones

To edit existing clients' DNS zones:
1. Go to your Control Panel's DNS menu.
2. Click the User DNS Zones tab. On the screen that appears, you'll see a list of all clients' DNS zones.
3. Click the Actions button next to it, then click Edit. On the screen that appears, edit its details and click the Save button.

Delete User DNS Zones

To delete existing clients' DNS zones:
1. Go to your Control Panel's DNS menu.
2. Click the User DNS Zones tab. On the screen that appears, you'll see a list of all clients' DNS zones. Click the Actions button next to the DNS zone you want to delete, then click Delete. You'll be asked to confirm deletion.

Blueprints

Blueprints are used for VMware vCenter virtual server management. It allows importing VMware vApps images from the ESXi Compute resources at vCenter, and creating blueprints from those images within the OnApp Control Panel.

Using blueprint templates, OnApp administrators can create and manage multiple virtual servers as a single multi-tiered application (blueprint). A single blueprint template is a pre-configured template that contains virtual server operating system and the configuration settings (network configuration and firewall rules). Utilization of blueprints allows you to create sets of different types of servers: for example, web servers, database, etc. based on imported vApps templates.

Blueprint management is described in the Blueprints section of the vCenter Implementation guide.

Integrated Storage

Integrated Storage functionality allows the cloud admin to build a highly scalable and resilient SAN storage target for virtual server storage using local disks in Compute resources. Using the Integrated Storage, you can create a virtual data store in OnApp Cloud that spans multiple physical drives in Compute resources, with RAID-like replication and striping across drives. The SAN is fully integrated into the Compute resource platform, and the platform is completely decentralized: each node is capable of making decisions about data synchronization and load balancing, and communicates directly with other nodes to move content around dynamically without depending on any centralized controller. There is no single point of failure: for example, if a Compute resource fails, the SAN reorganizes itself and automatically recovers the data. The OnApp Integrated Storage makes exclusive use of CloudBoot to provision Compute resources, so Compute resources must be booted via CloudBoot in order to enable the integrated SAN functionality. For details, refer to the CloudBoot Compute resources section.

Known Limitations and Restrictions

- You can use integrated storage on XEN and KVM cloudbooted Compute resources only. VMware Compute resources are not supported for IS.
- Currently it is not possible to utilize bonded NICs for the CloudBoot management/boot interface.
- To start using integrated storage, you must have a Manage OnApp Storage permission enabled for your user role. Also, you have to enable the integrated storage in the system configuration manually (Settings > Configuration > OnApp Storage). Visit Configuration Settings chapter for more details.
- Integrated Storage supports PCI devices that have drivers compatible with the Linux kernel versions we use.
- Some customers may experience MAC address flapping across ports because the switch does not support the balance-rr mode. In this case, we recommend to set up separated VLANS per each bond pair for that switch.
- If an IS data store is created with overcommit (overcommit is not equal to none) and a backend node in the data store runs out of space, the storage controller which manages the backend node will become unavailable and vdisk paths will become degraded. Enabling overcommit and running out of physical space is a bad condition and should always be avoided. It is strongly recommended that you create data store with overcommit = none for production purposes.

For details, see the dedicated OnApp Storage guide.

**Integrated Storage Data Stores**

Integrated storage data store functionality allows combining physical disks from any server in the system into a virtual data store to create a SAN. Afterwards you can remove disks from a server, add them to any other server and run anywhere in the system without impacting operation of your SAN. The disks in the SAN are grouped by performance.

**Data stores can only contain drives of equal performance.**

**How many virtual servers can reside on the integrated storage data store?**

Use the following approach to calculate the number of virtual servers that can reside on the data store. First you need to calculate \( N \), the maximum number of NBD paths available. This is given by the following formula:

\[
N = \frac{(\text{Controller memory size} - 128)}{4}
\]

Where:

- \( \text{Controller memory size} \) = the memory assigned to the storage controller (the default is 1024MB).
- \( 128 \) = amount of system memory reserved for the storage controller
- \( 4 \) = the amount of memory needed per NBD server

After that, divide the result by \( P \), the number of paths required per disk:

\[
P = (S \times R)
\]

Where:
- \( S \) = the number of stripes
- \( R \) = the number of replicas

This gives \( D \), the number of virtual disks that can be hosted on the datastore:

\[
D = \frac{N}{P}
\]

**For example:**

Take a default setup using a 2R2S datastore configuration:

\[
N = \frac{(1024-128)}{4} = 224 \text{ NBD paths}
\]

\[
P = 2 \times 2 = 4 \text{ paths per disk}
\]

\[
D = 224 \div 4 = 56 \text{ virtual disks}
\]

Linux virtual servers have (at least) 2 disks, so if you are using the same datastore for both the swap and the main disks then you can host 28 Linux virtual servers on this datastore (56 ÷ 2).

To be able to get more virtual servers in the cloud, we recommend not using replicated storage for swap drives.

**View Integrated Storage Data Stores**

To view the list of all integrated storage data store in the cloud:

1. Go to your Control Panel's Integrated Storage > Data Stores menu.
2. On the screen that appears, you'll see the list of all integrated storage data stores in the cloud.
3. Mouse over a data store to view the list of storage nodes attached to the data store grouped by Compute resource:
To edit or delete a data store, click the **Actions** button next to the required data store, then select the appropriate action.

### View Integrated Storage Data Store Details

To view the list of all integrated storage data stores in the cloud:

1. Go to your Control Panel’s **Integrated Storage** menu.
2. On the screen that appears, you’ll see the list of all integrated storage data stores in the cloud.
3. Click the label of the data store to view its details.
4. On the screen that appears, you will see the following data store details:

   - **Total space** - total data store size in GB
   - **Usable size** - free space available
   - **Maximum disk size** - maximum disk size allowed
   - **Performance** - the storage node performance level
   - **Copies** - the number of copies used for data in this data store
   - **Stripes** - the number of stripes the data store is be divided into
   - **Overcommit** - overcommit percentage
   - The following data store management options:
     - **Performance benchmarks**
     - **Add disks**
     - **Edit data store**
     - **Delete data store**
   - The list of **data store disks**

### Create Integrated Storage Data Store

Before creating an integrated storage data store:

1. Create one or more Xen or KVM Compute resources with integrated storage enabled to group their drives together into a virtual data store.
2. Create a Compute zone.
3. Add your Compute resources to the Compute zone.
4. Select the Compute zone as a storage API endpoint.

After that, you can proceed to the integrated storage data store creation.

To create a new integrated storage data store:

1. Go to your Control Panel’s **Integrated Storage > Data Stores** menu.
2. On the screen that appears, you’ll see the list of all integrated storage data stores in the cloud.
3. To create a new data store, click the **Create New Integrated Storage Data Store** button, and complete the wizard that follows:

   - **Name** - give your data store a name

   **Show advanced options** - select this check box to reveal the list of advanced settings:

   - **Replicas** - specify the number of data copies to increase the resilience to individual drive failure. You can specify 1, 2 or 4 replicas.
   - **Stripes** - specify the number of data splittings to increase the number of physical disks included to the virtual disk. You can specify 0, 2 or 4 stripes.
- **Overcommit** - specify the over-provisioning percentage. You can set the following overcommit values: none (0%), 20%, 50% or unlimited (100%).

If an IS data store is created with overcommit (overcommit is not equal to none) and a backend node in the data store runs out of space, the storage controller which manages the backend node will become unavailable and vdisk paths will become degraded. Enabling overcommit and running out of physical space is a bad condition and should always be avoided. It is strongly recommended that you create data store with overcommit = none for production purposes.

### Storage Nodes

In order for your hard drives (nodes) to be detected and active, multicast traffic should be enabled on your switch, for the Onapp Integrated Storage Network/VLAN.

- **Filter by Compute resource** - use this to filter the nodes (disks) available for inclusion in this data store, by specific Compute resources.
- **Filter by performance** - use this to filter the nodes available for inclusion in this data store by performance.

4. Click the **Save** button to create the data store. The data store must be assigned to a Compute zone and data store zone before you can provision storage to a VS.

### Edit Integrated Storage Data Store

You can add and remove storage nodes from a data store at any time after the data store has been created. This makes it easy to expand your distributed storage as you add drives to Compute resources, or add new Compute resources.

To edit a distributed storage data store:

1. Go to your Integrated Storage > Data Stores menu. On the screen that appears, you will see all data stores currently available.
2. Click the **Actions** icon next to the data store you want to edit, then choose **Edit**.
3. Use filter to sort storage nodes by Compute resources.
4. To add or remove storage nodes from this data store, move sliders next to the required nodes.
5. Click the **Save** button to save your changes.

### Delete Integrated Storage Data Store

To delete integrated storage data store:

1. Go to your Control Panel’s Integrated Storage menu.
2. On the screen that appears, you’ll see the list of all distributed storage data stores in the cloud.
3. Click the **Actions** icon next to the data store you want to remove, then choose **Delete**. You will be asked to confirm the deletion.

### Integrated Storage Data Store Disks

Disks are partitions of an integrated storage data store that can be allocated to specific virtual servers. OnApp Storage disks are managed through the Control Panel’s Integrated Storage menu. Disks for individual virtual servers are managed through the Control Panel’s Virtual Servers menu.

When you exceed the NBD device path limit, you will see the following message in the UI failure log when starting a virtual server: *No free devices available for the operation.*

### View the List of Integrated Storage Data Store Disks

To view the list of the integrated storage data store disks:

1. Go to your Control Panel Integrated Storage menu.
2. Click the label of the required integrated storage data store.
3. Scroll down to the list of disk to view the list of all data store disks with the following details:
Add Disks to Integrated Storage Data Store

We recommend creating VDisks according to data store configuration and spread stripe sets (replicas) over different Compute resources so that if a Compute resource goes down another should be able to run the content after the VS is migrated (if it was hosted on the Compute resource). Create several data stores and group the disk drives based on performance levels (e.g. keep SSD separate from SATA to avoid wasting IO throughput for synchronous writes).

To add a new disk to the integrated storage data store:

1. Make sure that all VDisks are fully synced. Perform repair if it is required.
2. Migrate all virtual servers from the Compute resource to which the drive(s) will be added.
3. Shut down the Compute resource and connect the disk drive(s). Some VDisks will degrade - this is the expected behaviour.
4. Start up the Compute resource.
5. Once the Compute resource boots, ensure that the drive is ready for use in the Storage platform.
6. Run 'formatandconfigure /dev/sda' for all new / replaced drives (where /dev/sda is the new / replaced disk drive). onapp_scsi_id can help to identify if the drive has been previously identified.
7. Enable the new drive(s) via OnApp User Interface (Edit CloudBoot Compute Resource screen).
8. Restart groupmon service on the Compute resource.

Compute resource#: service groupmon restart

9. Repair all degraded disks:

Compute resource#: repairvdisks

10. Migrate virtual servers back to Compute resource.

Repair VS Disks Assigned to Integrated Storage Data Store

In the event that a storage node reboots, or a drive fails, it may be necessary to repair the content of one or more virtual disks.

If there are sufficient copies remaining (as configured in the Advanced Settings while creating or editing a distributed data store) then drive content can always be repaired, without any downtime required.

1. Click the Integrated Storage menu, and then the label of a data store to show the virtual disks in that store.
2. If any of the VDisks has a red background, it can be repaired via UI.
3. Click the disk label to view its details.
4. On the screen that appears, select the Repair option next to the Consistency field. Note that only one VDisk can be repaired at a time.
5. When the disk is successfully repaired, the consistency value will be changed from the "Degraded" to "Fully synced".
6. Once the content has been re-balanced, the disk will display a green icon again to indicate that all content is fully up to date.

The disk will be synchronized a short time after the disk repair is finished (approximately in two minutes).

Remove Disks from Integrated Storage Data Store

To remove disk from the integrated storage data store:

1. Rebalance content away from the Disk drive and remove the drive.
2. Re-balance all VDisks which use this drive to other drives that have free space, one path at a time.
3. Once empty, forget the node. Go to the Integrated Storage Nodes screen, select the Actions drop-down menu next to the required node, then choose Forget.
4. Ensure that all vDisks are fully synced (perform repair if it needed)
5. Migrate all virtual servers from the Compute resource that hosts the drive to another Compute resource.
6. From the Edit CloudBoot Compute Resource screen, deselect the drive that has been forgotten. Save your changes.
7. Shut down the Compute resource and remove the failed drive. Some paths will be displayed as degraded - this is the expected behavior, as these are paths from other disk drives on the Compute resource that is down.
8. Once the drive has been removed, start up the Compute resource again.
9. Repair all degraded disks by running repairvdisks in console on one of the Compute resources in the data store zone. Alternatively, repair every VDisk from the UI.

If there are sufficient good paths remaining, degrade the paths and repair them:

1. Perform steps 4-8.
2. Forget the node that has been removed from the UI (it will be in the inactive nodes list).
3. Repair the drives as described in the 9th step above.

Rebalance VDisks Assigned to Integrated Storage Data Store

Rebalancing a VDisk assigned to Integrated Storage data store is moving the data from one node to another. You can rebalance a VDisk using User Interface or via Command Line Interface. Currently, rebalancing using UI is preferable.

To rebalance a VDisk via UI:

1. Go to your Control Panel's Integrated Storage > Data Stores menu.
2. Click the required Data Store label.
3. On the page that loads, scroll down to the Disks section.
4. Click the label of the VDisk you're interested in.
5. On the page that appears scroll down to the Storage Nodes section and select the target node to host the content (deselect one of current nodes).
6. Click Rebalance Disk button to start the process. The disk will be shown as degraded while the rebalancing is taking place.

To rebalance a VDisk using CLI:

1. View the current members of the disk:

    onappstore diskinfo <uuid>

2. Forget a member (members) from a particular VDisk. It is recommended to rebalance one path at a time.

    onappstore forget forgetlist=<member> vdisk_uuid=<VD_UUID>

where VD_UUID is a particular VDisk

3. Choose a new member on which to host the VDisk.

    onappstore repairenmembership uuid=<uuid> memberlist=<member>

Memberlist restricts the members that can be chosen to one or more members. A single member forces the VDisk to use that as the member to host content.

4. Perform the repair that copies content from the master to the slave. The master will be one of the remaining replicas that hosts VDisk content for a stripe. The slave will be the destination drive where the content is copied to.
Storage Nodes

OnApp storage nodes are self-managing, self-discovering and self-contained hot-pluggable units. Each storage node manages and compresses its own content in the most efficient way possible, without loss of performance, using a highly efficient data de-duplication engine. This ensures that data is stored optimally across the whole environment, while maintaining data replication and drive resiliency properties. There is no centralized management system to fail, and each node can make decisions about data synchronization and load balancing without depending on a central controller.

The list of storage nodes can be found in the Integrated Storage menu:

The number of NBD device paths that can exist on the storage node depends on the amount of RAM available to the storage node.

Use the following formula to calculate the number of NBD device paths per storage node:

\[(\text{Storage node memory size} - 128) \div 4\]

Where 128 is the maximum number of VDisks that can be hosted on back-end nodes.

View the List of Storage Nodes

To view the list of storage nodes:

1. Go to your Control Panel Integrated Storage > Nodes menu
2. On the screen that appears, you will see the list of all storage drives available on the cloud.
3. To filter storage nodes by specific Compute resource, choose the required Compute resource from the Host drop down box and click the Filter button.
4. To view inactive nodes only, move the inactive slider to the right, then click the Filter button.
5. To view node's properties, edit or forget it, press the Actions button next to the node, then choose the required action.

View Storage Node Details

To view the list of storage nodes:
1. Go to your Control Panel Integrated Storage > Nodes menu.
2. On the screen that appears, you will see the list of all storage nodes in the cloud.
3. Click the Actions button next to the required storage node, then choose Properties.
4. On the screen that follows, you will see the following node details:

   - **Performance** - node performance mode: low, normal or high
   - **Model** - node model
   - **Size** - node size in GB
   - **Allocated space** - allocated node's space in GB
   - **Serial** - serial number
   - **Status** - storage node status: 1 if the node is enabled and 0 if it is disabled
   - **Disk count** - the number of VDisks hosted on this node.

   **Storage Node IO statistics**

---

**Edit Storage Node**

You can change the node's performance by editing a storage node. To do so:

1. Go to your Control Panel Integrated Storage > Nodes menu.
2. On the screen that appears, you will see the list of all storage nodes in the cloud.
3. Click the Actions button next to the required storage node, then choose Edit.
4. On the screen that appears, select the required storage node performance type from the drop-down box.
5. Click the Submit button to save your changes.

**Forget Storage Node**

Forget option make the data store forget about the drive. Use the forget option when you need to remove drives for maintenance or replacement in the following cases:

- When a node disappears permanently, for example, due to disk removal or failure it is necessary to ‘forget’ it.
- When you need to remove and repair the membership in order to resync a drive.

Forget command removes the failed storage node from all formerly owned VDisks. Use the forget disk option only if you are going to remove the vDisk completely!

There are two options to forget the integrated storage node:

- Via the OnApp Control Panel user interface.
- Using the CLI tool.

**To forget storage node via UI:**

1. Go to your Control Panel Integrated Storage > Nodes menu
2. On the screen that appears, you will see the list of all storage nodes in the cloud.
3. Click the Actions button next to the required storage node, then choose Forget.

To be able to use the forgotten node again, you need to format it using the external utility or by running the following command via CLI:

```
formatandconfigure
```

**To forget storage node via CLI:**

1. Check if that there are sufficient replicas and good paths for all vDisks that reside on that disk before removing a physical drive. Then:

   - To forget a node from a specified VDisk:

```
forget forgetlist=<UUID> vdisk_uuid=<VDISK_UUID
```
To forget a node member from all VDisks:

```plaintext
forgetfromall forgetlist=<UUID>
```

2. Remove the disk.
3. After that, you can add a new vDisk at this point.
   Before adding a new disk:
   - Make sure that all vDisks that are hosted on the Compute resource have sufficient replicas.
   - Migrate all VSs are hosted on the Compute resource to another Compute resource.

4. To register the disk, you need to deselect the old disk and select the new one via UI. Update the configuration by rebooting the Compute resource and running the groupmon restart command:

```plaintext
[root@<ipaddr_Compute resource_1> ~]# service groupmon start
```

5. After that, add the disk to the data store by editing the Integrated Storage data store settings in the OnApp Control Panel.
6. Repair the degraded VDisks of the removed member.
7. Run the following commands in the CLI:

```plaintext
onappstore repairmembership <UUID>
onappstore repair <UUID>
```

8. Check the disk status as before with the repair operation:

```plaintext
onappstore resynchstatus uuid=mq98y0trhi5bxo
status={u'3335881780':{u'4142566975':59},u'138773005':{u'433710490':66}}
result=SUCCESS
```

View Storage Node IO Statistics

To view the storage node IO statistics:

1. Go to your Control Panel `Integrated Storage > Nodes` menu.
2. On the screen that appears, you will see the list of all storage nodes in the cloud.
3. Click the `Actions` button next to the required storage node, then choose `Properties`.
4. On the screen that follows, press the `Show IO Statistics` button.
5. On the Statistics screen, specify the viewing parameters:
   a. Choose the required IO statistics type from the drop-down box. You can view the following IO statistics types:
      - read I/Os
      - read merges
      - read sectors
      - read ticks
      - write I/Os
      - write merges
      - write sectors
   b. Set `From` and `To` time. By default, the statistics are generated for the last three months or the actual VS existence period.
   c. Move the `Show in my Timezone` slider to the right to show bandwidth statistics according to your profile’s time zone settings.
   d. Press `Filter`.
View Storage Node Disks

To view the list of disks located on a particular storage node:

To view the storage node IO statistics:

1. Go to your Control Panel Integrated Storage > Nodes menu.
2. On the screen that appears, you will see the list of all storage nodes in the cloud.
3. Click the label of a storage node you are interested in to view its properties, then click the Show Disks button.
4. On the screen that appears, you will see the list of storage node disks along with their details:

- **Identifier** - disk's identifier
- **Label** - disk's label
- **Size** - disk's size
- **Utilisation** - disk utilization rate
• **Virtual machine** - the virtual server that utilizes this disk
• **Data store** - the data store to which this disk belongs
• **In sync?** - whether the disk is synced or not
• **Snapshot?** - disk's backup status

To delete a disk, click the **Actions** button next to the required disk, then choose **Delete**.

---

**Integrated Storage Drive Devices**

Drive devices are physical hard drives that can be assigned to Compute resources tied to the integrated storage data stores and used as **storage nodes**. When the integrated storage is enabled and configured, the drive devices are available under the **Nodes** menu.

**View Integrated Storage Data Store Drives**

To view the list of integrated storage data store drives:

1. Go to your Control Panel **Integrated Storage** menu.
2. Click the **Nodes** tab.
3. On the screen that appears, you'll see the list of all available drives in the **Drives** table along with their details.

**Assign Drive**

To assign a drive to the Compute resource:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon.
3. Click the **Actions** button next to the required Compute resource, then click **Edit**.
4. The following page will list all the Compute resource properties, as well as the list of all available drives (**Storage Disks** section)
5. Move the slider next to the available disk to the right to select it for this Compute resource.
6. Click **Save**.

Assigning a drive operation requires a Compute resource reboot. To avoid a reboot, use the 'diskhotplug' CLI tool on the Compute resource to assign or unassign the drive in question. Refer to **Disk Hot Plug** documentation for details.

**Prepare Drive**

Preparing a drive is a process of formatting a hard drive to make it usable. To prepare a drive:

1. Go to your Control Panel **Integrated Storage** menu.
2. Click the **Nodes** tab.
3. On the screen that appears, you'll see the list of all available drives in the **Drives** table.
4. Click the **Actions** button next to the required drive, then choose **Prepare**.

**Storage API Endpoint**
Storage API endpoint utilization allows you to view the storage of several Compute resources assigned to the Compute zone that functions as an endpoint gateway. The API endpoint option allows selecting Compute zones as storage API endpoints to link storage from several servers. Then, the storage channel is created automatically when adding a Compute resource to the Compute zone. The API endpoint utilization ensures correct communication between all data stores.

**Add Storage API Endpoint**

To configure a Storage API endpoint:

1. Go to the Integrated Storage > API Endpoint menu.
2. On the screen that appears, select the required Compute zone from the drop-down list. To select all Compute zones, tick the Any Compute Zone check box.
3. Click Save.

**Performance Benchmarks**

Performance benchmarks are used for measuring the integrated data store performance by running tests against it. Performance benchmarks are only available for disks created manually. It is not possible to use benchmarking for disk that are being used for virtual servers.

**View Performance Benchmarks**

To view the list of previously run performance benchmarks:

1. Go to your Control Panel’s Integrated Storage > Data Stores menu.
2. On the screen that appears, you’ll see the list of all integrated storage data stores in the cloud.
3. Click the label of the required data store.
4. On the data store’s details screen, click the Performance Benchmarks button.
5. On the screen that appears, you will see the list of benchmarks along with the following details:
   - Creation time - time when the benchmark was run
   - Type - benchmark type: xddwrapper or ddwrapper
   - Status.

To view test result and activity log, click the benchmark status.

**Create Performance Benchmark**

To run a performance benchmark:

1. Go to your Control Panel’s Integrated Storage > Data Stores menu.
2. On the screen that appears, you’ll see the list of all integrated storage data stores in the cloud.
3. Click the label of the required data store.
4. On the data store’s details screen, click the Performance Benchmarks button.
5. On the screen that appears, click the Create Benchmark button.
6. Specify new benchmark details:
   a. Type - specify the benchmark type:
      - dwrapper - select the dwrapper task to utilize the control domain
      - xddwrapper - select the xddwrapper to create a virtual server and run the benchmark within that server.
   b. Compute resource - chose the Compute resource on which the test will be performed
   c. Disk uuid - select the VDisk that will be used for the performance benchmark
   d. Block size - specify the block size which the dd will use for benchmarks in KB. The block size is equal to the bs=<value> option
   e. If you have chosen the xddwrapper type at step a, specify the following details:
      - Xddwrapper type - choose the the type of operation to run: read,write or a ratio test that compares the read to write speed
      - Read/Write ratio - This parameter only applies to the read/write ratio performance test

   The “Read/Write ratio” is only used when the ratio xddwrapper type is selected to specify the percent of read operations.

   - Random seek - select this check box to determine if data should be read from random locations
   - Random seek range - specify the the range from 0 to the block number to define where random seeks will be performed
   - Mbytes - specify the number of megabytes to transfer
• **Passes** - number of types to perform the test
• **Queuedepth** - Number of queues to use.
• **Timelimit** - Timeout limit for running the benchmark. This parameter returns the performance levels up until the timeout value
• **Reqsize** - specifies the number of blocks to transfer. The size of the block is specified in the **Block size** parameter

f. Click the **Start Benchmark** button to run this benchmark test.

---

**Delete Performance Benchmark**

To delete a benchmark:

1. Go to your Control Panel’s **Integrated Storage > Data Stores** menu.
2. On the screen that appears, you’ll see the list of all integrated storage data stores in the cloud.
3. Click the label of the required data store.
4. On the data store’s details screen, click the **Performance Benchmarks** button.
5. On the screen that appears, you will see the list of all data store benchmarks.
6. Click the **Actions** icon next to the required benchmark, then choose **Delete**.

**Diagnostics**

The diagnostics feature allows you to check the status of each integrated storage API endpoint and resolve these issues via the OnApp user interface. The main diagnostics screen displays the disk health and node health statuses, with critical issues shown at the top and issues with minimal priority shown lower in the page.

**Diagnostics** screen displays the following states that may occur in the Integrated Storage system:

- Degraded VDisks
- Lost stripe members
- Inconsistent VDisk membership and current members
- Low disk space warning for physical nodes (90% or < 2GB free)
- Snapshot and VDisk zombies / orphans

You can easily perform the following tasks via the **Diagnostics** screen:

- Check and clear old transaction files.
- Repair VDisks.
- Repair degraded VDisks in a data store zone.
- Check that all Compute resources can communicate with each other and the back end nodes.
- Detect when a disk drive does not respond, but has not been removed from the configuration.
- Ensure that the Compute resources are all on the same version of OnApp.
- Check that failover settings are set to the minimum recommended value of 2mins + if IS and failover is enabled.

To view results of a particular diagnostics, click the label of the required test under the **Diagnostics** column.

**Storage Health Check**

This menu displays the result of past diagnostics tests. Below you will find the details on all possible results shown for the following resources:

- Disk health
- Drive health

**Disk Health**
<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Details</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degraded disks</td>
<td>Shows the list of VDisks in a degraded state, which means that one or more (but not all) replicas of a stripe are not fully synchronised. Degraded VDisks are listed with the OnApp vd_uuid and a repair option.</td>
<td>Use the repair all option to queue the repairs. Repair will resynchronise the content from an elected master to a slave. The repair button starts a repair task that will take some time depending on the data store, network and disk drive configuration</td>
</tr>
<tr>
<td>Disks with partial memberlist</td>
<td>Shows the list of VDisks having an incomplete membership list, due to disk failure, network failure or otherwise. Each VDisk should have (S)tripe * (R)eplica members.</td>
<td>Use the repair operation to repair the membership. This will elect a new valid member from the suitable nodes in the data store. Once the membership is repaired, the VDisk will be in a degraded state until it is re-synced.</td>
</tr>
<tr>
<td>Stripes with no replica</td>
<td>Shows the list of VDisks which have lost all replicas for a stripe. There is no redundancy at this point for this stripe and the data is lost. If a VDisk is in this category then the associated VS is likely broken unless the VDisk is a swap drive.</td>
<td>No repair action available.</td>
</tr>
<tr>
<td>Disks with no redundancy found</td>
<td>One or more VDisks have not got a replica stripe member on another Compute resource. VDisk is healthy but all replicas of a stripe are on the same Compute resource.</td>
<td>Use a Rebalance link in the Actions column that leads to re-balance page for a VDisk. This will allow the content of a VDisk to be rebalanced to another suitable disk drive.</td>
</tr>
<tr>
<td>Partially online Disks found</td>
<td>The list of VDisks that have at least one stripe online and at least one stripe offline. There must be an authoritative member for each stripe.</td>
<td>Use a Repair link in the Action column that will issue a special Storage API call (online refresh action) to fix this problem. Status of the VDisk before will show offline but one or more members will show an online front end.</td>
</tr>
<tr>
<td>Degraded snapshots</td>
<td>The list of VDisk snapshots in degraded states (except ones currently being used for ongoing backups). Backups cannot be made from a degraded snapshot.</td>
<td>To resolve this, use a bulk Delete All link in Action column that will create a background task. This task unmounts, performs unpartx, makes zombie snapshots offline on each Compute resource from the zone, and then removes the snapshot. The task may leave some snapshot VDisks left, so check for unremoved VDisks upon task completion.</td>
</tr>
<tr>
<td>Zombie disks found</td>
<td>The list of VDisks that are not associated with a VS have been found. These may include VDisks created by the command line and VDisks created for benchmarks.</td>
<td>To resolve, use a bulk Delete All link in Action column that will create a background task. This task unmounts, performs unpartx, makes zombie disks offline on each Compute resource from the zone, and then removes the disk. The task may leave some zombie disks left, so check for unremoved disks upon task completion.</td>
</tr>
<tr>
<td>Disks in other degraded states</td>
<td>The list of VDisks that are degraded but not in any of the other states above. These can be the disks that have missing partial members, missing inactive members, missing active members, or missing unknown members.</td>
<td>No repair action available.</td>
</tr>
</tbody>
</table>
## Drive Health

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Details</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial node found</td>
<td>The Compute resource hosting the node is reachable, and reports over the API that the node is running. Possibly storageAPI and groupmon are not responding on the storage controller server.</td>
<td>To fix, perform a controller restart. Make sure that there is sufficient redundancy such that restarting controllers on one Compute resource will not cause VS downtime.</td>
</tr>
<tr>
<td>Inactive nodes found</td>
<td>Either the Compute resource hosting the node is not reachable, or it is and is reporting that the storage controller for the node is not running.</td>
<td>Either power-cycle the Compute resource, or bring up the storage controller VS. This can be a bit tricky if there are more than one storage controllers running on the same Compute resource, and only one has shutdown.</td>
</tr>
<tr>
<td>Nodes with delayed ping found</td>
<td>Node reachable over the storage API, but is not sending out pings. Groupmon service is not responding on the node.</td>
<td>To fix this problem, restart the groupmon service from inside the storage controller server, that can be triggered from the UI.</td>
</tr>
<tr>
<td>Nodes with high utilization found</td>
<td>The list of nodes with disk utilization over 90%.</td>
<td>To improve, click the Rebalance link in Action column leading to list of disks located on the node, so that user can rebalance them away from it.</td>
</tr>
<tr>
<td>Out of space nodes found</td>
<td>Node utilisation is reported at 100% for one or more nodes.</td>
<td>To Repair action will forget the content of one of the VDisks that is Compute resource redundant and in sync.</td>
</tr>
<tr>
<td>Missing drives found</td>
<td>The Compute resource configuration has a drive selected that is not being reported to Integrated Storage.</td>
<td>No repair action available. Compute resource configuration edit page can be selected from the error reported to deselect the drive if appropriate.</td>
</tr>
<tr>
<td>Extra Drives</td>
<td>The drives that are disk-hotplugged into the system.</td>
<td>No repair action available from UI.</td>
</tr>
<tr>
<td>Inactive controllers</td>
<td>The list of controllers that cannot be reached but the host Compute resource is responding.</td>
<td>Restart the controller.</td>
</tr>
<tr>
<td>Unreferenced NBDs found</td>
<td>The list of NBD data paths that are active but not referenced by a device mapper.</td>
<td>To fix, schedule a CP transaction which will try to clean up the unreferenced NBDs by disconnecting from the frontend. Delete all.</td>
</tr>
<tr>
<td>Reused NBDs found</td>
<td>The list of multiple uses of the same NBD connection.</td>
<td>No repair action available from UI.</td>
</tr>
<tr>
<td>Dangling device mappers found</td>
<td>The list of device mappers that are not in use.</td>
<td>To fix, look for the corresponding VS and if the VS is booted do nothing but otherwise try to unmount and offline the VDisk.</td>
</tr>
</tbody>
</table>
Our S.M.A.R.T drive health diagnostics is based on smartmontools - smartd and smartctl utilities, which read the the hardware-supported attributes from each drive.

Note that starting with ATA/ATAPI-4, revision 4, the meaning of these Attribute fields has been made entirely vendor-specific. However most newer ATA/SATA disks seem to respect their meaning, so the option of printing the Attribute values is retained.

Solid-state drives use different meanings for some of the attributes. In this case the attribute name printed by smartctl is incorrect unless the drive is already in the smartmontools drive database.

Since this is vendor specific, not all drives support SMART. Nonetheless most do, providing the SMART reporting is enabled in the BIOS and that the hardware supports SMART.

If the drives are behind a RAID or another controller, the controller must also support the SMART's passthrough for SMART to work. Specific BIOS and firmware upgrades may enable SMART support, however it remains very much hardware and configuration dependent.

| SMART errors found | For one or more Disk drives in the Compute resource, SMART inbuilt tests have reported one or more warnings. SMART errors occur when the drive has surpassed the threshold for reporting a failure. | Replace the drives in the maintenance window that appears. |
| SMART warnings found | SMART warnings occur when the failure attributes exist but are not at the threshold level - either Pre-failure or Old age. Pre-failure Attributes are ones which, if less than or equal to their threshold values, indicate pending disk failure. Old age, or usage Attributes, are ones which indicate end-of-product life from old-age or normal aging and wear-out, if the Attribute value is less than or equal to the threshold. | Please note: the fact that an Attribute is of type ‘Pre-fail’ does not mean that your disk is about to fail! It only has this meaning if the Attribute’s current Normalized value is less than or equal to the threshold. |

**Content Balance Check**

This feature is currently in beta

This diagnostics is launched automatically ever time you open its page and allows you to rebalance the content in your cloud enhancing its performance and reliability.

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Details</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>DataStores have Nodes with non-uniform capacity</td>
<td>Shows if the actual size of connected nodes is the same and/or how much it differs from the average size of the nodes</td>
<td></td>
</tr>
<tr>
<td>DataStores have non-uniform Node structure</td>
<td>Indicates the average number of nodes per Compute resource and shows the deviations in percents for each cluster.</td>
<td></td>
</tr>
<tr>
<td>Some disks are not optimized for local read performance</td>
<td>Local read performance ensures the complete stripe set is located on the same Compute resource. This tab list the disks which stripes are located on different Compute resources.</td>
<td>Use repair option to rebalance the disk so that the complete stripe set is within one Compute resource.</td>
</tr>
<tr>
<td>Content is not uniformly distributed across Compute resources</td>
<td>Show the list of Compute resources with indication of free space available for each Compute resource and the percentage ratio to the average free space for all Compute resources within one data store.</td>
<td>Use repair to redistribute the content between Compute resources so that each Compute resource has the same amount of free space which is equal to the average value.</td>
</tr>
</tbody>
</table>
Content is not uniformly distributed within Compute resources

<table>
<thead>
<tr>
<th>Shows the list of nodes with indication of free space available for each node and the percentage ratio to the average free space for all nodes in the data store.</th>
<th>Use repair to redistribute the content between nodes so that each node has the same amount of free space which is equal to the average value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some VirtualServers are not placed in an optimal way</td>
<td>Lists the virtual servers which are running on different Compute resources than their disks.</td>
</tr>
</tbody>
</table>

**Network Health Check**

Network Health is a diagnostics which allows you to check the status of each integrated storage API endpoint and resolve these issues via the OnApp user interface. The main diagnostics screen displays the disk health and node health statuses, with critical issues shown at the top and issues with minimal priority shown lower in the page.

**Run diagnostic**

To run a new diagnostic test:

1. Go to your Control Panel’s Integrated Storage > Diagnostics menu.
2. Scroll to the bottom of the screen and click the New Diagnostic button.
3. A new diagnostic test will be successfully created.

This will create a new task that performs some long running actions. For details, click the date of the required diagnostics.

**View the results of a particular diagnostics**

1. On the screen that appears, you will see the following diagnostics test details:
   - Date and time when the test was taken.
   - Status - test status.
   - Compute resource count - the number of Compute resources inspected.

2. Below you will find the further details:
   - **Connectivity matrix** - connectivity matrix displays test results of each Compute resource in the API endpoint zone. Click the check box next to the Compute resource to view its connectivity matrix, then select the required tab:
   - **Ping** - view the Compute resource’s ping results. Pings are made from each Compute resource to each other Compute resource using following command `ping -c 10 -s 1500 -M do 112.111.1.1` (pings are made on storage network), if any of the 10 pings did not succeed, the row that corresponds to this Compute resource combination is considered to have failed.

![Connectivity Matrix](image)

The green squares on the chart mean that Compute resource can ping another Compute resource.

- **Big ping** - view the results of Compute resource ping with maximum packets size (MTU size is defined in the CloudBoot Compute resource settings). To make a big ping, the following command is used: `ping -c 10 -s MTU -M do`
where MTU is substituted by the MTU value set for given Compute resource during creation. The green squares on the chart mean that Compute resource can ping another Compute resource with MTU size packets.

- **Bandwidth** - view the Compute resource's bandwidth test results. Bandwidth is measured from each Compute resource to each other Compute resource using the following command on source Compute resource:
  
  ```
  iperf -s -D
  ```

  and on target Compute resource:
  
  ```
  iperf -t60 -N -y C -c 112.111.1.1
  ```

  The Compute resource bandwidth values are displayed on the chart.

- **Activity log** - activity log contains log messages of all actions that take place during the diagnostic test. Click the log item’s Ref to view its details.

### Delete diagnostics

To delete a diagnostics test:

1. Go to your Control Panel’s Integrated Storage > Diagnostics menu.
2. Scroll to the Diagnostics table.
3. Click the Actions icon next to the diagnostic test you want to remove, then choose Delete.
4. Confirm the deletion.

### Disk Hot Plug

OnApp Cloud supports disk hot plug for CloudBooted Compute resources using the Integrated Storage platform. You can now assign and unassign drives from the IO controllers on the Compute resources, using a CLI utility that is provided on the root FS of the CloudBoot Compute resource:
To use the hotplug, run the following command from the required Compute resource:

```
diskhotplug
```

The list of available disk hotplug commands:

- `diskhotplug list`
- `diskhotplug assign <Controller> <Slot> <device>`
- `diskhotplug unassign <Controller> <Slot>`
- `diskhotplug initNewController`
- `diskhotplug restartController <Controller>`

After the upgrade (both live and non-live Compute resource reboot) you will now see drives appear in the diskhotplug 'list' output.

Example for a system with 6 disk drives set with default 4 drives per controller:

```
> [root@x.x.x.x ~]# /usr/pythoncontroller/diskhotplug list
> Controller 0
>    Slot 0 - /dev/sda (SCSIid:22A7VJQD_22A7VJQD,NodeID:130322041)
>    Slot 1 - /dev/sdb (SCSIid:9W6B5WQS_9W6B5WQ,NodeID:4043912490)
>    Slot 2 - /dev/sdc (SCSIid:9W6B955S_9W6B955,NodeID:2281894381)
>    Slot 3 - /dev/sdd
>    (SCSIid:CVPR116003YH160DGN_2CW16_CVPR116003YH160DGN,NodeID:476612602)
> Controller 1
>    Slot 0 - /dev/sde (SCSIid:350025388500786eb_S1D9NEAD904298P,NodeID:235613508)
>    Slot 1 - /dev/sdf (SCSIid:35000cca0220b54c8_KPV675RF,NodeID:2574447922)
>    Slot 2 - EMPTY
>    Slot 3 - EMPTY
```

Use the 'unassign' command to remove a drive, e.g. due to mechanical drive failure, or to manually move it to another server:

```
diskhotplug unassign <Controller> <Slot>
```

In the example below, /dev/sdf is being removed:

```
> [root@x.x.x.x ~]# /usr/pythoncontroller/diskhotplug unassign 1 1
Result of diskhotplug unassign:
> [root@x.x.x.x ~]# /usr/pythoncontroller/diskhotplug list
> Controller 0
>    Slot 0 - /dev/sda (SCSIid:22A7VJQD_22A7VJQD,NodeID:130322041)
>    Slot 1 - /dev/sdb (SCSIid:9W6B5WQS_9W6B5WQ,NodeID:4043912490)
>    Slot 2 - /dev/sdc (SCSIid:9W6B955S_9W6B955,NodeID:2281894381)
>    Slot 3 - /dev/sdd
>    (SCSIid:CVPR116003YH160DGN_2CW16_CVPR116003YH160DGN,NodeID:476612602)
> Controller 1
>    Slot 0 - /dev/sde (SCSIid:350025388500786eb_S1D9NEAD904298P,NodeID:235613508)
>    Slot 1 - EMPTY
>    Slot 2 - EMPTY
>    Slot 3 - EMPTY
```
To insert a new drive into the IO controller, use the 'assign' command:

```
diskhotplug assign <Controller> <slot> <device>
```

For example:

```
> [root@x.x.x.x ~]# /usr/pythoncontroller/diskhotplug assign 1 1 /dev/sdf
> [root@x.x.x.x ~]# /usr/pythoncontroller/diskhotplug list
> Controller 0
>   Slot 0 - /dev/sda (SCSIid:Z2A7VJQD_Z2A7VJQD,NodeID:130322041)
>   Slot 1 - /dev/sdb (SCSIid:9WM6B5WQ8_9WM6B5WQ,NodeID:4043912490)
>   Slot 2 - /dev/sdc (SCSIid:9WM6B955S_9WM6B955,NodeID:2281894381)
>   Slot 3 - /dev/sdd (SCSIid:CVPR116003YH160DGN_2CW16_CVPR116003YH160DGN,NodeID:476612602)
> Controller 1
>   Slot 0 - /dev/sde (SCSIid:350025388500786eb_S1D9NEAD904298P,NodeID:235613508)
>   Slot 1 - /dev/sdf (SCSIid:35000cca0220b54c8_KPV675RF,NodeID:2574447922)
>   Slot 2 - EMPTY
>   Slot 3 - EMPTY
```

NOTE:
- Use the UI diagnostic view to query the current state of the Integrated Storage platform.
- Check that all VDisk content is redundant and all vdisks are in-sync before attempting to unassign a physical drive when it is still active in the system.

To avoid warning messages such as DELAYED_PING showing on the diagnostics page, it will also be necessary to forget the disk drive. Whenever removing a disk drive permanently from OnApp Integrated Storage forget should be used. This can be performed by selecting nodes, finding the corresponding node and then using the Forget option.

**CloudBoot IPs**

Cloud Boot IPs are IP addresses which Compute resources will acquire via DHCP when they boot.

**View CloudBoot IP Addresses**

To view the list of CloudBoot IP addresses:

1. Go to your Control Panel's Settings menu.
2. Click the Compute resources icon, then click CloudBoot IPs tab.
3. On the screen that appears, you'll the range of CloudBoot IP addresses along with their details:
   - IP address
   - Network
   - Compute resource
   - Compute Zone

To edit an IP address, click the Edit icon next to it, then change its details as required.

To delete an IP address, click the Delete icon next to the required IP address.

**Create CloudBoot IP Address**

To add new CloudBoot IP address:

1. Go to your Control Panel's Settings menu.
2. Click the Compute resources icon, then click CloudBoot IPs tab.
3. On the screen that appears, click the **New IP Address** button.
4. Specify the following IP address properties:
   - IP Address
   - Netmask
   - Gateway

5. Click **Submit**.

**Edit CloudBoot IP Address**

To edit CloudBoot IP address:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon, then click **CloudBoot IPs** tab.
3. On the screen that appears, you'll the list of all CloudBoot IP addresses.
4. Click the **Edit** icon next to the required CloudBoot IP address.
5. On the screen that appears, edit IP address details. You can change the following IP address properties:
   - IP address
   - Netmask
   - Gateway

6. Press the **Submit** button to save your changes.

**Delete CloudBoot IP Address**

To edit CloudBoot IP address:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon, then click **CloudBoot IPs** tab.
3. On the screen that appears, you'll the list of all CloudBoot IP addresses.
4. Click the **Delete** icon next to the CloudBoot IP address you want to remove.
5. Confirm the deletion.

**Templates**

**What templates are**

OnApp templates are used to deploy virtual servers in your cloud. A template is a fully preconfigured operating system environment – a tar + gzip archive that contains the root directory of an operating system. A basic template includes the data needed for a minimum OS installation, but templates may also include applications and additional OS components.

**Windows templates version 4.0**

OnApp version 4.0 introduces new Windows templates version 4.x with Cygwin as SSH server (instead of CopSSH as in versions 3.x). These templates are currently in beta.

- New 4.0 templates cannot be used in OnApp version 3.x or below.
- Windows templates version 3.x can be used in OnApp version 4.0 without restrictions.

Windows Server 2003/XP OSs come to their end-of-life on July 14th, 2015 and will no longer be supported.

**Types of templates**

There are two different kinds of template:

- **System templates** These are provided by OnApp and downloaded from an online library. They comprise an operating system with the latest set of packages installed. Windows 2008 templates require 20GB of free disk space. Windows 2003 templates require 10GB. Most Linux templates require 2–10GB.
**Custom/user templates** These are templates you create by backing up an existing virtual server, and converting that backup to a template. This allows you to pre-configure virtual servers (for example with specific OS settings, or pre-installed applications) and use the same configuration again and again.

**Miscellaneous**

You can use the following templates for smart servers and baremetal server creation:

<table>
<thead>
<tr>
<th>OS</th>
<th>Baremetal Servers</th>
<th>Smart Servers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>2008 R2 Standard Edition</td>
<td>Windows 2008 x64 STD R2 XEN 3.1</td>
</tr>
<tr>
<td></td>
<td>2008 R2 Data Center Edition</td>
<td></td>
</tr>
<tr>
<td>Linux</td>
<td>CentOS 5 64 bit</td>
<td>Debian 6.0 x64</td>
</tr>
<tr>
<td></td>
<td>CentOS 6 64 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redhat 6 64 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Debian 6 64 bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ubuntu 12 64 bit</td>
<td></td>
</tr>
</tbody>
</table>

- It is not possible to change or reset the password if the Windows virtual server with Active Directory Domain Controller is used as a domain controller.

**Manage Templates**

You can perform a set of actions with the templates:

- view/edit/delete system templates
- create/edit/delete/make public custom templates
- manage template recipes and recipe variables
- download new and update existing templates

Refer to the following sections for details.

**View Template Details**

The Control Panel's Templates List menu lists all of the templates available on your system, their version number, the Operating System they install, whether swap disk is allowed, and whether you can adjust their CPU cores/priority & RAM without rebooting a virtual server based on that template ("resize without reboot").

The templates are organized into four tabs:

- **System templates** - the OS images provided by OnApp.
- **My templates** - the list of custom templates created by the user who is currently logged in.
- **User templates** - the list of templates converted by all users in the cloud from VS backups. To see user templates, make sure the See User Templates permission is enabled.
- **Inactive templates** - the templates that are currently unavailable to build VS on.

To see which virtual servers are based on a specific template:

1. Go to your control Panel's Templates > Templates List menu to bring up the list of templates.
2. Click the template's label (name) in the list.

**Edit Template Details**

You can edit a range of template details through the Control Panel, including minimum disk size required, version number, filename and label. To do so:

1. Go to your Control Panel's Templates > Templates List menu. You'll see a list of templates on your system.
2. Click the **Actions** icon next to the template you want to change, then choose **Edit Template**.
3. On the screen that follows, enter template details as required:
   - **Label** – change the template name
   - **Filename** – edit the template filename
   - **Version** – the template version
   - **Min disk size** – the minimum VS disk size required to build a VS on this template (in GB)
   - **Min memory size** – the minimum VS RAM required to build a VS on this template (in MB)

4. Click the **Save** button to finish.

**Delete System Templates**

To delete a template:

1. Go to the Control Panel's **Templates > Templates List** menu.
2. Click the **Actions** icon next to the template you wish to delete, then choose **Delete Template**.

You cannot delete a template if there are virtual servers in your system built on that template. To delete the said template you will have to destroy such virtual server first.

**Install/Update Templates**

The Template server URL has to be set at **Control panel > Settings > Configuration > Backups/templates** tab as a prerequisite for installing/upgrading templates.

VMware vCenter templates are not installed using the template server. For information on installing VMware templates, refer to the VMware Template Installation Guide section.

OnApp template manager allows you to update the system templates which are already installed to your cloud and download new templates available on a template server.

The OnApp template library includes over 100 VS templates based on various 32-bit and 64-bit flavours of Windows and Linux operating systems. OnApp customers can also access a large number of JumpBox virtual Compute resources and deploy them as templates in OnApp. For the latest list see: [https://docs.onapp.com/display/templates/Templates](https://docs.onapp.com/display/templates/Templates)

Only customers with a Paid license (not a free 16-core) have access to the complete template library, and special deals with JumpBox.

### Installing templates

To download and install a template from a remote template server:

1. Go to the Control Panel's **Templates** menu.
2. Click the **System Templates** tab. The page that loads will list all the templates installed to your cloud.
3. Click the **Available** tab.
4. You will see the list of all templates available for installation. You can scroll through the list of templates with the Previous/Next buttons at the bottom of the screen.
5. Click the plus button next to a required template to install.

### Upgrading templates

Template manager allows you to update the installed templates from the template server.

To update a template:

1. Go to your Control Panel's **Templates** menu.
2. Click the **System Templates** tab.
3. On the page that appears, the **Updates** tab will show the list of templates with more recent version than you have installed.
4. Click the plus button next to a required update to install.

If you update an existing template (by downloading a more recent version) it will not update existing VSs built on the previous version. Only new VSs, or those that are rebuilt, will use the new template.
Installations

You can see the status of the active downloads and cancel/restart them.

For this:
1. Go to the Control Panel's Templates menu.
2. Click the System Templates tab. The page that loads will list all the templates installed to your cloud.
3. Click the Installations tab.
4. You will see the list of all templates that are currently being installed to your Cloud with their details and status.
5. Click the Properties icon next to a required template to restart or delete the template installation/update.

Where templates are stored

Depending on the configuration of your cloud, new templates are stored at different locations.

**No backup servers and ssh_file_transfer option is disabled**

In this configuration, the templates will be uploaded to all Compute resources. If this template already exists somewhere, the action is skipped. In such case NFS or any other sharing service should be enabled between Compute resource's.

**No backup servers and ssh_file_transfer option is enabled**

The template is uploaded to this ssh_file_transfer server only.

**There are backup servers and ssh_file_transfer option is disabled**

The templates are uploaded to all backup servers. The action is skipped if such a template already exists. In this configuration ensure that some sharing service is between backup servers. Provisioning is performed at backup servers only. If there is more than one backup server in the cloud, the user is prompted to choose to which BS a template will be stored.

**There are backup servers and ssh_file_transfer is enabled**

The templates are uploaded to this ssh_file_transfer server only.

**High Availability is configured for the Cloud**

In this configuration, make sure to store templates at Database&Transactions server or any other server with shared NFS service, so that both Control Panels could access the templates directory.

Create Custom Templates

You can create custom templates by making a backup of an existing virtual server and saving it as a template for future use. To create a custom template:

1. Create a new virtual server and configure it as you would like for your template.
2. Click the Actions icon next to this virtual server, then choose Backups.
3. In the list of backups, click Convert to Template next to the backup you want to convert.
4. Click OK to proceed.
5. On the next screen, enter the following:
   a. A label for your template.
   b. The minimum memory size: make sure the minimum memory size takes into account the settings for the template on which the VS was built, plus any modifications you may have made to the template before making the backup.
   c. The minimum disk size: ensure the value is based on the template settings and any possible modifications you may have made, e.g. installing additional software.
   d. Click the Convert Backup button.
6. The backup will be scheduled for creation. When conversion is complete, it will be then listed on the Templates > Templates List > User Templates tab, from where you can edit it.

   During the custom Windows template creation the Admin account is created anew.

   To select a preferred licensing type (KMS, MAK, own) for a Windows virtual server built on a custom template you need to add this custom template to My Template Groups and associate the desired licensing type with such group.

   When updating a custom template (by converting a more recent backup of a VS, for example), existing VSs built on previous versions will not be updated. Only new VSs, or those that are rebuilt, will use the new template.

Edit Custom Templates

You can edit your custom templates at any time. To do so:

1. Go to your Control Panel's Templates > Templates List menu and click the User Templates tab. Your custom templates will be listed
1. Click the Actions icon next to the template you want to change.
2. Choose Edit Template, make your changes on the screen that follows, and click Save.

Delete Custom Templates

You can delete your custom templates at any time. To do so:

1. Go to your Control Panel's Templates > Templates List menu and click the User Templates tab. Your custom templates will be listed there.
2. Click the Actions icon next to the template you want to delete.
3. Choose the Delete Template button next to a template if you want to delete it.

Make Templates Public

The template list is organized into three tabs. The User templates tab lists all the custom templates created form the backups. By default those templates are available only to those users who created them. When you make templates public, you make your templates available to all users:

1. Go to your Control Panel's Templates > Templates List menu.
2. Click User templates tab.
3. Click the Actions button next to the template you want to make public, then select Make public.
4. Confirm the window that pops up.

When you make a custom template public, it is moved to a System templates tab.

Allow Users to Make Templates Public

All custom templates are private by default, which means they are only available to the users who created them. As administrator, you can give users the right to create templates that are available to all users – i.e. to create public templates. This is handled through the Control Panel's Users and Groups menu:

1. Go to your Control Panel's Roles and Sets menu.
2. Click the Edit icon next to the role you want to edit.
3. On the screen that follows, check the box next to the Make own template public permission and click the Save button.

Manage Template Recipes

To manage template recipes:

1. Go to your Control Panel's Templates > Templates List menu. You'll see a list of templates on your system.
2. Click the Actions icon next to the template you want to change, then choose Manage Recipes.
3. The screen that follows shows details of all the recipes in the cloud:
   - The right pane displays the list of events to which the recipes can be assigned to.
   - The left pane shows the list of all recipes in the cloud.

Assign recipe

Use drag and drop feature to assign recipe to assign a recipe to a desired event.

You can assign template recipes to the following events:

- VS provisioning - run the recipe during VS provisioning
- VS network rebuild - run the recipe when rebuilding a network
- VS disk added - run the recipe when adding a disk
- VS network interface added - run the recipe when adding a network interface
- VS disk resized - run the recipe when resizing a VS disk
- VS resize - run the recipe when resizing a VS

To use recipes with own Windows templates, the templates must be version 3.1 or later.

To use drag and drop:

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.
Remove recipe

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

Manage Template Recipe Custom Variables

You can define custom variables for image templates. To do so:

1. Go to your Control Panel’s Templates > Templates List menu
2. Click the Actions icon next to the template you want to change, then choose Manage Custom Recipe Variables.
3. On the screen that appears, click the “+” button to add new recipe variable.
4. Specify the recipe name and its value.
5. Move the Enabled slider to the right to allow use of this recipe.
6. Click Save.

To edit a custom variable, click the Edit icon next to the required variable and change its details.

To delete a custom variable, click the Delete icon next to the variable you want to remove. You will be asked to confirm the deletion.

It is possible to set custom variables for image templates, as well as for virtual servers. Virtual server custom variables will always overlay template custom variables.

Template Software Licenses

To create a virtual server from a template which is based on paid software, such as MS Windows, you must have a valid license. The system verifies if you have a license before allowing the VS to be created, so before creating a VS you must first upload the license keys you’ve bought to OnApp, or connect to a licensing server.

OnApp supports three license types:

- **MAK licensing**: the default licensing type applied to all Windows-based VSs.
- **KMS licensing**: this is applicable to Windows 2008 and Windows 7 VSs only.
- **User licenses**: allow end users to input a license key when creating a VS.

The template licenses in OnApp are managed in two places:

1. **Template store** – where you specify which license types can be applied to templates assigned to the particular template group.
2. **Billing plans** – where you specify which license types a user on this plan can apply to their Windows-based VSs.

To avoid billing issues, do not use different Windows licensing types for the same template in one billing plan. In case you assign a template to template groups with different licensing types or different prices, it will be charged at a smaller price.

The billing plan settings override the template group settings. For example, if the KMS licensing is allowed by template group settings, but is not enabled in billing plan configuration, the user will not be able to create VSs using KMS licensing.

The user specifies the license type for a particular virtual server during the VS creation process. The list of available license types depends on the template which is chosen for the VS, and the billing plan the user is signed up to.

To enable users to choose the license type:

1. Create a template group
2. Specify which licenses can be used within this group
3. Assign the templates to this group
4. Create Billing Plan
5. Specify which license types can be used within this plan
6. Assign template groups to a billing plan (optional)
7. Assign a user to this billing plan.

**NOTE:**

- If you do not assign a template to a template group, the default MAK licensing is applied to that template.
- If you do not assign any template group to a billing plan, the user can build VSs on any template available in the cloud. The choice of licenses will depend on the settings specified for the template group to which this template belongs.
KMS Licensing

To allow your users to create virtual servers (on Windows 2008 and Windows 7 templates) using KMS licensing:

1. Log in to your Control Panel as an Admin.
2. Enable KMS licensing for a particular template group, and attach the templates for which you plan to enable KMS licensing to this group (see Template Store in the next section).

Windows 2003 and XP templates do not support KMS licensing.

3. Enable KMS licensing for a billing plan, and assign this template group to a billing plan (see the Billing Plans section).
4. Sign up a user to this billing plan (see the Assign Users to Billing Plans section).

MAK Licensing

To add a MAK license to OnApp:

1. Go to your Control Panel's Software Licenses menu.
2. Click the Add new License button.
3. Set the necessary parameters in the form that appears.

Where:

- **Label** – Windows OS distribution (2003, 2008, 7)
- **R2** – tick this parameter if your license is for the second edition of Windows OS distribution
- **x64 or x86** – specify the architecture
- **Specify the Edition** – STD (Standard), ENT (Enterprise), WEB (web), PRO (Professional), DC (Data center)
- **License** – enter the license code, e.g. TZXTC-R4GGG-9TT3V-DYDY4-T628B
- **Total** - the total number of servers allowed by the license (the amount of licenses you bought from Microsoft)

4. Click Save.

To view MAK license details:

1. Go to your Control Panel's Software Licenses menu. This screen lists all the licenses you've added to your OnApp installation with their details:

- **Label** – the license name specifying the OS distribution, architecture and edition, e.g. Windows 2008 R2 x64 STD/ENT
- **License** – the license code
- **Total** - the number of VSs allowed by the license
- **Count** - the number of licenses used

To edit/delete an existing MAK license:

1. Go to your Control Panel's Software Licenses menu. This screen lists all the licenses you've added to your OnApp installation.
2. Click the Edit/Delete icons next to the license you're interested in.

Template Store

Template store enables you to organize individual templates into groups that can be used as a paid resource for billing plans. This allows you to easily create groups of templates which can be added to the billing plan to limit the amount or types of templates that are available to a user.

The template groups have hierarchical (tree) structure:

- Template group – e.g.OS
- Child group
- Templates

Click the Template group's label to expand the list of child groups, then click the template group's label to view the list of templates, respectively.

To add a template group:

1. Go to your Control Panel's Template Store menu.
2. On the page that follows, click the "+" button next to the required template group's label, then select Add Child.
3. Give a name to your group.
4. Specify the Windows Licensing type: MAK, KMS, or User license.
5. For KMS licensing, set the following parameters:
   - **Server label** – the name of the KMS server
   - **KMS server host** – the hostname of the licensing server
   - **KMS server port** – the port used to connect to the licensing server
6. Click Save.
7. On the page that appears, you'll be prompted to assign a template to a group.
To assign a template to a template group:

1. Go to your Control Panel's **Template Store** menu.
2. Click the "+" button next to the required child group's label, then select **Add Template**.
3. Choose the template from the drop-down box at the **Add a template** section.
4. Indicate price if required and click **Save**.

To remove a template from a template group:

1. Go to your Control Panel's **Template Store** menu.
2. Click the template group's label, then click the name of the template group from which you wish to remove a template.
3. Click the **Delete** icon next to a template you want to remove.
4. Confirm the deletion.

To change the template price:

1. Go to your Control Panel's **Template Store** menu.
2. Click the name of the template group.
3. Click the price field next to the template which price you want to change and enter the value.

