

# OpenStack Tutorial

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Laboratori Nazionali del Gran Sasso - INFN

Cloud Computing Tutorial

1 Introduction to OpenStack

2 Gran Sasso Clouds

3 Sample session

1 Introduction to OpenStack

2 Gran Sasso Clouds

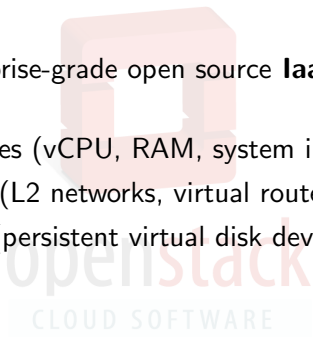
3 Sample session

# What is OpenStack

OpenStack is an enterprise-grade open source **IaaS** platform.

It provides:

- computing resources (vCPU, RAM, system images. . .)
- network resources (L2 networks, virtual routers. . .)
- storage resources (persistent virtual disk devices, VM snapshots)



# Who is behind OpenStack

OpenStack development is overseen by the OpenStack Foundation. The Foundation is backed by 5600 individual members and 850 organizations.

Different companies contribute to OpenStack development:

- AT&T
- Canonical
- HP
- IBM
- Rackspace
- Red Hat, Inc.
- SUSE

... and many more!



Some numbers about OpenStack:

- 3 years of development
- 1278 contributors
- 1289000 lines of code
- more than \$10 million in funding

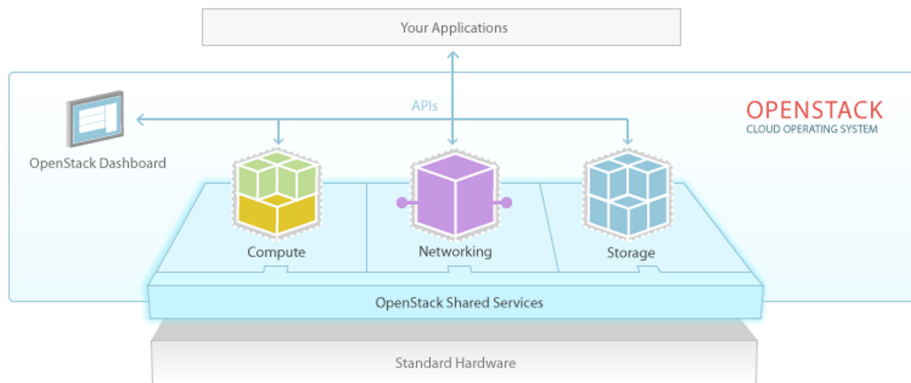
OpenStack is quickly becoming the *de facto* standard for private IaaS clouds.

For more information visit <http://www.openstack.org/>

OpenStack is composed by 5 different components:

- 1 identity and authentication service
- 2 computing service
- 3 networking service
- 4 storage service
- 5 dashboard (web frontend)

# OpenStack components





## What it does

Authenticates users and verifies project membership.

Authentication and authorization based on:

- username/password pair
- projects (also known as “tenants”)
- roles



## What it does

Creates, runs and manages instances (virtual machines).

Resources managed by this service:

- instances
- vCPU
- RAM
- instance metadata (hostname, SSH keypairs, boot scripts. . . )



## What it does

Provides network resources to the computing service.

Resources managed by this service:

- L2 networks
- subnets
- virtual routers
- firewalling rules
- floating IPs



## What it does

Provides persistent storage to the computing service.

Resources managed by this service:

- volumes (virtual disk devices)
- snapshots
- OS images

Every user has access to the following resources:

- instances
- vCPU
- RAM
- networks
- virtual routers/firewalls
- virtual disks

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## Nota Bene

Resources belong to **projects**, only SSH keypairs belong to users!

An instance is a self-contained virtual machine:

- resource allocation based on “flavors”
- boots from a **pre-installed system image** or from a **snapshot**
- has a fixed **private** IP address
- can have one or more floating IP addresses
- can have an ephemeral disk
- can have one or more volumes attached

Instances boot off a standard system image and can be customized upon boot with a **user script**.

Most system images come with SSH enabled out-of-the-box and keyed to a user-specific SSH keypair. **Password-based login is disabled for the default account.**



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### Warning

Instances exist as long as they are not terminated. Upon termination the system disk will be **irreversibly** destroyed. To retain system configuration make a **snapshot** or simply **suspend** the instance.

OpenStack provides isolated L2 networks to each project. Each network can have one or more subnets and virtual routers.

