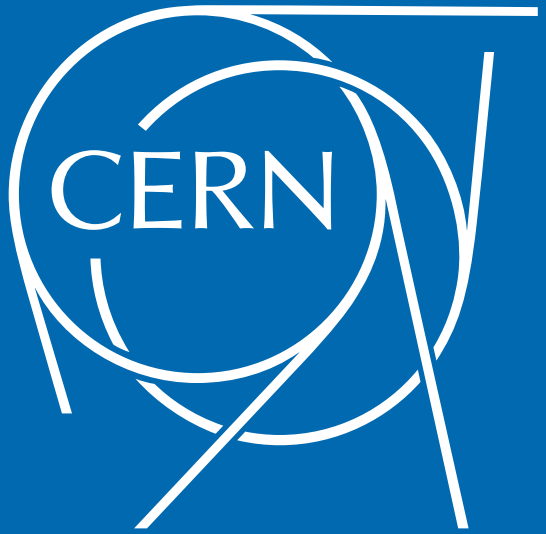
CERN

OpenStack training

April, 2014

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What is OpenStack?

OpenStack is a collection of open source projects that provides an operating platform for orchestrating clouds in a massively scale.

What is OpenStack?

"Founded by Rackspace Hosting and NASA, OpenStack has grown to be a global software community of developers collaborating on a standard and massively scalable open source cloud operating system."

"All of the code for OpenStack is freely available under the Apache 2.0 license. Anyone can run it, build on it, or submit changes back to the project."

What is OpenStack?

At CERN we have the following OpenStack projects deployed:

- compute service (nova)
- image service (glance)
- dashboard service (horizon)
- block storage service (cinder)
- metering service (telemetry)
- identity service (keystone)

First steps with OpenStack at CERN

- Subscribe CERN Cloud Service

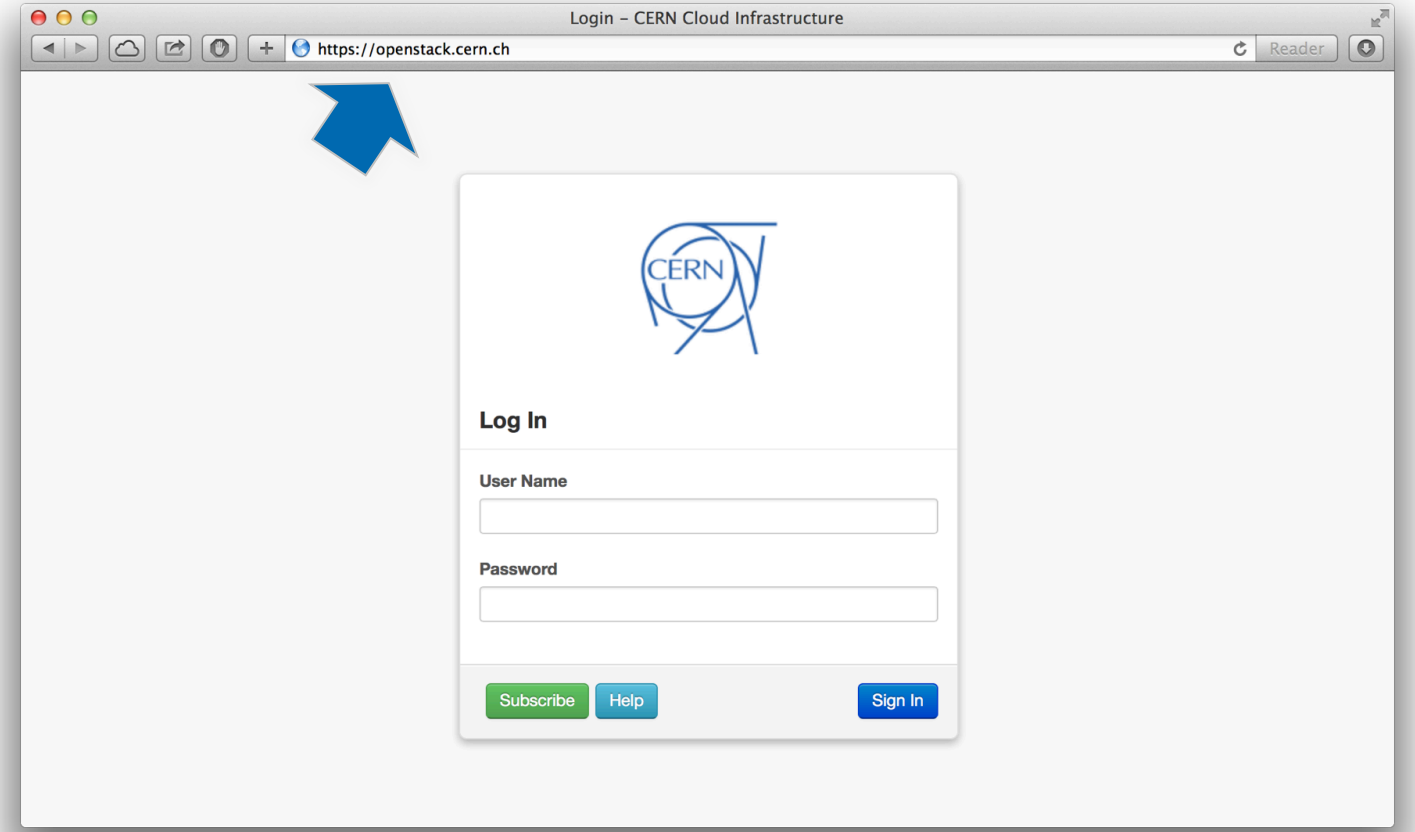
  https://resources.web.cern.ch/resources/Manage/ListServices.aspx

- (optional) Install CLIs (nova, glance, cinder, ceilometer)
  - Dependent on your OS.

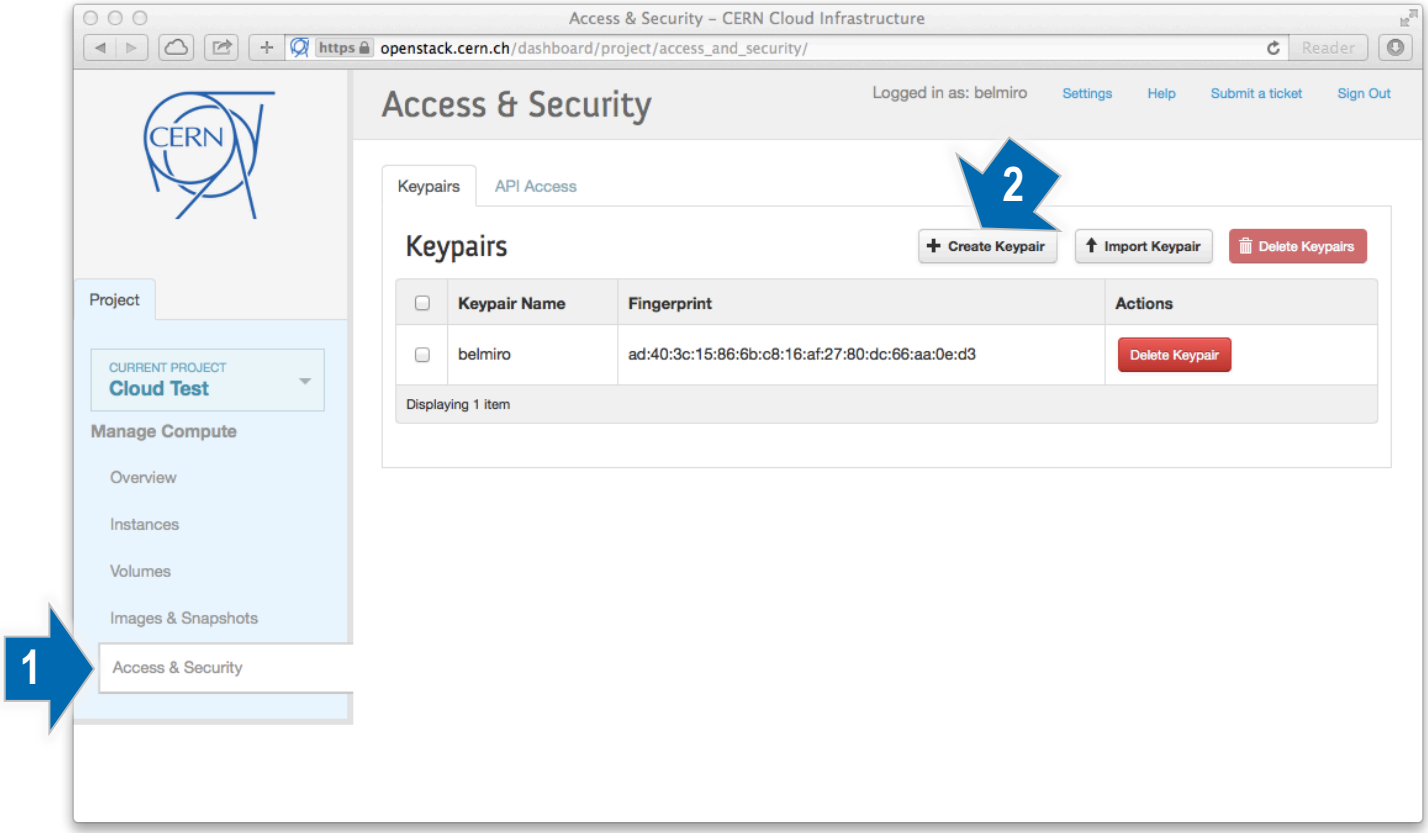
  See: https://information-technology.web.cern.ch/book/cern-cloud-infrastructure-user-guide/advanced-topics/installing-tools-client-machines

  See: http://docs.openstack.org/user-guide/content/install_clients.html for more information.
  - All CLIs are available on lxplus and aiadm

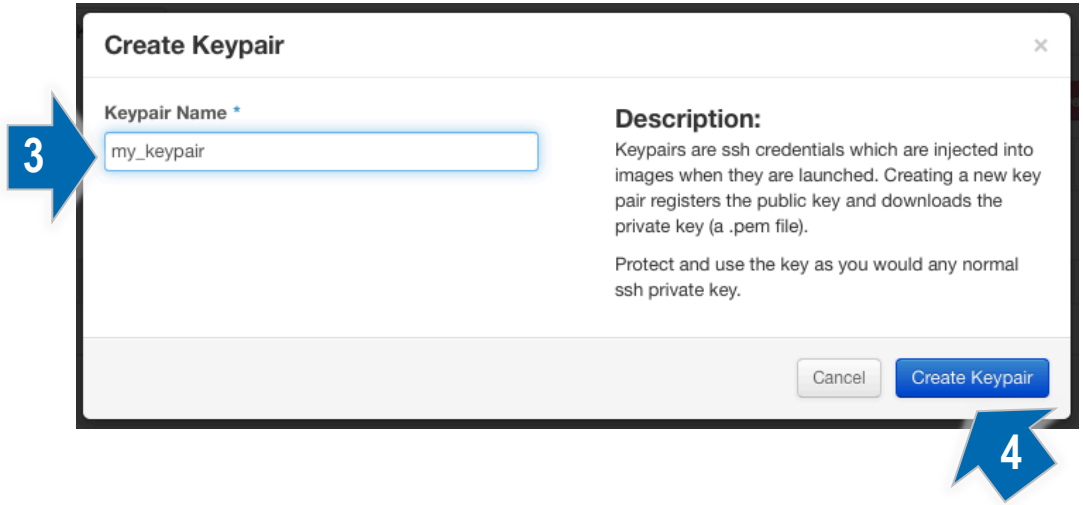
Login into OpenStack dashboard



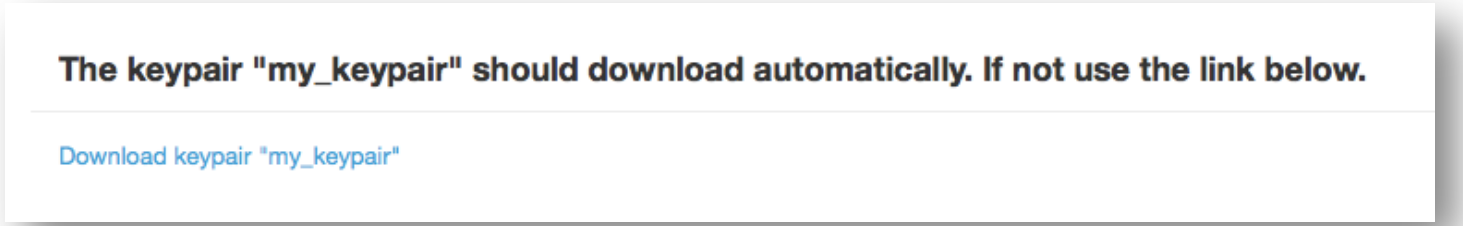
How to create a keypair (dashboard)



How to create a keypair (dashboard)



How to create a keypair (dashboard)



5) Download the private key file

6) Change its permissions so that only you can read and write to the file

```
$ chmod 0600 my_keypair.pem
```

7) Make the keypair known to SSH

```
$ ssh-add my_keypair.pem
```

How to create a keypair (nova CLI)

1) Generate a keypair with the name “my_keypair”

```
$ nova keypair-add my_keypair > my_keypair.pem
```

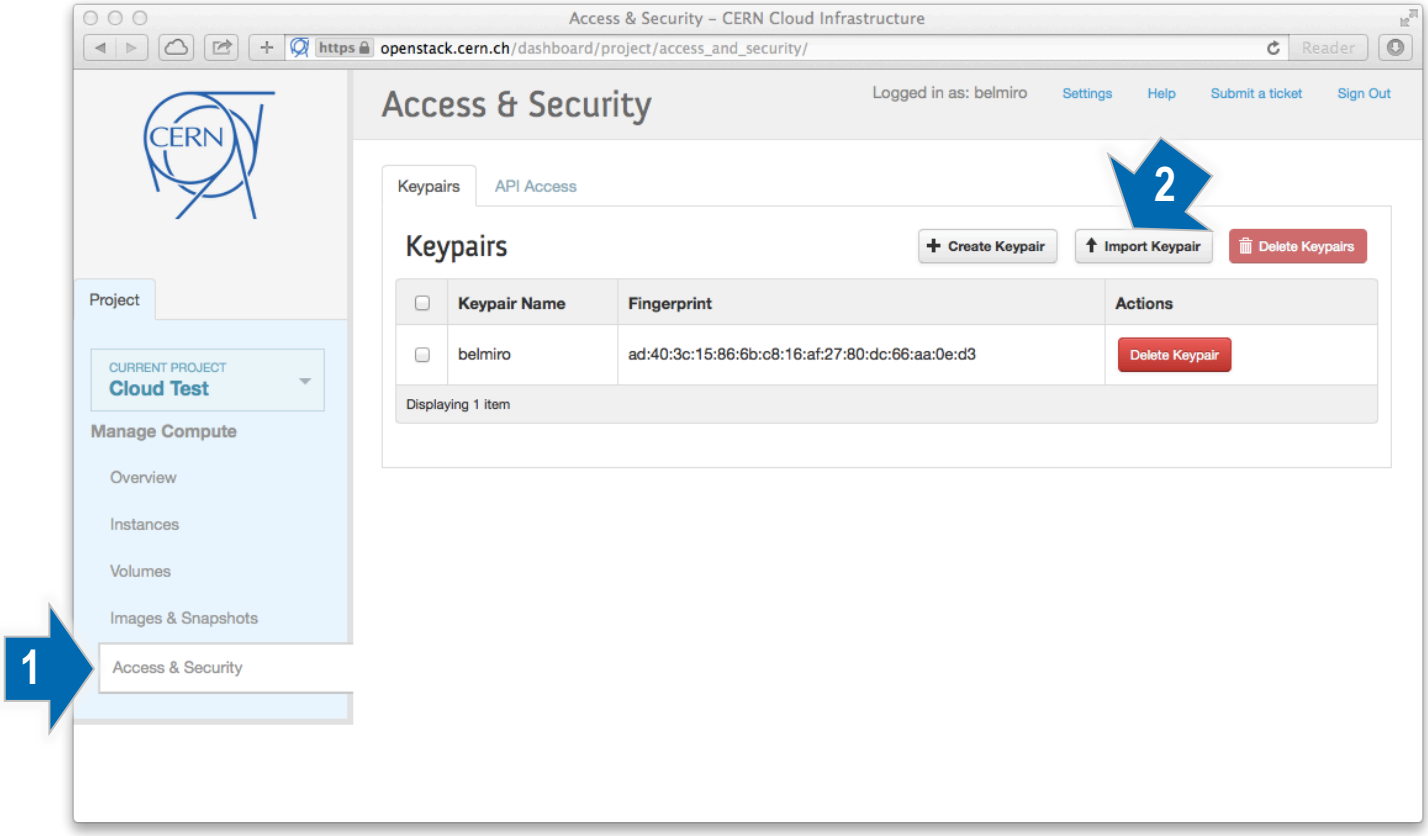
2) Change its permissions so that only you can read and write to the file

```
$ chmod 0600 my_keypair.pem
```

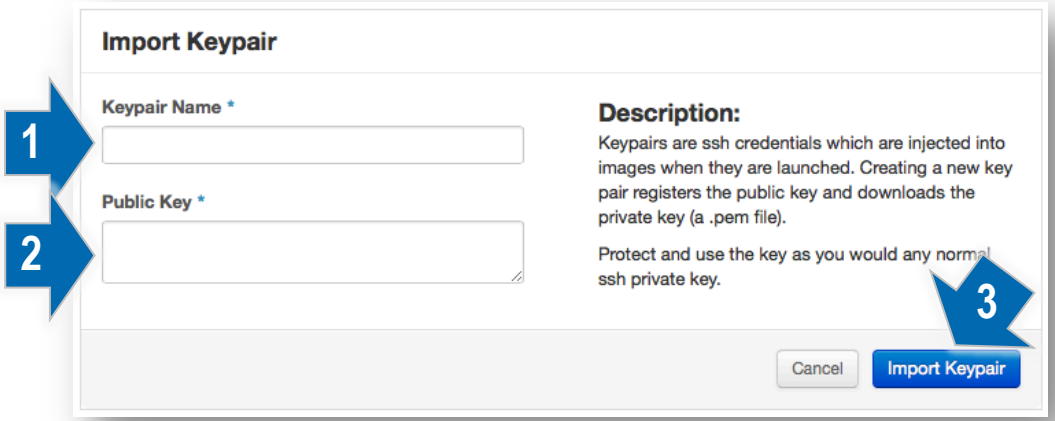
3) Make the keypair known to SSH

```
$ ssh-add my_keypair.pem
```

