How to install Contrail v2005 + CentOS 7.7

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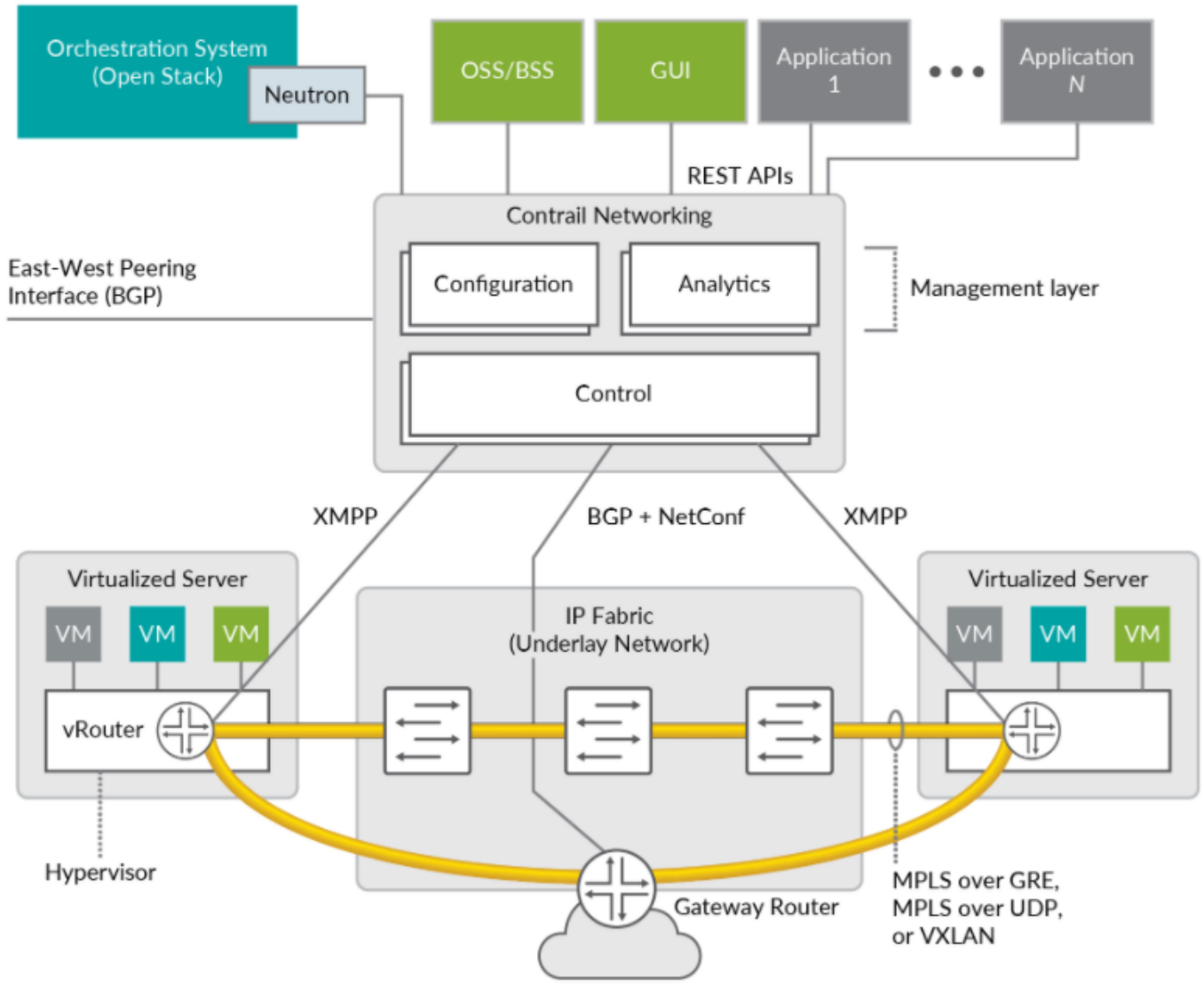
0. Contrail-Networking overview.

