How to deploy private OpenStack Cloud on CentOS with Packstack?. OpenStack is a popular free and open-source software platform for building both Public and Private clouds. You can have an all-in-one OpenStack Cloud running on CentOS 7 in minutes by using Packstack installation utility. After the deployment, you can [add more nodes](https://www.rdoproject.org/install/adding-a-compute-node/) to your OpenStack cloud, if you choose.

In this setup, we will build an OpenStack Cloud using Packstack on CentOS with the following services.

* **Cinder** – Block storage service
* **Neutron** – Networking service
* **Nova** – Compute
* **Swift** – Object storage service
* **Keystone** – Identity Service
* **Heat** – Orchestration Service
* **Glance** – image service
* **Horizon** – Dashboard
* **Magnum** -Container service

I’m doing the installation on a physical server with the following specs.

Memory: 128GB RAM

CPU: Intel(R) Xeon(R) CPU E5-1650 v2 @ 3.50GHz (12 cores)

Disk: 3 x 4TB SATA

Network: 1Gbit

IPV4 Adresses: 1 x IPV4 + /28 Subnet (14 IPs)

------------------------------------------------------------

$ grep -c ^processor /proc/cpuinfo

12

$ free -h

total used free shared buff/cache available

Mem: 125G 207M 125G 21M 244M 124G

Swap: 0B 0B 0B

$ lsblk

NAME MAJ:MIN RM SIZE RO TYPE MOUNTPOINT

loop0 7:0 0 3G 1 loop

sda 8:0 0 3.7T 0 disk

sdb 8:16 0 3.7T 0 disk

sdc 8:32 0 3.7T 0 disk

$ ip link show

1: lo: <LOOPBACK,UP,LOWER\_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000

link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00

2: eth0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc mq state UP mode DEFAULT group default qlen 1000

link/ether 0c:c4:7a:02:26:be brd ff:ff:ff:ff:ff:ff

The server provider is Hetzner, check our guide on [How To Install CentOS 7 on Hetzner Root Servers](https://computingforgeeks.com/how-to-install-centos-7-on-hetzner-root-servers/)

Step 1: Satisfy Setup requirements

We will disable firewalld, NetworkManager and SELinux using the commands shared here.

sudo systemctl disable --now firewalld NetworkManager

sudo setenforce 0

sudo sed -i 's/^SELINUX=.\*/SELINUX=permissive/g' /etc/selinux/config

Set your server hostname.

sudo hostnamectl set-hostname [openstackcloud.example.com](http://openstackcloud.example.com/) --static

Finally, update your system and install basic utilities.

sudo yum -y update

sudo yum -y install vim wget curl telnet bash-completion

sudo reboot

Step 2: Install Packstack packages

Add RDO (RPM Distribution of OpenStack) repository using the commands below.

--- OpenStack Stein ----

$ sudo yum install -y centos-release-openstack-stein

--- OpenStack Rocky ----

$ sudo yum install -y centos-release-openstack-rocky

If you’re following this article when there is a newer release of Openstack, replace *stein* or *rocky* with release name.

Once the repository has been added, install packstack package for CentOS.

sudo yum install -y openstack-packstack

Step 3: Create packstack answers file

We need to generate a configuration file that will be used to Install OpenStack Cloud with Packstack. This file has information like services to install, storage configuration, networking e.t.c.

$ sudo packstack --gen-answer-file /root/answers.txt

Packstack changed given value to required value /root/.ssh/id\_rsa.pub

Open generated configuration file and edit it to suit your desired installation. These are my parameters set.