Private IP addresses are **automatically** allocated to instances, while floating IP addresses must be **manually** allocated to projects and assigned to instances.

The networking service also provides **virtual firewalls** for all instances with multiple independent rulesets.

Each instance can have more than one ruleset attached to it. The rules also apply to traffic **within** the same network.

Volumes are persistent virtual disk devices. Each instance can have one or more volumes attached to it and each volume may be attached to one instance at a time.

They are created and destroyed independently from instances, so they are suited for **long-term storage of data**.

When created, volumes are like **empty disks**. They must be partitioned and formatted in order to use them.

Volumes are persistent virtual disk devices. Each instance can have one or more volumes attached to it and each volume may be attached to one instance at a time.

They are created and destroyed independently from instances, so they are suited for **long-term storage of data**.

When created, volumes are like **empty disks**. They must be partitioned and formatted in order to use them.

## Warning

Due to their nature, volumes are **not** backed up automatically. Users have to arrange backup of volume contents on their own!

1 Introduction to OpenStack

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# What is Gran Sasso Clouds

Gran Sasso Clouds is the OpenStack environment of LNGS.

It is currently a standalone system. In the future it will be integrated with other computing services like U-LITE.

It is available upon request to experimental collaborations, working groups, LNGS services and individual users.

Currently, Gran Sasso Clouds has the following resources available:

- 48 CPU cores
- 80 GB of RAM
- several TB for volume and snapshot storage

Capacity will be expanded as needed as more users start working with it.



Gran Sasso Clouds is extremely flexible and can be used for many scenarios:

- internal and public web sites
- wikis
- blogs
- database services
- software development
- data analysis
- Monte Carlo
- prototyping
- ...

## The web frontend

Gran Sasso Clouds can be accessed from **<https://stackctl.lngs.infn.it>**. All operations can be performed via the web frontend.

## Who can access it

Everybody with a standard LNGS account can request access to the Computing and Network Service. CNS staff will enable access for your account and assign it to one or more projects (experiment and/or LNGS service).

## Accessing Gran Sasso Clouds (cont'd)

Direct access to Gran Sasso Clouds is required only to **manage** resources (instances, networks, volumes. . . ). Depending on the kind of use case, end users do not require any account at all or just a regular UNIX account on the instances themselves.

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## What about groups?

Groups need to designate a few selected individuals that will manage resources.

Gran Sasso Clouds supports various network configurations. The standard network configuration **just works** for most users and groups. Experimental collaborations and working groups that require a more complex network configuration can contact the CNS for more information.