> contrail-networking overview
https://www.juniper.net/documentation/en_US/contrail19/topics/concept/understanding-contrail-networking-components.html

Figure 1: Contrail Networking Overview



1. 2 installation methods.

There are 2 methods

1.1 With 'instance.yml' , installing at a time.

- At this time, I am going to install Contrail with this method.
- Prerequisite: on all servers, please do CentOS 7.7 re-image and set ip and DNS, hostname properly. If you are done pre-requests, then only in "Contrail-command" server, everything will go on. (For details, please see below)

1.2. First, install "Contrail-command", then go to 'Contrail-command' web GUI, do the rest on GUI.

2. Check lists before going to install

2.1. server spec

- Please find below server spec required officially.
- My server's spec such as memory and CPU are poor. But no problem with installation and running.
- But one thing to mention, for the node "contrail-Controller", please enhance Physical memory at least to 32GB.

> How to Install Contrail Command and Provision Your Contrail Cluster - TechLibrary - Juniper Networks

> ### Server Requirements
>
> A Contrail Networking environment can include physical servers or VMs providing server functions, although we highly recommended using physical servers for scalability and availability reasons whenever possible.
>
> Each server in a Contrail environment must have a minimum of:
>
> - 64 GB memory.
> - 300 GB hard drive.
> - 4 CPU cores.
> - At least one Ethernet port.

> my lab spec & server naming used.

Device (Host NAME)	Servers	MGMT IP	Internal IP	CPU	RAM	HDD
contrail-command(contrailcommand-221)	Eslim server #1	172.27.122.221 (enp5s0f0)	100.0.0.221(enp5s0f1)	8	16GB	150GB
contrail-Controller (controller-222)	EXSI VM	172.27.122.222 (ens32)	100.0.0.222 (ens33)	8	32GB	100GB
contrail-service-node (CSN-223)	Eslim server #2	172.27.122.223 (enp5s0f0)	100.0..0.223(enp5s0f1)	8	16GB	150GB
Compute 1 (compute1-224)	Eslim server #3	172.27.122.224 (enp5s0f0)	100.0.0.224(enp5s0f1)	8	16GB	150GB
Compute 2 (compute2-225)	Eslim server #4	172.27.122.225 (enp5s0f0)	100.0.0.225(enp5s0f1)	8	16GB	150GB
MX960		172.27.122.195 (fxp0)				
QFX5110		172.27.122.197 (em0)				

2.2. Contrail and CentOS version

- please check contrail version, you are going to install and CentOS, and Linux Kernel version
- n my installation “Contrail_v2005 + CentOS7.7”, I didn’t meet/upgrade linux kernel properly, but it works. Just to be aware of that.

> Contrail Networking Supported Platforms List (juniper.net)

Contrail Networking Supported Platforms List - Releases 20xx

Contrail Networking Release		2011	2008	2005 2005.1	2003 2003.1
DPDK Release		19.11	19.11	18.05.1	18.05.1
Orchestrator Platform					
OpenStack Queens	Ansible	x	CentOS 7.8—Linux Kernel Version 3.10.0-1127.13.1 Ansible version: 2.5.2 Docker version: 18.03.1-ce	CentOS 7.8—Linux Kernel Version 3.10.0-1127 Ansible version: 2.5.2 Docker version: 18.03.1-ce CentOS 7.7—Linux Kernel Version 3.10.0-1062.12.1 Ansible version: 2.5.2 Docker version: 18.03.1-ce	CentOS 7.7—Linux Kernel Version 3.10.0-1062.12.1 Ansible version: 2.5.2 Docker version: 18.03.1-ce
	Canonical OpenStack Queens	Ubuntu 18.04.5—Linux Kernel Version 4.15.0-126-generic MaaS Version: 2.4.2	Ubuntu 18.04.4—Linux Kernel Version 4.15.0-112-generic MaaS Version: 2.4.2	Ubuntu 18.04.4—Linux Kernel Version 4.15.0-104-generic MaaS Version: 2.4	Ubuntu 18.04.4—Linux Kernel Version 4.15.0-91-generic MaaS Version: 2.4
	Juju Charms	Ubuntu 18.04.5—Linux Kernel Version 4.15.0-126-generic MaaS Version: 2.4.2	x	x	x

> How to check Linux kernel version and upgrade.