CONFIG\_NTP\_SERVERS=0.pool.ntp.org,1.pool.ntp.org,2.pool.ntp.org

CONFIG\_CONTROLLER\_HOST=192.168.10.10

CONFIG\_COMPUTE\_HOSTS=192.168.10.10

CONFIG\_NETWORK\_HOSTS=192.168.10.10

CONFIG\_STORAGE\_HOST=192.168.10.10

CONFIG\_KEYSTONE\_ADMIN\_PW=b29e883d82dd45f8

CONFIG\_SWIFT\_STORAGES=/dev/sdc2

CONFIG\_PROVISION\_DEMO=n

CONFIG\_HEAT\_INSTALL=y

CONFIG\_HEAT\_CFN\_INSTALL=y

CONFIG\_CEILOMETER\_INSTALL=y

CONFIG\_MAGNUM\_INSTALL=y

CONFIG\_LBAAS\_INSTALL=y

CONFIG\_CINDER\_VOLUMES\_CREATE=n

CONFIG\_NOVA\_SCHED\_RAM\_ALLOC\_RATIO=3.0

CONFIG\_NOVA\_LIBVIRT\_VIRT\_TYPE=%{::default\_hypervisor}

CONFIG\_HORIZON\_SSL=n

Cinder and Swift storage will be on my block device **/dev/sdc**.

sudo parted -s -a optimal -- /dev/sdc mklabel gpt

sudo parted -s -a optimal -- /dev/sdc mkpart primary 0% 70%

sudo parted -s -a optimal -- /dev/sdc mkpart primary 70% 100%

For Cinder, I’ll create a separate LVM Volume group which uses **/dev/sdc1**.

$ **sudo pvcreate /dev/sdc1**

Physical volume "/dev/sdc1" successfully created.

$ **sudo vgcreate cinder-volumes /dev/sdc1**

Volume group "cinder-volumes" successfully created

$ **sudo lvcreate -l 100%FREE -T cinder-volumes/cinder-volumes-pool**

Thin pool volume with chunk size 256.00 KiB can address at most 63.25 TiB of data.

Logical volume "cinder-volumes-pool" created.

Swift storage will sit on a partition **/dev/sdc2**, Let’s create a filesystem on it.

sudo mkfs.xfs /dev/sdc2

Step 4: Install OpenStack with packstack

Now that we have answers file to be used, we can bootstrap an OpenStack Cloud using packstack command line.

sudo packstack --answer-file /root/answers.txt --timeout=1500 | tee packstrack-output.txt

See below installation output.

Welcome to the Packstack setup utility

The installation log file is available at: /var/tmp/packstack/20190710-211124-ZVhc4m/openstack-setup.log

Installing:

Clean Up [ DONE ]

Discovering ip protocol version [ DONE ]

Setting up ssh keys [ DONE ]

Preparing servers [ DONE ]

Pre installing Puppet and discovering hosts' details [ DONE ]

Preparing pre-install entries [ DONE ]

Setting up CACERT [ DONE ]

Preparing AMQP entries [ DONE ]

Preparing MariaDB entries [ DONE ]

Fixing Keystone LDAP config parameters to be undef if empty[ DONE ]

Preparing Keystone entries [ DONE ]

Preparing Glance entries [ DONE ]

Checking if the Cinder server has a cinder-volumes vg[ DONE ]

Preparing Cinder entries [ DONE ]

Preparing Nova API entries [ DONE ]

Creating ssh keys for Nova migration [ DONE ]

Gathering ssh host keys for Nova migration [ DONE ]

Preparing Nova Compute entries [ DONE ]

Preparing Nova Scheduler entries [ DONE ]

Preparing Nova VNC Proxy entries [ DONE ]

Preparing OpenStack Network-related Nova entries [ DONE ]

Preparing Nova Common entries [ DONE ]

Preparing Neutron LBaaS Agent entries [ DONE ]

Preparing Neutron API entries [ DONE ]

Preparing Neutron L3 entries [ DONE ]

Preparing Neutron L2 Agent entries [ DONE ]

Preparing Neutron DHCP Agent entries [ DONE ]

Preparing Neutron Metering Agent entries [ DONE ]

Checking if NetworkManager is enabled and running [ DONE ]

Preparing OpenStack Client entries [ DONE ]

Preparing Horizon entries [ DONE ]

Preparing Swift builder entries [ DONE ]

Preparing Swift proxy entries [ DONE ]

Preparing Swift storage entries [ DONE ]

Preparing Heat entries [ DONE ]