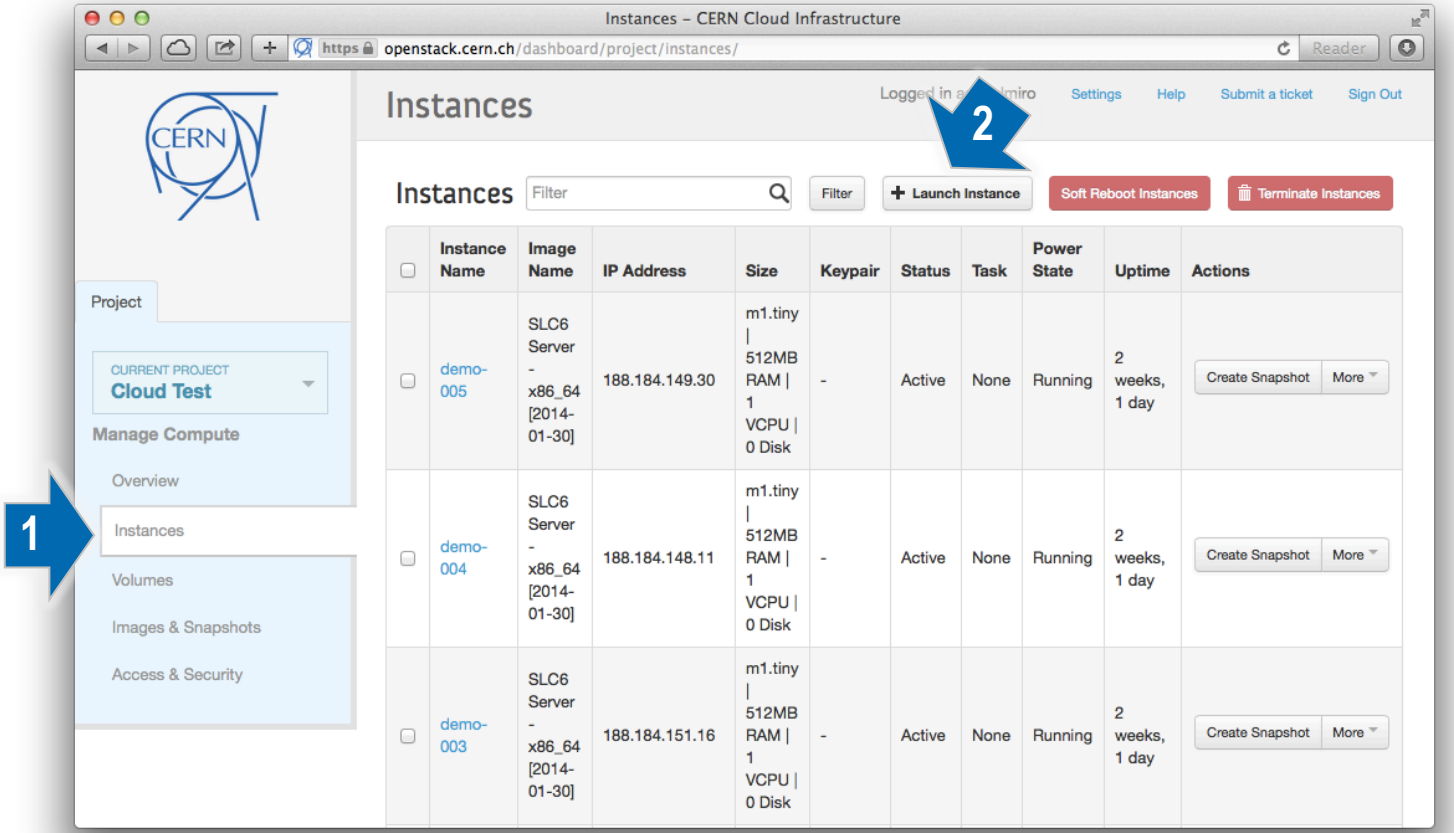
How to import a keypair (dashboard)



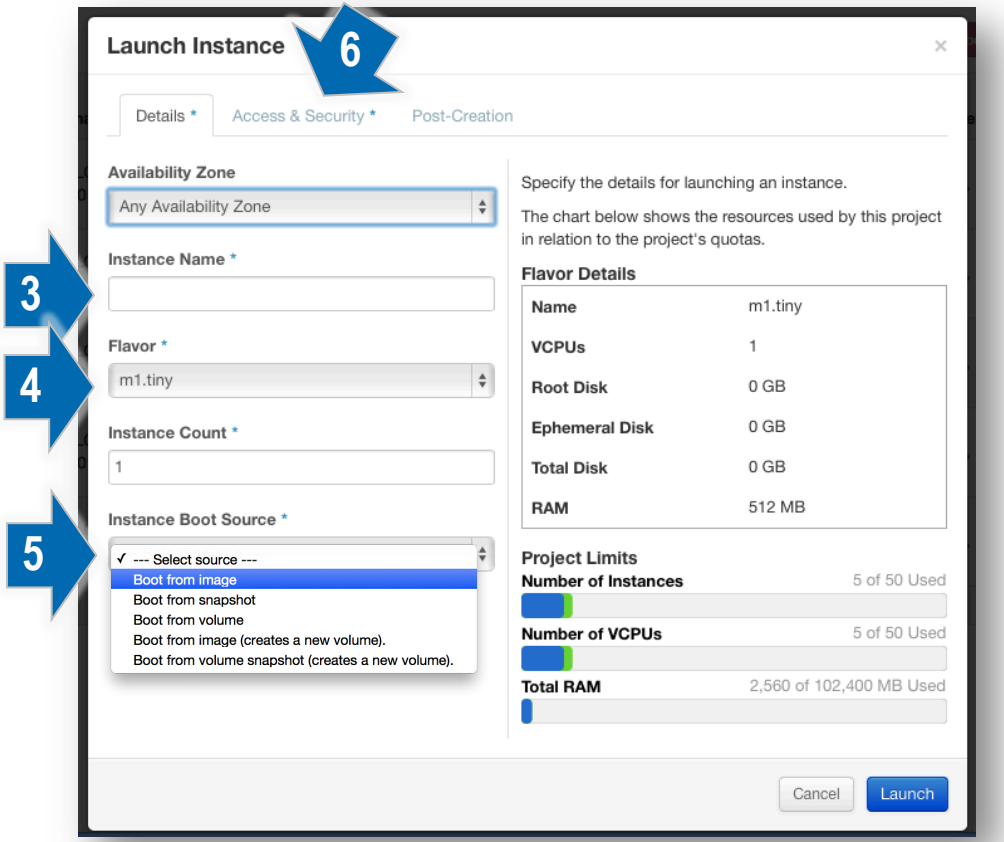
How to import a keypair (dashboard)



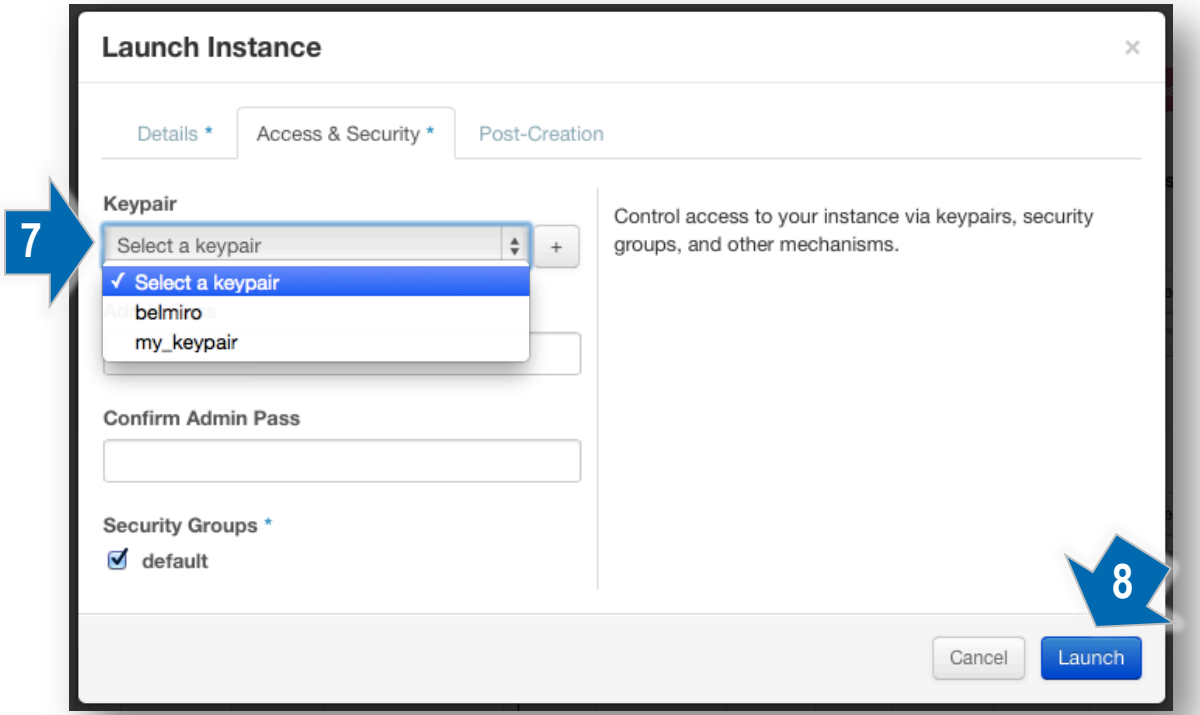
How to create instance (dashboard)



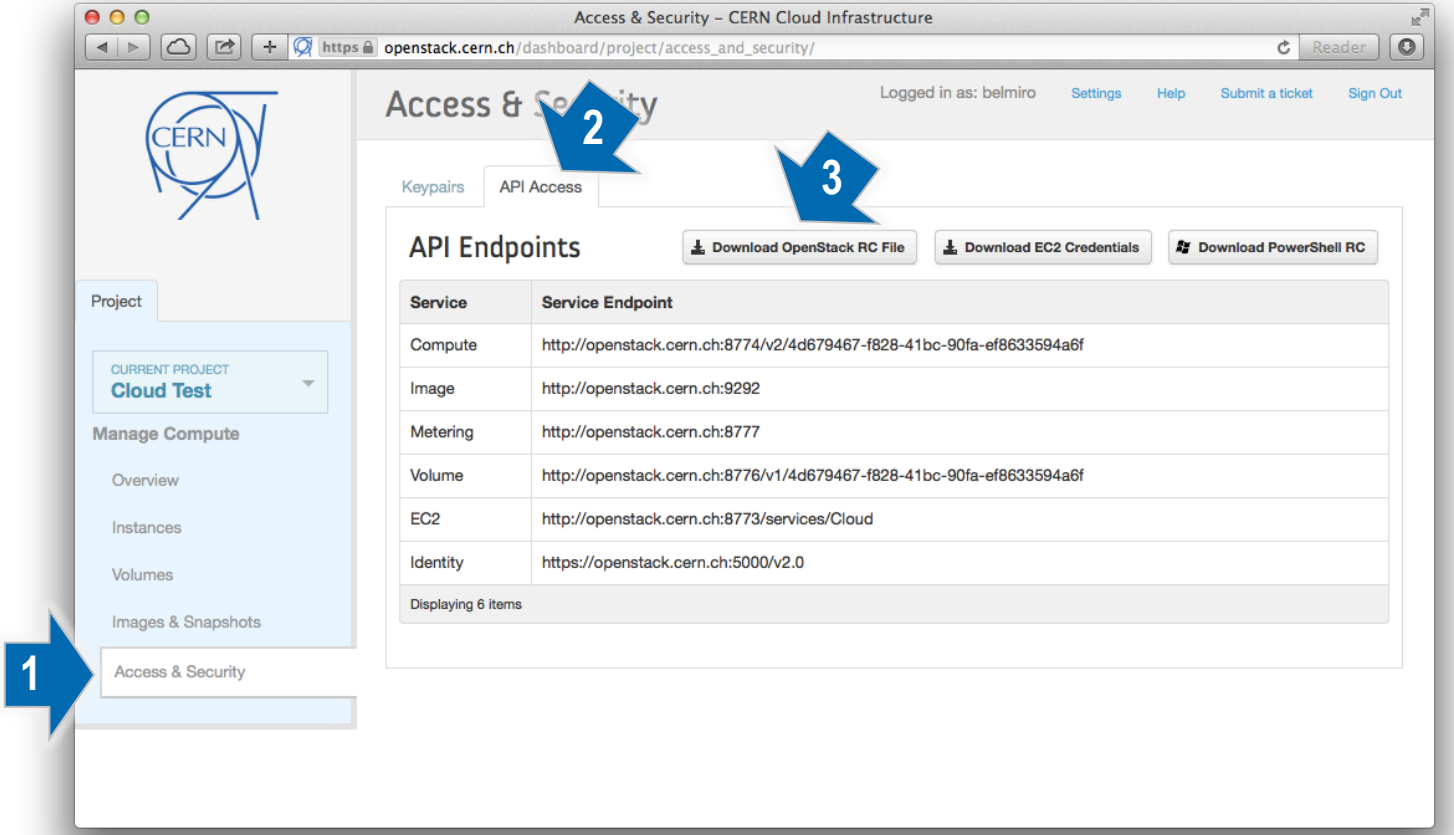
How to create instance (dashboard)



How to create instance (dashboard)



How to download credentials for nova/EC2 API



How to download credentials for nova CLI

Example of the openrc file to set the required environment variables for the OpenStack command-line clients.

```
#!/bin/bash

export OS_AUTH_URL=https://openstack.cern.ch:5000/v2.0
export OS_TENANT_ID=<tenant-id>
export OS_TENANT_NAME=<tenant-name>
export OS_USERNAME=<username>

# With Keystone you pass the keystone password.
echo "Please enter your OpenStack Password: "
read -sr OS_PASSWORD_INPUT
export OS_PASSWORD=$OS_PASSWORD_INPUT
```

How to create instance (nova CLI)

Before you can launch an instance, gather the minimum following parameters: “flavor”, “image” and “keypair”

1) List all available flavors

```
$ nova flavor-list
+----+------------+-----------+------+-----------+------+-------+-------------+-----------+
| ID | Name       | Memory_MB | Disk | Ephemeral | Swap | VCPUs | RXTX_Factor | Is_Public |
+----+------------+-----------+------+-----------+------+-------+-------------+-----------+
| 1  | m1.tiny    | 512       | 0    | 0         |      | 1     | 1.0         | True      |
| 2  | m1.small   | 2048      | 20   | 0         |      | 1     | 1.0         | True      |
| 3  | m1.medium  | 4096      | 40   | 0         |      | 2     | 1.0         | True      |
| 4  | m1.large   | 8192      | 80   | 0         |      | 4     | 1.0         | True      |
| 50 | win.small  | 2048      | 60   | 0         |      | 1     | 1.0         | True      |
| 51 | win.medium | 4096      | 80   | 0         |      | 2     | 1.0         | True      |
| 52 | win.large  | 8192      | 120  | 0         |      | 4     | 1.0         | True      |
+----+------------+-----------+------+-----------+------+-------+-------------+-----------+
```

How to create instance (nova CLI)

2) List all available images

```
$ nova image-list
+--------------------------------------+-----------------------------------------------+--------+--------+
| ID                                   | Name                                          | Status | Server |
+--------------------------------------+-----------------------------------------------+--------+--------+
| e3496dfa-11a7-496c-a634-107d3d10b22a | SLC5 CERN Server - i386 [2014-01-30]          | ACTIVE |        |
| 8ba9f996-4399-4dbb-93ee-98821d74f7a1 | SLC5 CERN Server - x86_64 [2014-01-30]        | ACTIVE |        |
| d1285114-9c39-467f-8d6b-487b10fbaf90 | SLC5 Server - i386 [2014-01-30]               | ACTIVE |        |
| 690be388-2e8e-4498-9c1f-7c4eac862260 | SLC5 Server - x86_64 [130624]                 | ACTIVE |        |
| 41992b34-19e9-4ea9-ad30-177233795732 | SLC5 Server - x86_64 [130920]                 | ACTIVE |        |
| 0d2c81c6-488d-42e6-8d30-8bcc5cdffa58 | SLC5 Server - x86_64 [2014-01-30]             | ACTIVE |        |
| 764434ef-47a9-4345-befb-2b0479a346c5 | SLC6 CERN Server - i386 [130920]              | ACTIVE |        |
| 4d9a71b8-92e4-446e-9939-21f3a7e99211 | SLC6 CERN Server - i686 [2014-01-30]          | ACTIVE |        |
| 2171bb6e-6404-44e9-8cbd-8c6f6bacce1c | SLC6 CERN Server - x86_64 [130920]            | ACTIVE |        |
| 98686db8-834d-4cf5-bfe3-4bc09513682a | SLC6 CERN Server - x86_64 [2014-01-30]        | ACTIVE |        |
| 49e166bb-68e1-4969-b26a-64023e87ef28 | SLC6 Server - i386 [130624]                   | ACTIVE |        |
| eac5a399-d1c5-43a4-928f-3bbbba7f7cf7 | SLC6 Server - i386 [130920]                   | ACTIVE |        |
| ab2fd0fa-ae7b-4a29-a9fa-57c5c5baf6da | SLC6 Server - i686 [2014-01-30]               | ACTIVE |        |
| 321b8583-967f-4f56-913e-2a10e058ff37 | SLC6 Server - x86_64 [2014-01-30]             | ACTIVE |        |
| 4717a8fa-6980-4b33-b27d-1526db467749 | Windows 7 - x64 [130924]                      | ACTIVE |        |
| b51918ba-8bf7-421e-a1a6-cee78928cbc9 | Windows 7 - x64 [131213]                      | ACTIVE |        |
| 091a87b6-5882-42cf-9de3-d049281b51e8 | Windows Server 2008 R2 - x64 [130904]         | ACTIVE |        |
| 6be8397d-264f-4804-a7a9-e83488f6ee9a | Windows Server 2008 R2 - x64 [140116]         | ACTIVE |        |
| ea4179a9-cc5f-40ce-b700-92e1fee13a44 | Windows Server 2012 R2 - x64 [2014-01-29]     | ACTIVE |        |
+--------------------------------------+-----------------------------------------------+--------+--------+
```

How to create instance (nova CLI)

3) List all available keypairs

```
$ nova keypair-list
+------------+-------------------------------------------------+
| Name       | Fingerprint                                     |
+------------+-------------------------------------------------+
| belmiro    | ad:40:3c:15:86:6b:c8:16:af:27:80:dc:66:aa:0e:d3 |
| my_keypair | 6d:2f:b9:a2:a2:c7:46:fa:69:50:66:1a:6b:30:d9:a6 |
+------------+-------------------------------------------------+
```

How to create instance (nova CLI)

4) Create a new instance

```
$ nova boot --image 321b8583-967f-4f56-913e-2a10e058ff37 --flavor m1.tiny --key-name my_keypair my-vm

+--------------------------------------+--------------------------------------------------------------------------------+
| Property                             | Value                                                                          |
+--------------------------------------+--------------------------------------------------------------------------------+
| OS-DCF:diskConfig                    | MANUAL                                                                         |
| OS-EXT-AZ:availability_zone          | nova                                                                           |
| OS-EXT-STS:power_state               | 0                                                                              |
| OS-EXT-STS:task_state                | scheduling                                                                     |
| OS-EXT-STS:vm_state                  | building                                                                       |
| OS-SRV-USG:launched_at               | -                                                                              |
| OS-SRV-USG:terminated_at             | -                                                                              |
| accessIPv4                           |                                                                                |
| accessIPv6                           |                                                                                |
| config_drive                         |                                                                                |
| created                              | 2014-03-14T22:14:23Z                                                           |
| flavor                               | m1.tiny (1)                                                                    |
| hostId                               |                                                                                |
| id                                   | 3e822ed1-e27c-4ef8-b84d-c02f00585d5c                                           |
| image                                | SLC6 Server - x86_64 [2014-01-30] (321b8583-967f-4f56-913e-2a10e058ff37)       |
| key_name                             | my_keypair                                                                     |
| metadata                             | {}                                                                             |
| name                                 | my-vm                                                                          |
| os-extended-volumes:volumes_attached | []                                                                             |
| progress                             | 0                                                                              |
| security_groups                      | default                                                                        |
| status                               | BUILD                                                                          |
| tenant_id                            | 4d679467-f828-41bc-90fa-ef8633594a6f                                           |
| updated                              | 2014-03-14T22:14:23Z                                                           |
| user_id                              | belmiro                                                                        |
+--------------------------------------+--------------------------------------------------------------------------------+
```

How to list available instances (nova CLI)

For each server the command returns the server ID, name, status, task state, power state and network address, as shown in the following output

```
$ nova list
+--------------------------------------+----------+--------+------------+-------------+-----------------------------+
| ID                                   | Name     | Status | Task State | Power State | Networks                    |
+--------------------------------------+----------+--------+------------+-------------+-----------------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.211 |
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.168.44  |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.151.16  |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.11  |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.30  |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.241 |
+--------------------------------------+----------+--------+------------+-------------+-----------------------------+
```

How to list available instances (nova CLI)

- Search servers by “status” use “--status”
- Search servers by “name” use “--name”
- Search servers by “flavor” use “--flavor”
- Search servers by “image” use “--image”
- Get only “uuid” and “name” use “--minimal”

Examples:

```
$ nova list --name demo-003
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| ID                                   | Name     | Status | Task State | Power State | Networks                     |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.151.16  |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
```

```
$ nova list --minimal
+--------------------------------------+----------+
| ID                                   | Name     |
+--------------------------------------+----------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 |
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    |
+--------------------------------------+----------+
```

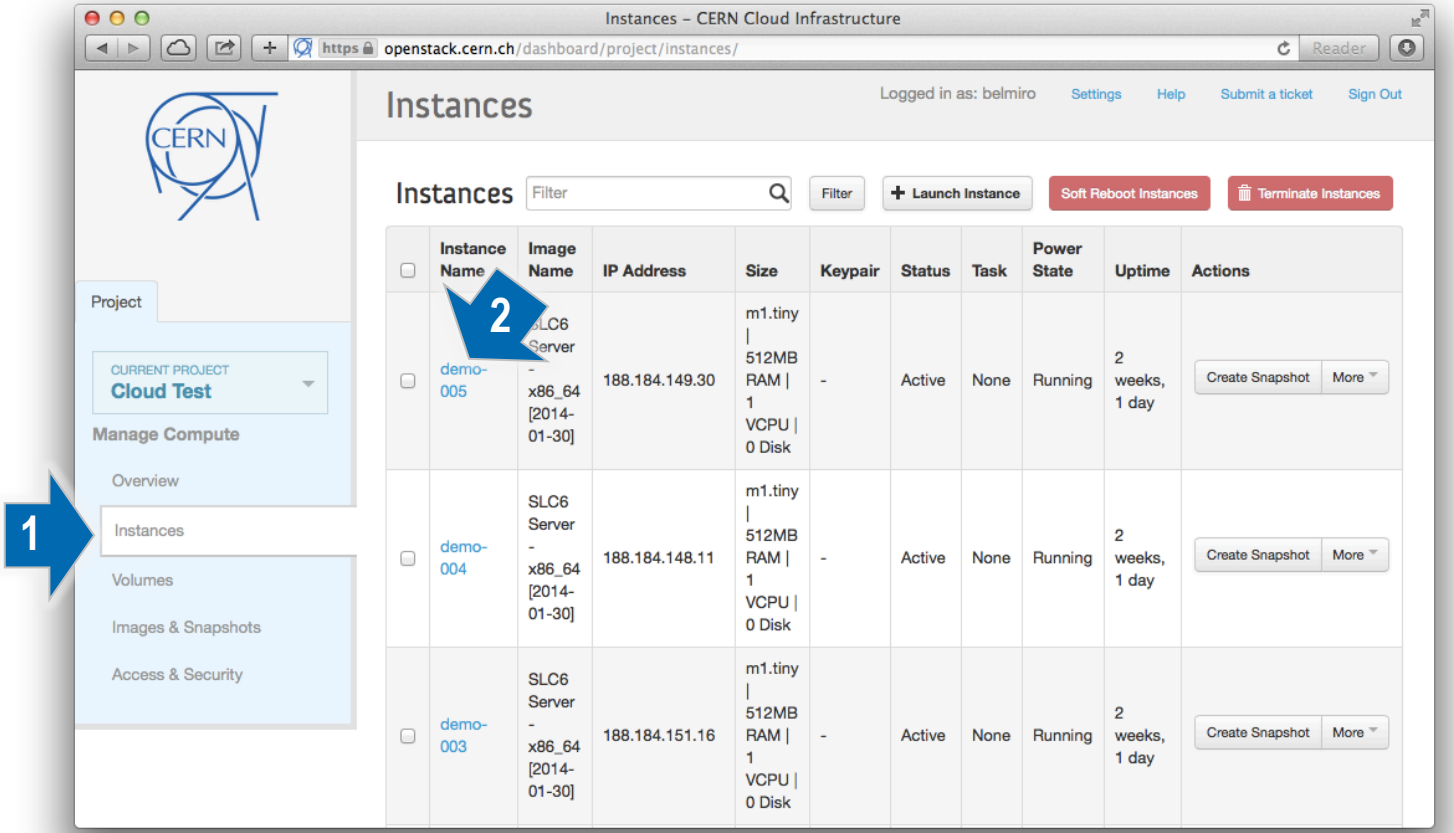
How to list available instances (nova CLI)

To select the fields to display use “--fields” and comma-separated list of fields to display.

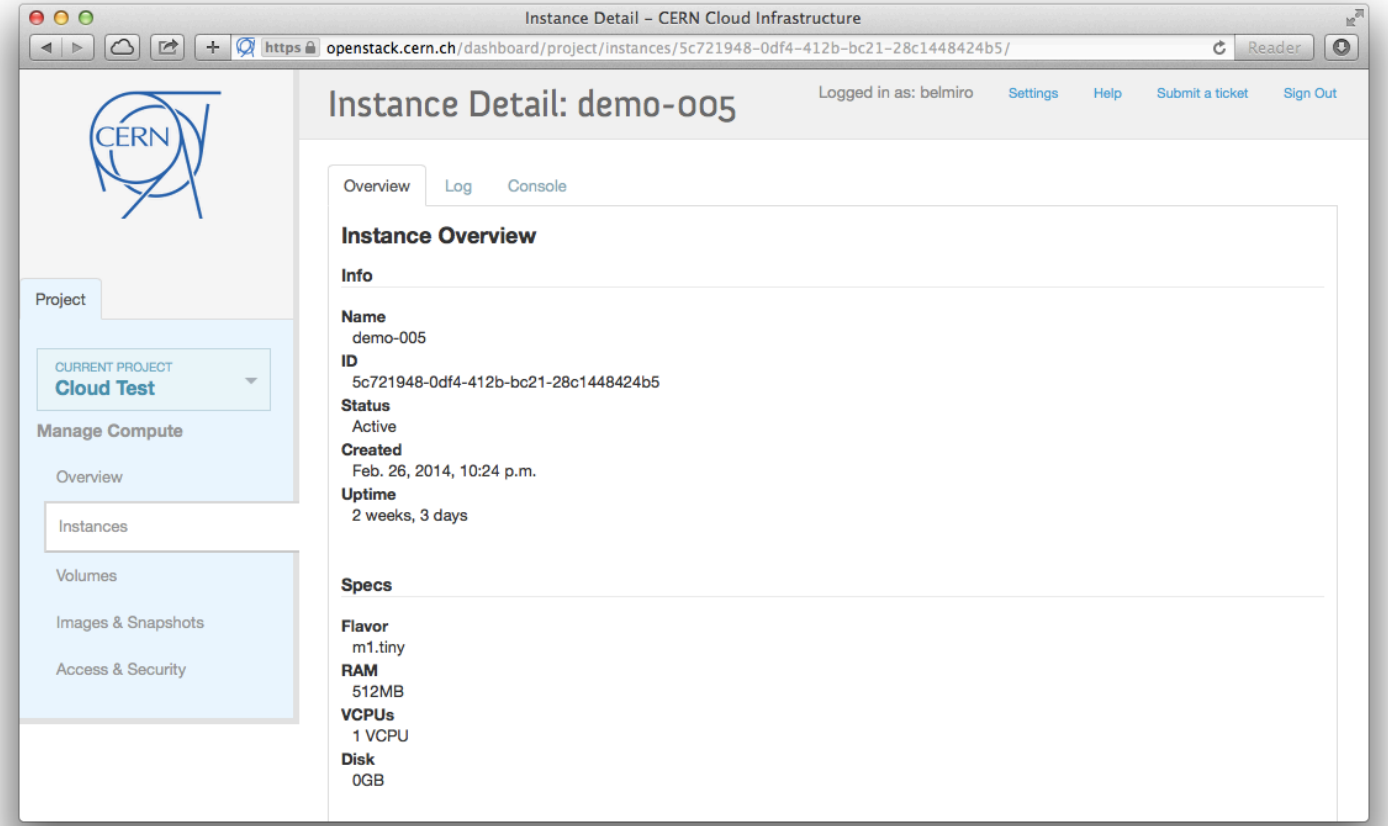
Example:

```
$ nova list --fields name,user_id,created
+--------------------------------------+----------+---------+----------------------+
| ID                                   | Name     | User Id | Created              |
+--------------------------------------+----------+---------+----------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | belmiro | 2014-02-26T22:24:18Z |
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 | belmiro | 2014-02-26T22:24:30Z |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | belmiro | 2014-02-26T22:24:38Z |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 | belmiro | 2014-02-26T22:24:45Z |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 | belmiro | 2014-02-26T22:24:55Z |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    | belmiro | 2014-03-14T22:14:23Z |
+--------------------------------------+----------+---------+----------------------+
```

How to get instance details (dashboard)



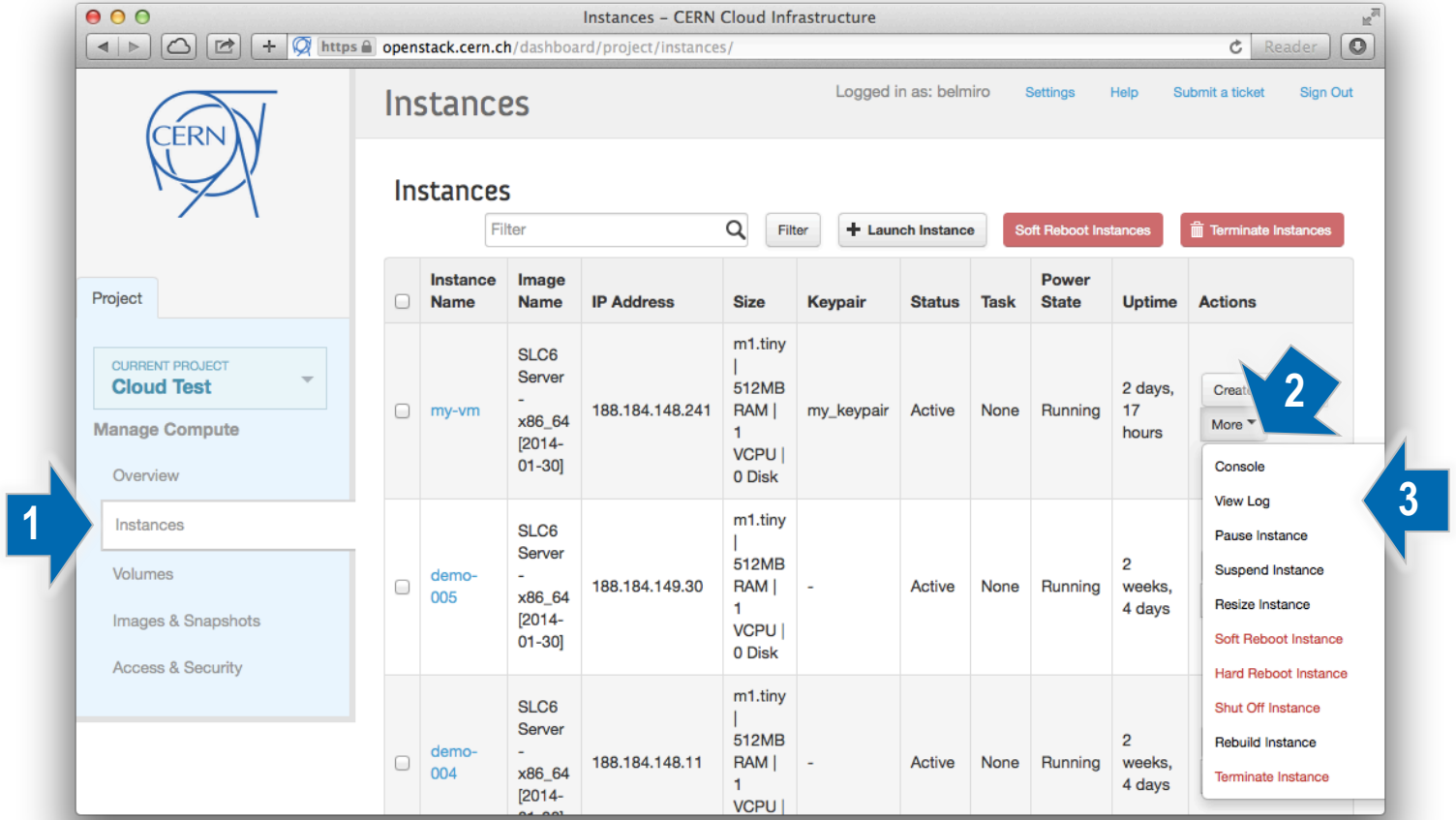
How to get instance details (dashboard)



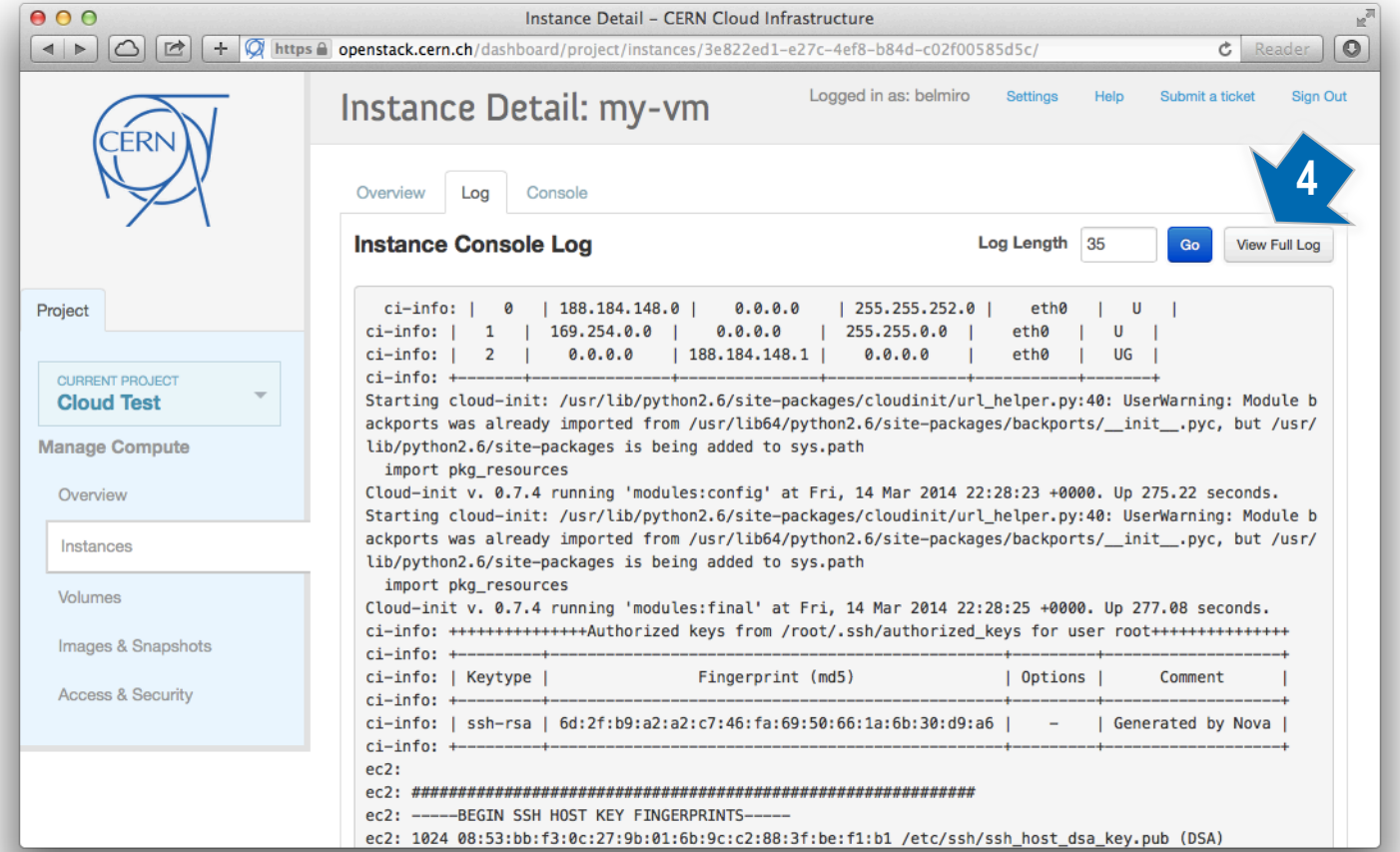
How to get instance details (nova CLI)

```
$ nova show 7a78ea0e-47bf-48fe-af62-157492285afa

+--------------------------------------+----------------------------------------------------------------------------+
| Property                             | Value                                                                      |
+--------------------------------------+----------------------------------------------------------------------------+
| CERN_NETWORK network                 | 188.184.149.211                                                            |
| OS-DCF:diskConfig                    | MANUAL                                                                     |
| OS-EXT-AZ:availability_zone          | nova                                                                       |
| OS-EXT-STS:power_state               | 1                                                                          |
| OS-EXT-STS:task_state                | -                                                                          |
| OS-EXT-STS:vm_state                  | active                                                                     |
| OS-SRV-USG:launched_at               | 2014-02-26T22:27:29.000000                                                 |
| OS-SRV-USG:terminated_at             | -                                                                          |
| accessIPv4                           |                                                                            |
| accessIPv6                           |                                                                            |
| config_drive                         |                                                                            |
| created                              | 2014-02-26T22:24:18Z                                                       |
| flavor                               | m1.tiny (1)                                                                |
| hostId                               | 859af9ab61d4627edbf8dee026e5124c4e6220545b5fabdd30e564dd                   |
| id                                   | 7a78ea0e-47bf-48fe-af62-157492285afa                                       |
| image                                | SLC6 Server - x86_64 [2014-01-30] (321b8583-967f-4f56-913e-2a10e058ff37)   |
| key_name                             | -                                                                          |
| metadata                             | {"cern-services": "false"}                                                 |
| name                                 | demo-001                                                                   |
| os-extended-volumes:volumes_attached | []                                                                         |
| progress                             | 0                                                                          |
| security_groups                      | default                                                                    |
| status                               | ACTIVE                                                                     |
| tenant_id                            | 4d679467-f828-41bc-90fa-ef8633594a6f                                       |
| updated                              | 2014-02-26T22:27:29Z                                                       |
| user_id                              | belmiro                                                                    |
+--------------------------------------+----------------------------------------------------------------------------+
```