In this example, the Linux kernel is verified on the Contrail Command server.

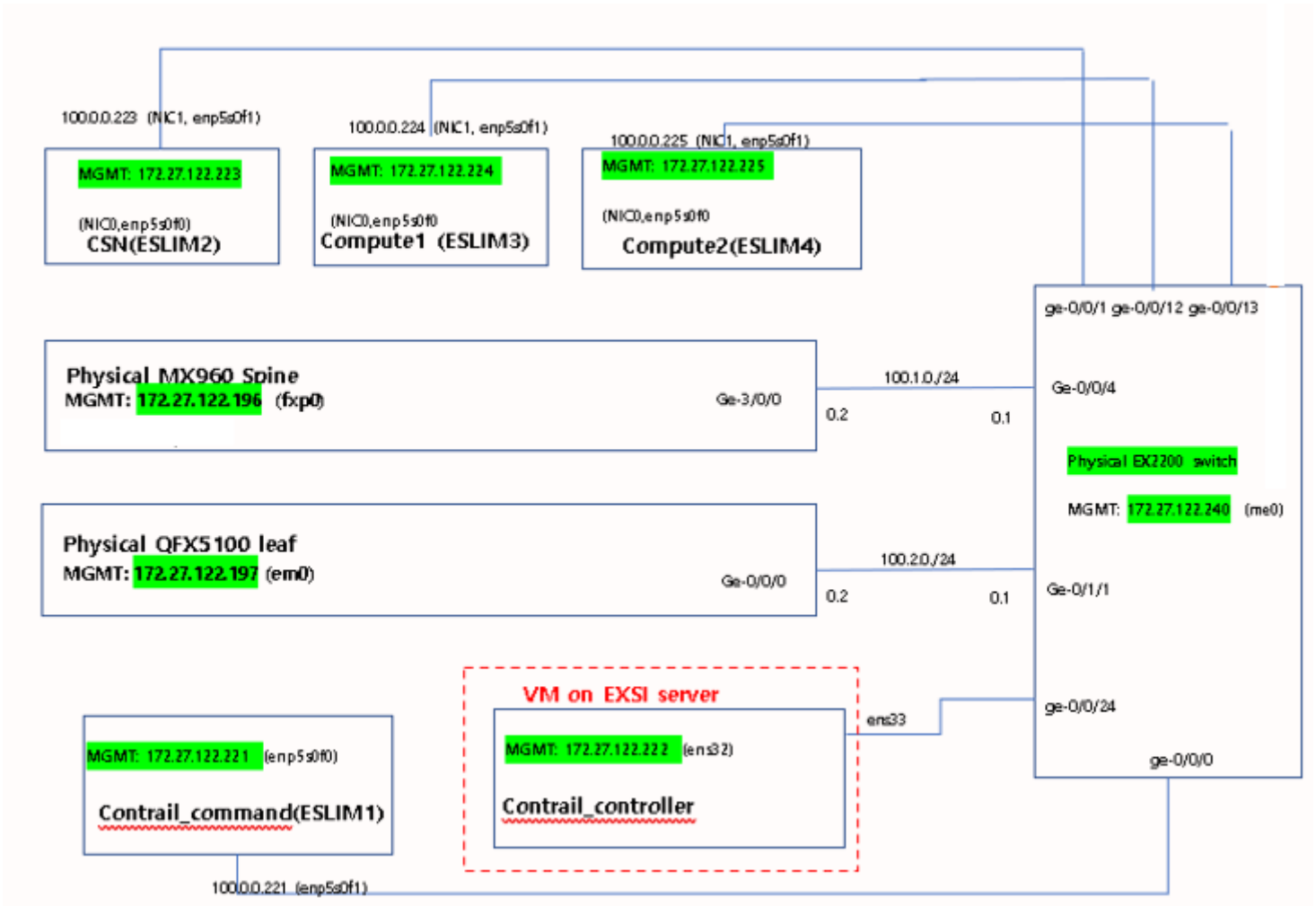
```
[root@ix-cn-ccmd-01 ~]# uname -a
Linux ix-cn-ccmd-01 3.10.0-1062.el7.x86_64 #1 SMP Wed Aug 7 18:08:02 UTC 2019 x86_64 x86_64 x86_64

[root@ix-cn-ccmd-01 ~]# ls
anaconda-ks.cfg  kernel-3.10.0-1062.12.1.el7.x86_64.rpm

[root@ix-cn-ccmd-01 ~]# rpm -ihv kernel-3.10.0-1062.12.1.el7.x86_64.rpm
warning: kernel-3.10.0-1062.12.1.el7.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID f4a80eb5: I
Preparing...                          ################################# [100%]
Updating / installing...
   1:kernel-3.10.0-1062.12.1.el7      ################################# [100%]

[root@ix-cn-ccmd-01 ~]# shutdown -r now
```