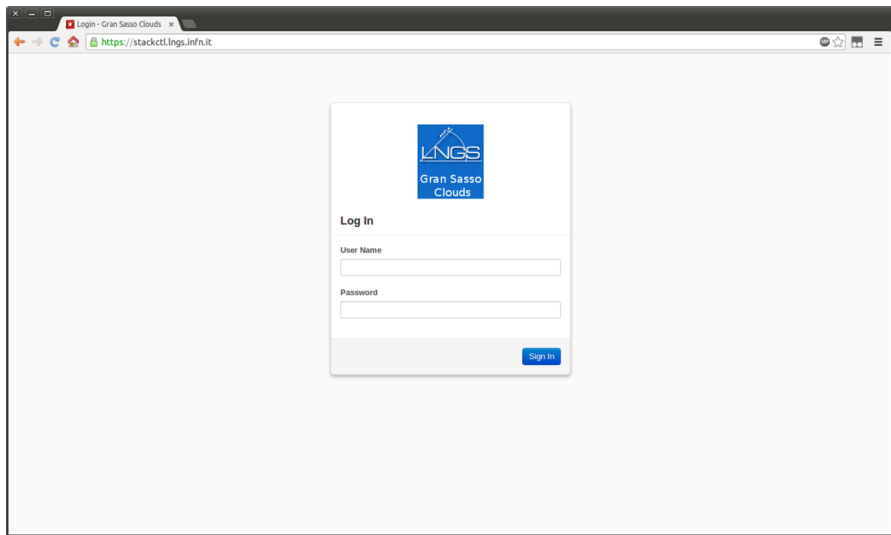
# Summary

1 Introduction to OpenStack

2 Gran Sasso Clouds

3 Sample session

# Login screen



The screenshot shows the OpenStack dashboard interface. On the left is a navigation sidebar with the LINGS Gran Sasso Clouds logo and various menu items like Project, Manage Compute, and Manage Network. The main content area is titled 'Overview' and displays several resource usage metrics with progress bars: 3 of 10 available instances, 3 of 20 available vCPUs, 6,144 MB of 51,200 MB available RAM, 0 of 10 available volumes, and 0 GB of 1,000 GB available volume storage. Below these is a section to 'Select a month to query its usage' with a dropdown for 'September' and '2013', and a 'Submit' button. The active status is shown as 'Active Instances: 3 Active RAM: 6GB This Month's VCPU-Hours: 240.16 This Month's GB-Hours: 5671.39'. A 'Usage Summary' table lists three instances: 'pinger', 'lunanode003', and 'tarsnap', with their respective VCPUs, Disk usage, RAM, and Uptime. A 'Download CSV Summary' button is located to the right of the table.

## Overview

Logged in as: mpanella [Settings](#) [Help](#) [Sign Out](#)

### Quota Summary

Used 3 of 10 Available Instances

Used 3 of 20 Available vCPUs

Used 6,144 MB of 51,200 MB Available RAM

Used 0 of 10 Available volumes

Used 0 GB of 1,000 GB Available volume storage

Select a month to query its usage:

September 2013

Active Instances: 3 Active RAM: 6GB This Month's VCPU-Hours: 240.16 This Month's GB-Hours: 5671.39

### Usage Summary

[Download CSV Summary](#)

Instance Name	VCPUs	Disk	RAM	Uptime
<a href="#">pinger</a>	1	20	2GB	1 month, 3 weeks
<a href="#">lunanode003</a>	1	30	2GB	3 weeks, 5 days
<a href="#">tarsnap</a>	1	30	2GB	1 day, 17 hours

Displaying 3 items



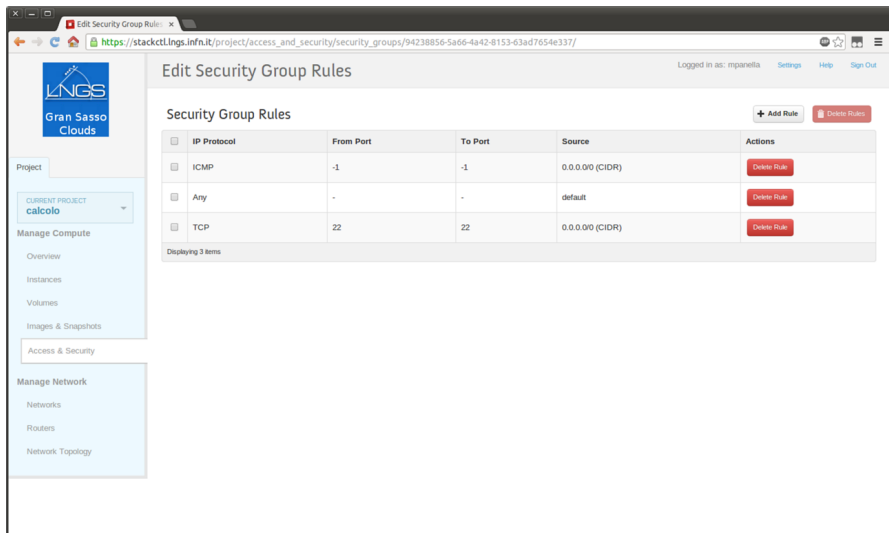
# Security groups

The screenshot shows the OpenStack Access & Security interface. The browser address bar displays `https://stackctl.lnsg.infn.it/project/access_and_security/`. The page title is "Access & Security". The user is logged in as "mpanella". The interface includes a sidebar with the LNCS Gran Sasso Clouds logo and navigation menus for "Project" (current project: calcolo), "Manage Compute" (Overview, Instances, Volumes, Images & Snapshots, Access & Security), and "Manage Network" (Networks, Routers, Network Topology). The main content area is titled "Security Groups" and includes tabs for "Security Groups", "Keypairs", "Floating IPs", and "API Access". There are buttons for "+ Create Security Group" and "Delete Security Groups". A table lists the security groups:

<input type="checkbox"/>	Name	Description	Actions
<input type="checkbox"/>	default	default	Edit Rules
<input type="checkbox"/>	gluster	porte per gluster	Edit Rules More ▾
<input type="checkbox"/>	web	Porte per servizi web	Edit Rules More ▾

Displaying 3 items

# Security group rules



The screenshot shows a web browser window with the URL [https://stackct.lnsg.infn.it/project/access\\_and\\_security/security\\_groups/94238856-5a66-4a42-8153-63ad7654e337/](https://stackct.lnsg.infn.it/project/access_and_security/security_groups/94238856-5a66-4a42-8153-63ad7654e337/). The page title is "Edit Security Group Rules". The user is logged in as "mpanella".