How to get console log (dashboard)



How to get console log (dashboard)

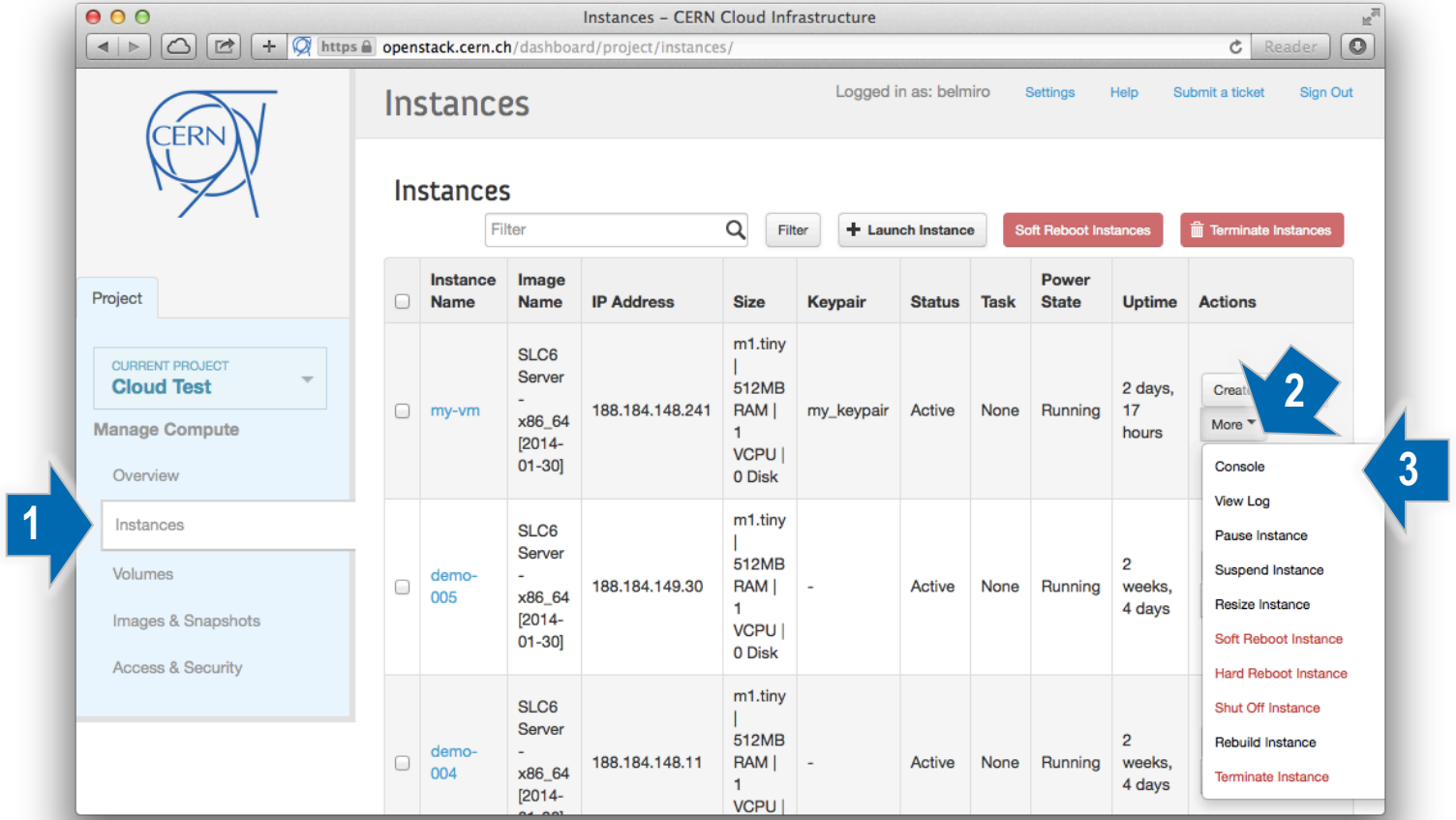


How to get console log (nova CLI)

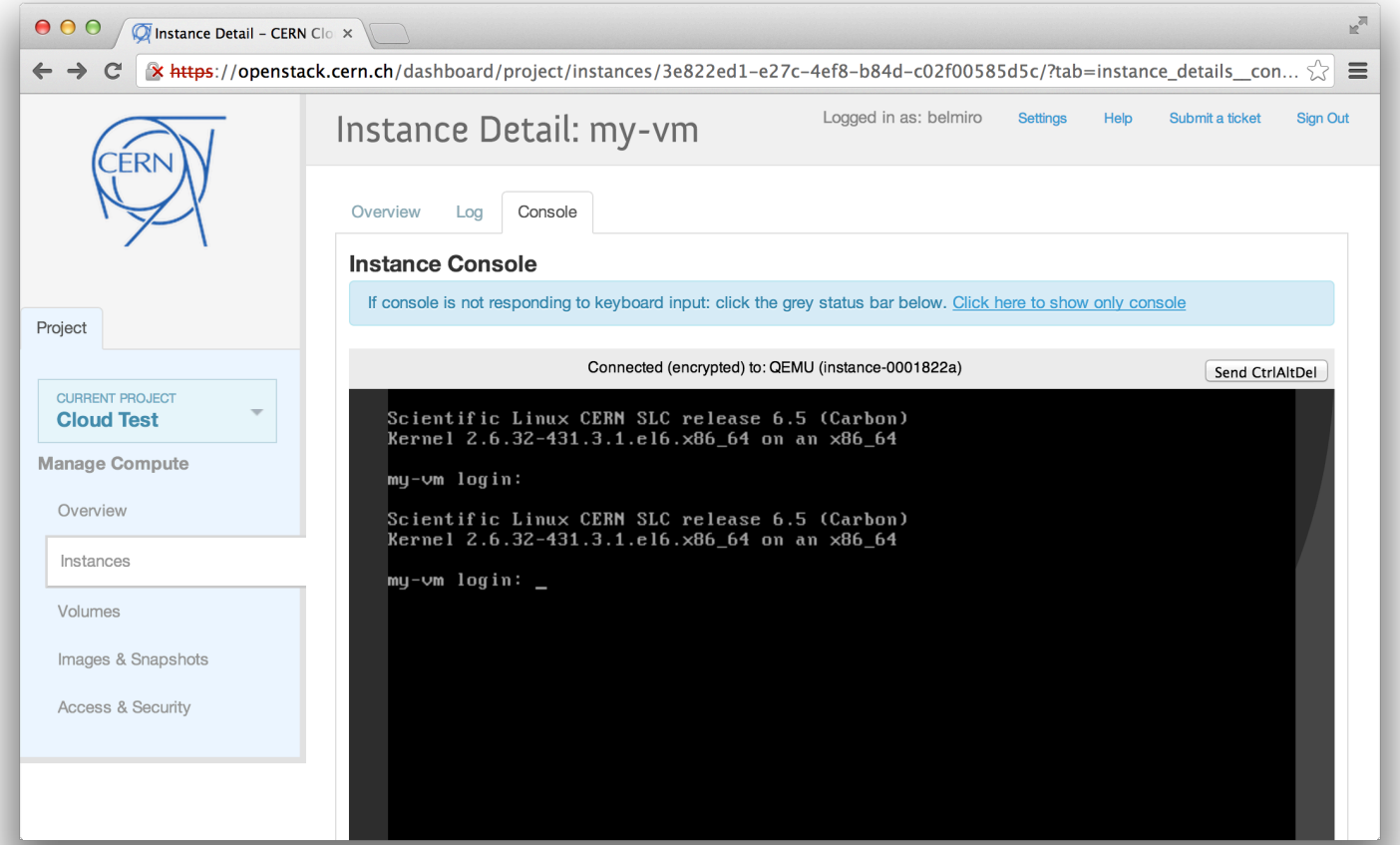
To get console log use "nova console-get <instance_uuid>"

```
$ nova console-log 3e822ed1-e27c-4ef8-b84d-c02f00585d5c

Initializing cgroup subsys cpuset
Initializing cgroup subsys cpu
Linux version 2.6.32-431.3.1.el6.x86_64 (mockbuild@lxdist01) (gcc version 4.4.7 20120313 (Red Hat 4.4.7-4) (GCC) )
Disabled fast string operations
BIOS-provided physical RAM map:
 BIOS-e820: 0000000000000000 - 000000000009dc00 (usable)
 BIOS-e820: 000000000009dc00 - 00000000000a0000 (reserved)
 BIOS-e820: 00000000000f0000 - 0000000000100000 (reserved)
 BIOS-e820: 0000000000100000 - 000000001fffd000 (usable)
 BIOS-e820: 000000001fffd000 - 0000000020000000 (reserved)
 BIOS-e820: 00000000fffbc000 - 0000000100000000 (reserved)
DMI 2.4 present.
SMBIOS version 2.4 @ 0xFDA30
Hypervisor detected: KVM
last_pfn = 0x1fffd max_arch_pfn = 0x400000000
x86 PAT enabled: cpu 0, old 0x70106, new 0x7010600070106
init_memory_mapping: 0000000000000000-000000001fffd000
RAMDISK: 1ef98000 - 1ffec876
ACPI: RSDP 00000000000fda00 00014 (v00 BOCHS )
ACPI: RSDT 000000001fffd630 00034 (v01 BOCHS  BXPCRSDT 00000001 BXPC 00000001)
ACPI: FACP 000000001ffffe10 00074 (v01 BOCHS  BXPCFACP 00000001 BXPC 00000001)
ACPI: DSDT 000000001fffd910 024A2 (v01   BXPC   BXDSDT 00000001 INTL 20090123)
ACPI: FACS 000000001ffffdc0 00040

(...)
```

How to interact with console (dashboard)



How to interact with console (dashboard)



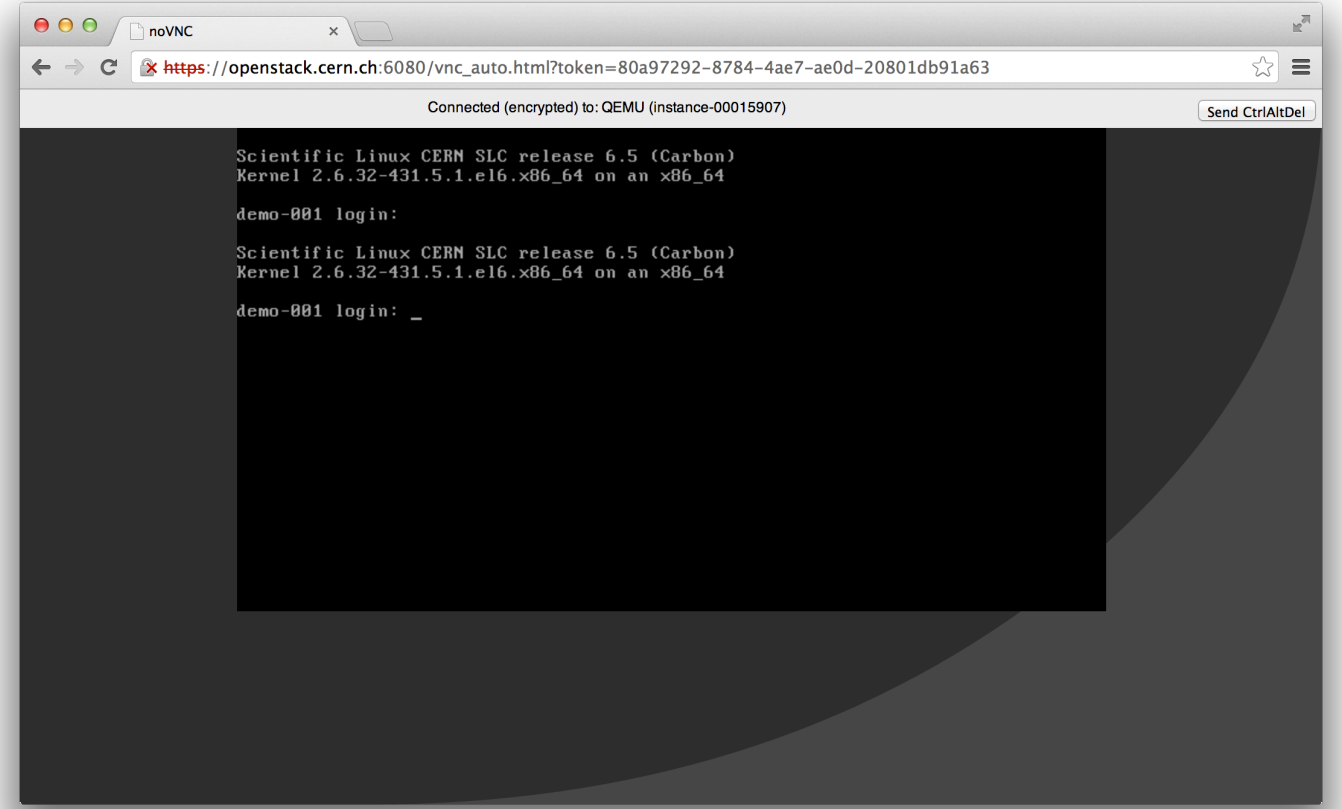
How to interact with console (nova CLI)

To get console log use "nova get-vnc-console <instance_uuid> novnc"

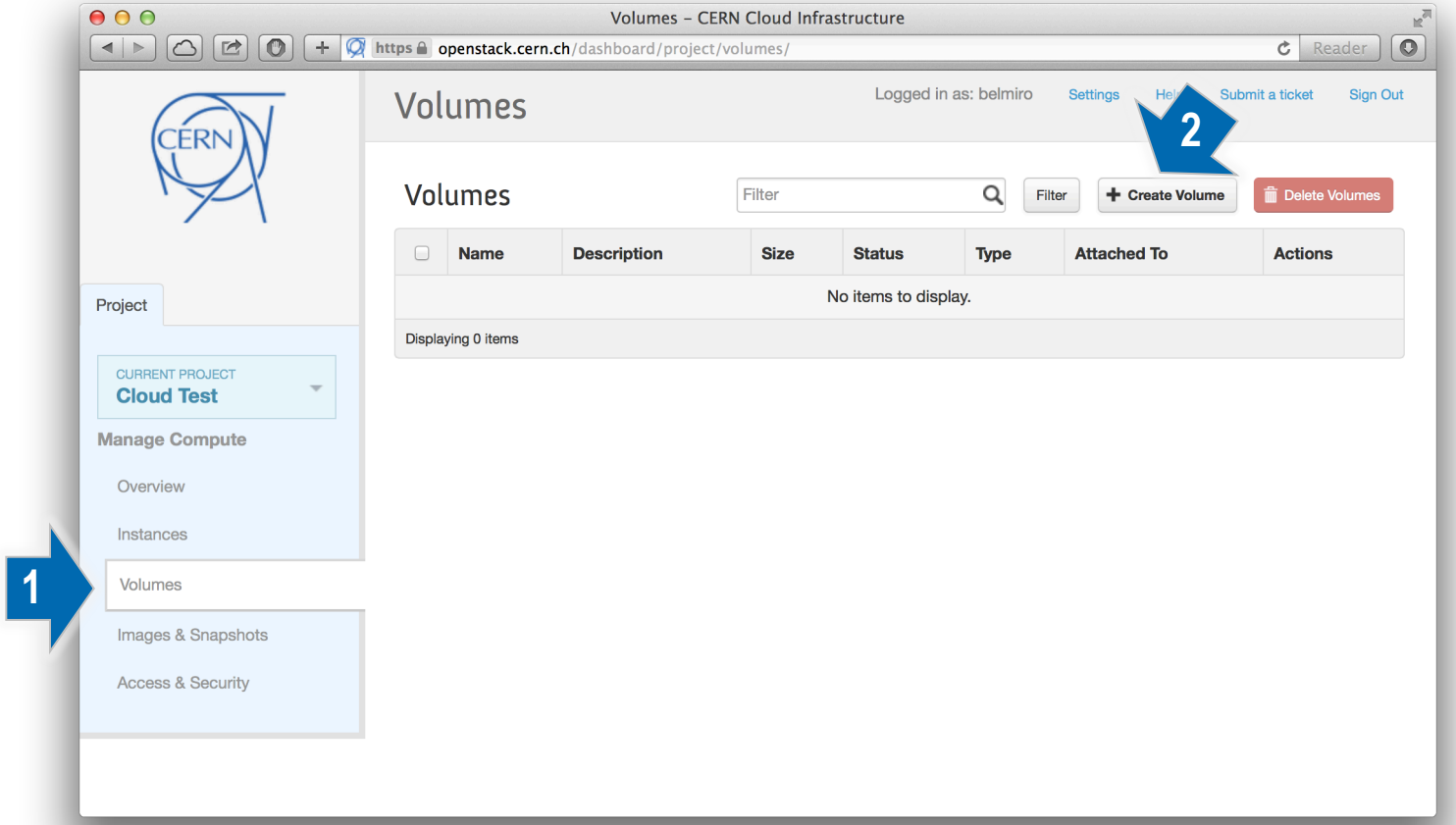
```
$ nova list
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| ID                                   | Name     | Status | Task State | Power State | Networks                     |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.211 |
(...)

$ nova get-vnc-console 7a78ea0e-47bf-48fe-af62-157492285afa novnc
+-------+-----------------------------------------------------------------------------------------+
| Type  | Url                                                                                     |
+-------+-----------------------------------------------------------------------------------------+
| novnc | https://openstack.cern.ch:6080/vnc_auto.html?token=80a97292-8784-4ae7-ae0d-20801db91a63 |
+-------+-----------------------------------------------------------------------------------------+
```

Copy the address and use your preferred browser to open the console

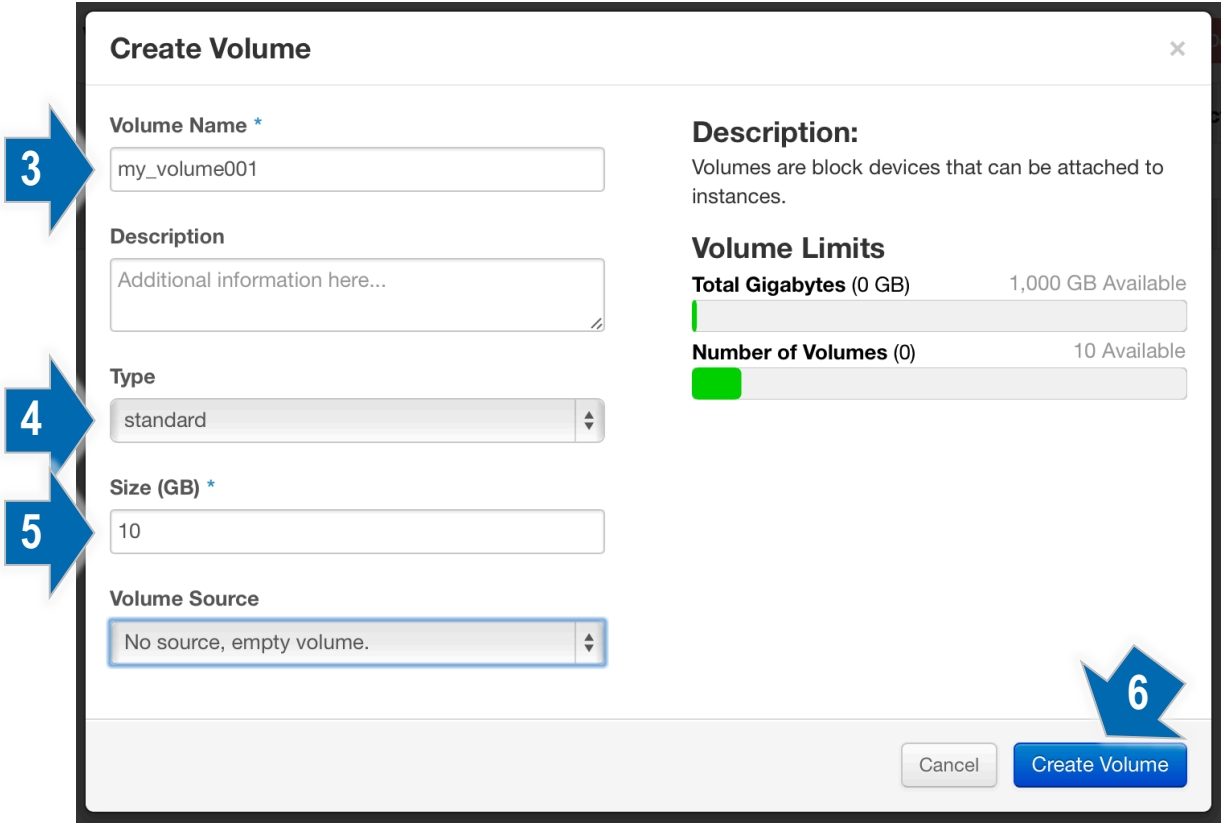
How to interact with console (nova CLI)



Create volume (dashboard)



Create volume (dashboard)



Create volume (cinder CLI)

To create a volume use:

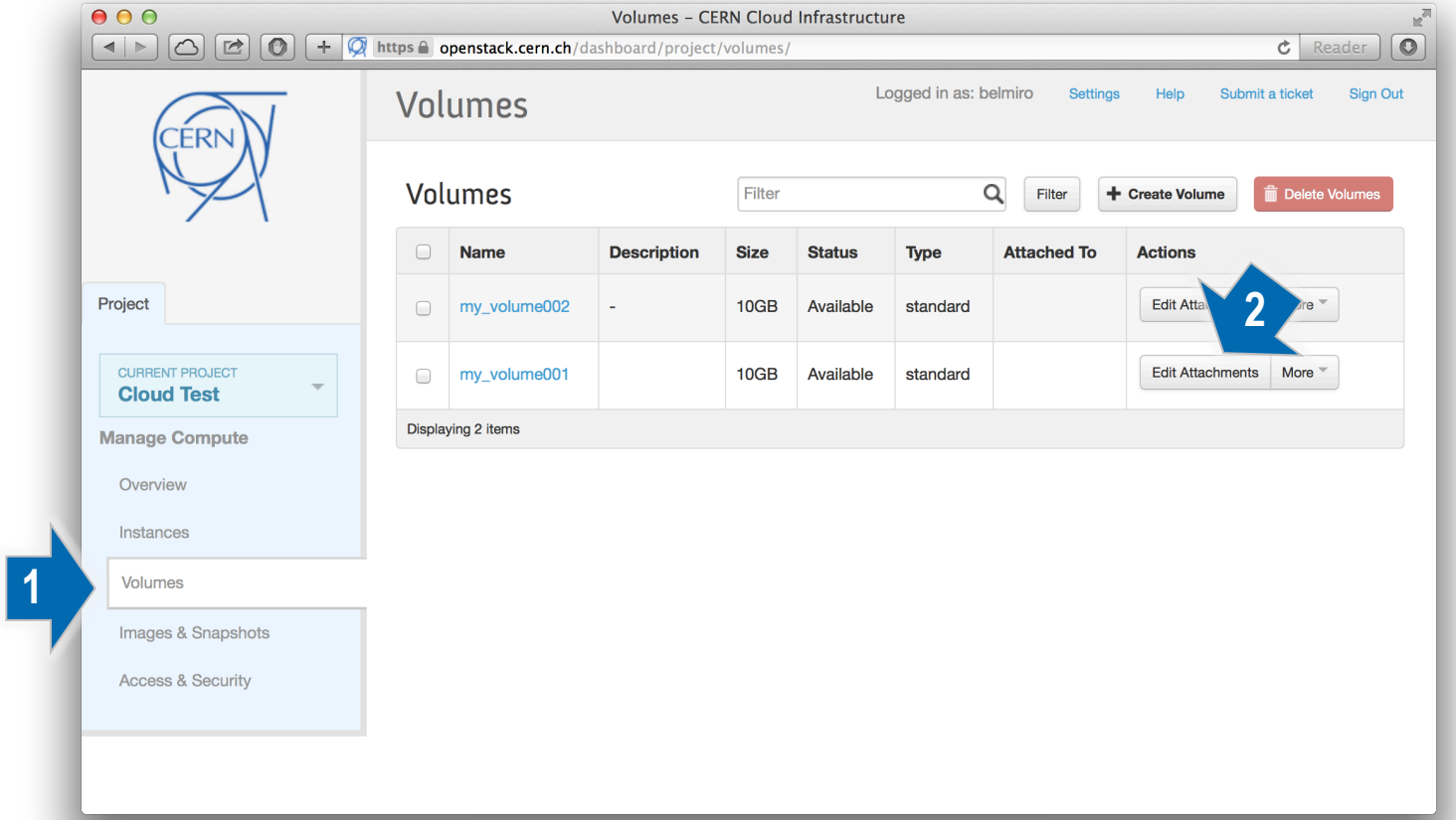
"cinder create --display-name <volume_name> <volume_size>

```
$ cinder create --display-name my_volume002 10
+---------------------+--------------------------------------+
|       Property      |                Value                 |
+---------------------+--------------------------------------+
|     attachments     |                  []                  |
|  availability_zone  |                 nova                 |
|       bootable      |                false                 |
|      created_at     |      2014-03-19T21:11:22.262268      |
| display_description |                 None                 |
|     display_name    |              my_volume002            |
|          id         | bc022ed7-cd80-41df-a819-fbaa3b9d4a3d |
|       metadata      |                  {}                  |
|         size        |                  10                  |
|     snapshot_id     |                 None                 |
|     source_volid    |                 None                 |
|        status       |               creating               |
|     volume_type     |               standard               |
+---------------------+--------------------------------------+
```

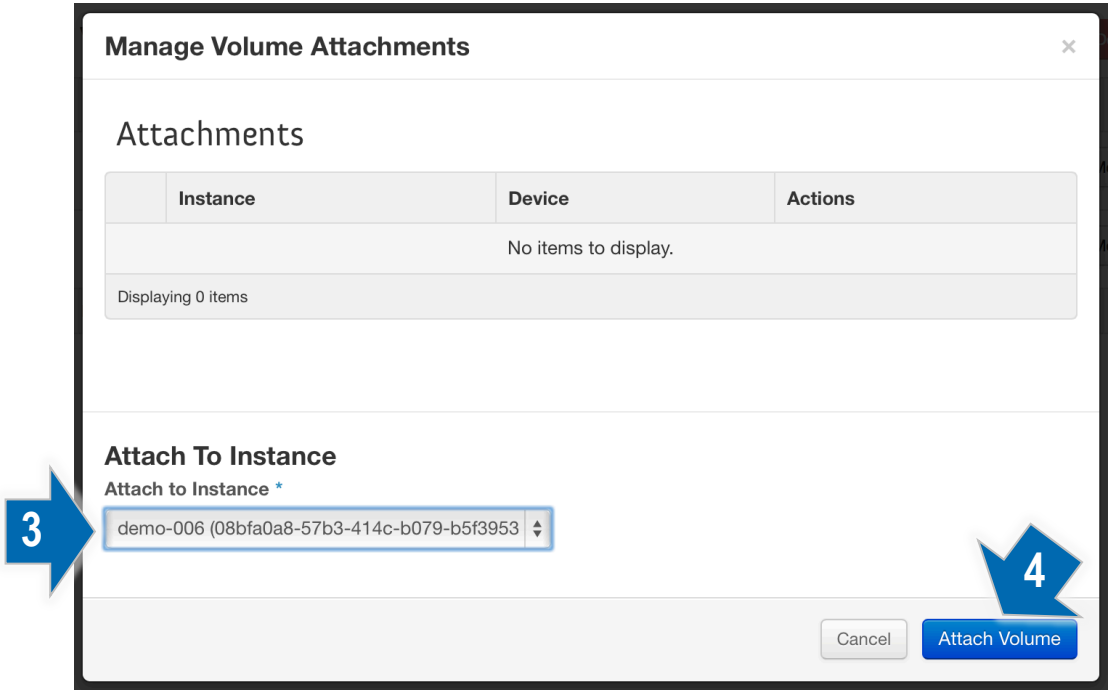
List all available volumes:

```
$ cinder list
+--------------------------------------+-----------+--------------+------+-------------+----------+-------------+
|                  ID                  |   Status  | Display Name | Size | Volume Type | Bootable | Attached to |
+--------------------------------------+-----------+--------------+------+-------------+----------+-------------+
| bc022ed7-cd80-41df-a819-fbaa3b9d4a3d | available | my_volume002 |  10  |   standard  |  false   |             |
| c2ea689e-7f2c-4490-9165-5a2a97a1cbc9 | available | my_volume001 |  10  |   standard  |  false   |             |
+--------------------------------------+-----------+--------------+------+-------------+----------+-------------+
```

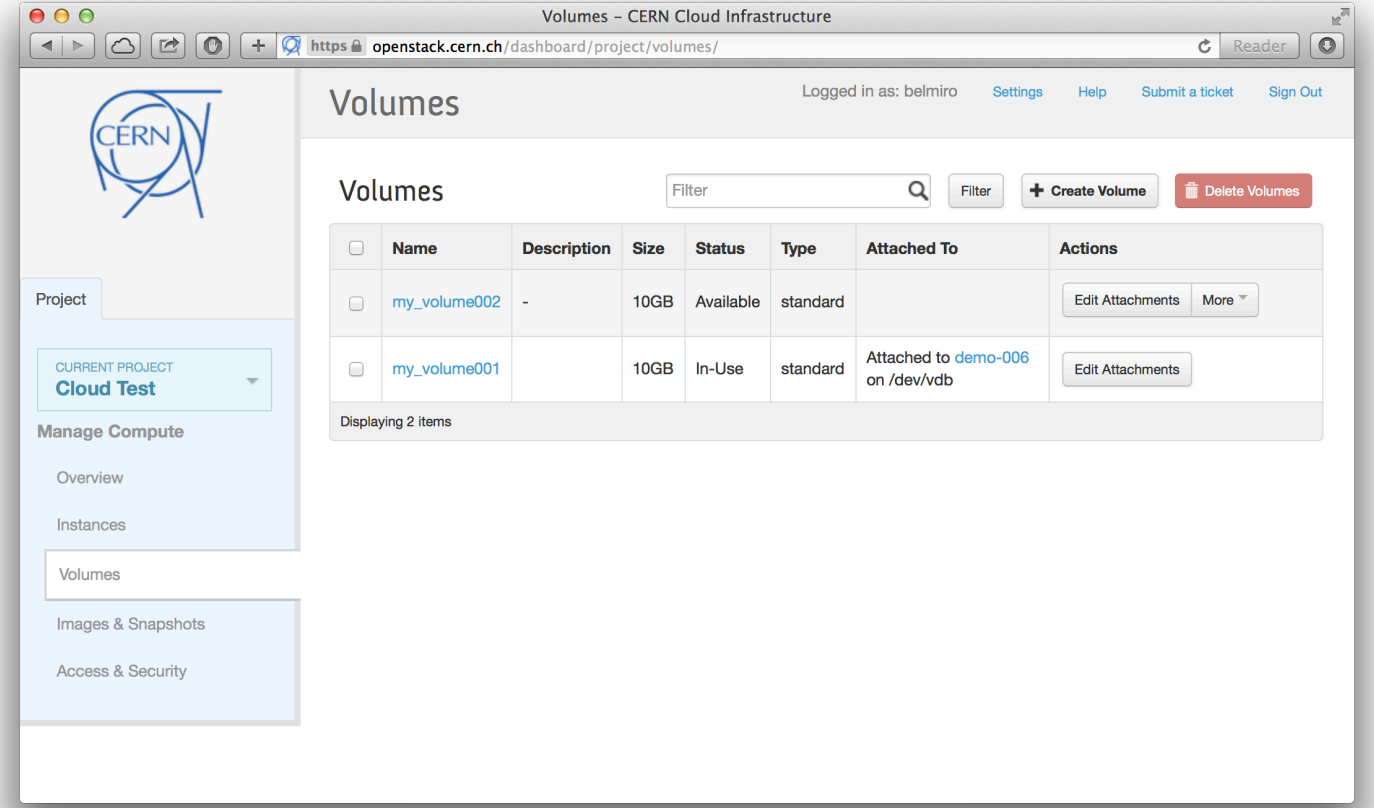
Attach volume (dashboard)



Attach volume (dashboard)



Attach volume (dashboard)



Attach volume (nova CLI)

To attach volume use:

"nova volume-attach <instance_uuid> <volume_uuid> auto

```
$ nova volume-attach 5c721948-0df4-412b-bc21-28c1448424b5 bc022ed7-cd80-41df-a819-fbaa3b9d4a3d auto
+----------+--------------------------------------+
| Property | Value                                |
+----------+--------------------------------------+
| device   | /dev/vdb                             |
| id       | bc022ed7-cd80-41df-a819-fbaa3b9d4a3d |
| serverId | 5c721948-0df4-412b-bc21-28c1448424b5 |
| volumeId | bc022ed7-cd80-41df-a819-fbaa3b9d4a3d |
+----------+--------------------------------------+
```

List all available volumes:

```
cinder list
+--------------------------------------+--------+--------------+------+-------------+----------+--------------------------------------+
|                  ID                  | Status | Display Name | Size | Volume Type | Bootable |             Attached to              |
+--------------------------------------+--------+--------------+------+-------------+----------+--------------------------------------+
| bc022ed7-cd80-41df-a819-fbaa3b9d4a3d | in-use | my_volume002 |  10  |   standard  |  false   | 5c721948-0df4-412b-bc21-28c1448424b5 |
| c2ea689e-7f2c-4490-9165-5a2a97a1cbc9 | in-use | my_volume001 |  10  |   standard  |  false   | 08bfa0a8-57b3-414c-b079-b5f3953d1263 |
+--------------------------------------+--------+--------------+------+-------------+----------+--------------------------------------+
```

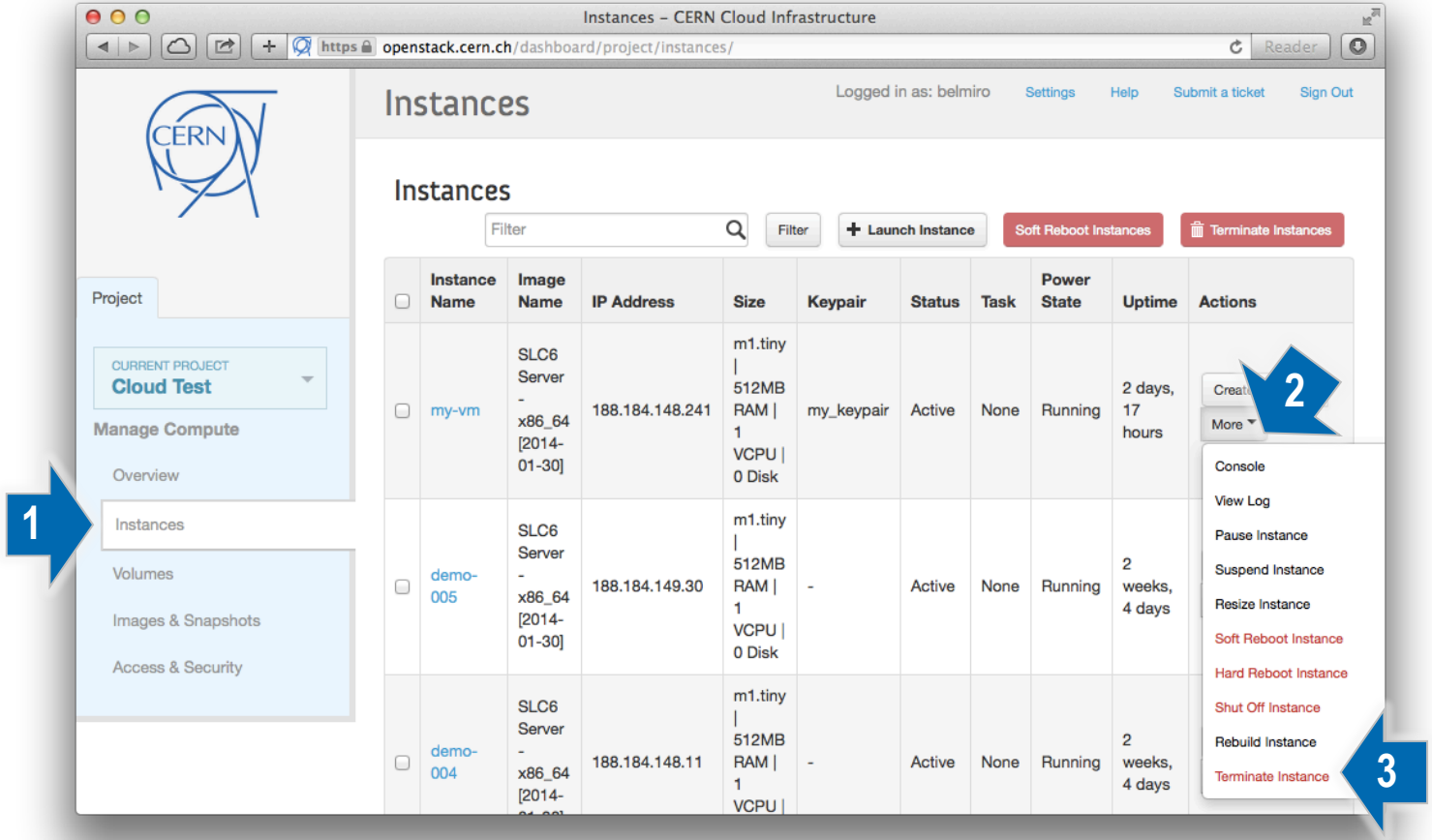
How to delete instance

When deleting an instance the root disk and all ephemeral disks associated with the instance will be also deleted. It will not be possible to recover disk data afterwards.

If you want to keep your data you need to create a disk snapshot as described in this guide.

All attached volumes will be preserved after instance deletion.

How to delete instance (dashboard)

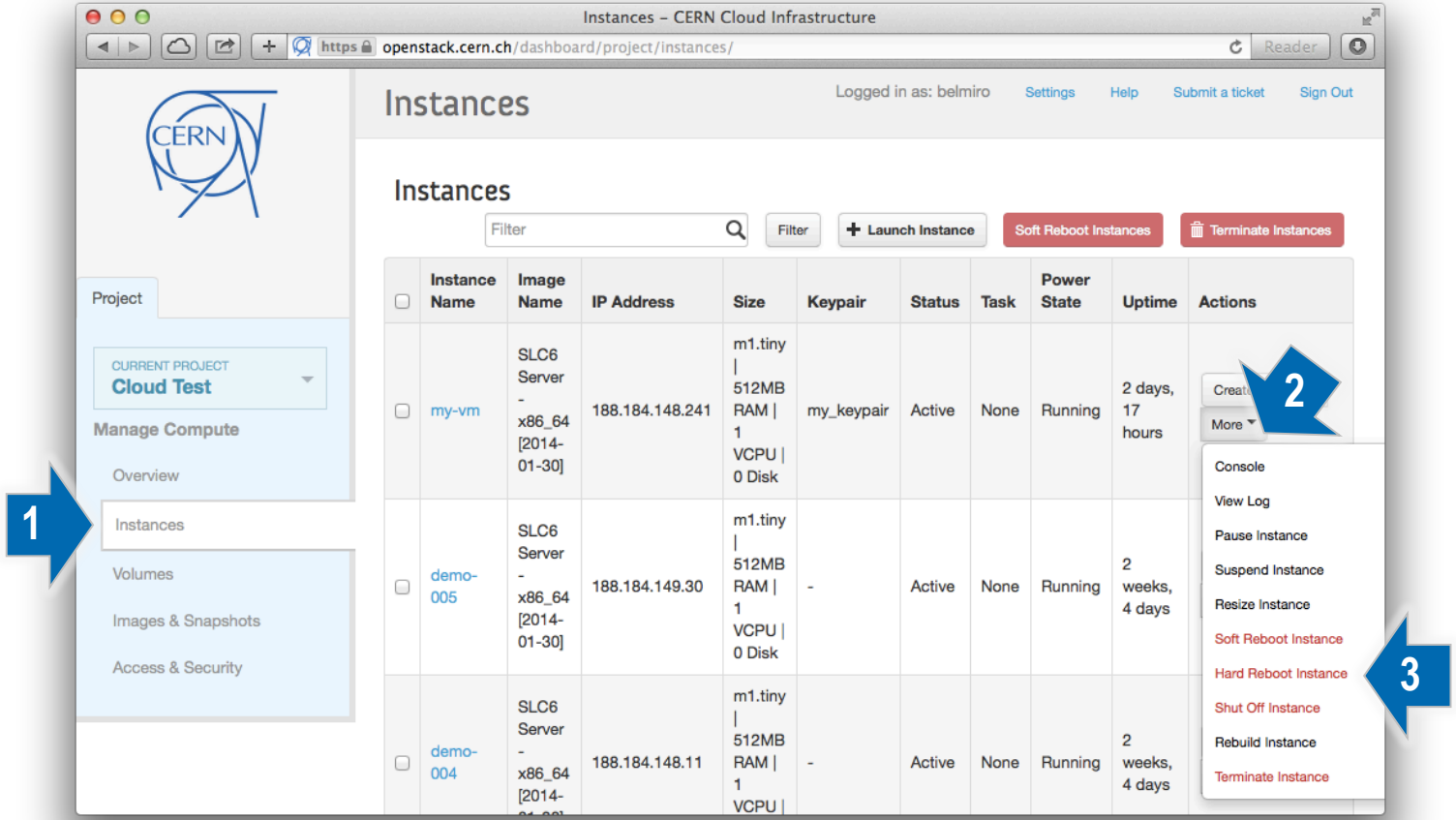


How to delete instance (nova CLI)

To delete an instance use "nova delete <instance_uuid>"

```
$ nova list
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| ID                                   | Name     | Status | Task State | Power State | Networks                     |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.211 |
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.168.44  |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.151.16  |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.11  |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.30  |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.241 |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+

$ nova delete 7a78ea0e-47bf-48fe-af62-157492285afa

$ nova list
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| ID                                   | Name     | Status | Task State | Power State | Networks                     |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.168.44  |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.151.16  |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.11  |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.30  |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.241 |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
```

How to hard reboot instance (dashboard)

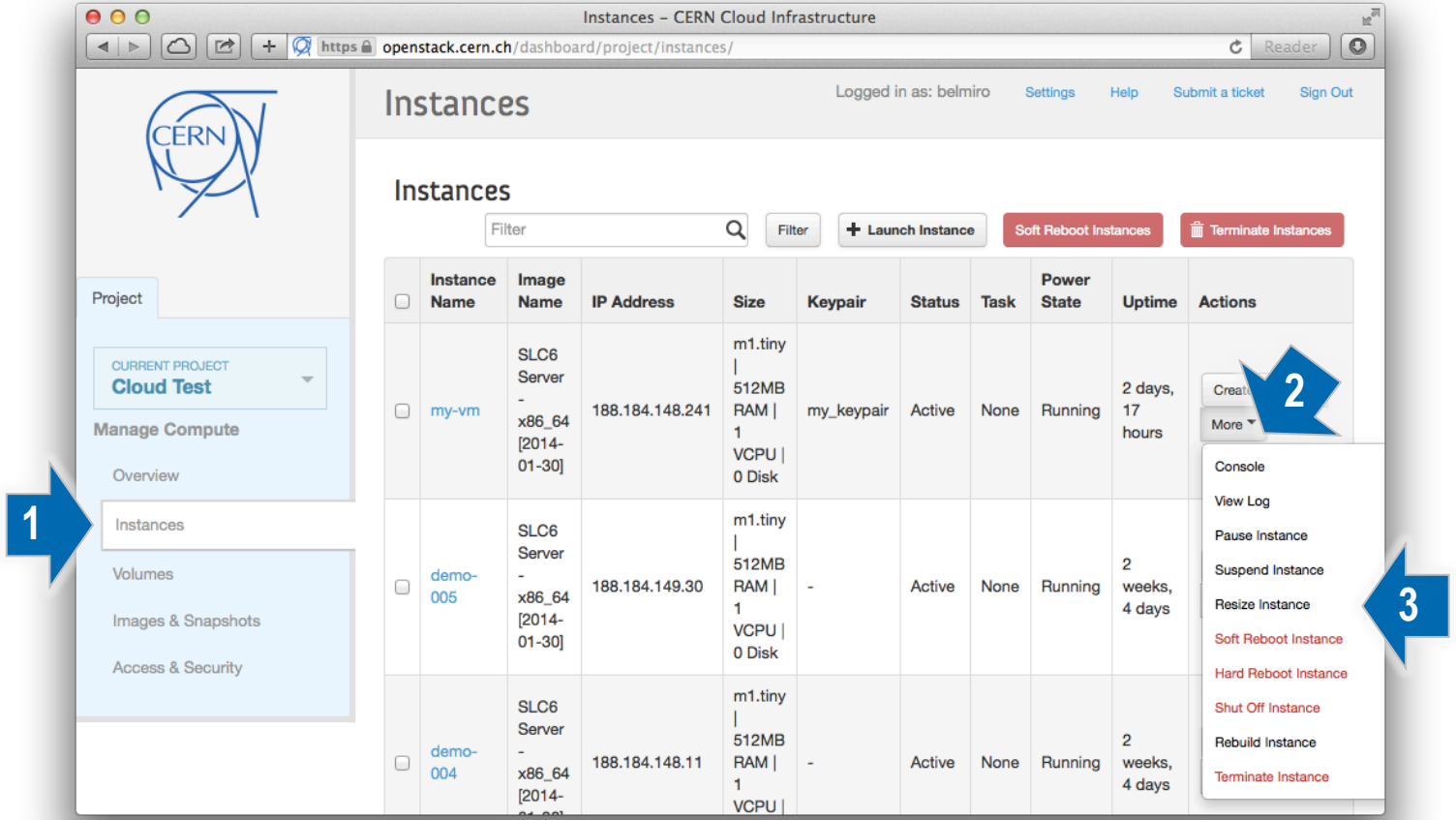


How to hard reboot instance (nova CLI)

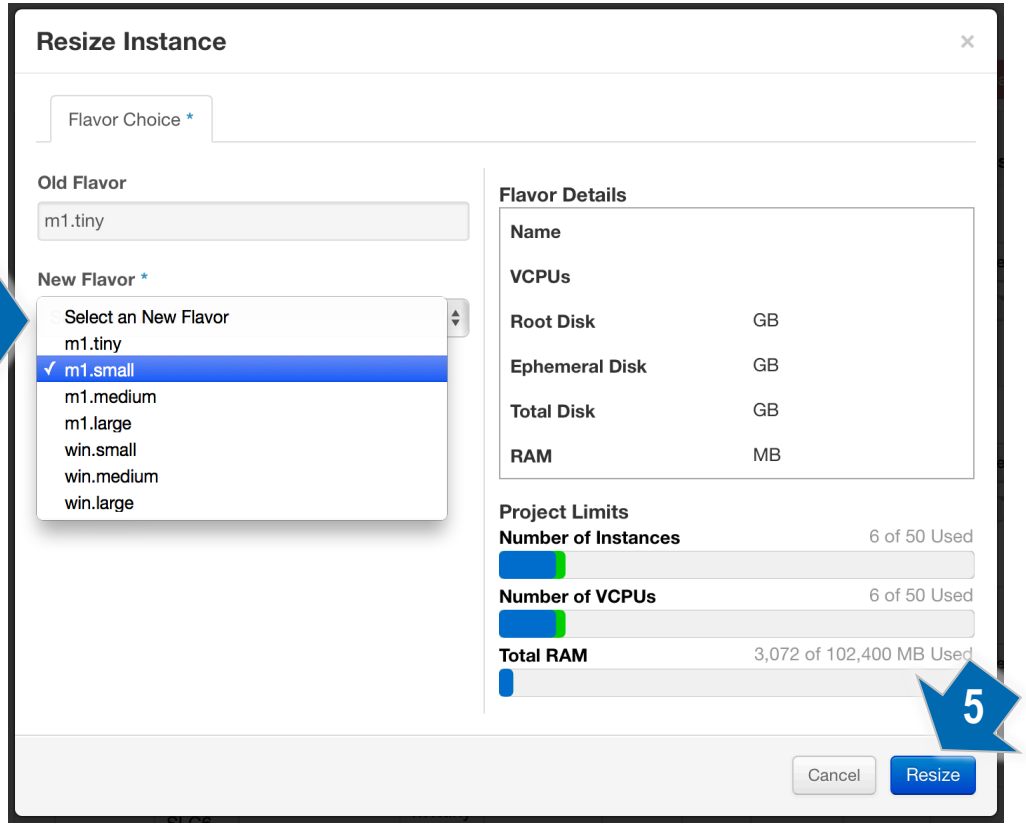
To hard reboot an instance use "nova reboot --hard <instance_uuid>"

```
$ nova list
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| ID                                   | Name     | Status | Task State | Power State | Networks                     |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.211 |
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.168.44  |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.151.16  |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.11  |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 | ACTIVE | -          | Running     | CERN_NETWORK=188.184.149.30  |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    | ACTIVE | -          | Running     | CERN_NETWORK=188.184.148.241 |
+--------------------------------------+----------+--------+------------+-------------+------------------------------+

$ nova reboot --hard 7a78ea0e-47bf-48fe-af62-157492285afa
+--------------------------------------+----------+-------------+---------------+-------------+------------------------------+
| ID                                   | Name     | Status      | Task State    | Power State | Networks                     |
+--------------------------------------+----------+-------------+---------------+-------------+------------------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | HARD_REBOOT | rebooting_hard | Running     | CERN_NETWORK=188.184.149.211 |
| 063bb389-67b5-4125-85ce-0972473724dd | demo-002 | ACTIVE      | -             | Running     | CERN_NETWORK=188.184.168.44  |
| 913f4c16-23a9-48a0-8070-07f9a8245283 | demo-003 | ACTIVE      | -             | Running     | CERN_NETWORK=188.184.151.16  |
| 087d0047-d4b6-4fe8-8224-c13c599beed0 | demo-004 | ACTIVE      | -             | Running     | CERN_NETWORK=188.184.148.11  |
| 5c721948-0df4-412b-bc21-28c1448424b5 | demo-005 | ACTIVE      | -             | Running     | CERN_NETWORK=188.184.149.30  |
| 3e822ed1-e27c-4ef8-b84d-c02f00585d5c | my-vm    | ACTIVE      | -             | Running     | CERN_NETWORK=188.184.148.241 |
+--------------------------------------+----------+-------------+---------------+-------------+------------------------------+
```

How to resize instance (dashboard)



How to resize instance (dashboard)



How to resize instance (nova CLI)

"nova resize <instance_uuid> <flavor>"

```
$ nova show 7a78ea0e-47bf-48fe-af62-157492285afa
+-------------------------------------+--------------------------------------------------------------------------------+
| Property                            | Value                                                                          |
+-------------------------------------+--------------------------------------------------------------------------------+
| CERN_NETWORK network                | 188.184.149.211                                                                |
| OS-DCF:diskConfig                   | MANUAL                                                                         |
| OS-EXT-AZ:availability_zone         | nova                                                                           |
| OS-EXT-STS:power_state              | 1                                                                              |
| OS-EXT-STS:task_state               | -                                                                              |
| OS-EXT-STS:vm_state                 | active                                                                         |
| OS-SRV-USG:launched_at              | 2014-02-26T22:27:29.000000                                                     |
| OS-SRV-USG:terminated_at            | -                                                                              |
| config_drive                        |                                                                                |
| created                             | 2014-02-26T22:24:18Z                                                           |
| flavor                              | m1.tiny (1)                                                                    |
| hostId                              | 859af9ab61d4627edbf8dee026e5124c4e6220545b5fabdd30e564dd                       |
| id                                  | 7a78ea0e-47bf-48fe-af62-157492285afa                                           |
| image                               | SLC6 Server - x86_64 [2014-01-30] (321b8583-967f-4f56-913e-2a10e058ff37)       |
| key_name                            | -                                                                              |
| metadata                            | {"cern-services": "false"}                                                     |
| name                                | demo-001                                                                       |
| os-extended-volumes:volumes_attached | []                                                                             |
| progress                            | 0                                                                              |
| security_groups                     | default                                                                        |
| status                              | ACTIVE                                                                         |
| tenant_id                           | 4d679467-f828-41bc-90fa-ef8633594a6f                                           |
| updated                             | 2014-03-19T12:46:25Z                                                           |
| user_id                             | belmiro                                                                        |
+-------------------------------------+--------------------------------------------------------------------------------+

$ nova resize 7a78ea0e-47bf-48fe-af62-157492285afa m1.small
```

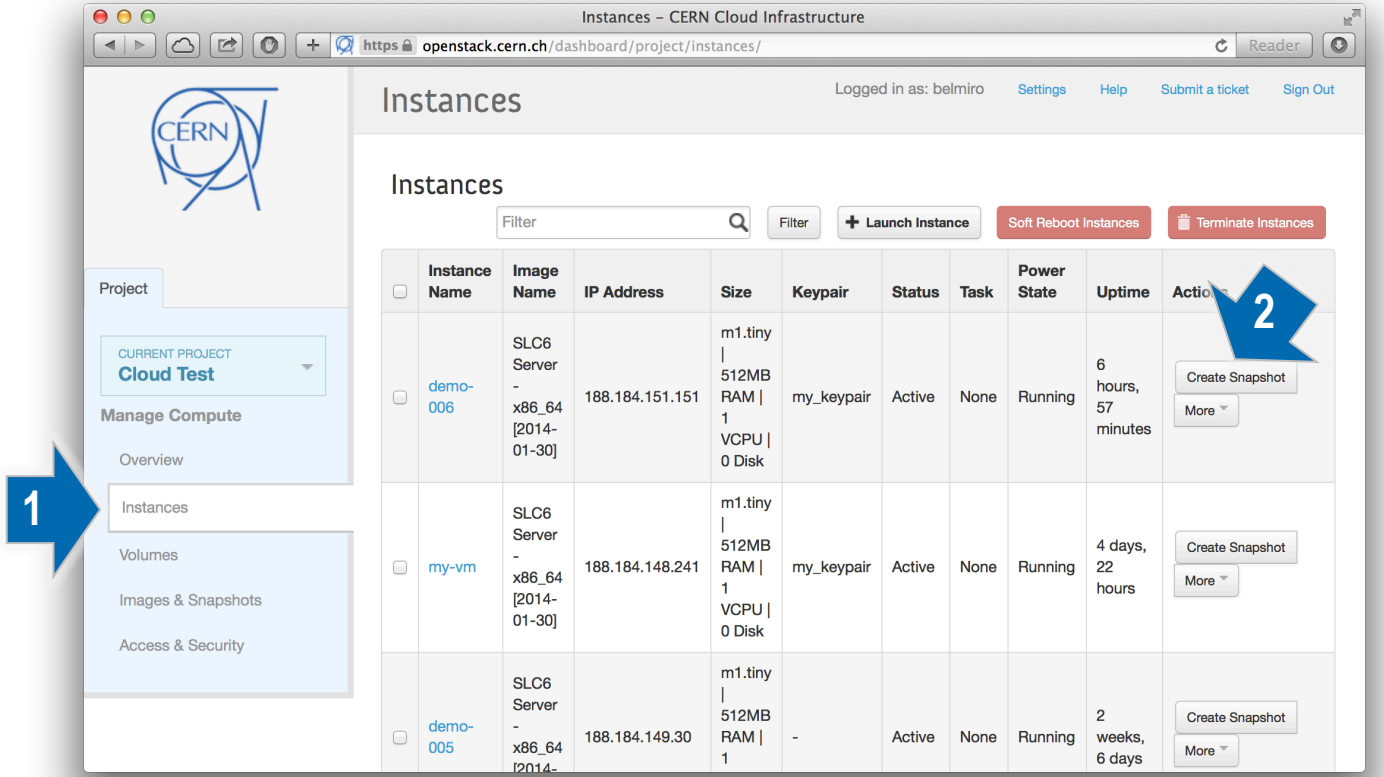
How to resize instance (nova CLI)

After resize check if instance is OK.