After the server reboots, confirm that the kernel is updated.

```
[root@ix-cn-ccmd-01 ~]# uname -a
Linux ix-cn-ccmd-01 3.10.0-1062.12.1.el7.x86_64 #1 SMP Tue Feb 4 23:02:59 UTC 2020 x86_64 x86_64 x8
```

2.3. My Lab topo

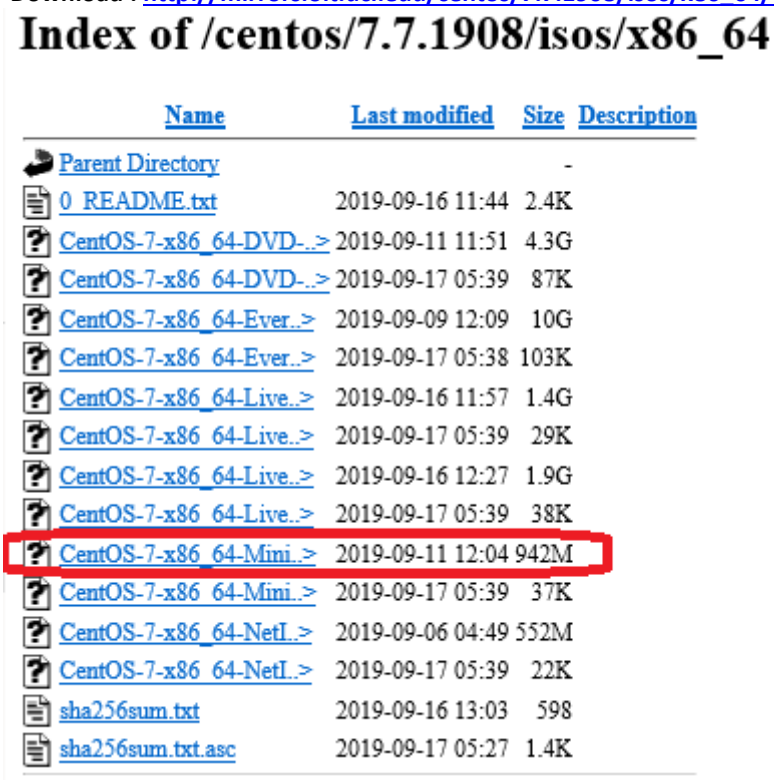
- For contrail installation, at least you need 2 ports.
  => port1 : MGMT , port 2 : internal port.
- port1 (MGMT) used to install and download overall installation files. So it must be internet/DNS reachable