Preparing Heat CloudFormation API entries [ DONE ]

Preparing Gnocchi entries [ DONE ]

Preparing Redis entries [ DONE ]

Preparing Ceilometer entries [ DONE ]

Preparing Aodh entries [ DONE ]

Adding Magnum manifest entries [ DONE ]

Preparing Puppet manifests [ DONE ]

Copying Puppet modules and manifests [ DONE ]

Applying 192.168.10.10\_controller.pp

192.168.10.10\_controller.pp: [ DONE ]

Applying 192.168.10.10\_network.pp

192.168.10.10\_network.pp: [ DONE ]

Applying 192.168.10.10\_compute.pp

192.168.10.10\_compute.pp: [ DONE ]

Applying Puppet manifests [ DONE ]

Finalizing [ DONE ]

\*\*\*\* Installation completed successfully \*\*\*\*\*\*

Additional information:

\* Time synchronization installation was skipped. Please note that unsynchronized time on server instances might be problem for some OpenStack components.

\* File /root/keystonerc\_admin has been created on OpenStack client host 192.168.10.10. To use the command line tools you need to source the file.

\* To access the OpenStack Dashboard browse to <http://192.168.10.10/dashboard> .

Please, find your login credentials stored in the keystonerc\_admin in your home directory.

\* Because of the kernel update the host 192.168.10.10 requires reboot.

\* The installation log file is available at: /var/tmp/packstack/20190710-211124-ZVhc4m/openstack-setup.log

\* The generated manifests are available at: /var/tmp/packstack/20190710-211124-ZVhc4m/manifests

Step 5: Configure OpenStack Networking

Create an external OVS bridge on your interface.

$ sudo vi /etc/sysconfig/network-scripts/ifcfg-eno1

DEVICE=eno1

ONBOOT=yes

TYPE=OVSPort

DEVICETYPE=ovs

OVS\_BRIDGE=br-ex

$ sudo vi /etc/sysconfig/network-scripts/ifcfg-br-ex

DEVICE=br-ex

BOOTPROTO=none

ONBOOT=yes

TYPE=OVSBridge

DEVICETYPE=ovs

USERCTL=yes

PEERDNS=yes

IPV6INIT=no

IPADDR=192.168.10.10

NETMASK=255.255.255.0

GATEWAY=192.168.10.1

DNS1=192.168.10.1

Move your static route for configured interface to br-ex.

sudo mv /etc/sysconfig/network-scripts/route-eno1 /etc/sysconfig/network-scripts/route-br-ex

Add the network physical interface to the**br-ex** bridge in Open vSwitch.

sudo ovs-vsctl add-port br-ex eno1; systemctl restart network.service

Additional bridges can be configured in a similar manner. You’ll need to configure Open vSwitch with correct mappings.

$ sudo vi /etc/neutron/plugins/ml2/openvswitch\_agent.ini

bridge\_mappings=extnet:br-ex

Restart Nova services.

sudo systemctl restart openstack-nova-compute

sudo systemctl restart openstack-nova-api

sudo systemctl restart openstack-nova-scheduler

Create OpenStack private Network.