The main content area is titled "Security Group Rules" and contains a table with the following data:

<input type="checkbox"/>	IP Protocol	From Port	To Port	Source	Actions
<input type="checkbox"/>	ICMP	-1	-1	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>
<input type="checkbox"/>	Any	-	-	default	<a href="#">Delete Rule</a>
<input type="checkbox"/>	TCP	22	22	0.0.0.0/0 (CIDR)	<a href="#">Delete Rule</a>

Below the table, it says "Displaying 3 items".

On the left sidebar, the "Gran Sasso Clouds" logo is visible. The navigation menu includes "Project", "CURRENT PROJECT calcolo", "Manage Compute" (with sub-items: Overview, Instances, Volumes, Images & Snapshots), "Access & Security", "Manage Network" (with sub-items: Networks, Routers, Network Topology), and "Settings", "Help", "Sign Out" in the top right.

# Keypair management

Access & Security - Gran Sasso Clouds

https://stackct.lnsg.it/project/access\_and\_security/

Logged in as: mpanella [Settings](#) [Help](#) [Sign Out](#)

Security Groups **Keypairs** Floating IPs API Access

Keypairs [+ Create Keypair](#) [↑ Import Keypair](#) [Delete Keypairs](#)

<input type="checkbox"/>	Keypair Name	Fingerprint	Actions
<input type="checkbox"/>	matteo	1d:2d:77:b7:12:75:61:10:b4:53:b2:8b:7a:25:b1:cb	<a href="#">Delete Keypair</a>

Displaying 1 item

Project: **calcolo**

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots
- Access & Security

Manage Network

- Networks
- Routers
- Network Topology

# Running instances

The screenshot shows the 'Instances' page in the LINGStack management console. The page title is 'Instances' and the user is logged in as 'mpanella'. The interface includes a sidebar with navigation options and a main content area displaying a table of running instances.

**Instances**

Logged in as: mpanella [Settings](#) [Help](#) [Sign Out](#)

**Instances** + Launch Instance Terminate Instances

<input type="checkbox"/>	Instance Name	IP Address	Size	Keypair	Status	Task	Power State	Actions
<input type="checkbox"/>	tarsnap	192.168.42.6 172.16.3.131	m1.small   2GB RAM   1 VCPU   20GB Disk	matteo	Active	None	Running	<span>Create Snapshot</span> <span>More ▾</span>
<input type="checkbox"/>	lunanode003	192.168.42.4 172.16.3.127	m1.small   2GB RAM   1 VCPU   20GB Disk	stestallo	Active	None	Running	<span>Create Snapshot</span> <span>More ▾</span>
<input type="checkbox"/>	pinger	192.168.42.2 172.16.3.122	m1.small   2GB RAM   1 VCPU   20GB Disk	matteo	Active	None	Running	<span>Create Snapshot</span> <span>More ▾</span>

Displaying 3 items

# Running instances

The screenshot shows the 'Instances' page in the LINGStack management console. The page title is 'Instances' and the user is logged in as 'mpanella'. The interface includes a sidebar with navigation options like 'Project', 'Manage Compute', 'Manage Network', and 'Volumes'. The main content area displays a table of instances with columns for Instance Name, IP Address, Size, Keypair, Status, Task, Power State, and Actions. Three instances are listed: 'tarsnap', 'lunanode003', and 'pinger', all in a 'Running' state. A '+ Launch Instance' button is circled in orange, and a 'Terminate Instances' button is visible to its right.

Instances

Logged in as: mpanella [Settings](#) [Help](#) [Sign Out](#)

Instances

+ Launch Instance [Terminate Instances](#)

<input type="checkbox"/>	Instance Name	IP Address	Size	Keypair	Status	Task	Power State	Actions
<input type="checkbox"/>	tarsnap	192.168.42.6 172.16.3.131	m1.small   2GB RAM   1 VCPU   20GB Disk	matteo	Active	None	Running	<a href="#">Create Snapshot</a> <a href="#">More ▾</a>
<input type="checkbox"/>	lunanode003	192.168.42.4 172.16.3.127	m1.small   2GB RAM   1 VCPU   20GB Disk	stestallo	Active	None	Running	<a href="#">Create Snapshot</a> <a href="#">More ▾</a>
<input type="checkbox"/>	pinger	192.168.42.2 172.16.3.122	m1.small   2GB RAM   1 VCPU   20GB Disk	matteo	Active	None	Running	<a href="#">Create Snapshot</a> <a href="#">More ▾</a>

Displaying 3 items

# Launching an instance

**Launch Instance**

Details | Access & Security | Networking | Volume Options | Post-Creation

**Instance Source**  
Image

**Image**  
debian-7-cloudinit

**Instance Name**  
workshop

**Flavor**  
m1.small

**Instance Count**  
1

Specify the details for launching an instance.  
The chart below shows the resources used by this project in relation to the project's quotas.