3. CentOS7.7 installation.

3.1. First of all, please download & re-image it with CentOS7.7

> Download : http://mirrors.oit.uci.edu/centos/7.7.1908/isos/x86_64/



Index of /centos/7.7.1908/isos/x86_64

Name	Last modified	Size	Description
Parent Directory		-	
0_README.txt	2019-09-16 11:44	2.4K	
CentOS-7-x86_64-DVD-..>	2019-09-11 11:51	4.3G	
CentOS-7-x86_64-DVD-..>	2019-09-17 05:39	87K	
CentOS-7-x86_64-Ever..>	2019-09-09 12:09	10G	
CentOS-7-x86_64-Ever..>	2019-09-17 05:38	103K	
CentOS-7-x86_64-Live..>	2019-09-16 11:57	1.4G	
CentOS-7-x86_64-Live..>	2019-09-17 05:39	29K	
CentOS-7-x86_64-Live..>	2019-09-16 12:27	1.9G	
CentOS-7-x86_64-Live..>	2019-09-17 05:39	38K	
CentOS-7-x86_64-Mini..>	2019-09-11 12:04	942M	
CentOS-7-x86_64-Mini..>	2019-09-17 05:39	37K	
CentOS-7-x86_64-NetI..>	2019-09-06 04:49	552M	
CentOS-7-x86_64-NetI..>	2019-09-17 05:39	22K	
sha256sum.txt	2019-09-16 13:03	598	
sha256sum.txt.asc	2019-09-17 05:27	1.4K	

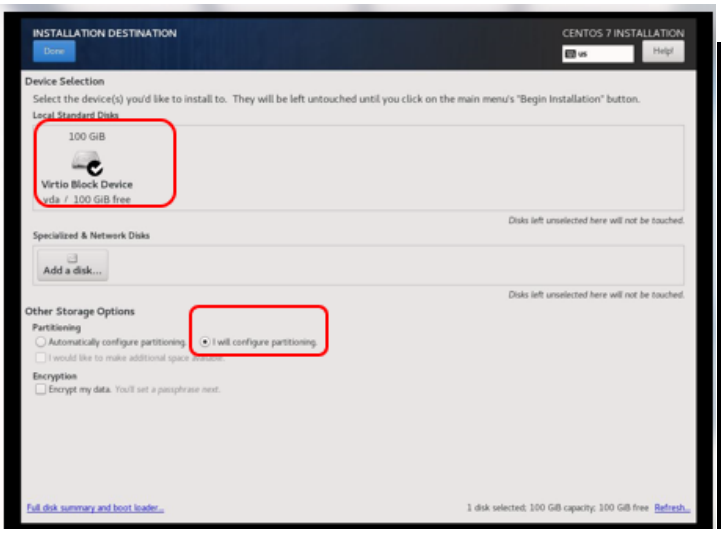
3.2. Pre-caution during CentOS7.7 installation.

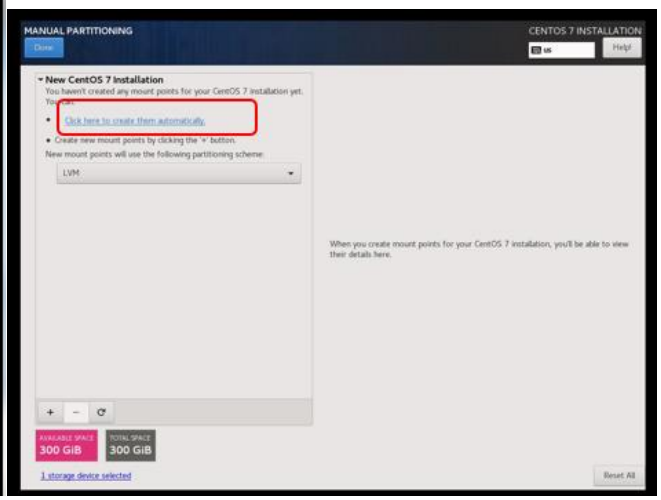
> Be aware of below.

