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Open
Nebula

How to set up a basic private cloud environment with OpenNebula

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Content

1. Project Goal and Environment

This guide provides a complete step-by-step tutorial to set up an OpenNebula private cloud environment with one masternode and one workernode.

The masternode can manage multiple worker nodes including network, storage and more. This environment can easily be extended by more workers if needed. Workernodes provide resources to host VMs. These resources can easily be assigned as needed. You will use the frontend which will be installed on the masternode to manage your worker node and hosted VMs.

In our project setup we used Ubuntu 18.04 as operating systems (OS). Therefore, slight differences could exist in the following commands, depending on your OS.

In our project setup we used VMWare Player Workstation to create VMs for master and worker nodes. This enables nested virtualization on the VMs. Furthermore, KVM was used as hypervisor for the VMs on the worker node.

2. Set up Masternode with Frontend

Install Components

To start we need to download and install the necessary software components for the masternode. We use the sudo su command to execute all following commands with sudo privileges.

```
sudo su

wget -q -O- https://downloads.opennebula.org/repo/repo.key | apt-key add -

echo "deb https://downloads.opennebula.org/repo/5.8/Ubuntu/18.04 stable opennebula" > /etc/apt/sources.list.d/opennebula.list

apt update

apt-get install opennebula opennebula-sunstone opennebula-gate opennebula-flow

/usr/share/one/install_gems
```

Starting the Frontend

A default password is generated for the frontend. You can find it in the following file after "oneadmin:" which is the default username.

```
nano /var/lib/one/.one/one_auth
```

To change the password for the created linux user “oneadmin”, execute the following command (as root).

```
passwd oneadmin
```

Next start OpenNebula and the frontend (called “Sunstone”) service.

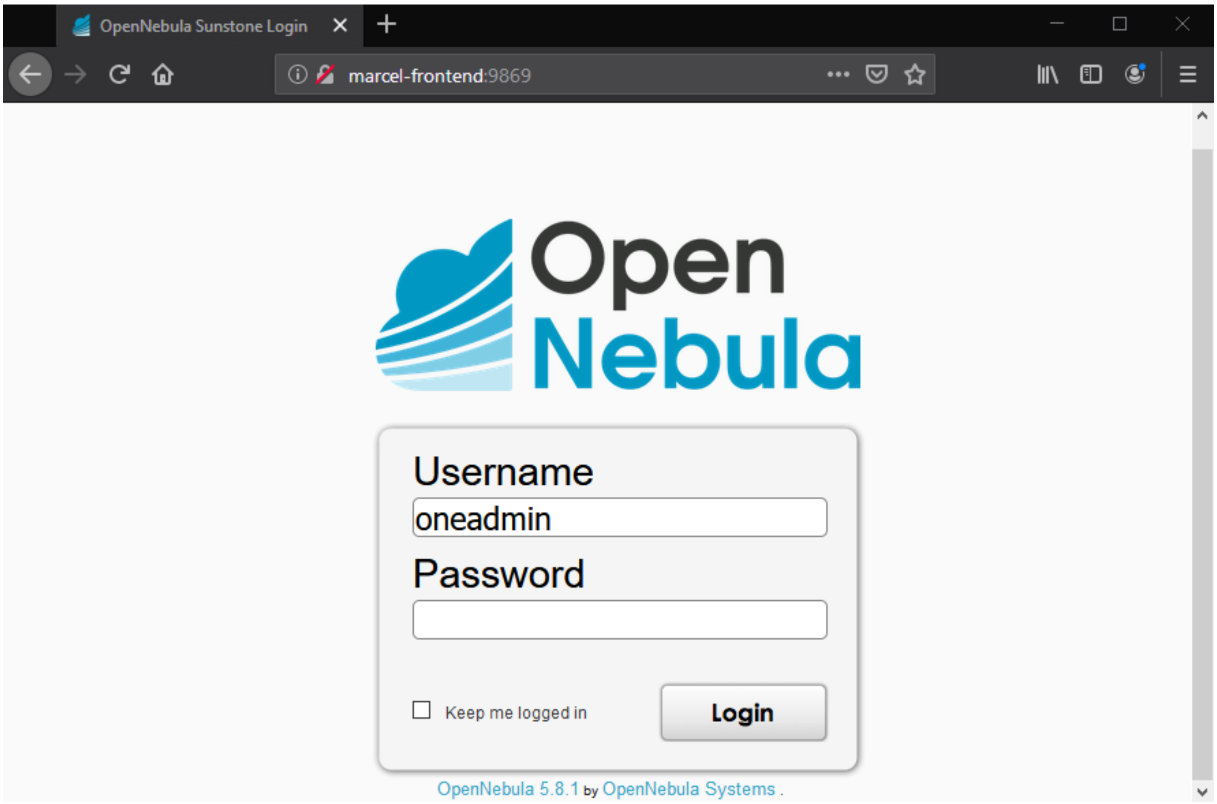
```
systemctl start opennebula

systemctl start opennebula-sunstone
```