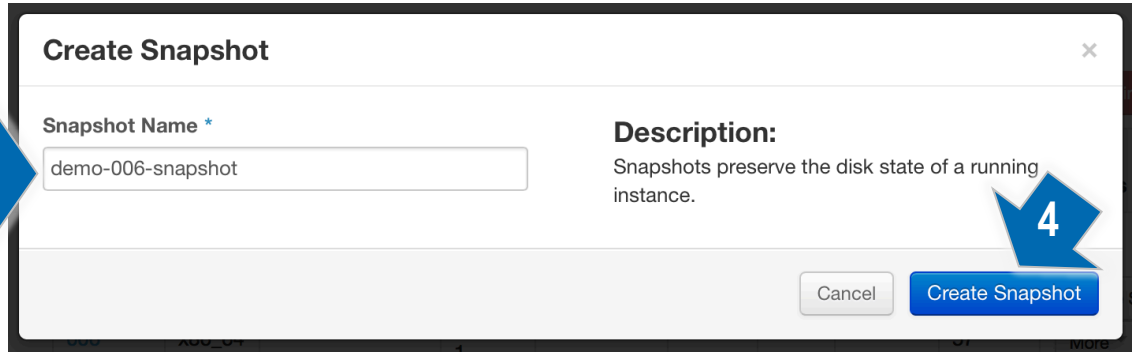
Confirming resize will delete old instance disk files.

```
$ nova list

+--------------------------------------+----------+---------------+------------+-------------+------------------------------+
| ID                                   | Name     | Status        | Task State | Power State | Networks                     |
+--------------------------------------+----------+---------------+------------+-------------+------------------------------+
| 7a78ea0e-47bf-48fe-af62-157492285afa | demo-001 | VERIFY_RESIZE | -          | Running     | CERN_NETWORK=188.184.149.211 |
(...)

$ nova show 7a78ea0e-47bf-48fe-af62-157492285afa
+--------------------------------------+----------------------------------------------------------------------------------+
| Property                             | Value                                                                            |
+--------------------------------------+----------------------------------------------------------------------------------+
| CERN_NETWORK network                 | 188.184.149.211                                                                  |
| OS-DCF:diskConfig                    | MANUAL                                                                           |
| OS-EXT-AZ:availability_zone          | nova                                                                             |
| OS-EXT-STS:power_state               | 1                                                                                |
| OS-EXT-STS:task_state                | -                                                                                |
| OS-EXT-STS:vm_state                  | resized                                                                          |
(...)
| flavor                               | m1.small (2)                                                                     |
| id                                   | 7a78ea0e-47bf-48fe-af62-157492285afa                                             |
(...)

$ nova resize-confirm 7a78ea0e-47bf-48fe-af62-157492285afa
```

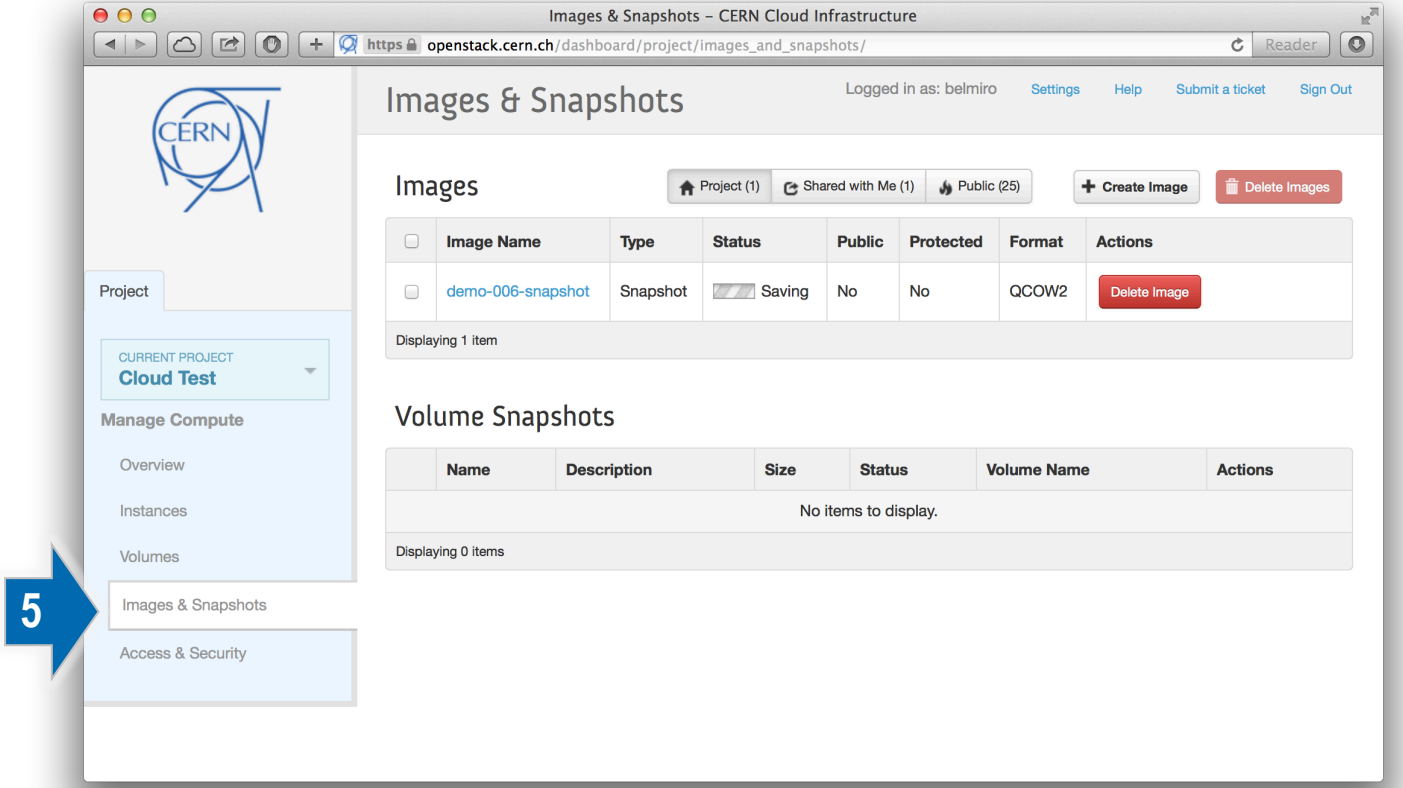
Create instance image snapshot (dashboard)



Create instance image snapshot (dashboard)



Create instance image snapshot (dashboard)



Create instance image snapshot (nova CLI)

To create instance image snapshot use:

"nova image-create <instance_uuid> <snapshot_name>

```
nova image-create 08bfa0a8-57b3-414c-b079-b5f3953d1263 demo-006-snapshot
```

List image snapshot with:

```
$ glance image-list
+--------------------------------------+---------------------------------------------+-------------+------------------+-------------+--------+
| ID                                   | Name                                        | Disk Format | Container Format | Size        | Status |
+--------------------------------------+---------------------------------------------+-------------+------------------+-------------+--------+
| 9207a644-f390-43a8-911d-19bd74f136f5 | demo-006-snapshot                           | qcow2       | bare             | 2468937728  | active |
(...)
```

Availability Zones (nova CLI)

Logical separation for application deployment. Allows application redundancy.

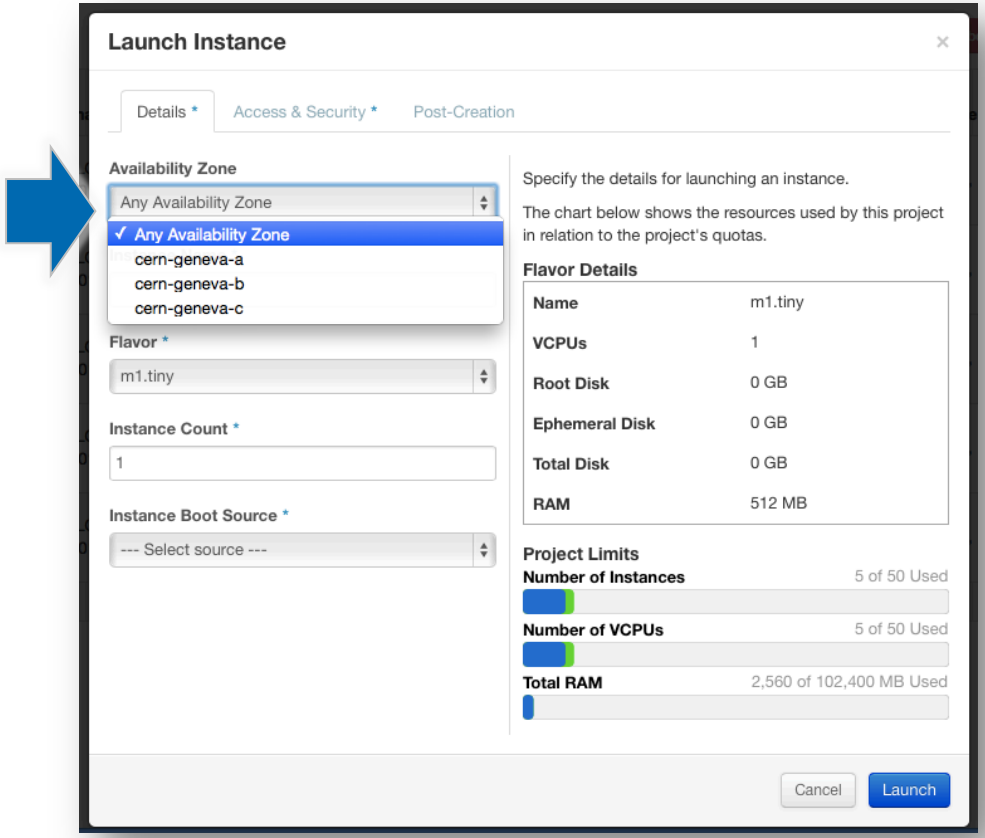
List all availability zones:

```
$ nova availability-zone-list
+---------------+-----------+
| Name          | Status    |
+---------------+-----------+
| cern-geneva-a | available |
| cern-geneva-b | available |
| cern-geneva-c | available |
+---------------+-----------+
```

Create instance in a specific availability zone. Use --availability-zone

```
$ nova boot --image 321b8583-967f-4f56-913e-2a10e058ff37 --flavor m1.tiny --key-name my_keypair
--availability-zone cern-geneva-a my-vm
```

Availability Zones (dashboard)



CERN specific options

Create instance without waiting for DNS propagation (nova CLI)

The VM will only boot when the hostname is known by the DNS infrastructure.
It can take more than 10 minutes.
To skip this waiting time you can use the metadata:
"--meta cern-services=false"

```
$ nova boot --image 321b8583-967f-4f56-913e-2a10e058ff37 --flavor m1.tiny --key-name my_keypair --meta cern-services=false
demo-006
```

CERN specific options

Create instance with specific landb “user”/“responsible” (nova CLI)

The "Main User" and "Responsible" of a device in LanDB can be configured at instance creation time. By default it's the user that created the instance.

Use the metadata:

"--meta landb-mainuser=<user or egroup>"

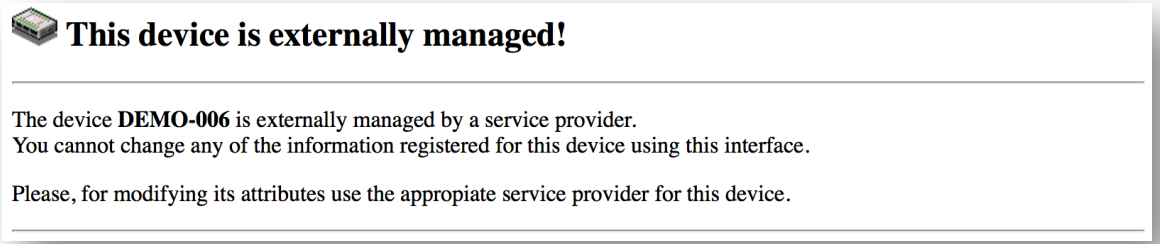
"--meta landb-responsible=<user or egroup>

```
nova boot --image 321b8583-967f-4f56-913e-2a10e058ff37 --flavor m1.tiny --key-name my_keypair
--meta landb-mainuser="ai-openstack-newcomers" --meta landb-responsible="ai-openstack-newcomers" demo-007
```

CERN specific options

Change landb “user”/“responsible” of existing instances (nova CLI)

LanDB updates for devices created by OpenStack can't be performed directly in the LanDB interface.

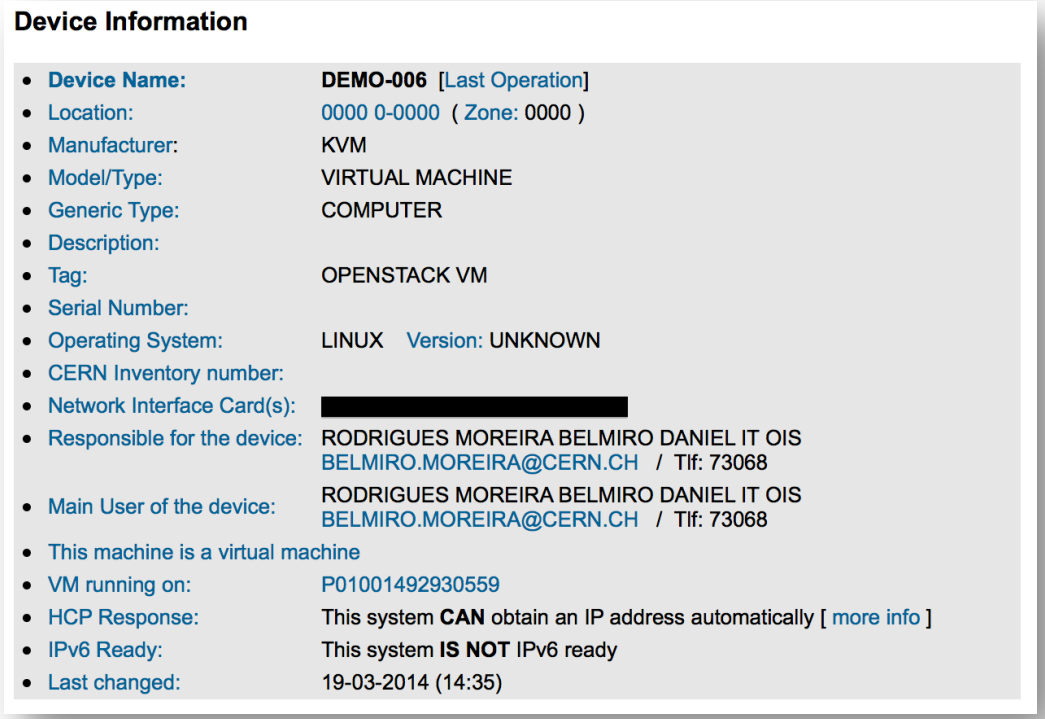


To change the "Main User" and "Responsible" of an existing device in LanDB created by OpenStack use: "nova meta <instance_uuid> set"

- "landb-mainuser=<user or egroup>"
- "landb-responsible=<user or egroup>"

CERN specific options

Change landb “user”/“responsible” of existing instances (nova CLI)



Device Information

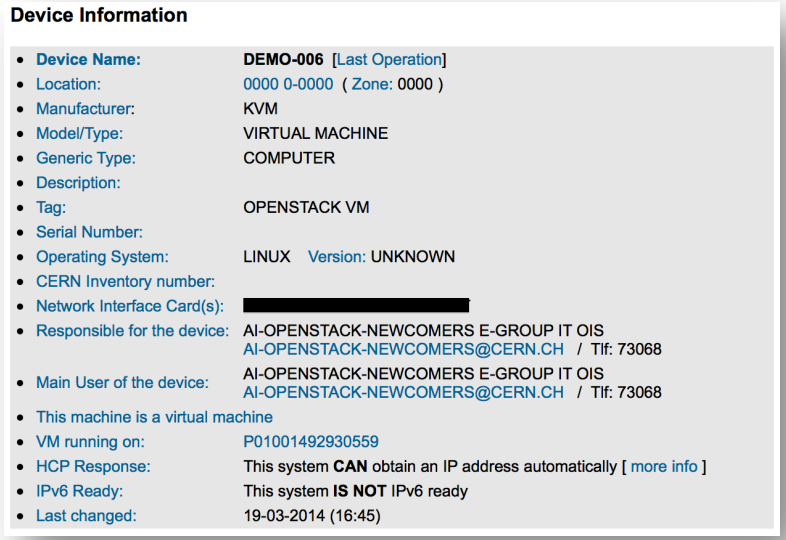
- **Device Name:** **DEMO-006** [Last Operation]
- Location: 0000 0-0000 (Zone: 0000)
- Manufacturer: KVM
- Model/Type: VIRTUAL MACHINE
- Generic Type: COMPUTER
- Description:
- Tag: OPENSTACK VM
- Serial Number:
- Operating System: LINUX Version: UNKNOWN
- CERN Inventory number:
- Network Interface Card(s): [redacted]
- Responsible for the device: RODRIGUES MOREIRA BELMIRO DANIEL IT OIS BELMIRO.MOREIRA@CERN.CH / Tlf: 73068
- Main User of the device: RODRIGUES MOREIRA BELMIRO DANIEL IT OIS BELMIRO.MOREIRA@CERN.CH / Tlf: 73068
- This machine is a virtual machine
- VM running on: P01001492930559
- HCP Response: This system **CAN** obtain an IP address automatically [more info]
- IPv6 Ready: This system **IS NOT** IPv6 ready
- Last changed: 19-03-2014 (14:35)

CERN specific options

Change landb “user”/“responsible” of existing instances (nova CLI)

```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 set landb-mainuser="ai-openstack-newcomers"
```

```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 set landb-responsible="ai-openstack-newcomers"
```



Device Information

- **Device Name:** **DEMO-006** [Last Operation]
- Location: 0000 0-0000 (Zone: 0000)
- Manufacturer: KVM
- Model/Type: VIRTUAL MACHINE
- Generic Type: COMPUTER
- Description:
- Tag: OPENSTACK VM
- Serial Number:
- Operating System: LINUX Version: UNKNOWN
- CERN Inventory number:
- Network Interface Card(s): [redacted]
- Responsible for the device: AI-OPENSTACK-NEWCOMERS E-GROUP IT OIS AI-OPENSTACK-NEWCOMERS@CERN.CH / Tlf: 73068
- Main User of the device: AI-OPENSTACK-NEWCOMERS E-GROUP IT OIS AI-OPENSTACK-NEWCOMERS@CERN.CH / Tlf: 73068
- This machine is a virtual machine
- VM running on: P01001492930559
- HCP Response: This system **CAN** obtain an IP address automatically [more info]
- IPv6 Ready: This system **IS NOT** IPv6 ready
- Last changed: 19-03-2014 (16:45)

CERN specific options

Change landb “user”/“responsible” of existing instances (nova CLI)

If you delete the "mainuser" or "responsible" instance metadata, LanDB will be updated to the user that created the instance.