$ source keystonerc\_admin

$ openstack network create private

+---------------------------+--------------------------------------+

| Field | Value |

+---------------------------+--------------------------------------+

| admin\_state\_up | UP |

| availability\_zone\_hints | |

| availability\_zones | |

| created\_at | 2019-06-26T13:44:43Z |

| description | |

| dns\_domain | None |

| id | e406e76f-e89d-42a2-bab1-9c883b2e49aa |

| ipv4\_address\_scope | None |

| ipv6\_address\_scope | None |

| is\_default | False |

| is\_vlan\_transparent | None |

| mtu | 1450 |

| name | private |

| port\_security\_enabled | True |

| project\_id | d16dda64b73945898eebbd5be9572612 |

| provider:network\_type | vxlan |

| provider:physical\_network | None |

| provider:segmentation\_id | 82 |

| qos\_policy\_id | None |

| revision\_number | 2 |

| router:external | Internal |

| segments | None |

| shared | False |

| status | ACTIVE |

| subnets | |

| tags | |

| updated\_at | 2019-06-26T13:44:43Z |

+---------------------------+--------------------------------------+

$ openstack subnet create --network private --allocation-pool \

start=10.1.1.50,end=10.1.1.200 --dns-nameserver 8.8.8.8 \

--subnet-range 10.1.1.0/24 private\_subnet

+-------------------+--------------------------------------+

| Field | Value |

+-------------------+--------------------------------------+

| allocation\_pools | 10.1.1.50-10.1.1.200 |

| cidr | 10.1.1.0/24 |

| created\_at | 2019-06-26T13:48:34Z |

| description | |

| dns\_nameservers | 8.8.8.8 |

| enable\_dhcp | True |

| gateway\_ip | 10.1.1.1 |

| host\_routes | |

| id | 76ff61dd-0438-4848-a611-f4b4de070164 |

| ip\_version | 4 |

| ipv6\_address\_mode | None |

| ipv6\_ra\_mode | None |

| name | private\_subnet |

| network\_id | e406e76f-e89d-42a2-bab1-9c883b2e49aa |

| project\_id | d16dda64b73945898eebbd5be9572612 |

| revision\_number | 0 |

| segment\_id | None |

| service\_types | |

| subnetpool\_id | None |

| tags | |

| updated\_at | 2019-06-26T13:48:34Z |

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Create a public network.

$ openstack network create --provider-network-type flat \

--provider-physical-network extnet --external public

+---------------------------+--------------------------------------+

| Field | Value |

+---------------------------+--------------------------------------+

| admin\_state\_up | UP |

| availability\_zone\_hints | |

| availability\_zones | |

| created\_at | 2019-06-26T16:35:43Z |

| description | |

| dns\_domain | None |

| id | 900b1ede-3e62-4d73-88d3-b28c129a6bb6 |

| ipv4\_address\_scope | None |

| ipv6\_address\_scope | None |

| is\_default | False |

| is\_vlan\_transparent | None |

| mtu | 1500 |

| name | public |

| port\_security\_enabled | True |

| project\_id | d16dda64b73945898eebbd5be9572612 |

| provider:network\_type | flat |

| provider:physical\_network | extnet |

| provider:segmentation\_id | None |

| qos\_policy\_id | None |

| revision\_number | 2 |

| router:external | External |

| segments | None |

| shared | False |

| status | ACTIVE |

| subnets | |

| tags | |

| updated\_at | 2019-06-26T16:35:43Z |

+---------------------------+--------------------------------------+

$ openstack subnet create --network public \

--allocation-pool start=<startip>,end=<lastip> \

--no-dhcp \

--subnet-range <subnet>/27 public\_subnet

Add a new router and configure router interfaces.

$ openstack router create --no-ha router1

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| Field | Value |

+-------------------------+--------------------------------------+

| admin\_state\_up | UP |

| availability\_zone\_hints | |

| availability\_zones | |

| created\_at | 2019-06-26T16:36:54Z |

| description | |

| distributed | False |

| external\_gateway\_info | None |

| flavor\_id | None |

| ha | False |

| id | 188d5388-6f58-4387-8a13-018b9c2e81f4 |

| name | router1 |

| project\_id | d16dda64b73945898eebbd5be9572612 |

| revision\_number | 0 |

| routes | |

| status | ACTIVE |

| tags | |

| updated\_at | 2019-06-26T16:36:54Z |

+-------------------------+--------------------------------------+

$ openstack router set --external-gateway public router1

$ openstack router add subnet router1 private\_subnet

$ ip netns show

qrouter-188d5388-6f58-4387-8a13-018b9c2e81f4 (id: 1)

qdhcp-e406e76f-e89d-42a2-bab1-9c883b2e49aa (id: 0)

Step 6: Configure Cinder

Configure Cinder to use configured LVM volume.