To access the frontend open a browser and enter your masternode on Port 9869, which is used by default by OpenNebula. If you are working on the machine, just use localhost as computername.

```
http://<rechnername>:9869
```

You will see the login prompt. Use oneadmin and the password which you received earlier.

Login: oneadmin, <generated password>



OpenNebula Sunstone Login
marcel-frontend:9869
Open Nebula

Username

oneadmin

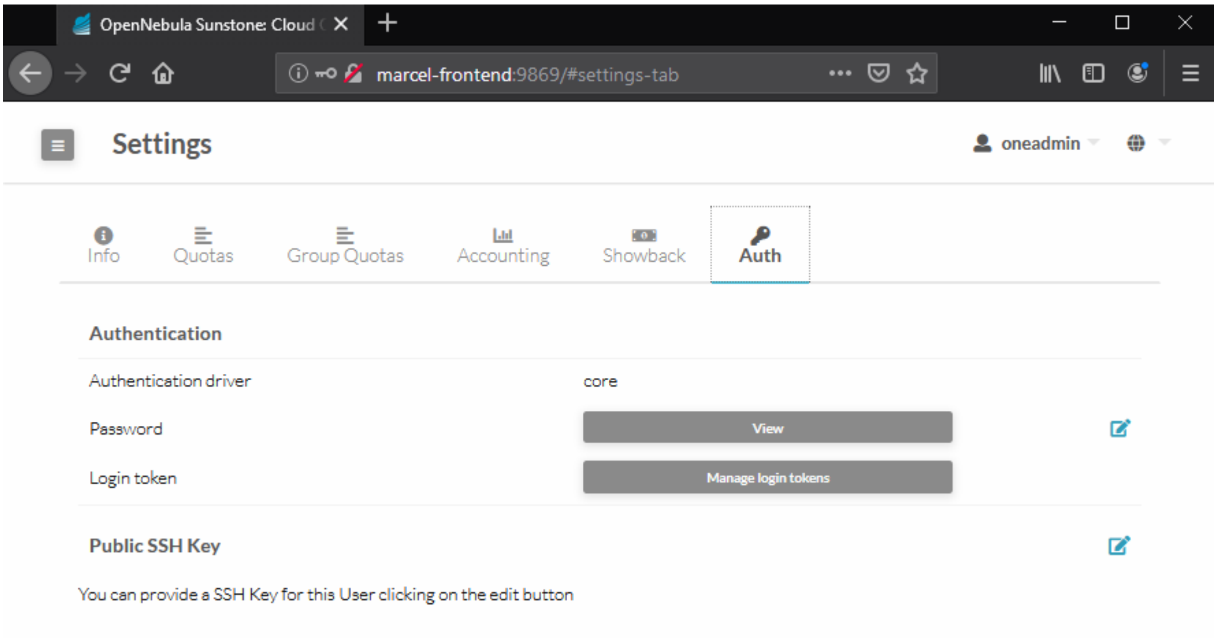
Password

□ Keep me logged in

Login
OpenNebula 5.8.1 by OpenNebula Systems .

Figure 1 - Sunstone Login Form

You can change the default password of the webfrontend user in the user management section.