"nova meta <instance_uuid> delete"

- "landb-mainuser"
- "landb-responsible"

```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 delete landb-responsible
```

CERN specific options

Change landb “user”/“responsible” of existing instances (nova CLI)

Device Information

- **Device Name:** **DEMO-006** [Last Operation]
- Location: 0000 0-0000 (Zone: 0000)
- Manufacturer: KVM
- Model/Type: VIRTUAL MACHINE
- Generic Type: COMPUTER
- Description:
- Tag: OPENSTACK VM
- Serial Number:
- Operating System: LINUX Version: UNKNOWN
- CERN Inventory number:
- Network Interface Card(s): [redacted]
- Responsible for the device: RODRIGUES MOREIRA BELMIRO DANIEL IT OIS
  BELMIRO.MOREIRA@CERN.CH / Tlf: 73068
- Main User of the device: AI-OPENSTACK-NEWCOMERS E-GROUP IT OIS
  AI-OPENSTACK-NEWCOMERS@CERN.CH / Tlf: 73068
- This machine is a virtual machine
- VM running on: P01001492930559
- HCP Response: This system **CAN** obtain an IP address automatically [more info]
- IPv6 Ready: This system **IS NOT** IPv6 ready
- Last changed: 19-03-2014 (16:52)

CERN specific options

Add/remove aliases in existing instances (nova CLI)

To add/remove aliases in an OpenStack instance use:

"nova meta <instance_uuid> set landb-alias=<comma_separated_list>"

```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 set landb-alias="alias001"
```

```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 set landb-alias="alias001,alias002,alias003,alias004"
```

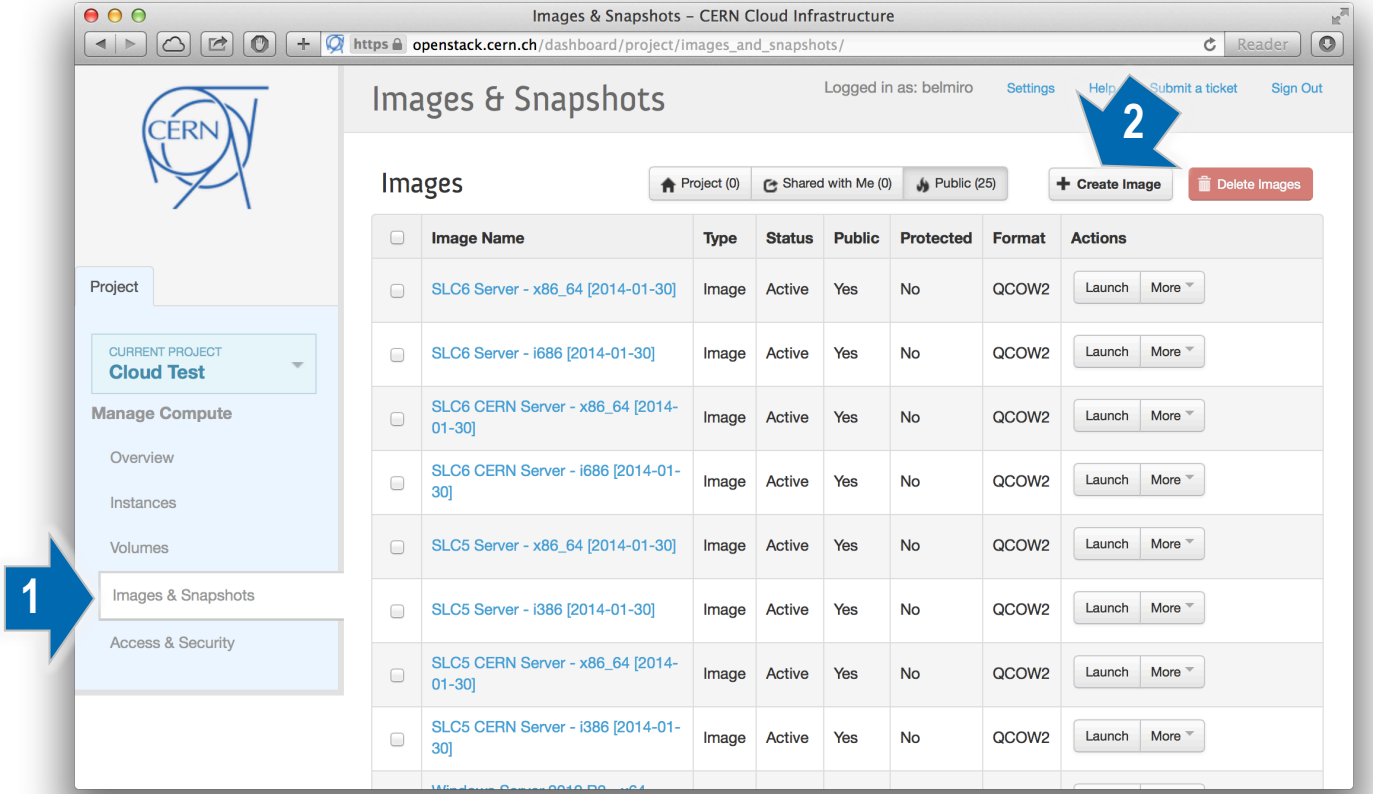
```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 set landb-alias="alias003,alias005"
```

To delete all alias use:

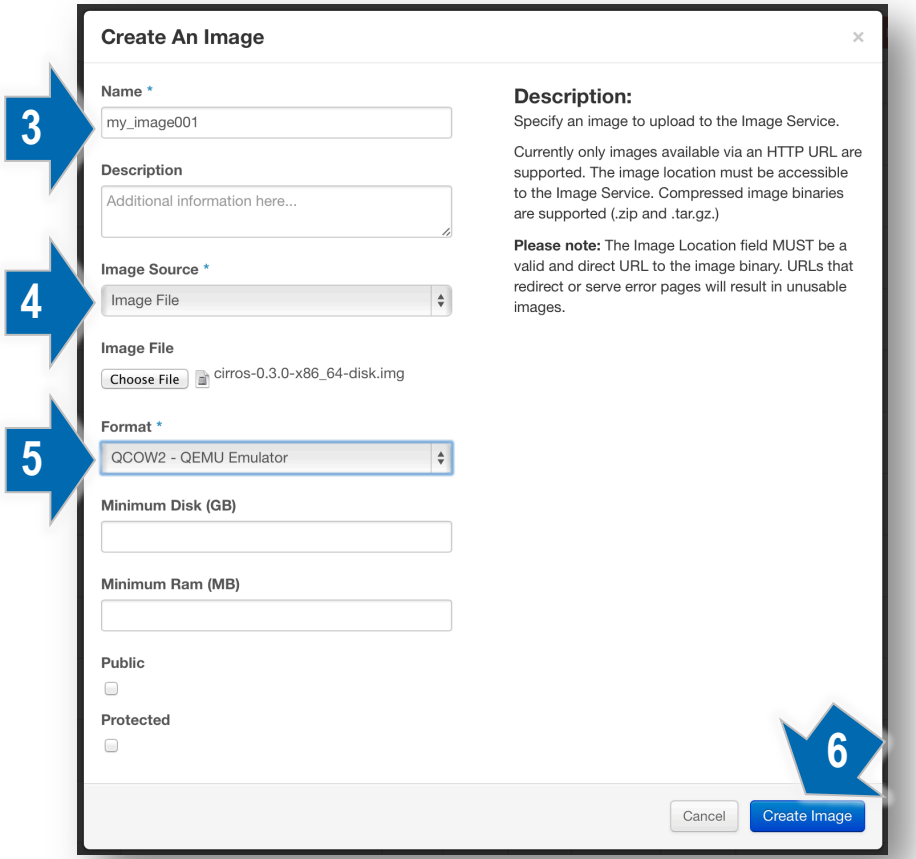
"nova meta <instance_uuid> delete landb-alias

```
$ nova meta 08bfa0a8-57b3-414c-b079-b5f3953d1263 delete landb-alias
```

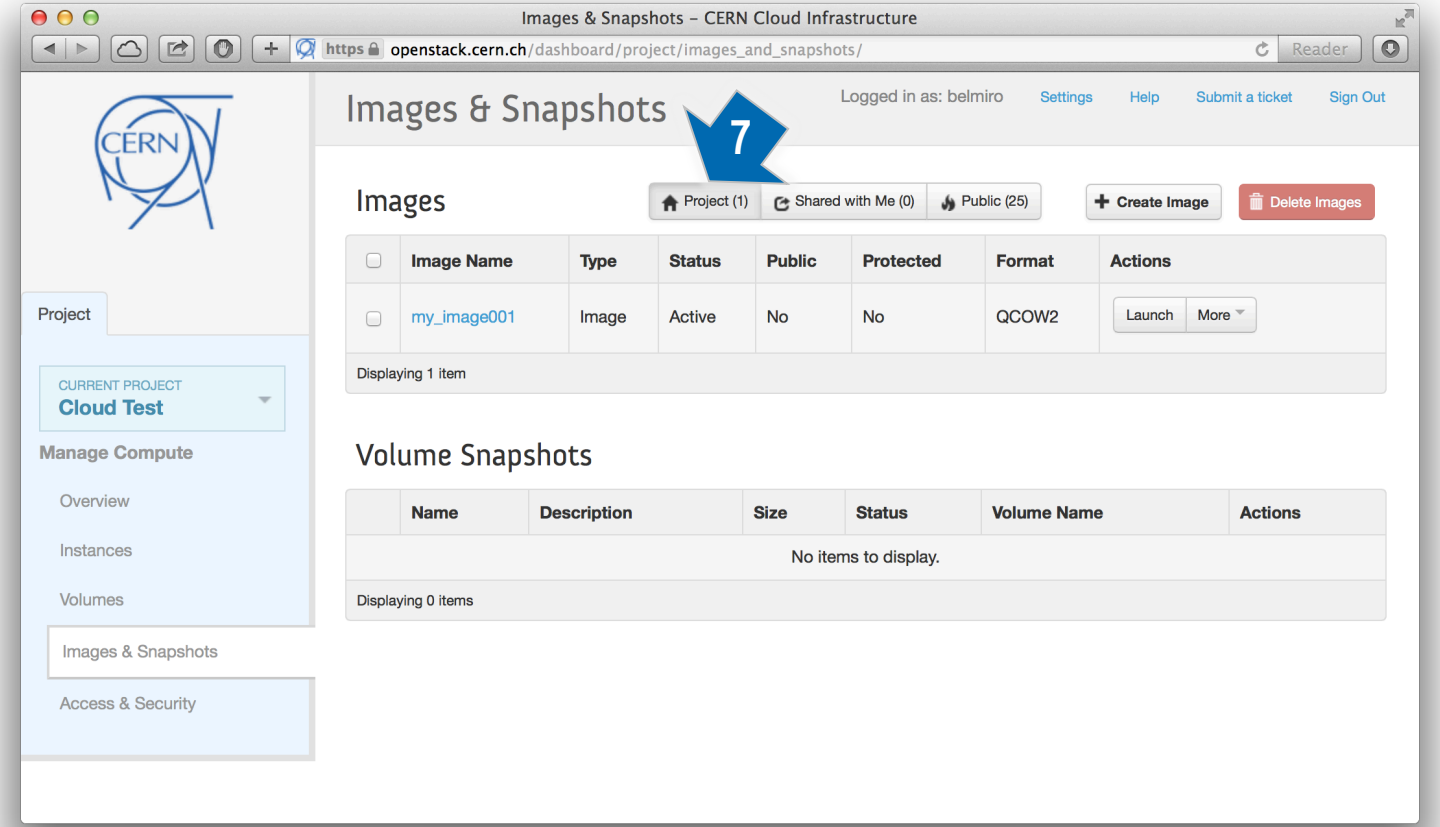
How to upload image file (dashboard)



How to upload image file (dashboard)



How to upload image file (dashboard)



How to upload image file (glance CLI)

To upload image file to glance use:

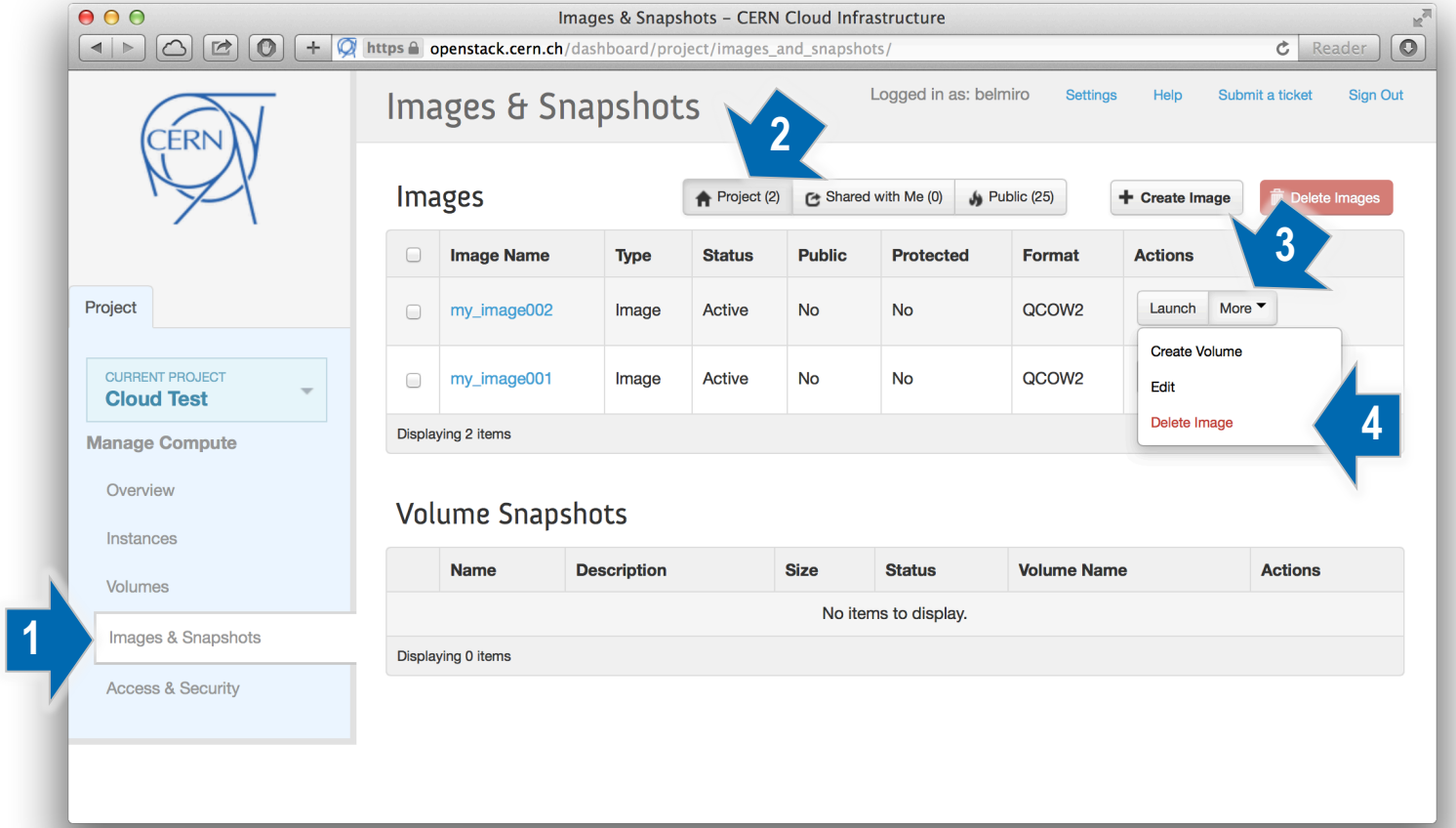
"glance image-create --name <image_name> --disk-format <disk_formate> --container-format <container_format> --file <path_to_local_file>"

```
$ glance image-create --name my_image001 --disk-format qcow2 --container-format bare --file cirros.0.3.0.disk.img
```

List all available images using glance CLI with:

```
$ glance image-list
+--------------------------------------+---------------------------------------------+-------------+------------------+-------------+--------+
| ID                                   | Name                                        | Disk Format | Container Format | Size        | Status |
+--------------------------------------+---------------------------------------------+-------------+------------------+-------------+--------+
| 323ef4d2-da32-4c88-a985-87ae32b588fc | my_image001                                 | qcow2       | bare             | 9761280     | active |
(...)
```

How to delete image (dashboard)



How to delete image (glance CLI)

To delete an image use:

"glance image-delete <image_uuid>

```
$ glance image-delete 323ef4d2-da32-4c88-a985-87ae32b588fc
```

Share images between tenants (glance CLI)

Images can be shared between different tenants.
Select the image and the tenant to share with. Use:
"glance member-create <image_uuid> <tenant_uuid>

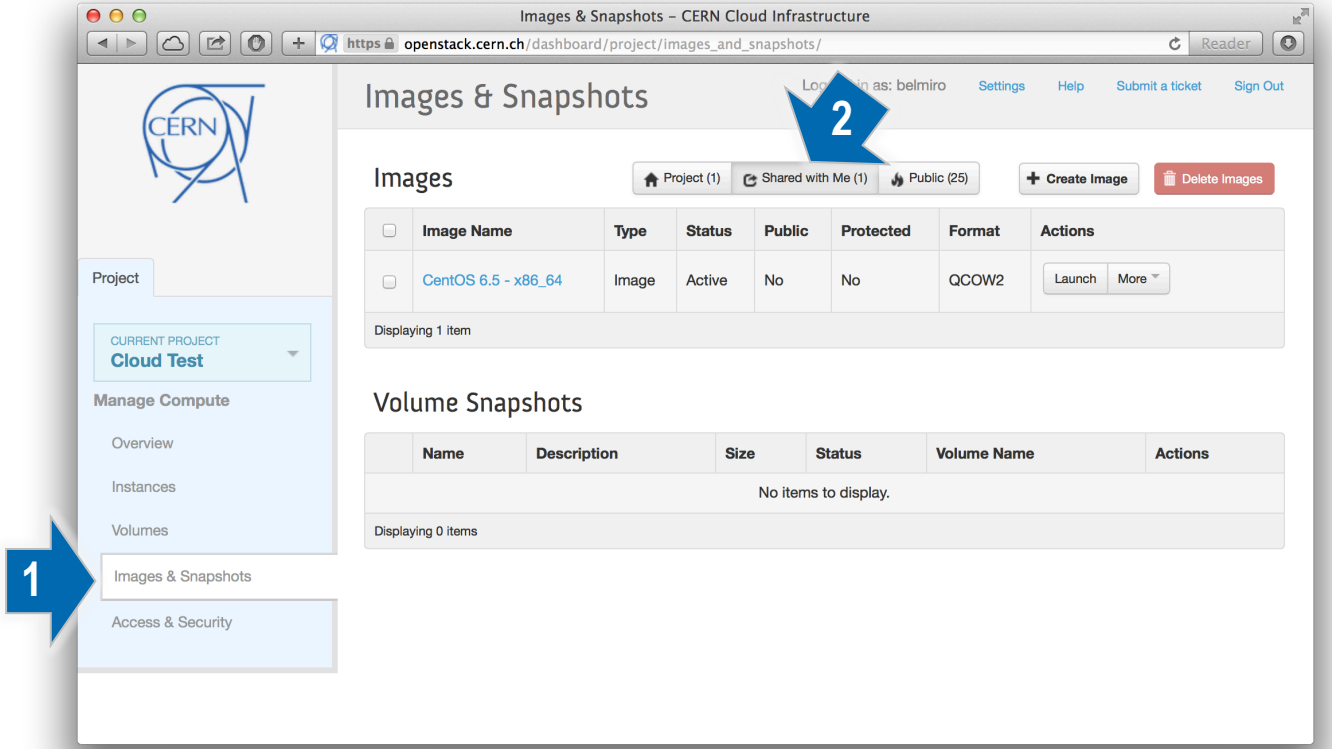
```
glance member-create d294212a-d9b9-4d3b-ac45-a09016e6f5b1 4d679467-f828-41bc-90fa-ef8633594a6x
```

List all shared images with:
"glance member-list --tenant-id <tenant_uuid>

```
$ glance member-list --tenant-id 4d679467-f828-41bc-90fa-ef8633594a6f
+--------------------------------------+--------------------------------------+-----------+
| Image ID                             | Member ID                            | Can Share |
+--------------------------------------+--------------------------------------+-----------+
| d294212a-d9b9-4d3b-ac45-a09016e6f5b1 | 4d679467-f828-41bc-90fa-ef8633594a6f |           |
+--------------------------------------+--------------------------------------+-----------+
```

Share images between tenants (dashboard)

View images that are provided by other tenants



What's next...

This guide is only a brief OpenStack introduction for users.
For more information:
- http://docs.openstack.org
- https://information-technology.web.cern.ch/book/cern-private-cloud-user-guide

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www.cern.ch