To view/edit/delete a template group:

1. Go to your Control Panel's **Template Store** menu.
2. On the page that follows, you'll see the list of all template groups created within your cloud:
   - Click the group's label, then click the child group label to see the list of templates assigned to this group.
   - Click the **Edit** icon next to a group to edit its name.
   - Click **Delete** icon to delete a group.

**My Template Groups**

My Template Groups allow you to create own license groups for your own personal/custom templates. The groups cannot be shared amongst the users. Also, for Windows based templates, My Template Groups provide the possibility to use your own licensing type regardless of your billing plan.

For your convenience, My Template Groups have hierarchical (tree) structure:

- **Template group** – e.g. OS
- **Child group**
- **Templates**

You may assign templates directly to the group, or create a child group(s) and assign templates there.

To add a template group:

1. Go to your Control Panel's **My Template Groups** menu.
2. On the page that follows, click the "+" button.
3. Give a name to your group in the window that appeared.
4. If you are planning to use this group for Windows templates, specify the Windows Licensing type: MAK, KMS, or Own (user license).
   - Click **Save**.

   This licensing type will apply to all templates directly in the group and in the child groups.

5. For KMS licensing, set the following parameters:
   - **Server label** – the name of the KMS server
   - **KMS server host** – the hostname of the licensing server
   - **KMS server port** – the port used to connect to the licensing server
6. Click **Save**.

On the page that appears, you can **add** a template or a child to the group, **edit** the group, or **delete** it.

To view/edit/delete a template group:

1. Go to your Control Panel's **My Template Groups** menu.
2. On the page that follows, you'll see the list of all template groups created within your cloud:
   - Click the group's label to see the child groups or the list of templates assigned to this group; click the child group label to see the list of templates assigned to the child group.
   - Click the **Edit** icon next to a group or a child group to edit its name and the type of Windows licensing; click **Save** button upon
making the necessary changes.

- Click **Delete** icon to delete a group or a child group. The templates which were assigned to this group/child group will become your ungrouped templates.

**To add a child group to the group:**

1. Go to your Control Panel's **My Template Groups** menu.
2. Click the "+" button next to the required group.
3. Select **Add Child** from a drop-down menu.
4. In the screen that appears fill in:
   - **Label** – the name of the child group
   - If you are planning to use this group for Windows templates, specify the Windows Licensing type: MAK, KMS, or Own (user license).

   This licensing type will apply to all templates in the child group. Providing you have indicated the licensing type for the parent group - both types will apply

   - For KMS licensing, set the following parameters:
     - **Server label** – the name of the KMS server
     - **KMS server host** – the hostname of the licensing server
     - **KMS server port** – the port used to connect to the licensing server

   Providing the KMS licensing was selected for the parent group, both KMS servers will be available for selection while creating a virtual server based on the templates in the child group

5. Click **Save**.

**To assign a template to a template group / child group:**

1. Go to your Control Panel's **My Template Groups** menu.
2. Click the "+" button next to the required group's label, then select **Add Template**, or click on the group's label to expand it, then click the "+" button next to the required child group's label.
3. Choose the template from the drop-down box at the **Add a template** section.

   Only your custom templates will be available for selection

4. Click **Save**.

**To remove a template from a template group:**

1. Go to your Control Panel's **My Template Groups** menu.
2. Click the template group's label or click the name of the template group from which you wish to remove a template.
3. Click the **Delete** icon next to a template you want to remove.
4. Confirm the deletion.

**ISOs**

OnApp allows uploading your custom bootable ISOs for recovery purposes. These could be different images for Windows/Linux/FreeBSD or any additional software. As a cloud administrator you can limit user's ability to upload and manage ISOs by permissions and in billing plans. You can boot virtual servers from your own ISOs or the ISOs that are uploaded and made publicly available by other users. Currently, there is a limitation of 1 GB for the ISOs uploaded from the file system. There are no space limitations for the ISOs uploaded form the URL (except for your disk space limitations).

- OnApp supports rebooting existing virtual and smart servers from ISO.
- To build a new server from an ISO, create a server using the **creation wizard** and then **reboot this VS from the appropriate ISO**.
- As soon as you boot a VS from the installation ISO, OnApp cannot control any VS components (backups, networks, disks).
- Be aware, that all the contents of the disk might be deleted if a VS is booted from the ISO that installs a new distributive.
- If you boot a VS from an ISO with the RAM requirement larger than the VS’s RAM, the transaction will fail.
- If your cloud deployment is not a fresh installation, make sure that permissions on ISOs are enabled. For more info refer to **List of all OnApp Permissions**.
You can upload your own ISOs and make them available to all users of the cloud (the way the templates work in OnApp). After the ISO is uploaded, it is possible to select the Boot from ISO option on VS management screen.

View ISOs

To view the ISOs available to you:

1. Go to Control Panel and click Templates.
2. Select ISO list from the menu that expands.
3. The page that loads, will show the list of ISOs available to you separated into four tabs:
   - All ISOs - the list of all ISOs available on your system
   - System ISOs - the list of the ISOs that are publicly available to all users
   - My ISOs - the list of custom ISOs uploaded by the user who is currently logged in
   - User ISOs - the list of the ISOs uploaded by your users

For each ISO listed, you see the following details displayed:

- log status - the status of the last log item of the ISO (complete/pending/failed). Click the status to view the log details for the ISO (available to the ISOs that were uploaded through an URL).
- OS - the name of the ISO
- Label - the name of the ISO
- Min memory size - the minimum RAM size required for the ISO
- Operating systems - the operating system on the ISO
- Virtualization - the virtualization type chosen for the ISO
- Actions - click the Actions icon to perform the following procedures with the ISO:
  - Edit ISO
  - Delete ISO
  - Make Public - only for the images from the My ISOs and User ISOs tabs

Boot from ISO

To enable booting virtual and smart servers from ISO in your cloud, you need to perform the following configurations:

- Share the location where the ISOs are stored.
- Enable ISO Permissions.
- Upload ISO(s) into the cloud.
- Make ISO(s) public.
- Boot virtual or smart server from ISO.

Share the location where the ISOs are stored.

The default configuration is to upload ISOs on the Control Panel server. Then it is required to mount and share the location where the ISOs are stored at CP with all the compute resources. When the virtual servers are booted from the ISOs, the ISO is taken from the compute resource server. The location is preconfigured at onapp.yml config file:

- iso_path_on_cp - specifies the location where ISOs are stored on the Control Panel server. By default the location is /data. You can change it to any other suitable location. Make sure that this location is shared with the specified iso_path_on_hv location.
- iso_path_on_hv - specifies the location where ISOs are located on the compute resource servers. By default the location is /data. You can change it to any other suitable location with the onapp owner and read/write access. Make sure that this location is mounted to the specified iso_path_on_cp location.

CloudBoot compute resources mount the /data location automatically at boot to the /onapp/tools/recovery on HV. ISOs can be hosted on a dedicated server at any desired location with an arbitrary name if you wish. In this case it is necessary to mount the ISOs' location on this server to the Control Panel/iso_path_on_cp directory and all the compute resources' iso_path_on_hv locations. This can be a backup server to avoid the excess usage of the Control Panel's space.

Enable ISO Permissions

If your cloud deployment is not a fresh installation, make sure to enable the following permissions for your Admin and other roles as appropriate:

- Any action on ISOs - the user can take any action on ISOs
- Create a new ISO - the user can create a new ISO
- Destroy any ISO - the user can delete any ISO (own, user, and public)
- Destroy own ISO - the user can only delete own ISO
- Destroy user ISO - the user can delete ISOs created by any user, but not public ISOs
- Make any ISO public - the user can make public any ISO available to all users
- Make own ISO public - the user can make public own ISOs only
- Make user ISO public - the user can make public ISOs created by any user
- Create and manage own ISOs - the user can create and edit/delete/view own ISOs
- Manage all ISOs - the user can manage own/user/public ISOs
- Create and manage user ISOs - the user can view/create/edit/delete ISOs created by any user
- See all ISOs - the user can view all ISOs in the cloud
- See own ISOs - the user can only view the ISOs created by themselves
- See all public ISOs - the user can view all public ISOs
- See user ISOs - the user can view the ISOs created by any user in the cloud
- Update any ISO - the user can edit any ISO in the cloud
- Update own ISO - the user can only edit own ISO
- Update user ISO - the user can edit the ISOs created by any user in the cloud

For more info refer to [List of all OnApp Permissions](#).

Upload ISO(s) into the cloud.

Once you've configured the locations for storing ISOs, you can add a new ISO to the system. Follow this procedure:

1. Go to your Control Panel and click the Templates menu from the left navigation pane.
2. Select ISO list from the menu that expands.
3. On the page that loads, click the Upload ISO button at the bottom of the screen.
4. Choose the ISO to upload and fill its details:
   - make public - move the slider to the right if you want to make the ISO publicly available
   - label - choose a name for the ISO
   - min memory size - specify the minimum required RAM for the ISO
   - version - fill in the version of the ISO
   - operating system - choose the operating system of the ISO
   - operating system distro - fill in the operating system distribution of the ISO in free form
   - virtualization - tick the required virtualization type(s): XEN, KVM or KVM+Virtio
   - file - click Choose File to select the required ISO file from your file system. The yellow infobox will show the maximum file size for ISOs. The max upload size is pre-configured at Settings > Configuration (the Max upload size field).
   - file url - select this tab if you want to upload the ISO from URL and specify the link from which the ISO will be uploaded.
5. Click Save to upload the ISO.

Make ISO(s) public.

By default ISOs are available only to those users who uploaded them. These ISO images are available in the User ISOs tab. To make your ISO public and accessible for all users:

1. Go to your Control Panel's Templates > ISO List menu.
2. Click User ISOs tab.
3. Click the Actions button next to the ISO you want to make public, then select Make public.
4. Confirm the window that pops up.

When you make a user ISO public, it is moved to the System ISOs tab.

Make sure that you have enabled the Any power action on own virtual servers and Allow own virtual servers to boot from ISO permissions for the user to be able to boot servers from ISO.

Boot virtual or smart server from ISO.

Once you have shared the location where ISOs are stored and uploaded ISOs into the system, you can boot virtual or a smart servers from them using the server's power options menu. To boot a virtual/smart server from ISO:

1. Go to your Control Panel's Virtual Servers/Smart Servers menu.
2. Click the label of the required server.
3. Click the Tools button on the server's screen to expand the Tools menu.
4. Select Boot from ISO. You can boot virtual/smart servers from your own ISOs or the ISOs that are uploaded and made publicly available by other users. If you boot a server from an ISO with the RAM requirement larger than the server's RAM, the transaction will fail.

Edit ISOs

To edit the ISOs available to you:

1. Go to Control Panel and click Templates.
2. Select ISO list from the menu that expands. The page that loads shows the list of ISOs available to you.
3. Click the Actions button next to the required ISO and choose Edit ISO.
4. On the page that loads you can edit the following ISO details:
   - label - choose the name for the ISO
   - min memory size - specify the minimum required RAM for the ISO
   - version - fill in the version of the ISO
   - operating system - choose the operating system of the ISO
   - operating system distro - fill in the operating system distribution of the ISO in free form
   - virtualization - tick the required virtualization type(s): XEN, KVM or KVM+Virtio
5. Click Save.

### Delete ISOS

To delete an ISO:

1. Go to Control Panel and click Templates.
2. Select ISO list from the menu that expands. The page that loads shows the list of ISOs available to you.
3. Click the Actions button next to the required ISO and choose Delete ISO.

### Recipes

The recipe is the plugin mechanism used for adding new functionalities to the OnApp cloud. Each recipe is a set of instructions that triggers events at certain stages during the execution of certain services/event in the cloud. Essentially, recipes allow inputting code into virtual servers, appliances or the Control Panel server. This enables administrators to use recipes for configuring the server or report on it, thus providing advanced customization options in a standard environment.

Recipes run over SSH, and all commands triggered can run on virtual servers, appliances or the Control Panel server.

- SSH connection is not required for running recipes on VMware virtual servers.

- OnApp CP does not update the status of the recipe if it takes longer than 1 hour to complete the transaction. As a result, cPanel will complete the installation, but the task will be displayed as still running. This issue will be fixed in next releases.

- Currently it is not possible to execute recipes using cPanel/CloudLinux template with the /tmp mounted as noexec.

### Recipe use

Recipes allow admins to perform the following operations:

- Perform post script installation.
- Use post provision installation scripts for third party applications, agents, etc.
- Disk reclaiming.
- Update/modify virtual servers and Compute zones with script injection.
- Allow host to spin up custom virtual servers without requiring custom templates.
- Download, run and report audit tools.

Use of recipes brings cloud administrators more control over their cloud environment and allows them to self-maintain such tasks as custom template creation, etc.

You can use recipes for Unix (Linux and FreeBSD) and Windows virtual servers, smart servers, baremetal servers, virtual server templates, Compute zones and the control panel server. For details, refer to the relevant sections of the Admin guide:

- Template Recipes
- Virtual Server Recipes
- VMware Virtual Server Recipes
- Smart Server Recipes
- Baremetal Server Recipes
- Compute Zone Recipes
- Control Panel Recipes

To be able to use recipes in the cloud, you must enable recipe permissions first.

### Recipe variables

The recipes run when the appropriate events are triggered on the Compute resources, virtual servers or CP server. Depending on the object
where the event occurs, the recipe runs on Compute resource/VS/CP and contains the variables for that object. When the recipe execution on Compute resource is triggered by the event happening on virtual server, then the recipe also contains the variables for the virtual server object. The same relates to CP server.

Here is the list of variables that you can define in recipes:

### Compute resource variables
- IP_ADDRESS - Compute resource IP address
- VIRTUALIZATION - Compute resource virtualization type; Xen, KVM or VMware
- SERVER_TYPE - server type: virtual, smart or baremetal

### Virtual Server variables
- VM_IDENTIFIER - virtual server identifier
- IP_ADDRESS - virtual server IP address
- HOSTNAME - hostname of a virtual server
- ROOT_PASSWORD - server root password
- OPERATING_SYSTEM - virtual server operating system
- OPERATING_SYSTEM_DISTRO - virtual server OS distribution
- OPERATING_SYSTEM_ARCH - architecture of the operating system
- OPERATING_SYSTEM_EDITION - edition of the OS

All recipes have access to these variables:
- CP_ADDRESS - control panel server IP address
- RESPONSE_FROM_PREVIOUS - response from the previous recipe step

Each user can set custom recipe variables for different appliances. For details, refer to the following sections:
- Virtual Server Recipe Custom Variables
- VMware Virtual Server Custom Variables
- Smart Server Recipe Custom Variables
- Baremetal Server Recipe Custom Variables
- Template Recipe Custom Variables

### View List of All Recipes

To view the list of all recipes:
1. Go to your Control Panel’s Recipes menu.
2. On the screen that appears, you’ll see the list of all recipes in the cloud.

Use the tabs above to view the particular recipe type:

- **All**
  To view the list of all recipes, click the All Recipes tab.

- **Unix compatible**
  To view the list of Unix compatible recipes, click the Unix Compatible tab.

- **Windows compatible**
  To view the list of Windows compatible recipes, click the Windows Compatible tab.

- **Unowned**
  To view the list of recipes which owners have been deleted, click the Unowned Recipes tab.
  Recipes that run on other user’s resources are not deleted after their owners are removed. These recipes can be accessed via Recipes > Unowned recipes menu. A user with global permissions can become an owner of any of the unowned recipes by choosing Actions > Become an owner.

To view a particular recipe details, click the label of a required recipe.

### View Recipe Details

To view the recipe details:
1. Go to your Control Panel’s Recipes menu.
2. On the screen that appears, you’ll see the list of all recipes in the cloud.
3. Click the required recipe label to view the following recipe details, along with the recipe step information:
   - **Label** - recipe label
   - **Description** - recipe description
   - **Unix compatible** - whether the recipe is compatible with Unix virtual servers
   - **Windows compatible** - whether the recipe is compatible with Windows virtual servers
   - **Recipe steps along with their details:**
     - **Script** - step code
     - **Result source** - step result source
     - **Pass values** - specify the pass output value, for example, 0
     - **On success** - recipe behavior on success
     - **Fail values** - specify the pass output value
     - **On failure** - the recipe behaviour on failure

For information how to see the list of servers to which the recipe is assigned, see View the List of Assigned Servers section.

---

**View the List of Assigned Servers**

To view the list of servers that use the recipe:

1. Go to your Control Panel’s Recipes menu.
2. On the screen that appears, you’ll see the list of all recipes in the cloud.
3. Click the **Actions** icon next to the required recipe, then select **Applied to VS**.
4. On the screen that appears, you will see the list of servers this recipe is assigned to.

**Create Recipe**

You can create and use recipes for Unix (Linux and FreeBSD) and Windows virtual servers, smart servers, baremetal servers, virtual server templates, Compute zones and the control panel server. For details, refer to the relevant sections of the Admin guide:

- Template Recipes
- Virtual Server Recipes
- VMware Virtual Server Recipes
- Smart Server Recipes
- Baremetal Server Recipes
- Compute Zone Recipes
- Control Panel Recipes

Adding a recipe consists of two stages:

1. creating a recipe
2. creating a recipe step

**Create recipe**

To create a recipe:

1. Go to your Control Panel’s Recipes menu.
2. Click the “+” button.
3. Fill in the recipe creation form:

   **Properties**
   - **Label** - give your recipe a label
   - **Description** - provide a short recipe description (optional)
   - **Unix compatible** - move this slider to the right to use this recipe for Unix virtual servers.
   - **Windows compatible** - move this slider to the right to use this recipe for Windows virtual servers.
For Windows compatible recipe, specify the script type. You can select the following script types:

- BAT
- VBS
- PowerShell v1.0

4. Click **Save**.

After that, you'll be redirected to the recipe details screen where you can add steps to this recipe.

**Create steps**

To create a new recipe step:

1. Click the "+" button in the upper right corner of the **Steps** screen.
2. In the pop-up window, specify step details as required:

   **Script** - input the recipe code.

   **Result source** - specify the step result source:
   - Exit code - an exit code, for example, 0 is the default value returned on success.
   - STDOUT - standard output.
   - STDERR - standard error
   - STDOUT and STDERR - standard output and standard error.

   **Pass values** - specify the pass output value, for example, 0.

   You cannot specify both pass and fail values for one recipe step.
   You can specify multiple recipe values. In this case you have to specify each value from a new line.

   **On success** - the recipe behavior on success:
   - Proceed - proceed to the next step.
   - Fail - terminate the recipe and mark it as failed.
   - Stop - terminate the recipe and mark it as successful.
   - Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

   **On failure**
   Specify the recipe behavior on failure.
   In case you have already specified the recipe pass value, leave these fields empty and tick the **Anything Else** checkbox.

   You can specify multiple recipe values. In this case you have to specify each value from a new line.

   **Pass values** - specify the pass output value.

To use exit code in the VBS or PowerShell scripts, you have to specify it directly in the script. For example:

**VBS**

```
WScript.Echo "test"
WScript.Quit 95
```

**PowerShell**

```
get-date -displayhint date
exit 227
```

- STDOUT - standard output.
- STDERR - standard error
- STDOUT and STDERR - standard output and standard error.
**On failure** - the recipe behaviour on failure

- **Proceed** - proceed to the next step.
- **Fail** - terminate the recipe and mark it as failed.
- **Stop** - terminate the recipe and mark it as successful.
- **Go to step** - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

3. Press **Save**.

### Drag and drop steps to change their order. To do so:

- a. Select the required step and hold it down with the left mouse button.
- b. Drag the recipe up to the required position and release the mouse button to drop it.

---

**Assign Recipe to Multiple Servers**

You can assign recipe to several virtual or smart servers at once. To do so:

1. Go to your Control Panel’s **Recipes** menu.
2. On the screen that appears, you’ll see the list of all recipes in the cloud.
3. Click the **Actions** icon next to required recipe and click the **Run Recipe on Vs(s)** button.
4. On the screen that appears, tick the check boxes next to the servers you want to assign the recipe to.
5. Click the **Run on Selected** button to confirm the selection.

Assigning several recipes to the same server may lead to simultaneous recipe implementation and performance issues.

When assigning one recipe to several servers via API, there is possibility to run the recipe incompatible with the server type (Unix recipe on Windows servers or vice versa). In this case the transaction will be scheduled and completed, but the recipe will not do anything.

---

**Edit Recipe**

To adjust recipe details:

1. Go to your Control Panel’s **Recipes** menu.
2. Click the label of a recipe you want to edit, then click the **Edit** icon. You can edit the following recipe details:
   - **Label** - recipe label
   - **Description** - recipe description
   - **Unix compatible** - move this slider to the right to use this recipe for Unix virtual servers
   - **Windows compatible** - move this slider to the right to use this recipe for Windows virtual servers
3. Click the **Save** button to save your changes.

To edit recipe step, click the edit icon next to the required step, then change its details as required. Refer to the **Edit Recipe Step** section for details.

---

**Edit Recipe Step**

To edit recipe steps:

1. Go to your Control Panel’s **Recipes** menu.
2. Click the **Actions** icon next to the recipe you want to change, then click the **Edit** button.
3. On the screen that appears, you’ll see the list of recipe steps. Click the **Edit** icon next to the step you want to edit.
4. In the pop-up window, edit the step details as required:
Script - input the recipe code.

Result source - specify the step result source:

- Exit code - an exit code, for example, 0 is the default value returned on success.
- STDOUT - standard output.
- STDERR - standard error.
- STDOUT and STDERR - standard output and standard error.

Pass values - specify the pass output value, for example, 0.

You cannot specify both pass and fail values for one recipe step.

You can specify multiple recipe values. In this case you have to specify each value from a new line.

On success - the recipe behavior on success:

- Proceed - proceed to the next step.
- Fail - terminate the recipe and mark it as failed.
- Stop - terminate the recipe and mark it as successful.
- Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

On failure

Specify the recipe behavior on failure.

In case you have already specified the recipe pass value, leave these fields empty and tick the Anything Else checkbox.

You can specify multiple recipe values. In this case you have to specify each value from a new line.

Pass values - specify the pass output value.

On failure - the recipe behavior on failure:

- Proceed - proceed to the next step.
- Fail - terminate the recipe and mark it as failed.
- Stop - terminate the recipe and mark it as successful.
- Go to step - specify the step to proceed to. If you specify the nonexistent step, the recipe will be stopped.

5. Press Save.

Drag and drop steps to change their order. To do so:

a. Select the required step and hold it down with the left mouse button.
b. Drag the recipe up to the required position and release the mouse button to drop it.

Delete Recipe

To delete a recipe:

1. Go to your Control Panel’s Recipes menu.
2. Click the Delete icon next to the recipe you want to remove.
3. Confirm the deletion.

Recipe Permissions
You can control user access to recipes functionality by giving different user roles certain permissions. The list below includes all the recipe permissions that can be set up in OnApp.

**Recipes**
- Any actions on recipes (recipes) - the user can take any action on recipes
- Create new recipes (recipes.create) - the user can create a new recipe
- Delete any recipe (recipes.delete) - the user can delete any recipe
- Delete own recipes (recipes.delete.own) - the user can delete own recipes
- Edit any recipe (recipes.edit) - the user can edit any recipe
- Edit own recipes (recipes.edit.own) - the user can edit own recipes
- Read any recipe (recipes.read) - the user can view all recipes
- Read own recipes (recipes.read.own) - the user can view own recipes

**Recipe Groups**
- Any action on recipe groups - the user can take any action on recipe groups
- Create a new recipe group - the user can create a new recipe group
- Destroy any recipe group - the user can delete any recipe group
- See list of all recipe groups - the user can view the list of recipe groups
- See all recipe groups - the user can view any recipe group details
- Update any recipe group - the user can edit all recipe groups

**Recipe Group Relations**
- Any action on recipe group relations - the user can take any action on recipe relation group
- Create a new recipe group relation - the user can create a new recipe relation group
- Destroy any recipe group relation - the user can delete any recipe relation group
- See list of all recipe group relations - the user can view the list of recipe relation groups
- See all recipe group relations - the user can view recipe relation group details
- Update any recipe group relation - the user can edit any recipe relation group

**Control Panel**
- Add recipe to control panel (control_panel.recipe_add) - the user can add recipes to the control panel
- Remove recipe from control panel (control_panel.recipe_delete) - the user can remove recipes from the control panel

**Compute Zones**
- Add recipe to Compute zone (hypervisor_zones.recipe_add) - the user can add recipes to Compute zone
- Remove recipe from Compute zone (hypervisor_zones.recipe_delete) - the user can remove recipes from Compute zone

**Virtual Servers**
- Add recipe to virtual machine (virtual_machines.recipe_add) - the user can detach recipes from own virtual servers
- Remove recipe from virtual machine (virtual_machines.recipe_delete) - the user can detach recipes from all virtual servers

**Smart Servers**
- Add recipe to any smart server (smart_servers.recipe_add) - the user can add recipes to any smart servers
- Add recipe to own smart server (smart_servers.recipe_add.own) - the user can add recipes to own smart servers
- Remove recipe from any smart server (smart_servers.recipe_delete) - the user can remove recipes from any smart servers
- Remove recipe from own smart server (smart_servers.recipe_delete.own) - the user can remove recipes from own smart servers

**Baremetal Servers**
- Add recipe to any baremetal server (baremetal_servers.recipe_add) - the user can add recipes to any baremetal servers
- Add recipe to own baremetal server (baremetal_servers.recipe_add.own) - the user can add recipes to own baremetal servers
- Remove recipe from any baremetal server (baremetal_servers.recipe_delete) - the user can remove recipes from any baremetal servers
- Remove recipe from own baremetal server (baremetal_servers.recipe_delete.own) - the user can remove recipes from own baremetal servers

**Templates**
- Add recipe to any template (templates.recipe_add) - the user can add recipe to any template
- Add recipe to own templates (templates.recipe_add.own) - the user can add recipes to own templates
- Remove recipe from any template (templates.recipe_delete) - the user can remove recipes from any template
- Remove recipe from own templates (templates.recipe_delete.own) - the user can remove recipes from own templates

**Recipe Groups**
Recipe groups allow OnApp administrators to organize individual recipes into groups that can be used as a billing plan resource. This allows you to easily create groups of recipes which can be added to the billing plan to limit the recipes that are available to a user.
The recipe groups have hierarchical (tree) structure:

- Recipe group
- Child group
- Recipes

You can also add a recipe directly to the recipe group section without assigning it to a child group.

Click the recipe group’s label to expand the list of child groups, then click the recipe group’s label to view the list of recipes, respectively.

To view the list of recipe groups:
1. Go to your Control Panel's Recipes > Recipe Groups menu.
2. On the page that follows, you will see the list of all recipe groups.
3. Click the arrow next to the recipe group to expand the list of child groups and assigned recipes.

To edit a recipe group:
1. Go to your Control Panel's Recipes > Recipe Groups menu.
2. On the page that follows, you'll see the list of all recipe groups created within your cloud.
3. Click the Edit icon next to a group to edit its name.
4. Click the Save button to save your changes.

To delete a recipe group:
1. Go to your Control Panel's Recipes > Recipe Groups menu.
2. On the page that follows, you'll see the list of all recipe groups created within your cloud.
3. Click the Delete icon next to the required group to remove it.
4. Confirm the deletion.

To add a recipe group:
1. Go to your Control Panel's Recipes > Recipe Groups menu.
2. On the page that follows, click the “+” button.
3. Give a name to your group.
4. Click Save.
5. On the page that appears, you'll be prompted to assign a recipe to a group.

To add a child group to a recipe group:
1. Go to your Control Panel's Recipe Groups menu.
2. Click the “+” button next to the required group's label, then select Add Child.
3. Give a name to your child group.
4. Click the Save button to confirm.

To assign a recipe to a recipe group:
1. Go to your Control Panel's Recipe Groups menu.
2. Click the “+” button next to the required group's or child group's label, then select Add Recipe.
3. Choose the required recipe from the drop-down menu.
4. Click the Save button to confirm.

To remove a recipe from a recipe group:
1. Go to your Control Panel's Recipe Groups menu.
2. Click the arrow button next to the required recipe group to expand the list of recipes.
3. Click the Delete icon next to a required recipe.
4. Confirm the deletion.

Recipe Use Examples

The set of examples aimed to illustrate the recipe utilization.

Recipe 1

Runs on VSs for Apache server installation and default web page configuration.
Can be used for the following events:

- VS provisioning (starts Apache server during the VS creation)
- Network rebuild
- Network interface added

Consists of 5 steps. Each step depends on the previous step result.

Step 1

```bash
#if echo $OPERATING_SYSTEM_DISTRO |grep rhel ; then
    if rpm -qa |grep httpd |grep -v grep ; then
        yum -y update httpd
    else
        yum -y install httpd
    fi
#else
    # exit 1
    #fi
```

Result source: Exit code
Pass values: 0
On success: Proceed
Fail values: Fail anything else
On failure: Fail

Step 2

```bash
```

Result source: Exit code
Pass values: 0
On success: Go to step 5
Fail values: Fail anything else
On failure: Go to step 4

Step 3

```bash
service httpd restart
```

Result source: Exit code
Pass values: 0
On success: Stop
Fail values: Fail anything else
On failure: Fail

Step 4
Recipe 2
Runs on Compute resources to check the virtualization type.
Can be used for the following events:
- When Xen/KVM Compute resource goes online

Recipe 3
Runs on Compute resources to check the snmpd and snmpdtrap services and restarts them.
Can be used for Compute resource and control panel server events.
service snmpd restart && service snmptrapd restart

Result source: Exit code
Pass values: 0
On success: Proceed
Fail values: Fail anything else
On failure: Fail

Recipe 4
Runs on Windows virtual servers to check if the Apache folder is present and deletes it, otherwise installs Apache.
Can be used for Windows virtual server events.

Step 1
$files = dir 'C:\Program Files (x86)\Apache*'  
$process = "ApacheMonitor*"  

if ($files -ne $null) 
{  
  "there's installed apache. Removing apache ..."
$installer = dir 'c:\apache.msi'
Stop-Process -Name $process
Start-Sleep -Second 5
Remove-Item $files -Force -Recurse
Remove-Item $installer -Force -Recurse
$files = dir 'C:\Program Files (x86)\Apache*'  
  if ($files -ne $null) 
    {  
      "Failed to remove apache"
        return 1
    }  
  else  
    {  
      "apache has been removed"
        return 0
    }  
}  
else  
{  
  "Apache has not been installed."
  "Downloading installer..."


"silence apache installation..."
  c:\apache.msi /quiet
  return 0
}  

Result source: Exit code  
Pass values: 0  
On success: Proceed  
Fail values: Fail anything else  
On failure: Fail  

Control Panel Recipes Settings.  
Recipes are sets of instructions that are triggered during the certain stages of events defined. By managing recipes via the Settings menu, you can assign recipes to the control panel server.  

To manage this functionality make sure that you have the Manage recipes for Control Panel permission enabled.  

To manage Control Panel recipes settings:  
1. Go to your Control Panel's Settings menu and click the Recipes icon.  
2. On the screen that appears, you will see the details of all recipes in the cloud:
The left pane shows the list of all recipes in the cloud organized into recipe groups.
The right pane displays the list of control panel events to which the recipes can be assigned to.

**Assign recipe**

Drag and drop recipe to assign it to a desired control panel event.

You can assign virtual server recipes to the following events:

- **KVM Compute resource goes online** - run the recipe when the KVM Compute resource comes online
- **KVM Compute resource goes offline** - run the recipe when the KVM Compute resource goes offline
- **XEN Compute resource goes online** - run the recipe when the Xen Compute resource comes online
- **XEN Compute resource goes offline** - run the recipe when the Xen Compute resource goes offline
- **VMware Compute resource goes online** - run the recipe when the VMware Compute resource comes online
- **VMware Compute resource goes offline** - run the recipe when the VMware Compute resource goes offline

The recipe will be triggered when the statistics is not received from a Compute resource for a certain period of time for some reason. If the Compute resource is offline, the recipe will not run.

- **Compute resource added** - run the recipe when the new Compute resource is added
- **Compute resource removed** - run the recipe when Compute resource is removed
- **VS Provisioning** - run the recipe during VS provisioning
- **VS Network rebuild** - run the recipe when rebuilding a network
- **VS Disk added** - run the recipe when adding a disk
- **VS Network Interface added** - run the recipe when adding a network interface
- **VS Disk resized** - run the recipe when resizing a VS disk
- **VS Resize** - run the recipe when resizing a VS

**To use drag and drop:**

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

**Remove recipe**

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the **Delete** button next to the recipe you want to remove.

**CDN**

OnApp CDN is a software product that works with OnApp Cloud v2.3 and later. If you enable CDN for your end users, they can get access to a network of global edge servers (yours, and/or those provided by other cloud hosts) and use that network to deliver web content more quickly and reliably to visitors all over the world. Your CDN is managed alongside your cloud using your OnApp Control Panel. See [http://www.onapp.com/cdn](http://www.onapp.com/cdn) for more information.

OnApp provides the following CDN types:

- **HTTP Pull**
- **HTTP Push**
- **Live Streaming**
- **On Demand Streaming**

**Push**

HTTP Push method is similar to secondary server: the user uploads content to CDN and links to it, so the content is physically stored at CDN storage servers.

**Pull**

With an HTTP Pull CDN, the website owner stores content on their server and rewrites URLs to include a subdomain. Then, when the specific content is requested, it is pulled to the CDN network from the host and delivered to the closest point to the consumer who requested that content (the content is cached on edge server).

**Streaming**

There are two supported streaming types in the OnApp CDN – live streaming and on demand streaming. To utilize CDN streaming service, you have to deploy CDN streaming Edge Server.

**Live streaming**
Live streaming CDN allows delivering the content to end users in a live broadcast mode. When using a live streaming CDN service, end users receive media the same time like a traditional broadcasting.

**Video On Demand streaming**

Video On Demand streaming CDN allows delivering video on request and makes it repeatedly accessed. Consumers can control content and are able to fast forward or rewind it the same as live streaming.

Only mp4 and flv files are currently supported by VoD streaming.

Setting up OnApp CDN includes:

- Enabling CDN for your cloud in the OnApp customer dashboard (contact OnApp Support if you don't have dashboard access)
- Running CDN Setup wizard in your OnApp Control Panel
- Setting up storage servers
- Setting up edge servers
- Adding CDN edge groups and assigning them to billing plans
- Creating CDN resources (when you create a CDN resource, CDN is enabled automatically in the OnApp)
- Assigning the billing plan to a user, and setting their permissions.

When creating a user account, you need to grant that user with all necessary permissions for managing CDN resources and assign him to the appropriate billing plan.

Storage servers store web content to be distributed over the Content Delivery Network. The content is then cached by edge servers and delivered to consumers.

Edge servers cache web content and deliver it to website visitors. They are deployed on Compute resources and managed just like VSs. You can use edge servers to sell CDN bandwidth to your end users, and/or submit the edge server to the OnApp CDN marketplace and sell your bandwidth to other hosts. You can create as many edge servers as you need and place them on different Compute resources in different geographical locations, and easily broaden your CDN by combining your own edge servers with other locations on the CDN marketplace. You can even build a CDN solely with marketplace resources. For details, refer to the chapter.

Edge groups are groups of edge servers – your own, and those you subscribe to from the CDN marketplace. They are usually grouped by location, so they represent a pool of servers for a given geographical area.

Edge groups are assigned to billing plans to set the prices for the bandwidth that your end users consume. You can assign several groups to one billing plan at a time, and establish different geographical zones with different pricing. The bandwidth pricing of the billing plan is the price for CDN bandwidth sold to your end users.

CDN resources are specific servers with content an end user wants to distribute via the CDN. CDN resources are assigned to edge groups, which determines the list of servers taking part in distributing/caching of their data.

Starting with OnApp Cloud v3.0, CDN is enabled automatically after adding the first DNS record or CDN resource.

**CDN Setup Wizard**

This section contains a comprehensive guide through the CDN Setup wizard. The wizard is used to enable and configure the CDN service. Follow the stages of the wizard as instructed on the screen to configure a CDN portal. To make any changes after setup is complete, rerun the CDN wizard.

The setup cycle consists of 3 steps:

- Permissions
- CDN edge groups
- Billing

You can rerun the wizard after the initial configuration as many times as you need.

To start the CDN wizard:

1. Go to your Control Panel’s CDN Edge Servers menu.
2. Click the CDN Setup Wizard button to begin the CDN setup wizard.
3. Proceed the steps in wizard, as described below.
Step 1 of 3. Permissions
- Set the CDN permissions for the user role to enable CDN for your clients. Select a Client role from the drop-down list to enable the required permissions. You can enable CDN permissions for additional groups later via Users and Groups menu.
- Enable CDN resources permissions for the Administrator role. In case you have multiple roles assigned to your account, select the role from the drop-down list.
- Click Next.

Be careful not to assign Administrator role to a Client shared role. You may skip the permissions section if you have set permissions before. Users will not be able to purchase and manage their CDN resources unless they are enabled for their ROLE.

Step 2 of 3. CDN edge groups
- Give your edge group a unique label. For example, you can create an Edge group called "North America" and add to it your North American POPs. You will be able to define additional groups later under the Users and Groups menu.
- Choose the available locations from the Available Locations list. To add a location, click the '+' button next to the location you wish to add to the group.
- Click Next.

Step 3 of 3. Billing
- Assign the CDN edge group to the billing plan from the drop-down list. Restriction: you can't add two edge groups with the same location to one billing plan.
- Specify the price per GB of CDN usage (traffic used by your clients on the locations within the edge group). You will be able to assign additional edge groups with different prices to the selected billing plan later, using a Users and Groups menu. Any customer assigned to the selected billing plan will be able to create a CDN service, powered by the Edge Group locations at the defined price.
- After you have finished configuring the CDN edge group properties, click the CDN Dashboard button to head back to the Dashboard or click Create Edge Group button to quit the CDN setup wizard.

User should have the following permissions enabled to run the CDN setup wizard:
- Update any Role
- See all Roles
- Create a new edge group

CDN Edge Servers
Web content is cached in the network of edge servers on the CDN, distributed across different geographic locations. Currently there are two types of edge servers in OnApp: HTTP and Streaming.
HTTP edge servers support both Push and Pull population methods in 80/20 ratio (80% HTTP Pull and 20% HTTP Push). When the edge server is created, its storage limit for HTTP Pull and HTTP Push is automatically assigned by system.
Streaming edge server type allows sending a stream to one of the publishing points, or pick up the stream externally and deliver it to the end users.
Take note that Operator has to deploy CDN streaming Edge Server to utilize CDN streaming service.
Streaming edge server support only streaming services. The following protocols are supported:
- HTTP
- RTMP/RTMPE/RTMPT/
- HDS
- RTSP/RTP
- iPhone
- SilverLight
- MPEG-TS

Streaming service includes the following advanced features:
- Hotlinking protection - protect your media from being hotlinked (linked to website without your permission)
- Geo Blocking - restrict access to your media so that it is accessible only for certain countries/regions
- RMTPE (secure Wowza) – streaming encryption.

You do not have to add the Wowza license key manually to enable streaming edge servers. A third party application - Wowza will be
Content is delivered to end users from the server which is closest to the user, or has the best availability. If you have CDN enabled for your cloud, you can use the control panel to set up your own edge servers, and manage them in the same way you manage virtual servers. You can submit your edge server to the locations in marketplace to sell bandwidth across it.

To be able to sell CDN bandwidth through our online marketplace, you must first submit your edge server for assessment.

You can use smart Compute resources for CDN edge server deployment.

CDN edge servers do not support firewall and NAT (network address translation).

Create CDN Edge Server

To add new CDN edge server:

1. Go to your Control Panel's **CDN Edge Servers** menu.
2. On the screen that appears, click the **Create Edge Server** button or press the "+" button.
3. Fill in the edge server creation form step by step:

**Step 1 of 3. Properties**

- Give your edge server a label. The label can consist of:
  - Lower- & upper-case letters [A-Za-z]
  - Digits [0-9]
  - Dash [-]
  - Underscore [ _ ]
  - Space character [ ]
  - At sign [@]
  - Brackets [ (){} ]
  - Slashes [/]
  - Caret [$]
  - Dollar sign [ $]
  - Asterisk [*]
  - Comma [ , ]
  - Dot [ . ]

- Select an edge server type: HTTP or streaming

A third party application - Wowza will be installed automatically when installing a streaming edge server and additional charges will apply. Please, contact your account manager for details.

- Location - choose the location group to assign this edge server to.
- CDN Location - choose CDN location group to assign this edge server to.
- Choose a Compute zone to build this server on.
- Choose a specific Compute resource to build this server on.

You can use smart Compute resources for CDN edge server deployment.

- Move the **Add to Marketplace** slider to the right to submit this server to the OnApp CDN marketplace. If so, the minimum required disk size is 1 TB.
- **Click Next.**

Any servers you submit will be assessed before they are accepted into the marketplace. Criteria include geographic location, bandwidth and server specs.

**Step 2 of 3. Resources**
- Set the resources needed for this edge server: RAM, CPU cores and CPU priority.
- Choose a data store zone for this edge server's primary disk.
- Set the primary disk size. The disk size is calculated in the following way: 10 GB for OS, the rest of total disk space is estimated 80% per Pull population and 20% per Push population.

The disk size should not exceed 2 TB when a new disk is added. You can later resize the disk if you need it to be larger than 2 TB.

- Choose a network zone and set the port speed for this edge server, or make it unlimited. It is not possible to set port speed value for edge servers based on smart Compute resources.

**Step 3. Confirmation**
- Move the **Build Edge Server Automatically** slider to the right if you want the system to automatically build the edge server. Otherwise, you will have to build your server manually after it is created.

4. Click **Create Edge Server**.

**View CDN Edge Server Details**

Edge servers are virtual Compute resources that are much like other virtual servers in your cloud. You can perform the same basic actions on them as for VSs.

To view all edge servers in the cloud:

1. Go to your Control Panel's **CDN Edge Servers** menu to see an overview of all edge servers in your cloud: their label, IP addresses, power status (with on/off buttons), allocated disk size, RAM and backups.
2. To reboot, start up or shut down a CDN edge server, click the **Actions** button next to the required edge server, then select the relevant action.
3. To narrow the list of edge servers by type, click the relevant tab at the top of the list.

To view a particular edge server's details:

1. Go to your Control Panel's **CDN Edge Servers** menu.
2. Click the label of the edge server required.
3. On the screen that appears, use the top navigation tabs to manage your edge server.

Edge servers are managed with the same tools you use to manage VSs in your cloud. The table below links to the relevant sections of this guide's Virtual Servers chapter. The exception is that autoscaling, backups and firewall rules are not available for edge servers.

<table>
<thead>
<tr>
<th>Overview</th>
<th>The Overview tab shows CDN edge server information and gives access to the most frequently-used management tools.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Properties</strong></td>
<td>CDN edge server's details page</td>
</tr>
<tr>
<td><strong>CPU Usage</strong></td>
<td>CDN edge server's CPU usage statistics</td>
</tr>
<tr>
<td><strong>Billing Statistics</strong></td>
<td>CDN edge server's billing statistics information</td>
</tr>
<tr>
<td><strong>Networking</strong></td>
<td>The Networking tab gives access to the edge server's Network interfaces and IP addresses.</td>
</tr>
<tr>
<td><strong>Network Interfaces</strong></td>
<td>CDN edge server's network configuration</td>
</tr>
<tr>
<td><strong>IP Addresses</strong></td>
<td>CDN edge server's IP addresses</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>The Storage tab lets you manage your edge server's disks.</td>
</tr>
</tbody>
</table>

4. To expand the **Tools** menu, click the **Tools** button on the edge server's screen. The list of available options depends on the edge server's status. For options description, refer to relevant sections of the Virtual servers chapter.
Edit CDN Edge Server

Editing a CDN edge server means adjusting the resources allocated to it, changing its label and basic properties.

To edit a CDN edge server:

1. Go to your Control Panel's CDN edge server menu.
2. Click the label of an edge server.
3. On the next screen, click the Tools button, then click the Edit Edge Server link:
   - Change the edge server label.
   - Edit CPU core/priority and RAM values.
   - Move the Add to Marketplace slider to the right to add the edge server to the marketplace. (This option is only available for edge servers that were not added to the marketplace earlier.)
4. Click Save Edge server.

Set VIP Status for Edge Server

If a Compute resource fails or reboots, the system migrates edge servers to another Compute resource, one server at a time. The order servers are migrated in is random. However, you can give an edge server "VIP" status, and this will give that server priority in the migration queue.

To set or remove VIP status for an edge server:

1. Go to your Control Panel's CDN Edge Servers menu.
2. Use the VIP button next to a required edge server to change its VIP status.

Delete CDN Edge Server

To delete a CDN edge server:

1. Go to your Control Panel's CDN edge servers menu.
2. Click the label of an edge server.
3. When the page loads, click the Tools button, then click Delete Edge Server.
4. You will be asked for confirmation before the edge server is deleted.

CDN Edge Server Network Interface Usage

Network Interface usage page displays bandwidth used in two charts: statistics for 24 hours and hourly statistics for the period up to three months.

To view the edge server's network interface usage statistics:

1. Go to your Control Panel's CDN Edge Servers menu.
2. Click the label of the Edge Server required.
3. On the screen that appears, click Networking tab > Network Interfaces.
4. Click the Interface Usage icon next to the network interface needed.
5. On the screen that appears, set the start time and end time and click Apply.

CDN Storage Servers

CDN storage servers are used for storing the content which should be distributed over CDN. When the content is requested on the CDN, it is served by the edge server nearest to the customer’s geographical location.

There are two types of CDN storage servers in OnApp: HTTP and Streaming.

You can use smart Compute resources for CDN storage server deployment.

View CDN Storage Server Details

To view the list of all CDN storage servers in the cloud:

1. Go to your Control Panel's CDN Storage Servers menu to see an overview of all storage servers in your cloud: their label, IP addresses, power status (with on/off buttons), allocated disk size, RAM and backups.
2. To reboot, startup/shutdown a storage server, click the Actions button next to the required storage server, then select the relevant action.
3. To narrow the list of storage servers by type, click the relevant tab at the top of the list.
To view a particular edge server's details:

1. Go to your Control Panel's **CDN Storage Servers** menu.
2. Click the label of the storage server required.
3. On the screen that appears, use the top navigation tabs to manage your storage server.

<table>
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<tr>
<th>Overview</th>
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<td>Storage server’s IP addresses</td>
</tr>
<tr>
<td>Storage Disks</td>
<td>The Storage tab lets you manage your edge server’s disks.</td>
</tr>
</tbody>
</table>

4. To expand the **Tools** menu, click the **Tools** button on the storage server's screen. The list of available options depends on the edge server's status. For options description, refer to **VS properties** section.

### Create CDN Storage Server

To create new storage server:

1. Go to your Control Panel’s **CDN Storage Servers** menu.
2. Click the **Create Storage Server** button at the bottom of the screen.
3. Fill in the storage server creation form step by step:

**Step 1 of 3. Properties**

Specify the storage server details:

- Specify the server’s label in a human-recognizable format.
- Select the storage server type: HTTP or Streaming.

A third party application - Wowza will be installed automatically when installing a streaming storage server and additional charges will apply. Please, contact your account manager for details.

- Location - choose the location group to assign this storage server to.
- CDN Location - choose CDN location group to assign this edge server to.
- Specify the Compute resource and Compute zone.

You can use **smart Compute resources** for CDN storage server deployment.

- Click **Next**.

**Step 2 of 3. Resources**

- Set the resources needed for this storage server: RAM, CPU cores and CPU priority.

The minimum memory capacity is 8 GB.

- Choose a data store zone for this storage server’s primary disk
- Set the primary disk size (Storage server HDD). The minimum required disk size is 30 GB.
Choose a network zone from the drop-down box. If the option is available, you can also assign an IP address for the VS from the drop-down menu. Indicate Compute resource and network to have the list of available IPs. Tick the Show Only My IP Addresses check box to view only own IP addresses in the IP addresses dropbox. Set the port speed in Mbps or tick it as unlimited. It is not possible to set port speed value for storage servers based on smart Compute resources. Click Next.

Step 3. Confirmation

- On the screen that appears, move the Build Edge Server Automatically slider to the right if you want to build the storage server automatically, otherwise you will have to build your storage server manually after it is created.
- Click the Create Storage Server button to start the creation process.

Edit CDN Storage Server

1. Go to your Control Panel's CDN Storage Servers menu.
2. Click the label of a required storage server.
   - On the next screen, click the Tools button, then click the Edit CDN Edge Server link under the Storage Server Options.
   - Change the storage server label.
   - Edit CPU core/priority and RAM values.
3. Click Save.

Set VIP Status for Storage Server

If a Compute resource fails or reboots, the system migrates storage servers to another Compute resource, one server at a time. The order servers are migrated in is random. However, you can give a storage server "VIP" status, and this will give that server priority in the migration queue.

To set or remove VIP status for a storage server:

1. Go to your Control Panel's CDN Storage Servers menu.
2. Use the VIP button next to a required storage server to change its VIP status.

Delete CDN Storage Server

To delete a storage server:

1. Go to your Control Panel's CDN Storage Servers menu.
2. On the screen that appears, you'll see the list of all storage servers in the cloud. Click the HTTP/Streaming tabs to view storage servers by type.
3. Click the Actions button next to the storage server you want to remove, then click Delete.

CDN Resources

A CDN resource is a host (e.g. a specific web server), the content of which you are going to distribute over the network of edge servers.
There are three types of CDN resources in the OnApp Control Panel:

- **HTTP** CDN resource type supports both Push and Pull population.
- **VoD** CDN resource type (Pull and Push types) allows using on demand video streaming service - uploading video and streaming to the end users.
- **Live Streaming** CDN resource type allows broadcasting content using CDN.

Only servers added to the edge groups assigned to the resource will distribute/cache the host's content.

To activate the CDN Resources menu, at least one CDN Edge Group with at least one edge server or marketplace location must be available.
Apart from the CDN Resources permissions enabled, the following requirements must be met for the publisher to be able to create respective resources. If the requirements are not met, the publisher will not be able to create the particular resource type:

<table>
<thead>
<tr>
<th>Resource Type based on user Edge group</th>
<th>HTTP Pull</th>
<th>HTTP Push</th>
<th>VoD Pull</th>
<th>VoD Push</th>
<th>Live Streaming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requirements</td>
<td>User billing plan must include an edge group with at least one location that supports HTTP.</td>
<td>User billing plan must include an edge group with at least one location that supports HTTP Push, and an HTTP storage server.</td>
<td>User billing plan must include an edge group with at least one location that supports VoD Pull.</td>
<td>User billing plan must include an edge group with at least one location that supports VoD Push, and a streaming storage server</td>
<td>User billing plan must include an edge group with at least one location that supports live streaming.</td>
</tr>
</tbody>
</table>

**View CDN Resources**

Go to your Control Panel's **CDN Resources** menu. You will see the list of all CDN resources with the following information:

- **CDN Hostname** – hostname of the CDN resource.
- **Origin Sites** – path of the content that will be served from the CDN.
- **Type** - resource type: HTTP Push, HTTP Pull, VoD or Live streaming.
- **Cost** – cost of the resource.

To view HTTP, VoD or live streaming resources only, click the required tab.

You can edit/delete a resource using the relevant icons next to each resource in the list, and add a resource with the **CDN Resource Wizard** button.

**View CDN Resource Details**

View basic and advanced details of a CDN Resource.

To view basic settings:

1. Go to your Control Panel's **CDN Resources** menu.
2. Click the required CDN Hostname.
3. On the page that appears, click **Basic settings** tab. The screen provides you with the following information (depending on the resource):

   **CDN Resource details**
   - **Owner**
   - **CDN hostname**
   - **Resource type**
   - **SSL On** - whether SSL is enabled for the resource or not
   - **SNI SSL Certificate** - custom SNI SSL certificate associated with the resource
   - **CDN reference** – the ID of the resource in database
   - **Resource Status** – shows the resource status. Click **Suspend** to terminate.

   **Origins**
   - The IP of the content that will be served from the CDN.

   **DNS settings**
   - A CNAME for the CDN Hostname which can then be used to view the contents. Use this for the origin settings.

   **Edge Groups**
   - Shows to which Edge groups the resource is assigned.

   **Last 24 hours cost**
   - Cost of the resource for the last 24 hours.

To view advanced details:

1. Go to your Control Panel's **CDN Resources** menu.
2. Click a CDN Hostname.
3. On the screen that appears, click the **Advanced Details** tab.
4. This screen provides you with the detailed information on the CDN Resources. See the following sections for details.

View HTTP CDN Resource Details

To view instructions and basic settings of an HTTP CDN resource:

1. Go to your Control Panel's **CDN Resources** menu.
2. Click the required CDN Hostname.
3. On the page that appears, click **Basic settings** tab. The screen provides you with the following information:

**CDN Resource details**

- **Owner**
- **CDN hostname**
- **Resource type** - Push or Pull
- **SSL on** - whether SSL is enabled for the resource or not
- **SNI SSL Certificate** - custom SNI SSL certificate associated with the resource
- **CDN reference** – the ID of the resource in database
- **Resource status** – shows the resource status.

**Origins (HTTP Pull only)**

- Path of the content that will be served from the CDN.

**DNS Settings**

- Add a CNAME for the CDN Hostname which can then be used to view the contents.

**Uploaded files (HTTP Push only)**

A list of uploaded files. Click the file name to preview the video file.

**Edge Groups**

- Shows to which Edge groups the resource is assigned.

**Last 24 hours cost**

- Cost of the resource for the last 24 hours.

**Advanced details**

Click the **Advanced details** tab to view advanced details of an HTTP CDN resource. The screen that appears will provide you with the following information:

- **Publisher name** - name of the user who created the CDN Resource record
- **IP Access Policy** - access policy from a range of IP addresses: either NONE (disabled), ALLOWED BY DEFAULT or DISABLED BY DEFAULT
- **Country Access Policy** - access policy to the CDN resource's content for specified countries: either NONE (disabled), ALLOWED BY DEFAULT or DISABLED BY DEFAULT
- **Url Signing Enabled** - whether access requires URL signing or not
- **Hotlink Policy** - whether hotlink policy is enabled or not
- **Origin Policy** - the type of connection chosen (HTTP or HTTPS)
- **Password On** - whether the password is enabled or not
- **Cache Expiry** - cache expiry time in minutes
- **MP4 Pseudo Streaming** - whether the MP4 pseudo streaming is enabled or not
- **FLV Pseudo Streaming** - whether the FLV pseudo streaming is enabled or not
- **Ignore Set-Cookie** - whether content caching with SetCookie response headers is enabled or not
- **Secure Wowza** - whether secure Wowza token is enabled or not
- **Token for Edge/Flash player** - whether token for Edge/Flash player is enabled or not
- **Token Authentication Enabled** - whether token authentication is enabled or not
- **Nginx Settings:**
  - **Limit rate** - sets speed limit of a response to a client (per request) in KB/s. Maximum limit rate value - 2147483647 KB/s
  - **Limit rate after** - sets the amount after which the speed of a response to a client will be limited in MB. Maximum limit rate after value - 2147483647 KB
  - **Proxy cache key** - key for caching
  - **Proxy read timeout** - proxy server response timeout in seconds. Maximum proxy read timeout value - 65535 seconds
  - **Proxy connect timeout** - timeout for establishing connection with proxy server in seconds. Maximum proxy connect timeout value - 75 seconds.
- **Block search engine crawlers** - whether search engine crawlers are blocked from indexing the CDN content or not (for HTTP Pull CDN resources only)

**Upload instructions (HTTP Push only)**
Click the Instructions tab to view the instructions for uploading files and embedding video from HTTP Push CDN resources.

*Prefetch/Purge CDN content (HTTP Pull only)*

To prefetch or purge the resource content of the HTTP Pull CDN resource, click the required tab respectively.

*View CDN resource billing statistics*

To view the resource billing statistics, click the Billing Statistics tab.

*Advanced Reporting*

View the analysis of your resources in reports. Refer to View CDN Advanced Reporting for details.

*HTTP Caching Rules*

Customize the CDN edge server behavior by setting the rules. More info at HTTP Caching Rules.

**View VoD CDN Resource Details**

To view details of a video on demand CDN resource:

1. Go to your Control Panel’s CDN Resources menu.
2. Click the CDN hostname of a required VOD CDN resource.
3. On the page that appears you will see basic resource settings:

   **CDN Resource details**
   - Owner
   - CDN hostname
   - Resource type - VOD Push or VOD Pull
   - SSL on - whether SSL is enabled for the resource or not
   - CDN reference – the ID of the resource in database
   - Resource status – shows the resource status.

   **Origins (VOD Pull only)**
   - Path of the content that will be served from the CDN.

   **DNS settings**
   - CNAME for the CDN Hostname which is used to view the contents.

   **Uploaded files (VOD Push only)**
   - A list of uploaded files. Click the file name to preview the video file.

   **Edge Groups**
   - Shows to which Edge groups the resource is assigned.

   **Last 24 hours cost**
   - Cost of the resource for the last 24 hours.

*Advanced details*

Click the Advanced details tab to view advanced details of a VOD CDN resource. The screen that appears will provide you with the following information:

- Publisher name - name of the user who created the CDN Resource record
- Country Access Policy - access policy to the CDN resource's content for specified countries: either NONE (disabled) or BLOCK BY DEFAULT
- Hotlink Policy - whether hotlink policy is enabled or not
- Secure Wowza - whether secure Wowza token is enabled or not
- Token for Edge/Flash player - whether token for Edge/Flash player is enabled or not
- Token Authentication Enabled - whether token authentication is enabled or not

*Upload instructions*

Click the Instructions tab to view the instructions for uploading files and embedding video from Video On Demand CDN resources.
View CDN resource billing statistics

To view the resource billing statistics, click the Billing Statistics tab.

View Live Streaming CDN Resource Details

To view details of a live streaming CDN resource:

1. Go to your Control Panel's CDN Resources menu.
2. Click the CDN Hostname of a required live streaming CDN resource.
3. On the page that appears you will see basic resource settings:

   **CDN Resource details**
   - **Owner**
   - **CDN hostname**
   - **Resource type** - Live Streaming
   - **CDN Reference** the ID of the resource in database
   - **Publishing Point** - the publishing point type: external or internal
   - **Main Internal Publishing Location** - main internal publishing point URL address (in case of internal publishing point type)
   - **Failover Internal Publishing Location** - internal publishing point failover URL (in case of internal publishing point type)
   - **Main External Publishing Location** - main external publishing point URL address (in case of external publishing point type)
   - **Failover External Publishing Location** - external publishing point failover URL (in case of external publishing point type)
   - **Resource status** – shows the resource status

   **DNS settings**
   - **CNAME** for the CDN Hostname which is used to view the contents.

   **Edge Groups**
   - Shows to which Edge groups the resource is assigned.

   **Last 24 hours cost**
   - Cost of the resource for the last 24 hours.

**Advanced Settings**

Click the Advanced details tab to view advanced details of a Live Streaming CDN resource. The screen that appears will provide you with the following information:

1. Go to your Control Panel's CDN Resources menu.
2. Click a CDN Hostname.
3. On the screen that appears, click the Advanced Details tab.
4. This screen provides you with the following information:

   - **Publisher name** - name of the user who created the CDN Resource record
   - **Country Access Policy** - access policy to the CDN resource’s content for specified countries: either NONE (disabled) or BLOCK BY DEFAULT
   - **Hotlink Policy** - whether hotlink policy is enabled or not
   - **Secure Wowza** - whether secure Wowza token is enabled or not
   - **Token for Edge/Flash player** - whether token for Edge/Flash player is enabled or not
   - **Token Authentication Enabled** - whether token authentication is enabled or not

**Upload instructions**

Click the Instructions tab to view the instructions for uploading files and embedding video from Live Streaming CDN resources.

Create HTTP CDN Resource

To add an HTTP CDN resource:

1. Go to your Control Panel's CDN Resources menu. The page that loads shows the list of CDN resources.
2. To create a new CDN resource, click the "+" button in the top right corner or the CDN Resource Wizard button.
3. Follow the steps of the CDN resource creation wizard:
**Type Select**

Select the required resource type - HTTP, by clicking the corresponding button and click **Next** to proceed.

**Properties**

- **CDN hostname** – the hostname from which you will serve static content. E.g. if your site (origin) is onapp.com, and you want to serve static content from the CDN and make it available at static.onapp.com, then static.onapp.com would be the CDN hostname.
- **Enable SSL** - move the slider to the right to enable the secure socket protocol for your CDN resource.
  - **Shared SSL** - choose this option if you want to apply a shared SSL certificate for the resource.
  - **Custom SNI SSL** - choose this option if you want to apply a custom SNI SSL certificate for the resource and choose the required certificate from the drop-down menu.
- **Content origin** – specify the content origin type (PULL or PUSH):
  - For the PULL type, you can use a custom origin port. Specify a port number using the colon character ("::") in the Origins field. If you do not indicate the custom origin port, then system will put it by default depending on origin policy:
    - 80 if origin policy is HTTP
    - 443 if origin policy is HTTPS
    - None if origin policy is AUTO (Origin policy AUTO is not compatible with custom origin port)
  - For the PUSH type:
    - **Storage server location** - choose the storage server location from the drop-down menu.
    - **FTP password** - specify the FTP password. It can consist of 6-32 alphanumeric characters.
    - **FTP password confirmation** - confirm the password.

**Edge Locations**

Tick the box next to the edge group(s) that will share the new resource. Available edge groups depend on the assigned billing plan limits.

The map displays own, subscribed and available CDN resources:
At this point, you can create the CDN resource or proceed to the Advanced Settings step which is optional in the wizard.

**Advanced Settings**

**Origin Policy**
Choose the type of the connection from the drop-down menu. Select HTTP, HTTPS or Auto.

**Country Access**
Configure a rule to enable/disable access to the CDN resource's content for specified countries.
- **Access Policy** – select Disabled to switch off the rule; otherwise choose between Allow by default/Block by default.
- **Except for Countries** – select countries to which the access policy won’t be applied. To select more than one country, hold Ctrl during selection.

**Hotlink Policy**
- **Hotlink Policy** – select Disabled to switch off a hotlink policy; otherwise choose between Allow by default/Block by default.
- **Except for domains** – specify domains to which the hotlink policy won’t be applied

**IP Access**
Configure a rule to enable/disable access to the CDN resource's content for a range of IP addresses.
- **Access Policy** – select Disabled to switch off the rule; otherwise choose between Allow by default/Block by default.
- **Except for IP Addresses** – fill in IP address(es) to which the access policy won’t be applied.

**Secondary CDN Hostnames**
Submit secondary hostnames apart from the default one for HTTP based CDN sites. With these configured, users will be able to access the CDN site using secondary CDN hostname(s). You can add up to 7 secondary CDN hostnames to your CDN resource.

To be able to use a secondary hostname for the CDN resource with SSL enabled, you require an SSL certificate for your custom hostname. For help with questions about the SSL certificate purchase, please contact OnApp support.

**URL Signing**
Protect your files from unauthorized access with a key. A signed URL looks like `http://example.com/filename?hash=DMF1ucDxtqgxwYQ`.
- **Enable URL Signing** – move the slider to the right to enable it.
- **URL Signing Key** – fill in the key which will be used for URL signing. The secret key is similar to a password and can contain a minimum of 6 to a maximum of 32 characters. Symbols and spaces are not allowed.

You can also specify the expiration time, that is the time when this URL becomes invalid. The time is passed in the URL itself in a Unix timestamp format and takes part in hash generation.

Here is the example of PHP script used to generate the hash key:

```bash
/**
 * Create hash link CDN resource
 */
```
*
* @param string $cdnResourceUrl
* The CDN resource URL, eg cdn.yourdomain.com
* @param string $filePath
* File path of the CDN resource
* @param string $secretKey
* The secret key that is obtained from CDN resource property
* @param int $expiryTimestamp [optional]
* UNIX timestamp format, specify how long the hash link is accessible to the
public
* By default will be accessible forever.
*
* @return string URL with generated hash link
* URL with designated format to access the resource
*
* Example:
* Generate hash link for resource www.example.com/images/photo.png for next
3 days, assume today is Sun, 01 Apr 2012.
*
* <?php
* $hashLink = generateHashLink('www.example.com', '/images/photo.png',
'l33tf0olol', 1333497600);
*
* print $hashLink;
* ?>
*
http://www.example.com/images/photo.png?secure=kaGd_cu6Iy4LDgfX3jy5Rw==,133349760
0
* .
*/
function generateHashLink($cdnResourceUrl, $filePath, $secretKey,
$expiryTimestamp = NULL){
// NOTE [yasir 20110331] + and ? are some of represented chars of
based64 encoding (8 bits)
// + is 62 and / is 63 . and These char should be replaced by other
predefined chars.
$searchChars = array('+','/');
$replaceChars = array('-', '_');
if($filePath[0] != '/'){
$filePath = "/{$filePath}";
}
if($pos = strpos($filePath, '?')){
$filePath = substr($filePath, 0, $pos);
}
$hashStr = $filePath.$secretKey;
if($expiryTimestamp){
$hashStr = $expiryTimestamp.$hashStr;
$expiryTimestamp = ",{$expiryTimestamp}";
}
return

"http://{$cdnResourceUrl}{$filePath}?secure=".
str_replace($searchChars, $replaceChars,


4. Click Create CDN Resource.

Create Video On Demand CDN Resource

To add a video on demand CDN resource:

1. Go to your Control Panel’s CDN Resources menu.
2. Click the "+" button in the top right corner or the CDN Resource Wizard button.
3. Follow the steps of the CDN resource creation wizard:

   **Type Select**

   Select the required resource type - VOD, by clicking the corresponding button and click Next to proceed.

   **Properties**

   - CDN hostname – specify the name which will serve as a label only
• Content origin – specify the content origin type PULL or PUSH

If you have selected the PULL type, specify the origin.

If you have selected the PUSH type:

• Storage server location - choose the storage server location from the drop-down menu.
• FTP password - specify the FTP password. It can consist of 6-32 alphanumeric characters.
• FTP password confirmation - confirm the password.

Edge Locations

Tick the box next to the edge group(s) which will share the resource added. Available edge groups depend on the assigned billing plan limits.

The map displays own, subscribed and available CDN resources:

Advanced Settings

Origin Policy

Choose the type of the connection from the drop-down box. Select HTTP, HTTPS or Auto.

Country Access

Configure a rule to enable/disable access to the CDN resource’s content for specified countries.

• Access Policy – select the Disabled option to switch off a rule or Block by default. If the access policy is set to block by default, fill in the Except for Countries field to specify countries to which the access policy won’t be applied. To select more than one country, hold Ctrl during selection.
Hotlink policy

Hotlink policy - select the Disabled option to switch off hotlink policy security: otherwise choose between Allow by default/Block by default. If the hotlink policy is set to block by default, fill in the Except for domains field to specify the domains to which the hotlink policy won’t be applied.

Cache expiry

- Cache expiry – set the cache expiry time in minutes (min=1, max=3500000).

Ignore Set-Cookie

Ignore Set-Cookie - tick this checkbox to enable caching content with Set-Cookie response headers.

Search Engine Crawlers

- Block search engine crawlers - move the slider to the right to block web crawling bots from indexing the CDN content (for HTTP Pull CDN resources only).

Secure Wowza

- Enable secure Wowza – tick the box to protect your stream with Wowza secure token.
- Token for Edge/Flash player – specify the token authentication code. The authentication code will be then saved on the edge server. The token at the player side and the token at the edge server must match in order to make the video available.

Token Authentication

- Tick the Enable Token Authentication box
- TokenAuth Primary Key - specify the secret key to be used with the scripts which generate token.
- TokenAuth Backup Key - input the backup key which can be used if you want to change the primary key. To make sure the link generated with existing token won't be broken, the suggested procedure is the following:
  - Copy the existing primary key and paste to backup key.
  - Fill in a new primary key.
- Protected Path - specify the protected path. By default it is "". Only the Path inserted is allowed to be streamed.

Now proceed with running the .NET or .JAVA scripts to complete the procedure.

4. Click Create CDN Resource.

Only mp4 and flv files are currently supported.

Create Live Streaming CDN Resource

To add a live streaming CDN resource:

1. Go to your Control Panel’s CDN Resources menu.
2. Click the "+" button in the top right corner or the CDN Resource Wizard button.
3. Follow the steps of the CDN resource creation wizard:

Type Select

Select the required resource type - HTTP, by clicking the corresponding button and click Next to proceed.

Properties

- CDN hostname – specify the name which will serve as a label only
- Publishing point – specify the resource's publishing point settings - Internal or External. The internal publishing point is one of your storage servers. It is configured at the next step - Edge locations. The external publishing point is simply an URL. Specify its settings here:
  - External publishing location - specify your publishing point's URL as an RTMP protocol. For example, rtmp://domain.com/xxx.
  - Failover external publishing location - specify the failover URL
**Edge Locations**

Tick the box next to the edge group(s) which will share the resource added. Available edge groups depend on the assigned billing plan limits.

The map displays own, subscribed and available CDN resources:

Map legend:

In case of choosing Internal Publishing Point in previous step, specify its settings here:

- **Internal publishing location** - select any of your edge servers from the drop-down menu
- **Failover internal publishing location** - specify the failover edge server

**Advanced Settings**

**Country Access**

Configure a rule to enable/disable access to the CDN resource’s content for specified countries.

- **Access Policy** – select the Disabled option to switch off a rule or Block by default. If the access policy is set to block by default, fill in the *Except for Countries* field to specify countries to which the access policy won’t be applied. To select more than one country, hold Ctrl during selection.

**Hotlink policy**

*Hotlink policy* - select the **Disabled** option to switch off hotlink policy security: otherwise choose between Allow by default/Block by default. If the hotlink policy is set to block by default, fill in the *Except for domains* field to specify the domains to which the hotlink policy won’t be applied.

**Secure Wowza**

- **Enable secure Wowza** – tick the box to protect your stream with Wowza secure token.
• **Token for Edge/Flash player** – specify the token authentication code. The authentication code will be then saved on the edge server. The token at the player side and the token at the edge server must match in order to make the video available.

**Token Authentication**

- Tick the **Enable Token Authentication** box
- **TokenAuth Primary Key** - specify the secret key to be used with the scripts which generate token.
- **TokenAuth Backup Key** - input the backup key which can be used if you want to change the primary key. To make sure the link generated with existing token won't be broken, the suggested procedure is the following:
  - Copy the existing primary key and paste to backup key.
  - Fill in a new primary key.
- **Protected Path** - specify the protected path. By default it is "\". Only the Path inserted is allowed to be streamed.

Now proceed with running the .NET or .JAVA scripts to complete the procedure.

4. Click the **Create CDN Resource** button.

**Edit CDN Resource**

To edit a CDN Resource:

1. Go to your Control Panel's CDN Resources menu.
2. Click the Actions button next to a resource and choose Edit.
3. On the screen that appears you can edit all CDN resource parameters (see the Create HTTP CDN Resource section for details).
4. Click the Save button to finish.

**Bandwidth Statistics**

To see the bandwidth statistics/graphs for CDN resources:

1. Go to your Control Panel's CDN Resources menu and then click the Bandwidth statistics tab.
2. Select type of filter – either GB or Mbits/s. In MBPS mode you can get statistics for the last 10 days only. The older statistics is removed.
   - There are no limitations for GB mode.
3. Specify the period in the From and To fields.
4. Select a resource or location for which the statistics will be generated.
5. Click the Apply button.

The points in the graph are displayed according to a particular frequency, which depends on the time period specified with From and To parameters:

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Frequency in seconds</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 30 days</td>
<td>86400</td>
<td>1 day</td>
</tr>
<tr>
<td>31 - 93 days</td>
<td>604800</td>
<td>1 week</td>
</tr>
<tr>
<td>equal or more than 93 days</td>
<td>1209600</td>
<td>2 weeks</td>
</tr>
</tbody>
</table>

Statistics available in the frequency higher than selected will be accumulated to a single point of such frequency.

E.g. The statistics was requested for the period of 31-93 days, so the frequency of points in the graph is 7 days. If the statistics was generated few times during those 7 days (day1+day2+day3\ldots) it will be added up and displayed as a single point, with a time stamp marked as the first day of such 7 days.

The statistics are displayed in two graphs: Cached and Non Cached.

To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.
Stream Statistics

The CDN streaming statistics screen shows the concurrent viewers report for your CDN streaming sites.

To view the statistics/graphs for your CDN streaming sites:

1. Go to your Control Panel's CDN Resources menu.
2. Click the Streaming statistics tab.
3. Specify the period in the From and To fields.
4. Select type of filter – either by resources or by locations
5. Click the Apply button.

To zoom into a time period drag the chart by holding down the left mouse button and moving the mouse. Click the Reset Zoom button to zoom out again.
Raw Logs

The raw logs functionality allows you to send logs associated with your CDN resources to your distant server in real time. The raw log allows customers to understand, analyze, and debug files delivered via OnApp CDN, or can be served as audit trailed. Once the user creates CDN resource(s), the raw logs are enabled for this account and the user can configure and receive raw logs. Logs are sent for all the CDN Resources associated with the user. There are three different types of delivery: Syslog, SFTP and FTP. The frequency of uploading the log to client destination is every 10 minutes for SFTP and FTP protocols. For the Syslog protocol, logs are uploaded instantaneously.

To view and set the raw log configuration:

1. Go to your Control Panel’s **CDN Resources** menu.
2. Click the **Raw Log** tab.
3. The page that loads shows the current raw log configuration. On this page you can also set the raw log configuration:
   - For the **FTP/SFTP** delivery protocol:
     - **Hostname** - fill in the hostname of the server to which the log will be delivered
     - **Ftp username** - specify the user name of the FTP/SFTP client on the server to which the log will be delivered
     - **Ftp password** - fill in the password of the FTP/SFTP client on the server to which the log will be delivered
   - For the **Syslog** delivery protocol:
     - **Hostname** - fill in the hostname of the server to which the log will be delivered
     - **Syslog protocol** - select the protocol that will be used for sending the log: TCP or UDP
     - **Syslog port** - specify the port number of the syslog server to which the log will be delivered
4. Click **Save** to save the configuration.

To edit, set new configuration parameters and click **Save**.

To disable, choose **Disabled** from the raw log configuration delivery protocol drop-down.

If the SFTP or FTP protocol is applied, raw logs are delivered as an archive. If the Syslog delivery protocol is selected, user will receive the text of the logs.

**View CDN Advanced Reporting**
With CDN advanced reporting you can study and review the in-depth analysis of your resources in reports. Currently you can view the reports on Bandwidth Statistics, Cache Utilization and Status Codes.

To view advanced reporting on **Bandwidth statistics**:

1. Go to your Control Panel's **CDN > Resources** menu
2. Click the **Actions** button next to a required CDN Hostname and choose **Advanced Reporting**.
3. On the page that appears, set the period for which the reports should be generated. The default period is the last week.
4. Specify the location or several locations to **Filter by**. If none specified, the report for all locations is generated.
5. Click **Apply**.

The report that appears will show the total/cached/non-cached statistics.
To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.

To view advanced reporting on **Cache Utilization**:

1. Go to your Control Panel's **CDN > Resources** menu
2. Click the **Actions** button next to a required CDN Hostname and choose **Advanced Reporting**.
3. On the page that appears, set the period for which the reports should be generated. The default period is the last week.
4. Specify the location or several locations to **Filter by**. If none specified, the report for all locations is generated.
5. Click **Apply**.

The report that appears will show the number of pages cached on the Edge (hits) as well as the number of misses - the pages which are not cached.
To zoom into a time period, click and drag in a chart. Click the **Reset Zoom** button to zoom out again.

To view advanced reporting on **Status codes**:

1. Go to your Control Panel's **CDN > Resources** menu
2. Click the **Actions** button next to a required CDN Hostname and choose **Advanced Reporting**.
3. On the page that appears, click the **Status codes** tab.
4. Set the period for which the reports should be generated. The default period is the last week.
5. Specify the location or several locations to **Filter by**. If none specified, the report for all locations is generated.
6. Click **Apply**.

The report that appears will show the list of HTTP Status codes together with the number of times (hits) these codes were returned.

To return to the **Resource Details** screen, click the **Basic Settings** tab at the top of the screen.

**Prefetch Content**

This tool allows pre-populating content of an HTTP Pull or HTTP Push CDN resource to the CDN. Recommended only for files which are especially large.

To prefetch the content:

1. Go to your **Control Panel's CDN Resources** menu.
2. Click the required resource link.
3. On the page that appears, click the **Prefetch** tab.
4. In the input field, specify paths on the CDN Resource to prefetch (one per line). You may indicate only one path per line.
5. Click the **Prefetch** button to finish.

**PLEASE NOTE:** You can only prefetch content of HTTP Pull and Push CDN resources.

**Purge Content**

This tool allows instant removal of HTTP Pull and HTTP Push cache content in the CDN, if newly updated content has not been properly replicated.

To purge content:

1. Go to **CDN Resources** menu.
2. Click the required resource link.
3. On the page that appears, click the **Purge** tab.
4. In the input field, specify paths on the CDN Resource to purge (one per line). You may indicate only one path per line.
5. Click the **Purge** button to finish.
Then click the **Purge All Contents of this Site** button to purge all content.

**PLEASE NOTE:** You can only purge content of HTTP Pull and HTTP Push CDN resources.

### Billing Statistics

OnApp has a record of all the charges applied to your CDN resources. You can view the resource statistics under the statistics available, or those for a shorter period by setting a Start and End time.

To view billing statistics for a CDN resource:

1. Go to your Control Panel’s **CDN Resources** menu.
2. Click the label of the resource you’re interested in and then click the **Billing Statistics** tab.
3. Set Start and End time.
4. Move the **Show in my Timezone** slider to the right to show bandwidth statistics according to your profile’s timezone settings.
5. Press the **Apply** button.
6. On the screen that appears, you will see the following billing statistics details:

   - **Date** – particular date and time for the generated statistics
   - **Edge Group** - the edge group to which the CDN resource belongs to.
   - **Traffic** - resource traffic in MB.
   - **Cost** – the total due for the CDN resource at the point of time specified in the Date column.

Scroll down to see **Total Amount** (the total due for the whole billing statistics period).

### HTTP Caching Rules

The HTTP Rules engine allows users to customize the CDN edge server behavior, e.g. how the CDN will manage cache and redirection. This creates a lot of flexibility and adaptability for different platform websites to integrate with CDN without much hassle. HTTP rules are set in OnApp Control Panel and are specific to each CDN resource.

A CDN resource can be configured with up to 100 rules. This is collectively called a ruleset. A rule consists of conditions and actions. A condition consists of a subject, which determines the value to select, and a predicate, which specifies what to compare the subject against. Conditions are bonded by the connectives “AND” or “OR”. When all the conditions are met, the CDN edge server will perform the actions associated with the rule. The CDN edge server processes these rules from top to bottom order. It ends processing on the first match.

### Limitations
- You can create up to 100 rules per resource
- You can set up to 100 actions per rule
- Values can be up to 1000 characters long
- Rule processing ends after the first match
- You can set the rules for HTTP Pull and HTTP Push resources

Set HTTP Rules.

To create a rule, you have to specify the required conditions and the action which should be performed if the condition is met.

To set HTTP rules:

1. Log in to your OnApp Control Panel.
2. Click the Resources under the CDN menu.
3. On the page that appears, click the required resource label.
4. On the following page, click the HTTP Caching Rules tab.
5. Click Create New Rules button.
6. Give the Name to your rule.
7. Set the Conditions: specify the Connective/Subject/Predicate/Value from the drop-down menu.
8. To specify additional conditions, click the plus button next to the Conditions header.
9. Choose the appropriate action to take place from the Actions drop-down.
10. Click the plus button next to the Actions header to add some more actions which should take place when the conditions are met.
11. Click Save.

Refer to the following sections for details on subjects, predicates, values and actions.

Edit HTTP Rules.

To edit an already created HTTP rule:

1. Log in to your OnApp Control Panel.
2. Click the Resources under the CDN menu.
3. On the page that appears, click the label of the required resource.
4. On the following page, click the HTTP Caching Rules tab.
5. Click the Actions icon and choose Edit next to a required rule.
6. Make all necessary changes.
7. Click Save.

Delete HTTP Rule.

To delete an HTTP rule:

1. Log in to your OnApp Control Panel.
2. Click the Resources under the CDN menu.
3. On the page that appears, click the label of the required resource.
4. On the following page, click the HTTP Caching Rules tab.
5. Click the Actions icon and choose Delete next to a required rule.

The List of Subjects.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default</td>
<td>Matches all remaining requests. When used, it should be the last rule in the ruleset.</td>
</tr>
</tbody>
</table>
| URL     | Selects the URL part of the request. It excludes the query string.  
         | Example:  
         | Client requests: http://cdn.example.com/image.jpg  
<pre><code>     | Selected value: “/image.jpg” |
</code></pre>
<table>
<thead>
<tr>
<th>Predicate</th>
<th>Description</th>
</tr>
</thead>
</table>
| IP | Selects the IP address of the client. If the clients use a proxy server, the IP of their proxy server which made the request to the edge server will be selected.  
*Example*  
“192.0.2.43” |
| Cookie | Selects the value of a specific cookie sent by the client.  
*Example*  
Cookie chosen: “logged_in”  
Client request header: “Cookie: session_id=abcdef; logged_in=1; cart_id=defabc”  
Selected value: “1” |
| Country | Selects the client’s two-letter country code. If the client’s country cannot be derived from their IP, the value “” is selected.  
*Example*  
Client’s IP: 193.113.9.162  
Selected value: “GB” |
| Param | Selects the value of a specific query string parameter. If there are multiple identical keys, the last value is selected.  
*Example*  
Parameter chosen: “page”  
Client requests: http://cdn.example.com/index.php?page=about&id=53  
Selected value: “about” |
| Extension | Selects the file extension of the request. If the request filename does not contain a dot, then the value “” is selected.  
*Example*  
Client requests: http://cdn.example.com/image.jpg  
Selected value: “jpg” |
| Header | Selects the value of a specific client request header. If the request header does not exist, then the value “” is selected.  
*Example*  
Header chosen: “User-Agent”  
Client sends header: “User-Agent: Mozilla/5.0 (Windows NT 6.3) Firefox/30.0”  
Selected value: “Mozilla/5.0 (Windows NT 6.3) Firefox/30.0” |
| Scheme | Selects the scheme part of the request. It can be either http or https.  
*Example*  
Client requests: http://cdn.example.com/image.jpg  
Selected value: “http”  
*Example*  
Client requests: https://secure.example.com/image.jpg  
Selected value: “https” |

**The List of Predicates.**

Note that all predicates are case-insensitive.
<table>
<thead>
<tr>
<th>Predicate</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equals</strong></td>
<td>Compares the subject to an exact value.</td>
</tr>
<tr>
<td></td>
<td><em>Example</em></td>
</tr>
<tr>
<td></td>
<td><strong>URL</strong> &quot;/index.php&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Equals</strong> &quot;/index.php&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> TRUE</td>
</tr>
<tr>
<td></td>
<td><strong>URL</strong> &quot;/ExampleFile.txt&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Equals</strong> &quot;/examplefile.txt&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> TRUE</td>
</tr>
<tr>
<td></td>
<td><strong>URL</strong> &quot;/image.jpg&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Equals</strong> &quot;/index.php&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> FALSE</td>
</tr>
<tr>
<td><strong>Starts with</strong></td>
<td>Compares whether the subject starts with a value.</td>
</tr>
<tr>
<td></td>
<td><em>Example</em></td>
</tr>
<tr>
<td></td>
<td><strong>IP</strong> &quot;192.0.2.54&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Starts With</strong> &quot;192.0.2.&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> TRUE</td>
</tr>
<tr>
<td></td>
<td><strong>URL</strong> &quot;/images/files.jpg&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Starts With</strong> &quot;/images/&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> TRUE</td>
</tr>
<tr>
<td></td>
<td><strong>IP</strong> &quot;192.5.54.3&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Starts With</strong> &quot;192.0.2.&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> FALSE</td>
</tr>
<tr>
<td><strong>Ends with</strong></td>
<td>Compares whether the subject ends with a value.</td>
</tr>
<tr>
<td></td>
<td><em>Example</em></td>
</tr>
<tr>
<td></td>
<td><strong>URL</strong> &quot;/images/files.jpg&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Ends With</strong> &quot;.jpg&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> TRUE</td>
</tr>
<tr>
<td></td>
<td><strong>URL</strong> &quot;/videos/video.mp4&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Ends With</strong> &quot;.jpg&quot;</td>
</tr>
<tr>
<td></td>
<td><strong>Result</strong> FALSE</td>
</tr>
<tr>
<td>In List</td>
<td>Compares the subject to the list of values. Each value is separated by a single space.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>“GB”</td>
</tr>
<tr>
<td>In List</td>
<td>“GB ES FR DE”</td>
</tr>
<tr>
<td>Result</td>
<td>TRUE</td>
</tr>
<tr>
<td>Country</td>
<td>“US”</td>
</tr>
<tr>
<td>In List</td>
<td>“GB ES FR DE”</td>
</tr>
<tr>
<td>Result</td>
<td>FALSE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Matches wildcard</th>
<th>Compares whether the subject matches a wildcard value. The wildcard character “<em>” matches any 0 or more characters. Multiple “</em>”s can be specified.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Example</strong></td>
<td></td>
</tr>
<tr>
<td>Url</td>
<td>“/images/photos/photo.jpg”</td>
</tr>
<tr>
<td>Matches Wildcard</td>
<td>“/images/*”.jpg”</td>
</tr>
<tr>
<td>Result</td>
<td>TRUE</td>
</tr>
<tr>
<td>Url</td>
<td>“/images/videos/video.mp4”</td>
</tr>
<tr>
<td>Matches Wildcard</td>
<td>“/images/*”.jpg”</td>
</tr>
<tr>
<td>Result</td>
<td>FALSE</td>
</tr>
<tr>
<td>Url</td>
<td>“/archives/2014/news/index.html”</td>
</tr>
<tr>
<td>Matches Wildcard</td>
<td>“/2014/news/*”</td>
</tr>
<tr>
<td>Result</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does not equal</th>
<th>Opposite of the Equals value</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Does not start with</th>
<th>Opposite of the Starts with value</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Does not end with</th>
<th>Opposite of the Ends with value</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Is not in list</th>
<th>Opposite of the In list value</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Does not match wildcard</th>
<th>Opposite of the Matches wildcard value</th>
</tr>
</thead>
</table>

### The List of Actions.

Here is the list of all the Actions for HTTP Rules:

<table>
<thead>
<tr>
<th>Action</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force Edge To Never Cache</td>
<td>Forces the CDN edge server to never cache the request. However, if the request is already cached (for example, if it was cached prior to setting up this rule), it will not be forced out of cache.</td>
</tr>
<tr>
<td>Force Client To Never Cache</td>
<td>Forces the client to never cache the request. This is achieved by removing all Cache-Control and Expires response headers, sending instead “Cache-Control: no-cache”.</td>
</tr>
</tbody>
</table>
| Force Edge To Cache | Forces the CDN edge server to cache the request for a specified duration. This overrides any Cache-Control or Expires headers from the origin, even if they specify “private” or “no-cache”.  
  The value must be 1 second or longer. |
| Force Client To Cache | Forces the client to cache the request for a specified duration. This is achieved by removing all Cache-Control and Expires response headers, sending instead “Cache-Control: max-age=...”.  
  The value must be 1 second or longer. |
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Override Default Cache Validity</td>
<td>Changes the CDN edge server’s default validity period for origin responses that do not explicitly specify Cache-Control or Expires. Responses with Cache-Control or Expires headers are still honored. The value must be 1 second or longer.</td>
</tr>
<tr>
<td>Forbid Client</td>
<td>Returns a simple 403 Forbidden response to the client.</td>
</tr>
<tr>
<td>Redirect Client</td>
<td>Returns a 302 Redirect response to the client, to the specified URL. The URL must be specified in full, starting with http:// or https://</td>
</tr>
<tr>
<td>Set Request Header</td>
<td>Overrides a request header to the origin. A header name and header value must be provided.</td>
</tr>
<tr>
<td>Set Response Header</td>
<td>Overrides a response header to the client. A header name and header value must be provided.</td>
</tr>
<tr>
<td>Set Client IP In Request Header</td>
<td>Sets the client’s IP address in a request header to the origin. A header name must be provided.</td>
</tr>
<tr>
<td>Prepend Origin Directory</td>
<td>Prepends a directory to the URL when the edge server requests it from the origin. Examples: Prepend origin directory “images” Client requests to edge: <a href="http://cdn.example.com/photo.jpg">http://cdn.example.com/photo.jpg</a> Edge requests to origin: <a href="http://cdn.example.com/images/photo.jpg">http://cdn.example.com/images/photo.jpg</a> Prepend origin directory “/some/sub%20directory/” Client requests to edge: <a href="http://cdn.example.com/some/file.txt">http://cdn.example.com/some/file.txt</a> Edge requests to origin: <a href="http://cdn.example.com/some/sub%20directory/some/file.txt">http://cdn.example.com/some/sub%20directory/some/file.txt</a></td>
</tr>
<tr>
<td>Set Custom Origin</td>
<td>Overrides the origin that the edge server connects to. Example: Resource has origin “3.3.3.3”. A rule is added such that if a URL starts with “/images/”, it sets a custom origin to “5.5.5.5”. A value must be provided (it cannot be empty) and it must be a valid hostname or IP. A custom origin port cannot be specified or overridden. “Set Request Header” may be used in conjunction with this to set a correct Host header.</td>
</tr>
</tbody>
</table>

The List of Country Codes.

Here is the list of all the country codes which you can set as a subject Country in your HTTP rules:

- A1 Anonymous Proxy
- A2 Satellite Provider
- O1 Other Country
- AD Andorra
- AE United Arab Emirates
AF  Afghanistan
AG  Antigua and Barbuda
AI  Anguilla
AL  Albania
AM  Armenia
AO  Angola
AP  Asia/Pacific Region
AQ  Antarctica
AR  Argentina
AS  American Samoa
AT  Austria
AU  Australia
AW  Aruba
AX  Aland Islands
AZ  Azerbaijan
BA  Bosnia and Herzegovina
BB  Barbados
BD  Bangladesh
BE  Belgium
BF  Burkina Faso
BG  Bulgaria
BH  Bahrain
BI  Burundi
BJ  Benin
BL  Saint Barthelemy
BM  Bermuda
BN  Brunei Darussalam
BO  Bolivia
BQ  Bonaire, Saint Eustatius and Saba
BR  Brazil
BS  Bahamas
BT  Bhutan
BV  Bouvet Island
BW  Botswana
BY  Belarus
BZ  Belize
CA  Canada
CC  Cocos (Keeling) Islands
CD  Congo, The Democratic Republic of the
CF  Central African Republic
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<tr>
<td>CI</td>
<td>Cote d'Ivoire</td>
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NF Norfolk Island
NG Nigeria
NI Nicaragua
NL Netherlands
NO Norway
NP Nepal
NR Nauru
NU Niue
NZ New Zealand
OM Oman
PA Panama
PE Peru
PF French Polynesia
PG Papua New Guinea
PH Philippines
PK Pakistan
PL Poland
PM Saint Pierre and Miquelon
PN Pitcairn
PR Puerto Rico
PS Palestinian Territory
PT Portugal
PW Palau
PY Paraguay
QA Qatar
RE Reunion
RO Romania
RS Serbia
RU Russian Federation
RW Rwanda
SA Saudi Arabia
SB Solomon Islands
SC Seychelles
SD Sudan
SE Sweden
SG Singapore
SH Saint Helena
SI Slovenia
SJ Svalbard and Jan Mayen
SK Slovakia
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<th>Code</th>
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<td>Vanuatu</td>
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<tr>
<td>WF</td>
<td>Wallis and Futuna</td>
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</table>
Token Authentication

Token authentication helps to protect CDN streams from being snitched. Similar to HTTP URL signing, this feature allows customers to enter a secret key during setting up a CDN resource. Then, customer can use secret key, along with expiry date and allowed/blocked referrer site to generate the token from a script.

To enable token authentication:

1. **Enter your secret key and secure path using OnApp UI.**
2. Download .NET or Java token generator.
3. Generate the token with the secret key, allow referrer, deny referrer, and expiry date.
4. Append the token with your stream URL, eg ?token=110ea31ac69c09a2db0bdd7423843631cdab498ff7e6e75cb99cc4d5426ab679a57015d4e48438c97b921652daec62de3829f8f437e27494cfc2f1e59c47f14e91a51ea7
5. Embed with your website.

Set up Token Authentication in UI

You can set up token authentication for Video on demand and Live streaming CDN resources.

To do so:

2. Now proceed with running the .NET or JAVA scripts.

Run Token Generator

Download the script from the following locations:

- .NET script: https://bitbucket.org/onappcore/cdn-wowza-token-tool/src/fd00957110a33a1804b8edc033b254a77a1d324/dotnet/?at=master
- Java script: https://bitbucket.org/onappcore/cdn-wowza-token-tool/src/fd00957110a33a1804b8edc033b254a77a1d324/java/?at=master

Refer to the following sections on instructions for running the scripts.

Generate Token Using .NET

Prerequisites:

- .NET Framework 4.5
- BouncyCastle C# Crypto library 1.7 (http://www.bouncycastle.org/csharp/)

Build

To build a generator:

1. Go to /cdn-wowza-token-tool/dotnet/src location
2. Run xbuild

Upon success of the build, you will find the .exe (TokenAuthGenerator.exe) file at the "TokenAuthGenerator/bin/Debug" folder.

Usage

TokenAuthGenerator.exe (encrypt | decrypt) {<primary_key> | <backup_key>} "<security_parameters>"
Security Parameters

expire
- Number of seconds since Unix time (Epoch time)
- UTC based
- Must not be earlier than current time

ref_allow
- Referrer domain (e.g. google.com) or path (e.g. google.com/video/)
- Allow multiple referrers separated by comma (,) without space(s)
- Wildcard (*) allowed only at the beginning of a referrer, e.g. *.DOMAIN
- Do not append space at the start & end of a referrer
- Domain must fulfill RFC 3490
- Path must fulfill RFC 2396
- Should not include port (e.g. google.com:3000/video)
- Should not include protocol (e.g. http) portion

ref_deny
- The same rules as for ref_allow

If both ref_allow & ref_deny are specified, ref_allow will be taking precedence over ref_deny

Allow blank/missing referrer
Both “ref_allow” & “ref_deny” could be configured to allow/deny blank or missing referrer during TokenAuth validation.

The following configuration allows blank or missing referrer:
ref_allow=allow.com,
ref_allow=allow.com,MISSING
ref_deny=deny.com

The following configuration deny blank or missing referrer:
ref_allow=allow.com
ref_deny=deny.com,
ref_deny=deny.com, MISSING

Normally ref_allow & ref_deny should not be used together, but if this happened ref_allow will take precedence over ref_deny.

Generate Token
To generate token, run the following:
TokenAuthGenerator.exe encrypt samplekey
"expire=1598832000&ref_allow=*.TrustedDomain.com&ref_deny=Denied.com"

Sample Output:
token=110ea31ac69c09a2db0bdd74238843631cdab498ff7e6e75cbd99cc4d05426ab679a57015d4e48438c97b921652daec62de3829f8ff437e27449cfdfc2f1e5d9fc47f14e91a51ea7

After generating a token, append the result to the playback URL.

Decrypt token
To decrypt a token, run the following:

```
TokenAuthGenerator.exe decrypt samplekey
110ea31ac69c09a2db0bd74238843631cdab498ff7e6e75cbe99cc4d05426ab79a57015d4e48438c97b921652daed62e3829f8ff
437e27449cfdd42f1e5d9fc47f1e9a51e8a7
```

Output example:

```
security
parameters=expire=1598832000&ref_allow=*.TrustedDomain.com&ref_deny=Denied.com
```

### Generate Token Using Java

#### Prerequisites:
- Java 6 or 7
- Maven 2 or 3

#### Build

To build a generator:

1. Go to `/cdn-wowza-token-tool/java` location.
2. Run the following:
   ```
mvn clean install
   ```

Upon success of the build, you will find the jar (`token-auth-generator.jar`) file at the `target` folder.

#### Usage

```
java -jar token-auth-generator-1.2.jar (encrypt | decrypt) (<primary_key> | <backup_key>) "<security_parameters>"
```

#### Security parameters

**expire**
- Number of seconds since Unix time (Epoch time)
- UTC based
- Must not be earlier than current time

**ref_allow**
- Referrer domain (e.g. google.com) or path (e.g. google.com/video/)
- Allowed multiple referrers separated by comma (,) without space(s)
- Wildcard (*) allowed only at the beginning of a referrer, e.g. *.DOMAIN
- Do not append space at the start & end of a referrer
- Domain must fulfill RFC 3490
- Path must fulfill RFC 2396
- Should not include port (e.g. google.com:3000/video)
- Should not include protocol (e.g. http)

**ref_deny**
- Same rules as in ref_allow

If both ref_allow & ref_deny are specified, ref_allow will be taking precedence over ref_deny

#### Allow blank/missing referrer

Both "ref_allow" & "ref_deny" could be configured to allow/deny blank or missing referrer during TokenAuth validation. The following configuration allow blank or missing referrer: ref_allow=allow.com,
The following configuration deny blank or missing referrer:

ref_allow=allow.com
ref_deny=deny.com

ref_deny=deny.com,MISING

Normally ref_allow & ref_deny are not to be used together, but if this happened ref_allow will take precedence over ref_deny.

Generate token

To generate token, run the following:

java -jar token-auth-generator-1.2.jar encrypt samplekey
"expire=1598832000&ref_allow=*.TrustedDomain.com&ref_deny=Denied.com"

Sample Output:

token=110ea31ac69c09a2db0bd74238843631cdab498ff7e6e75cb99cc4d05426ab679a57015d4e48438c97b921652daec62de3829f8ff437e27449cfdfc2f1e5d9fc47f14e91a51ea7codecode

After generating a token, append the result to the playback URL.

Decrypt token

To decrypt token, run the following:

java -jar token-auth-generator-1.2.jar decrypt samplekey
110ea31ac69c09a2db0bd74238843631cdab498ff7e6e75cb99cc4d05426ab679a57015d4e48438c97b921652daec62de3829f8ff437e27449cfdfc2f1e5d9fc47f14e91a51ea7

Sample Output:

security
parameters=expire=1598832000&ref_allow=*.TrustedDomain.com&ref_deny=Denied.com

CDN Edge Groups

CDN edge groups are groups of edge servers – your own, and those you subscribe to from the CDN marketplace. They are usually grouped by location, so they represent a pool of servers for a given geographical area. Once you have created an edge group containing edge servers in specific locations, you can then assign the group (or groups) to a specific CDN resource.

The CDN edge groups menu enables you to see available edge server locations and form them into CDN Edge groups.

You need to associate CDN Edge groups with billing plans to make them available for users.

View CDN Edge Group Details
To see details of a CDN Edge Group:

1. Go to your Control Panel’s **Edge Groups** menu.
2. Click the label of the edge group you want to see.
3. On the screen that appears you will see the list of assigned locations and available locations with the following information:
   - **ID** – the ID of a location
   - **City** – the city the edge server is in.
   - **Operator** – name of the edge server owner.
   - **Type** - HTTP or streaming
   - **Source** – either Marketplace (locations added from the CDN marketplace) or your Own Edge servers (servers added by you).
   - **Status** - whether edge server is active or not.
   - **Price** – price per GB transferred.

**Create CDN Edge Group**

There are two ways of creating a CDN edge group:

1. Using a **CDN setup wizard**
2. Creating the edge group under the **Edge Groups** menu at OnApp Cloud Control Panel

To create a new CDN Edge Group using the Edge Groups menu:

1. Go to your Control Panel’s **Edge Groups** menu.
2. On the screen that appears, you will see existing groups with the number of assigned locations and associated billing plans.
3. Click the **Create Edge Group** button.
4. On the screen that appears, give your new group a label and click the **Create Edge Group** button.
5. You will be redirected to the screen where you can assign locations to the group.

For details on CDN setup wizard, refer to **CDN wizard** section.

**Edit CDN Edge Group**

To edit the name of a CDN Edge Group:

1. Go to your Control Panel’s **Edge Groups** menu.
2. On the screen that appears you will see the list of existing groups.
3. Click the **Actions** button next to appropriate CDN Edge Group, then click **Edit**.

**Delete CDN Edge Group**

To delete a CDN Edge Group:

1. Go to your Control Panel’s **Edge Groups** menu.
2. On the screen that appears you will see the list of existing groups.
3. To delete the group, click the **Actions** icon, then click **Delete**.

Be careful when deleting an edge group which is associated with CDN resources.

**Assign/Remove CDN Edge Group Locations**

1. Go to your Control Panel’s **Edge Groups** menu.
2. Click the label of the **CDN Edge Group** you want to configure.
3. On the screen that appears you may assign or remove locations by clicking the **Actions** button next to the required location.

**CDN Upload Instructions**

Here is the list of instructions for uploading files and embedding video to CDN resources. Follow the step-by-step instructions below to upload files or embed video to the required CDN resource type.

- **Http Push CDN Resources**
- **VOD Pull CDN Resource**
- **VOD Push CDN Resource**
- **Live Streaming CDN Resource**

**HTTP Push CDN Resource**
To upload files to the HTTP Push CDN resource:

1. Connect to the FTP origin using an FTP client. For example, a browser plug-in like FireFTP or FTP software like FileZilla.
2. Please wait up to 10 minutes until the FTP server configures with the HTTP resource.
3. Specify the following FTP details:
   - Hostname: 6789.origin.customercdn.com
   - Username: 6789
   - Password: The FTP password set at CDN resource creation.
4. Upload your files.

VOD Pull CDN Resource

To upload files to the HTTP Push CDN resource, enter the following script into your web page:

```html
<html>
<head>
    <script src="http://video.worldcdn-beta.net/player.js" type="text/javascript"></script>
</head>
<body>
    <div id="my-video-player"/>
    <script type="text/javascript">
        CDNPlayer("my-video-player", 1234, "1234/mystream", {width:640, height:360} );
    </script>
</body>
</html>
```

- This is an instruction template. Replace “1234” with the resource id, “customercdn.com” with the operator’s domain, and “mystream.mp4” with the filename or stream name.
- `resource_id` must prefix the path with `<resource_id>`, it is ONLY applicable to VOD PULL playback.
- This example provides default values for width and height. You can change them to your own values.

Our easy video embed script automatically detects the browser type (Desktop or Mobile device) and loads the appropriate player. Currently, this is either Flow Player or the browser’s native HTML5 player. The streaming protocol is also set appropriately.

VOD Push CDN Resource

To upload files to the VOD Push CDN resource:

1. Connect to the FTP origin using an FTP client. For example, a browser plug-in like FireFTP, or FTP software like FileZilla.
2. Please allow up to 10 minutes for the FTP server to be configured with the VOD resource.
3. Specify the FTP details:
   - Hostname: 6789.origin.customercdn.com
   - Username: 6789
   - Password: the password set at creation

This is an instruction template. Replace “6789” with the resource id, and “customercdn.com” with the operator’s domain.
4. Upload your files.
5. Enter the following script into your web page:

```html
<html>
<head>
  <script src="http://video.worldcdn-beta.net/player.js" type="text/javascript"></script>
</head>
<body>
  <div id="my-video-player"/>
  <script type="text/javascript">
    CDNPlayer("my-video-player", 1234, "1234/mystream", {width:640, height:360} );
  </script>
</body>
</html>
```

- This is an instruction template. Replace “1234” with the resource id, “customercdn.com” with the operator’s domain, and “mystream.mp4” with the filename or stream name.
- This example provides default values for width and height. You can change them to your own values.

Our easy video embed script automatically detects the browser type (Desktop or Mobile device) and loads the appropriate player. Currently, this is either Flow Player or the browser’s native HTML5 player. The streaming protocol is also set appropriately.

**Live Streaming CDN Resource**

1. Before you start, make sure your publishing point settings meet the following requirements (to be able to retrieve with the Silverlight Player):
   - h.264 Baseline 3
   - AAC or MP3-stereo-44100Hz audio
   - 2 seconds key frame frequency
   - lower bitrate

2. Install and configure the Adobe Live media encoder:
   a. Install Adobe Live Encoder.
   b. Once the Adobe Live Encoder is installed, run the application and move on to the next step.
   c. Complete the form:
      - FMS URL: rtmp://1234.publishstream.customercdn.com/P1234
      - Backup URL: rtmp://backup.1234.publishstream.customercdn.com/P1234
      - Stream: your stream name

This is an instruction template. Replace “1234” with the resource id, and “customercdn.com” with the operator’s domain.

d. Press Connect.
e. In the password pop up window, enter “P1234” as the username and the resource secret key for the password.
f. Press Start to start publishing the live stream.
Enter the following script into your web page to embed video to the Live Streaming CDN resource:

```html
<html>
<head>
  <script src="http://video.worldcdn-beta.net/player.js" type="text/javascript"></script>
</head>
<body>
  <div id="my-video-player"/>
  <script type="text/javascript">
    CDNPlayer("my-video-player", 1234, "mystream", {width:640, height:360} );
  </script>
</body>
</html>
```

This example provides default values for width and height. You can change them to your own values.

Our easy video embed script automatically detects the browser type (Desktop or Mobile device) and loads the appropriate player. Currently, this is either Flow Player or the browser’s native HTML5 player. The streaming protocol is also set appropriately.

3. Manual Instructions

We support a variety of methods to get the CDN URL to use in your player.

SMIL

http://video.cdn.qaonapp.net/726128906/_definst_/mystream.smil
The SMIL playlist provides an RTMP URL and should be used with Flash-based players only. Longtail Player and Flow Player are compatible with SMIL redirection.

Apple HTTP Live Streaming

http://video.cdn.qaonapp.net/726128906/_definst_/mystream.m3u8
This returns a 302 redirect to a Apple HLS manifest and should be used with Apple HLS-compatible players only.

Adobe HTTP Dynamic Streaming

http://video.cdn.qaonapp.net/726128906/_definst_/mystream.f4m
This returns an Adobe HDS manifest and should be used with Adobe HDS-compatible players only.

Microsoft Smooth Streaming (Silverlight)

http://video.cdn.qaonapp.net/726128906/_definst_/mystream.ism
This returns a 302 redirect to Smooth Streaming manifest and should be used with Smooth Streaming-compatible players only.

Javascript JSONP

This example provides default values for width and height. You can change them to your own values.
http://video.cdn.qaonapp.net/726128906/_definst_/mystream.jsonp?callback=MyCallBack
This returns a JSONP document, embeddable using <script>

An example of a callback with a successful result:

    MyCallBack({ "rtmp": "rtmp://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream", "rtmpe": "rtmp://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream", "apple": "http://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream/playlist.m3u8", "adobe": "http://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream/manifest.f4m", "rtsp": "rtsp://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream", "silverlight": "http://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream/Manifest" });

An example with an error:

    MyCallBack({ "error": "File not found" });

Javascript JSON

http://video.cdn.qaonapp.net/726128906/_definst_/mystream.json
This returns a JSON document. Cross-origin resource sharing is enabled to allow XMLHttpRequest from any domains.

An example of a callback with a successful result:

    { "rtmp": "rtmp://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream", "rtmpe": "rtmp://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream", "apple": "http://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream/playlist.m3u8", "adobe": "http://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream/manifest.f4m", "rtsp": "rtsp://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream", "silverlight": "http://609821627.e.726128906.r.cdn.qaonapp.net/726128906/_definst_/mystream/Manifest" }

An example of a callback with a JSON document with an error thrown:

    { "error": "File not found" }

CDN SSL Certificates

OnApp customers can import their own SSL certificates with the Subject Name Indication (SNI) extension.

SNI lets the client specify the hostname it is trying to reach at the start of the handshaking process. SNI is supported by most modern browsers, and provides an efficient way to deliver content over HTTPS using your own domain and SSL certificate. Custom SNI SSL relies on the SNI extension of the Transport Layer Security protocol, which allows multiple domains to serve SSL traffic over the same IP address by including the hostname viewers are trying to connect to.

Previously, OnApp applied SAN SSL certificate from a certificate authority to which additional certified domains can be added. This allowed you to host several domains on one IP by sharing the same certificate, and add all domains to this IP. However, the number of domains per SAN certificate is limited. Moreover, the certificate's size increases as more domains are added. This causes additional bandwidth to be used for the SSL handshake.

Currently, OnApp applies the CloudSSL+SNI solution. Users can import custom SNI SSL certificates into the system or request SSL to be enabled for their CDN resource. One SSL certificate can be associated with several CDN resources, but a resource can only be linked to one SSL certificate. However, some of the older browsers do not support SNI. In this case, users who prefer browsers that do not support SNI can purchase an SSL certificate and the SAN solution will be applied. On questions about the SSL certificate purchase, please contact OnApp support.

For the list of browsers that do not support SNI, kindly refer to the Server Name Indication article.

OnApp currently supports the following types of certificates:

- domain-validated (DV) certificate (example.com)
- single certificate
- wildcard certificate (*.example.com)
- SAN certificate (any domains)

- organization validation (OV) certificates
  - single certificate
  - wildcard certificate (*.example.com)
  - SAN certificate (any domains)

- extended validation (EV) certificates
  - single certificate
  - wildcard certificate (*.example.com)
  - SAN certificate (any domains)

- high-assurance certificates

- This feature is available for HTTP Pull and HTTP Push resources only.
- To add custom SNI SSL certificates, the user needs to have CDN resources in the cloud and CDN SSL Certificates permission.
- Custom SNI SSL certificates can be used for secondary hostnames.
- A custom SNI SSL certificate can only be associated with a CDN resource if the certificate and the resource have the same owner. The drop-down list of SSL certificates in the CDN resource creation wizard shows only the certificates of the user who will be the resource owner.
- When a custom SNI SSL certificate is associated with a CDN resource, the certificate applies only to the edge servers subscribed to that resource.

## View Custom SNI SSL Certificates

To view the list of available SSL certificates:

1. Log in to your Control Panel.
2. Choose SSL Certificates in the CDN section of the left navigation pane. The page that loads, shows all available custom SNI SSL certificates with their details:
   - **ID** - the ID of the custom SNI SSL certificate.
   - **Name** - the name of the certificate. Click the name to view the certificates' properties and associated CDN resources.
   - **Actions** - click the Actions button to edit or delete the certificate.

## Add Custom SNI SSL Certificates

To import an SSL certificate:

1. Log in to your Control Panel.
2. Choose the SSL Certificates menu in the CDN section of the left navigation pane. The page that loads shows all available custom SNI SSL certificates.
3. Click the Import SSL Certificate button.

To add custom SNI SSL certificates, the user needs to have CDN resources in the cloud and CDN SSL Certificates permission.

4. On the following page, fill in the required information:
   - **Name** - specify a name for the certificate. This parameter is optional.
   - **Ssl certificate key** - fill in the certificate key, it must be in pem-format.
   - **Private key** - fill in the SSL key provided by your SSL provider.

   Make sure that Ssl certificate key and Private key parameters are filled in the same way they are generated - with the line breaks.

5. Click the Create SSL Certificate button to import the certificate.

After you add a custom SNI SSL certificate to the cloud you can associate it with a CDN resource. To do this, proceed to the second step of the CDN resource creation wizard in the Control Panel's CDN Resources section. For more information, refer to Create HTTP CDN Resource. When a custom SNI SSL certificate is associated with a CDN resource, the certificate applies only to the edge servers subscribed to that resource.

## Edit Custom SNI SSL Certificate

You can edit your custom SNI SSL certificates, by following this procedure:

1. Log in to your Control Panel.
2. Choose SSL Certificates in the CDN section of the left navigation pane. The page that loads shows all available custom SNI SSL certificates.
3. Click the Actions button next to the required certificate and choose Edit. Alternatively, click the name of the certificate and click the Edit.
button on the page that loads.
4. On the following page edit the certificate's details:
   - Name - specify a name for the certificate.
   - Ssl certificate key - fill in the certificate key, it must be in pem-format.
   - Private key - fill in the SSL key provided by your SSL provider. Private key will not be displayed for security reasons.

   Make sure that Ssl certificate key and Private key parameters are filled in the same way they are generated - with the line breaks.

5. Click Save.

Delete SNI SSL Certificate

To delete a custom SNI SSL Certificate, follow this procedure:

1. Log in to your Control Panel.
2. Choose SSL Certificates in the CDN section. The page that loads shows all available CDN SSL certificates.
3. Click the Actions button next to the required certificate and choose Delete.

SolidFire Integration

OnApp is integrated with the SolidFire storage management system. With the Solid Fire integration it is possible to utilize the SF SAN directly within the OnApp cloud and manage the SolidFire cluster via the SolidFire API.

You can perform the following options with SolidFire:
   - Allocate dedicated LUNs from the SF cluster per virtual machine disk, when creating a VS. (LUN is created per each VS disk, with a separate lun per swap disk.)
   - Manage SolidFire LUNs automatically via API.
   - Create virtual servers without the swap disk.
   - Implement backups / snapshots using SF CloneVolume method.

To be able to utilize SolidFire in the cloud, you need to install the SolidFire storage system first.

There is a disk dependency between OnApp and SolidFire - when a new disk is created on the OnApp side, a new LUN is created automatically on the SF side, using the CreateVolume API call.

As the SolidFire data store has two interfaces (OnApp and SolidFire) you have to specify two IP addresses when creating a Solidfire Data Store

To be able to use the SF volume, you have to enable export to this device (Compute resource or a data store). To do that, you need to send an account username and initiator password to the iscsi_ip address. You will be able to use this device after the authorization.

The following options are not available under SolidFire:
   - It is not possible to migrate SolidFire disks, as SF virtualises the storage layer.
   - SolidFire does not support live disk resize. To resize disk, you need to shut down the virtual server first and use the CloneVolume functionality to increase the disk size. After the disk resize operation is complete, the original volume will be replaced with the new one and deleted, after that the VS will be booted.

SolidFire Management

   - Gather statistics
     Statistics gathering is performed by the OnApp Usage collection system using the GetVolumeStats API call.
   - Create data store
     You can create one SolidFire data store per cloud that will represent the space available at the SolidFire side. Use GetLimits/GetClusterCapacity API calls to view data store size availability.
   - Activate/deactivate disk
     All activation/deactivation operations should include automating the OpenISCSI Initiator on the Compute resource activation/deactivation for the specific Volume.
   - Remove disk
     The Disk/LUN is removed with the DeleteVolume API call.
   - Backup disk
     Using the CloneVolume API call, with readOnly option, a snapshot is created which you can then mount on the backup server for backup processing. The clone is than taken down after the backup using DeleteVolume API call.

For more details, refer to the SolidFire API documentation.
SolidFire Quality of Service

SolidFire provides a substantial QoS control for the efficient performance in a cloud environment.

SolidFire data store zone has the following parameters:

- **Minimum IOPS** (SF clusters with lower minimum IOPS will have lower priority when a system is overloaded)
- **Maximum IOPS**
- **Burst IOPS**

It is possible to configure the minimum IOPS resource properties as a minIOPS resource in the billing plan. The maximum IOPS and burst IOPS are static values that can differ per zone, thus providing tiered functionality.

For details how to change minIOPS settings, refer to the [Set Billing Plan Prices And Resource Limits] section of this guide.

For more details on Solid Fire management, refer to [Solid Fire documentation].

SolidFire data store requires authorization for sending API requests from the CP to the SolidFire cluster (you will need to provide Cluster Admin authorization credentials when creating a SolidFire data store).

A Cluster Admin must be created on the SF side before creating a data store in the OnApp control panel.

**AWS**

You can manage Amazon EC2 instances from OnApp Control Panel using the AWS API. EC2 management is represented with as much similarity to AWS as possible. The following sections provide the details on how to manage AWS and Amazon EC2 instances in CP. AWS is enabled globally for the cloud.

Amazon EC2 support is an opt-in feature that is available for a small additional fee on top of your normal OnApp license. Please discuss with your account manager if you plan to enable EC2 support for your cloud.

Enable/disable AWS

Amazon EC2 support is an opt-in feature that is available for a small additional fee on top of your normal OnApp license. Please contact your account manager before enabling Amazon EC2 support.

To enable AWS for your cloud, follow the procedure below:

1. Go to your OnApp Control Panel [Settings > Configuration] and switch on the [Allow users connect to AWS] toggle. This will enable AWS for the cloud.
2. Go to the [Users and Groups] menu and click the name of the appropriate user.
3. Find [Amazon Web Services] and click [Connect].

4. To connect, provide the following credentials:
   - [AWS access key] - go to your [Amazon profile > Security credentials > Users > Manage]
   - [AWS secret access key] - use the same path as above. For security reasons AWS secret access key is stored encrypted in the OnApp DB.

5. In the left navigation pane of your Control Panel a new entry **AWS > EC2 instances** will appear.
View EC2 Instances

EC2 Instances menu lists your machines per selected region and lets you Launch New EC2.

<table>
<thead>
<tr>
<th>EC2 INSTANCES</th>
<th>US East (Virginia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Id</td>
<td>Name</td>
</tr>
<tr>
<td></td>
<td>Instance type</td>
</tr>
<tr>
<td></td>
<td>Availability zone</td>
</tr>
<tr>
<td></td>
<td>Status</td>
</tr>
<tr>
<td></td>
<td>Public DNS name</td>
</tr>
<tr>
<td></td>
<td>Public IP address</td>
</tr>
</tbody>
</table>

OnApp does not cash, store, or change any information regarding the instances and takes it via API from AWS.

To view the details of your EC2 Instances:

1. Go to your Control Panel EC2 Instances menu.
2. The page that loads will list your EC2 instances and the following details:
   - ID
   - Name
   - Instance type
   - Availability zone
   - Status
   - Public DNS name
   - Public IP address
3. You can perform the following actions to your instances:
   - Start/ Stop
   - Terminate (only if stopped)
   - Reboot
   - Connect - instruction how to connect to a console of the instance.

The instances are listed per region, so if you do not have instances in the selected region the list will be empty.

Launch New EC2
Launching a new instance is a process similar to creation of a new virtual server.

To launch a new instance:

1. Go to your Control Panel **EC2 instances** menu.
2. Click the “+” icon or click **Launch EC2 Instance** at the bottom of the list. This step initiates a wizard which will guide you through the EC2 instance launch.

**AMIs**

Select the AMI template from your list or search the marketplace. The right panel lists the main AMI’s properties.

![AMI selection screen](image)

You may search using one or more key words or using the AMI ID. Please note, that search timeout is 30 seconds. If your request times out - try shortening the search time by making it more specific.

**Instance Type**

Select the instance type. It must be compatible with the AMI. If not - a corresponding error message will be displayed after the EC2 instance creation wizard completes.

![Instance Type selection screen](image)

**Instance Details**

On this step you need to fill in the following information:

- Indicate the number of instances to be launched. You may launch several identical instances at the same time.
- Specify network configuration. Choose network and subnet.
- Select the key name.
Review and Launch

On this step you can see the information on the EC2 instance you are going to create. You can either initialize the EC2 instance creation process or click the Previous button to change the required details of the instance.

3. Click Launch EC2 Instance button.

Some of the templates from the marketplace are not free of charge and require a subscription at AWS. Unfortunately this information cannot be obtained via API in the process of AMI selection. So, in case a paid AMI is selected, an error message will be displayed, requesting you to accept the terms and conditions and subscribe to the selected AMI at the Amazon website.

Users And Groups

OnApp provides very fine control over cloud users and what they're allowed to do. You can set up as many different types of user as you need, and customize their access to cloud resources and Control Panel functions as required.

For example, standard, VIP and reseller users can have different capabilities and resource limits. You might provide basic cloud management functionality to L1 support staff (e.g. reboot virtual servers but not destroy them) while your L3 admins have full rights. Your development teams
will probably need to deploy test VSs in the cloud just as a customer would, only without being charged for them. Meanwhile, your billing staff need a "billing only" view with no access to customer resources. This fine control is enabled by a combination of user accounts, roles and permissions and billing plans.

**User Accounts**

There are two types of accounts in OnApp: administrators and users. An administrator account is created automatically when OnApp is installed. Administrators have full access to the system, including managing virtual servers and Compute resources, performing actions on templates and backups, and configuring data stores and networks. There can be several administrators in OnApp. User accounts are created by administrators, and only have access to those actions which are specified by an administrator.

**View Users**

For a quick view of user account details, go to your Control Panel's Users and Groups menu. You'll see a list of all user accounts in your cloud, along with their details:

- **Full name** – user's name and surname
- **Username** – user's screen name
- **User role** – the role set for the user
- **User group** – the group to which the user is assigned
- **Status** – user's status (active or deleted)

You can scroll through the list of users with the Previous/Next buttons at the bottom of the screen, as well as use search tool to search for a specific user.

Click the Actions button next to the required user to edit, suspend or delete them, view the list of whitelist IPs or login as user.

Click Drop All Sessions button to terminate all sessions.

Every user including you will be logged out.

To get the list of additional fields, click the User Additional Fields button.

To view detailed information about a user's account, click user's full name.

**View User Account Details**

To view account details of a particular user:

1. Go to your Control Panel Users menu.
2. On the screen that appears, click the full name of the user to view their account details.
3. The user details screen that appears shows the following information:

- **User details**
  These are the settings which are specified at user creation process.
  - **User's avatar** (This feature is available if the Use gravatar option is enabled).
  - **User's name and surname**
  - **User's email**
  - **Last access log** - click to see information on the IP addresses that logged in to your account, and the time and date of access.
  - **Drop other sessions** - click this button to drop other sessions except the active one, will be dropped
  - **Login** - user's screen name.
  - **User role** – the role set for the user.
  - **User group** – the group to which the user is assigned.
  - **Time Zone** - timezone set for this user.
  - **Locale** - locales set for this user.
  - **System theme** - system theme set for this user.
  - **Display infoboxes** – whether infoboxes are displayed or not for this user.
  - **Restore infoboxes** - click this button to display infoboxes for the user (this option may be disabled depending on the user's permissions).

**Amazon Web Services**

Shows the the status of the Amazon Web Services: disconnected or connected. For more information, see Enable/disable AWS.

Here you can also connect Amazon Web Services:

a. Click the (Connect) icon.
b. On the following page provide your AWS credentials: AWS access key ID and AWS secret access key.
c. Click Submit to connect AWS to your account.

**API info**

- **API key** - click the Generatekey button to generate a new API key.
Billing details

- **Price per hour** - shows the price for VSs, Load Balancers, and other resources per hour.
- **Billing plan** - click the plan label to see its details.
- **Outstanding amount** - the total amount of money owned by this user since it has been created, for all resources, minus the amount of Payments. The sum is displayed for the period since a user has been created until the last 24hrs.
- **Monthly fee** - a set monthly price for a billing plan.
- **Total cost** - the sum of used resources cost and virtual servers cost
- **Payments** - the total amount of payments made.
- **Virtual Server Hourly Statistic** - clicking this link will generate billing statistics for all virtual servers owned by this user. For more information, see Virtual Server Billing Statistics.
- **User Statistic** - clicking this link will generate user's resource usage statistics. For more information, see User Billing Statistics.
- **Monthly Bills** - clicking this link will generate the bills list that shows the total due per each month of the year. To view billing statistics, select a year from the drop-down list and click Apply. The list that appears displays a particular month of the selected year and the cost of used resources for that month. At the bottom of the list there is the total amount of money which was to be paid for the selected period.

**Prices** - the list of payments with their details.
**Backups** - the list of user backups with their details.

User Payments

To view, add and edit payments for a user:
1. Go to your Control Panel's Users and Groups menu.
2. Click the name of the required user.
3. On the screen that appears, click Payments tab.
4. Click the Edit icon to change details of a specific payment.
5. Click the Create Payment button at the end of the list to add a new payment.

User Billing Statistics

The system has a record of all the billing statistics on a user account for the last three months. If the account was created less than three months ago, statistics are generated for the actual period. You can also define a shorter period by setting Start and End time.

To view billing statistics for an account:
1. Go to your Control Panel's Users and Groups menu.
2. You'll see a list of all user accounts in your cloud. Click the name of appropriate user.
3. Go to billing details and click the User Statistic link next to a user in question.
4. Set Start and End time. By default the statistics are generated for the last three months or the actual account existence period. On the page that appears:

- **Daily Stats** – particular date and time for the generated statistics.
- **Backups cost** - the price for the amount of backups taken by the user during the chosen period on the compute resource.
- **Autoscaling monitor Fee** - the price for using the autoscaling monitor during the selected period.
- **Storage Disks Size Costs** - the price for the storage disk size for the predefined period.
- **ISOs cost** - the price for the amount of ISOs uploaded by the user during the chosen period.
- **Templates Costs** - the price for the templates made by the user during the chosen period.
- **Templates, ISOs & Backups Storage Costs** - the price for the disk space taken by the templates, ISOs and backups on the compute resource. For backups and templates, applies if you use compute resources for disk-related actions. If there is a backup server in the cloud, Backup Zones Backup Disk Size Cost and Template Disk Size Cost will apply.
- **Backup Zones Backups Cost** - the price for the amount of backups of the backup zones taken during the selected period. Applies if backup servers are used for disk-related actions. Otherwise Backups cost record will apply.
- **Backup Zones Backup Disk Size Cost** - the price for disk size taken by backups on the backup servers during the predefined period. Applies if backup servers are used for disk-related actions. Otherwise Templates, ISOs & Backups Storage Costs record will apply.
- **Backup Zones Templates Cost** - the price for the amount of templates of the backup zones made during the chosen period.
- **Backup Zones Template Disk Size Cost** - the price for the disk size taken by templates stored on the backup zones during the predefined period.
- **Customer Network Cost** - the price for all customer networks for the selected period.
- **CDN Edge Group Costs** - the price for all CDN Edge groups for the chosen period.
- **Virtual Servers Cost** – the total due for all the VVs minus Backups/Templates Cost (if any) for the predefined period.
- **Total Cost** – the sum of Used resources cost and Virtual Servers cost for the selected period.
- **User Statistics:**
  - **Resources cost**– the money owed per virtual server for the following resources:
- CPU
- CPU Priority
- Disk Size
- Memory
- IP Address
- Virtual Server
- Template&Backup Storage
- Disk size
- IP Address
- **Usage cost** – the money owed per virtual server for the following resource usage:
  - Data read/written
  - Input/Output requests
  - Port speed
  - Data received
  - Data sent
- **Total** – the total due per virtual server for Resources and Usage cost.

**User Whitelist IPs**

Whitelist IP addresses are IPs from which a particular user can access the OnApp control panel. If whitelisted IP addresses are specified for a particular user, the user can only access CP from that defined IP addresses.

To add a whitelist IP address:

1. Go to your Control Panel's **Users and Groups** menu.
2. Click the name of the required user. You will see the **User Profile** page.
3. Click the Create **White List** tab.
4. On the page that appears, click **Create White List IP** button.
5. Fill in the form that appears:
   - **IP** - an IP you wish to enter to the white list.
   - **Description** - any description (this may be a reason why you entered an IP to the list, etc.)
6. Click **Save IP**.
7. Repeat steps 4-6 if you need to add more IPs to the white list.

To edit/delete a whitelisted IP address, click the **Actions** button next to the required IP address, and then choose the required action.

**Customer Networks**

Customer networks are used for isolation of customer's virtual servers from other customers' VSs via VLAN. This feature is applicable only for VSs with VMware compute resource.

For more information, see **Customer vCenter Networks**.

**Log in as User**

Administrators can log in as a user to see their view of the cloud. To do so:

1. Go to your Control Panel's **Users and Groups** menu. You'll see a list of all user accounts in your cloud.
2. Click the **Actions** button next to the user you'd like to log in as, then select **Login as** option.
3. Your screen will refresh and you should now be logged in as that user.

To return to your original view of the cloud, click the **Back to Admin Area** link at the top of the screen.

**Create User**

To add a new user:

1. Go to your Control Panel's **Users and Groups** menu. You'll see a list of all user accounts in your cloud.
2. Click the **Create User** button at the bottom of the list.
3. Fill in the user creation form step by step:

   **Step 1 of 4**
   - **Move the Use Gravatar** slider to the right to use the gravatar image.
   - **Login name** - provide user login name. It can consist of 2-40 characters, letters [A-Za-z], digits [0-9], dash [-], lower dash [ _ ], [@]. You can use both lower- and uppercase letters.
   - **First name** - specify user first name. It can consist of any 1-20 characters.
   - **Last name** - specify user last name. It can consist of any 1-20 characters.
- **Email address** - specify user email.
- **Time zone** - select the required time zone from the drop-down box.
- **Locale** - specify user locale settings by selecting the appropriate locale from the drop-down box (see Locales section for details).
- **Password** - specify user password and confirm it. The password can consist of 6-40 characters and must meet the password complexity requirements.
- **Repeat password** - repeat user password
- **Additional info** - fill in field 1, field 2, field 3, testing with additional information
- **Display infoboxes** - move the slider to the right to display guidance infoboxes for the user.
- **Click Next.**

**Step 2 of 4**

- Assign user to the billing plan by selecting the required billing plan from the drop-down box.
- **Click Next.**

**Step 3 of 4**

- **User role** - select the user role for this user.
- **User group** - assign user to the user group by selecting the required user group from the drop-down box.
- **Click Next.**

**Step 4**

- Specify Auto-suspending options if any. You can configure the system to suspend a user at a definite time or in several hours after creation.
- 4. Click the **Save** button to finish.

**User Additional Fields**

User Additional Fields allow administrators to create custom fields and use them with the API or a third party system. The custom fields are stored and edited in the user profile.

To add a new Additional Field:

1. Log in to the Control Panel as an Admin.
2. Go to the **Users and Groups** menu.
3. On the screen that appears, click the **User Additional Fields** button at the bottom of the list.
4. Click the **Create Additional Field** at the bottom of the list.
5. Fill in the form that appears. You can choose the string/integer data type, and set the Default Value that will be displayed if a user hasn't specified data for this field, or if they have entered information that doesn't match the data type.
6. Click the **Create New Field** button to finish.

To edit or delete an additional field:

1. Click the **Edit** icon next to an additional field to change its details.
2. Click the **Delete** icon next to an additional field to delete it.

**Edit User**

To edit a user account:

1. Go to your Control Panel's **Users and Groups** menu. You'll see a list of all user accounts in your cloud.
2. Click the **Edit** icon next to the user you want to edit.
3. Change their details as required on the screen that appears:
   - Move the **Use Gravatar** slider to the right to use the gravatar image.
   - **Login name** - provide user login name. It can consist of 2-40 characters, letters [A-Za-z], digits [0-9], dash [ - ], lower dash [ _ ], [@]. You can use both lower- and uppercase letters.
   - **First name** - specify user first name. It can consist of any 1-20 characters.
   - **Last name** - specify user last name. It can consist of any 1-20 characters.
   - **Email address** - specify user email.
   - **Time zone** - select the required time zone from the drop-down box.
   - **Locale** - specify user locale settings by selecting the appropriate locale from the drop-down box (see Locales section for details).
   - **System theme** - specify the desirable theme for the user CP look and feel. By default, the global cloud settings are applied.
   - **Password** - specify user password and confirm it. The password can consist of 6-40 characters and must meet the password complexity requirements.
   - **Repeat password** - repeat user password
   - **Display infoboxes** - move the slider to the right to display guidance infoboxes for the user.
   - **Billing plan** - select the required billing plan from the drop-down box.
   - **User roles** - select the user role for this user.
   - **User group** - assign user to the user group by selecting the required user group from the drop-down box.
• **Auto suspending** - edit the auto-suspending options.

4. Click the **Save** button to finish.

You can also view and change the following settings when editing a user:

- User Payments
- Billing Plans
- User Whitelist IPs
- View User Backups
- Customer Networks (standalone guide)
- Add SSH Key

### Add SSH Key

To add a SSH key to a user profile:

1. Go to your Control Panel's **Users and Groups** menu.
2. Click the **Edit** icon next to the required user.
3. Click the **SSH Key** button.
4. On the pop-up screen you can add a new key, and edit/delete a key.

The SSH key will be automatically assigned to all VSs the user creates.

To assign keys to existing VSs, go to the **VS Overview -> Properties** menu.

### Delete User

Completely deleting a user from the system is a two-step process.

#### Step 1. Deleting users and their resources.

To delete a user:

1. Go to your Control Panel's **Users and Groups** menu. You'll see a list of all user accounts in your cloud.
2. Click the **Actions** icon next to the user you want to remove, then choose **Delete**. A confirmation window with the warning that all resources associated with the user will be removed as well will appear.

After this process all user's resources will be deleted, however, the user and their statistics will remain in the cloud.

Recipes that run on other user's resources are not deleted after their owners are removed. These recipes can be accessed via **Recipes > Unowned** recipes menu. User with global permissions can become an owner of any of the unowned recipes by choosing **Actions > Become an owner**.

#### Step 2. Erasing the user.

The deleted user will appear in the users list with the deleted status. The cloud administrator can completely erase the user from the cloud by performing the following procedure:

1. Go to your Control Panel's **Users and Groups** menu. You'll see a list of all user accounts in your cloud.
2. Click the **Actions** icon next to the user you want to delete, then choose **Erase**. You'll be asked for confirmation before the user is erased.

### Suspend and Activate Users

Suspending a user account makes it inactive, but still present on the system. A suspended user will not be able to log into the Control Panel. To suspend an account:

1. Go to your Control Panel's **Users and Groups** menu. You'll see a list of all user accounts in your cloud.
2. Click the **Suspend** icon next to the user you want to suspend. You'll be asked for confirmation before the user is suspended.
3. To activate a suspended user, click the **Activate** user button next to their entry in the Users and Groups menu.

You can also set a user to auto-suspend at a certain time/date on the user's Edit Profile screen (**Users & Groups > [user name] > Edit Profile** tab).
**View User Backups**

Backups in OnApp clouds are associated with user account. To view backups of a particular user:

1. Go to your Control Panel's Users and Groups menu.
2. You'll see a list of all user accounts in your cloud. Click the name of a required user.
3. On the User Details screen, click Backups tab.
4. On the screen that appears, you'll see the list of backups that belong to this user along with their details:
   - date when the backup was taken
   - target
   - status
   - backup size
   - initiated
   - backup server
   - note
   - virtual server
   - customer

To move to the VS backups page, delete a backup or convert it to template, click the Actions button next to template and then select the required action.

**Unlock User**

To unlock the user:

1. Go to your Control Panel's Users and Groups menu. You'll see a list of all user accounts in your cloud.
2. Click the Actions button next to the locked user, then click the Unlock Account button.

**User Groups**

You can assign users into different user groups, so you can tie some users together and offer similar cloud experiences. At present, you can configure the following for user groups:

- assign a UI theme to specific user groups (Settings > Look&Feel menu)
- set the default roles
- specify billing plans

User groups are also used for configuring restrictions sets to correctly set up the reseller role. These can limit the resources available to a user based on either the user's billing plan or the user group.

**View User Group**

To view user groups:

1. Go to your Control Panel's Users and Groups menu.
2. Click the User Groups tab.
3. Click a group's label to see all the roles and billing plans assigned to the questioned group.

**Create User Group**

To create a user group:

1. Go to your Control Panel's Users and Groups menu.
2. Click the User Groups tab.
3. On the page that follows, click Create Group button.
4. On the next page, fill in the user group details:
   - label - choose a name for the user group

The following parameters affect restrictions sets configuration only:

- roles - assign role(s) which will be available to resellers with the appropriate restrictions set
- billing plans - assign billing plan(s) which will be available to resellers with the appropriate restrictions set

5. Click Save.

**Edit User Group**

To edit a user group:

1. Go to your Control Panel's Users and Groups menu.
2. Click the User Groups tab.
3. Click the Actions button next to the user group you want to change, then click Edit.
   Alternatively, you can click the user group's label and on the screen that appears, click the Edit (pencil) icon.
Edit the user group details:

- **label** - choose a name for the user group

The following parameters affect **restrictions sets configuration** only:

- **roles** - assign role(s) which will be available to resellers with the appropriate restrictions set
- **billing plans** - assign billing plan(s) which will be available to resellers with the appropriate restrictions set

5. Click **Save**.

**Assign New User to Group**

You can do this on the Add New User screen, as part of the user creation process:

1. Go to your Control Panel's **Users and Groups** menu.
2. Click the **Create User** button.
3. In the **Roles & Groups** section, select the User Group from the drop-down menu.
4. Complete the other user detail fields, and click **Save**.

**Change User Group for User**

You can change the group a user is assigned to on the Edit User screen:

1. Go to your Control Panel's **Users and Groups** menu.
2. Click the **Actions** icon next to the user, then click **Edit**.
3. Select a user group for the user from the user group drop-down menu.
4. Click the **Save** button.

**Delete User Group**

To delete a user group:

1. Go to your Control Panel's **Users and Groups** menu.
2. Click the **User Groups** tab.
3. Click **Delete** in the **Actions** list next to a user group to delete a specific group.

**Drop Session**

The Drop session panel is used to terminate a session from an OSA-ICC. You can use this functionality if you need to terminate a session because you can’t get to a PC or you have a bad connection.

If the auto-reconnect option was selected during the customization of your session, the option will automatically reconnect your session after you drop it.

To drop sessions:

1. Go to your Control Panel's **Users and Groups** menu.
2. On the **Users** tab, click the **Drop all sessions** tab in the lower left corner of your screen.

**Drop Own Sessions**

To terminate own sessions:

1. Click on your user name at the top of the Control Panel screen to view details of the user account you’re currently logged in with.
2. On the screen that appears, click **Drop Other Sessions** button.

All sessions, except the active one, will be dropped.

To be able to use drop session functionality, you should have the following permissions enabled for your user role:

- Drop all the existing sessions ([`sessions.drop_all`])
- Drop all the user sessions but the current ([`sessions.drop_others`])

For details on permissions, refer to the **Permissions List** section.

**Users with Config Problems**

With OnApp you can manage users which have some configuration problems and resolve those issues through the **Users with config problems** menu.

For this:

1. Go to your Control Panel's **Users and Groups** menu.
2. Click the **Users with Config Problems** tab, and then choose one of the following:
   - Users without roles - shows the list of those users who do not have the roles assigned.
   - Users without time zones - shows the list of users who do not have the time zones set.
   - Users without user groups - shows the list of users who are not assigned to any user group.
3. On the page that appears, click the Actions button next to a required user to perform the following:
   - Log in as User
   - Edit User
   - Delete User
   - Suspend and Activate Users
   - Whitelist IPs

Roles And Sets

OnApp allows you to assign roles to users. Each role has a set of permissions associated with it. By assigning users to different roles you can control what those users are allowed to do. Roles are assigned to users during the user creation process.

OnApp provides the following pre-configured user roles:
   - Administrator
   - User

For details on user permissions, see Permissions List.

Create New Role

To add a new role:

1. Go to Control Panel > Roles and Sets.
2. Click the Roles tab.
3. Press the "+" button or click the Create Role button at the bottom of the screen.
4. On the screen that follows, give the role a name (label) and use the radio buttons to set its permissions.
5. Click the Save button to finish.

Edit Role

To edit a role:

1. Go to Control Panel > Roles and Sets.
2. Click the Roles tab. You'll see a list of all roles on your system and a number of users assigned to each role.
3. Click the Actions button next to the role you want to change, then click Edit.
4. On the screen that appears, change the role's description and permissions, then click the Save button.

Delete Role

To delete a role:

1. Go to Control Panel > Roles and Sets.
2. Click the Roles tab. You'll see a list of all roles in your system.
3. Click the Actions button next to the role you want to delete, then click Delete. You'll be asked for confirmation before the role is removed.

Clone Role

You can copy the role with all its permissions in OnApp. To clone a role:

1. Go to Control Panel > Roles and Sets.
2. Click the Roles tab. You'll see a list of all roles in your system and a number of users assigned to each role.
3. Click the Actions button next to the role you want to change, then click Clone.

Now the role is copied with the name of the original role proceeded with the date and time suffix.

To change the role's name or the set of permissions, edit its details:
1. Go to Control Panel > Roles and Sets.
2. Click the Roles tab. You'll see a list of all roles in your system and a number of users assigned to each role.
3. On the screen that appears, click the Edit (pencil) icon.
4. Change the permissions and role's label if required.
5. Click Save to apply the changes.

Restrictions Sets

The restrictions set is a customizable group of limitations. Configure restrictions sets to create a sub-admin role, i.e. reseller role, with control over a limited amount of cloud resources. This tool gives cloud administrators more flexibility in limiting resources and operations available to reseller role(s). Creating a new restrictions set associates a role or number of roles with certain resources' limitations. The resellers can only view and control the part of cloud assigned to them by the cloud administrator. Within that part they have admin permissions. However, they cannot view or use the resources of the whole cloud.

Previously, the exact list of resources and actions that the users were able to handle in their cloud was defined by the following parameters:

- billing plan - configures which resources are available to users (e.g. data store zones, recipes, network zones, and so on). If none are added, the user will have unlimited resources.
- roles/permissions - specifies which actions the user can perform with those resources configured by billing plan (e.g. See all data store zones in the cloud, edit own recipes only, etc.).

The restrictions sets add possibility to tie the user limitations with the user groups. With this new option, you can choose if the particular resources are restricted by the following:

- billing plans - if restricted by billing plans, the resellers will be able to manage only those resources which are added to a billing plan. If nothing is added, no resources will be available.
- user groups - if the resource is restricted by user group, the reseller will be able to handle only the resources owned by the users of their group.

Resellers cannot create any new zones or resources.

A reseller cannot create roles, therefore, the roles that reseller requires have to be created by the cloud administrator. Further corrections to user roles can only be performed by the cloud administrator.

Reseller’s users have the same permissions as regular OnApp users.

We recommend that the cloud administrator grants the reseller full access to all resources excluding the following permissions:

- Restrictions Resources group
- Restrictions Sets group
- Create/update/destroy role
- Create new zones or resources

Configure Reseller Role

The reseller role is limited only to the part of the cloud assigned to the reseller by the cloud administrator. Resellers have no influence on the cloud as a whole. This section describes the steps the cloud administrator needs to perform to configure the reseller role.

To implement and use the reseller instance, cloud administrator must create and tie together the following:

- a reseller role
- a billing plan
- a user group
- a reseller account
- a restrictions set
Further, the resellers can adjust the cloud "Look and Feel" to their preferences.

**Create a reseller role**

The cloud administrator creates a reseller role. This process is similar to creating other roles in OnApp. For more information, see Create New Role.

We recommend that the cloud administrator grants the reseller full access to all resources excluding the following permissions:

- Restrictions Resources group
- Restrictions Sets group
- Create/update/destroy role
- Create new zones or resources

**Create a restrictions set**

The restrictions set specifies to which resources in the cloud the reseller will have the limited access. If you do not limit a particular resource, the reseller will have unlimited admin-like access to it. When creating a restrictions set, you tie the role to which a reseller user will be further assigned with the limitations configured in this set. Refer to the Create Restrictions Sets section for details on how to create restrictions sets.

**Create billing plan**

Create a billing plan for the reseller and specify the limits and prices for the resources. For more information, see Set Billing Plan Prices And Resource Limits.

If the restrictions for the reseller role are set based on the billing plan approach, then the billing plan of the reseller works differently from typical OnApp billing plans. In typical ones, if the resources are not added, users assigned to such a billing plan will have access to unlimited resources. In case of a reseller, if some resources were not added, the reseller will have no access to that resource.

**Create other roles required by the reseller**

Create the roles which the reseller requires so that they could add their own users based on it, as the reseller cannot create new or update existing roles. This process is similar to creating other roles on OnApp. For more information, refer to Create New Role section.

All further corrections to the roles are performed by the cloud administrator. Therefore, it is important that the resellers inform the cloud administrator what functionality they require for users to have access to.

**Create a user group**

To tie the restrictions set with the end users of the reseller and their resources, create a user group and add there the appropriate user roles.

During the user group creation process, the cloud administrator:

- Adds the reseller role and the roles requested by the reseller to the group
- Adds the reseller's billing plan to the group

For more information on how to create a role, refer to Create New Role section.

**Create reseller account**

Create a reseller account:

- Assign the reseller role to this account
- Assign the reseller's billing plan to this account
- Add the reseller to the user group created earlier

For more information on creating users, refer to Create User section.

**Create Restrictions Sets**

To create a restrictions set:

1. Go to the Control Panel > Roles and Sets menu.
2. Click the Restrictions Sets tab.
3. Press the "+" button or click the Create Set button at the bottom of the screen.
4. On the screen that follows, fill in the restrictions set details:
   - label - choose a name for the restrictions set
   - roles - select the roles that will be limited under the restrictions set
   - resources - choose the resources you want to limit for the resellers assigned to the role specified above. You can restrict users by billing plan and user group or both:
     - billing plans - if restricted by billing plans, the resellers will be able to manage only those resources which are added to a
billing plan. If nothing is added to a billing plan, no resources will be available.

- user groups - if the resource is restricted by user group, the reseller will be able to handle only the resources owned by the users of their group.
- both - if the resource is restricted both by user group and billing plan, the restrictions overlap.

For the list of resources that can be limited under a restrictions set, see List of Restrictions Resources.

5. Click the Submit button to finish.

**List of Restrictions Resources**

Restrictions sets can limit the following resources:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Restriction Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity logs</td>
<td>by user group</td>
<td>The reseller can see the activity log of those users, who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td>Autoscaling configuration</td>
<td>by user group</td>
<td>The reseller can manage only those autoscaling configurations, which are created for VSs created by users who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td></td>
<td>by billing plan</td>
<td>The reseller can manage autoscaling configurations for VSs which are created on Compute resources in Compute zones added to reseller billing plan.</td>
</tr>
<tr>
<td>Backups server zones</td>
<td>by billing plan</td>
<td>The resellers can manage backup server zones within the limits set in their billing plan.</td>
</tr>
<tr>
<td>Backup servers</td>
<td>by billing plan</td>
<td>The reseller can see and use only those backup servers, which are set in his billing plan.</td>
</tr>
<tr>
<td>Backups</td>
<td>by user group</td>
<td>The reseller can configure only those backups, which are created by users, who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td></td>
<td>by billing plan</td>
<td>The reseller can manage backups created on backup server zones added to the reseller billing plan.</td>
</tr>
<tr>
<td>Base resources</td>
<td>by user group</td>
<td>The reseller can manage only those base resources of billing plans which are assigned to users, who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td>Billing plans</td>
<td>by user group</td>
<td>The reseller can manage only those billing plans, which are assigned to users, who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td>Blueprints</td>
<td>by billing plan</td>
<td>The reseller can manage blueprints stored on data store zones which are added to reseller billing plan.</td>
</tr>
<tr>
<td></td>
<td>by user group</td>
<td>The reseller can see and use only those blueprints, which were created by users, who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td>CDN resources</td>
<td>by user group</td>
<td>The reseller can manage only those CDN resources, which are used by customers, who are members of the user group to which this reseller is assigned.</td>
</tr>
<tr>
<td></td>
<td>by billing plan</td>
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<td>The reseller can manage recipes assigned to recipe groups which are added to the reseller billing plan.</td>
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<td>The reseller can see and manage only those SAML identity providers that were configured by users, who are members of the user group to which this reseller is assigned.</td>
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<tr>
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<td>by user group</td>
<td>The reseller can view only the schedule logs of the users, who are members of the user group to which this reseller is assigned.</td>
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<td>The reseller can view schedule logs depending on where the backup schedules have been taken:</td>
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<td>• for incremental backups, the schedule logs for Compute zones added to reseller billing plan are available</td>
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<tr>
<td>Schedules</td>
<td>by user group</td>
<td>The reseller can see and manage only those schedules, that were created by users, who are members of the user group to which this reseller is assigned.</td>
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<tr>
<td>by billing plan</td>
<td>The reseller can view schedules depending on where they have been taken:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• for normal backups, the schedules for data store zones added to reseller billing plan are available</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• for incremental backups, the schedules for Compute zones added to reseller billing plan are available</td>
<td></td>
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<tr>
<td>Storage servers</td>
<td>by user group</td>
<td>The reseller can see and manage only those storage servers, that were created by users, who are members of the user group to which this reseller is assigned.</td>
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<tr>
<td>by billing plan</td>
<td>The reseller can manage storage servers that are based on Compute resources from Compute zones added to reseller billing plan.</td>
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<td>User groups</td>
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<td>The reseller can see and manage only those user groups, that were created by users, who are members of the user group to which this reseller is assigned.</td>
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<td>White IPs</td>
<td>by user group</td>
<td>The reseller can see and manage only those white IPs that were added by users, who are members of the user group to which this reseller is assigned.</td>
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<tr>
<td>Users</td>
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<td>The reseller can see and manage only those users who are members of the user group to which this reseller is assigned.</td>
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<tr>
<td>Virtual server snapshots</td>
<td>by user group</td>
<td>The reseller can see and manage only those virtual server snapshots, that were created by users, who are members of the user group to which this reseller is assigned.</td>
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<td>by billing plan</td>
<td>The reseller can see and manage snapshots of virtual servers running on the Compute resources from the Compute zones added to reseller billing plan.</td>
<td></td>
</tr>
</tbody>
</table>
Virtual servers by user group
The reseller can manage only those virtual servers, that were created by users, who are members of the user group to which this reseller is assigned.

by billing plan
The reseller can see and create virtual servers within the limits set in his billing plan.

Virtual machine statistics
by user group
The reseller can view only the virtual server statistics of those users, who are members of the user group to which this reseller is assigned.

by billing plan
The reseller can view the statistics for virtual servers running on the Compute resources from the Compute zones added to reseller billing plan.

The following vCD restrictions set elements apply to vCloud users only:

<table>
<thead>
<tr>
<th>Element</th>
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<td>The vCloud user can manage only vApp templates in the vCloud organization (user group).</td>
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<td>vApp Template Groups</td>
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<td>The vCloud user can manage only vApp template groups in the vCloud organization (user group).</td>
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<td>The vCloud user can manage virtualDataCenters which exist in the vCloud Organization (user group).</td>
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<tr>
<td>vDC Storage Profiles</td>
<td>by user group</td>
<td>The vCloud user can manage Storage profiles associated with virtualDataCenters in the vCloud Organization (user group).</td>
</tr>
</tbody>
</table>

Edit Restrictions Sets

To edit a restrictions set:

1. Go to Control Panel > Roles and Sets menu.
2. Click the Restrictions Sets tab. You'll see a list of all restrictions sets.
3. Click the Actions button next to the restrictions set you want to change, then click Edit.
4. On the screen that appears, you can change the following parameters:
   - Label
   - Roles
   - Resources
5. Click the Submit button.

Delete Restrictions Sets

To delete a restrictions set:

1. Go to Control Panel > Roles and Sets menu.
2. Click the Restrictions Sets tab. You'll see the list of all restrictions sets.
3. Click the Actions button next to the restrictions set you want to remove, then click Delete. You'll be asked for confirmation before the restrictions set is removed.

Billing Plans

Before users can create virtual servers in your cloud, it is important to set prices for the resources they use. This is a three-step process: creating a billing plan, setting prices and resources limits for that plan, and then assigning users to that plan.

You can set default (master) and custom resource limits for Compute resource, data store and network zones. The master zones are virtual zones which do not exist physically. They are added to each billing plan automatically. The main purpose of the master bucket and master template zones is holding limit and price settings that can be applied to multiple zones with one click. So that, if you have a lot of zones and want to set the same limits per each zone, you can simply set desired limits and prices per master zone and assign all your Compute resource, data store and network zones to it.

Master Bucket Zone Billing
Master bucket zone is created automatically with each billing plan as a part of the Compute zone limits section. Master bucket zone is highlighted in green. You can add or remove Compute zones to/from the master bucket zone any time after the billing plan creation.

Depending on the configuration, Compute zone billing may behave differently:

1. **The billing plan contains only master bucket zone with no Compute zones within and besides it.**
   
   In this case the limits and prices set in the master bucket zone will be applied to all user’s virtual servers. Users will be able to create virtual servers in any Compute zone available as long as there are enough limits in the master bucket zone.

   If you create or alter a billing plan of a user who already has Compute zones, “orphaned” Compute zones will use master bucket zone limits. For example, if user has three Compute zones and you add two of them to the billing plan, the third one will be billed according to the master bucket zone limits.

2. **The billing plan contains several Compute zones, all of which are added to master bucket zone.**
   
   The users signed up with this plan will be able to manage virtual servers in these zones only. The master zones’ limits and prices will affect all Compute resources in these zones as if they were a single zone. For example, if you have three Compute zones added to the master bucket zone with the CPU limit set to 6, you can either create one virtual server with 6 CPUs in any of three zones, or three virtual servers with two CPUs in any of the three Compute zones, or two virtual servers with three CPUs, and so on.

3. **The billing plan contains several Compute zones with custom prices and limits.**
   
   Users will only be able to control these zones’ resources. The prices and ability to control virtual servers are determined by limits set for each Compute zone individually. For example, you will be only be able to create virtual servers in the Compute zones set in the billing plan. Limits and prices for that virtual servers will be taken from the corresponding Compute zone limits (each Compute zone will have its own limits and prices).

4. **The billing plan contains mixed Compute zone limits (both master and custom).**
   
   For example, if there are three Compute zones added to a billing plan, two of which are added to the master bucket zone and one zone added with custom limits, the first two zones will share the master zone’s limits, while the third one will use its own limits.

Refer to Set Billing Plan Prices And Resource Limits section for details on applying resources to zones.

**Master Template Zone Billing**

Master template zone is created automatically with each billing plan as a part of the data store zone and network zone limits sections. Master bucket zones are highlighted in yellow. You can add data stores and network zones to the master template zones any time after the billing plan creation.

Depending on the configuration, master zone billing may behave differently:

1. **The billing plan contains only the master template zone with no data store/network zones added.**
   
   In this case the billing plan does not limit/charge the data stores and networks.

2. **The billing plan contains one or more data store/network zones which are not added to the master template zone and have custom prices/limits.**
   
   The prices and ability to control virtual servers is determined by limits set for each data store/network zone individually. Users signed up with this billing plan will be able to control only data store/network zones set in the billing plan. Limits and prices will be taken from the corresponding data store/network zone limits (each data store/network zone will have its own limits and prices).

3. **The billing plan contains data store/network zones added to the master template zone.**
   
   The master template zones’ limits and prices will affect all those data stores/networks as if they were a single zone.

4. **The billing plan contains mixed data store/network zone limits (both master and custom).**
   
   For example, if there are three data store zones added to a billing plan, two of which are added to the master template zone and one zone added with custom limits, the first two zones will share the master zone’s limits, while the third one will use its own limits.

Refer to Set Billing Plan Prices And Resource Limits section for details on applying resources to zones.

Keep in mind: when a zone is assigned to the master bucket or master template zone, its current prices are deleted and substituted with corresponding bucket/template zone’s settings.

When you unsubscribe a billing plan limit from the master bucket or master template zone, its resources will be restored.

**Create Billing Plan**

To create a billing plan:

1. Go to your Control Panel’s Billing Plans menu.
2. On the screen that appears, press “+” button or click the Create Billing Plan button at the bottom of the screen.
3. Complete the form on the screen that follows:
   
   - **Label** - give your billing plan a name.
   - **Monthly price** – set a monthly price for the billing plan. This price will be applied regardless of the actual prices for used resources.
Set Billing Plan Prices And Resource Limits

You can set pricing and limits for cloud resources for each billing plan.

To add a resource limit to a billing plan:

1. Go to your Control Panel's Billing Plans menu.
2. The screen that appears shows all billing plans currently available. Click the Actions button next to the plan in question, then click Resources.
3. The screen loads all the resources currently assigned to this billing plan. Now you can add limits to the following resources:
   - User VS limits
   - Limits for template store
   - Limits for recipe groups
   - Limits for Compute zones
   - Limits for data store zones
   - Limits for network zones
   - Limits for edge groups
   - Limits for backup server zones
   - Limits for guaranteed miniIOPS
   - Limits for instance types

**User VS limits**

To set resource limits for user virtual servers:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the User VS limits.
3. In the window that pops up, select the resource type from the drop-down menu and click Add Resource.
4. Set limits for user virtual servers:
   - **Virtual Servers Limits (Max)** - the maximum number of virtual servers users can create.
   - **Autoscaling Limits (Free, Max, Price)** – the number of VSs using Autoscaling that user can create for free as well as the total amount of such VSs. You can also set the price for the VSs using Autoscaling (per VS).
   - **Templates, ISOs & Backups Storage (Disk size for free, Disk size, Price)** - the amount of free disk space users get for backup, ISO and template storage, and the total amount of disk space they can use for backups, ISOs and templates. Disk space is measured in GB, and priced per hour.
   - **Backups Limits (Free, Max, Price)** - the number of backups users can create for free as well as the maximum number of backups, according to their template/backup storage space limit. You can set prices per backup per hour. Alternatively, use Templates & Backups Storage limit to charge per GB of disk space the backup actually takes.
   - **Template Limits (Free, Max, Price)** - the number of user templates which can be created for free as well as the maximum number of user templates, according to their template/backup storage space limit. You can set prices per user template per hour. Alternatively, use Templates & Backups Storage limit to charge per GB of disk space the template actually takes.
   - **Customer network limits** - (Free, Max, Price) - the number of customer networks users can create for free, and the maximum number of customer networks they can create.
   - **ISO Limits (Free, Max, Price)** - the number of ISOs users can create for free as well as the maximum number of ISOs, according to their template/ISO/backup storage space limit. You can set prices per ISO per hour. Alternatively, use Templates, ISOs & Backups Storage limit to charge per GB of disk space the ISOs actually take.
Limits for template store

When you add template store limits to a billing plan, you limit the number of preconfigured system templates available to users signed up for this billing plan – they can only choose from templates specified.

To add resource limits for template store:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the Limits for Template Store box.
3. In the window that pops up, select the target template distribution from the drop-down menu and click Add Resource.

Limits for recipe groups

When you add a recipe group to a billing plan, you limit the number of preconfigured plug-ins called recipes to users signed up for this billing plan - they can only choose from the recipe groups specified. If nothing added to a billing plan, the users can use all the recipe groups in the system.

User's own recipes will not be included into the billing plan.

To add resource limits for recipe groups:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the Limits for Recipe Groups box.
3. In the window that pops up, select the target recipe group from the drop-down menu, and click Add Resource.

Limits for Compute zones

The master bucket zone is added to each billing plan automatically. When applying the master bucket zone limits to a Compute zone, each server running on a Compute resource within this zone will come under these values. You can use custom resource limits for Compute zones alongside with master bucket zone limits.

You can also reset the limits and prices and set them to default (used in master bucket zone). In this case your current settings will be overridden.

To add limits for Compute zones:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Scroll down to the Limits & Pricing for Compute resource Zones section and set the following limits for the Master Buckets resource:

   **CPU**
   - the number of CPU cores that users get for free
   - the maximum number of CPU cores they can request under this plan
   - the price per CPU core per hour, for VSs powered on
   - the price per CPU core per hour for VSs powered off

   **CPU Share**
   - the CPU share % that users get for free
   - the maximum CPU share % they can request under this plan
   - the prices per CPU share % per hour, for VSs powered on
   - the prices per CPU share % per hour, for VSs powered off

   **CPU Units** - move the Use CPU Units slider to the right to enable CPU Units instead of CPU shares and CPU cores.
   - the CPU units that users get for free
   - the maximum CPU units they can request under this plan
   - the prices per CPU unit per hour, for VSs powered on
   - the prices per CPU unit per hour, for VSs powered off

   - Currently CPU Units are available for Xen and KVM Compute resources only.
   - Do not use CPU Units for KVM5 Compute resources, Baremetal, VMware servers, and load balancers.
Memory

- the amount of RAM users get for free
- the maximum RAM they can request under this plan
- the prices for RAM for VSs powered on
- the prices for RAM for VSs powered off. RAM is measured in MB and priced per hour.

3. Set the **VS creation properties** which specify the minimum amount of resources available for users in a server creation wizard form. You can also set the default values for CPU and CPU share resources. Each server created based on this particular Compute zone will be created with these default values and CPU/CPU share parameters won't be shown in a server creation wizard.

**CPU**

- set the minimum number of CPU cores for a server
- alternatively, configure the default values which set the amount of CPU cores automatically added per each VS (move the **Use default values** slider and set the values). It is only possible to enable the **Use default values** option when resource prices and max limit are not set.

**CPU Priority** (refer to Billing Calculation section for details on how CPU priority is calculated)

- set the minimum CPU priority for a server
- alternatively, configure the default values which set the CPU Priority automatically assigned when creating a VS (move the **Use default values** slider and set the values). It is only possible to enable the **Use default values** option when resource prices and max limit are not set.

**Memory**

- set the minimum RAM available when creating a VS.

You can set default CPU and CPU priority settings in the billing plan. This option is available only if limits and prices for the CPU and CPU shares are set to zero for the corresponding zone. Specifying the default CPU and/or default CPU priority amount will result in VSs always being created with the corresponding CPU/CPU priority amount for the given Compute zone.

To prevent users from choosing a Compute resource when creating a VS, but still enable them to select the type of virtualization, use **Show Compute resources on Virtual Machine creation** permission. For details, refer to Permissions List section.

4. Click the “+” button in the upper right corner of the Limits & Pricing for Compute zones box to add a custom Compute zone.
5. In the window that pops up:
   a. Select the target Compute zone from the drop-down menu.
   b. Specify if this Compute zone should use the limits set for a Master Bucket zone
   c. Specify if CPU units should replace CPU shares and CPU cores for this Compute zone.
   d. Click the **Add resource** button.

6. Set the limits and pricing. For details, refer to step 2.
7. To reset the Compute zone limits and pricing to those specified for Master Bucket zone, move the slider in the **Use Bucket Master Zone?** column to the right.

If you'd like to prevent your users from choosing a Compute resource when creating a VS, but still enable them to select the type of virtualization, use **Show Compute resources on Virtual Server creation** permission. For details, refer to Permissions List section.

**Limits for data store zones**

The master template zone is added to each billing plan automatically. When applying the master template zone limits to a data store zone, each VS running on a data store within this zone will come under these values. You can use custom limits for data store zones alongside with master template zone limits.

You can also reset the limits and prices and set them to default (used in master template zone). In this case your current settings will be overridden.

To add limits for data store zones:

1. Go to the billing plan resources screen (**Billing Plans > Resources**).
2. Scroll down to the Limits & Pricing for Data Store Zones section and set the following limits for the Master Templates resource:

- **Disk Size** - the disk space users get for free, and the maximum disk space they can request under this plan. You can set prices for disk space for VSs powered on and off. Disk size is measured in GB and priced per hour.
- **Data read** - set the amount of data read users can send for free, and the price over free units. Data read is measured in GB and priced per GB.
- **Data written** - set the amount of data written users can send for free, and the price over free units. Data written is measured in GB and priced per GB.
- **Input requests** - specify the number of input requests per hour users can get for free and the price over free units. Input requests are measured in millions and priced per million requests.
- **Output requests** - specify the number of output requests per hour users can get for free and the price over free units. Output requests are measured in millions and priced per million requests.

3. Click the “+” button in the upper right corner of the Limits & Pricing for Data Store zones box to add a custom data store zone.
4. In the window that pops up:
   a. Select the target data store zone.
   b. Select the limit type: hourly or monthly. For details on hourly/monthly billing calculation, see Billing Calculation.
   c. Specify if this data store zone should use the limits set for a Master Defaults zone.
   d. Click the Add resource button.

5. Set limits and prices for the data store zone. For details, refer to step 2.
6. To reset the data store zone limits and pricing to those specified for Master Template resource, move the slider in the Use Template Master Zone? column to the right. In this case your current settings will be overridden.

**Limits for network zones**

The master template zone is added to each billing plan automatically. When applying the master template zone limits to a network zone, each VS running within this zone will come under these values. You can use custom limits for network zones alongside with master template zone limits.

You can also reset the limits and prices and set them to default (used in master template zone).

To add limits for network zones:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Scroll down to the Limits & Pricing for Network Zones section and set the following for Master Templates zone:

- **IP address** (Free, Max, On, Off) - the number of IP addresses users get for free, and the maximum number of IP addresses they can request under this plan. IP addresses are priced per hour.
- **Port speed** - set the amount of port speed user gets for free, and the maximum port speed amount user can request. The port speed is measured in MB per second and priced per MB.
- **Data received** - set the amount of data received users can send for free, and the price over free units. Data received is measured in GB and priced per GB.
- **Data sent** - set the amount of data sent users can send for free, and the price over free units. Data sent is measured in GB and priced per GB.

3. Click the “+” button in the upper right corner of the Limits & Pricing for Network Zones box to add a custom network zone.
4. In the window that pops up:
   a. Select the target network zone.
   b. Select the limit type: hourly or monthly. For details on hourly/monthly billing calculation, see Billing Calculation.
   c. Specify if this network zone should use the limits set for a Master Defaults zone
   d. Click the Add resource button.

5. Set limits and prices for the network zone. For details, refer to step 2.
6. To reset the network zone limits and pricing to those specified for Master Template resource, move the slider in the Use Template Master Zone? column to the right. In this case your current settings will be overridden.

---

By adding Compute resource, data store and network zone resources to a billing plan, you can add to the overall limits enforced by the billing plan by limiting what amount of resource is available in different zones of your cloud. For example: a user is assigned to a billing plan with a total limit of 10 IP addresses. The plan is associated with 2 network zones: NZ1, a high performance zone, which has a limit of 2 IPs; and NZ2, which has a limit of 8 IPs.

In this case, the user would be able to use a maximum of 10 IPs for all of their VSs - of which, up to 2 may be located in NZ1, and up to 8 located in NZ2.

**Limits for edge groups**
To add limits for edge groups:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the Limits for edge groups box.
3. In the window that pops up, select the target edge group from the drop-down menu, and click Add Resource.
4. Set the prices for the edge group per GB.

If no limits or edge groups are specified, no edge groups will be available to this billing plan.

Limits for backup server zones

To add limits for backup server zones:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the Limits for backup server zones box.
3. In the window that pops up, select the target backup server zone from the drop-down menu, and click Add Resource.
4. Set limits and prices for the backup server zone:
   - Backups - set the amount of backups users get for free, and the total amount they may use. You can set prices for backups. Quantity backup limit only affects manual backups (created by clicking the Take backup button).
   - Backup Disk Size - set a maximum amount of backup server space users get for free, and total amount of backup server space users can request. When the backup server space is exceeded, you can take a backup, but you cannot restore it unless the size is freed up. You can set prices for backup server space. Backup server space is measured in GB.

   Please also set the Backups max limit to 0 in the User VS limits.

   - Templates - set the amount of templates users can send for free, and the prices for each template over that limit.
   - Template Disk Size - set the amount of template disk size users can receive for free, and the prices for each GB over that limit.
     Template disk size is measured in GB, and priced per GB.
5. If you specify backup server zone in the billing plan, users will be able to use only the backup servers specified in the backup server zones assigned to their billing plan.
6. If the billing plan does not contain any assigned backup servers zone, users will be able to use any available Backup Server.

Limits for guaranteed minIOPS

(for billing plans with SolidFire data stores added)

To add limits for guaranteed minIOPS:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the Limits for guaranteed minIOPS box.
3. In the window that pops up, select the target data store zone from the drop-down menu, and click Add Resource.

Limits for Instance Types

When you add instance types limits, you enable users signed up for this billing plan to select predefined resource packages in the virtual server creation wizard. If you add compute/data store/network zones to this section, you limit the zones to which the instance type will apply. If no zones are added, the instance types will be applied to all zones within this billing type.

Add limits for Instance Types

To add limits for instance types:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the "+" button in the upper right corner of the Limits for Instance types box.
3. In the window that pops up, select the target instance type and the compute zone(s), data store zone(s) and network zone(s) the instance type will apply to. Click Add Resource.

If you do not select any compute resource/data store/network zones, the instance type will apply to all compute resource/data store/network zones available for the user.

It is advisable that you limit the user's billing plan by the compute zones that have enough resources to support the instance type(s) you add to the user's billing plan. If the user selects a compute zone that does not have enough resources during virtual server creation, they will see all instance types available to them, but those that have resources incompatible with the chosen compute zone will be greyed out. Greyed out instance types cannot be selected.

For the info on how the instance types are billed, refer to the Billing for Instance Types document.

Modify/delete Limits for Instance Types

If required, you can edit the zones the instance type applies to:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the Actions button next to the instance type you are interested in and select Edit.
3. In the window that pops up, edit the compute resource/data store/network zone(s) and click Update.

If there is a VS created on a compute resource/data store/network zone you remove while editing the billing plan, the VS will still be billed according to the instance type.

Also, you can delete instance types from the billing plan:

1. Go to the billing plan resources screen (Billing Plans > Resources).
2. Click the Actions button next to the instance type you are interested in and select Delete. You will be asked for confirmation before the instance type is removed from the billing plan.

Instance types that have been used during virtual server creation cannot be deleted.

Billing Plan Configuration Workflow

The following scheme describes how to configure a billing plan:
Billing Calculation

Below you will find the description of the billing logic and how the billing is calculated for the following billing plan resources:

- Hourly and monthly resource limit types
- IP addresses
- Port speed
- Guaranteed minIOPS
- Disk size
- CPU
- CPU priority
- CPU shares
- CPU units
- Instance Types

Hourly and monthly resource limit types

It is possible to choose hourly or monthly billing when adding a data store or network zone resources to the OnApp billing plan.

When setting hourly resource type, the statistics is gathered hourly and then is compared to the free resource limit. Then, the resource limits which exceed the free amount allowed are billed.

When setting monthly resource type, the statistics is gathered hourly and then is compared to the free resource limit. When the free limit is exceeded, the exceeding amount is billed.

For example, user adds a data store zone resource to the billing plan and sets free disk size limit to 50 GB.

- During the first hour, 50 GB are used (all the free limit).
- During the second hour, 2 GB are used. As there’s no free limits left, the user is charged for 2 GB.
- During the third hour, 5 GB are used. Since there’s no free limits left, the user is charged for 5 GB (previous 2 GB over limit are not taken into account, since they are already billed).

IP addresses

Each virtual server has two IP types: regular and outside. Public IP addresses are used for servers’ Internet access. Private IP addresses are
used for private networks.

When calculating IP address billing for a particular resource, each virtual server’s IP address is compared to the free IP limit in a linear queue (starting with the first added IP address). Regular IPs are calculated first.

One IP address can be added as a regular and an outside IP at the same time. In this case, it will be only charged as a regular one. That is why outside IPs are calculated second.

The IP address billing calculation:

Example
Free IP address limit is 3.

VS 1
The first virtual server has two regular and two outside IP addresses, but the second regular IP address is the same as the second outside IP address, so the number of unique IPs assigned to this virtual server is 3.

VS 2
The second virtual server has two regular and two outside IP addresses.

According to the billing algorithm, the first regular IP address checks if there are some IPs added before it and then gets compared to the free IP address limit: 1 < 3, so it is not charged (2 IPs of free disk size limit left).

Then, the second IP address is compared to the remaining free IP address number. 1 < 2, so the second IP also is not charged (1 IP of free disk size limit left).

After that, the outside IPs are calculated:

The first outside IP address checks if there are some outside IPs added before it and then gets compared to the free IP address limit. 1 1, so this IP address is not charged (0 IP of free disk size limit left).

Then, the second outside IP is compared to the remaining free IP address number. There are no free IPs left, but since the second regular IP address equals the second outside IP address, the second IP also is not billed.

Consequently, all IP addresses of the second virtual server are billed, as the free IP address limit is already used up.

Port Speed

Port speed is calculated by subtracting the free port speed value from free port speed limit and summing up the remainders. If the disk’s port speed is less that the free port speed limit, it is not billed.

The port speed billing calculation is the following:

\[
(NIC\ 1\ port\ speed\ -\ free\ port\ speed\ value) + (Disk\ 2\ port\ speed\ -\ free\ port\ speed\ value)\ ..etc
\]

Example
In this example, free port speed limit is 20 MB/second.

VS 1
First virtual server has two NICs.

NIC 1 = 10 MB/second
NIC 2 = 25 MB/second

**VS 2**
Second virtual server has two NICs.
NIC 3 = 10 MB/second
NIC 4 = 30 MB/second

Then, \((10 - 20) + (25 - 20) + (10 - 20) + (30 - 20)\) = 15 MB will be charged.
Since the first and the third NICs are less than the free amount, they are not charged.

**Guaranteed minIOPS**

Guaranteed minIOPS is calculated by subtracting the free IOPS value from each disk’s IOPS and summing up the remainders. If the disk’s IOPS is less than the free IOPS value, it is not billed.

With this in mind, the formula for minIOPS billing calculation is:

\[
(Disk 1 \text{ IOPS} - \text{free IOPS value}) + (Disk 2 \text{ IOPS} - \text{free IOPS value})...\text{etc.}
\]

**Example**

In this example, free IOPS = 45

Disk 1 has 50 IOPS
Disk 2 has 45 IOPS
Disk 2 has 60 IOPS
Disk 4 has 20 IOPS

Then: \((50-45) + (45-45) + (60-45) + (20-45)\) = 20 IOPS which is billed.
Since the second and the fourth disks’ IOPS values are less than the free amount, these disks are not billed.

**Disk size**

When calculating disk size billing for a particular resource, each virtual server’s disk size is compared to the free disk size limit in a linear queue (starting with the first added disk), then each next disk is compared to the free disk size limit remainders.

The disk size billing calculation is:

**Example**

Free disk size is 50 GB.

We have two virtual servers assigned to the same data store.

**VS 1**
The first virtual server has two disks.

- Disk 1 = 15 GB
- Disk 2 = 20 GB

**VS 2**

The second virtual server has two disks.

- Disk 1 = 20 GB
- Disk 2 = 15 GB

According to the billing algorithm, the first disk checks if there are disks added before it and then gets compared to the free disk size limit:

- $15 < 50$, so it is not charged (35 GB of free disk size limit left).

Then, the second disk is compared to the remaining free disk size limit:

- $20 < 35$ (15 GB of free disk size limit left).

So, the second disk is also not charged.

After that, the second virtual server’s disks are processed. The third disk is compared to the remaining free disk size limit:

- $20 > 15$ ($20 - 15 = 5$, so 5 GB of the disk’s size will be charged).

Finally, the fourth disk is charged for the whole disk size, as the free disk size limit is already reached.

**CPU**

CPU, CPU shares and memory limits are set for the Compute zone.

When calculating CPU billing for a particular resource, the sum of all virtual server’s CPU over the free limit is billed.

So, the CPU billing formula can be displayed as follows:

$$\text{(VS1 CPUs)} + \text{(V2 CPUs)} + \text{(VS# CPUs)} - \text{free CPU limit}$$

**Example**

Free CPU limit is 3.
If we have two virtual servers:

**VS 1**
The first VS has 2 CPUs

**VS 2**
The second VS has 3 CPUs

The number of CPUs charged: \((2+3) - 3 = 2\)

**CPU shares**

To calculate the CPU shares price for the virtual server, multiply the number of server's cores by CPU priority percentage given.

Then, each virtual server's CPU priority value is compared to the free CPU shares limit in a linear queue (starting with the first added virtual server), then each next virtual server is compared to the free CPU shares limit remainders.

**Example**

In this example, free CPU shares limit is 140.

**VS 1**
The first virtual server has 2 CPUs and 50% CPU priority (100% in total).

**VS 2**
The second virtual server has 3 CPUs and 40% CPU priority (120% in total).

According to the billing algorithm, the first virtual server checks if there are servers added before it and then gets compared to the free CPU shares limit:

100 < 140, so it is not charged (40 of free CPU shares limit left).

Then, the second virtual server is compared to the remaining CPU shares limit:

120 > 40 (120 – 40 = 80), so 80 percent of this server’s CPU shares will be charged.

**CPU Priority**

The amount of CPU resource a VS is given, is the CPU priority (you can think of this as its "share percentage") multiplied by the number of cores allocated to that VS. This is a minimum number – clients can burst over it, up to 100% multiplied by the number of cores. For example, on a Compute resource with 3GHz CPU cores:

- 100% x 1 core = 3GHz (burstable to 3GHz)
- 10% x 2 cores = 600MHZ (burstable to 6GHz)
- 5% x 4 cores = 600MHz (burstable to 12GHz)

By default, OnApp allows overselling of cloud resources. For example, OnApp will allow users to create 5 VSs with 100% CPU priority/1 CPU core on a Compute resource with a 4-core CPU. In this example, OnApp would reduce the guaranteed CPU for each VS. If you build a VS on a KVM Compute resource, the CPU priority settings will be disabled and CPU priority value will be 100 by default.

**CPU Units**

The CPU unit is an abstract figure that replaces CPU priority. It is an arbitrary relative value that the host can enter to mark the capacity of the Compute resources in a zone. It is the host's responsibility to enter the values per Compute resources correctly and logically. You can set the amount of units per Compute zone and per each particular Compute resource in a zone. If you set the CPU Units per Compute zone, then each Compute resource in this zone will be assigned the number of units set. To set different capacity to a particular Compute resource, specify the CPU units amount to a required Compute resource not a zone. To bill for CPU Units, enable CPU units for a billing plan and set the price per unit.

Each Compute resource core within a zone is given a 1000 CPU Units default value when CPU units are enabled.
per zone (this is made in the billing plan). The Host can then change that number for each Compute resource to any other number between 1-100,000 to fit its capacity. The faster the Compute resource, the higher the value should be set.

CPU Units show the speed of the CPU - this can be done in any way that the host wants to as it’s just a number that is relative to another number. OnApp will simply process the numbers. For example, if one Compute resource is two times more powerful than another, then the CPU units could be 1000 and 500.

To evaluate Compute resource’s physical performance, you can take the following values:

1. CPU Mhz
2. Passmark Score (http://www.cpubenchmark.net/)

When creating a VS, you will specify the desired amount of CPU Units that this VS will take out of total CPU Units set for Compute resource.

Please note that OnApp cannot guarantee identical performance over different Compute resources and workload types when migrating VSS.

Example: If you have a Compute zone (Compute resourceZ) with 5 Compute resources attached to it, and you set 1000 CPU Units to Compute resourceZ zone, then each of five Compute resources in this zone will have 1000 CPU Units. In case you would like to increase the capacity of specific Compute resource1 Compute resource to 2000 in this Compute resourceZ zone, set the CPU Units option of this Compute resource1 to 2000. For example, giving Compute resource 1 a score of 1000 and Compute resource 2 the score of 500 is the same as giving Compute resource 1 a score of 2 and Compute resource 2 a score of 1. However, the first case gives you more flexibility in spreading the resources between VSs.

When setting CPU units, the main thing is that the correlation between the CPU Units for each Compute resource should correspond to the correlation of their actual performance. Example of setting CPU units based on CPU speed:

<table>
<thead>
<tr>
<th>Compute resource</th>
<th>Compute resource CPU Mhz</th>
<th>Compute resource Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4000</td>
<td>1000</td>
</tr>
<tr>
<td>B</td>
<td>2000</td>
<td>500</td>
</tr>
<tr>
<td>C</td>
<td>1000</td>
<td>250</td>
</tr>
<tr>
<td>D</td>
<td>500</td>
<td>125</td>
</tr>
</tbody>
</table>

**Limitations**

- CPU Units are available for Xen and KVM Compute resources only.
- Do not apply CPU Units for KVM Compute resources running on CentOS5, VMware, baremetal servers, and load balancers.
- Currently, you cannot change from Cores to Units or Units to Cores in an existing Compute Zone.
- So far only billing calculation can be performed based on CPU units. At this time we do not guarantee the same performance for VSs when migrating to another Compute resource with different capacity.

**Instance Types**

To set up billing for the instance types, at first configure the amount of available resources in the package at the Instance Types > Create Instance Type menu.

Second, add the instance type(s) to the billing plan. There you set the price that will be charged per VS powered on/off for each appropriate instance type.
There are also a number of VS resources that are not set up during instance type creation but are configured automatically:

- **CPU Priority** - CPU priority is automatically set to 100
- **CPU shares** - CPU shares are automatically set to 100
- **Swap disk size** - swap disk size can have the size of 1/2/3 GB. Its size is calculated by multiplying the RAM by two.
- **IP address** - the first available IP address is selected. One IP address is assigned to the preconfigured VS for free.
- **Port speed** - depends on the billing plan limit. If the port speed Max limit in the billing plan is set to unlimited, the port speed in the instance type will also be set to unlimited. If the port speed Max limit in the billing plan is set to a certain value, the port speed in the instance type will be set to that same value.

When you build a VS using an instance type, certain billing plan limits will not apply to that VS:

- Data read/written and input/output requests are not billed for disks of preconfigured VSs. The VSs disk size will be defined by the disk size indicated in the selected instance type.
- The Limits & Prices for Network Zones will only apply to the VSs that overuse the bandwidth limit set in the selected instance type. A free IP address is assigned to the VS. The VSs port speed, data sent and data received are not billed until the VS overuses the instance type's bandwidth limit. After that, the data the VS sends and receives will be billed according to the Price over free units cost.

For more information, refer to the Billing for Instance Types section.

### Assign Users to Billing Plan

Assigning a new user to a billing plan takes place on the Add New User screen, as part of the user creation process:

1. Go to your Control Panel's Users and Groups menu.
2. Click the Create User button.
3. Fill in the required details and click Next.
4. On the screen that appears, select a billing plan for the user from the billing plan drop-down menu.
5. Complete the other user detail fields, and click the Save button.

### Edit User Billing Plan

Changing a user's billing plan takes place on the Edit User screen:

1. Go to your Control Panel's Users and Groups menu.
2. Click the Actions button next to the user in question, then click Edit.
3. Select a billing plan for the user from the billing plan drop-down menu.
4. Click the Save button.

Editing a billing plan that is associated with more than one user will affect all users attached to it. If you wish to only affect that user then copy the billing plan and associate it only with the single user.

### Copy Billing Plan

To copy a billing plan:

1. Go to your Control Panel's Billing Plans menu. The screen that appears will show all the billing plans currently set up on the cloud.
2. Click the Actions icon next to a required billing plan, then click Copy.

### Delete Billing Plan

To delete a billing plan:

1. Go to your Control Panel's Billing Plans menu. The screen that appears will show all the billing plans currently set up on the cloud.
2. Click the Delete icon next to a billing plan to remove it from the system. You'll be asked for confirmation before the plan is removed.

Deleting a billing plan that is associated with more than one user will affect all users attached to it. If you wish to only affect that user then copy the billing plan and associate it only with the single user.

### Instance Types

Instance types are preconfigured CPU/RAM/Disk/Bandwidth packages that can be selected during the VS creation process. You can add multiple instance types specifying different values for the parameters to suit your customer's needs. Resources that are not set when creating an instance type, such as, for example, swap disk size, are calculated automatically.
Instance types make it easier for users to create virtual servers. The users simply need to select one of the instance types available to them in the wizard. However, it is still possible to set the VS resources manually if required. Instance types apply only to virtual servers created on KVM or Xen compute resources.

To provide your users with the ability to choose VS resources from the predefined instance type(s), add the necessary types to the users' billing plan(s). After that, instance types will appear in the server creation wizard, on the Resources step.

For more info on how to configure instance types in your cloud, refer to Set up Instance Types for Cloud.

View Instance Types

The Instance Types page shows the list of all instance types in your cloud with their details. To view the list instance types:

1. Go to your Control Panel's Instance Types menu.
2. The screen that appears, shows the list of all instance types and their details:
   - Label - the name of the instance type
   - CPUs - the number of CPU cores available in this instance type
   - Memory - the RAM size (GB) available in the instance type
   - Disk Size - the disk size available in this instance type
   - Bandwidth - the bandwidth available in this instance type
   - Associated Billing Plans - the number of billing plan(s) which use this instance type. Click the number next to the instance type you are interested in to view the details of the billing plans associated with it.
   - Actions - click the Actions button to either edit or delete the instance type
3. Click the label of an instance type to view its details:
   - Label - the name of the instance type
   - CPUs - the number of CPU cores available in this instance type
   - Memory - the RAM size (GB) available in the instance type
   - Disk Size - the disk size available in this instance type
   - Bandwidth - the bandwidth available in this instance type
   - Associated Billing Plans - the labels of billing plan(s) in which this instance type is used. Click the label of billing plan to view it.
   - Associate Virtual Servers - the number of preconfigured virtual servers that were created using this instance type. Click this number to view the details of the VSs associated with this instance type.

Set up Instance Types for Cloud

To enable your users to create virtual servers using instance types, you need to perform the following configurations:

- Enable the instance types permission
- Add instance type(s) to your cloud
- Add the instance type(s) to the users' billing plan
- Interface configuration
- Build virtual server using instance types

Enable the instance types permission

In OnApp, there are two permissions that control how resources are selected during virtual server creation: Select resources manually on virtual server creation and Select instance type on virtual server creation. You can enable one or both of these permissions for your users. By default, users with the role User have the Select resources manually on virtual server creation enabled. If you want your users to be able to select instance types during virtual server creation, you need to enable the Select instance type on virtual server creation permission. Depending on the permissions, the Resources step of the virtual server creation wizard can be different:

- If both the Select resources manually on virtual server creation and Select instance type on virtual server creation permissions are enabled, the user will be able to choose whether to create a VS using an instance type or by setting resources manually.
- If you disable the Select resources manually on virtual server permission and enable the Select instance type on virtual server creation permission, the user will be able to select VS resources only from the instance type(s) available to that user.
- If you disable the Select instance type on virtual server creation permission and enable the Select resources manually on virtual server permission, the user will only be able to select resources manually.

If you are adding a custom role, make sure to enable either the Select resources manually on virtual server creation or the Select instance type on virtual server creation permission, or both if required. If the user does not have any of these permissions enabled, they will not be able to create virtual servers.

For the list of OnApp permissions, refer to the Permissions List section.

Add instance types to your cloud

After you enable the necessary permissions for your user(s), you need to add instance types to your cloud. When you add a new instance type,
you set CPU/RAM/Disk/Bandwidth. You can add multiple instance types to provide your customers with a number of predefined packages to choose from. Resources that are not set when creating an instance type are calculated automatically.

To create an instance type:

1. Go to your Control Panel’s **Instance Types** menu.
2. The screen that appears, shows the list of all instance types. Click the “+” button at the top of the screen.
3. Complete the form on the screen that follows:
   - **Label** - fill in the name of the instance type.
   - **CPUs** - move the slider to set the number of CPU cores available in the instance type. The maximum CPUs value is 8.
   - **Memory** - move the slider to set the RAM size available in the instance type. The maximum value is 16384 MB by default.
   - **Disk Size** - move the slider to set the Disk size available in the instance type. The maximum value is 100 GB by default. The maximum disk size cannot be larger than the largest data store size in your cloud.
   - **Bandwidth** - move the slider to set the bandwidth available in the instance type. The maximum value is 450 GB by default.
   
   If the user exhausts the bandwidth limit, the resources he overuses will be calculated according to the billing plan’s price over free units in the **Limits & Pricing for Network Zones** section.

   You can change the default minimum and/or maximum values for memory, disk size and bandwidth by adding the following parameters to the config/on_app.yml file and restarting OnApp services:
   - `instance_type_min_disk_size` (GB)
   - `instance_type_max_disk_size` (GB)
   - `instance_type_max_memory` (MB)
   - `instance_type_min_bandwidth` (GB)

4. Click **Save** to finish.

### How are other VS resources calculated?

The following resources are set automatically for instance types:

- **CPU Priority** - CPU priority is automatically set to 100
- **CPU Shares** - CPU shares are automatically set to 100
- **Swap disk size** - swap disk size can have the size of 1/2/3 GB. Its size is calculated by multiplying the RAM by two. If the calculated value is larger than three, the swap disk size is set to 3. If the calculated value is smaller than three, it is rounded to the closest value from the 1/2/3 range that is larger than the calculated size. If the calculated value is larger than the disk size set for the instance type, the swap disk is not added to the VS.
- **IP address** - the first available IP address is selected
- **Port speed** - depends on the billing plan limit. If the port speed Max limit in the billing plan is set to unlimited, the port speed in the instance type will also be set to *unlimited*. If the port speed Max limit in the billing plan is set to a certain value, the port speed in the instance type will be set to that same value.

### Add the instance type(s) to the users' billing plan

Once you created the instance types, they can be added to billing plan(s). This step is required to bundle the instance types with the specific compute/data store/network zones. To add limits for instance types:

1. Go to the **Billing Plans** list and click the label of the billing plan to which you want to add instance or create a new billing plan.
2. Click the “+” button in the upper right corner of the **Limits for Instance types** box.
3. In the window that pops up, select the target instance type and the compute zone(s), data store zone(s) and network zone(s) to which the instance type will apply. Click **Add Resource**.

Instance types apply only to Xen and KVM compute zones. If you select a vCloud or VMware compute zone, the instance type will not be displayed in the virtual server creation wizard.

If you do not select any compute/data store/network zones, the instance type will apply to all compute/data store/network zones available for the user.

It is advisable that you limit the user's billing plan by the compute zones that have enough resources to support the instance type(s) you add to the user's billing plan. If the user selects a compute zone that does not have enough resources during virtual server creation, they will see all instance types available to them, but those that have resources incompatible with the chosen compute zone will be greyed out. Greyed out instance types cannot be selected.

If required, you can edit the zones to which the instance type applies:

1. Go to the **Billing Plans** list and click the label of the billing plan you are interested in.
2. Click the **Actions** button next to the instance type you are interested in and select **Edit**.
3. In the window that pops up, edit the compute resource/data store/network zone(s) and click **Update**.
If there is a VS created on a compute/data store/network zone which you remove while editing the billing plan, the VS will still be billed according to the instance type.

Also, you can delete instance types from the billing plan:

1. Go to the Billing Plans list and click the label of the billing plan you are interested in.
2. Click the Actions button next to the instance type you want to remove and select Delete. You will be asked for confirmation before the instance type is removed from the billing plan.

You cannot delete the Instance types that are used for existing VSs.

After you add instance types to the user's billing plan, they will be available in the virtual server creation wizard at the Resources step.

Interface configuration

After you add instance types to the user's billing plan, you can configure how instance types will be displayed in the virtual server creation wizard. This step is optional.

Instance types can be displayed either in card or list view. Displaying instance types in card view is convenient if there is one or several instance types available to the user.

However, if the user can choose among a large number of instance types, it is more convenient to view instance types in list view.
To change the layout of instance types in the virtual server creation wizard:

1. Go to your Control Panel's **Settings** menu, and click the **Configuration** icon.
2. The page that loads is the **System** tab. At the bottom of this page, set the **Instance Types number** parameter. The default value is 3.
3. Click **Save Configuration**.

**Build Virtual Server Using Instance Types**

Once you perform the above configurations, instance types can be selected during virtual server creation.

Depending on the permissions, on the **Resources** step, users will be able to select an instance type, set resources manually or choose one of these options. Instance types are selected at the Instance Types tab of the Resources step.

If the user selects a compute zone that does not have enough resources during virtual server creation, they will see all instance types available to them, but those that have resources incompatible with the chosen compute zone will be greyed out. Greyed out instance types cannot be selected.
From this tab, you can choose one of the predefined instance types for your virtual server. For each of the instance types the following details are displayed:

- **Memory** - the RAM size (GB) available in the instance type
- **CPUs** - the number of CPU cores available in this instance type
- **Disk Size** - the disk size available in this instance type
- **Bandwidth** - the bandwidth available in this instance type
- **Price per Hour**:
  - **Mode ON** - hourly instance type price for the VS powered on
  - **Mode OFF** - hourly instance type price for the VS powered off
- **Price per Month**:
  - **Mode ON** - monthly instance type price for the VS powered on
  - **Mode OFF** - monthly instance type price for the VS powered on

Click the instance type to select it. After that, the instance type you have chosen will be highlighted in green.

Click **Next** to proceed to the following step of the wizard.

You are forwarded to the next step from the tab you are currently on. If you select an instance type and then click the **Create Your Own** tab (where you set the resources manually) and proceed to the next step, the system will set the resources from the **Create Your Own** tab even if you did not configure any resources there.

Virtual servers created using instance types do not support autoscaling.

The virtual servers you create using the **Instance Types** tab will be billed according to one of your preconfigured instance types.

### Billing for Instance Types

A VS built using instance types is billed differently than VSs built by configuring resources manually. To set up billing for instance types you need to perform two steps:

1. Add an instance type to your cloud and select the quantity of resources available to a VS built using it.
2. Add the instance type to the billing plan and set the price the preconfigured VS will be charged.

### Add instance types to your cloud

To set up billing for instance types, at first configure the amount of resources available in the package at the **Instance Types > Create Instance Type** menu. The users who build a VS applying that instance type will be limited to:

- **CPUs** - the number of CPU cores available in the instance type. The maximum CPUs value is 8.
- **Memory** - the RAM size (GB) available in the instance type. The maximum value is 16384 MB by default.
- **Disk Size** - the disk size available in the instance type. The maximum value is 100 GB by default. The maximum disk size cannot be larger than the largest data store size in your cloud.
- **Bandwidth** - the bandwidth available in the instance type. The maximum value is 450 GB by default.

You can change the default minimum and/or maximum values for memory, disk size and bandwidth by adding the following parameters to the config/on_app.yml file and restarting OnApp services:

- `instance_type_min_disk_size` (GB)
- `instance_type_max_disk_size` (GB)
- `instance_type_max_memory` (MB)
- `instance_type_min_bandwidth` (GB)

### Add instance types to the billing plan

After you create instance types in your cloud you need to add them to the billing plan. There you set the price that will be charged per VS powered on/off for each appropriate instance type.

There are also a number of VS resources that are not set up during instance type creation but are configured automatically, or differ from standard procedure:

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Resource</th>
<th>Default Value</th>
<th>Additional Information</th>
</tr>
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<tbody>
<tr>
<td>Limits for</td>
<td>CPU Priority</td>
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<td>CPU priority is automatically set to 100.</td>
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<tr>
<td><strong>Compute Zones</strong></td>
<td><strong>Limits for Data Store Zones</strong></td>
<td><strong>Limits for Network Zones</strong></td>
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<td>Max limits for data store</td>
<td>One IP address is assigned</td>
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### Edit Instance Type

You can edit all the resources set for an instance type.

To edit an instance type:

1. Go to your Control Panel's **Instance Types** menu.
2. The screen that appears, shows the list of all instance types. Click the **Actions** button next the instance type you are interested in and select **Edit**.

Only those instance types that are not used in a billing plan and during VS creation can be edited. If you try to edit an instance type that is used an error message will appear.
3. On the page that loads, you can edit the following details:
   - **Label** - edit the name of the instance type.
   - **CPUs** - move the slider to set the number of CPU cores available in the instance type. The maximum CPUs value is 8.
   - **Memory** - move the slider to set the RAM size (MB) available in the instance type. The maximum value is 16384 MB by default.
   - **Disk Size** - move the slider to set the Disk size (GB) available in the instance type. The maximum value is 100 GB by default.
   - **Bandwidth** - move the slider to set the bandwidth (GB) available in the instance type. The maximum value is 450 GB by default.

4. Click **Save** to finish.

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You can change the default minimum and/or maximum values for memory, disk size and bandwidth by adding the following parameters to the config/on_app.yml file and restarting OnApp services:

- `instance_type_min_disk_size` (GB)
- `instance_type_max_disk_size` (GB)
- `instance_type_max_memory` (MB)
- `instance_type_min_bandwidth` (GB)

---

**Delete Instance Type**

To edit an instance type:

1. Go to your Control Panel's **Instance Types** menu.
2. The screen that appears, show the list of all instance types. Click the **Actions** button next the instance type you are interested in and select **Delete**. You will be asked for confirmation before the instance type is removed.

   Only those instance types that are not used in a billing plan and during VS creation can be deleted. If you try to delete an instance type that is used an error message will appear.

---

**Compute Resource Settings**

The Control Panel's Compute resource Settings menu is where you get detailed control over low-level cloud settings for Compute resources, Compute zones and location groups.

**Compute Resource Settings.**

Compute resources are a critical part of the cloud. You should only change Compute resource settings if you are confident about what settings you want to change and how to configure them.

**Create Compute Resource**

You can add more physical Compute resources at any time. To add a Compute resource:

1. Go to your Control Panel **Settings** menu.
2. Click the **Compute resources** icon.
3. Press "+" button or click the **Add a new Compute resource** button underneath the list of Compute resources on the screen.
4. On the screen that appears:
   - **Label** - enter a Compute resource label.
   - **IP Address** - add an IP address.
   - **Compute resource Type** - choose a Compute resource type (Xen, KVM, vCloud or VMware).

   For instructions on creating a VMware Compute resource, refer to vCenter Implementation Guide.

   For instructions on creating a vCloud Compute resource, refer to OnApp and vCloud Director Configuration Guide.

   - **Backups IP address** - add a backup IP address.
   - **CPU Units** - adjust the slider to set the desired amount of CPU units for this Compute resource. For more info on CPU units, refer to Billing Calculation.

   Do not apply CPU Units for KVM Compute resources running on CentOS5 and baremetal servers.

   - **Enabled** - move the slider to the right to enable a Compute resource. Compute resources that are not enabled cannot be used to host VSs.
   - **Collect Stats** - move the slider to the right to collect statistics for this Compute resource.
   - **Disable Failover** - move the slider to the right to disable failover on this Compute resource (failover is automatic VS migration to
another Compute resource if this one goes down).

- **Power Cycle command** - arbitrary command string to be executed by IPMI from the CP server. If the command is entered, a new option "Power Cycle Compute resource" - which will execute the entered command will appear in Tools menu at Settings > Compute resources > Compute resource page.

Currently, a command or commands should be written in one line separated with semicolon. If the command(s) is written in two lines you will receive a "fail" response, although the transaction will be performed. The power cycle command is executed on Control Panel under user onapp, this may be any script created in bash.

5. Click the **Save** button. The Compute resource will be added to the system. You can view it under the **Compute resources** menu. Click the **Back** button to return to the **Compute resource Settings** page.

For details how to create a CloudBoot Compute resource, refer to the Create CloudBoot Compute Resource section.

**Create CloudBoot Compute Resource**

To create a CloudBoot Compute resource, follow the instructions below:

1. To add a Compute resource you must first configure the IP range the Control Panel will assign to Compute resources, and then add specific Compute resources to the Control Panel itself.

2. Go to your Control Panel's **Settings** menu and click the **Compute resources** icon.

3. Click the **CloudBoot IPs** tab – this is where you add an IP address or range for the Compute resource management interfaces, which Compute resources will acquire via DHCP when they boot. It is recommended to locate Compute resources management interfaces on a separate subnet with a dedicated NIC on the CP server also attached. In this configuration, the management subnet can use private address space and does not need to be externally addressable.

4. Next, power on your Compute resources. As they boot, the Control Panel will detect and record their MAC addresses.

   - Click the **New IP Address** button. On the page that loads, fill in the following information:
     - **IP Address** - enter a single address or a range of addresses to be used by the PXE server- e.g. 192.168.1.100-192.168.1.200 (see the note below).
     - **Netmask** - enter a netmask.
     - **Gateway** - enter a default gateway address (see the note below).
   - Click the **Submit** button to finish.

   The dynamic range should be quite a bit larger than the actual IPs that will get assigned. This allows space for reassigning new nodes that come online, without creating address collisions.

   Compute resource management interfaces must be on the same subnet as the Control Panel server, and addresses must be valid for that addressable subnet. The Compute resource management interface must also have PXE boot enabled.

   Once the Compute resources are online and detected, you can add them to the Control Panel:
     - Go to your Control Panel's **Settings** menu.
     - Click the **Compute resources** icon.
     - Click the **Add a new CloudBoot Compute resource** button at the bottom of the screen.
     - On the next screen choose a Compute resource MAC from the drop-down list and click **Next**.
     - Complete the form that appears:

   **Compute resource properties.**

   - **Label** - give the Compute resource a name.
   - **PXE IP address** - select an IP address for this Compute resource from the address pool available – see step 2.
   - **Compute resource type** - choose Xen or KVM (Note that VMware is not available as a CloudBoot option).
   - **Server type** - specify the type of servers that will be deployed on this Compute resource:
     - **virtual** - select the virtual server type if this Compute resource will be used for virtual servers deployment.
     - **smart** - specify the smart server type if this Compute resource will be used for smart server deployment. You can only deploy smart servers on KVM CloudBoot Compute resources.
     - **baremetal** - specify the baremetal server type if this Compute resource will be used for baremetal server deployment.
     - You can only deploy baremetal servers on Xen CloudBoot Compute resources.
   - **Backup** - move this slider to the right to use this CloudBoot Compute resource as a backup/transaction server. OnApp Storage cannot be provisioned if this option is selected. Refer to the Create CloudBoot Backup Server section for details.
   - **Backup IP address** - add a provisioning network IP address.
   - **Enabled** - move the slider to the right to allow VSs to be installed/booted on this Compute resource.
   - **Collect stats** - move the slider to the right to collect statistics for this Compute resource.
   - **Disable failover** - move the slider to the right to disable VS migration to another Compute resource if this Compute resource is marked as offline by the Control Panel server.
Storage disks
Skip these parameters if you are creating a Compute resource that will be used as a backup server.

- **Format disks** - check this to initialize all disks on the Compute resource. Leave unchecked to preserve disk content (e.g. if you switch a Compute resource from Xen to KVM, but want to preserve the existing virtual disks).
- **Passthrough all disks** (Xen) - select this for Xen Compute resources to pass through disks to the storage controller, however on KVM you can select a subset (see next option).

The following options are relevant to the integrated storage platform:

### Storage NICs
For each Compute resource NIC, you can use one of the following options:

- **Unassigned** - leave the NIC unused.
- **SAN subnet** - select this option to use this interface for storage network. In this case, NIC interface will be bonded with virtual network interface of the Storage Controller Server.
- **Passthrough to storage** - this option is available for Xen CloudBoot Compute resources. The network interface will be added to the Storage Controller Server without the bond and the Storage Controller Server will have the complete control over this interface.
- **Passthrough to Guest** - this option is available for smart CloudBoot Compute resources. The network interface will be added to the smart server.

### Storage PCI devices

- **Passthrough custom PCI devices** - if network interfaces are available but are not detected by the Control Panel, check this box to display all PCI devices available on the Compute resource. You can then choose specific devices to pass through to the storage controller.

### Advanced

Move the **Show advanced settings** slider to the right to specify advanced Compute resource settings:

- **MTU** - specify the maximum transportation unit size. You can set the frame size from 1500 to 9000 bytes.

The maximum transportation unit (MTU) is the maximum size of a unit that can be transmitted transferred via ethernet traffic. Any data that exceed the specified MTU value will be divided into smaller units before being transferred. Utilization of jumbo frames allows you to reduce increase throughput and increase CPU utilization during large size file transfers.

- **Storage controller RAM** - specify the storage controller RAM value (minimum 640 MB).
- **Drives per controller** - specify the number of disks per controller virtual server. You can specify from 1 to 4 disks. By default, the controller virtual server is created per 4 disk drives.
- **Allow unsafe assigned interrupts** - this parameter is for Smart CloudBoot Compute resources only. Move this slider to the right to allow/restrict unsafe assigned interrupts. This parameter is enabled automatically during the smart CloudBoot Compute resource creation if the Compute resource does not support interrupt remapping.
- **CloudBoot OS** - select the required Compute resource OS type from the drop down box - CentOS5 or CentOS6. Note that CentOS6 support for Xen is currently in experimental mode.
- **Custom config** - specify any custom commands you want to run when Compute resource is booted.

Centos now defaults to NFSv4. This is known to cause compatibility issues so we strongly recommend that you use NFSv3 for all mounts. This can be done by passing `-t nfs -o vers=3` in any mount commands.

We strongly recommend that you recheck if custom config doesn't break any functionality. So before putting in production, the server with changed custom config should be rebooted, and the server behaviour rechecked. We recommend to perform the Storage Health Check and Network Health Check.

- **Power Cycle command** - arbitrary command string to be executed by IPMI from the CP server. If the command is entered, a new option "Power Cycle Compute resource" - which will execute the entered command will appear in Tools menu at Settings > Compute resources > Compute resource page.

Currently, a command or commands should be written in one line separated with semicolon. If the command(s) is written in two lines you will receive a "fail" response, although the transaction will be performed.
5. Click the **Save** button to finish.

The Compute resource will automatically reboot and pick up the new configuration. This may take a few minutes. Once the reboot has completed, you should see the “active” light show up next to the Compute resource in the main **Settings -> Compute resources** screen. You do not need to power cycle the Compute resource manually – the Control Panel handles this remotely, and takes care of the configuration automatically.

### Delete Compute Resource

Compute resources can be removed from your cloud if required. A Compute resource cannot be removed until all of the virtual servers assigned to it are migrated to another Compute resource.

To remove a Compute resource:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon.
3. Click the **Actions** button next to the Compute resource you want to delete, then click **Delete**.

### Edit Baremetal CloudBoot Compute Resource

To edit a Baremetal CloudBoot Compute resource:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon.
3. Click the **Actions** button next to the CloudBoot Compute resource you want to edit, then click **Edit**.
4. On the screen that follows, change details as required:
   - **Label** - the Compute resource's name
   - **CPU units** - the amount of CPU units assigned to this Compute resource
   - **Enabled** - enable or disable the ability to install/boot virtual servers on this Compute resource
   - **custom config** - specify any custom commands you want to run when Compute resource is booted
   - **Power Cycle command** - arbitrary command string to be executed by IPMI from the CP server. If the command is entered, a new option "Power Cycle Compute resource" - which will execute the entered command will appear in Tools menu at **Settings > Compute resources > Compute resource** page.

Currently, a command or commands should be written in one line separated with semicolon. If the command(s) is written in two lines you will receive a "fail" response, although the transaction will be performed. The power cycle command is executed on Control Panel under user onapp, this may be any script created in bash.

5. Click the **Save** button to save your changes.

### Edit CloudBoot Compute Resource

To edit a CloudBoot Compute resource:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon.
3. Click the **Actions** button next to the CloudBoot Compute resource you want to edit, then click **Edit**.
4. On the screen that follows, change details as required:
   - **Properties**
     - **Label** - the Compute resource's name
     - **Backup IP address** - provisioning network IP address
     - **Enabled** - enable or disable the ability to install/boot virtual servers on this Compute resource
     - **Collect stats** - enable or disable the ability to collect statistics for this Compute resource
     - **Disable failover** - enable or disable the VS migration to another Compute resource if this Compute resource is marked as offline by the Control Panel server.
   - **Storage disks**
     - Move the slider next to the available disk to the right to select it for this Compute resource.
   - **Storage NICs**
     - For each Compute resource NIC, you can use one of the following options:
- **Unassigned** - leave the NIC unused.
- **SAN subnet** - select this option to use this interface for storage network. In this case, NIC interface will be bonded with virtual network interface of the Storage Controller Server.
- **Passthrough to storage** - this option is available for Xen CloudBoot Compute resources. The network interface will be added to the Storage Controller Server without the bond and the Storage Controller Server will have the complete control over this interface.
- **Passthrough to Guest** - this option is available for smart CloudBoot Compute resources. The network interface will be added to the smart server.

Please note, that using more than one NIC for SAN subnet requires switch support. Please ensure that your network infrastructure supports the utilized NIC bonding and is configured correctly. By default, the utilized NICs bonding mode is round-robin which requires grouping appropriate ports together according to the section 5 Switch Configuration of Linux Ethernet Bonding Driver guide.

**Advanced**

Move the Advanced slider to the right to edit advanced Compute resource settings:

- **MTU** - specify the maximum transportation unit size. You can set the frame size from 1500 to 9000 bytes.

The maximum transportation unit (MTU) is the maximum size of a unit that can be transmitted transferred via ethernet traffic. Any data that exceed the specified MTU value will be divided into smaller units before being transferred. Utilization of jumbo frames allows you to reduce increase throughput and increase CPU utilization during large size file transfers.

- **Storage controller RAM** - specify the storage controller RAM value (minimum 640 MB).
- **Drives per controller** - specify the number of disks per controller virtual server. You can specify from 1 to 4 disks. By default, the controller virtual server is created per 4 disk drives
- **custom config** - specify any custom commands you want to run when Compute resource is booted.
- **Power Cycle Command** - arbitrary command string to be executed by IPMI from the CP server. If the command is entered, a new option "Power Cycle Compute resource" - which will execute the entered command will appear in Tools menu at Settings > Compute resources > Compute resource page.

Currently, a command or commands should be written in one line separated with semicolon. If the command(s) is written in two lines you will receive a "fail" response, although the transaction will be performed. The power cycle command is executed on Control Panel under user onapp, this may be any script created in bash.

5. Click the **Save** button to save your changes.

**Edit Smart CloudBoot Compute Resource**

To edit a CloudBoot Compute resource:

1. Go to your Control Panel's Settings menu.
2. Click the **Compute resources** icon.
3. Click the **Actions** button next to the CloudBoot Compute resource you want to edit, then click **Edit**.
4. On the screen that follows, change details as required:

**Properties**

- **Label** - the Compute resource's name
- **Backup IP address** - provisioning network IP address
- **CPU units** - the amount of CPU units assigned to this Compute resource
- **Enabled** - enable or disable the ability to install/boot virtual servers on this Compute resource
- **Collect stats** - enable or disable the ability to collect statistics for this Compute resource
- **Disable failover** - enable or disable the ability to migrate to another Compute resource if this Compute resource is marked as offline by the Control Panel server.

**Storage disks**

- Move the slider next to the available disk to the right to select it for this Compute resource.

**Storage NICs**

For each Compute resource NIC, you can use one of the following options:
4.

- **Unassigned** - leave the NIC unused.
- **SAN subnet** - select this option to use this interface for storage network. In this case, NIC interface will be bonded with virtual network interface of the Storage Controller Server.
- **Passthrough to storage** - this option is available for Xen CloudBoot Compute resources. The network interface will be added to the Storage Controller Server without the bond and the Storage Controller Server will have the complete control over this interface.
- **Passthrough to Guest** - this option is available for smart CloudBoot Compute resources. The network interface will be added to the smart server.

### Advanced

Move the Advanced slider to the right to edit advanced Compute resource settings:

- **MTU** - specify the maximum transportation unit size. You can set the frame size from 1500 to 9000 bytes.

The maximum transportation unit (MTU) is the maximum size of a unit that can be transmitted transferred via ethernet traffic. Any data that exceed the specified MTU value will be divided into smaller units before being transferred. Utilization of jumbo frames allows you to reduce increase throughput and increase CPU utilization during large size file transfers.

- **Storage controller RAM** - specify the storage controller RAM value (minimum 640 MB).
- **Drives per controller** - specify the number of disks per controller virtual server. You can specify from 1 to 4 disks. By default, the controller virtual server is created per 4 disk drives.
- **Allow unsafe assigned interrupts** - move this slider to the right to allow/restrict unsafe assigned interrupts. This parameter is enabled automatically during the smart CloudBoot Compute resource creation if the Compute resource does not support interrupt remapping.
- **custom config** - specify any custom commands you want to run when Compute resource is booted.

#### Power Cycle Command

- **Power Cycle Command** - arbitrary command string to be executed by IPMI from the CP server. If the command is entered, a new option "Power Cycle Compute resource" - which will execute the entered command will appear in Tools menu at Settings > Compute resources > Compute resource page.

Currently, a command or commands should be written in one line separated with semicolon. If the command(s) is written in two lines you will receive a "fail" response, although the transaction will be performed. The power cycle command is executed on Control Panel under user onapp, this may be any script created in bash.

5. Click the **Save** button to save your changes.

### Edit Xen/KVM Compute Resource

To edit a Xen or KVM Compute resource:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Compute resources** icon.
3. Click the **Actions** button next to the Compute resource you want to edit, then click **Edit**.
4. On the screen that follows, change details as required:
   - **Label** - the Compute resource's name
   - **IP Address** - IP address of the Compute resource
   - **Compute resource Type** - Compute resource type (Xen, KVM)
   - **Backup IP address** - provisioning network IP address
   - **CPU units** - change the amount of CPU units assigned to this Compute resource.
   - **Enabled** - enable or disable the ability to install/boot virtual servers on this Compute resource
   - **Collect Stats** - enable or disable the ability to collect statistics for this Compute resource
   - **Disable failover** - enable or disable the VS migration to another Compute resource if this Compute resource is marked as offline by the Control panel server.

#### Power Cycle Command

- **Power Cycle Command** - arbitrary command string to be executed by IPMI from the CP server. If the command is entered, a new option "Power Cycle Compute resource" - which will execute the entered command will appear in Tools menu at Settings > Compute resources > Compute resource page.

Currently, a command or commands should be written in one line separated with semicolon. If the command(s) is written in two lines you will receive a "fail" response, although the transaction will be performed. The power cycle command is executed on Control Panel under user onapp, this may be any script created in bash.

5. Click the **Save** button to save your changes.
Manage Compute Resource Data Stores

Data stores can easily be attached and removed from Compute resources. This association between a Compute resource and a data store is called a data store join.

To add/remove data store joins:

1. Go to your Control Panel's Settings menu and click the Compute resources icon.
2. Click the label of the Compute resource you want to manage data stores for.
3. On the screen that appears, click the Tools button, then click Manage Data Stores.
4. On the screen that follows, you'll see a list of all data stores currently associated with this Compute resource.

To remove a data store join, click the Delete icon next to it. You'll be asked for confirmation before the store is removed.

To add a new data store join, choose a data store from the drop-down menu and click the Add Data Store button.

Manage Compute Resource Networks

Networks can easily be attached and removed from Compute resources. This association between a Compute resource and a network is called a network join.

To add/remove network joins:

1. Go to your Control Panel's Settings menu and click the Compute resources icon.
2. Click the label of the Compute resource you want to manage networks for.
3. On the screen that appears, click the Tools button, then click Manage Networks.
4. On the screen that follows, you'll see a list of all networks currently associated with this Compute resource.

To remove a network join, click the Delete icon next to it. You'll be asked for confirmation before the network is removed.

To add a new network join, choose a network from the drop-down menu, enter its interface name (eth0, eth1) and click the Add Network button.

View Compute Resource Settings

To view Compute resource settings:

1. Go to your Control Panel Settings menu.
2. Click the Compute resources icon.
3. On the screen that appears, you will see the list of all Compute resources in the cloud along with their details:

   - **Label** - the name of the Compute resource
   - **IP Address** - the IP address of the Compute resource
   - **Enabled** - Compute resource power status
   - **CPU Cores** - number of CPU cores
   - **RAM** - total/free RAM
   - **Features** - , where the first icon shows Compute resource's failover status, the second one - statistics collection, the third one - CloudBoot status and the fourth one - backup.

To view a particular Compute resource details, click the label of a required Compute resource.

To edit or delete a Compute resource, click the Actions button next to the Compute resource, then select the required action.

Compute Zones Settings

Compute zones can be used to create different tiers of service - for example, by setting up different zones for high-performance Compute resource servers, with different prices for virtual servers deployed on that zone. Compute zones can have data stores and networks attached to them. The combination of Compute resource, data store and network groups can be used to create private clouds for customers.

If there is only one Compute resource located in the Compute zone, it will not be marked as offline during the management network failure. This in an expected OnApp behavior.

Create Compute Zone

Follow the below procedure to create a Compute Zone for any type of Compute resources apart from VMware. To create a Compute Zone for VMware Compute resources, please, refer to Create VMware Compute Zone.
To create a new Compute zone:

1. Go to your Control Panel's Settings menu and click the ComputeZones icon.
2. Press "+" or click the Add New Compute Zone button.
3. On the screen that follows:

   a. **Label** - give your Compute zone a name.
   b. **Provider name** - enter the provider name that will appear in the list of zones in Federation. This field is relevant only to federated zones.
   c. **Server type** - choose the server type from the drop-down box:
      - Choose the virtual server type to create a Xen, KVM, or CloudBoot zone
      - Choose the smart server type to create a smart server zone.
      - Choose the baremetal server type to create a baremetal server zone.
   d. **Location group** - select the location group to which this Compute zone will be assigned.
   e. **Release resource type** - this option allows you to free up the Compute resource resources and over-commit RAM, CPU and CPU shares by means of the virtual servers that are shut down. By default, the Compute zone is created with the Memory Guarantee option enabled. In this case the over-committing cannot be used. To enable resource releasing, choose either the Ballooning or Only Started VS option.
      - **Memory guarantee** - the actual free Compute resource memory is calculated. All virtual servers residing on the Compute resource will be able to start.
      - **Ballooning (KVM Compute resources only)** - free Compute resource memory is calculated with the ability to use memory over-committing.

   A virtual server may be migrated to another Compute resource if there is not enough memory for it to start up on the Compute resource with the ballooning option enabled. Do not use the ballooning option if there is at least one edge or storage server within the Compute zone.

   - **Only started VS** - only the memory of running virtual servers is calculated.
   f. **Max VS to start at once** - specify the maximum number of virtual servers that can be started simultaneously on this Compute resource (5 recommended). This option ensures that virtual servers with VIP status will be booted prior to other servers.
   g. **Placement type** - specify the Compute resource selection algorithm, which will be used on virtual server provisioning and recovery, per Compute zone:
      - **Take HV with maximum free RAM (Sparse)** - set this type to select the Compute resource with maximum free RAM during the VS recovery. This option allows you to perform faster migration of virtual servers with the lesser (sparse) number of iterations during the failover.

   This option behaves in different ways, depending on the event:
   - On provisioning, the round-robin algorithm will be used on Compute resource selection.
   - On recovery, the Compute resource with maximum free RAM will be selected.

   g. **Take HV with minimum free RAM (Dense)** - with this type the system selects the Compute resource with minimum required free RAM. This option allows filling Compute resource as densely as possible before starting to use next Compute resource in the zone.
   h. **Failover timeout** - time period for which the iterations will run during the failover if the Compute resource does not respond.
   i. **CPU units** - set the number of CPU units which will be assigned to each Compute resource in this zone by default. Do not apply CPU Units for the zones which have KVM Compute resources running on CentOS5 and baremetal servers.
   j. **CPU guarantee** - move the slider to the right to ensure there is enough CPU on the Compute zone to create a new VS
   k. **Use Local Read Path** - move the slider to the right to minimize the network throughput dependency for read heavy workloads. When the Use Local Read Path option is enabled, reads go over the local software bridge to a local replica of the data rather than traverse a physical NIC + switch.
   l. **Run Sysprep** - move the slider to enable Windows virtual server deployment without running sysprep. If there are several simple deployed virtual servers from the same template in the cloud, they will have identical SIDS. This will result in the system conflict.

   It is not possible to set VS password when creating a Windows-based VMware virtual server without running a sysprep.

4. Click the Save button.

**View Compute Zones**

To view Compute zones:

1. Go to your Control Panel's Settings menu and click the Compute Zones icon.
2. The screen that appears will show all zones currently set up in the cloud along with the following details:
   - **Label** - Compute zone's name
   - **Zone type** - type of the zone: Compute resource, smart or baremetal
   - **Location group** - the location group to which the Compute zone is assigned
To view the list of Compute zones via the Control Panel menu, click the **Compute resources** menu in the left pane.

3. To **view a particular Compute zone details**, click the label of a required zone.

### View Compute Zone Details

To view details of a Compute zone:

1. Go to your Control Panel’s **Settings** menu and click the **Compute Zones** icon.
2. Click the label of the zone you’re interested in. The screen that follows shows details of that zone:

   - **Label** - Compute zone’s name.
   - **Location group** - location group where this zone is located.
   - **Max VS to start at once** - the maximum number of VSs which can run simultaneously in this zone.
   - **Placement type** - the Compute resource selection algorithm, which will be used on virtual server provisioning and recovery.
   - **Failover timeout** - time period for which the iterations will run during the failover if the Compute resource does not respond.
   - **Release resource type** - this option is set to free up the Compute resource resources and over-commit RAM, CPU and CPU shares by means of the virtual servers that are shut down.
   - **Assigned Compute resources** - the list of Compute resources assigned to the zone.
   - **Unassigned Compute resources** - the list of Compute resources in the cloud that are not assigned to the zone.

### Add Compute Resource to Compute Zone

To add a Compute resource to a zone:

1. Go to your Control Panel’s **Settings** menu and click the **Compute Zones** icon.
2. Click the label of the zone you want to add a Compute resource to. The screen that appears will show you all Compute resources in the cloud, organized into two lists – those assigned to the zone already, and those that are unassigned.
3. In the unassigned list, find the Compute resource you want to add to the zone and click the **Actions** button next to it, then click **Add**.

We strongly recommend that you avoid creating mixed Compute zones:

- do not add CloudBoot and static boot Compute resources to one Compute zone
- do not add both XEN and KVM Compute resources to one zone

The reason is that XEN VSs cannot migrate/failover to a KVM Compute resource and KVM VSs cannot migrate/failover to a XEN Compute resource.

### Remove Compute Resource from Compute Zone

To remove a Compute resource from a zone:

1. Go to your Control Panel’s **Settings** menu and click the **Compute Zones** icon.
2. Click the label of the zone you want to remove a Compute resource from. The screen that appears will show you all Compute resources in the cloud, organized into two lists – those assigned to the zone already, and those that are unassigned.
3. In the assigned list, find the Compute resource you want to remove and click the delete button (−) in the **Actions** section next to it.

You can only remove a Compute resource from a Compute zone if it currently hosts no virtual servers.

### Delete Compute Zone

To delete a Compute zone:

1. Go to your Control Panel’s **Settings** menu, and click the **Compute Zones** icon.
2. The screen that appears will show all zones currently set up in the cloud.
3. Click the **Actions** button next to the zone you want to remove, then choose **Delete** to remove it from the cloud. You will be asked to confirm the deletion.
Edit Compute Zone

To edit Compute zones:

1. Go to your Control Panel's **Settings** menu, and click the **Compute Zones** icon.
2. The screen that appears will show all zones currently set up in the cloud.
3. Click the **Actions** button next to the required Compute zone, then click **Edit**. You can edit the following Compute zone details:

   - **Label** - Compute zone’s name
   - **Location group** - location group to which the Compute zone is assigned. You can change the already set location if there are no virtual servers built on Compute resources of this zone.
   - **Release resource type** - Compute zone’s resource type. This option allows you to free up the Compute resource resources and over-commit RAM, CPU and CPU shares by means of the virtual servers that are shut down. By default, the Compute zone is created with the **Memory Guarantee** option enabled. In this case the over-committing cannot be used. To enable resource releasing, choose either the **Ballooning** or **Only Started VS** option.
     - **Memory guarantee** - the actual free Compute resource memory is calculated. All virtual servers residing on the Compute resource will be able to start.
     - **Ballooning (KVM Compute resources only)** - free Compute resource memory is calculated with the ability to use memory over-committing. Note: a virtual server may be migrated to another Compute resource if there is not enough memory for it to start up on the Compute resource with the ballooning option enabled.

   - **Only started VS** - only the memory of running virtual servers is calculated.

   - **Max VS to start at once** - the maximum number of virtual servers that can be started simultaneously on this Compute resource (5 recommended). This option ensures that virtual servers with VIP status will be booted prior to other servers.

   - **Placement type** - specify the Compute resource selection algorithm, that will be used on virtual server provisioning and recovery, per Compute zone:
     - **Take HV with maximum free RAM (Sparse)** - set this type to select the Compute resource with maximum free RAM during the VS recovery. This option allows performing faster migration of virtual servers with the lesser (sparse) number of iterations during the failover.
     - **Take HV with minimum free RAM (Dense)** - with this type the system selects the Compute resource with minimum required free RAM. This option allows filling Compute resource as densely as possible before starting to use next Compute resource in the zone.

   - **Failover timeout** - time period in minutes for which the iterations will run during the failover if the Compute resource does not respond.

   - **CPU Units** - edit the amount of CPU units assigned to each Compute resource in this zone by default.

   - **CPU guarantee** - move the slider to the right to ensure there is enough CPU on the Compute zone to create a new VS.

   - **Update Compute resource CPU units** - move the slider to apply the edited number of CPU units to all the Compute resources in this zone.

   - **Disable failover** - Compute resource failover means VS migration to another Compute resource if the Compute resource on which it is running goes offline.

When you assign Compute resource to the new Compute zone without any Compute resources, the disable failover zone’s parameter automatically takes the value of the Compute resource.

When all Compute resources within the zone have the same value, the Compute zone’s disable failover status will be the same, otherwise the Compute resources zone’s failover status will be set to disabled.

When you change the Compute zone’s disable failover value, this change will be applied to all Compute resources within this zone.
• Use local reads path - minimize the network throughput dependency for read heavy workloads. When the Use Local Read Path option is enabled, reads go over the local software bridge to a local replica of the data rather than traverse a physical NIC + switch.

• Run Sysprep - enable or disable Windows virtual server deployment without running sysprep.

It is not possible to set VS password when creating a Windows-based VMware virtual server without running a sysprep.

4. Click the Save button to save your changes.

Manage Compute Zone Data Stores

Data stores can easily be attached and removed from Compute zones. This association between a Compute zone and a data store is called a data store join.

1. Go to your Control Panel's Settings menu and click the Compute Zones icon.
2. Click the label of the Compute zone you want to manage data stores for.
3. On the screen that appears, click the Manage Data Stores link in the Tools section.
4. On the screen that follows you'll see a list of all data stores currently associated with this Compute zone.

To remove a data store from the zone, click the Delete icon next to it. You'll be asked for confirmation before the store is removed.

To add a new data store, choose one from the drop-down menu and click the Add Data Store button.

Manage Compute Zone Networks

Networks can easily be attached and removed from Compute zones. This association between a Compute zone and a network is called a network join.

1. Go to your Control Panel's Settings menu and click the Compute Zones icon.
2. Click the label of the Compute zone you want to manage data stores for.
3. On the screen that appears, click the Manage Networks link in the Tools section.
4. On the screen that follows you'll see a list of all networks currently associated with this Compute zone.

To remove a network, click the Delete icon next to it. You'll be asked for confirmation before the network is removed.

To add a new network, choose one from the drop-down menu, enter its interface name (eth0, eth1) and click the Add Network button.

If the Compute zone loses network connection, a warning message "All Compute resources are not responsive" will be displayed.

Manage Compute Zone Recipes

To manage Compute zone recipes:

1. Go to your Control Panel's Settings menu and click the Compute Zones icon.
2. Click the label of the zone you're interested in.
3. On the Compute zone details page click the Tools button, then select Manage Recipes.
4. The screen that follows shows details of all the recipes in the cloud:

• The right pane displays the list of Compute zone events to which the recipes can be assigned to.
• The left pane shows the list of all recipes in the cloud.

Assign recipe

Use drag and drop feature to assign a recipe to a desired Compute zone event.

You can assign template recipes to the following events:

• Compute resource comes online - run the recipe when the Compute resource comes online
• Compute resource goes offline - run the recipe when the Compute resource goes offline

The recipe will be triggered when the statistics is not received from a Compute resource for a certain period of time for some reason. If the Compute resource is offline, the recipe will not run.
- VS provisioning - run the recipe during VS provisioning
- VS network rebuild - run the recipe when rebuilding a network
- VS disk added - run the recipe when adding a disk
- VS network interface added - run the recipe when adding a network interface
- VS disk resized - run the recipe when resizing a VS disk
- VS resize - run the recipe when resizing a VS

To use drag and drop:
1. Click the arrow button in front of the required event to unfold it.
2. Click the arrow button in front of the required recipe group to unfold it. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

Remove recipe
To remove recipe:
1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

Location Groups
The location group ties compute resource, network, data store and backup server zones into the same location group. So, when you create a compute resource and choose a compute zone assigned to a specific location group, the network, data store and backup servers will be limited to this location group. This enables you to host different types of servers (virtual, smart, application, edge and storage) in remote locations using a single control panel. Please contact your cloud specialist to enable this feature.

The location group specified per server predefines the selection of compute zones and, consequently, its compute resources.

If a user has compute zones assigned to location groups in their billing plan, the Cloud Locations step will appear in the virtual server creation wizard. On this step, the user selects the country and city where the cloud is located. If the user’s billing plan has several compute zones, some of which are assigned to location groups, whereas others are not - the cloud locations screen will not be available in the wizard.

It is not possible to take incremental backups if you are using location group functionality without a backup server added to the group - the following error message will appear:

“Backup cannot be made at this time: This disk cannot be backed up, check Location Group settings.”

This issue will be fixed in next releases. As a workaround, add an empty backup server zone to your location group.

Add Location Groups
To add a location group:
1. Add and properly configure a location in OnApp Dashboard.
2. Go to your Control Panel Settings > Location Groups screen.
3. The page that loads will show the groups of all available locations.
4. Click the Refresh button if the required location is not listed.

After that, configure the resources that will be attached to the location groups. We recommend the following configuration sequence to ensure correct relationships within location groups:
1. Add resources to the zones. For example, attach data stores to the data store zones.
2. Add zones you configured at Step 1 to the required location group.

Create relations between resources themselves: attach data stores and networks to the Compute zones.

Do not delete location groups with assigned zones!

View Location Groups
The Location Groups are added in OnApp Dashboard. So, when you log in to your Control Panel, the system lists all the locations added and configured in OnApp Dashboard.
To view the list of Location Groups available in your cloud:

1. Go to your Control Panel’s Settings menu.
2. Click the Location Groups icon. The page that appears will show all the location groups in your cloud.
3. Click the location group name to see its details:
   - country and city
   - CDN locations
   - Compute resource, data store, network, and backup server zones assigned to this location

**Edit Location Groups**

It is possible to modify an existing location in OnApp Dashboard if the location is not used by any zone.

If special requirements are met, you can change the location already assigned to Compute resource/data store/network/backup server zones. For more info on this, refer to the following sections:

- Edit Compute Zone
- Edit Data Store Zone
- Edit Network Zone
- Edit Backup Server Zone

**Assign Zones to Location Groups**

To properly configure the Location groups in your cloud, assign the CDN locations and Compute resource, Data store, Network and Backup server zones to them.

To assign zones to a location group:

1. Log in to your OnApp Control Panel.
2. Go to your Settings > Location Groups menu.
3. Click the Country or City of the Location Group in question.
4. The page that loads is organized into the list of CDN Locations and Compute resource/Data store/Network/Backup server zones. Click the “+” button next to a required zone.
5. In the window that pops up, choose a particular location or zone and click Attach. The CDN locations available for sign up are those configured in OnApp Dashboard, while zones are taken from OnApp CP.
6. Repeat the procedure for other zones/locations.

You can also assign a Location Group to a particular CDN Edge Server/Compute resource/Data store/Network/Backup server zone on the following screens:

- Create CDN Edge Server
- Edit Compute Zone
- Edit Data Store Zone
- Edit Network Zone
- Edit Backup Server Zone

**Unassign Zones from Location Groups**

To unassign a Compute resource/Data store/Network/Backup server zone from a location group:

1. Log in to your OnApp Control Panel.
2. Go to your Settings > Location Groups menu.
3. Click the Country or City of the Location Group in question.
4. The page that loads is organized into the list of Compute resource/Data store/Network/Backup server zones. Click the “−” (Delete) button in the Actions column next to a required zone.
5. Repeat the procedure for other required zones.

You cannot unassign a Compute resource/Data store/Network/Backup server zone from a Location Group if such zone is used by any virtual server. It is impossible to unassign a CDN Location, if this location has Edge servers within it.

You can also unassign a Location Group from a particular Compute resource/Data store/Network/Backup server zone on the following screens:

- Edit Compute Zone
- Edit Data Store Zone
- Edit Network Zone
- Edit Backup Server Zone
Storage Settings

The Control Panel's Storage Settings menu is where you get detailed control over low-level cloud settings for data stores, data store zones and disks.

Data Store Zones Settings

Data store zones can be used to create different tiers of service – for example, by setting up different zones for ordinary and high-performance SANs in the cloud. Zones can also be used to create private clouds for specific users.

View Data Store Zones

To view data store zones:

1. Go to your Control Panel's Settings menu, and click the Data Store Zones icon.
2. The screen that appears will show all data store zones currently set up in the cloud with their labels and the location groups they are assigned to.

Click a zone's label (name) to see details of the zone and to access the functions for adding/removing data stores to/from the zone.

View Data Store Zone Details

To view details of a data store zone:

1. Go to your Control Panel's Settings menu and click the Data Store Zones icon.
2. Click the label of the zone you're interested in. On the screen that appears, you will see the following data store zone details:
   - Its label
   - A list of data stores assigned to the zone
   - A list of data stores unassigned to the zone

Create Data Store Zone

To create a new data store zone:

1. Go to your Control Panel's Settings menu and click the Data Store Zones icon.
2. Click the Create Data Store Zone button.
3. On the screen that follows:
   - Label - give your data store zone a name.
   - Location group - select the location group you wish to assign this data store zone to from the drop-down list.
4. Click the Save button.

Create Solidfire Data Store Zone

To create a new data store zone:

1. Go to your Control Panel's Settings menu and click the Data Store Zones icon.
2. Click the Create Data Store Zone button.
3. On the screen that follows:
   - Label - give your data store zone a name.
   - Location group - select the location group you wish to assign this data store zone to from the drop-down list.
4. Click the Save button.
5. You will be redirected to the Data Store Zone overview page. On that page you will see Unassigned Data Stores which can be added to this Data Store Zone.
6. Click the "+" icon to assign a required SolidFire Data Store(s).
7. Afterwards click the "edit" icon to proceed with SolidFire Data Store zone settings.
8. On the page that follows specify the following options, which will be applied while selecting this data store zone when creating a virtual server or adding a disk to an existing virtual server:
   - Default max iops - the maximum number of Input/Output operations per second.
   - Default burst iops - the number of burst IOPS.

Both maximum and burst IOPS values cannot exceed 15000.
Min disk size - the minimum size of a disk to be added to a virtual server.

9. Click the Save button.

**Edit Data Store Zone**

To edit data store zones:

1. Go to your Control Panel's **Settings** menu, and click the **Data Store Zones** icon. The screen that appears will show all data store zones currently set up in the cloud.
2. To change the zone's name and location group, click the **Actions** button next to the data store zone you are interested in, then click **Edit**. You can change the already assigned location group only if there are no disks or ISOs built on data stores of current zone.

**Attach Data Stores to Data Store Zone**

To add a data store to a zone:

1. Go to your Control Panel's **Settings** menu and click the **Data Store Zones** icon.
2. Click the label of the zone you want to add a data store to.
3. On the screen that follows, click the “+” icon next to the unassigned data store you want to add.

**Remove Data Stores From Data Store Zone**

To remove a data store from a zone:

1. Go to your Control Panel's **Settings** menu and click the **Data Store Zones** icon.
2. Click the label of the zone you want to remove a data store from.
3. On the screen that appears, click the “−” icon next to the data store you want to remove, to delete it.

**Delete Data Store Zone**

Delete data store zones:

1. Go to your Control Panel's **Settings** menu, and click the **Data Store Zones** icon. The screen that appears will show all data store zones currently set up in the cloud.
2. Click the **Actions** button next to the zone you want to remove, then click **Delete**. You'll be asked for confirmation before the zone is removed.

**Data Stores Settings**

Data stores provide disk space for your virtual servers and operating systems. Data stores are attached to Compute resources. There are several types of data stores in OnApp:

1. Traditional logical volume data stores based on a centralized SAN.
2. ESXi datastores used under VMware (refer to vCenter Implementation Guide for details)
3. Integrated storage data stores (the core Integrated Storage functionality). See Integrated Storage chapter for details.

The basic management tools are the same for all data store types, but the creation process differs.

Use caution when changing data store settings!

---

OnApp is integrated with the SolidFire storage management system. It is now possible to perform the following options with the SolidFire:

- Allocate dedicated LUN from SF cluster per virtual server disk, when creating a VS (LUN is created per each VS disk, with a separate LUN per swap disk).
- Create virtual servers without the swap disk.
- Implement backups / snapshots using SF CloneVolume method

Logical unit number (LUN) is a unique identifier assigned to one or several virtual server disks, addressed by SCSI protocol. In the SolidFire SAN environment, a RAID controller provides multiple LUN support, presenting storage as multiple devices. In this case, a LUN is used to present a view of the disk storage to the virtual server. When a LUN is assigned to a virtual server, it acts as its physical...
View Data Stores

To view all data stores on your cloud:

1. Go to your Control Panel Settings menu.
2. Click the Data Stores icon. The screen that appears lists all data stores currently available and their details:
   - **Label** - the name of the data store
   - **IP address** - the IP address of the data store
   - **Shared?** - whether the data store is shared or not
   - **Identifier** - the identifier of the data store
   - **Enabled** - whether the data store is enabled or not
   - **Data Store Zone** - the data store zone to which this data store is assigned
   - **Location Group** - the location group to which this data store is assigned
   - **Disk Usage** - used disk size within the data store
   - **Disk Capacity** - the disk capacity set for the data store
   - **Actions** - click the Actions icon to **Edit** or **Delete** a data store

Create LVM Data Store

To create a data store:

1. Go to your Control Panel Settings menu.
2. Click the Data Stores icon.
3. Click the Create Data Store link at the bottom of the screen.
4. Follow the steps in the creation wizard:

   **Step 1 of 2. Properties**
   - **Label** - choose a name for the data store
   - **IP address** - enter an IP address for your data store
   - **Data store type** - select the **lvm** data store type
   - **Enabled** - move the slider to the right to enable the data store. When disabled, OnApp will not allow new disks to be created automatically on that data store. This is useful to prevent an established data store from becoming too full. It also lets you prevent the automatic creation of root disks on 'special' data stores (high speed, etc).
   - **Click Next.**

   **Step 2. Resources**
   - **Disk Capacity** - set disk capacity in GB
   - **Local Compute resource** - if required, you can also bind the data store with a local Compute resource. This is helpful if you wish that the data store and a Compute resource were located on the same physical server thus decreasing the time needed for a Compute resource-data store connection.
   - **Data Store Zone** - if required, you can also assign the data store to a data store zone. The drop-down menu lists all data store zones set up in the cloud (to add or edit data store zones, see Data Store Zones Settings).

   5. When you've finished configuring the store, click the Create Data Store button.

To use the data store, you have to assign it either to a Compute resource or a Compute zone.

Create SolidFire Data Store

You can create one SolidFire data store per cloud that will represent the space available at the SolidFire side.

To create a SolidFire data store:

1. Go to your Control Panel Settings menu.
2. Click the Data Stores icon.
3. Click the Create Data Store link at the bottom of the screen.
4. Follow the steps in the creation wizard:

   **Step 1 of 3. Properties**
   - **Label** - enter a data store label
- **IP address** - specify an IP address to be used for managing the data store via CP (Inasmuch SolidFire data stores have two interfaces, you'll have to specify the IP address for the cluster admin later)
- **Data store type** - select a solidfire data store type
- **Enabled** - move the slider to the right to enable a data store. When disabled, OnApp will not allow new disks to be created automatically on that data store. This is useful to prevent an established data store from becoming too full. It also lets you prevent the automatic creation of root disks on 'special' data stores (high speed, etc).
- **Click Next.**

**Step 2 of 3. Resources**

- **Disk Capacity** - set disk capacity in GB.
- **Local Compute resource** - if required, you can also bind the data store with a local Compute resource. This is helpful if you wish that the data store and a Compute resource were located on the same physical server thus decreasing the time needed for a Compute resource-data store connection.
- **Data Store Zone** - if required, you can also assign the data store to a data store zone. The drop-down menu lists all data store zones set up in the cloud (to add or edit data store zones, see Data Store Zones Settings).

**Step 3. Authentication Settings**

- Specify the cluster Admin settings:
  - iSCSI IP - iSCSI IP address
  - Username - specify username for cluster authorization
  - Password - specify password for cluster authorization
- Specify the SolidFire Account settings:
  - Username - specify SolidFire account username
  - Initiator secret - specify iSCSI initiator secret (optional)
  - Target secret - specify iSCSI initiator secret (optional)

_initiator secret and target secret_ are optional parameters. They are created automatically for a newly created account. For the new account they will be taken from the SolidFire database. If you specify target and initiator secrets for an existing user, they will be overwritten.

5. When you've finished configuring the store, click the Create Data Store button.

### Edit Data Store

To edit a data store:

1. Go to your Control Panel’s Settings menu.
2. Click the Data Stores icon. You’ll see a list of the data stores on your system.
3. Click the Actions button next to the store you want to change, then click Edit.
4. On the following page the appropriate data store details:
   - **Label** - the name of the data store.
   - **IP address** - the IP address of the data store.
   - **iSCSI IP** - iSCSI IP address.
   - **Disk Capacity** - set disk capacity in GB.
   - **Enabled** - move the slider to the right to enable a data store. When disabled, OnApp will not allow new disks to be created automatically on that data store. This is useful to prevent an established data store from becoming too full. It also lets you prevent the automatic creation of root disks on ‘special’ data stores (high speed, etc).
   - **Local Compute resource** - if required, you can also bind the data store with a local Compute resource. This is helpful if you wish that the data store and a Compute resource were located on the same physical server thus decreasing the time needed for a Compute resource-data store connection.
   - **Data Store Zone** - if required, you can also assign the data store to a data store zone. The drop-down menu lists all data store zones set up in the cloud (to add or edit data store zones, see Data Store Zones Settings).
   - **Data store type** - choose the data store type.
5. Click the Save Data Store button to finish.

### Delete Data Store

To delete a data store:

1. Go to your Control Panel’s Settings menu.
2. Click the Data Store icon. You’ll see a list of the data stores in your system.
3. Click the Actions icon next to the data store you want to delete, then click Delete. You’ll be asked for confirmation before the store is deleted.

### Disks Settings
The disk settings screen lets you view, edit, migrate and delete every disk in the cloud, and provides quick access to their backup and schedule functions.

Do not create multiple partitions on one disk for virtual servers. OnApp backups will not see the secondary partition and might fail. If required, create additional disks instead.

View Disks

To view a disk:

1. Go to your Control Panel's Settings > Disks menu.
2. On the page that loads, you can see the list of all the disks in the cloud and their details:
   - Disk - disk ID
   - Label - disk label
   - Size - disk size in GB
   - Data Store - data store the disk is configured on
   - Virtual Server - the virtual server the disk is assigned to
   - Mounted? - whether the disk is mounted or not
   - File system - the disk's file system
   - Type- the disk's type (swap or standard)
   - Built? - whether the disk has been built or not
   - Backups - number of backups taken
   - Auto-backup? - whether auto-backups are scheduled for this disk

Enable Disk Auto-backups

To enable disk auto-backups:

1. Go to your Control Panel's Settings > Disks menu.
2. Move the Auto-backup icon to the right next to the required disk.

You can use disk auto-backups to enable/disable automatic backups for a particular disk. If the incremental backups are enabled in your cloud, you can set auto-backups per VS rather than per disk.

If disk auto-backups were turned on before enabling the incremental backups option, you will need to disable the disk auto-backups and enable incremental auto-backup per virtual server.

Backup Disks

The Disks screen lists all the disks in the cloud and indicates disk ID, disk label, disk size, data store they're configured on, the virtual server they're assigned to, their type, status, number of backups taken and backup status.

To back up a disk:

1. Go to your Control Panel's Settings > Disks menu.
2. Click the Actions > Backup button next to the required disk.
3. Click Take a Backup button.

Migrate Disks.

You can migrate disks to other data stores, which are allocated to the same Compute resource. Unlike VS migration – disk migration requires reboot of the VS (despite the template it is based on). You can only migrate disks to data stores in data store zones assigned to your billing plan.

To migrate a disk to another data store:

1. Go to your Control Panel's Settings > Disks menu.
2. Click the Actions button next to the disk you want to change, then click the Migrate link.
3. Choose a target data store.
4. Click the Start Migrate button.
View Disk IOPS

To see IOPS for a disk:

1. Go to your Control Panel's Settings > Disks menu.
2. Click the Actions button next to the required disk, then click the IOPS link.
3. There are four charts on the screen that appears:
   - Instant IOPS - IOPS for the last hour
   - Hourly IOPS - IOPS for the last 24 hours
   - Instant data written/read - data written/read for the last 24 hours
   - Hourly data written/read - data written/read for the last hour
4. To zoom into a time period, click and drag in a chart. Click the Reset Zoom button to zoom out again.

Schedule Disks for Backups

In addition to the system auto-backup presets, you can schedule backups of virtual servers (VS disks) as required. For example, you can set up a schedule to back up your disks once a week.

To schedule a backup:

1. Go to your Control Panel's Settings > Disks menu.
2. Click Actions > Schedule for backups button next to a disk to schedule a backup for.

Delete Disks

To delete a disk:

1. Go to your Control Panel's Settings > Disks menu.
2. Click Actions > Delete button next to a disk to delete it. You'll be asked for confirmation before the disk is removed. All backups for this disk will be removed too.

Disk Wipe

OnApp Cloud provides two ways to clean VS data when deleting or migrating a VS's disk. By default, OnApp Cloud will format the physical disk space used by a virtual server when that VS's virtual disk is deleted, or when the VS disk is migrated to another data store.

You can also choose to wipe/format a VS's disk (filling it with zeroes) by changing a configuration setting on the OnApp Control Panel server. To enable this behavior:

1. Log in as root on your OnApp Control Panel server.
2. Edit the following configuration file: /onapp/interface/config/on_app.yml and set the wipe_out_disk_on_destroy parameter to true.

The wipe_out_disk_on_destroy value is set to FALSE by default. If you wish to return disk wiping behaviour to the default setting (formatting rather than zeroing disks), simply edit the config file and set the value to FALSE again.

Backup Settings

The Control Panel's Backup Settings menu is where you get detailed control over low-level cloud settings for backup servers and backup server zones.

Auto-backup Presets Settings

Auto-backup presets are a simple way to set up an automatic backup schedule when virtual servers are created. Once configured, they can be applied to a VS automatically when the Automatic Backups Required box is checked during VS creation.

A number of preset backup time periods are available (daily, weekly, monthly and annual backups) which are configured further by specifying how often each backup is taken. So, for example, you can set up automatic backups every 2 days, every 1 month, or even every 12 months (the same as every 1 year). Each type of backup can be enabled or disabled.

To view and edit auto-backup presets:

1. Go to your Control Panel's Settings menu
2. Click the Auto-backup Presets icon. You'll see a list of the presets available on the following screen, and whether they are enabled or not.
3. To change a preset, click its Actions icon, then click Edit to change the following auto-backup preset details:
The combination of Auto-backup Presets and Scheduled VS backups provides a great deal of flexibility in the way backups are handled for the cloud, and for individual VSs. Auto-backup Presets can be applied to all new VSs added to the cloud. Scheduled VS backups enable specific backups to be scheduled for individual VSs, outside of the auto-backup pattern.

Backup Servers Settings

Backup servers are servers responsible for storing backups and templates of virtual servers running in the cloud, in order to prevent data loss in the event of failure.

There are now three ways to handle backup and template storage in your cloud:

1. Basic backup scheme
2. Advanced backup scheme
3. CloudBoot backup scheme

Only one Backup Scheme can be used per cloud.

Basic Backup Scheme

Running disk-related actions on Compute resources

This was the default backup method prior to OnApp Cloud 2.3.2. In this scenario, template/backup storage works as follows:

- Backups and templates are stored on a single backup/template server.
- Backup transactions are performed on Compute resources.
- After the backup is taken on a Compute resource, it is put on the backup/template server. This server can be accessed via SSH or NFS.
  - In order to make this server accessible via SSH, you should configure SSH file transfer server options.
  - In order to make this server accessible via NFS, you should mount the appropriate directory from this server to each Compute resource.

Centos now defaults to NFSv4. This is known to cause compatibility issues so we strongly recommend that you use NFSv3 for all mounts. This can be done by passing `-t nfs -o vers=3` in any mount commands.

- Backups created are stored at the path defined in Settings > Configuration > Backups/templates

OnApp SANity can only use the Basic Backup Scheme.

Advanced Backup Scheme

Running disk-related actions on one or more dedicated backup servers

This backup scheme can be used in OnApp Cloud 2.3.2 and above. This option does not use Compute resources to take backups. Instead, you deploy one or more dedicated backup servers, which handle transactions and store all backups & templates.

- If you have added one or more backup servers, all backups will be stored on these servers.
- If there is more than one backup server, backups are performed on the server with the most available disk space.
- A network is used to connect Compute resource with the backup server. (An IP address is assigned to Compute resource and a backup server to build an ISCI connection. If no IP is assigned to the Compute resource, an IP from the management network will be used.
- Using this method, templates are also stored on the dedicated backup server(s). When converting a backup to a template, the new template will be stored on the same server as the backup.

Dedicated backup servers handle the following activities:

Backup and template related actions
• Take a backup
• Restore a backup
• Convert backup to template
• Destroy backup
• Destroy template

Disk related actions
• Configure OS on virtual server
• Provision virtual server
• Create disk
• Format disk
• Resize disk
• Migrate disk
• Destroy disk

VS related actions
• Set SSH keys
• Network Configuration
• Rebuild network
• Attach/detach Network Interface

If there are no dedicated backup servers in the cloud, all these actions will be performed by Compute resources, and backups/templates stored according to the settings defined in Settings > Configuration > Backups/templates.

PLEASE NOTE:
• The use of dedicated backup servers is available for non-local data stores only.
• Volume groups of each data store based on SAN must be shared with the backup server.
• If your cloud uses a combination of local storage and SANs, you will only be able to use the new backup method for virtual servers that have been allocated SAN-based storage.
• If only local storage is used, you shouldn't define any dedicated backup servers – instead, configure your SSH or NFS settings in the Settings > Configuration > Backups/templates menu.

CloudBoot Backup Scheme

Starting from the OnApp v3.0 you can use dedicated CloudBoot backup servers and virtual backup servers in your cloud. Please refer to the Create CloudBoot Backup Server and Create Virtual Backup Server sections for more details.

Create Backup Server

To create a backup server:

1. Go to your Control Panel's Settings menu, then press Backup Servers icon.
2. Click the Create Backup Server button.
3. Fill in the form that appears:
   • Label - give your backup server a label
   • IP address - enter the backup server IP address (IPv4)
   • Backup IP address - add a provisioning network IP address
   • Capacity - set the backup server capacity (in GB)
   • Backup server zone - select the backup server zone to which this backup server will be assigned
4. Move the Enabled slider to the right to enable the backup server.
5. Click the Add Backup server button.

Once you've added a backup server to your cloud and wish to limit the backup resources, make sure to set the limits in billing plan for backup server zone resources.

Create CloudBoot Backup Server

CloudBoot backup servers are CloudBooted KVM Compute resources that can be be used as backup servers. Follow the step-by-step instructions provided in this chapter to configure CloudBoot backup servers in your cloud.

• You should configure some local or remote attached storage for persistent backups on the provisioning/backup server. We
To create a CloudBoot backup server:

1. Update CloudBoot and CP server RPMs:

   ```
   yum update onapp-store-install yum update onapp-cp-install
   ```

2. Configure CloudBoot settings:

   ```
   /onapp/onapp-store-install/onapp-store-install.sh
   ```

3. Create a new KVM CloudBoot Compute resource with an IP address from the dynamic range. Refer to the Create CloudBoot Compute Resource section of this guide for details.

4. Make sure to choose the 'Backup' option and don't format disks.

5. Go to your Control Panel's Settings menu, then press Backup Servers icon.

6. Click the Create Backup Server button.

7. Fill in the form that appears:
   - Tick the Enabled box to enable the backup server.
   - Label - give your backup server a label
   - IP address - enter the IP address of a Compute resource you have created at step 1
   - Backup IP address - add a provisioning network IP address
   - Capacity - set the backup server capacity (in GB)
   - Backup Server Zone - assign your backup server to the backup server zone.

   If you intend to attach LVM-based storage and create backups, you should also add the IP address of the KVM Compute resource added in step 1 in the 'Backup IP address' field of each of your Compute resources.

Further steps:

1. Format and mount the local storage:
   - SSH to the backup server
   - Format the storage, e.g.:

   ```
   bash#> mkfs.ext4 /dev/sda
   ```

   - Mount the storage to /onapp:

   ```
   bash#> mount /dev/sda /onapp
   ```

   Add mount /dev/sda /onapp to custom config file also.

   - Make folders for backups and templates:

   ```
   bash#> mkdir /onapp/backups
   bash#> mkdir /onapp/templates
   ```

2. Copy templates from the Control Panel server to the Backup server using SCP:

   ```
   strongly recommend you to deploy one or more backup servers for backups and VS provisioning when using a CloudBoot functionality.
   - Centos now defaults to NFSv4. This is known to cause compatibility issues so we strongly recommend that you use NFSv3 for all mounts. This can be done by passing -t nfs -o vers=3 in any mount commands.
   ```
bash#> scp /onapp/templates/*.gz root@[backup_server_ip]:/onapp/templates

3. Update the database so that the location of the templates is known:

a. Find the database password:

```
cat /onapp/interface/config/database.yml | grep password
```

b. Open the onapp database in MySQL:

```
bash#> mysql -p
bash#> use onapp;
```

c. Find the ID of the backup server:

```
bash#> select * from backup_servers;
```

d. For all of the templates, set the required backup_server_id:

```
bash#> update templates set backup_server_id='[your_id]';
```

4. To download the base templates during the installation to your Control Panel, download and run the following script:

```
bash#> wget http://downloads.repo.onapp.com/get_template.sh
bash#> /bin/sh get_template.sh
```

If your backups disappear after rebooting the CloudBoot backup server with LVM storage, add mount command to CloudBoot backup server custom config after the reboot. This is a known issue which will be fixed in the future release.

To fix your custom config settings, use one of the following options provided in the examples below (you will have to specify your own device names):

1. If you have a separate partition for backups and templates (/dev/sda1 and /dev/sda2)

```
mkdir -p /onapp/backups
mkdir -p /onapp/template
mount /dev/sda1 /onapp/backups
mount /dev/sda2 /onapp/templates
```

2. If you current array is detected as /dev/sda1 and currently everything is located in /onapp within templates and backup directories within:
Create Virtual Backup Server

Virtual backup server is a configured backup server based on the Xen CloudBoot Compute resource that can be used as a backup server. Utilization of virtual backup servers helps to reduce IO load in Domain 0 on Xen Compute resource servers and improve their performance and may be used as an alternative to dedicated backup servers. The virtual backup servers can then be used to offload the backup activities from Dom0 and free up resources from the Compute resource. Once configured via the CloudBoot interface, virtual backup servers are managed exactly the same as dedicated physical backup servers.

For clouds using the backup scheme without dedicated backup servers, virtual backup servers should be used rather than the standard procedure.

You can create a virtual backup server either via OnApp user interface or using the CLI tool:

- Creating a virtual backup server via CLI
- Creating a virtual backup server via OnApp UI

You need to configure a backup target for storing backups before using a virtual backup server. If you reboot a Compute resource that functions as a virtual backup server without a target specified, all backups will be lost!

Virtual backup servers are included in the onappstore rpm and need to be configured manually via the CP terminal.

You can execute the following commands:

Command `backupServerAdmin`

Usage:

```sh
backupServerAdmin list
backupServerAdmin create <Compute resource MAC Addr> <RAM> <vCPUs> <Bridge1,Bridge2,...BridgeN>
backupServerAdmin delete <Compute resource MAC Addr> <VMname>
backupServerAdmin start <Compute resource MAC Addr> <VMname>
backupServerAdmin stop <Compute resource MAC Addr> <VMname>
backupServerAdmin move <Src Compute resource MAC Addr> <Dst Compute resource MAC Addr> <VMname>
backupServerAdmin Compute resourcenetinfo <Compute resource MAC Addr>
```

Where:

- **Compute resource MAC Addr** - MAC address of a Xen Compute resource that is used for the virtual backup server
- **RAM** - virtual backup server RAM
- vCPUs - virtual backup server CPUs
- Bridge1,Bridge2,...BridgeN - bridge identifiers configured on the Compute resources
- Src Compute resourceMAC Addr - the MAC address of the Compute resource we will move the virtual backup server from during the migration
- Dst Compute resource MAC Addr - target MAC IP address during the virtual backup server migration
- VSname - virtual backup server name that is generated automatically during the creation process

**backupServerAdmin list report example:**

```
Node <MAC_ADDRESS> (<IP_ADDR>)
Backup Server '<BS_NAME>':
Memory: 'BS_RAM'
vCPUs: 'BS_CPU'
Networks: ['bridge=BRIDGENAME,vifname=VIFNAME,mac=MAC_ADDR']*'
Running: TRUE/FALSE
```

**Creating a virtual backup server via CLI**

To add the virtual backup server via CLI:

1. List available Compute resources and IP addresses:

   ```
   backupServerAdmin list
   ```

2. Query Networks available to a given Compute resource:

   ```
   backupServerAdmin Compute resourcenetinfo
   ```

3. Create a config on a chosen Compute resource:

   ```
   backupServerAdmin create
   ```

4. Find the ID of the backup server:

   ```
   backupServerAdmin list
   ```

5. Start the Backup server VS:

   ```
   backupServerAdmin start
   ```

6. Wait for two minutes. After that, go to the OnApp Control Panel and create new Xen CloudBoot Compute resource with the MAC of a virtual backup server address obtained with the 'backupServerAdmin list' command.

7. Restart the backup server from the CLI:
### Creating a virtual backup server in the OnApp UI

To create new virtual backup server in the OnApp Control Panel:

1. Go to your Control Panel's **Settings** menu, then press **Backup Servers** icon.
2. Click the **Create Backup Server** button.
3. Fill in the form that appears:
   - **Label** - give your backup server a label
   - **IP address** - enter the IP address of a virtual backup server
   - **Backup IP address** - skip this field, as it is not required for the virtual backup server
   - **Capacity** - set the backup server capacity (in GB)
   - **Backup Server Zone** - assign your backup server to a backup server zone

4. Tick the **Enabled** box to enable the backup server.

### FAQ:

**Where are backups stored?**

A backup target must be configured prior to using a virtual backup server otherwise it will soon run out of space. Also all backups will be lost if the Compute resource with a virtual backup server is rebooted in case a target is not specified.

**How does a virtual backup server work?**

Once booted and managed via the CloudBoot interface, exactly the same as a backup server.

**Is the virtual backup server used for provisioning?**

Yes - it performs the same operations as a dedicated backup server.

**How can you tell if a backup server is virtual or dedicated?**

In the UI there will be an additional Compute resource that has a MAC address beginning "de:be", that is available during the CloudBoot Compute resource creation. From the CP server, running backupServerAdmin list will show the presence of a backup server.

### Edit Backup Server

To edit a backup server:

1. Go to your Control Panel's **Settings** menu and click the **Backup Servers** icon.
2. On the screen that appears, you'll see the list of all backup servers currently set up in the cloud. Click the **Actions** button next to the backup server you want to edit, then click **Edit** to change the backup server's properties:
   - **Label**
   - **IP address**
   - **Backup IP address**
   - **Capacity (in GB)**
   - **Backup server zone**
   - **Enabled box** – if you leave the enabled box empty, the backup server will be disabled.
3. Click the **Save Backup server** button to save changes.

### Backup Server Balancing

The choice of a specific backup server on which a backup will be performed is called backup server balancing.

Previously when you sent a command to take a backup, the system would schedule a corresponding transaction at a specific backup server. This transaction would be pending until its queue came up. However, if the backup server was very loaded, offline, or somehow not available, this transaction would take very long, or even should be restarted manually.
Now, with Backup Server Balancing, when the transaction is launched, the system will reassign it to the most appropriate backup server.

OnApp supports two backup types: **normal** and **incremental**, each of them having its own procedure of selecting the most appropriate server to take a backup:

For **Normal Backups** the system will follow the sequence below to take a backup:

1. Check which backup servers are assigned to this location group
2. Which of them are available to the user
3. Which of those have enough space
4. From those remaining, the most appropriate backup server will be the one with the smallest count of "take backup" transactions at the moment of the check
5. If for several backup servers this quantity is equal (0, 1, 2, ...n), the backup server with the lowest load (highest `cpu_idle` parameter) will be selected as the most appropriate

In case of **Incremental Backups**, the first backup (which is similar to normal backups) the server will be selected the same as for normal backups:

1. Check which backup servers are assigned to this location group
2. Which of them are available to the user
3. Which of those have enough space
4. From those remaining, the most appropriate backup server will be the one with the smallest count of "take backup" transactions at the moment of the check
5. If for several backup servers this quantity is equal (0, 1, 2, ...n), the backup server with the lowest load (highest `cpu_idle` parameter) will be selected as the most appropriate

All consequent backups will be performed at the same backup server as long as it is available and has enough storage space. If not - the alternative backup server will be selected following the principle described above.

**Manage Backups For Backup Server**

Click a backup server zone's label to perform the following actions with a backup server:

- See the list of all backups currently present on the backup server.
- Remove a particular backup.
- Proceed to the backup page.

**Delete Backup Server**

To delete a backup server:

1. Go to your Control Panel's **Settings** menu and click the **Backup Servers** icon.
2. Click the backup server's label.
3. On the screen that appears, you'll see the list of all backup servers currently set up in the cloud.
4. Click the **Actions** button next to the backup server you want to remove from the cloud, then click **Delete**. You'll be asked to confirm deletion.

   All the backups stored on that backup server will be deleted!

**Backup Server Zones Settings**

The Backup server zones feature can be used to create different tiers of service – for example, by organizing backup servers in the cloud into different backup server zones. You can also specify limits and prices individually for each Backup Server Zone assigned to the Billing Plan.

**View Backup Server Zone Details**

To view details of a backup server zone:

1. Go to your Control Panel's **Settings** menu and click the **Backup Server Zones** icon.
2. On the screen that appears, you'll see all backup server zones currently set up in the cloud.
3. Click the label of the zone you're interested in. The screen that appears shows details of that zone:

   - Zone's label
   - List of assigned backup servers
List of unassigned backup servers

Create Backup Server Zone

To create a new backup server zone:

1. Go to your Control Panel's Settings menu and click the Backup Server Zones icon.
2. On the screen that appears, click the Create New Backup Zone button at the bottom of the list.
3. On the screen that follows:
   - **Label** - Give your backup server zone a name.
   - **Location group** - select the location group you wish to assign this backup server zone to from the drop-down list.
4. Click the Save button.

Edit Backup Server Zone

To edit a backup server zone:

1. Go to your Control Panel's Settings menu.
2. Click the Backup Server Zones icon.
3. Click the Actions button next to the backup server zone, then click Edit to change the zone's label and location group. You can change the already assigned location only if there are no backups or templates stores on backup servers of the current zone.
4. Click Save.

Add Backup Server to Backup Server Zone

To attach a backup server to the backup server zone:

1. Go to your Control Panel's Settings menu and click the Backup Server Zones icon.
2. Click the label of the zone you want to attach a backup server to. On the screen that appears you will see the list of all backup servers in the cloud organized into two groups – those already assigned to this backup server zone and those that are unassigned.
3. Choose an unassigned backup server and click the Add icon next to it.

Remove Backup Server From Backup Server Zone

To remove a backup server from the backup server zone:

1. Go to your Control Panel's Settings menu and click the Backup Server Zones icon.
2. Click the label of the zone you want to remove a backup server from. On the screen that appears you will see the list of all backup servers in the cloud organized into two groups – those already assigned to this backup server zone and those that are unassigned.
3. In the assigned list, find the backup server you want to remove, and click the Delete icon next to it.

Delete Backup Server Zone

To delete a backup server zone:

1. Go to your Control Panel's Settings menu
2. Click the Backup Server Zones icon.
3. Click the Actions button next to the zone you want to remove, then click Delete. You will be asked to confirm deletion.

Schedules Settings

Schedules settings screen provides overview of all virtual servers' backup schedules in the cloud. Depending on the backup type set in your cloud settings, schedules are created either per virtual server or per disk:

- If you are using normal backups, the schedules are created per disk.
- If you are using incremental backups, the schedules are created per virtual server.

When you create a schedule, the first backup is taken automatically. All subsequent backups will be taken at the same time the first one was taken. Each backup erases the previous backup. When a schedule is no longer needed, we recommend deleting it so that the task will no longer run.

Backup schedules are managed per server. See the following sections for details:

- [Virtual Server Backup Schedules](#)
- [View Smart Server Backup Schedules](#)

View Schedules

To view the list of all schedules:
1. Go to your Control Panel's Settings menu.
2. Click the Schedules icon to see a list of all schedules on the system along with their details:
   - **Date** - time when the schedule was created
   - **Target** - server or disk for which the schedule was created (depending on the backup type)
   - **Action** - scheduled action
   - **Duration** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted

   This parameter is applicable to incremental backups only! Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - **Next Start** - time of the next backup
   - **User** - user who created the backup schedule
   - **Status** - schedule status

3. To view schedules of a particular server, see:
   - View Virtual Server Backup Schedules
   - Smart Server Backup Schedules

**Edit Schedules**

To edit a schedule:

1. Go to your Control Panel's Settings menu.
2. Click the Schedules icon to see a list of all schedules on the system.
3. Click the Edit icon next to a schedule to change its details:
   - **Frequency** - how frequently the backup will take place according to the period set. For example, duration of 2 and a period of days will take a backup every 2 days
   - **Period** - backup period: days, weeks, months or years
   - **Rotation period** - number of backups after which the first backup will be deleted. This parameter is for incremental backup schedules only.

   Despite of the input value, for normal backups (when Disk is the target) rotation period is always 1. Thus, only 1 normal auto-backup with specific frequency, period and target will be stored in the system.

   - **Start Time** - the time when the backup will be taken
   - **Enabled** - move the slider to enable or disable the schedule

4. Click the Save button to save your changes.

**Delete Schedules**

To delete a schedule:

1. Go to your Control Panel's Settings menu.
2. Click the Schedules icon to see a list of all schedules on the system.
3. Click the Actions icon next to the schedule you want to remove, then choose Delete.

**Network Settings**

The Control Panel's Network Settings menu is where you get detailed control over low-level cloud settings for networks, network zones, IP address pools, firewalls, resolvers, customer VLANs.

**Networks Settings**

OnApp enables you to modify network configurations quickly and easily. Use caution when changing network settings.

**View networks**
To view the networks currently available in your cloud:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Networks** icon.
3. The screen that appears shows every network available in your cloud and their details:
   - **Label**
   - **Identifier**
   - **VLAN**
   - **Network Zone**
   - **Location Group**

Click a network's label to show details of IPs assigned to that network, and to add new IP addresses.

Click the **Edit** icon to change the network's label, VLAN and network zone settings.

**Create Network**

To add a new network:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Networks** icon: the screen that appears shows every network available in your cloud.
3. Click the **Add New Network** button at the end of the list.
4. On the screen that follows, specify the following network details:
   - **Label** - choose a name for the network. The network label is simply your choice of a human-readable name — "public", "external", "1Gb", "10Gb" etc.
   - **VLAN** - fill in a VLAN number. The VLAN field only needs to be given a value if you are tagging the IP addresses you will add to this network with a VLAN ID (IEEE 802.1Q). If you plan to tag IP addresses in this way, you need to make sure the link to the public interface on the Compute resources is a trunked network port. If you are not VLAN tagging addresses, this field can be left blank and the public port on the Compute resource can be an access port.
   - **Network Zone** - assign the network to a network zone if required
5. Click the **Add Network** button to finish.

Once you have added a network to OnApp you will need to add an IP address range to the new network.

To use the network, you have to assign it either to a **Compute resource** or a **Compute zone**.

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**Edit Network**

To change the name, VLAN or network zone of an existing network:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Networks** icon.
3. Click the **Actions** button next to the network you want to change, then click **Edit**.
4. On the screen that follows, change the details of the network:
   - **Label** - the name of the network. The network label is simply your choice of a human-readable name — "public", "external", "1Gb", "10Gb" etc.
   - **VLAN** - a VLAN number. The VLAN field only needs to be given a value if you are tagging the IP addresses you will add to this network with a VLAN ID (IEEE 802.1Q). If you plan to tag IP addresses in this way, you need to make sure the link to the public interface on the Compute resources is a trunked network port. If you are not VLAN tagging addresses, this field can be left blank and the public port on the Compute resource can be an access port.
   - **Network Zone** - assign the network to a network zone if required.
5. Click the **Save Network** button to save the changes.

**Add IP Address to Network**

Once a network has been added you need to add IP addresses to that network. The system supports dual-stack protocol implementation (both IPv4 and IPv6).

To add IPv4 or IPv6 addresses:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Networks** icon: the screen that appears shows every network available in your cloud.
3. Click the name (label) of the network you want to add addresses to. On the screen that follows you'll see a list of all IP addresses currently assigned to this network.
4. Click the **Add New IP Address** button at the bottom of the screen, and complete the form that appears:
   - **IP Address** – you can create either single IP address or a range of IP addresses.

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Baremetal servers are not compatible with VLANs.
Assign IP Address to User

You can assign an IP address or several IP addresses to a particular user, so that they could create a VS based on it:

1. Go to your Control Panel's Settings menu.
2. Click the Networks icon.
3. Click the name (label) of the network from which you wish to assign an IP address to a user.
4. On the page that appears, you will see the list of IP addresses added to this network. Tick the box or drag the cursor around the required address or several addresses to select them. The Filter at the top of the page will simplify the selection process.
5. Click Assign IP addresses.
6. On the window that pops up, choose the user name.
7. Click the Assign IP addresses button.

Unassign IP Address from User

You can unassign an IP Address from a particular user at any time:

1. Go to your Control Panel's Settings menu.
2. Click the Networks icon.
3. Click the name (label) of the network from which you wish unassign an IP address.
4. On the page that appears, you will see the list of IP addresses added to this network. Tick the box or drag the cursor around the required address or several addresses to select them. The Filter at the top of the page will simplify the selection process.
5. To unassign, click Unassign IP addresses.

Delete IP Address from Network

To delete an IP address from a network:

1. Go to your Control Panel's Settings menu.
2. Click the Networks icon.
3. Click the name (label) of the network you wish to remove an address from.
4. On the page that appears you will see the list of IP addresses added to this network. Tick the box or drag the cursor around the required address or several addresses to select them. Click the Delete IP Address(s) button at the bottom of the page or the Delete icon in the Actions section next to an IP address. The Filter at the top of the page will simplify the selection process.

Delete Network

Before deleting a network please ensure that it is detached from compute zone and compute resources.

To delete an existing network, so it is no longer available as a cloud resource:

1. Go to your Control Panel's Settings menu.
2. Click the Networks icon.
3. Click the Actions button next to the network you want to remove, then click Delete. You will be asked for confirmation before the network is deleted.

Network Zones Settings

Network zones can be used to create different tiers of service – for example, by setting up different zones for different network resources in the cloud. Zones can also be used to create private clouds for specific users.

Create Network Zone

To create new network zone:
1. Go to your Control Panel's **Settings** menu and click the **Network Zones** icon.
2. Click the **Create Network Zone** button.
3. On the screen that follows:
   - **Label** - give your network zone a name.
   - **Location group** - select from the drop-down list the location group you wish to assign this network zone to.
4. Click the **Save** button.

**View Network Zone**

To view network zones:

1. Go to your Control Panel's **Settings** menu, and click the **Network Zones** icon. The screen that appears will show all network zones currently set up in the cloud.
2. Click a zone's label (name) to see details of the zone and to access the functions for adding/removing networks to/from the zone.

**View Network Zone Details**

To view details of a network zone:

1. Go to your Control Panel's **Settings** menu and click the **Network Zones** icon. The screen that appears will show all network zones currently set up in the cloud.
2. Click the label of the zone you're interested in. The screen that follows shows details of that zone:
   - Network zone's label
   - A list of networks assigned to the zone
   - A list of networks unassigned to the zone

**Edit Network Zone**

To edit network zones:

1. Go to your Control Panel's **Settings** menu, and click the **Network Zones** icon. The screen that appears will show all network zones currently set up in the cloud.
2. Click a zone's label (name) to see details of the zone and to access the functions for adding/removing networks to/from the zone.
3. To change the network zone's label and location group, click the **Actions** button next to required zone, then click **Edit**. You can change the already assigned location only if there are no network joins, IP addresses or name servers within networks in this zone.

**Add Networks to Network Zone**

To add a network to a zone:

1. Go to your Control Panel's **Settings** menu and click the **Network Zones** icon.
2. Click the label of the zone you want to add a network to. The screen that appears will show you all networks in the cloud, organized into two lists – those assigned to the zone already, and those that are unassigned.
3. In the unassigned list, find the network you want to add to the zone and click the **Add** icon next to it.

**Remove Networks From Network Zone**

To remove a network from a zone:

1. Go to your Control Panel's **Settings** menu and click the **Network Zones** icon.
2. Click the label of the zone you want to remove a network from. The screen that appears will show you all networks in the cloud, organized into two lists – those assigned to the zone already, and those that are unassigned.
3. In the assigned list, find the network you want to remove, and click the **Delete** icon next to it.

**Delete Network Zone**

To delete network zones:

1. Go to your Control Panel's **Settings** menu, and click the **Network Zones** icon.
2. The screen that appears will show all network zones currently set up in the cloud.
3. To remove a network zone from the cloud, click the **Actions** icon next to the zone, then click **Delete**. You'll be asked for confirmation before the zone is removed.

Network zone must contain only one network type - either usual networks, or VMware customer networks.
Firewalls

Firewalls are used to manage VLANs and route VS networking traffic in and out of OnApp. Vyatta Community Edition is used with standard OnApp CP firewall interface on a VS basis. Because all customer VS are running inside customer network, firewalls are required as the VS gateway. The shared Vyatta must be installed and configured for CP to control it before creating any VMware virtual server.

Documentation on Vyatta can be found at www.vyatta.com

View/Edit/Delete Firewalls

To view the list of firewalls:

1. Go to your Control Panel's Settings menu and click the Firewalls icon. On the screen that appers, you'll see the list of all firewalls.
2. To edit a firewall, click the Actions button next to the required firewall, then choose Edit.
3. To delete a firewall, click the Actions button next to the firewall you want to remove, then choose Delete.

Create firewall

To configure firewall settings:

1. Go to your Control Panel's Settings menu and click the Firewalls icon.
2. On the page that loads, you can see the list of available firewalls. To create a firewall click Add Firewall.
3. Specify the following settings:
   - IP Address for CP communication - IP address used to manage firewall via CP
   - CIDR to CP link - internal IP address prefix size
   - VLAN Interface Name - interface used for managing the firewall via CP
   - External IP Address - external firewall IP
   - External CIDR - external IP address prefix size
   - External Interface Name - external firewall interface
   - External Gateway - external gateway address
   - Default Rule - default firewall settings for new virtual servers (INSIDE_OUT)
   - User Name - specify username for the remote Vyatta management
   - Password - set password for remote Vyatta management

4. Click Add firewall button.

You may experience compatibility issues when using the 6.6 version of Vyatta. We highly recommend using the 6.5 version.

Resolvers Settings

OnApp Resolvers work like DNS servers – they translate a hostname to an IP address.

You should specify at least 2 resolvers for each network in OnApp. When a new VS is provisioned, these resolvers are injected into the resolver configuration automatically.

View Resolvers

To view the resolvers on your system:

1. Go to your Control Panel's Settings menu.
2. Click the Resolvers icon. The screen that appears lists all resolvers set up for your cloud.

Create Resolver

To add a new resolver:

1. Go to your Control Panel's Settings menu.
2. Click the Resolvers icon.
3. On the screen that appears, click the Create Resolver button.
4. Specify resolver details:
   - Address - the resolver IP address
   - Network - the ID of the network to which this resolver should belong
5. Click **Create Resolver** button.

**Edit Resolver**

To edit an existing resolver:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Resolvers** icon.
3. Click the **Actions** icon next to the resolver you want to change, then click **Edit** to change the resolver's address and network.
4. Click **Save Resolvers** to save changes.

**Delete Resolver**

To delete an existing resolver:

1. Go to your Control Panel's **Settings** menu.
2. Click the **Resolvers** icon.
3. Click the **Actions** button next to the resolver you want to remove, then click **Delete**. You will be asked for confirmation before the resolver is removed.

**Customer VLANs**

Customer VLAN is a group of virtual servers functioning as if they’re connected to a single network (even if they are not, in fact). This is a vCenter implementation functionality only. For details, refer to a vCenter guide **Customer VLANs**.

**IP Address Pools**

IP Address Pools are network configurations that you can associate with VLANs. They assign IP addresses to VMware vCenter virtual servers included to customer VLANs. Each IP address pool consists of a range of NAT IP addresses. When configuring an IP Address Pool, you set a range of IPv4 or IPv6 addresses and specify the network address of a VLAN that this pool will be available to.

IP address pools is used for VMware vCenter virtual servers only. For more details, refer to [vCenter Implementation Guide](#).

**OnApp Configuration**

The Control Panel's **OnApp Configuration** menu is where you get detailed control over the configuration of OnApp itself.

**Authentication**

OnApp offers you a possibility to log in using the credentials from a third-party Identity Provider.

This section contains information on SAML and OAuth authentication possibilities.
OAuth

OAuth - open standard for authorization - enables your users to log into OnApp using their Google and Facebook accounts. To provide users of your cloud with such login possibility:

- Cloud Administrator must enable OAuth provider
- User must connect the enabled provider to their profile.

Enabling OAuth for the cloud

1. Go to OnApp Dashboard > Settings > Authentication page
2. Select OAuth Providers tab
3. Move the Enable slider next to the required OAuth providers.

Facebook

1. Select an icon to be displayed during the login
2. Fill in the app key and app secret from the Facebook application

Configure Facebook application
To create and configure the Facebook application for your cloud:

a. Log in as Facebook developer at https://developers.facebook.com/
b. Create an application:
   - enter display name
   - select suitable category for your product
   - on the Dashboard of the created app you will see App ID and App Secret which are required in step 2 above
   - go to the Settings menu, press Add Platform and select Website
   - in the appearing field Site URL specify the address of your Control Panel
   - specify your Contact Email, otherwise your application cannot go live
   - go to Status & Review menu and make your application public using the slider in the top right corner

Google

1. Select an icon to be displayed during the login
2. Fill in the app key and app secret from the Google application

Configure Google application*
1. Go to the Google Developers Console.
2. Select a project, or create a new one by clicking Create Project. Use a single project to hold all platform instances of your app (Android, iOS, web, etc.), each with a different Client ID.
   a. In the Project name field, type in a name for your project.
   b. In the Project ID field, optionally type in a project ID for your project or use the one that the console has created for you. This ID must be unique world-wide.
   c. Click the Create button and wait for the project to be created. Note: There may be short delay of up to 30 seconds before the project is created. The project name appears at the top of the left sidebar, indicating you are now editing the project.
3. In the left sidebar, select APIs & auth. A list of Google web services appears.
4. Find the Google+ API service and set its status to ON—notice that this action moves the service to the top of the list.
5. Enable any other APIs that your app requires.
6. In the sidebar, select Credentials.
7. In the OAuth section of the page, select Create New Client ID.
   In the resulting Create Client ID dialog box, register the origins where your app is allowed to access the Google APIs, as follows. The origin is the unique combination of protocol, hostname, and port.
   a. In the Application type section of the dialog, select Web application.
   b. In the Authorized JavaScript origins field, enter the origin for your app. You can enter multiple origins to allow for your app to run on different protocols, domains, or subdomains. Wildcards are not allowed. In the example below, the second URL could be a production URL.

| http://onapp.cp |
| https://myproductionurl.example.com |

c. In the Authorized redirect URI field, enter your redirect URI callback:

| http://onapp.cp/users/auth/google/callback |

It is important to set the configuration indicated in the box above, otherwise the Google will set the default value as http://onapp.cp/callback
d. Select Create Client ID.
8. Go into the Consent Screen and add your email address and a product name. The other fields are optional.
9. In the resulting Client ID for web application section, note or copy the Client ID and Client secret that your app will need to use to access the APIs.

* Configurations are taken from official Google instructions “Step 1: Create a client ID and client secret".
**Connecting the enabled OAuth provider to user profile**

To connect a user profile to either of above OAuth providers and be able to log in with it, the user has to:

2. Go to their own profile by clicking the name on the top panel of the dashboard or in the list of users in **Users and Groups** menu.
3. In the **Oauth Authentication** section press the **Connect** button next to the required provider.
4. User will be redirected to confirm such connection.

Upon completion, the user will be able to log in to OnApp with the OAuth Provider they have connected.

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**SAML Authentication**

SAML Authentication enables the integration of OnApp as a Service Provider into third-party systems via Single Sign-On possibility, so that users of third-party systems can use their credentials to access OnApp services, without the need to be previously registered in OnApp Cloud.

This Authentication is enabled by adding an Identity Provider (IdP) instance, which is used to direct OnApp login requests to the server configured with SAML.

- Currently OnApp supports only Windows ADFS identity provider.
- It must be configured properly to be able to store OnApp mapping attributes (user role, time zone, etc).
- It requires that only HTTPS protocol is used.

Selecting a SAML IdP on OnApp login screen, a user will be redirected to the login screen of that identity provider. Upon logging in there with their email and password (or if they are already logged in), they will be redirected back to OnApp Control Panel. This final redirect will contain an email attribute of that user which is used for their recognition in OnApp system – if such a user already exists he or she are recognized and authorized, if not - a new OnApp user will be automatically created.

A new user will not be created without the OnApp Key attribute.
The attributes of the third party system users will be synchronized during every login, depending on the available keys for attributes mapping. This will enable third party system administrator to preset the main OnApp user properties (user role, time zone, group) without the necessity to enter OnApp and make the required configurations manually.

Users created without these attributes can be located and managed at **Users and Groups > Users with Config Problems** on your OnApp Control Panel.
Add New Id Provider

Enabling the possibility to log into OnApp through Identity Provider involves two stages:

1. Add the Identity Provider (IdP) instance to Service Provider (SP)
2. Configure Service Provider at Identity Provider

Add the IdP instance on the OnApp CP

To add a new Identity Provider instance follow these steps:

1. Go to your Control Panel's Settings > Authentication
2. Click New SAML Id Provider or a "+" sign
3. Fill in the fields in the new window:

- **Enabled** - move the slider to the right to enable this identity provider at the login screen
- **Name** - enter the name of the identity provider
- **Icon** - select the icon file, which will be displayed at the login screen
- **Issuer** - the name of the service provider; by default - the address of your OnApp Control Panel
- **Idp sso target url** - the URL to which the authentication request should be sent
- **Idp cert fingerprint** - the SHA1 fingerprint of the certificate, e.g. "90:CC:16:F0:8D:...
- **Idp cert** - the identity provider's certificate in PEM format

Either Idp cert or Idp cert fingerprint must be present. If both are present - Idp cert will take precedence over Idp cert fingerprint.

4. Fill in the keys for attributes mapping. These keys are the names of attributes of the third-party system’s users which will be synchronized with OnApp. See Attributes Mapping Configuration for more details.
   - **OnApp Key** - the key which enables the synchronization of the below attributes during every login to OnApp; third party system users who are not yet registered in OnApp will not be created without this key
   - **User name key** - login name of the user; cannot be changed or synchronized after creating; if this key is missing the email address will be utilized as a login name for the user
   - **Roles key** - key of the role attribute, which will create/sync the user's role in OnApp
   - **User group key** - the group attribute to assign the user to a particular group
   - **Time zone key** - key of the time zone to which the user will be associated
5. Click **Save** button.

Configure Service Provider

Besides adding the IdP instance, the Identity Provider must also configure the SP instance in their system. To simplify this configuration process, the Identity Provider may use the SP metadata:

1. Upon creation you will be redirected to the screen with details of the Identity Provider. At the bottom of the page you will see the **Link to Metadata**.
2. Copy this link and submit it to the Identity Provider in the **Select Data Source** menu.
3. In the **Claim Rules** menu create new rule by clicking **Add Rule** and select **Transform an Incoming Claim** as the template.
Select **E-mail Address** as the **Incoming Claim Type**.  
For **Outgoing Claim Type**, select **Name ID**.  
For **Outgoing Name ID Format**, select **Email**.

Now this identity provider may be selected at the login screen clicking the "gear" button:

![OnApp login screen](image)

**Attributes Mapping Configuration**

To import users into OnApp Cloud already with a number of preset properties (user role, time zone, group), the administrator of the Identity Provider adds additional attributes to their users. These attributes can be imported into or synchronized with the Server Provider (OnApp cloud), making it possible to configure SP users in Identity Provider's system.

To import users with additional attributes, the administrator of the Identity Provider adds the required attribute(s) to users and fills them in with values from OnApp. For example, the administrator of the Identity Provider wants users imported with a role. For this, the role attribute should be created and given a value of an OnApp role(s). The name of this parameter is entered in the **Roles key** field.

When a user enters OnApp Cloud through the IdP instance, the system will check whether the synchronization is enabled and then it will look for the OnApp-dedicated attributes. Keys for attributes mapping are the names of the said attributes.

There are the following keys for attributes mapping:

- **OnApp Key** - the key which enables the synchronization of the below attributes during every login to OnApp; third party system users who are not yet registered in OnApp will not be created without this key
- **User name key** - login name of the user; cannot be changed or synchronized after creating; if this key is missing the email address will be utilized as a login name for the user
- **Roles key** - key of the role attribute, which will create/sync the user's role in OnApp
- **User group key** - the group attribute to assign the user to a particular group
- **Time zone key** - key of the time zone to which the user will be associated

These fields are optional. SAML Authentication will work if these fields are left blank.

Do not fill in these fields if the attributes were not added by the administrator of the Identity Provider.

An example of Attribute Mappings keys may look like the following:

- **OnApp key** - OnApp_ENABLED
- **User name key** - OnApp_UserName
- **Roles key** - OnApp_Roles
- **User group key** - OnApp_UserGroup
- **Time zone key** - OnApp_TimeZone

These attributes have to contain values which will be imported or synchronized with corresponding OnApp user entries.

**OnApp_ENABLED** attribute must be "boolean" type, case insensitive:

```
"OnApp_ENABLED" => "TRUE" / "false",
```
The other attributes are case insensitive, of the "string" type. The value of the attributes OnApp_TimeZone, OnApp_Roles, OnApp_UserGroup must correspond to the label of the required time zone, role, or user group accordingly. OnApp_Roles attribute may contain several values divided by a semicolon:

```
"OnApp_Roles" => "Administrator";"Advanced user",
"OnApp_TimeZone" => "Baghdad",
"OnApp_UserName" => "somename",
"OnApp_UserGroup" => "Test user group"
```

Manage Identity Providers

To see the list of Identity Providers and manage them:

1. Go to your Control Panel's Settings > Authentication. You will see all SAML IdPs available in your cloud with their key details:
   - Name - name of the Identity Provider
   - IdP SSO Target Url - the URL to which the authentication request is sent
   - IdP Cert Fingerprint - the SHA1 fingerprint of the certificate
   - Status - either "Active" or "Disabled"
   - Action - click the "gear" button to Edit, Delete or access Metadata of this Identity Provider
2. To see more detailed description of the Identity Provider - click its label.
3. To enable or disable IdP - go to Edit screen.

SAML Troubleshooting

Some errors you may encounter while setting up a connection between OnApp and Identity Provider and how to solve them:

- missing name_id - make sure that you set up an email for a user on IdP
- fingerprint mismatch - ensure you are using an appropriate certificate or fingerprint. Note, the certificate takes precedence on the fingerprint if both are indicated
- idp cert - the identity provider's certificate must be in PEM format
- Make sure to access OnApp CP via https before adding the identity provider instance to ensure the links containing in the Metadata file are correct. If the link in the Metadata is incorrect (http instead of https), please delete the IdP instance and create it again having accessed OnApp CP via https.

License

The license screen lets you view and edit your OnApp license key details. To edit OnApp license details:

1. Go to your Control Panel's Settings menu.
2. Click the License icon.
3. The screen that appears will show the following license details:
   - license type
   - license key
   - core limit
   - license status
   - trader status
   - supplier status
4. Click the Change License Key button to change the OnApp license key. You will be redirected to the System Configuration page.
5. To accelerate the license validation after changing the license, click the Restart License Client button.

Configuration Settings

The configuration settings screen lets you change various aspects of your OnApp installation. To edit these OnApp configuration settings:

1. Go to your Control Panel's Settings menu.
2. Click the Configuration icon. Click the tabs to edit the relevant config settings (System, Backups/Templates, Interface, Defaults) – these are explained in the subsections that follow.

Edit System Configuration.

1. Go to your Control Panel's Settings menu, and click the Configuration icon.
2. Click the System tab to change the following application settings:
License info

- **Key** - the key for your OnApp installation.

File Upload configuration

- **Max upload size** - the maximum file size for ISOs that can be uploaded to boot a VS.

SAML

- **Force SAML login** - enabling this feature will force SAML users to log into the cloud only with their third-party credentials and disable the possibility for them to log with OnApp login and password.

Compute resources*

- **Requests before marked as failed** - determines how many times the Control Panel server will attempt to contact a Compute resource before failover is initiated. For the Integrated Storage, we recommend increasing this parameter to 30, so that the storage platform has enough time to mark the Compute resources accordingly, and allow the VSs to start up after a failed Compute resource. In integrated storage statuses of backend nodes are marked as inactive approximately in 3 minutes after a backend node has stopped reporting its status. Integrated storage is a distributed system and it takes some time to sync/converge metadata across nodes.

VS Console Ports*

These are the ports used to remotely connect to virtual servers using the integrated VNC console.

- Set the port range using the **First port** and **Last port** fields.

Email

- This is where you configure OnApp to send email alerts for failed transactions and changes of Compute resource status. If OnApp Storage is enabled, you may also switch on Storage hourly and/or daily email reports.

  - **Send notifications?** - move this slider to the right to enable email alerts (failed tasks, offline Compute resources, etc).
  - **Enable hourly Storage reports** - generate and send hourly Storage reports. Hourly Storage report is an email with details about storage disks changing degradation statuses (e.g. "Healthy" > "Degraded", "Missing members" > "Healthy", etc). If no such changes occurred during the last hour, the email is not sent.
  - **Enable daily Storage reports** - are the health check diagnostic pages sent as email for each Compute zone with storage.
  - **System host** - enter a server IP or URL. Email alerts link to transaction logs for alert events, and those logs are opened from the server configured here.
  - **FROM**: – the email address from which help requests and email alerts are sent.
  - **TO**: - the email address to which the system will send alerts about failed transactions and change of Compute resource status.

- **Email delivery method** - select a mail transfer agent: either **sendmail** or **smtp**. If you select smtp, please configure the options below:
  - **SMTP address** - address of the SMTP server
  - **SMTP port** - port of the SMTP server
  - **SMTP domain** - associated domain
  - **SMTP username** - user name to login into SMTP server
  - **SMTP password** - password to login into SMTP server
  - **SMTP authentication** - select an authentication mechanism from a drop-down menu
  - **SMTP enable STARTTLS** - enable or disable StartTLS extension

Miscellaneous

- **Application name** – here you may change the application name, which is displayed at the welcome screen.
- **Config comment** - this text is added by OnApp to system configuration files, such as resolv.conf. This prevents the system from creating VSs with more CPU than is available for a Compute resource. For example, on a Compute resource with 4 CPU cores, with CPU guarantee enabled, you will only be able to create 4 VSs with 100% CPU priority. The system will not allow you to create a 5th VS.
- **Enable huge pages** - move this slider to the right to enable huge pages utilization. Huge pages are the memory pages of size 2MB. Use of huge pages allows you to reduce the number of page walks as compared to a standard method of translation from a virtual address to physical 4kB page.
- **Show IP address selection for new VS** – move this slider to the right to enable IP address assignment during VS creation.
- **Number of simultaneous transactions** - the number of transaction runners which the daemon will execute at the same time.
• **Zombie transaction time** - set the duration in minutes for the system to consider a task as "pending" before it can be relegated to zombie status.
• **System alert reminder period** - the duration in minutes for the system to email alerts to admin if the failover resources are not enough. The default value is 60.
• **Enable wrong activated logical volume alerts** - move the slider to the right to enable system alerts.
• **Wrong activated logical volume minutes** - specify the alert emails frequency in minutes.
• **Timeout Before Shutting Down VSs (30-600 sec)** - specify the VS shutdown period within the indicated range. This will allow refusing the shutdown if the VS is booting and retry every 30 seconds till it is registered.
• **Allow VS password encryption** – move this slider to the right to enable root password encryption for virtual servers.
• **Allow VMware Compute resource password encryption** – move this slider to the right to enable root password encryption for VMware Compute resources.
• **Use HTML 5 VNC console** - move this slider to the right to enable the use of HTML 5 VNC console. VNP ports from the CP server are not required if the HTML 5 console is enabled.

It is only possible to use HTML 5 console if the Control Panel server is based on CentOS6.

• **Max network interface port speed** - maximum NIC port speed in MB
• **Allow users connect to AWS** - move this slider to the right to enable AWS for the cloud

**Delay in seconds between executing background tasks**
Sets frequency in seconds for executing the following tasks:

- Backup taker
- Billing stats monitor
- Cluster monitor
- Compute resource monitor
- Schedule runner
- Transaction runner
- CDN Sync

**Background Processes**

- **Amount of service instances** - the number of system processes that perform the OnApp engine tasks simultaneously. Each of the system processes performs the task using a separate CPU core. The default value is 1. Currently, the maximum value is 5. If you input a value larger than five, the number of system process will still be five.
- **Transaction standby period** - the time which a transaction spends in stand-by period before requeueing to pending queue. The default value is 30. We recommend increasing this parameter for clouds with thousands of pending long lasting transactions (like backups) in order to decrease CPU/IO load.

**CloudBoot**

- **Enable CloudBoot** - move this slider to the right to enable/disable the PXE boot system on the cloud.
- **Static Config target** - the IP of NFS server that contains virtual server image templates.
- **CP server Cloudboot target** - the IP of Control Panel server.

**OnApp Storage**

- **Enable OnApp Storage** - move this slider to the right to enable/disable the OnApp storage on the cloud.
- **Use Local Read Path** - move this slider to the right to minimize the network throughput dependency for read heavy workloads. When the Use Local Read Path feature is enabled, reads go over the local software bridge to a local replica of the data rather than traverse a physical NIC + switch.
- **Use unicast** - switch from multicast to unicast mode. Instead of CP server setting a multicast 'channel' and restarting all Compute resource control stacks that are added to the zone, the CP server now maintains the list of unicast hosts. This is the list of IDs of all hosts in the same zone separated with a comma. CP server updates the unicast hosts list for all Compute resources whenever any member is added or deleted from the set. This parameter is stored in the onappstore.conf file, and the CP server explicitly copies the /rw/onappstore.conf to /onappstore/onappstore.conf on all Compute resources whenever a change is made.

Please, be aware this is a beta option. We suggest switching to unicast mode only in case you are not able to use multicast. Also, if at least one Virtual Server is running - unicast cannot be turned on.

**VMware**

- **VMware cluster name** - the name of the VMware cluster.
Statistics Management

- **Time of instant statistics storage (days)** - the number of days the instant statistics from Compute resource will be stored.
- **Enable hourly statistics archiving** - move the slider to the right to enable hourly statistics to be archived several months before it is aggregated into monthly statistics. If this feature is enabled, hourly statistics will be stored for a certain period of time specified in the Time of hourly statistics storage (months) parameter below.
- **Time of hourly statistics storage (months)** - this parameter configures how long you want the detailed hourly statistics to be kept in database before being converted into monthly statistics.

Custom Tools In Recovery Images

- **URL for custom tools** - specify the full URL to the tools file packed with GNU Tar + Gzip, like http://domain.com/file.tgz. These tools will be copied to a recovery VS after rebooting in recovery mode. The users will then be able to unpack and use these tools as they wish to.

If the recovery image file is too large, the virtual servers may fail to start up in the recovery mode. We highly recommend you to test the custom recovery image on the virtual server with minimum RAM size before using it.

SNMP Trap Settings

- **Snmptrap addresses** - a set of IPv4 management network IP(s) from the CP server separated by coma. These IP addresses will be used for communication between Control Panel and Compute resources.
- **Snmptrap port** - port used for snmptrap. This must be greater than 1024.

We recommend that you do not change the default value.
In case you change the port value on your OnApp CP - the corresponding change of the port VM_STATUS_SNMP_PORT should be made for all Compute resources in /etc/onapp.conf file.

OnApp Dashboard API

- **Access Token** - enter the Access token that is displayed in your OnApp Dashboard for your user account details. This token is used to synchronize locations between OnApp CP and OnApp Dashboard. Make sure to enable the Access Token if you are using CDN Locations.

CDN Settings

- **Maximum results per page for API-call to Aflexi** - the maximum number of results per page delivered when OnApp data are synchronized with Aflexi. The default value is 500.

Instance Types

- **Instance Types number** - when the specified number is reached, instance types are shown in the linear view in the virtual server creation wizard for easier instance type selection. The default value is 3.

3. Click the **Save Configuration** button to finish

Edit Backups/Templates Configuration

1. Go to your Control Panel's **Settings** menu, and click the **Configuration** icon.
2. Click the **Backups/Templates** tab to manage the following settings:

If you change any settings here and save, the Control Panel server will restart OnApp services

Manage Templates

To enable template **update and install**, set the following parameters:

- **Delete template source after install** - enable this option to delete the downloaded templates after they were distributed.

Do not enable this option if the location of your templates is shared with CP box. Otherwise, recently downloaded templates may be removed!
Paths to

Sets paths for various OnApp files (shown here with default path examples)

- Templates - /onapp/templates
- Recovery templates - /onapp/tools/recovery
- Backups - /onapp/backups

Backup/template server

Backups and templates can be stored on a remote server or a mounted disk. To store backups & templates remotely, configure the following settings:

- **Allow incremental backups** - move this slider to the right to enable incremental backups. Incremental backups are advanced method of taking backups. During the incremental backup, only the changes made after the last backup are archived instead of backing up the whole target. See Virtual Server Backups for details. Incremental backups are not available for Windows virtual servers, as well as under VMware and SolidFire.

  If the **Allow incremental backups** option is enabled, the new provisioning scheme will be used (with unpacked templates). Otherwise, the system will use the traditional provisioning method.

  When the incremental backups option is enabled, the ability to create full backups will be disabled (except for the servers that do not support incremental backup type). Existing full backups will be still accessible via Backups > Images menu.

  If you are using incremental backups option AND ssh_file_transfer is disabled, you should either enable dedicated backup servers in your cloud or share the backups and templates folders (paths) between your Compute resources.

- **Use SSH file transfer** - move this slider to the right to enable SSH data transfer for your template/backup server. If this option is not enabled, you will need to mount the templates/backup server manually. It is not possible to utilize SSH file transfer option when incremental backups are enabled.

  Skip this option if you are using incremental backups.

- **Server IP** - specify the IP address of the backup/template server.
- **User login** - the login used for remote server authentication. A password is not required, but it is required that you store a host key.
- **SSH options** - the SSH protocol options that set the rules and behavior of how to log into the remote server. By default, the options are set to omit adding new host keys to the host file, and skip password authentication. They also specify the path where the host key is stored. For a detailed list of configuration options, refer to SSH protocol man pages (under the -o option description. See [http://unixhelp.ed.ac.uk/CGI/man-cgi?ssh+1](http://unixhelp.ed.ac.uk/CGI/man-cgi?ssh+1)).

Backup processes

- **Total number allowed** - the maximum number of Compute resource and data store backup processes allowed at once on the Control Panel.
- **Total per data store** - if this number exceeds the overall total, the overall total limit will be enforced.
- **Total per Compute resource** - if this number exceeds the overall total, the overall total limit will be enforced.
- **Total per backup server** - if this number exceeds the overall total, the overall total limit will be enforced.

  For example: if **Total number allowed** is 10, and **Total per data store** and **Total per Compute resource** are set to 5, then up to 10 backups can be taken at once – 5 per data store, and 5 per Compute resource.

Incremental backups

*Minimum Disk Size Calculation Coefficient for Template* - this parameter is for incremental backups only. During the backup conversion to template, backup’s size is multiplied by this coefficient to make sure that template will be slightly bigger than the actual size for correct performance.

Rsync options

These options are for clouds with enabled incremental backups. Your cloud must have dedicated backup server configured with one of the following file systems: ext2, ext3, ext4, reiserfs or xfs.

- **Store extended attributes** - enable this option to store extended attributes when taking incremental backups.
- **Store ACLs** - enable this option to store access control lists.

3. Click the **Save Configuration** button to finish.
Edit Interface Configuration

1. Go to your Control Panel's **Settings** menu, and click the **Configuration** icon.

2. Click the **Interface** tab to change the following application settings:

   Please note, the system will restart OnApp services automatically after you save new configuration.