**Flavor Details**

Name	m1_small
VCPUs	1
Root Disk	20 GB
Ephemeral Disk	10 GB
Total Disk	30 GB
RAM	2,048 MB

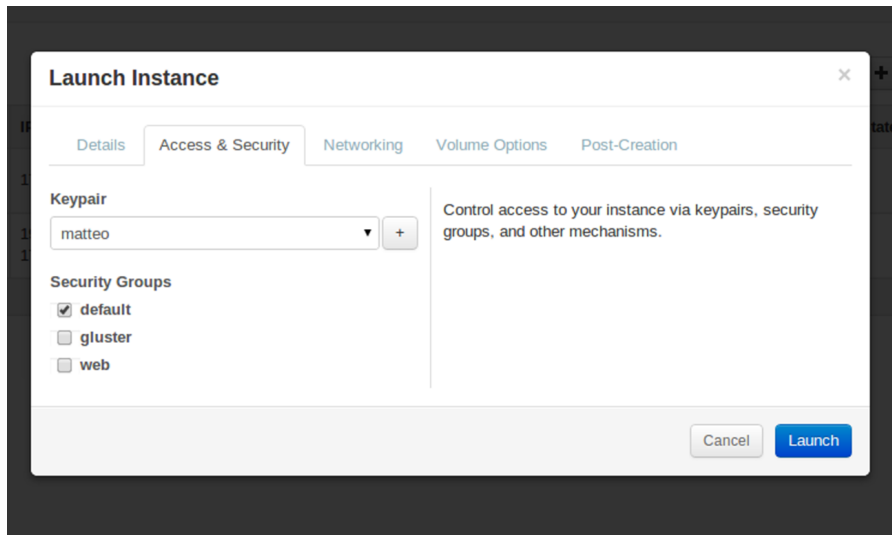
**Project Quotas**

**Number of Instances (3)** 7 Available

**Number of VCPUs (3)** 17 Available

**Total RAM (6,144 MB)** 45,056 MB Available

Cancel Launch



The image shows a 'Launch Instance' dialog box with a close button (X) in the top right corner. The dialog has five tabs: 'Details', 'Access & Security' (which is selected), 'Networking', 'Volume Options', and 'Post-Creation'. Under the 'Access & Security' tab, there are two main sections. The first is 'Keypair', which features a dropdown menu currently showing 'matteo' and a plus sign button to its right. The second is 'Security Groups', which contains three items: 'default' (checked with a checkbox), 'gluster' (unchecked), and 'web' (unchecked). To the right of these sections is a vertical line, followed by the text: 'Control access to your instance via keypairs, security groups, and other mechanisms.' At the bottom right of the dialog, there are two buttons: a grey 'Cancel' button and a blue 'Launch' button.

**Launch Instance** ✕

Details Access & Security **Networking** Volume Options Post-Creation

**Selected Networks**

Choose network from Available networks to Selected Networks by push button or drag and drop, you may change nic order by drag and drop as well.

**Available networks**

↕ calcolo (96e7a38f-de71-4ab5-a369-80a09e744012) +

Cancel **Launch**



# Post-boot customization

Logged in a

## Launch Instance

Details Access & Security Networking Volume Options **Post-Creation**

**Customization Script**

You can customize your instance after it's launched using the options available here.

The "Customization Script" field is analogous to "User Data" in other systems.

Cancel Launch

Instance Detail: workshop

Overview Log Console

Instance Console Log Log Length 35 Go View Full Log

```
| . . . 0 . |
| . . 0000 |
++
[7251]71c7[16][32m ok [39:49m8[?25h[?0c.
[... ] Starting Cloud service: cloudinitCloudinit v. 0.7.2 running 'modules:config' at Wed, 04 Sep 2013 08:14:02 +0000. Up 72.93 seconds.
20130904 10:14:03,061 stages.py[WARNING]: Module sshimportid is verified on ['ubuntu'] distros but not on debian distro. It may or may not work correctly.
Generating locales (this might take a while)...
en_US.UTF8... done
Generation complete.
20130904 10:14:05,041 util.py[WARNING]: Running aptconfigure (<module 'cloudinit.config.cc_apt_configure' from '/usr/lib/python2.7/distpackages/cloudinit/config/cc_apt_configure.pyc'>) failed
20130904 10:14:05,076 stages.py[WARNING]: Module landscape is verified on ['ubuntu'] distros but not on debian distro. It may or may not work correctly.
[7251]71c7[16][32m ok [39:49m8[?25h[?0c.
[... ] Starting OpenBSD Secure Shell server: sshd[?251[?1c7[16][32m ok [39:49m8[?25h[?0c.
[... ] Starting Cloud service: cloudinitCloudinit v. 0.7.2 running 'modules:final' at Wed, 04 Sep 2013 08:14:05 +0000. Up 75.52 seconds.
clinfo: ++++++Authorized keys from /home/debian/.ssh/authorized_keys for user debian++++++
clinfo: +++++
clinfo: | Keytype | Fingerprint (md5) | Options | Comment |
clinfo: +++++
clinfo: | sshrsa | 1d:2d:77:b7:12:75:61:f0:b4:53:b2:8b:7a:25:b1:cb | | morpheus@windu |
clinfo: +++++
ec2:
ec2: #####
ec2: BEGIN SSH HOST KEY FINGERPRINTS
ec2: 1024 66:68:2a:c1f3:b0:e2:51:ff:09:b1:e9:f9:02:da:f2 root@workshop (DSA)
ec2: 256 31:ca:d2:fb:53:60:fe:aa:2b:5d:e6:24:b4:32:6d:6c root@workshop (ECDSA)
ec2: 2048 cf:c5:48:10:8e:ef:1a:45:e2:7a:eb:ed:f9:7c:99:88 root@workshop (RSA)
ec2: END SSH HOST KEY FINGERPRINTS
ec2: #####
ec2: BEGIN SSH HOST KEY KEYS
ec2: ecdsasha2nistp256 AAAAE2VjZHNhXNoYTI1bn1zdzHAYnTYAAAAIbm1zdHAYnTYAAABBB02b2v2dRb8648Zc5GLIK4poVrNHNuU1z106F7YQY7ZedXokSq0S09XhJ01axSNLEc/I017AL/TUJ1M5o13N=
root@workshop
sshrsa AAAAB3NzaC1yc2EAAAADAQABAAQDhUPqhxerIf10b7trfNjxvOKK4c1F0nQa+6jN+4gbsXgwPfZnN/IN1VD3XJ0LdE1yNBuAFdhhNpCJTJ0pm06eVslAKLH9+8YerPmQm8ktQ1HvDsoXoYHO
t116IEa0rDTZ+us0P70hKc+sFYByVK1MU1n0yM+8ac19260P+1hrv3AAu0855eq/VMS-omL5H+rSMH1V008wFUuVrARxvYSD1m6rIn/T1pE0g/lumvsv1BNCfPeI.14FXC11PSE1b3/66U3IE7inV2UB
```

Volumes - Gran Sasso Clouds

https://stackct.lnsg.infn.it/project/volumes/

Logged in as: mpanella [Settings](#) [Help](#) [Sign Out](#)

## Volumes

[+ Create Volume](#)

Name	Description	Size	Status	Type	Attached To	Actions
No items to display.						
Displaying 0 items						

Project

CURRENT PROJECT **calcolo**

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots
- Access & Security

Manage Network

- Networks
- Routers
- Network Topology

Volumes - Gran Sasso Clouds

https://stackct.lnsg.infn.it/project/volumes/

Logged in as: mpanella Settings Help Sign Out

## Volumes

+ Create Volume

Name	Description	Size	Status	Type	Attached To	Actions
No items to display.						

Displaying 0 items

Project

CURRENT PROJECT **calcolo**

Manage Compute

- Overview
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# Creating a volume

## Create Volume ✕

**Volume Name**

**Description**

**Type**

**Size (GB)**

**Description:**  
Volumes are block devices that can be attached to instances.

**Volume Quotas**

**Total Gigabytes (0 GB)** 1,000 GB Available

**Number of Volumes (0)** 10 Available

# Volumes (cont'd)

The screenshot shows the OpenStack dashboard interface for managing volumes. The browser address bar indicates the URL is <https://stackct.lnsg.infn.it/project/volumes/>. The user is logged in as 'mpanella'. The page title is 'Volumes'. In the top right corner, there are links for 'Settings', 'Help', and 'Sign Out'. Below the title, there are two buttons: '+ Create Volume' and 'Delete Volumes'. The main content area features a table with the following columns: Name, Description, Size, Status, Type, Attached To, and Actions. One volume is listed with the name 'workshop', description 'Volume for CC workshop', size '10GB', status 'Available', and type '-'. The 'Actions' column for this volume contains 'Edit Attachments' and 'More'. Below the table, it says 'Displaying 1 item'. The left sidebar contains the 'LNGS Gran Sasso Clouds' logo and a navigation menu with sections: 'Project' (with a dropdown for 'CURRENT PROJECT calcolo'), 'Manage Compute' (with sub-items: Overview, Instances, Volumes), 'Images & Snapshots', 'Access & Security', 'Manage Network' (with sub-items: Networks, Routers, Network Topology).

<input type="checkbox"/>	Name	Description	Size	Status	Type	Attached To	Actions
<input type="checkbox"/>	workshop	Volume for CC workshop	10GB	Available	-		Edit Attachments More ▾

Displaying 1 item

# Volumes (cont'd)

The screenshot shows the OpenStack Volumes dashboard. The page title is "Volumes" and the user is logged in as "mpanella". The dashboard includes a sidebar with navigation options like "Project", "Manage Compute", "Manage Network", and "Volumes". The main content area displays a table of volumes. One volume is listed with the name "workshop", a description "Volume for CC workshop", a size of "10GB", and a status of "Available". The "Actions" column for this volume contains a button labeled "Edit Attachments", which is circled in orange. There are also buttons for "Create Volume" and "Delete Volumes" at the top right of the table.

<input type="checkbox"/>	Name	Description	Size	Status	Type	Attached To	Actions
<input type="checkbox"/>	workshop	Volume for CC workshop	10GB	Available	-		<a href="#">Edit Attachments</a> <a href="#">More ▾</a>

Displaying 1 item

# Attaching a volume

## Manage Volume Attachments

### Attachments

Instance	Device	Actions
No items to display.		
Displaying 0 items		

### Attach To Instance

Attach to Instance

workshop (14a6eab9-7dcc-4b8b-bb8d-30d6180f: ▾)

Device Name

/dev/vdc

Cancel Attach Volume



# Attaching a volume

**Manage Volume Attachments** [X]

### Attachments

Instance	Device	Actions
No items to display.		

Displaying 0 items

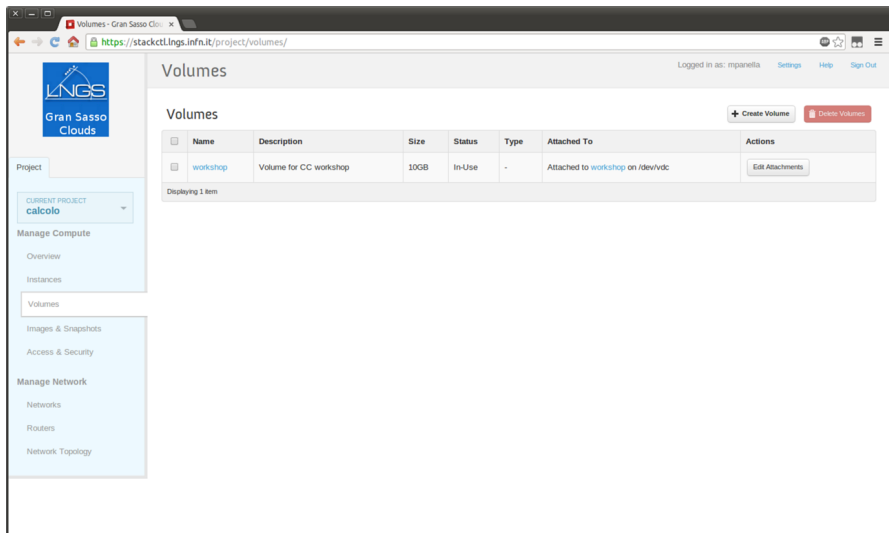
**Never use `/dev/vda` or `/dev/vdb` as device names!**

### Attach To Instance

Attach to Instance:

Device Name:

# Attaching a volume



The screenshot shows the OpenStack dashboard interface for the 'calcolo' project. The main content area is titled 'Volumes' and contains a table with the following data:

<input type="checkbox"/>	Name	Description	Size	Status	Type	Attached To	Actions
<input type="checkbox"/>	workshop	Volume for CC workshop	10GB	In-Use	-	Attached to <a href="#">workshop</a> on /dev/vdc	<a href="#">Edit Attachments</a>

Below the table, it indicates 'Displaying 1 item'. On the right side of the table, there are buttons for '+ Create Volume' and 'Delete Volumes'. The left sidebar shows the navigation menu with 'Volumes' selected under the 'Project' section.