OpenNebula Sunstone: Cloud
marcel-frontend:9869/#settings-tab
Settings
oneadmin
Info
Quotas
Group Quotas
Accounting
Showback
Auth

Authentication

Authentication driver	core
Password	View
Login token	Manage login tokens

Public SSH Key

You can provide a SSH Key for this User clicking on the edit button

Figure 2 - Change password of oneadmin or other users

3. Set up Workernode with KVM

Depending on the hypervisor you want to use for your VMs you need to set up your worker node.

Install Components

```
sudo su

wget -q -O- https://downloads.opennebula.org/repo/repo.key | apt-key add -

echo "deb https://downloads.opennebula.org/repo/5.8/Ubuntu/18.04 stable opennebula" >
/etc/apt/sources.list.d/opennebula.list

apt-get update

apt-get install opennebula-node

service libvirtd restart

passwd oneadmin
```

Establish an SSH communication pipeline between Master and Worker

Your master needs to be able to access the worker through SSH passwordless. To enable this, login to your master and exchange communication keys with all worker nodes. Use the oneadmin user that the saved file has correct access rights. To make this step easier you can set the oneadmin password on all machines to the same string.

```
su oneadmin

ssh-keyscan <frontend-rechnername> <workernode-rechnername> >>
/var/lib/one/.ssh/known_hosts

scp -rp /var/lib/one/.ssh <workernode-rechnername>:/var/lib/one/
```

-> confirm with your password previously setted

Test the SSH connection via terminal to be sure it works.

Network configuration

Moreover, a bridge is needed on the worker node. In order to have a working network on the new VMs, the bridge must be created. One can do it in the /etc/network/interfaces file.

Here you must add the following text in order to have a working bridge (based on DHCP).

```
auto br0
iface br0 inet dhcp
bridge_ports <network interface name>
```

Make sure that the network interface name (e.g. “eth0”) is the one of your LAN connection. Also remember the name of the bridge, in this case “br0”, which you may use in the Sunstone webfrontend for more advanced settings.

To check wether the bridge is working, you may use:

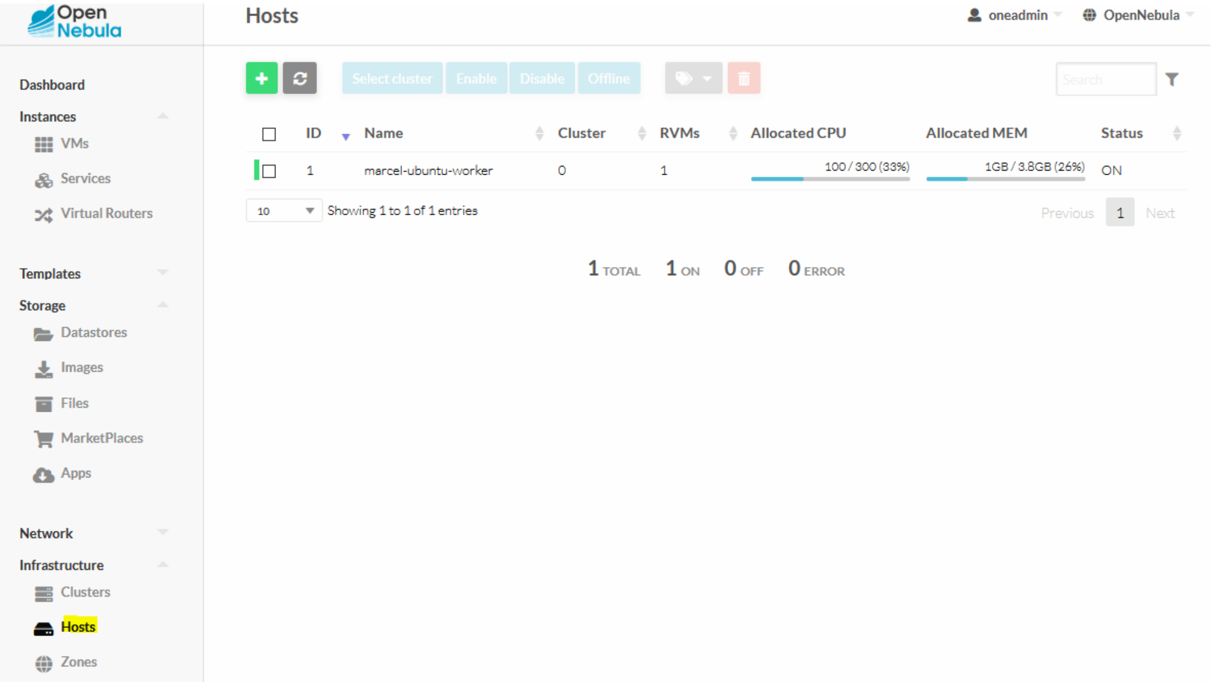
```
brctl show
```

4. Register Workernode

You can do this step using the frontend:

Infrastructure -> Hosts

To add the worker use the plus symbol and enter the computername of the worker. If this step was successful the state should be 'ON' after several seconds.



□	ID	Name	Cluster	RVMs	Allocated CPU	Allocated MEM	Status
□	1	marcel-ubuntu-worker	0	1	100 / 300 (33%)	1GB / 3.8GB (26%)	ON

10 Showing 1 to 1 of 1 entries

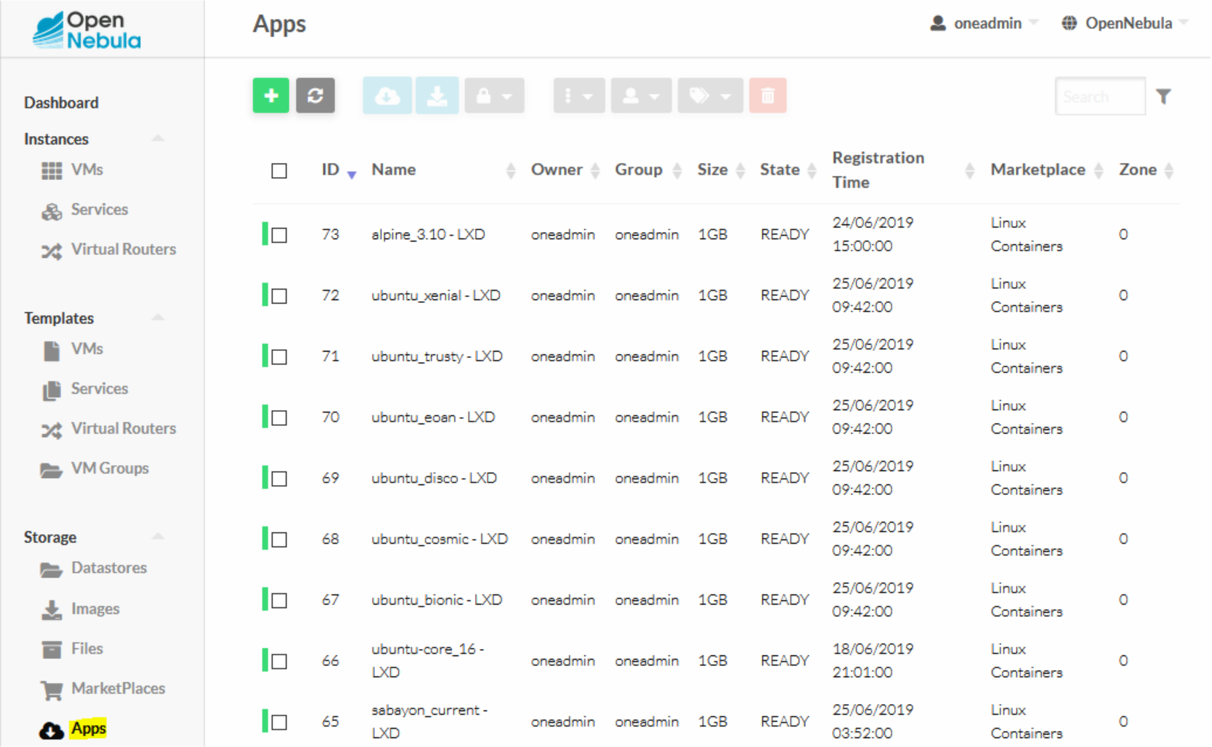
Previous 1 Next

1 TOTAL 1 ON 0 OFF 0 ERROR

Figure 3 - Add worker node as Host

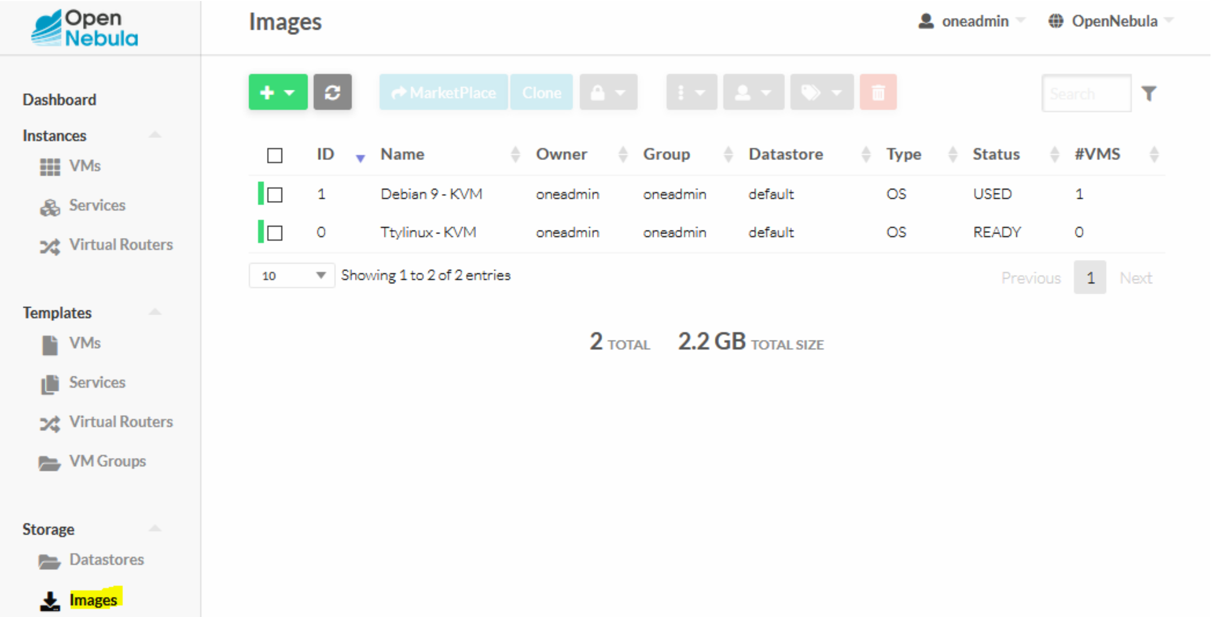
5. Deploy VM

Firstly, download a VM image from the OpenNebula AppStore via Sunstone-Frontend or upload an own image.



□	ID	Name	Owner	Group	Size	State	Registration Time	Marketplace	Zone
□	73	alpine_3.10 - LXD	oneadmin	oneadmin	1GB	READY	24/06/2019 15:00:00	Linux Containers	0
□	72	ubuntu_xenial - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 09:42:00	Linux Containers	0
□	71	ubuntu_trusty - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 09:42:00	Linux Containers	0
□	70	ubuntu_eoan - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 09:42:00	Linux Containers	0
□	69	ubuntu_disco - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 09:42:00	Linux Containers	0
□	68	ubuntu_cosmic - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 09:42:00	Linux Containers	0
□	67	ubuntu_bionic - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 09:42:00	Linux Containers	0
□	66	ubuntu-core_16 - LXD	oneadmin	oneadmin	1GB	READY	18/06/2019 21:01:00	Linux Containers	0
□	65	sabayon_current - LXD	oneadmin	oneadmin	1GB	READY	25/06/2019 03:52:00	Linux Containers	0

Figure 4 - Apps that can be downloaded



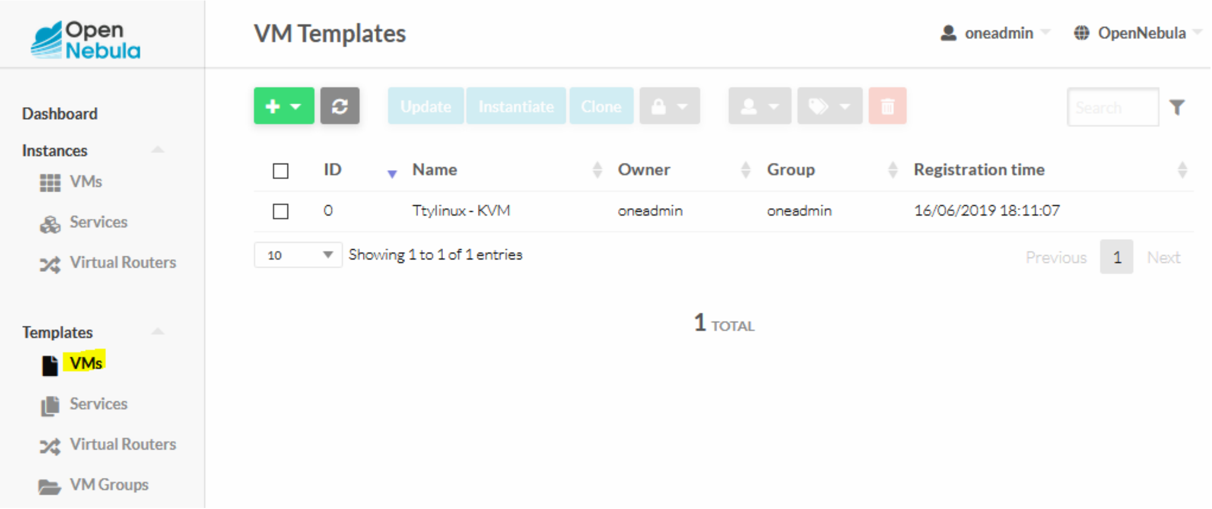
□	ID	Name	Owner	Group	Datastore	Type	Status	#VMS
□	1	Debian 9 - KVM	oneadmin	oneadmin	default	OS	USED	1
□	0	Ttylinux - KVM	oneadmin	oneadmin	default	OS	READY	0

10 Showing 1 to 2 of 2 entries Previous 1 Next

2 TOTAL 2.2 GB TOTAL SIZE

Figure 5 - Available images that were downloaded

Afterwards click on VM Templates. You may use the predefined VM templates which are generated automatically if downloaded in the App Store. Otherwise, you can create an own VM template.



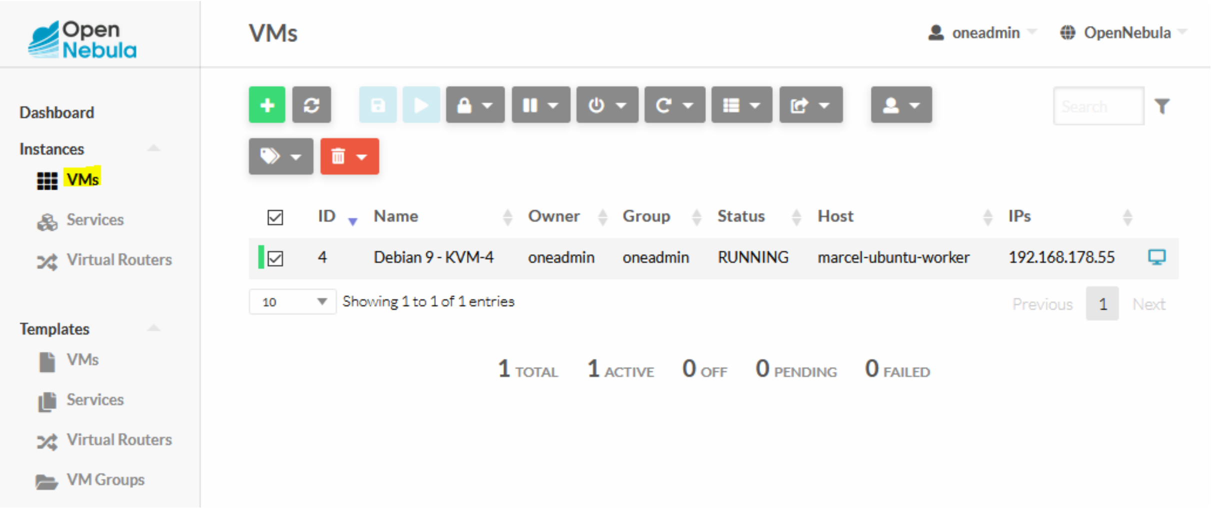
☐	ID	Name	Owner	Group	Registration time
☐	0	Ttylinux - KVM	oneadmin	oneadmin	16/06/2019 18:11:07

Showing 1 to 1 of 1 entries

1 TOTAL

Figure 6 - VM Templates

To create a VM use the button “Instantiate”. Your VM will be listed in the “VMs” section in “Instances” and have the state ‘Pending’ until you deploy it on a specific host. After deploying you can access via VNC in the browser.

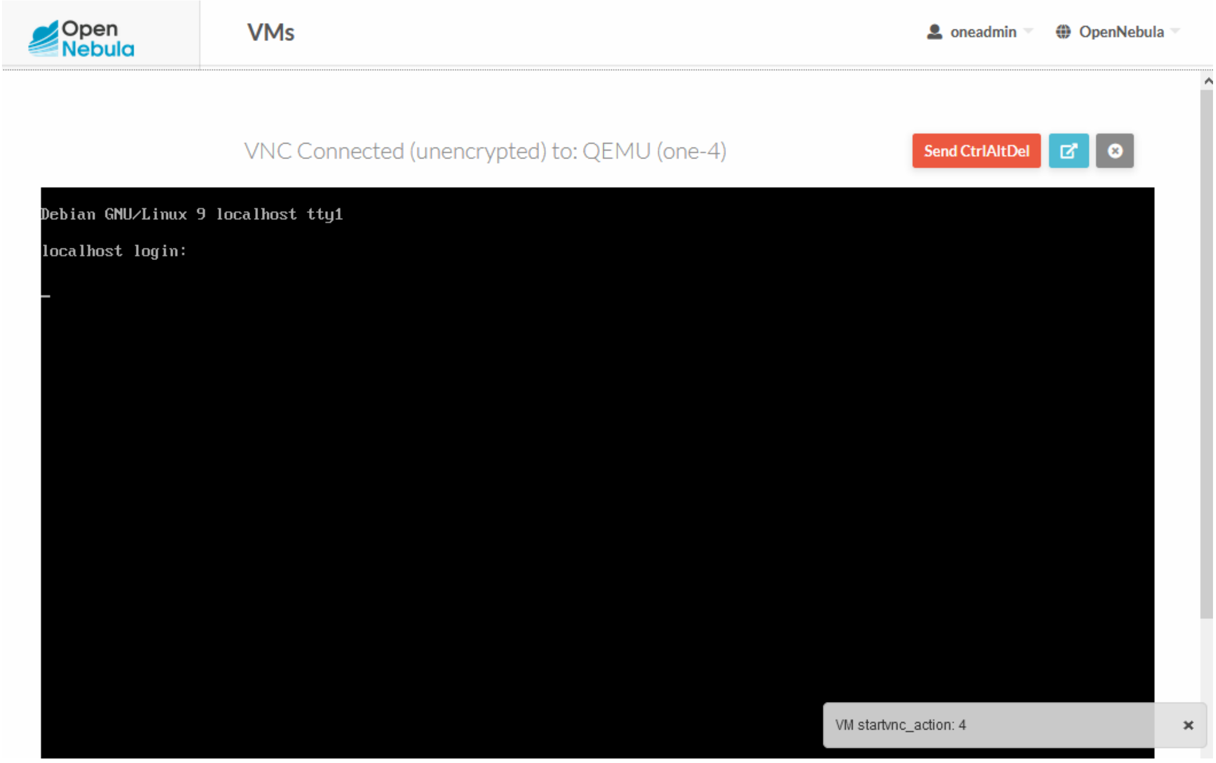


☑	ID	Name	Owner	Group	Status	Host	IPs
☑	4	Debian 9 - KVM-4	oneadmin	oneadmin	RUNNING	marcel-ubuntu-worker	192.168.178.55

Showing 1 to 1 of 1 entries

1 TOTAL 1 ACTIVE 0 OFF 0 PENDING 0 FAILED

Figure 7 - Running VM



VNC Connected (unencrypted) to: QEMU (one-4)

```
Debian GNU/Linux 9 localhost tty1

localhost login:
```

Figure 8 - Accessing the VM via VNC