$ sudo vi /etc/cinder/cinder.conf

enabled\_backends=lvm

volume\_clear = none

[lvm]

volume\_backend\_name=lvm

volume\_driver=cinder.volume.drivers.lvm.LVMVolumeDriver

iscsi\_ip\_address=192.168.10.10

iscsi\_helper=lioadm

volume\_group=cinder-volumes

volumes\_dir=/var/lib/cinder/volumes

You need to restart Cinder services after the change.

sudo systemctl restart openstack-cinder-volume

sudo systemctl restart openstack-cinder-api

Step 7: Create flavors and Security groups

Let’s add OpenStack flavors:

openstack flavor create --id 0 --ram 1024 --vcpus 1 --swap 2048 --disk 10 m1.tiny

openstack flavor create --id 1 --ram 2048 --vcpus 1 --swap 4096 --disk 20 m1.small

openstack flavor create --id 2 --ram 4096 --vcpus 2 --swap 8192 --disk 40 m1.medium

openstack flavor create --id 3 --ram 8192 --vcpus 4 --swap 8192 --disk 80 m1.large

openstack flavor create --id 4 --ram 16384 --vcpus 8 --swap 8192 --disk 160 m1.xlarge

And basic security group

openstack security group create basic --description "Allow base ports"

openstack security group rule create --protocol TCP --dst-port 22 --remote-ip 0.0.0.0/0 basic

openstack security group rule create --protocol TCP --dst-port 80 --remote-ip 0.0.0.0/0 basic

openstack security group rule create --protocol TCP --dst-port 443 --remote-ip 0.0.0.0/0 basic

openstack security group rule create --protocol ICMP --remote-ip 0.0.0.0/0 basic

Step 8: Create Private Key and Add Glance images

Create a new key for your account or use existing.

$ ssh-keygen -q -N ""

$ openstack keypair create --public-key=~/.ssh/id\_rsa.pub adminkey

+-------------+-------------------------------------------------+

| Field | Value |

+-------------+-------------------------------------------------+

| fingerprint | 7a:44:0d:94:8a:c6:6d:fd:11:8e:20:42:e9:10:6f:9d |

| name | adminkey |

| user\_id | 4d1ab48579084cda924ca40a8ce0766b |

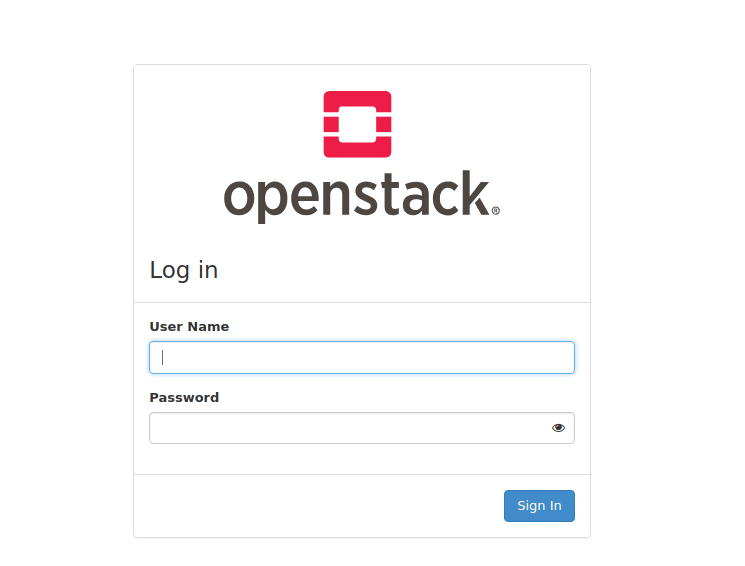
+-------------+-------------------------------------------------+

For Glance images, refer to our previous guide:

[How To add Glance Cloud images to OpenStack](https://computingforgeeks.com/adding-images-openstack-glance/)

Accessing OpenStack Dashboard

To access the OpenStack Dashboard browse to[http://openstackip/dashboard](https://computingforgeeks.com/).



Your login credentials are stored in the **keystonerc\_admin** file in your home directory.

Other OpenStack guides: