OpenNebula.org

OpenNebula 4.4 Release Notes

OpenNebula Project

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CONTENTS

WHAT'S NEW IN OPENNEBULA 4.4

In the following list you can check the highlights of OpenNebula 4.4 Retina organised by component (a detailed list of changes can be found here):

1.1 OpenNebula Core: End-user functionality

OpenNebula 4.4 brings multiple new features to manage virtual machines:

- **Support rename for more resources**, users can now rename hosts, vnets and datastores.
- **Improved VM lifecycle**, it is possible to shutdown a VM from the `unknown` state. An updated diagram can be found here

1.2 OpenNebula Core: Internals & Administration Interface

There has been also several improvements for administrators and new features to enhance the robustness and scalability of OpenNebula core:

- **Multiple system datastores**, enables a much more efficient usage of the storage resources for running Virtual Machines. *Read this to configure and use this new feature*. This opens the possibility to use *storage policies*.
- **Improved quota subsystem**, now with volatile disk support. *More info here*.
- **Multiple group support**, with the ability to define *primary and secondary groups*.
- **Improved scalability**, new parameters support in oned.conf for xmlrpc parameters. *Seek information on how to configure this here*.
- **Check free disk space in system datastores**, to prevent deploying a VM in a host with no free space for it. This is taking into account in the *newly extended scheduling algorithm*, that now tales storage into account.

1.3 OpenNebula Drivers

The back-end of OpenNebula has been also improved in several areas, as described below:

1.3.1 Storage Drivers

- **New LVM drivers model**, the shared KVM model, as well as support for compressed images in LVM. *Check more info on the new model here*

- **Many improvements in ceph drivers**, more info *here*.

1.3.2 Monitorization Drivers

- **New monitorization model**, changed from a pull model to a push model, thus increasing the scalability of an OpenNebula cloud. *More information here*

1.3.3 Virtualization Drivers

- **VMware drivers improvements**, like maintaining cloned target image format, improved vCenter integration

1.3.4 Networking Drivers

- **Security improvements in Open vSwitch**, block ARP cache poisoning.

1.4 Contextualization

- **Support for cloud init**, now OpenNebula is able to contextualize guests using *cloud init*.
- **Improvements in contextualization**, ability to add INIT_SCRIPTS. Check *this guide* to learn how to define contextualization in your VM templates.

1.5 EC2 Public Cloud Improvements

Multiple improvements in the EC2 Public API exposed by OpenNebula:

- **VM snapshotting** and **VM tagging**. Read *this* for more info on the offered EC2 functionality.
- **Better use of ONE templates** in EC2 API, check more details *here*.

1.6 Cloud Bursting Improvements

The cloud bursting (previously called hybrid) drivers have been improved in a variety of areas:

- **Allow mixed templates**, ability to have templates defining VMs locally and in Amazon EC2. More info *here*.
- **Adoption of Ruby SDK**, for a better interaction with AWS.
- **EBS optimized option**, now it can be passed to an Amazon VM. More info on EC2 *specific template attributes*.
- **Extended host share variables**, to cope with big regions modelled in OpenNebula.

1.7 Sunstone

- **Improved Apache integration**, to allow uploading big images. More info on *Apache and Sunstone integration here*.
- **Better memcache integration**, for more details on Sunstone for large scale deployments *check this*.

- **Multiple minor bugfixes**: adding multiple tags of the same name, VM template wizard context fixes and updating, update quotas, attach disks problems, time format inconsistencies, tons of new tooltips, fixed typos, etc

MIGRATING FROM OPENNEBULA 4.2

A detailed *upgrade process* can be found in the documentation. For a complete set of changes to migrate from a 4.4 installation please refer to the *Compatibility Guide*.

> **Warning:** With the new *multi-system DS* functionality, it is now required that the system DS is also part of the cluster. If you are using System DS 0 for Hosts inside a Cluster, any VM saved (stop, suspend, undeploy) **will not be able to be resumed after the upgrade process**.

> **Warning:** After the OpenNebula upgrade make sure you run `onehost sync` to update the monitoring probes.

PLATFORM NOTES

This page will show you the specific considerations at the time of using an OpenNebula cloud, according to the different supported platforms.

This is the list of the individual platform components that have been through the complete OpenNebula Quality Assurance and Certification Process.

Certified Platform Component	Version
RedHat Enterprise Linux	6.4
Ubuntu Server	12.04 (LTS) & 13.04
SUSE Linux Enterprise	12.3
CentOS	6.4
openSUSE	12.3
Debian	7.1
VMware	ESX 5.0 & ESX 5.1
XEN	3.2 & 4.2
KVM	Supported version that is included in the kernel for the Linux distribution

3.1 All Front-Ends

- xmlrpc tuning parameters (MAX_CONN, MAX_CONN_BACKLOG, KEEPALIVE_TIMEOUT, KEEPALIVE_MAX_CONN and TIMEOUT) are only available with packages distributed by us as they are compiled with a newer xmlrpc-c library.

- for **cloud bursting**, a newer nokogiri gem than the on packed by current distros is required. If you are planning to use cloud bursting, you need to install nokogiri >= 1.4.4 prior to run `install_gems`

```
# sudo gem install nokogiri -v 1.4.4
```

3.1.1 ESX 5.x as VMware Node

- to accomplish disk hotplugging and nic hotplugging (ignore the first bullet for the latter)

    - disks need to be attached through SCSI, so their images should have a DEV_PREFIX="sd"

    - VM template that will permit SCSI disk attaches afterwards needs to have an explicitly defined SCSI controller:

```
RAW=[TYPE = "vmware",
    DATA = "<devices><controller type='scsi' index='0' model='lsilogic'/></devices>"]
```

- to use SCSI disk based VMs, it is usually a good idea to explicitly declare the PCI bridges. This can be accomplished with the following added to the VM template:

```
FEATURES=[PCIBRIDGE="1"]
```

- to accomplish hot migration (through vMotion)

    - VM needs to have all network card model with model "E1000"

3.1.2 CentOS 6.4 as KVM Node

- to accomplish disk hotplugging:

    - disks need to be attached through SCSI, so their images should have a DEV_PREFIX="sd"

    - VM template that will permit SCSI disk attaches afterwards needs to have an explicitly defined SCSI controller:

```
RAW=[TYPE = "kvm",
     DATA = "<devices><controller type='scsi' index='0' model='virtio-scsi'></controller></devices>"]
```

- due to libvirt version < = 0.10.2, there is a bug in libvrit/qemu attac/detach nic functionality that prevents the reuse of net IDs. This means that after a successful attach/detach NIC, a new attach will fail.

3.1.3 Ubuntu 12.04 as KVM Node

- due to libvirt version < = 0.10.2, there is a bug in libvrit/qemu attac/detach nic functionality that prevents the reuse of net IDs. This means that after a successful attach/detach NIC, a new attach will fail.

3.2 CentOS 6.4 Usage Platform Notes

Because home directory of oneadmin is located in /var, it violates SELinux default policy. So in ssh passwordless configuration you should disable SELinux by setting SELINUX=disabled in /etc/selinux/config.

3.3 Debian Platform Notes

3.3.1 Debian Lenny as Xen 3 Node

- The xen packages on Debian Lenny seem to be broken, and they don't work with the tap:aio interface. A workaround for this problem is the following:

```
# ln -s /usr/lib/xen-3.2-1/bin/tapdisk /usr/sbin
# echo xenblktap >> /etc/modules
# reboot
```

3.4 openSUSE 12.3 Platform Notes

- Limited startup scripts → only for OpenNebula and Sunstone services

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3.5 Ubuntu 12.04 Platform Notes

- Limited startup scripts → only for OpenNebula service
- Ubuntu12.04 presents libvirt 0.9.8. We recommend updating (manually, there are no packages) to 0.10.2 to use the AttachNic and DetachNic functionality.

3.6 Ubuntu 13.04 Platform Notes

- Limited startup scripts → only for OpenNebula service

3.7 Unsupported Platforms Notes

3.7.1 Installing on ArchLinux

OpenNebula is available at the Arch User Repository (AUR), please check the opennebula package page.

3.7.2 Installing on Gentoo

You need to compile the xmlrpc-c package with threads support, as:

```
USE="threads" emerge xmlrpc-c
```

COMPATIBILITY GUIDE

This guide is aimed at OpenNebula 4.2 users and administrators who want to upgrade to the latest version. The following sections summarize the new features and usage changes that should be taken into account, or prone to cause confusion. You can check the upgrade process in the following *guide*

Visit the *Features list* and the Release Notes for a comprehensive list of what's new in OpenNebula 4.4.

4.1 OpenNebula Administrators and Users

4.1.1 Add-ons Catalog

- There is a new initiative to host OpenNebula add-ons in github. There you will find community-contributed components that may not be mature enough, or not general-purpose enough to be included in the main distribution.

4.1.2 Sunstone

- The rows in the datatables are now ordered by ID in descending order. This behaviour can be changed by user in the settings dialog or by default in *sunstone-server.conf*.

4.1.3 Users and Groups

- New *secondary groups*. These work in a similar way to the unix groups: users will have a primary group, and optionally several secondary groups. This new feature is completely integrated with the current mechanisms allowing, for example, to perform the following actions:

  - The list of images visible to a user contains all the images shared within any of his groups.

  - You can deploy a VM using an Image from one of your groups, and a second Image from another group.

  - New resources are created in the owner's primary group, but users can later change that resource's group.

  - Users can change their primary group to any of their secondary ones.

- The quota subsystem now supports volatile disk usage and limit, see *the VOLATILE_SIZE attribute here*.

4.1.4 Scheduling

- There is a new *default scheduling policy* for both hosts and datastores: `fixed`. This policy will rank hosts and datastores according looking for a `PRIORITY` attribute that can be set manually by the administrator.

4.1.5 Virtual Machines

- The *''shutdown –hard'' action* can be performed on UNKNOWN VMs. This means that if the guest was shutdown from within or crashed, users can still save the persistent or snapshotted disks.

- The default device prefix, `DEV_PREFIX`, is now 'hd' for cdrom type disks, regardless of the value set in *oned.conf*.

4.1.6 Contextualization

- Support for cloud init: now OpenNebula is able to contextualize guests using *cloud init*.

- Improvements in contextualization: ability to add INIT_SCRIPTS. Check *this guide* to learn how to define contextualization in your VM templates.

4.1.7 Storage

- Multiple system datastores: enables a much more efficient usage of the storage resources for running Virtual Machines. *Read this to configure and use this new feature*.

- Now that VMs can be deployed in different system DS for each host, the *scheduler algorithm* has been extended to take storage into account.

- The amount of storage used by OpenNebula can be limited for each Datastore using the *new attribute LIMIT_MB*.

4.1.8 Resource Management

- Support rename for more resources: users can now rename hosts, vnets and datastores.

4.1.9 Monitoring

- New monitorization model: changed from a pull model to a push model, thus increasing the scalability of an OpenNebula cloud. *More information here*.

4.2 Developers and Integrators

4.2.1 Monitoring

- Ganglia drivers have been moved out of the main OpenNebula distribution and are available as an addon.

- The arguments of the im_mad poll action drivers have changed, you can see the complete reference in the *Information Manager Driver guide*.

```
# 4.2 arguments
hypervisor=$1
hot_id=$2
host_name=$3

# 4.4 arguments
hypervisor=$1
datastore_location=$2
collectd_port=$3
monitor_push_cycle=$4
host_id=$5
host_name=$6
```

- Probes returning float values will be ignored (set to 0), they must be integer.

4.2.2 Storage

- Changes in *Ceph*, SCSI and *LVM* Datastores. Now the *''BRIDGE_LIST'' attribute is mandatory* in the template used to create these type of datastores.

- CephX support. More information *here*.

- CDROM images are no longer cloned. This makes VM instantiation faster when a big DVD is attached.

- iscsi drivers have been moved out of the main OpenNebula distribution and are available as an addon.

- New LVM drivers model: the shared KVM model, as well as support for compressed images in LVM. *Check more info on the new model here*.

4.2.3 EC2 Hybrid Cloud / Cloudbursting

- AWS SDK Ruby is used instead of the Java CLI.

- The `ec2.conf` file was renamed to *ec2_driver.default*. In this file you can define the default values for ec2 instances.

- The `ec2rc` file has been removed. A new configuration file is available: `ec2_driver.conf`.

- Now AWS credentials and regions can be defined per host instead of specifying them in the driver configuration in oned.conf. You can customise these values in `ec2_driver.conf`. *More info*

- The `CLOUD` attribute has been deprecated, now you have to use `HOST` to define more than one EC2 sections in the template. *More info*

- The following EC2 template attributes have been removed:

    - `AUTHORIZED_PORTS`: we removed it because the right approach is to use SECURITY_GROUPS. What OpenNebula was doing was to modify the default security group, but we now think that a much better approach is to achieve the same using different SECURITY GROUPS and assigning VMs to them.

    - `USERDATAFILE`: OpenNebula 4.4 is dropping support due to a security risk, it allowed practically everyone to retrieve files from the OpenNebula front-end and stage them into an Amazon EC2 VM. The alternative is to read the file and set its contents into the `USERDATA` attribute, which is still supported.

- Now the VM monitoring provides more info. New tags that can be accessed inside each VM:

```
AWS_DNS_NAME
AWS_PRIVATE_DNS_NAME
AWS_KEY_NAME
```

```
AWS_AVAILABILITY_ZONE
AWS_PLATFORM
AWS_VPC_ID
AWS_PRIVATE_IP_ADDRESS
AWS_IP_ADDRESS
AWS_SUBNET_ID
AWS_SECURITY_GROUPS
AWS_INSTANCE_TYPE
```

- The `IPADDRESS` monitoring attribute has been renamed to `AWS_PRIVATE_IP_ADDRESS`.

4.2.4 Generic Hybrid Cloud / Cloudbursting

- There is better support for custom cloud bursting drivers, you can read more in *this guide*.

- im_mad drivers must return PUBLIC_CLOUD=YES

- There is a new generic attribute for VMs: `PUBLIC_CLOUD`. This allows users to create templates that can be run locally, or in different public cloud providers. Public cloud vmm drivers must make use of this:

```
DISK = [ IMAGE_ID = 7 ]

PUBLIC_CLOUD = [
  TYPE         = "jclouds",
  JCLOUDS_DATA = "..." ]

PUBLIC_CLOUD = [
  TYPE    = "ec2",
  AMI     = "...",
  KEYPAIR = "..." ]
```

4.2.5 EC2 Server

- Now instance types are based on OpenNebula templates instead of files. You can still use the old system, changing the `:use_file_templates:` parameter in *econe.conf*. But using the new system is recommended, since file based templates will be removed soon.

- New implemented methods:

  - describe-snapshots

  - create-snapshot

  - delete-snapshot

  - create-tags: for instances, amis, volumes and snapshots

  - describe-tags

  - remove-tags

- Enhanced methods:

  - describe-*: one or more IDS can be specified now

  - describe-instances: includes vms in DONE for 15 minutes. You can configure this behaviour in the conf.

  - register: now you have to use this command to use an opennebula image in ec2. Missing features that will be added: add arch, kernel, extra disks metadata.

  - create-volume: now you can create a volume from an snapshot

- **run-instance:** now instead of using erb files templates are based on opennebula templates. Therefore you can use restricted attributes and set permissions like any other opennebula resource.

- econe-* tools are no longer maintained, you can use euca2ools or hybridfox to test the new functionality

4.2.6 XML-RPC API

- Improved scalability: new parameters support in oned.conf for xmlrpc parameters. *xml-rpc_server_configuration*.

  - MAX_CONN: Maximum number of simultaneous TCP connections the server will maintain

  - MAX_CONN_BACKLOG: Maximum number of TCP connections the operating system will accept on the server's behalf without the server accepting them from the operating system

  - KEEPALIVE_TIMEOUT: Maximum time in seconds that the server allows a connection to be open between RPCs

  - KEEPALIVE_MAX_CONN: Maximum number of RPCs that the server will execute on a single connection

  - TIMEOUT: Maximum time in seconds the server will wait for the client to do anything while processing an RPC

- New parameter in *one.vm.deploy*

  - The Datastore ID of the target system datastore where the VM will be deployed. It is optional, and can be set to -1 to let OpenNebula choose the datastore.

- New method *one.user.addgroup*

- New method *one.user.delgroup*

- New method *one.host.rename*

- New method *one.datastore.rename*

- New method *one.cluster.rename*

KNOWN ISSUES

The following bugs or issues have been identified in the current 4.4 version, and will be solved in future releases.

5.1 VMware

- No multi boot support

5.2 OneFlow

- #2535: VM creation fails if role name has a space. Patch in ticket.

5.3 Drivers - Auth

- #823: X509 auth driver should check errors when encripting

An exception is returned if the data to be encripted is too large for that key size.

```
OpenSSL::PKey::RSAError – data too large for key size:
/srv/cloud/one/lib/ruby/x509_auth.rb:178:in 'private_encrypt'
```

5.4 Drivers - Network

- #2267: Reapply network driver actions after resume. OpenVSwitch tags are not reapplied upon VM resume.

5.5 Drivers - VM

- #2511: EC2 Tags are not correctly formatted before sending them to EC2
- #2483: Properly support cdrom in Xen HVM. Right now cdrom images in xen HVM are added like normal disks but should be set to emulate cdrom.

5.6 OneGate

- #2527: after VM delete-recreate onegate token is not valid

5.7 Packaging

- #2482: After 4.4 Upgrade, Sunstone may not display information in various views

5.8 Sunstone

- #2522: Uploading files from passenger needs a fix (workaround in ticket description)
- #2292: sunstone novnc send ctrl-alt-del not working in Firefox
- #2246: OneFlow Update wizard: reset button discards the resource, and shows a create dialog
- #1877: If syslog is enabled, the logs tab in the VM detailed view are not populated

You can see all tickets in our development portal: dev.opennebula.org.

ACKNOWLEDGEMENTS

The OpenNebula project would like to thank the community members and users who have contributed to this software release by being active with the discussions, answering user questions, or providing patches for bugfixes, features and documentation.