Locales

- **Locales** – select locales which will be available for the users from the drop-down menu. You may select multiple locales.

IP addresses

- **IP range limit** – set the number of IPs that can be added as a range at the same time.

AJAX update rates (ms)

- **VS Status** - AJAX pagination update time for virtual servers
- **Dashboard/logs/other** - AJAX pagination update time for dashboard, logs and other screens

Pagination

- **Max items limit** – set the maximum amount of items which can be displayed per page applying **Show All** button in the list. If the overall number of the items in the list exceeds the number entered herein, **Show All** button will not be available in the list menu.

System themes

- **Default system theme** – select a system theme from a drop-down menu. It can be light or dark.

3. Click the **Save Configuration** button to finish.

Edit Defaults Configuration

1. Go to your Control Panel's **Settings** menu, and click the **Configuration** icon.

2. Click the **Defaults** tab to change the following application settings:

   Please note, the system will restart OnApp services automatically after you save new configuration.

**Enforce password complexity** - move this slider to the right to specify the following password complexity configuration settings:

- **Minimum length** - specify minimum required password length (0-99). The default value is 6.
- **Enforce at least one upper and lower case letter** - move this slider to the right to enforce user using both uppercase and lowercase letters in their password.
- **Enforce at least one letter and number** - move this slider to the right to enforce user using both letters and numbers in their password.
- **Enforce symbols** - move this slider to the right to enforce user using symbols in their password.
- **Enforce unique password every time** - move this slider to the right to make user enter unique password each time they change password (the last 12 passwords are saved in OnApp configuration). This refers to the user account passwords only.
- **Lockout attempts** - the number of unsuccessful login attempts that are allowed before user's account is locked out.
- **Expiry (Months)** - specify the password expiry period in months.
New Virtual Servers

- **Default Image Template** - choose a particular OS template as the default for VS creation. A new virtual server will be created using this template, unless otherwise set in the wizard.
- **Service Account Name** - specify the service account name that will be automatically created on VMware virtual servers to be able to communicate with them.

Firewall

- **Default firewall policy** – default settings for a VS's Networking > Firewall tab (accept/drop)
- **Enable KVM anti spoofing** - move this slider to the right to run the anti-spoofing mechanism for IP addresses of the network interfaces attached to KVM-based virtual servers. To apply the anti-spoofing, it is necessary to restart the Control Panel and OnApp Daemon.
- **Allow to start more than one Virtual Server with the same IP** - move this slider to the right to allow starting up virtual servers with one IP address.

SSH Options

- **SSH port** – specify the port used to connect to Compute resources and backup servers.

SSH Keys

- **SSH-keys** – click to manage the administrator SSH keys. The keys will be automatically assigned to all VSs which will be created in the cloud later.
  
To assign the keys to existing VSs, go to VS Overview > Properties menu.

3. Click the **Save Configuration** button to finish.

Edit Availability Configuration

OnApp High Availability brings new opportunity to deploy more than one Control Panel within one cloud. This allows you to improve cloud load balancing, minimize server downtime in case of CP issues and enhance scalability of the whole infrastructure.

Currently you can use one master CP and one redundant sharing a single database within the Cloud. The communication between Control Panel servers is implemented with daemons which are constantly notifying each other about transactions that are being processed.

Daemons are standalone applications working independently from the Control Panel. They can be deployed on the same host with the Control Panel or on the separate one. All Daemon instances continuously communicate with each other spreading information about availability and current activity. Daemons handle the following processes: transactions, backups, statistics, schedules, and CDN synchronization.

To manage your availability settings:

1. Go to your Control Panel’s Settings menu, and click the Configuration icon.
2. Click the Availability tab to change the following application settings:

   **Enable availability** - move this slider to the right to deploy two CPs within your cloud. Specify the following settings:

   Click the **Save Configuration** button to finish.
   - **Control Panel 1 LAN IP Address** - set the first Control Panel LAN IP address.
   - **Enable Control Panel 1** - move the slider to the right to make the first CP active. You can leave it disabled, so this CP will be a standby Control Panel.
   - **Control Panel 2 LAN IP Address** - specify the LAN for the second CP.
   - **Enable Control Panel 2** - move the slider to the right to make this CP active. If disabled, the Control Panel will be on a standby.
   - **Active Node IP Address** - the IP address of the CP which is performing a specific transaction.
   - **Transactions Processing** - ????

Responsibility

- Backups Processing
- Cloud health monitoring
- Billing Processing

Control Panel Recipes Settings
Recipes are sets of instructions that are triggered during the certain stages of events defined. By managing recipes via the Settings menu, you can assign recipes to the control panel server.

To manage this functionality make sure that you have the Manage recipes for Control Panel permission enabled.

To manage Control Panel recipes settings:

1. Go to your Control Panel’s Settings menu and click the Recipes icon.
2. On the screen that appears, you will see the details of all recipes in the cloud:
   - The left pane shows the list of all recipes in the cloud organized into recipe groups.
   - The right pane displays the list of control panel events to which the recipes can be assigned to.

Assign recipe

Drag and drop recipe to assign it to a desired control panel event.

You can assign virtual server recipes to the following events:

- KVM Compute resource goes online - run the recipe when the KVM Compute resource comes online
- KVM Compute resource goes offline - run the recipe when the KVM Compute resource goes offline
- XEN Compute resource goes online - run the recipe when the Xen Compute resource comes online
- XEN Compute resource goes offline - run the recipe when the Xen Compute resource goes offline
- VMware Compute resource goes online - run the recipe when the VMware Compute resource comes online
- VMware Compute resource goes offline - run the recipe when the VMware Compute resource goes offline
- Compute resource added - run the recipe when the new Compute resource is added
- Compute resource removed - run the recipe when Compute resource is removed
- VS Provisioning - run the recipe during VS provisioning
- VS Network rebuild - run the recipe when rebuilding a network
- VS Disk added - run the recipe when adding a disk
- VS Network Interface added - run the recipe when adding a network interface
- VS Disk resized - run the recipe when resizing a VS disk
- VS Resize - run the recipe when resizing a VS

To use drag and drop:

1. Click the arrow button in front of the required event to unfold it.
2. Select the required recipe in the left pane and hold it down with the left mouse button.
3. Drag the recipe up to the right pane and release the mouse button to drop the recipe and add it to the required event.

Remove recipe

To remove recipe:

1. Click the arrow button in front of the required event to view the list of recipes assigned to it.
2. Click the Delete button next to the recipe you want to remove.

Permissions List

The permissions are used to determine what the OnApp users are authorized to do within the cloud. OnApp uses role-based access to specify what users can view, edit, create or remove in OnApp. Each role is a set of permissions defined for the OnApp cloud that you can assign to specific users to control user access to the cloud settings.

To set the permissions:

1. Go to your Control Panel’s Roles and Sets menu.
2. On the screen that follows, you will see a list of all roles on your system on the following screen.
3. Click the Actions button next to the relevant role, then click Edit.
4. Change the role’s permissions for users as required, then click the Save button.

The Permissions chapter comprises the complete list of OnApp cloud permissions as well as the default permissions for the Admin and User roles.

List of all OnApp Permissions
The list below includes all the permissions that can be set up in OnApp.

- Activity logs
- Application Servers
- Autoscaling Configuration
- Autoscaling monitors
- Backup server zones
- Backup servers
- Backups
- Base resources
- Billing plans
- Blueprints
- Blueprint templates
- Blueprint template groups
- Blueprint template group relations
- CDN locations
- CDN resources
- CDN SSL Certificates
- CDN usage statistics
- CloudBoot
- Control panel
- Compute resources
- Compute zones
- Currencies
- Customer networks
- Customer VLANs
- Dashboard
- Data stores
- Data store joins
- Data store zones
- Disks
- DNS zone
- Edge groups
- Edge servers
- Federation
- Firewall rules
- Global search
- Groups
- Help
- High Availability Cluster
- Http Caching Rules
- iFrame
- Instance Types
- Internationalization
- IO Statistics
- IP Address Pools
- IP addresses
- ISOs
- Last access log
- Load balancing clusters
- Location Groups
- Log items
- Monthly billing statistics
- Nameservers
- Networks
- Network zones
- OnApp Storage
- OAuth Providers
- Payments
- Permissions
- Recipes
- Recipe Groups
- Recipe Group Relations
- Relation group templates
- Resource limits
- Restrictions Resources
- Restrictions Sets
- Roles
- SAML Identity Providers
- Schedule logs
- Schedules
OnApp administrators can control users’ ability to manage activity logs configuration through the Control Panel’s Roles and Sets menu. The following activity logs for user roles can be set:

- **Any action on Activity Logs** - the user can take any action on activity logs
- **Destroy any Activity Logs** - the user can delete activity logs
- **Destroy own Activity Logs** - the user can only delete their own activity logs
- **See list of all Activity Logs** - the user can see list of all activity logs
- **See list own Activity Logs** - the user can only see list of their own activity logs
- **See all Activity Logs** - the user can see all activity logs
- **See all own Activity Logs** - the user can only see their own activity logs

Application Servers

OnApp administrators can control users’ ability to manage application servers. This is handled through the Control Panel’s Roles and Sets menu. You can set the following application servers permissions for user roles:

- **Any action on application servers** – the user can take any action on application servers
- **Change an owner of any application server** – the user can change the owner of any application server
- **Create a new application server** – the user can create a new application server
- **Destroy any application server** – the user can delete any application server. To delete any application server together with its backups, the user needs to have the **Destroy any backup** permission enabled. Otherwise, the backups of the application server deleted by the user will remain in the system.
- **Destroy own application servers** – the user can only delete their own application servers. To delete an application server together with its backups, the user needs to have the **Destroy own backup** permission enabled. Otherwise, the backups of the application server deleted by the user will remain in the system.
- **Migrate any application server** – the user can migrate any application server
- **Migrate own application servers** – the user can only migrate their own application servers
- **Any power action on application servers** – the user can take any power-related action on application servers
- **Any power action on own application servers** – the user can only take power-related actions on their own application servers
- **See all application servers** – the user can view any application server. If this permission is enabled, the user can manage applications deployed on any application server.
- **See own application servers** – the user can only view their own application servers. If this permission is enabled, the user can manage applications deployed on their application servers
- **Read VIP status** - the user can read VIP status of application servers.
- **Rebuild Network on any application server** – the user can rebuild network of any application server
- **Rebuild Network on own application servers** – the user can only rebuild network of own application server
- **Set VIP status** – the user can set/delete VIP status for application servers
- **Change Suspended status for application server** – the user can change Suspended status for an application server
- **Unlock any application server** – the user can unlock any application server
- **Update any application server** – the user can edit any application server
- **Update own application servers** – the user can only edit their own application servers

For details, refer to Application Servers section.

Autoscaling Configuration

OnApp administrators can control users’ ability to manage VS autoscaling configuration through the Control Panel’s Roles and Sets menu. The following autoscaling permissions for user roles can be set:
• Any Actions with Autoscaling Configuration - the user can take any action on autoscaling configuration
• Create Autoscaling Configuration - the user can create autoscaling configuration
• Destroy any Autoscaling Configuration - the user can delete autoscaling configuration
• Destroy own Autoscaling Configuration - the user can only delete own autoscaling configuration
• Read all Autoscaling Configuration - the user can read autoscaling configuration
• Read own Autoscaling Configuration - the user can only read own autoscaling configuration
• Update all Autoscaling Configuration - the user can edit autoscaling configuration
• Update own Autoscaling Configuration - the user can only edit own autoscaling configuration

For details, refer to the Autoscale Virtual Server section.

**Autoscaling monitors**

OnApp administrators can control users’ access to monitis monitors. You can set the following monitis monitors permissions for user roles:

• Any Actions on relation autoscaling monitors - the user can perform any actions on relation monitis monitors
• View autoscaling monitor information - the user can view monitis monitor information

For details, refer to View Load Balancer Autoscaling Monitors section.

**Auto-backup presets**

OnApp administrators can control users’ ability to manage auto-backup presets configuration through the Control Panel's Roles and Sets menu. The following auto-backup presets permissions for user roles can be set:

• Any action on auto-backup presets - the user can take any action on auto-backup presets that have been backed up automatically
• See all auto-backup presets - the user can see all auto-backup presets that have been backed up automatically
• Update any auto-backup presets - the user can edit any auto-backup presets that has been backed up automatically

For details, refer to Auto-backup Presets Settings section.

**Backup server zones**

OnApp administrators can control users’ ability to manage backup server zones through the Control Panel's Roles and Sets menu. The following backup server zone permissions for user roles can be set:

• Any action on backup server zones - the user can take any action on backup server zones
• Create a new backup server zone - the user can create a new backup server zone
• Delete any backup server zone - the user can delete any backup server zone
• See list of all backup server zones - the user can see list of all backup server zones
• See details of any backup server zone - the user can see details of any backup server zone
• Update any backup server zone - the user can edit any backup server zone

For details, refer to Backup Server Zones Settings chapter.

**Backup servers**

OnApp administrators can control users’ ability to manage backup servers through the Control Panel's Roles and Sets menu. You can set the following backup server permissions for user roles:

• Any action on Backup servers - the user can take any action on any Backup server
• Add a new Backup server - the user can add a Backup server
• Delete any Backup server - the user can delete any Backup server
• See all Backup servers - the user can see all Backup servers
• Update any Backup server - the user can edit any Backup server

For details, refer to Backup Servers Settings chapter.

**Backups**
OnApp administrators can control users' ability to manage backups through the Control Panel's Roles and Sets menu. You can set the following backup permissions for user roles:

- **Any action on backups** - the user can take any action on any backup
- **Convert any backup to template** - the user can take any backup of any virtual server, and convert it to a template
- **Convert own backup to template** - the user can only convert their own backups to templates
- **Create backup for any VS** - the user can create a backup of any virtual server
- **Create backup for own VS** - the user can only create backups of their own virtual servers
- **Destroy any backup** - the user can delete any backup. To delete any virtual server together with its backups, the user needs to have this permission enabled. Otherwise, the backups of the VS deleted by the user will remain in the system.
- **Destroy own backup** - the user can only delete their own backups. To delete own virtual server together with its backups, the user needs to have this permission enabled. Otherwise, the backups of the VS deleted by the user will remain in the system.
- **See all backups** - the user can see all backups
- **See own backups** - the user can only see their own backups
- **Update any backup** - the user can edit any backup
- **Update own backup** - the user can only edit their own backups

For details, refer to the Virtual Server Backups section.

### Base resources

OnApp administrators can control users' ability to manage billing plan resources through the Control Panel's Roles and Sets menu. You can set the following base resource permissions for user roles:

- **Any action on resources** - the user can take any action on base resources
- **Create a new resource** - the user can create a new base resource
- **Delete any resource** - the user can delete any base resource
- **See list of all resources** - the user can see list of all base resources
- **See details of any resource** - the user can see details of any base resource
- **See own base resources** - the user can only see own base resources
- **Update any resource** - the user can edit any base resource

For details, refer to the Billing Plans chapter.

### Billing plans

OnApp administrators can control users' ability to manage billing plans through the Control Panel's Roles and Sets menu. You can set the following billing plan permissions for user roles:

- **Any action on billing plans** - the user can take any action on any billing plan
- **Create a new billing plan** - the user can create a new billing plan
- **Delete any billing plan** - the user can delete any billing plan
- **See list of all billing plans** - the user can see list of all billing plans
- **See details of any billing plan** - the user can see details of any billing plan
- **See own billing plan** - the user can only see own billing plan
- **Update any billing plan** - the user can edit any billing plan

For details, refer to the Billing Plans chapter.

### Blueprints

OnApp administrators can control users' ability to manage blueprints through the Control Panel's Roles and Sets menu. You can set the following blueprint permissions for user roles:

- **Any action on blueprints** - the user can take any action on blueprints
- **Create a new blueprint** - the user can create a new blueprint
- **Destroy any blueprint** - the user can delete any blueprint
- **Destroy own blueprint** - the user can delete own blueprints
- **See all blueprints** - the user can see list of all blueprints
- **Read own blueprint** - the user can see details of own blueprint
- **Update any blueprint** - the user can edit own blueprint
- **Update own blueprint** - the user can edit any blueprint

For details, refer to the Blueprint Servers section.
Blueprint templates

- Any action on blueprint templates - the user can take any action on blueprint templates
- Create a new blueprint template - the user can create a new blueprint template
- Destroy any blueprint template - the user can delete any blueprint template
- Destroy own blueprint template - the user can delete own blueprint templates
- See all blueprint templates - the user can see list of all blueprint templates
- Read own blueprint template - the user can see details of own blueprint template
- Update any blueprint template - the user can edit any blueprint template
- Update own blueprint template - the user can edit own blueprint template

For details, refer to Blueprint Templates section.

Blueprint template groups

- Any action on blueprint template groups - the user can take any action on blueprint template groups
- Create a new blueprint template group - the user can create new blueprint template groups
- Destroy any blueprint template group - the user can delete any blueprint template group
- Destroy own blueprint template group - the user can delete own blueprint templates
- See all blueprint template groups - the user can see all blueprint template groups
- Update any blueprint template group - the user can update any blueprint template group

For details, refer to Blueprint Template Groups section.

Blueprint template group relations

- Any action on blueprint template group relations - the user can take any action on blueprint template group relations
- Create a new blueprint template group relation - the user can create a new blueprint template group relation
- Destroy any blueprint template group relation - the user can delete any blueprint template group relation
- Destroy own blueprint template group relation - the user can delete own blueprint template group relations
- See all blueprint template group relations - the user can see all blueprint template group relations
- Update any blueprint template group relation - the user can update any blueprint template group relations

For details, refer to Blueprint Template Groups section.

CDN locations

OnApp administrators can control users' ability to manage CDN locations through the Control Panel's Roles and Sets menu. You can set the following CDN locations permissions for user roles:

- Any action on CDN Locations - the user can take any action on CDN locations
- See all CDN Locations - the user can see details of all CDN locations
- Update any CDN Locations - the user can edit any CDN locations

CDN resources

OnApp administrators can control users' ability to manage CDN resources through the Control Panel's Roles and Sets menu. You can set the following CDN resources permissions for user roles:

- Any action on CDN resources - the user can take any action on CDN resources
- Create a new CDN resource - the user can create a new CDN resource
- Destroy any CDN resource - the user can delete a CDN resource
- Destroy own CDN resources - the user can only delete their own CDN resources
- See all CDN resources - the user can see all CDN resources
- See own CDN resources - the user can only see their own CDN resources
- Update any CDN resource - the user can edit any CDN resource
- Update own CDN resources - the user can only edit their own CDN resources

For details, refer to CDN Resources section.

CDN SSL Certificates
• Any action on CDN SSL Certificates - the user can take any action on CDN SSL certificates
• Create a new CDN SSL Certificate - the user can create a new CDN SSL certificate
• Destroy any CDN SSL Certificates - the user can delete any CDN SSL certificate
• Destroy own CDN SSL Certificate - the user can only delete their own CDN SSL certificates
• See all CDN SSL Certificates - the user can see all CDN SSL certificates. If this permission is disabled, the user cannot create SSL certificates.
• See own CDN SSL Certificates - the user can only see their own CDN SSL certificates
• Update any CDN SSL Certificate - the user can edit any CDN SSL certificate
• Update own CDN SSL Certificate - the user can only edit their own CDN SSL certificates

For details, refer to CDN SSL Certificates section.

**CDN usage statistics**

OnApp administrators can control users’ ability to manage CDN usage statistics through the Control Panel's Roles and Sets menu. You can set the following CDN usage statistics permissions for user roles:

• See details of CDN usage statistics - the user can see CDN usage statistics details
• User can see CDN usage statistics - the user can see CDN usage statistics
• User can see own CDN usage statistics - the user can only see own CDN usage statistics

For details, refer to CDN usage section.

**CloudBoot**

• Manage CloudBoot configurations - the user can manage Cloud Boot settings

**Control panel**

• Manage recipes for Control Panel - the user can manage recipes for any Control Panel

This permission will not be granted by pressing Full access button while editing the list of Permissions in the Roles section and can only be selected manually.

**Compute resources**

OnApp administrators can control users’ ability to manage Compute resources. This is handled through the Control Panel's Roles and Sets menu. You can set the following Compute resource permissions for user roles:

• Any action on Compute resources - the user can take any action on Compute resources
• Create a new Compute resource - the user can create a new Compute resource
• Destroy any Compute resource - the user can delete any Compute resource
• See all Compute resources - the user can see all Compute resources
• Show Compute resources on Virtual Server creation - display Compute resources on Add New Virtual Server screen. Note: the See All Compute resources permission must be enabled for this permission to work properly.
• Reboot any Compute resource - the user can reboot any Compute resource
• Update any Compute resource - the user can edit any Compute resource

For details, refer to Compute Resource Settings chapter.

**Compute zones**

OnApp administrators can control users’ ability to manage Compute zones. This is handled through the Control Panel's Roles and Sets menu. You can set the following Compute zone permissions for user roles:

• Any action on Compute zones - the user can take any action on Compute zones
• Create a new Compute zone - the user can create a new Compute zone
• Delete any Compute zone - the user can delete any Compute zone
• See list of all Compute zones - the user can see list of all Compute zones
• See details of any Compute zone - the user can see details of any Compute zone
• Show Compute Zones on Virtual server creation - display Compute zones on Add New Virtual Server screen. Note: the See Details of
any Compute Zone permission must be enabled for this permission to work properly.

- Manage recipes for Compute zone - the user can manage recipes for any Compute zone
- Update any Compute zone - the user can edit any Compute zone

For details, refer to Compute Zones Settings chapter.

**Currencies**

OnApp administrators can control users' ability to manage currency through the Control Panel's Roles and Sets menu. You can set the following currency permissions for user roles:

- Any action on Currencies - the user can take any action on currencies
- Create new Currency - the user can create a new currency
- Delete any Currency - the user can delete any currency
- See list of all Currencies - the user can view any currency
- Update all Currencies - the user can update any currency

For details, refer to Currencies section.

**Customer networks**

- Any action on customer networks – the user can take any action on customer networks
- Create own customer network – the user can create own customer networks
- Destroy own customer network – the user can delete own customer networks
- See own customer networks – the user can view own customer networks

For details, refer to Customer vCenter Networks section

**Customer VLANs**

- Any action on Customer VLAN - the user can see all actions available on customer VLANs
- Create a new Customer VLAN - the user can create a new customer VLAN
- Destroy any Customer VLAN - the user can delete all customer VLANs
- See all Customer VLANs - the user can view any customer VLAN
- Update any Customer VLAN - the user can edit any customer VLAN

For details, refer to Customer VLANs section.

**Dashboard**

OnApp administrators can control users' access to the dashboard through the Control Panel's Roles and Sets menu. You can set the following dashboard permissions for user roles:

- All actions on Dashboard - the user can see all available dashboard actions
- See Alerts - the user can see alerts on the dashboard, including zombie VSS and transactions, and background processes
- See Global Statistic - the user can see Global Dashboard statistics
- See License Details - the user can see Dashboard Cloud Licenses' details
- Show cloud dashboard - the user can see the cloud details on the dashboard

For details, refer to Dashboard section.

**Data stores**

OnApp administrators can control user access to data store management. You can set the following data store permissions for user roles:

- Any action on data_stores - the user can take any action on data stores
- Create a new data_store - the user can create a new data store
- Destroy any data_store - the user can delete any data store
- See all data_stores - the user can see all data stores
- Update any data_store - the user can edit any data store

For details, refer to Data stores section.
**Data store joins**

OnApp administrators can control users' ability to manage data store joins through the Control Panel's Roles and Sets menu. You can set the following data store joins permissions for user roles:

- **All actions on datastores on Compute resource** - the user can take any action on data stores attached to a Compute resource
- **Add Data Store to any Compute resource** - the user can add a data store to any Compute resource
- **Remove Data Store from any Compute resource** - the user can detach a data store from any Compute resource

For details, refer to [Manage Compute Zone Data Stores](#) section.

**Data store zones**

OnApp administrators can control user access to data store zones management. You can set the following data store zone permissions for user roles:

- **Any action on data store zones** - the user can take any action on data store zones
- **Create a new data store zone** - the user can create a new data store zone
- **Delete any data store zone** - the user can delete any data store zone
- **See list of all data store zones** - the user can see list of all data store zones
- **See details of any data store zone** - the user can see details of any data store zone
- **Update any data store zone** - the user can edit any data store zone

For details, refer to [Data Store Zones Settings](#) section.

**Disks**

OnApp administrators can control user access to disks management. You can set the following disks permissions for user roles:

- **Any action on disks** - the user can take any action on disks
- **Auto-backup for any disk** - the user can schedule an automatic backup on any disk
- **Auto-backup for own disk** - the user can only schedule automatic backups on their own disks
- **Create a new disk** - the user can create a new disk
- **Destroy any disk** - the user can delete any disk
- **Destroy own disk** - the user can only delete their own disks
- **Migrate any disk** - the user can migrate any disk
- **Migrate own disks** - the user can only migrate their own disks
- **See all disks** - the user can see all disks
- **See own disks** - the user can only see their own disks
- **Unlock any disk** - the user can unlock any disk
- **Update any disk** - the user can edit any disk
- **Update own disk** - the user can only edit their own disks

For details, refer to [Virtual Server Disks](#) section.

**DNS zone**

OnApp administrators can control users' ability to manage DNS zones through the Control Panel's Roles and Sets menu. You can set the following DNS zone permissions for user roles:

- **Any action on DNS zone** - the user can take any action on DNS zone
- **Create a new DNS zone** - the user can create a new DNS zone
- **Destroy any DNS zone** - the user can delete a DNS zone
- **Destroy own DNS zone** - the user can only delete their own DNS zones
- **See all DNS zones** - the user can see all DNS zones
- **See own DNS zones** - the user can only see their own DNS zones
- **Any action on DNS record** - the user can take any action on DNS record
- **Create a new DNS record** - the user can create a new DNS record
- **Destroy any DNS record** - the user can delete a DNS record
- **See all DNS records** - the user can see all DNS records
- **See own DNS records** - the user can see own DNS records
- **Update any DNS record** - the user can update any DNS record
- **Update own DNS record** - the user can update own DNS record
- **DNS Setup** - the user can set up DNS
For details, refer to DNS chapter.

**Edge groups**

OnApp administrators can control users’ ability to manage edge groups through the Control Panel's Roles and Sets menu. You can set the following edge groups permissions for user roles:

- *Any action on edge groups* - the user can take any action on edge groups
- *Create a new edge group* - the user can create a new edge group
- *Destroy any edge group* - the user can delete any edge group
- *See all edge groups* - the user can see all edge groups
- *See list of available Edge Group Locations* - allows users to see the list of all available locations which can be assigned to the edge group
- *Read price for all Edge Group Locations* - with this permission users will see the price for using the location. Without this permission, users won’t see the price column at all neither for assigned location nor for available
- *Update any edge group* - the user can edit any edge group

For details, refer to CDN Edge Groups section.

**Edge servers**

OnApp administrators can control users’ ability to manage edge servers through the Control Panel's Roles and Sets menu. You can set the following edge server permissions for user roles:

- *Any action on Edge Server* - the user can take any actions on edge servers
- *Change an owner of any Edge Server* - the user can change the owner of any edge server
- *Create a new Edge Server* - the user can create a new edge server
- *Destroy any Edge Server* - the user can destroy any edge server
- *Destroy own Edge Servers* - the user can destroy own edge servers
- *Migrate any Edge Server* - the user can migrate any edge server
- *Migrate own Edge Servers* - the user can migrate own edge servers
- *Any power action on Edge Servers* - the user can take any power-related action on edge server
- *Any power action on own Edge Servers* - the user can take any power-related action on own edge servers
- *See all Edge Servers* - the user can see all edge servers
- *See own Edge Servers* - the user can see own edge servers
- *Read VIP status* - the user can read VIP status of edge servers
- *Rebuild Network on any Edge Server* - the user can rebuild network on any edge server
- *Rebuild Network on own Edge Servers* - the user can only rebuild network on own edge servers
- *Set VIP status* - the user can set/delete VIP status for edge servers
- *Change Suspended status for Edge Server* - the user can change Suspended status for any edge server
- *Unlock any Edge Server* - the user can unlock any edge server
- *Update any Edge Server* - the user can update any edge server
- *Update own Edge Servers* - the user can update own edge servers

For details, refer to CDN Edge Servers section.

**Federation**

OnApp administrators can control users’ ability to access federated resources through the Control Panel's Roles and Sets menu. You can set the following federation permissions for user roles:

- *Any actions on federation resources* - the user can perform any action on federated resources
- *Add Compute zone to federation* - the user can add Compute zone to federation
- *View unsubscribed federation resources* - the user can view unsubscribed federation resources
- *Remove Compute zone from federation* - the user can remove Compute zone from federation
- *Activate or deactivate Compute zone for federation* - the user can activate or deactivate Compute zone for federation
- *Subscribe to the Compute zone* - the user can subscribe to the Compute zone
- *Unsubscribe from the Compute zone* - the user can unsubscribe from the Compute zone

For details, refer to the Federation Guide.

**Firewall rules**

OnApp administrators can control users’ ability to manage firewall rules through the Control Panel's Roles and Sets menu. You can set the following firewall rules permissions for user roles:

- *Any Action on Firewall Rules* - the user can take any actions with firewall rules
- *Create Firewall Rules for anyone* - the user can create firewall rules for anyone
- *Create own Firewall Rules* - the user can only create own firewall rules
- *Destroy any Firewall Rules* - the user can delete any firewall rules
• *Destroy own Firewall Rules* - the user can only delete own firewall rules
• *Read all Firewall Rules* - the user can read all firewall rules
• *Read own Firewall Rules* - the user can only read own firewall rules
• *Update all Firewall Rules* - the user can edit all firewall rules
• *Update own Firewall Rules* - the user can only edit own firewall rules

For details, refer to *Set Virtual Server Firewall Rules* section.

**Global search**

OnApp administrators can control user access to global search. You can set the following global search for user roles:

• *Global search* - global search through the whole database

For details, refer to *Cloud Search Tool* section.

**Groups**

This set of permissions is reserved for future use and currently is not used. Enabling or disabling those permissions will not effect the system in any way.

**Help**

OnApp administrators can control user access to help section.

• *All actions on Help* - the user can take any action under the Help menu
• *Send Support requests* - the user can send support requests from the Help menu

For details, refer to *Help* chapter.

**High Availability Cluster**

• Manage HA clusters settings - the user can manage High Availability clusters in the *Settings > HA Clusters* menu.

**Http Caching Rules**

OnApp Administrators can control user's ability to manage HTTP Caching rules. You can set the following permissions:

• *Any actions on http caching rules* - the user can create/delete/set rules/edit rules.
• *Create http caching rules* - the user can only create HTTP caching rules.
• *Delete http caching rules* - the user can remove HTTP caching rules.
• *See http caching rules for cdn resources* - the user can set HTTP caching rules for the resources.
• *Update http caching rules* - the user can edit HTTP caching rules.

**iFrame**

• *Any action on iFrame* - the user can perform any action on iFrame
• *Create new iFrame* - the user can create a new iFrame instance
• *Destroy any iFrame* - the user can delete any iFrame instance
• *See all iFrame* - enables to see the list of all iFrames in the cloud
• *See own iFrame* - enables to see only the iFrames associated with own user profile. Without this permission users won't be able to see the iFrame configured by the administrator.
• *Update any iFrame* - the user can edit any iFrame

For detail refer to *iFrame Configuration* section.

**Instance Types**

• *Any action on Instance Types* - the user can take any action on Instance Types
• *Create Instance Type* - the user can create new Instance Types
• *Delete any Instance Type* - the user can delete any Instance Type
- See all Instance Types - the user can see all Instance Types
- Update any Instance Type - the user can update any Instance Type

For details, refer to the Instance Types section.

**Internationalization**

- Edit Internationalization Locales - the user can view and edit all non-English language phrases

For details, refer to Localization and Customization chapter.

**IO Statistics**

OnApp administrators can control user access to IOPS statistics.

- Full access to IO Statistics - the user has full access to IO Statistics
- See all IO Statistics - the user can see all IO Statistics
- See own IO Statistics - the user can see own IO Statistics

For details on IO Statistics, refer to View Disk IOPS section

**IP Address Pools**

- Any action on IP Address Pool - the user has full access to IP address pools
- Create a new IP Address Pool - the user can create new IP address pools
- Destroy any IP Address Pool - the user can delete any IP address pool
- See all IP Address Pools - the user can see all IP address pools

For details, refer to IP Address Pools chapter.

**IP addresses**

OnApp administrators can control users' ability to manage IP addresses. This is handled through the Control Panel's Roles and Sets menu. You can set the following IP address permissions for user roles:

- Any action on IP addresses - the user can take any action on IP addresses
- Assign IP address to user - the user can assign IP address to user
- Create a new IP address - the user can create a new IP address
- Destroy any IP address - the user can delete any IP address
- See all IP addresses - the user can see all IP addresses
- Unassign IP address from user - the user can unassign IP address from user
- Update any IP address settings - the user can edit any IP address settings

For details, refer to Assign IP Address to User and Unassign IP Address from User sections.

**ISOs**

OnApp administrators can control users' ability to manage ISOs. This is handled through the Control Panel's Roles and Sets menu. You can set the following ISO permissions for user roles:

- Any action on ISOs - the user can take any action on ISOs
- Create a new ISO - the user can create a new ISO
- Destroy any ISO - the user can delete any ISO (own, user, and public)
- Destroy own ISO - the user can only delete own ISO
- Destroy user ISO - the user can delete ISOs created by any user, but not public ISOs
- Make any ISO public - the user can make public any ISO available to all users
- Make own ISO public - the user can make public own ISOs only
- Make user ISO public - the user can make public ISOs created by any user
- Create and manage own ISOs - the user can create and edit/delete/view own ISOs
- Manage all ISOs - the user can manage own/user/public ISOs
- Create and manage user ISOs - the user can view/create/edit/delete ISOs created by any user
- See all ISOs - the user can view all ISOs in the cloud
• See own ISOs - the user can only view the ISOs created by themselves
• See all public ISOs - the user can view all public ISOs
• See user ISOs - the user can view the ISOs created by any user in the cloud
• Update any ISO - the user can edit any ISO in the cloud
• Update own ISO - the user can only edit own ISO
• Update user ISO - the user can edit the ISOs created by any user in the cloud

For details, refer to ISOs section.

**Last access log**

OnApp administrators can control users’ access to log. You can set the following last access log permissions for user roles:

• Any action on last access log - the user can perform any action on last access log of any user
• See the last access log of any user - the user can see the last access log of other users
• See own last access log - the user can only see their own last access log

For details, refer to **Load Balancers** section.

**Load balancers**

OnApp administrators can control users’ ability to manage load balancers. This is handled through the Control Panel's Roles and Sets menu. You can set the following load balancer permissions for user roles:

• Any action on load balancer - the user can take any action on load balancer
• Migrate any load balancer - the user can migrate any load balancer
• Migrate own load balancer - the user can only migrate their own load balancer

For details, refer to **Load Balancers** section.

**Load balancing clusters**

OnApp administrators can control users’ ability to manage load balancing clusters. This is handled through the Control Panel's Roles and Sets menu. You can set the following load balancing cluster permissions for user roles:

• Any action on load balancing cluster - the user can make any action on load balancing cluster
• Configure autoscale out parameter of load balancing cluster - the user can configure Autoscale Out when creating/updating a load balancing cluster
• Create a new load balancing cluster - the user can create a new load balancing cluster
• Delete any load balancing cluster - the user can delete any load balancing cluster
• Delete own load balancing cluster - the user can only delete their own load balancing cluster
• See details of any load balancing cluster - the user can see details of any load balancing cluster
• See details of own load balancing cluster - the user can only see details of their own load balancing cluster
• Change any load balancing cluster - the user can make changes on any load balancing cluster
• Change own load balancing cluster - the user can only change their own load balancing cluster

For details, refer to **Load Balancers** section.

**Location Groups**

OnApp administrators can control users’ ability to manage location groups. You can set the following location groups permissions for user roles:

• Any action on location groups - the user can take any action on location groups
• Create a new location group - the user can create a new location group
• Delete any location group - the user can attempt to delete location group
• See all location groups - the user can see details of any location group
• Refresh location groups - the user can refresh location groups

For details, refer to **Location Groups** section.

**Log items**

OnApp administrators can control users’ ability to manage log items. You can set the following log items permissions for user roles:

• Any action on log items - the user can take any action on log items
• Delete any log item - the user can delete any log item
• Delete own log item - the user can only delete their own log items
• See list of all log items - the user can see all log items
• See list of own log items - the user can only see their own log items
• See details of any log item - the user can see details of any log item
• See details of own log item - the user can only see details of their own log items

For details, refer to Logs section.

Monthly billing statistics

OnApp administrators can control users’ access to monthly billing statistics. You can set the following monthly bills permissions for user roles:

• Full access to Monthly Bills Statistics - the user has full access to monthly bills statistics
• See all Monthly Bills Statistics - the user can see all monthly bills statistics
• See only own Monthly Bills Statistics - the user can only see own monthly bills statistics

For details, refer to View User Account Details section.

Nameservers

OnApp administrators can control users’ ability to manage name servers. This is handled through the Control Panel’s Roles and Sets menu. You can set the following nameservers permissions for user roles:

• Any action on nameservers - the user can take any action on nameservers
• Create a new nameserver - the user can create a new nameserver
• Destroy any nameserver - the user can delete any nameserver
• See all nameservers - the user can see all nameservers
• Update any nameserver settings - the user can edit any nameserver

Networks

OnApp administrators control how users can manage networks. This is handled through the Control Panel’s Roles and Sets menu. You can set the following network permissions for user roles:

• Any action on networks - the user can take any action on networks
• Create a new network - the user can create a new network
• Destroy any network - the user can delete any network
• See all networks - the user can see all networks
• Update any network - the user can edit any network

For details, refer to Networks Settings section.

Network zones

OnApp administrators control a user’s ability to manage network zones. This is handled through the Control Panel’s Roles and Sets menu. You can set the following network zone management permissions for user roles:

• Any action on network zones - the user can take any action on network zones
• Create a new network zone - the user can create a new network zone
• Delete any network zone - the user can delete any network zone
• See list of all network zones - the user can see list of all network zones
• See details of any network zone - the user can see details of any network zone
• Update any network zone - the user can update any network zone

For details, refer to Network Zones Settings section.

OnApp Storage

• Manage OnApp storage - the user can access the OnApp storage settings

OAuth Providers

OnApp administrators can control users’ ability to manage OAuth providers through the Control Panel’s Roles and Sets menu. You can set the following OAuth providers permissions for user roles:

• Any action on OAuth providers - the user can take any action on OAuth providers
• See all OAuth providers - the user can see all configured OAuth providers
- **Update any OAuth provider** - the user can edit any OAuth provider

For details, refer to [OAuth](#) section.

### Payments

OnApp administrators control how users can manage payments. This is handled through the Control Panel's Roles and Sets menu. You can set the following payments permissions for user roles:

- **Any action on payments** - the user can take any action on payments
- **Create a new payment** - the user can create a new payment
- **Destroy any payment** - the user can delete any payment
- **See all payments** - the user can see all payments
- **See own payments** - the user can only see their own payments
- **Update any payment** - the user can edit any payment

For details, refer to [User Payments](#) section.

### Permissions

OnApp administrators control a user's ability to manage permissions. This is handled through the Control Panel's Roles and Sets menu.

- **Any action on permissions** - the user can take any action on permissions
- **Create a new permission** - the user can create a new permission
- **Destroy any permission** - the user can delete any permission
- **See all permissions** - the user can see all permissions
- **Update any permission** - the user can edit any permission

### Recipes

OnApp administrators control a user's ability to manage recipes. This is handled through the Control Panel's Roles and Sets menu.

- **Any actions on Recipes** - the user can take any action on recipes
- **Create new Recipes** - the user can create new recipes
- **Delete any Recipe** - the user can delete any recipe
- **Delete own Recipes** - the user can delete own recipes
- **Edit any Recipe** - the user can edit any recipe
- **Edit own Recipes** - the user can edit own recipes
- **Read any Recipe** - the user can read any recipe
- **Read own Recipes** - the user can read own recipes

For details, refer to [Recipes](#) chapter.

### Recipe Groups

- **Any action on recipe groups** - the user can take any action on recipe groups
- **Create a new recipe group** - the user can create a new recipe group
- **Destroy any recipe group** - the user can delete any recipe group
- **See list of all recipe groups** - the user can view the list of recipe groups
- **See all recipe groups** - the user can view any recipe group details
- **Update any recipe group** - the user can edit all recipe groups

For details, refer to [Recipe Groups](#) chapter.

### Recipe Group Relations

- **Any action on recipe group relations** - the user can take any action on recipe relation group
- **Create a new recipe group relation** - the user can create a new recipe relation group
- **Destroy any recipe group relation** - the user can delete any recipe relation group
- **See list of all recipe group relations** - the user can view the list recipe relation groups
- **See all recipe group relations** - the user can see recipe relation group details
- **Update any recipe group relation** - the user can edit any recipe relation group

For details, refer to [Recipe Groups](#) chapter.
Relation group templates

OnApp administrators control how users can manage relation group templates. This is handled through the Control Panel's Roles and Sets menu. You can set the following relation group templates permissions for user roles:

- Any action on relation group templates - the user can take any action on relation group templates
- Create a new relation group template - the user can create a new relation group template
- Create own relation group template - the user can create his own template group
- Destroy any relation group template - the user can delete any relation group template
- Destroy own relation group templates - the user can delete own relation group templates
- See all relation group templates - the user can see all relation group templates
- See own relation group templates - the user can see his own relation group templates
- Update price for relation group template - the user can update price for relation group template

For details, refer to Template Store and My Template Groups section.

Resource limits

OnApp administrators control how users can manage resource limits. This is handled through the Control Panel's Roles and Sets menu. You can set the following resource limits permissions for user roles:

- Any action on resource limit - the user can take any action on resource limits
- Create a new resource limit - the user can create a new resource limit
- Destroy any resource limit - the user can delete any resource limit
- See all resource limits - the user can see all resource limits
- See own resource limits - the user can only see their own resource limits
- Update any resource limit - the user can edit resource limits for any user account

For details, refer to Set Billing Plan Prices And Resource Limits section.

Restrictions Resources

OnApp administrators can control users' ability to manage restrictions resources through the Control Panel's Roles and Sets menu. You can set the following restrictions resources permissions for user roles:

- Any actions on restrictions resources - the user can take any actions on restrictions resources while configuring restriction sets (Roles and Sets > Restrictions Sets tab > Resources)
- See all restrictions resources - the user can see all restrictions resources while configuring restriction sets (Roles and Sets > Restrictions Sets tab > Resources)

For details, refer to Restrictions Sets chapter.

Restrictions Sets

OnApp administrators can control users' ability to manage restrictions sets through the Control Panel's Roles and Sets menu. You can set the following restrictions sets permissions for user roles:

- Any action on restrictions sets - the user can take any action on restrictions sets
- Create a new restrictions set - the user can create a new restrictions set
- Delete restrictions set - the user can delete any restrictions set
- See all restrictions sets - the user can see all restrictions sets
- See own restrictions sets - the user can see restrictions sets assigned to his role(s)
- Update restrictions set - the user can update any restrictions set

For details, refer to Restrictions Sets chapter.

Roles

OnApp administrators control a user's ability to manage roles. This is handled through the Control Panel's Roles and Sets menu.

- Any action on Roles - the user can take any action on roles
- Create a new Role - the user can create a new role
- Destroy any Role - the user can delete any role
- See all Roles - the user can see all roles
- See user's own roles - the user can see only roles assigned to them
- Update any Role - the user can edit any role

For details, refer to Roles And Sets chapter.
**SAML Identity Providers**

- Any action on SAML identity providers - the user can perform any action on SAML Identity Providers
- Create a SAML identity provider - the user can add new Identity Provider
- Destroy any SAML identity provider - the user can delete any Identity Provider
- See all SAML identity providers - the user can see the list of all Identity Providers
- Update any SAML identity provider - the user can edit any SAML Identity Provider

**Schedule logs**

OnApp administrators control a user's ability to manage schedule logs. This is handled through the Control Panel's Roles and Sets menu.

- Any action on schedule logs - the user can take any action on schedule logs
- Create a new schedule log - the user can create a new schedule log
- Destroy any schedule log - the user can destroy any schedule log
- See all schedule logs - the user can see all schedule logs
- See own schedule logs - the user can only see their own schedule logs
- Update any schedule log - the user can edit any schedule log

For details, refer to Schedules Settings section.

**Schedules**

OnApp administrators control users' ability to manage schedules. This is handled through the Control Panel's Roles and Sets menu. You can set the following schedule management permissions for user roles:

- Any action on schedules - the user can take any action on schedules
- Create a new schedule - the user can create a new schedule
- Destroy any schedule - the user can delete any schedule
- Destroy own schedule - the user can only delete their own schedules
- See all schedules - the user can see all schedules
- See own schedules - the user can only see their own schedules
- Update any schedule - the user can edit any schedule
- Update own schedule - the user can only edit their own schedules

For details, refer to Schedules section.

**Sessions**

OnApp administrators control a user's ability to drop sessions. You can set the following drop session permissions for user roles:

- Any actions on sessions - the user can take any action on sessions
- Drop all the existing sessions - the user can drop all the existing sessions including their own
- Drop all the user sessions but the current - the user can delete all the sessions created under their account but their current

For details, refer to Drop Session section.

**Settings**

OnApp administrators control a user's ability to manage settings. This is handled through the Control Panel's Roles and Sets menu.

- Any action on settings - the user can take any action on settings
- See read settings - the user can see all settings
- Restart Dashboard Client - the user can restart the dashboard client
- Update Settings - the user can edit everything in the Settings menu
- View OnApp version - the can navigate to /version to see which version of OnApp is installed

For details, refer to OnApp Configuration chapter.

**Smart Servers**
OnApp administrators control how users can manage Smart Servers. This is handled through the Control Panel's Roles and Sets menu. You can set the following Smart Servers permissions for user roles:

- **Add recipe to any Smart Server** - the user can add recipes to any smart server
- **Add recipe to own Smart Server** - the user can add recipes to own smart servers only
- **Remove recipe from any Smart Server** - the user can remove a recipe from any smart server
- **Remove recipe from own Smart Server** - the user can remove recipe from own smart server

For details, refer to Smart Servers chapter.

**SSH keys**

OnApp administrators control how users can manage SSH keys. This is handled through the Control Panel's Roles and Sets menu. You can set the following SSH keys permissions for user roles:

- **Add ssh keys for all the virtual servers** - the user can add ssh keys for all the virtual servers
- **Add ssh keys for own virtual servers** - the user can only add ssh keys for own virtual servers

For details, refer to Add SSH Key section.

**Storage Servers**

- **Any action on Storage Server** - the user can take any actions on storage servers
- **Change an owner of any Storage Server** - the user can change the owner of any storage server
- **Create a new Storage Server** - the user can create a new storage server
- **Destroy any Storage Server** - the user can delete any storage server
- **Destroy own Storage Servers** - the user can delete own storage servers
- **Migrate any Storage Server** - the user can migrate any storage server
- **Migrate own Storage Servers** - the user can migrate own storage servers
- **Any power action on Storage Servers** - the user can take any power-related action on own storage servers
- **See all Storage Servers** - the user can see all storage servers
- **See own Storage Servers** - the user can see own storage servers
- **Read VIP status** - the user can read VIP status of storage servers
- **Rebuild Network on any Storage Server** - the user can rebuild network on any storage server
- **Rebuild Network on own Storage Servers** - the user can only rebuild network on own storage servers
- **Set VIP status** - the user can set/delete VIP status for storage servers
- **Change Suspended status for Storage Server** - the user can change Suspended status for any storage server
- **Unlock any Storage Server** - the user can unlock any storage server
- **Update any Storage Server** - the user can update any storage server
- **Update own Storage Servers** - the user can update own storage servers

For details, refer to CDN Storage Servers section.

**Sysadmin tools**

OnApp administrators control how users can manage sysadmin tools. This is handled through the Control Panel's Roles and Sets menu. You can set the following sysadmin tools permissions for user roles:

- **Any action Sysadmin Tools** - the user can see all actions on the Sysadmin Tools menu

For details, refer to Sysadmin Tools section.

**Templates**

OnApp administrators control how users can manage templates. You can set the following template sets permissions for user roles:

- **Any action on templates** - the user can take any action on all templates
- **See the list of available for installation templates** - the user can see all templates available for the installation from the template server (Templates > System templates > Available tab)
- **Install template upgrades** - the user can install upgrades to the system templates
- **See the list of template upgrades** - the user can see the upgrades for the installed system templates
- **Create a new template** - the user can create a new template
- **Destroy any template** - the user can delete any template
• Destroy own template - the user can only delete their own templates
• Destroy user template - the user can delete any user templates
• See the list of inactive templates - the user can see the list of inactive templates
• See list of active installations - the user can see the list of active template installations
• Make any template public - the user can make any template public
• Make own template public - the user can only make their own templates public
• Make user template public - the user can make any user templates public
• Manage own templates - the user can create and view/edit/delete their own templates
• Manage public templates - the user can create/edit/delete/view system/public template
• Manage user templates - the user can create and manage user templates
• See all templates - the user can see all templates
• See own templates - the user can only see their own templates
• See all public templates - the user can see all system templates including public
• See user templates - the user can see any user templates
• Manage recipe for any template - the user can manage recipes for any template
• Manage recipe for own templates - the user can manage recipes for own templates only
• Restart failed installation - the user can restart failed template installation
• Update any template - the user can edit any template (Templates > System templates > Edit template)
• Update own template - the user can only edit their own templates (Templates > My templates > Edit template)
• Update user template - the user can update user templates (Templates > User templates > Edit template)

For details, refer to Templates chapter.

Template groups

OnApp administrators can control users' ability to manage image template groups. This is handled through the Control Panel's Roles and Sets menu. You can set the following image template groups permissions for user roles:

• Any action on template group - the user can take any action on template groups
• Create a new template group - the user can create a new template group
• Create own template group - the user can create his own template group
• Delete any template group - the user can delete a template group
• Delete own template group - the user can delete his own template group
• See details of any template group (image_template_groups.read) - the user can view template group details
• See details of own template groups - the user can view his own template groups
• Update any template group (image_template_groups.update) - the user can edit any template group
• Update own template groups - the user can edit his own template groups

For details, refer to Template Store and My Template Groups sections.

Themes

OnApp administrators control a user's ability to manage themes. You can set the following themes permissions for user roles:

• Any action on Themes - the user can make any action on themes
• Create Theme - the user can create new themes
• Destroy Theme - the user can delete themes
• Read Theme - the user can read themes
• Update Theme - the user can make changes in themes

For details, refer to Look & Feel section.

Transactions

OnApp administrators control a user's ability to manage transactions. You can set the following transactions permissions for user roles:

• Any action on transactions - the user can take any action on transactions
• Cancel zombie transactions - the user can cancel transactions which run too long and are most likely failed
• Cancel own zombie transactions - the user can cancel transactions which run too long and are most likely failed and belong to this user
• Delete all transactions from log - the user can delete all transactions from a log
• Delete own transactions from logs - the user can only delete their own transactions from a log
• See list of all transactions - the user can see all transactions
• See list of own transactions - the user can only see their own transactions
• See details of all transactions - the user can see details of any transaction
• See details of own transaction - the user can only see details of their own transactions
For details, refer to Virtual Server Transactions and Logs, Smart Server Transactions and Logs, and VMware Virtual Server Transactions and Logs sections.

**Users**

OnApp administrators can control users' ability to manage configuration. This is handled through the Control Panel's Roles and Sets menu. You can set the following users permissions for user roles:

- **Any action on users** - the user can take any action on user accounts
- **Upload avatar** - the user can upload an avatar
- **Change user password** - the user can change user's password
- **Change own password** - the user can only change own password
- **Create any user** - the user can create a new user account
- **Destroy any user** - the user can delete any user account
- **Destroy own user** - the user can only delete their own user account
- **User can login as any user** - the user can login as any user
- **See all users** - the user can see all user accounts
- **See all users prices** - the user can see all users prices. By disabling this permission together with the See user outstanding amount and See user summary payments permissions, you can hide the payment screen on the dashboard.
- **See user backups/templates prices** – the user can see users' backups/templates prices
- **See user billing plan** – the user can see users' billing plans
- **See user hourly prices** – the user can see users' hourly prices
- **See user monthly prices** – the user can see users' monthly prices
- **See user outstanding amount** – the user can see users' outstanding amount. By disabling this permission together with the See all users prices and See user summary payments permissions, you can hide the payment screen on the dashboard.
- **See user summary payments** – the user can see users' summary payments. By disabling this permission together with the See user outstanding amount and See all users prices permissions, you can hide the payment screen on the dashboard.
- **See user total cost** – the user can see users' total cost
- **See user virtual server prices** – the user can see users' virtual server prices
- **See own users** – the user can only see their own user account
- **Suspend and unsuspend users** – the user can suspend/unsuspend any users
- **Unlock any user** - the user can unlock any user
- **Generate API key** – the user can generate API key for all users
- **Generate own API key** – the user can only generate own key
- **Update own user** – the user can only edit their own user account

For details, refer to Users chapter.

**User additional fields**

OnApp administrators control a user's ability to manage user additional fields. You can set the following user additional fields permissions for user roles:

- **Any action on user additional fields** - the user can perform any action on additional fields for user
- **Create user additional fields** - the user can create user additional fields
- **Destroy any user additional fields** - the user can delete any user additional fields
- **Read all user additional fields** - the user can read all user additional fields
- **Update all user additional fields** - the user can edit all user additional fields

For details, refer to User Additional Fields section.

**User groups**

OnApp administrators control a user's ability to manage user groups. You can set the following user groups permissions for user roles:

- **Any action on user groups** - the user can take any action on user groups
- **Create a new user group** - the user can create a new user group
- **Destroy user group** - the user can delete any user group
- **See list of all user groups** - the user can see the list of all user groups
- **See details of any user group** - the user can see details of any user group
- **Update any user group** - the user can edit any user group

For details, refer to User Groups section.
**VApps**

OnApp administrators can control users’ ability to manage vApps. This is handled through the Control Panel’s Roles and Sets menu. You can set the following vApps permissions for user roles:

- **Any action on vApps** – the user can take any action on vApps
- **Create a new vApp** – the user can create a new vApp
- **Delete any vApp** – the user can destroy any vApp
- **Delete own vApps** – the user can only destroy their own vApps
- **Any power action on vApps** – the user can take any power actions on vApps
- **Any power action on own vApps** – the user can only take power actions on their own vApps
- **Read any vApps** – the user can view any vApps
- **Read own vApps** – the user can only view their own vApps
- **Edit any vApp** – the user can edit any vApp
- **Edit own vApps** – the user can only edit their own vApps

**VApp Template Groups**

OnApp administrators can control users’ ability to manage vApp template groups. This is handled through the Control Panel’s Roles and Sets menu. You can set the following vApp template group permissions for user roles:

- **Any action on vApp template groups** – the user can take any action on vApp template groups
- **Read any vApp template group** – the user can view any vApp template group

**Virtual Servers**

OnApp administrators can control users’ ability to manage virtual servers. This is handled through the Control Panel’s Roles and Sets menu. You can set the following virtual servers permissions for user roles:

- **Any action on virtual servers** – the user can take any action on virtual servers
- **Allow all virtual servers to boot from ISO** - the user can boot from ISO any virtual server in the cloud
- **Allow own virtual servers to boot from ISO** - the user can boot from ISO their own virtual servers only
- **Build/rebuild any virtual server** - the user can build or rebuild any virtual server
- **Build/rebuild user's own virtual server** - the user can build or rebuild their own virtual servers only
- **Change an owner of any virtual server** – the user can change the owner of any virtual server
- **Console to any virtual server** – the user can access any virtual server via console
- **Console to own virtual server** – the user can only access their own virtual server via console
- **Allow user to set CPU topology** - the user can set CPU topology options for virtual server
- **Create a new virtual server** – the user can create a new virtual server
- **Destroy any virtual server** – the user can delete any virtual server. To delete any virtual server together with its backups, the user needs to have the **Destroy any backup permission** enabled. Otherwise, the backups of the VS deleted by the user will remain in the system.
- **Destroy own virtual server** – the user can only delete their own virtual servers. To delete a virtual server together with its backups, the user needs to have the **Destroy own backup permission** enabled. Otherwise, the backups of the VS deleted by the user will remain in the system.
- **Migrate any virtual server** – the user can migrate any virtual server
- **Migrate own virtual server** – the user can only migrate their own virtual servers
- **Any power action on virtual servers** – the user can take any power-related action on virtual servers
- **Any power action on own virtual servers** – the user can only take power-related actions on their own virtual servers
- **Read any virtual server** – the user can read any virtual server
- **Read own virtual servers** – the user can only read their own virtual servers
- **Read VIP status** - the user can read VIP status of virtual servers
- **Rebuild Network of any virtual server** – the user can rebuild network of any virtual server
- **Rebuild Network of own virtual server** – the user can only rebuild network of own virtual server
- **Manage recipes joins for all virtual servers** - the user can manage recipes joins for all virtual servers
- **Manage recipes joins for own virtual servers** - the user can manage recipes joins for their own virtual servers
- **Report a federation problem on any virtual server** - the user can report a federation problem on any virtual server
- **Report a federation problem on user's own virtual server** - the user can report a federation problem on user's own virtual server
- **Reset root password of any virtual server** – the user can reset the root password for any virtual server
- **Reset root password of own virtual server** – the user can only reset the root password of their own virtual servers
- **Select instance type on virtual server creation** - the user can select instance types on virtual server creation
- **Select resources manually on virtual server creation** - the user can select resources manually on virtual server creation
- **Set SSH keys** – the user can set their own ssh keys after the virtual server is created
- **Set VIP status** – the user can set/delete VIP status for virtual servers
- **Change Suspended status for virtual server** – the user can change Suspended status for a virtual server
- **Unlock any virtual server** – the user can unlock any virtual server
- **Update all virtual server** – the user can edit any virtual server

- **Manage recipes joins for own virtual servers**
• Update own virtual server – the user can only edit their own virtual servers
• Read Virtual Server’s root password - the user can view any virtual servers root password
• Read own Virtual Server’s root password - the user can view their own virtual servers root password
• Manage publications for all virtual servers - the user can manage publications for all virtual servers
• Manage publications for own virtual servers - the user can manage their own publications only

For details, refer to Appliances section.

Virtual Server Snapshots

OnApp administrators can control user’s access to VMware virtual server snapshots. You can set the following snapshot permissions:

• Any action on Virtual Server Snapshots - the user can take any action on snapshots
• Create or Restore own Virtual Server Snapshot - the user can create/restore own snapshots
• Destroy own Virtual Server Snapshot - the user can delete own snapshots
• See own Virtual Server Snapshots - the use can see the list of own snapshots

For details, refer to VMware Virtual Server Snapshots section.

Virtual Machine Statistics

OnApp administrators control user's access to virtual server statistics. You can set the following statistics permissions for user roles:

• See Virtual Machine Statistics – the user has full access to statistics
• See all Virtual Machines Statistics – the user can see statistics of all virtual servers
• See own Virtual Machines Statistics – the user can only see their own statistics

For details, refer to Virtual Server Statistics section.

Virtual Server's IP Addresses

OnApp administrators can control users’ ability to manage IP address joins. This is handled through the Control Panel's Roles and Sets menu. You can set the following IP address joins permissions for user roles:

• All actions on virtual server's IP addresses - the user can take any action on virtual server IP addresses
• Add IP address to any virtual server - the user can add an IP address to any virtual server
• Add IP address to own virtual server - the user can only add IP addresses to their own virtual servers
• Remove IP address from any virtual server - the user can remove an IP address from any virtual server
• Remove IP address from own virtual server - the user can only remove IP addresses from their own virtual servers
• See IP addresses assigned to any virtual servers - the user can see IP addresses assigned to any virtual server
• See IP addresses assigned to own virtual servers - the user can only see IP addresses assigned to their own virtual servers

For details, refer to Virtual Server IP Addresses section.