# Floating IPs

Access & Security - Gran Sasso

https://stackct.lnsg.infn.it/project/access\_and\_security/

Access & Security

Logged in as: mpanella Settings Help Sign Out

Security Groups Keypairs Floating IPs API Access

Allocate IP To Project Release Floating IPs

<input type="checkbox"/>	IP Address	Instance	Floating IP Pool	Actions
<input type="checkbox"/>	172.16.3.122	-	lnsg	Associate Floating IP More ▾
<input type="checkbox"/>	172.16.3.127	lunarode003	lnsg	Disassociate Floating IP More ▾
<input type="checkbox"/>	172.16.3.131	-	lnsg	Associate Floating IP More ▾
<input type="checkbox"/>	172.16.3.133	-	lnsg	Associate Floating IP More ▾

Displaying 4 items

Project

CURRENT PROJECT **calcolo**

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots

Access & Security

Manage Network

- Networks
- Routers
- Network Topology

# Floating IPs

The screenshot shows the OpenStack Horizon web interface for the 'Access & Security' section. The page title is 'Access & Security' and the user is logged in as 'mpanella'. The 'Floating IPs' tab is selected, showing a table of floating IP addresses. The table has columns for 'IP Address', 'Instance', 'Floating IP Pool', and 'Actions'. There are four rows of data, each with a checkbox in the first column. The 'Actions' column contains buttons for 'Associate Floating IP' and 'More'. The 'Associate Floating IP' button for the IP address 172.16.3.133 is circled in orange. Above the table, there are buttons for 'Allocate IP To Project' and 'Release Floating IP'. The left sidebar shows the 'Gran Sasso Clouds' logo and navigation menus for 'Project', 'Manage Compute', 'Access & Security', and 'Manage Network'.

Access & Security - Gran Sasso Clouds

https://stackct.lnsg.infn.it/project/access\_and\_security/

Access & Security

Logged in as: mpanella Settings Help Sign Out

Security Groups Keypairs Floating IPs API Access

Allocate IP To Project Release Floating IP

Floating IPs

<input type="checkbox"/>	IP Address	Instance	Floating IP Pool	Actions
<input type="checkbox"/>	172.16.3.122	-	lnsg	Associate Floating IP More ▾
<input type="checkbox"/>	172.16.3.127	lunarode003	lnsg	Disassociate Floating IP More ▾
<input type="checkbox"/>	172.16.3.131	-	lnsg	Associate Floating IP More ▾
<input type="checkbox"/>	172.16.3.133	-	lnsg	Associate Floating IP More ▾

Displaying 4 items

Project

CURRENT PROJECT **calcolo**

Manage Compute

- Overview
- Instances
- Volumes
- Images & Snapshots

Access & Security

Manage Network

- Networks
- Routers
- Network Topology

# Associating a floating IP

**Manage Floating IP Associations** ✕

IP Address

**IP Address**

172.16.3.133 +

**Port to be associated**

workshop: 192.168.42.5 ▼

Select the IP address you wish to associate with the selected instance.

Cancel Associate

# Inside the VM

```
debian@workshop: -
File Edit View Search Terminal Help
morphheus@enterprise:~$ ssh debian@172.16.3.133
The authenticity of host '172.16.3.133 (172.16.3.133)' can't be established.
ECDSA key fingerprint is 31:ca:d2:fb:53:60:fe:aa:2b:5d:e6:24:b4:32:6d:6c.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '172.16.3.133' (ECDSA) to the list of known hosts.
Linux wheezy 3.2.0-4-amd64 #1 SMP Debian 3.2.46-1 x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
debian@workshop:~$ sudo -l
root@workshop:~# mkfs.ext4
mkfs.ext4 mkfs.ext4dev
root@workshop:~# mkfs.ext4 /dev/vdc
mkfs 1.42.5 (29-Jul-2012)
filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
855360 inodes, 2621440 blocks
131072 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2684354560
80 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

root@workshop:~# █
```



Questions?