White IPs

OnApp administrators control a user's ability to manage white IPs. You can set the following white IPs permissions for user roles:

• Manage all White IPs for users - the user can take any action on White IPs for users
• Create white IP for all users - the user can create any white IP
• Create own white IP - the user can create own white IP
• Destroy white IP for all users - the user can destroy any white IP
• Destroy own white IPs - the user can only destroy own white IP
• Read all white user IPs - the user can read all white IPs
• Read own white IPs - the user can read own white IPs
• Update white IP for all users - the user can update any white IP
• Update own white IPs - the user can update own white IP

For details, refer to User Whitelist IPs section.

List of Default Permissions for Admin Role

The list below includes the set of default permissions for the Admin role in the OnApp v4.1.

Activity logs
• **Any action on Activity Logs** - the user can take any action on activity logs

**Application Servers**
• **Any action on application servers** – the user can take any action on application servers

**Autoscalings**
• **Any Actions on Autoscaling Configuration** - the user can take any actions with autoscaling configuration

**Autoscaling Monitors**
• **Any Actions on relation autoscaling monitors** - the user can perform any actions on relation monitors

**Auto-backup Presets**
• **Any action on auto-backup presets** - the user can take any action on auto-backup presets that have been backed up automatically

**Backup Server Zones**
• **Any action on backup server zones** - the user can take any action on backup server zones

**Backup Servers**
• **Any action on Backup servers** - the user can take any action on any Backup server

**Backups**
• **Any action on backups** - the user can take any action on any backup

**Base Resources**
• **Any action on resources** - the user can take any action on base resources

**Billing Plans**
• **Any action on billing plans** - the user can take any action on any billing plan

**Blueprints**
• **Any action on blueprints** - the user can take any action on blueprints

**Blueprint templates**
• **Any action on blueprint templates** - the user can take any action on blueprint templates

**Blueprints template groups**
• **Any action on blueprint template groups** - the user can take any action on blueprint template groups

**Blueprints template group relations**
• **Any action on blueprint template group relations** - the user can take any action on blueprint template group relations

**CDN locations**
• **Any action on CDN Locations** - the user can take any action on CDN locations

**CDN Resources**
• **Any action on CDN resources** - the user can take any action on CDN resources

**CDN SSL Certificates**
• **Any action on CDN SSL Certificates** - the user can take any action on CDN SSL certificates

**CDN Usage Statistics**
• **See details of CDN usage statistics** - the user can see CDN usage statistics details

**CloudBoot**
• **Manage CloudBoot** - the user can manage Cloud Boot settings

**Control panel**
• **Manage recipes for Control Panel** - the user can manage recipes for any Control Panel

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This permission will not be granted by pressing **Full access** button while editing the list of Permissions in the **Roles** section and can only be selected manually.
Currencies
- Any action with currencies - the user can take any action on currencies

Customer Networks
- Any action on customer networks – the user can take any action on customer networks

Customer VLANs
- Any action on customer VLAN - the user can see all actions available on customer VLANs

Dashboard
- All actions on dashboard - the user can see all available dashboard actions
- Show cloud dashboard - the user can see the dial pane and the percentage of cloud usage shown on the dashboard.

Data Store Joins
- All actions on data stores on Compute resource - the user can take any action on data stores attached to a Compute resource

Data Store Zones
- Any action on data store zones - the user can take any action on data store zones

Data Stores
- Any action on data_stores - the user can take any action on data stores

Disks
- Any action on disks - the user can take any action on disks

DNS Zones
- Any action on DNS zone - the user can take any action on DNS zone

Edge Groups
- Any action on edge groups - the user can take any action on edge groups

Edge Servers
- Any action on Edge Server - the user can take any actions on edge servers

Firewall Rules
- Any Action on Firewall Rules - the user can take any actions with firewall rules

Global Search
- Global search - global search through the whole database

Groups
- Any action on groups - the user can take any action on groups

Help
- All actions on help - the user can take any action under the Help menu

HTTP Caching Rules
- Any actions on http caching rules - the user can take any action on HTTP caching rules

Compute resource Zones
- Any action on Compute zones - the user can take any action on Compute zones

Compute resources
- Any action on Compute resources - the user can take any action on Compute resources

High Availability Cluster
- Manage HA clusters settings - the user can manage High Availability clusters in the Settings > HA Clusters menu.

iFrame
- Any action on iFrame - the user can take any action on iFrame

Instance Types
- Any action on Instance Types - the user can take any action on Instance Types

Internationalization
- Edit internationalization locales - the user can view and edit all non-English language phrases

IO Statistics
- Full access to IO Statistics - the user has full access to IO Statistics

IP Address Pools
- Any action on IP Address Pool - the user has full access to IP address pools

IP Addresses
- Any action on IP addresses - the user can take any action on IP addresses

ISOs
- Any action on ISOs - the user can take any actions on ISOs

Last Access Log
- Any action on last access log - the user can perform any action on last access log of any user

Load Balancers
- Any action on load balancer - the user can take any action on load balancer

Load Balancing Clusters
- Any action on load balancing cluster - the user can make any action on relation load balancing

Location Groups
- Any action on location groups - the user can take any action on location groups

Log Items
- Any action on log items - the user can take any action on log items

Monthly Billing Statistics
- Full access to Monthly Bills Statistics - the user has full access to monthly bills statistics

Nameservers
- Any action on nameservers - the user can take any action on nameservers

Network Zones
- Any action on network zones - the user can take any action on network zones

Networks
- Any action on networks - the user can take any action on networks

OAuth Providers
- Any action on OAuth providers - the user can take any action on OAuth providers

OnApp Storage
- Manage OnApp storage - the user can access the OnApp storage settings

Payments
- Any action on payments - the user can take any action on payments

Permissions
- Any action on permissions - the user can take any action on permissions

Recipes
- Any actions on Recipes - the user can take any action on recipes

Recipe Groups
- Any action on recipe groups - the user can take any action on recipe groups

Recipe Group Relations
- Any action on recipe group relations - the user can take any action on recipe relation group

Relation Group Templates
- Any action on relation group templates - the user can take any action on relation group templates

Resource Limits
- Any action on resource limit - the user can take any action on resource limits

Restrictions Resources
- Any actions on restrictions resources - the user can take any actions on restrictions resources while configuring restriction sets (Roles and Sets > Restrictions Sets tab > Resources)

Restrictions Sets
- Any action on restrictions sets - the user can take any action on restrictions sets

Roles
- Any action on Roles - the user can take any action on roles

SAML Identity Providers
- Any action on SAML identity providers - the user can perform any action on SAML identity providers

Schedule Logs
- Any action on schedule logs - the user can take any action on schedule logs

Schedules
- Any action on schedules - the user can take any action on schedules

Sessions
- Any actions on sessions - the user can take any action on sessions

Settings
- Any action on settings - the user can take any action on settings

Smart Servers
- Add recipe to any Smart Server - the user can add recipes to any smart server

SSH Keys
- Add ssh keys for all the virtual servers - the user can add ssh keys for all the virtual servers

Storage Servers
- Any action on Storage Server - the user can take any actions on storage servers

Sysadmin Tools
- All actions on Sysadmin Tools - the user can take any action on the Sysadmin Tools menu

Templates
- Any action on templates - the user can take any action on templates

Template Groups
- Any action on template group - the user can take any action on template groups

Themes
- Any action on Themes - the user can make any action on themes

Transactions
- Any action on transactions - the user can take any action on transactions

**Users**
- Any action on users - the user can take any action on user accounts

**User Additional Fields**
- Any action on user additional fields - the user can perform any action on additional fields for user

**User Groups**
- Any action on user groups - the user can take any action on user groups

**Virtual Servers**
- Any action on Virtual Servers – the user can take any action on virtual servers

**Virtual Server's IP Addresses**
- All actions on virtual server's IP addresses - the user can take any action on virtual server IP addresses

**Virtual Server Snapshots**
- Any action on Virtual Server Snapshots - the user can take any action on snapshots

**Virtual Machine's Statistics**
- See Virtual Machine Statistics – the user has full access to statistics

**White IPs**
- Manage all White IPs for users - the user can take any action on White IPs for users

### List of Default Permissions for User Role

The list below includes the set of default permissions for the User role.

**Activity Logs**
- See details of own activity log - the user can only see the details of their own activity log

**Backups**
- Convert own backup to template - the user can only convert their own backups to templates
- Create backup for own VS - the user can only create backups of their own virtual servers
- Destroy own backup - the user can only delete their own backups
- See own backups - the user can only see their own backups
- Update own backup - the user can only edit their own backups

**Base Resources**
- See own base resources - the user can only see own base resources

**Billing Plans**
- See own billing plan - the user can only see own billing plan

**CDN Resources**
- Create a new CDN resource - the user can create a new CDN resource
- Destroy own CDN resources - the user can only delete their own CDN resources
- See own CDN resources - the user can only see their own CDN resources
- Update own CDN resources - the user can only edit their own CDN resources

**CDN SSL Certificates**
- Create a new CDN SSL Certificate - the user can create new CDN SSL certificates
- Destroy own CDN SSL Certificate - the user can only delete their own CDN SSL certificates
- See own CDN SSL Certificates - the user can only see their own CDN SSL certificates
- Update own CDN SSL Certificates - the user can only edit their own CDN SSL certificates

**CDN Usage Statistics**
- User can see own CDN usage statistics - the user can only see own CDN usage statistics
Customer Networks
- Create own customer network – the user can create own customer networks
- Destroy own customer network – the user can delete own customer networks
- See own customer networks – the user can view own customer networks

Dashboard
- Show cloud dashboard - the user can see the cloud details on the dashboard

Data Stores
- See all data stores - the user can see all data stores

Disks
- Auto-backup for own disk - the user can only schedule automatic backups on their own disks
- Create a new disk - the user can create a new disk
- Destroy own disk - the user can only delete their own disks
- See own disks - the user can only see their own disks
- Unlock any disk - the user can unlock any disk
- Update own disk - the user can only edit their own disks

DNS Zones
- Create a new DNS zone - the user can create a new DNS zone
- Destroy own DNS zone - the user can only delete their own DNS zones
- See own DNS zones - the user can only see their own DNS zones
- Create a new DNS record - the user can create a new DNS record
- See own DNS records - the user can see all DNS records
- Update own DNS records - the user can update own DNS records

Edge Groups
- See all edge groups - the user can see all edge groups

Firewall Rules
- Create own Firewall Rules - the user can only create own firewall rules
- Destroy own Firewall Rules - the user can only delete own firewall rules
- Read own Firewall Rules - the user can only read own firewall rules
- Update own Firewall Rules - the user can only edit own firewall rules

Groups
- See all groups - the user can see all groups

Compute resources
- See all Compute resources - the user can see all Compute resources
- Show Compute resources on Virtual Server creation - display Compute resources on Add New Virtual Server screen

Template Groups
- See details of any template group (image_template_groups.read) - the user can view template group details

IO Statistics
- See own IO Statistics - the user can see own IO Statistics

Virtual Server's IP Addresses
- Add IP address to own virtual server - the user can only add IP addresses to their own virtual servers
- Remove IP address from own virtual server - the user can only remove IP addresses from their own virtual servers
- See IP addresses assigned to any virtual servers - the user can only see IP addresses assigned to their own virtual servers

IP Addresses
- See all IP addresses - the user can see all IP addresses

ISOs
- Read all public ISOs - the user can view public ISOs

Load Balancers
- Migrate own load balancer - the user can only migrate their own load balancer

Load Balancing Clusters
- Create new load balancing cluster - the user can create a new load balancing cluster
- Delete own load balancing cluster - the user can only delete own load balancing clusters
- See details of own load balancing cluster - the user can only see details of own load balancing cluster
- Change own load balancing cluster - the user can only change own load balancing cluster

Log Items
- Delete own log item - the user can only delete their own log items
- See list of own log items - the user can only see their own log items
- See details of own log item - the user can only see details of their own log items

Monthly Billing Statistics
- See only own Monthly Bills Statistics - the user can only see own monthly bills statistics

Nameservers
- See all nameservers - the user can see all nameservers

Networks
- See all networks - the user can see all networks

Payments
- See all payments - the user can see all payments
- See own payments - the user can only see their own payments

Recipes
- Create Recipes - the user can add new recipes
- Delete own Recipes - the user can delete own recipes
- Edit own Recipes - the user can edit own recipes
- Read own Recipes - the user can view own recipes

Recipe groups
- See list of recipe groups - the user can view the list of recipe groups
- Read recipe groups - the user can view recipe group details

Recipe group relations
- See list of recipe group relations - the user can view the list of recipe group relations
- Read recipe group relations - the user can view recipe group relation details

Roles
- See all Roles - the user can see all roles

Templates
- Manage own templates - the user can create and manage their own templates
- See all public templates - the user can see all public templates

Transactions
- Delete own transactions from logs - the user can only delete their own transactions from a log
- See list of own transactions - the user can only see their own transactions
- See details of own transactions - the user can only see details of their own transactions

Users
- Change own password - the user can only change own password
- See own users – the user can only see their own user account
- See user backups/templates prices – the user can see users’ backups/templates prices
- See user billing plan – the user can see users’ billing plans
- See user hourly prices – the user can see users’ hourly prices
- See user monthly prices – the user can see users’ monthly prices
- See user outstanding amount – the user can see users’ outstanding amount
- See user summary payments – the user can see user’s summary payments
- See user virtual server prices – the user can see users’ virtual server prices
- Update own user – the user can only edit their own user account
Tools

OnApp provides a number of tools to help you monitor and manage your OnApp system: Logs, Cloud Usage Statistics, CDN Usage Statistics, Sysadmin Tools and Alerts. To access them, click the relevant links under the main Tools menu item in the Control Panel.

Logs

OnApp logs all cloud management actions that take place on cloud resources, including virtual servers, disks, data stores, Compute resources, templates, networks.

To access and manage logs:

Click the Control Panel's Logs menu to view the log of all transactions in the cloud.

- To view details of a specific transaction, click its Ref number.
- You can also search for a transaction using the search box at the top.
- You can filter logs by their status by clicking the appropriate button - Complete, Running or Failed at the top.

Starting with OnApp version 4.0, users see transaction logs updated in real time. This is achieved by means of tail -f Unix command,
Failover Processes

Failover processes show the list of failover logs that take place on the Compute zones in the cloud.

To view the list of failover processes:

1. Go to Control Panel > Logs.
2. Click the Failover Processes button. On the page that appears, you can see the following information for each failover log:
   - Failover number
   - Indication of the time when it started
   - Compute zone on which the failover happened
   - Time of the last iteration
   - Failover action status: active or completed

To view the failover transaction details, click its reference number.

Statistics

Stats menu unites cloud usage and CDN usage statistics generated by the OnApp Statistics receiver. The statistics receiver is an SNMP agent that collects data from host and guest systems and saves it in the round-robin database for the future processing. The collected data are then converted into hourly, daily, weekly and monthly statistics. The interval can be changed in the application configuration file.

Hourly statistics are stored in the database for the last 2 months.
Daily statistics are stored for 12 months.
Old statistics data are stored as a monthly statistics (12 months, respectively).

Cloud Usage

The Usage Statistics screen lists every virtual server in the cloud, along with their details:

- **Owner** - the owner’s username.
- **CPU used** - the average CPU percentage that the VS has been using during the last 72 hours or during the specified period.
- **Disk reads completed** - the number of read operations performed by the disk.
- **Disk writes completed** - the number of write operations performed by the disk.
- **Disk data read** - the amount of data read from a disk.
- **Disk data written** - the amount of data written to a disk.
- **Bandwidth sent** - the number of Bytes sent by this VS.
- **Bandwidth received** - the number of Bytes received by this VS.

By default, statistics are generated for the last 72 hours. To specify another period, set the **Start** and **End** time and click the **Apply** button.

You can sort by all categories except the virtual server name: click a column label to sort in ascending order (you’ll see an arrow appear to show how the data is being sorted). Click it again to sort in descending order.

You can also drill into a specific VS, or its owner, by clicking the relevant links in the list.
**CDN Usage**

CDN usage report lists the summary of CDN Resources used by CDN with their details:

- **Owner** – the owner's user name. Click the owner's name for details.
- **Edge Group** – the edge group to which the CDN resource belongs to.
- **Location** – CDN edge server's location.
- **Data cached** – cached CDN traffic in a `number_to_human_size` format. (See the table below)
- **Data non cached** – non cached CDN traffic in a `number_to_human_size` format. (See the table below)

The table of formatting the bytes in `number` into a more understandable representation:

<table>
<thead>
<tr>
<th><code>number_to_human_size(number)</code></th>
<th>=&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>number_to_human_size(123)</code></td>
<td>=&gt; 123 Bytes</td>
</tr>
<tr>
<td><code>number_to_human_size(1234)</code></td>
<td>=&gt; 1.21 KB</td>
</tr>
<tr>
<td><code>number_to_human_size(12345)</code></td>
<td>=&gt; 12.1 KB</td>
</tr>
<tr>
<td><code>number_to_human_size(1234567)</code></td>
<td>=&gt; 1.18 MB</td>
</tr>
<tr>
<td><code>number_to_human_size(1234567890)</code></td>
<td>=&gt; 1.15 GB</td>
</tr>
<tr>
<td><code>number_to_human_size(1234567890123)</code></td>
<td>=&gt; 1.12 TB</td>
</tr>
<tr>
<td><code>number_to_human_size(1234567, :precision =&gt; 2)</code></td>
<td>=&gt; 1.2 MB</td>
</tr>
<tr>
<td><code>number_to_human_size(483989, :precision =&gt; 2)</code></td>
<td>=&gt; 470 KB</td>
</tr>
<tr>
<td><code>number_to_human_size(1234567, :precision =&gt; 2, :separator =&gt; ',')</code></td>
<td>=&gt; 1,2 MB</td>
</tr>
</tbody>
</table>

By default, statistics are generated for the last 72 hours. To specify another period, set the **Start** and **End** time and click the **Apply** button. Tick the **Show in my Timezone** box to show CDN usage statistics according to your profile's time zone settings.

Deleted CDN resources/locations will be marked as unavailable after the upgrade to newer version of the OnApp cloud.

**Top IOPS disks**

Top IOPS statistics chart displays 10 disks with top IOPS usage along with the following details:

- **Hostname** - hostname of a virtual server the disk is located at.
- **Disk** - disk ID.
- **Total IOPS** - total number of I/O operations per second.
- **IOPS Read** - number of read I/O operations per second.
- **IOPS Written** - number of written I/O operations per second.

**Alerts**

Alerts are created when zombies appear on the system. These are listed in the Control Panel's **Alerts** screen. There are different kinds of zombies:

- **Zombie Virtual Servers** - VSs which are detected by the OnApp controller as currently running on a Compute resource, but which are not in OnApp's database. Also, VSs running on a Compute resource the CP is not expecting it to be running on.
- **Zombie Disks** - disks which are detected by the OnApp controller as existing on a data store, but which are not in OnApp's database.
- **Zombie Data stores** - data stores which are detected by the OnApp controller as existing in the cloud, but which are not in OnApp's database.
- **Wrong Activated Logical Volumes** - the virtual servers' disks that are either activated on two Compute resources simultaneously, or activated on the wrong Compute resource.
- **Zombie Transactions** - transactions which have running status but their PIDs do not exist on the system, or transactions that have exceeded the zombie transaction time.

The **Alerts** menu also lists the background processes running on your system. **Max Amount** values show the maximum number of background processes which can run simultaneously. **Running** shows the number of processes running at the moment.

In most cases, you can remove the zombie elements from the system by clicking the **Delete** icon next to a zombie. For further help, contact support.
Sysadmin Tools

The Sysadmin Tools screen provides tools for a number of system administration tasks.

Services Status

Shows the statuses of all the services for High Availability clusters. Click the Services Status button to load the page with the list of services, their PID number and the online/offline status.

Background Task Daemon

Daemon is responsible for executing all background tasks such as:

- Transactions
- Backup takers
- Billing stats updater
- Cluster monitor
- Compute resource monitor
- Schedule runner

To operate the daemon, use the following buttons:

- **Reload daemon** – restarts the tasks, and completes all running tasks if their PIDs still exist.
- **Stop daemon** – completes any backups in progress, but prevents any more backups from starting; stops all tasks in progress.
- **Start daemon** - starts up all the tasks.
- **Check status** – shows PID of the task and its status.

To get details on daemon processes activity, run the Track Daemon Process Activity tool.

Availability Check

Availability check enables to see the status of OnApp Services Monitoring Tool and perform the following functions:

- Reload
- Disable
- Enable
- Check status

Running processes

The running processes screen displays the list of the running system processes:

**SNMP stats runner** - last time SNMP statistics was gathered from the Compute resources and virtual servers running in the cloud.

There are three levels of an SNMP statistics gathering:

1. **Level 1** - every 10 seconds. CP gets info about Compute resources uptime/virtual servers’ statuses.
2. **Level 2** - every 60 seconds. CP gets info about the disk usage, network usage, CPU usage statistics and the list of virtual servers.
3. **Level 3** every 120 seconds. CP gets list of volume groups and logical volumes.

The level values can be changed in the onapp.yml file. For details, see Advanced Configuration Settings section.

**VMware stats** - last time VMware statistics was gathered from the vCenter.

There are two levels of VMware statistics gathering:

1. **Level 1** - every 60 seconds.
2. **Level 2** - every 180 seconds.

For details, see Advanced Configuration Settings section.

**Clean Redundant Instant Stat** - last time redundant statistics was deleted.
Generate hourly stats - last time hourly statistics was aggregated.

CDN sync runner - last time CDN statistics was gathered.

Delete old stats - last time when the old SNMP has been deleted.

- Last time started - the last time when the transaction started.
- Last time finished - the last time when the transaction finished successfully. When the transaction has failed, the last time finished field will display the time of the last successful transaction, thus indicating the failure.

Running processes time is always displayed in UTC format.

Transactions/logs

- Clean all pending backups - removes all transactions relating to pending backups from the log.
- Cancel all pending tasks - removes all pending actions from the log.
- Clean logs - completely clears the log.

Activity Log

OnApp provides a possibility to trace back any user's behavior in the cloud to prevent possible misconduct or damage from staying unrevealed.

This Activity Log covers the following actions:

- DestroyVM
- DestroyUser
- DestroyBackup
- DestroyDisk
- Change Password
- LoginAs
- StopVirtualServer
- BuildVM
- Delete CDN Resource
- Delete DNS Zone

Activity Log registers actions with the following information:

- id - ID of the User in the DB
- username - name of the user
- created at - when the user was created
- action - what action was performed
- dependent - id of the action on which the current one was depending
- dependent type - type of the dependent
- ip address - ip address from which the action was launched
- user agent - description of the agent through which the cloud was accessed

Localization and Customization

You can easily adapt the Control Panel to your requirements by translating to different custom languages, adding new currencies and currency formats, and changing images, colors, names and titles. You can also assign differently localized/customized Control Panel views to different users. This chapter explains all of this functionality.

Languages

OnApp uses a standard Rails I18n internationalization system. You can add any language to your Control Panel and translate all the interface labels, error messages and other texts into a single custom language or several languages.

Add Custom Languages

You can add custom languages by translating the phrases using Control Panel UI. To do so:

1. Go to your Control Panel's Settings i18n Customization menu.
2. Click Add new locale button and select the required language from the list and click Submit.
3. In the i18n Customization menu click the appropriate custom language name.
4. On the screen that appears:
   - Subset name – the names correspond to the .yml files located at /onapp/interface/config/locales directory
   - English Items – the number of phrases in the original language files
Custom Language Items – the number of translated phrases in the custom language files
Missing Items – the number of phrases which haven’t been translated yet to a custom language
Out of Date Items – the number of phrases which have changed in English since the translation was made

5. Click a subset name. On the screen that follows:
   • Provide a translation in the Custom Language Phrase field next to an appropriate English value. Click Update.
   • To copy the English value to a target custom language, click the >> button in the Copy column next to a required value.

6. Restart the HTTPD service to apply new locale.

Click the Out of date tab to view phrases that exist in English and your custom language, but where the English phrase has been changed since the last translation.

Click the Missing tab to view phrases that exist in English but are missing in your custom language.

Click the Missing or out of date tab to view phrases that either exist in English but not in your custom language or exist in both languages but the English phrase has changed since the last translation.

Enable Custom Language for Specific User

Now that you have added one or more custom languages, you can specify which language a particular user will see in their view of the Control Panel. For this:

1. Go to your Control Panel's Users and Groups menu.
2. Click a user's name.
3. On the page that appears, click the Edit Profile tab.
4. Choose your custom language from the Locales drop-down list.
5. Click Save.

Currencies

By default, the system includes three currencies: USD, EUR and GBP. You can add more currencies at any time.

Create currency

To add a currency:

1. Go to your Control Panel's Settings menu.
2. Click the Currencies icon.
3. On the page that follows, click the Create New button.
4. Fill in the form that appears:
   • name - give the label to your currency
   • unit - insert a currency symbol
   • code - fill in a three-character currency code that is generally used to represent the currency you wish to add
   • separator - specify a character used to format decimal numbers, e.g 100.99.
   • delimiter - set a grouping character used to separate thousands, e.g: 100,000,000.
   • precision - specify the number of digits after the delimiter. The precision parameter is used to display the costs total for a certain period, e.g. Outstanding amount, Total Cost, Payments.
   • precision per unit - the number of digits after the delimiter. The precision per unit parameter is used to display the prices for the resources, e.g. for CPU, Disk size, RAM, IP, Data stores, Edge servers, Disks, Backups, Templates, etc.
   • format - set how the currency will be displayed in the control panel. Use the following parameters:
     • %n - for the digits
     • %u - for the currency symbol
5. Click Save.

For example, the currency form for US Dollars might look as follows…

- Name: US Dollar
- Unit: $
- Code: USD
- Separator: .
- Delimiter: ,
- Precision: 5
- Precision per unit :
- Format: %n %u

…and the prices will be displayed in the following way: $7,000,00000

You can now set Precision and Precision per Unit to specify the number of digits used after the delimiter. By default, Precision per Unit is set to 2.
Delete Currency

To delete existing currencies:

1. Go to your Control Panel's Settings menu.
2. Click the Currencies icon.
3. Click the Actions icon next to the currency you want to remove, then click Delete. You will be asked for confirmation before the currency is deleted.

You cannot delete a currency that is associated with a billing plan.

Edit Currency

To edit existing currencies:

1. Go to your Control Panel's Settings menu.
2. Click the Currencies icon.
3. Click the Actions icon next to it, then click Edit. On the screen that appears, edit currency details:
   - name - give the label to your currency
   - unit - insert a currency symbol
   - code - fill in a three-character currency code that is generally used to represent the currency you wish to add
   - separator - specify a character used to format decimal numbers, e.g. 100.99.
   - delimiter - set a grouping character used to separate thousands, e.g. 100,000,000.
   - precision - specify the number of digits after the delimiter. The precision parameter is used to display the costs total for a certain period, e.g. Outstanding amount, Total Cost, Payments.
   - precision per unit - the number of digits after the delimiter. The precision per unit parameter is used to display the prices for the resources, e.g. for CPU, Disk size, RAM, IP, Data stores, Edge servers, Disks, Backups, Templates, etc.
   - format - set how the currency will be displayed in the control panel. Use the following parameters:
     - %n - for the digits
     - %u - for the currency symbol
4. Click Save.

Localization and Customization Search

The search box in the Localization and Customization menu allows you to search by the following parameters:

- Item ID
- English Value
- Translation

To search:

1. Log in to your Control Panel.
2. Go to the Settings menu.
3. Click the I18n Customization icon.
4. Click the required language Name (e.g. "English").
5. On the following page, click the appropriate Subset Name (e.g. "core").
6. Type the search phrase into the search box and click Search.
7. If required, make changes and click Update.

Look & Feel

You can skin various aspects of the Control Panel's look & feel, including the logo displayed, background colors and other graphics. To do so:

1. Go to your Control Panel's Settings menu and click the Look & Feel icon.
2. Press the "*" button.
3. Use the fields provided to skin the UI, as explained below:

   **Theme options**
   - Label - give a name to your theme.
   - Active – use this checkbox to specify whether the theme is displayed or not. If this box is not checked, the default colors and graphics are used, irrespective of other settings.
User Group

- **User Groups** - check the groups of users for whom you wish to apply the theme.

General

- **Title** - enter the desired title which will be displayed at the top left corner of the browser window.
- **Logo** - click the **Browse** button to choose a custom logo.
  - Check the **Disable Logo** box to prevent a logo from displaying.
  - Check the **Remove logo** box to delete a custom logo.
- **Favicon** - click the **Browse** button to choose a custom favicon.
  - Check the **Disable favicon** box to prevent the favicon from displaying.
  - Check the **Remove favicon** box to delete a favicon.

Powered by

- **Hide** - check the box to remove the Powered by OnApp message at the top of the navigation pane.
- **Url** - enter an URL you wish to link to instead of http://www.onapp.com/.
- **Color** - this is the color displayed in the main body of the page (e.g. behind the fields you're currently editing).
  - To change the color, click the field to pop up a palette chooser, or enter a CSS color code.
  - To revert to the default color, leave this field blank.
  - The color will not be displayed unless any full screen Background Image you're using is disabled.
- **Text** - specify the text which will be added after **Powered by** instead of OnApp.

Wrapper

- **Color** - this is the color displayed around the rest of the UI.
  - To change the color, click the field to pop up a palette chooser, or simply enter a CSS color code. To revert to the default color, leave this field blank.
  - The color will not be displayed unless any full screen Background Image you're using is disabled.
- **Body image** - click the **Browse** button to choose a custom image.
  - Check the **Disable body image** box to prevent the top background image displaying.
  - Check the **Remove body image** box to delete a custom image.

Header & Footer HTML

- **Header** - enter the html codes to display instead of default header.
- **Footer** - enter the html codes to display instead of default footer.

4. Click **Save Theme** button to create and apply a theme.

iFrame Configuration

If required you can integrate an iFrame into OnApp which will display a web page within the user OnApp Control Panel. By default, the possibility to configure an iFrame is disabled. To enable, use the **Enable iFrame Window** permission.

Currently, the iFrame functionality is in beta!

To create an iFrame:

1. Log in to your OnApp Control Panel.
2. Go to **Settings > Look & Feel**.
3. On the page that loads, click the **iFrame** tab.
4. At the bottom of the screen, click **New iFrame** button.
5. Fill in the following fields to form a custom URL which should be loaded as an iFrame:
   - **url** - fill in the URL of the web page you're going to use as an iFrame.
   - **user** - select the appropriate user whose username will be used to form an URL
   - **user credentials** - select the required user parameter from the drop-down list. This could be a user ID, user email or user name.
   - **credentials parameter** - the type of the value specified above: user ID, email or username. This will be further used to form an URL, e.g. http://example.com/?userid=3
   - **custom field** - select the custom field from the drop-down menu. These are the Additional fields of the specified user.
   - **custom field parameter** - fill in the appropriate value.
   - **iFrame height** - set the height in pixels.
   - **custom name** - give the name to your iFrame
6. Click **Test Connection** to view the result.
7. Click **Submit** to provide the possibility to use this iFrame for a specified user. The user would then be able to access this iFrame from their user profile page, the **iFrame custom name** tab.

To edit an iFrame:
1. Log in to your OnApp Control Panel.
2. Go to Settings > Look & Feel.
3. On the page that loads, click the iFrame tab.
4. The list of all iFrames will load. Click the Actions icon next to a required iFrame, and click Edit or Delete if necessary.

**Miscellaneous**

This chapter describes more sophisticated operations, which help manage different OnApp functionalities. It is highly recommended that only advanced users perform these tasks.

**Reset Control Panel Administrator Password**

To generate a new password for an administrator user:

1. Log in to your OnApp Cloud Control Panel using SSH:
   ```
   ssh root@your.hostname
   ```

2. Go to the directory where your Control Panel is installed:
   ```
   cd /onapp/interface
   ```

3. To set a predefined password, run:
   ```
   RAILS_ENV=production rake onapp:password[admin,new_password]
   ```

   Make sure there are no spaces in brackets.

   If the operation was successful you will see a *Password successfully changed to 'new_password' message. If the operation could not be completed, you will see an error report.

**Add IPs in Windows Environment**

After you allocate an IP address assignment in your Control Panel, it is necessary to add IPs directly in your Windows environment. To add an additional IP address in Windows 2003/2008 Server and Windows 7:

1. Locate the My Network Places icon on your desktop, right click and select Properties.
2. To open the network properties dialogue, right-click on External or Ext. Select Properties.
3. Select Internet Protocol (TCP/IP) and click Properties.
4. Click Advanced.
5. Click Add, enter the IP address and corresponding Subnet mask.
6. Click Add.

If you wish to add more IP addresses, repeat steps 5 and 6 until you have added the IP addresses we assigned to you.

**Create New Linux/Windows Templates**

OnApp provides separate documents to explain how to create Windows and Linux templates from scratch, rather than from existing VS templates. Please refer to the Miscellaneous Documentation for details.

**Transaction Server**

Transaction server is an element of the location group (Compute resource or a backup server) where the particular transaction is performed. These are non-backup transactions, related to Appliances (apart from VMware virtual servers), such as:

- destroy disk
The system selects the element of your location group to be a transaction server according to the following principle:

1. If the appliance is associated with a Compute resource with only a local data store, this Compute resource will be selected.

2. If there are backup servers (server) available to the user who sets the transaction, any such backup server will be selected based on the lowest CPU load (highest cpu_idle parameter).

3. If the above user does not have access to the backup servers, but there are such in his location group, any of the available backup servers will be selected based on the lowest CPU load (highest cpu_idle parameter).

4. If there are no backup servers in the location group, the Compute resource associated with this virtual server will be selected as the transaction server.

**Calculate Billing Statistics for the Missing Period**

Sometimes customers are experiencing the problem of missing billing statistics because of daemon, delayed jobs, cron, raw statistics temporary failures. After the mentioned services get started, raw statistics data gets inserted into the DB and afterwards aggregated into raw hourly statistics (in most of cases). Having raw hourly stats in DB allows generating billing statistics based on it. That doesn't happen automatically because of peculiarities of billing statistics generation. However, it can be done manually running the rake task specifying the period (billing:calculate_hourly_stats_for_missed_period [:start_time, :end_time]).

Usage example:

```
RAILS_ENV=production rake
billing:calculate_hourly_stats_for_missed_period\['2014-06-01 01:00:00','2014-06-05 23:00:00']
```

**Advanced Configuration Settings**

Although you can alter most of the OnApp settings via the Control Panel user interface, there are some options that can be edited only in the onapp.yml file. You can use the Advanced Configuration Settings section to modify the OnApp configuration settings. This section contains the list of parameters you can edit in the onapp.yml file with their default values.

We recommend to make a copy of the configuration file before making any changes.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>log_path</td>
<td>/onapp/interface/log/onapp.log</td>
</tr>
<tr>
<td>background_process_log_path</td>
<td>/onapp/interface/log</td>
</tr>
<tr>
<td>background_process_pid_path</td>
<td>/onapp/interface/tmp/pids</td>
</tr>
<tr>
<td>private_key_path</td>
<td>/onapp/interface/config/keys/private</td>
</tr>
<tr>
<td>public_key_path</td>
<td>/onapp/interface/config/keys/public</td>
</tr>
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<td>ssh_port</td>
<td>22</td>
</tr>
<tr>
<td>use_ssh_file_transfer</td>
<td>false</td>
</tr>
<tr>
<td>ssh_file_transfer_server</td>
<td>127.0.0.1</td>
</tr>
<tr>
<td>ssh_file_transfer_user</td>
<td>root</td>
</tr>
<tr>
<td>ssh_file_transfer_options</td>
<td>-o StrictHostKeyChecking=no -o UserKnownHostsFile=/dev/null -o PasswordAuthentication=no</td>
</tr>
<tr>
<td><strong>template_path</strong></td>
<td>/onapp/templates</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>recovery_templates_path</strong></td>
<td>/onapp/tools/recovery</td>
</tr>
<tr>
<td><strong>mount_iso_path</strong></td>
<td>/onapp/iso</td>
</tr>
<tr>
<td><strong>backups_path</strong></td>
<td>/onapp/backups</td>
</tr>
<tr>
<td><strong>database_backups_path</strong></td>
<td>/onapp/database_backups</td>
</tr>
<tr>
<td><strong>remove_backups_on_destroy_vm</strong></td>
<td>true</td>
</tr>
<tr>
<td><strong>data_path</strong></td>
<td>/onapp/data</td>
</tr>
<tr>
<td><strong>update_server_url</strong></td>
<td><a href="http://repo.onapp.com/">http://repo.onapp.com/</a></td>
</tr>
<tr>
<td><strong>dashboard_host</strong></td>
<td>127.0.0.1</td>
</tr>
<tr>
<td><strong>license_key</strong></td>
<td></td>
</tr>
<tr>
<td><strong>generate_comment</strong></td>
<td>Automatically generated by OnApp (%s)</td>
</tr>
<tr>
<td><strong>graph_frequencies</strong></td>
<td>[[hourly, 4000], [daily, 100000], [weekly, 800000], [monthly, 3200000], [yearly, 40000000]]</td>
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<tr>
<td><strong>use_nbd</strong></td>
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<tr>
<td><strong>simultaneous_backups</strong></td>
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<tr>
<td><strong>simultaneous_backups_per_datastore</strong></td>
<td>2</td>
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<tr>
<td><strong>simultaneous_backups_per_Compute resource</strong></td>
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<td><strong>simultaneous_transactions</strong></td>
<td>3</td>
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<td><strong>cpu_guarantee</strong></td>
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<td><strong>enable_huge_pages</strong></td>
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<td><strong>schedule_failure_count</strong></td>
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<td><strong>remote_access_session_start_port</strong></td>
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<tr>
<td><strong>remote_access_session_last_port</strong></td>
<td>30099</td>
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<td><strong>ajax_power_update_time</strong></td>
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<td><strong>ajax_pagination_update_time</strong></td>
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<td><strong>Compute resource_live_times</strong></td>
<td>12</td>
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<td><strong>guest_wait_time_before_destroy</strong></td>
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<td><strong>disable_Compute resource failover</strong></td>
<td>false</td>
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<td><strong>allow_Compute resource password_encryption</strong></td>
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<td><strong>system_email</strong></td>
<td><a href="mailto:app@onapp.com">app@onapp.com</a></td>
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<td><strong>system_support_email</strong></td>
<td><a href="mailto:support@onapp.com">support@onapp.com</a></td>
</tr>
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<td><strong>system_host</strong></td>
<td>onapp.com</td>
</tr>
<tr>
<td><strong>system_notification</strong></td>
<td>true</td>
</tr>
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<td><strong>ips_allowed_for_login</strong></td>
<td>should be empty to allow all or string with IPs comma-separated, like 1.1.1.1, 2.2.2.2, 2.3.3.3</td>
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<td><strong>enable_ipv6</strong></td>
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<td><strong>pagination_max_items_limit</strong></td>
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<td>Parameter</td>
<td>Value</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>monitis_path</td>
<td>/usr/local/monitis</td>
</tr>
<tr>
<td>monitis_account</td>
<td><a href="mailto:monitis@onapp.com">monitis@onapp.com</a></td>
</tr>
<tr>
<td>locales</td>
<td>[en]</td>
</tr>
<tr>
<td>default_firewall_policy</td>
<td>ACCEPT</td>
</tr>
<tr>
<td>app_name</td>
<td>OnApp</td>
</tr>
<tr>
<td>show_ip_address_selection_for_new_vm</td>
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<tr>
<td>backup_taker_delay</td>
<td>5</td>
</tr>
<tr>
<td>cdn_sync_delay</td>
<td>1200</td>
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<tr>
<td>billing_stat_updater_delay</td>
<td>5</td>
</tr>
<tr>
<td>zombie_disk_space_updater_delay</td>
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<tr>
<td>cluster_monitor_delay</td>
<td>15</td>
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<tr>
<td>Compute_resource_monitor_delay</td>
<td>5</td>
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<td>schedule_runner_delay</td>
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<td>transaction_runner_delay</td>
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<td>zombie_transaction_time</td>
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<td>kms_server_host</td>
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<td>ip_range_limit</td>
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<td>same_autoscaleout_nodes_virtualization_system</td>
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<tr>
<td>dns_enabled</td>
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<tr>
<td>enabled_libvirtAntiSpoofing</td>
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<tr>
<td>allow_start_vms_with_one_ip</td>
<td>true</td>
</tr>
<tr>
<td>allow_initial_root_password_encryption</td>
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</tr>
<tr>
<td>wipe_out_disk_on_destroy</td>
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<td>password_enforce_complexity</td>
<td>true</td>
</tr>
<tr>
<td>password_minimum_length</td>
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<td>password_upper_lowercase</td>
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<tr>
<td>password_letters_numbers</td>
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</tr>
<tr>
<td>password_symbols</td>
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</tr>
<tr>
<td>password_force_unique</td>
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</tr>
<tr>
<td>password_lockout_attempts</td>
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<td>password_expiry</td>
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<td>password_history_length</td>
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<td>force_windows_backups</td>
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<tr>
<td>cloud_boot_enabled</td>
<td>false</td>
</tr>
<tr>
<td>nfs_root_ip</td>
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</tr>
<tr>
<td>cloud_boot_target</td>
<td>192.168.1.1</td>
</tr>
<tr>
<td>Parameter</td>
<td>Default value</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>storage_enabled</td>
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</tr>
<tr>
<td>prefer_local_reads</td>
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</tr>
<tr>
<td>vmware_cluster_name</td>
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<td>service_account_name</td>
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<td>archive_stats_period</td>
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</tr>
<tr>
<td>is_archive_stats_enabled</td>
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</tr>
<tr>
<td>wrong_activated_logical_volume_minutes</td>
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</tr>
<tr>
<td>use_html5_vnc_console</td>
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</tr>
<tr>
<td>use_rrd_for_statistic_tables</td>
<td>true</td>
</tr>
<tr>
<td>partition_align_offset</td>
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</tr>
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</table>

**SNMP Statistics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>server_community</td>
<td>onapp</td>
</tr>
<tr>
<td>snmp_timeout</td>
<td>2</td>
</tr>
<tr>
<td>snmp_connect_retries</td>
<td>3</td>
</tr>
<tr>
<td>snmp_stats_level1_period</td>
<td>10</td>
</tr>
<tr>
<td>snmp_stats_level2_period</td>
<td>60</td>
</tr>
<tr>
<td>snmp_stats_level3_period</td>
<td>120</td>
</tr>
<tr>
<td>snmp_max_recv_bytes</td>
<td>100000</td>
</tr>
<tr>
<td>snmp_stats_protocol</td>
<td>udp</td>
</tr>
</tbody>
</table>

Both TCP and UDP protocols are enabled on Compute resources by default. You can select the preferred protocol by changing the snmp_stats_protocol parameter value.

**VMware Statistics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>vmware_stats_level1_period</td>
<td>60</td>
</tr>
<tr>
<td>vmware_stats_level2_period</td>
<td>180</td>
</tr>
<tr>
<td>vmware_stats_usage_interval</td>
<td>20</td>
</tr>
</tbody>
</table>

**SolidFire Statistics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>solidfire_stats_usage_interval</td>
<td>120</td>
</tr>
</tbody>
</table>
Failover Configuration

OnApp allows configuring the Compute resource failover behaviour. The failover settings are specified per Compute zone.

- how failover works
- failover settings
- failover logs

How failover works

Control Panel daemon checks Compute resource accessibility via the management network (using snmp) each 10 seconds.

*Compute resource_live_time* (default value = 12) specifies how many times we cannot get a reply from a Compute resource after which the Compute resource is marked as offline. If Compute resource is marked as offline and the failover is enabled, the failover process starts. This parameter is configurable (*Control Panel > Settings > Configuration*, see the following Failover Settings section for details).

First iteration tries to migrate all VSs according to the failover algorithm set for the Compute zone. If some VSs weren't migrated, next iteration will start, until all VSs are migrated (iterations run once a minute).

Additional Considerations for Integrated Storage

In Integrated Storage backend nodes are marked as inactive approximately three minutes after a backend node has stopped reporting its status. IS is a distributed system and it takes some time to sync/converge metadata across nodes. If IS is used in the cloud it is strongly recommended to set the “Requests before marked as failed” parameter in Settings > Configuration menu to at least 18-20.

Failover settings

To configure Compute zone failover settings:

1. Go to your Control Panel's *Settings* menu, and click the *Compute resource Zones* icon.
   The screen that appears will show all zones currently set up in the cloud.
2. Click the Actions button next to the required Compute zone, then click Edit and specify the following parameters:
   - **Placement type** - specify the Compute resource selection algorithm, that will be used on virtual server provisioning and recovery, per Compute zone:
     a. *Take Compute resource with maximum free RAM* (Round Robin) - set this type to select the Compute resource with maximum free RAM during the VS recovery. This option allows performing faster migration of virtual servers with the lesser number of iterations during the failover.
        - This option behaves in different ways, depending on the event:
        i. On provisioning, the round-robin algorithm will be used on Compute resource selection.
        ii. On recovery, the Compute resource with maximum free RAM will be selected.
     a. *Take Compute resource with minimum required free RAM* - with this type the system selects the Compute resource with minimum required free RAM. This option allows filling Compute resource as tightly as possible before starting to use next Compute resource in the zone.
   - **Failover timeout** - time period for which the iterations will run during the failover if the Compute resource does not respond.

You can disable failover for each particular Compute resource in Compute resource settings:

1. Go to your Control Panel's *Settings* menu.
2. Click the *Compute resources* icon.
3. Click the Actions button next to the Compute resource you want to edit, then click Edit.
4. On the screen that follows, change the failover settings:
   - **Disable failover** - enable or disable the VS migration to another Compute resource if this Compute resource is marked as offline by the Control Panel server.

To configure the Compute resource_live_time parameter:
1. Go to your Control Panel's **Settings** menu, and click the **Configuration** icon.
2. Click the **System** tab to change the settings:

   *Requests before marked as failed* - determines how many times the Control Panel server will attempt to contact a Compute resource before failover is initiated. For the Integrated Storage, we recommend increasing this parameter to 30, so that the storage platform has enough time to mark the Compute resources accordingly, and allow the VSs to start up after a failed Compute resource.

**Failover Logs**

Failover processes show the list of failover logs that take place on the Compute zones in the cloud.

To view the list of failover processes:

1. Go to Control Panel > Logs.
2. Click the **Failover Processes** button. On the page that appears, you can see the following information for each failover log:
   - Failover number
   - Indication of the time when it started
   - Compute zone on which the failover happened
   - Time of the last iteration
   - Failover action status: active or completed

To view the failover transaction details, click its reference number.

**Track Daemon Process Activity**

To get the details on daemon process's activity, run the activity tracker:

```
./script/tools/process-logger.sh -p <PID> -l|--log-folder <log folder> -d|--pid-folder <pid folder>
```

**Example:**

```
./script/tools/process-logger.sh -p 4242 -l /tmp/logs -d /tmp/pids
```

**Usage:**
track -p <PID> -l|--log-folder <log folder> -d|--pid-folder <pid folder>

Logs folder structure: <LOG-FOLDER>/<PID>.
Example:
LOG-FOLDER = /tmp/logs
PID = 4242
Result: /tmp/logs/4242/

Options:
Required:
-p|--pid
PID of target process

-l|--log-folder
Folder, where logs are stored

-d|--pid-folder
Folder, where pid files are stored

Optional:
-t|--time-interval
Refresh time in seconds. Works only for main log and lsof command
Default: 1 second

-m|--memory-alert-step
Memory alert size. In megabytes.
Default: 100m

-r|--log-max-size
Max log size, before it rotates. In megabytes.
Default: 100m

Example:

track.sh -p 4242 -l /tmp/logs -d /tmp/pids

High Availability Control Panel

High availability (HA) is the capability of a system to operate continuously for a desirably long period of time despite the possible failure of one or several of its components. HA significantly decreases the extent of downtime. OnApp High Availability brings new opportunity to deploy more than one Control Panel within one cloud. This allows you to improve cloud load balancing, minimize server downtime in case of CP issues and enhance scalability of the whole infrastructure. High availability keeps virtual servers, daemon, and statistics live even if the physical box where they are running fails. In this case the required component keeps working on the box which is live in the cluster. This is the optional functionality.

The initial implementation allows using a master Control Panel and a redundant one sharing a single database. When the master server fails, the redundant CP server takes its place and runs all the processes. Two Control Panels are using two public IP addresses and are licensed as a single CP. OnApp High availability is based on Pacemaker + Corosync clustering stack, using multicast as a messaging backend. At this stage OnApp introduces high availability for the following components:

- UI (httpd, onapp-vnc-proxy services)
- Background services (onapp-engine, onapp-ssh-agent services)
- Cloudboot (nfs, xinetd, dhcpd services)

High availability introduces accessibility for services and communication between OnApp components:

- Database and Redis are deployed separately from CPs by cloud owner. You can deploy DB and Redis on the same or separate servers. In OnApp, we refer to this server as the Database & Transactions server.
- Compute resources and backup servers are configured to accept connections from any Control Panel
- UI and CloudBoot operates in Active/Standby mode
- OnApp Engine, onapp-engine service (onapp daemon) operates in load balancing mode

In case when service in active node becomes unavailable, the corresponding virtual IP address is being moved from the active node’s to standby node’s network interface with the highest priority. The network interface priority defines to which node the virtual IP address will be moved first, if the node where it is running gets broken.

HA prerequisites
The Database and Redis services should be deployed on a separate from control panel server. This can be one or two servers.

Make sure to create a dedicated network for control panels and DB/Redis/RabbitMQ server connection.

Do not use the control panel server as the backup/template server. Make sure that the Use SSH file transfer option is disabled at Settings > Configuration menu.

Logs and templates are stored on Database&Transactions server. Ensure that all the required directories are shared correctly, refer to High Availability Configuration section for details.

It is important that you add the IPs of CP servers into the config files for Compute resources and backup servers.

Compute resources accept API calls by StorageAPI from multiple IP Addresses only after reconfiguration.

SNMP Traps are being sent to control panels.

### High Availability Configuration

- Please note that High Availability has been tested with two Control Panel nodes in the cluster.
- Make sure you meet the hardware requirements before configuring the high availability cluster

To configure the high availability cluster, perform the following procedures:

1. **Configure network for all boxes**

When planning your network configuration for high availability cluster, make sure to consider the following aspects:

- add the control panel servers which will serve as the nodes to the cluster
- add the data server that includes the database, Redis or stock RabbitMQ (this can be one or separate servers)
- join the Control Panel servers to management and provisioning networks

Refer to the Recommended Network Configurations for the diagrams on the possible configurations of the high availability cluster.

2. **Configure Database&Transactions server (Database and Redis)**

We assume that you have already installed the database server. Proceed to configure the server or servers where the database, Redis and RabbitMQ will be deployed.

1. Log in to Database&Transactions server.
2. Enter the MySQL database and set the password.
3. For each Control Panel IP address, run the following command:

   ```
   > GRANT ALL PRIVILEGES ON onapp.* TO root@"cp_ip_address" IDENTIFIED BY 'PASSWORD' WITH GRANT OPTION;
   ```

   where:
   - `cp_ip_address` - the address of the Control Panel node.
   - `password` - the password to the database

4. Configure Redis. Download OnApp yum repository file:

   ```
   # rpm -Uvh http://rpm.repo.onapp.com/repo/onapp-repo.noarch.rpm
   ```

5. Install OnApp Redis package:

   ```
   bash#> yum install redis
   ```

6. Open the Redis configuration file `/etc/redis.conf` and set:

   - `bind` - the IP address of the Database&Transactions server where Redis is installed
   - `port` - the port to which Redis is listening. By default the 6379 port is set.
   - `requirepass` - the password to connect to Redis instance

7. Restart Redis. Run:

   ```
   service redis restart
   ```

Please note that High Availability has been tested with two Control Panel nodes in the cluster.

Make sure you meet the hardware requirements before configuring the high availability cluster.
8. Update relevant attributes in CP server’s configuration:

```yaml
/onapp/interface/config/redis.yml
```

9. Make sure Redis is started after the configuration:

```bash
chkconfig redis on
```

### 3. Configure Logs/Transactions/Templates Accessibility

For High Availability Control Panels, it is required to properly configure the locations where the shared entities (logs/transactions/templates) are stored. Such location should be accessible from both Control Panels, so that if one server fails, the other one still has the access to all the shared entities. That is why we recommend storing them on a separate Database&Transactions server and properly share the storage locations with Control Panels, Compute resources, and backup servers.

To do so:

1. Create the following directories on Database&Transactions server:
   - `/onapp/templates/` - the location where the templates manager uploads the templates and stores
   - `/onapp/log/transactions` - the location where transactions and logs are stored

   You can provide any arbitrary name to the locations where the shared entities are stored, providing that you properly configured the sharing settings for them as described at steps 2-4 of this section.

2. Enable NFS or any other sharing service between the following locations for each CP:
   - `mount the /onapp/templates (or any other location that you specified for storing templates at onapp.yml) on the Control Panel servers to /onapp/templates on Database&Transactions server`
   - `mount the /onapp/interface/log/transactions on the Control Panel servers to /onapp/log/transactions on Database&Transactions server`

3. Enable NFS or any other sharing service between the following locations for Compute resource servers:
   - `mount the /onapp/templates (or any other location that you specified for storing templates at onapp.yml) on the Compute resource servers to /onapp/templates on Database&Transactions server`

4. Enable NFS or any other sharing service between the following locations for backup servers:
   - `mount the /onapp/templates (or any other location that you specified for storing templates at onapp.yml) on the backup servers to /onapp/templates on Database&Transactions server`

Now all the logs/transactions/templates should be accessible from both Control Panels in case of failure.

### 4. Install and configure Control Panel servers

Install the CPs according to Install Control Panel Server documentation. Make sure to set the MySQL and Redis configs using the appropriate parameters.

Configure high availability:

1. Install the High Availability package:

   ```bash
   yum install onapp-cp-ha
   ```

2. Run the script:

   ```bash
   /onapp/onapp-ha/onapp-cp-ha.sh
   ```

3. Go to your Control Panel Settings > HA Clusters menu.
   - On the page that loads, fill in the high availability cluster configuration settings.
4. Configure the clusters:
UI Cluster

- `virtual_ip` - set the virtual IP address of the control panels

Specify the following parameters for the first node:

- `name` - specify the hostname of the first node
- `IP address` - specify the physical IP address of the first node
- `interface` - specify the network interface for the node
- `priority` - set the priority for the first node. The node with the highest priority will take over the virtual IP address when the component of the cluster fails.

Specify the following parameters for the second node:

- `name` - specify the hostname of the second node
- `IP address` - specify the physical IP address of the second node
- `interface` - specify the network interface for the node
- `priority` - set the priority for the second node. The node with the highest priority will take over the virtual IP address when the component of the cluster fails.

Click **Save Cluster Configuration** to apply the settings.

Daemon Cluster

- `virtual_ip` - set the virtual IP address of the control panels

Specify the following parameters for the first node:

- `name` - specify the hostname of the first node
- `IP address` - specify the physical IP address of the first node
- `interface` - specify the network interface for the node
- `priority` - set the priority for the first node. The node with the highest priority will take over the virtual IP address when the component of the cluster fails.

Specify the following parameters for the second node:

- `name` - specify the hostname of the second node
- `IP address` - specify the physical IP address of the second node
- `interface` - specify the network interface for the node
- `priority` - set the priority for the second node. The node with the highest priority will take over the virtual IP address when the component of the cluster fails.

Click **Save Cluster Configuration** to apply the settings.

Cloud_boot Cluster

- `virtual_ip` - set the virtual IP address of the cloudboot clusters

Please note, that `virtual_ip` must be equal to `Static Config target` and `CP server Cloudboot target` IP addresses that you set at **Settings > Configuration** screen.

Specify the following parameters for the first node:

- `name` - specify the hostname of the first node
- `IP address` - specify the physical IP address of the first node
- `interface` - specify the network interface for the node
- `priority` - set the priority for the first node. The node with the highest priority will take over the virtual IP address when the component of the cluster fails.

Specify the following parameters for the second node:

- `name` - specify the hostname of the second node
- `IP address` - specify the physical IP address of the second node
- `interface` - specify the network interface for the node
- `priority` - set the priority for the second node. The node with the highest priority will take over the virtual IP address when the component of the cluster fails.

Click **Save Cluster Configuration** to apply the settings.

3. Go to `/onapp/interface` and issue:
service onapp-ha start

crm_mon

wait until the current hostname appears in the list of online nodes, e.g.:

Online: [cp1.ha.infra]

Initiate the high availability cluster:

'RAILS_ENV=production rake ha:init'

4. *(Optional)* To check the status of services, run the following:

crm_mon -r

5. Check that the redundant node has the appropriate virtual IP of the cluster. Run:

ip a

6. Add public key of root user of the main Control Panel to the authorized keys at a secondary Control Panel. And vice versa.

7. Add the records with the IPs from internal network and the hostnames to the /etc/hosts

   For example:

   11.10.4.5 HA-cp-1.test
   11.10.4.6 HA-cp-2.test
8. Make sure you can log in from one node to another using SSH. Confirm the authorization with the new fingerprint.

Run from the first node:

```
ssh root@HA-cp-2.test
```

Run from the second node to the first one:

```
ssh root@HA-cp-1.test
```

9. Configure high availability on a secondary Control Panel server:

```
'RAILS_ENV=production rake ha:join'
```

If you deploy several independent clusters within one LAN, it is required to change the following parameters for each cluster as appropriate at `/etc/corosync/corosync.conf` file:

- `mcastaddr` - multicast IP address
- `mcastport` - multicast port

5. Configure HA for Compute resources

Run the following command to configure HA for static Compute resources:

```
bash#> /onapp/onapp-Compute resource-install/onapp-Compute resource-config.sh -h <CP_HOST_IP>
```

Where:

- `-h CP_HOST_IP` - the comma-separated FQDN or IP addresses of the management server which should receive all status reports and is authoritative for this Compute resource.

6. Configure HA for backup servers

Run the following command to configure HA for static backup servers:

```
bash#> /onapp/onapp-bk-install/onapp-bk-config.sh -h <CP_HOST_IP>
```

Where:
-h CP_HOST_IP - the comma-separated FQDN or IP addresses of the management server which should receive all status reports and is authoritative for this backup server.

---

**Additional Considerations for CloudBoot**

If you enable CloudBoot after you configured high availability cluster, or when you modify the IP addresses of CloudBoot nodes, it is required to run the following rake task for changes to take effect:

```
rake ha:pxe:update
```

---

**Recommended Network Configurations**

This section lists the recommended network configurations for installation of high availability feature:

- Redundant CP/Non redundant Database&Transactions server
- Non Redundant CP/Redundant Database&Transactions server
- Redundant CP/Database&Transactions server (2 Servers)
- Redundant CP/Redundant Database&Transactions server

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Redundant CP/Non redundant Database&Transactions server
Non Redundant CP/Redundant Database&Transactions server

Redundant CP/Database&Transactions server (2 Servers)
Redundant CP/Redundant Database & Transactions server
Hardware Requirements for High Availability

The basic implementations of High Availability requires that you deploy two Control Panel servers and one Database & Transactions. We recommend the following configurations for those servers:

Main Control Panel:
- Dual or Quad Core 2Ghz+ CPU
- 8GB RAM (16GB+ recommended)
- 100GB Raid 1
- 2x Gig network interface cards

Redundant Control Panel:
- Dual or Quad Core 2Ghz+ CPU
- 8GB RAM (16GB+ recommended)
- 100GB Raid 1
- 2x Gig network interface cards

Database & Transactions Server:
- Dual or Quad Core 2Ghz+ CPU
- 8GB RAM (16GB+ recommended)
- 100GB Raid 1
- 2x Gig network interface cards

The recommendations for other servers are the same as for standard OnApp installation.

Disable High Availability

To disable High Availability for your cloud, perform the following procedure:

1. Run the following for master node:
   ```
   rake ha:implode
   ```

2. Stop services at secondary node. Run:
   ```
   service httpd stop
   service crond stop
   service onapp stop
   ```

Help

The help menu lets you submit support requests to the OnApp team. All OnApp customers with a full (paid) license are entitled to 24/7 support.

- Click the **Help** link in the Control Panel, and complete the form on the screen that follows.
- Alternatively you can call +1 (888) 876-8666, or email support@onapp.com with your problem.