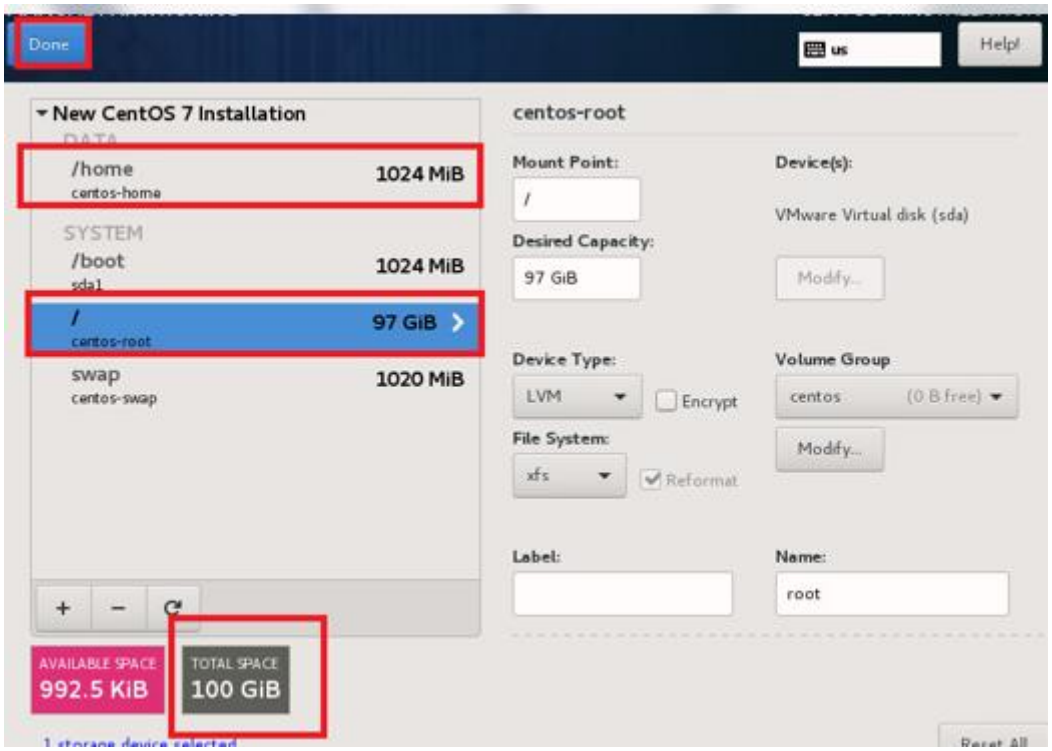
- When all servers are re-imaged with CentOs7.7, Disk size 100GB required.
- you don't need much size /home directory. I set to 1GB. For the rest, I set to all /root and /swap if your physical memory size is small.
- Earlier, I commented to "enhance contrail-controller memory to 32GB". Installing with 16BG on "Contrail-controller" server, it's ok. But after installation done, you may face Casandra DB cotainer restarting issue due to a lack of memory.

> Key points at CentOS installatoin.

****Disk**



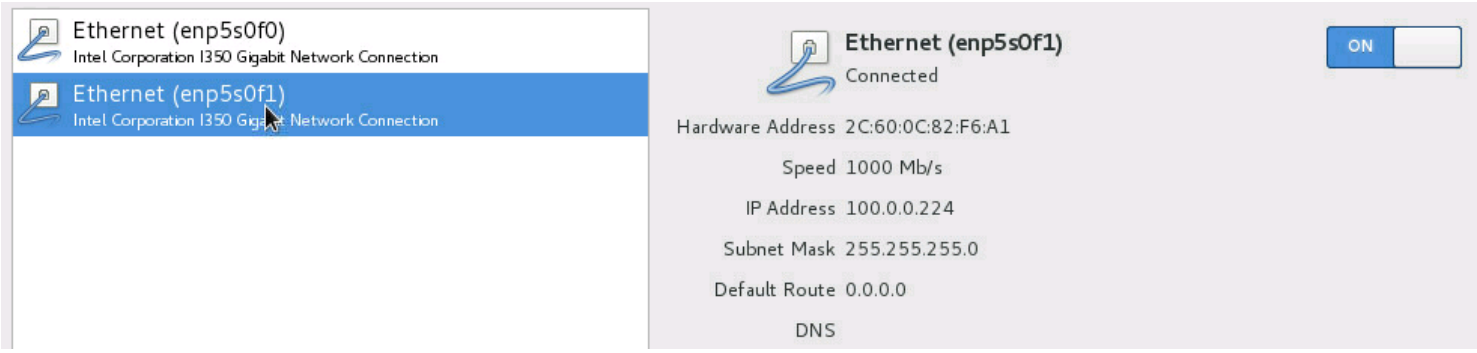




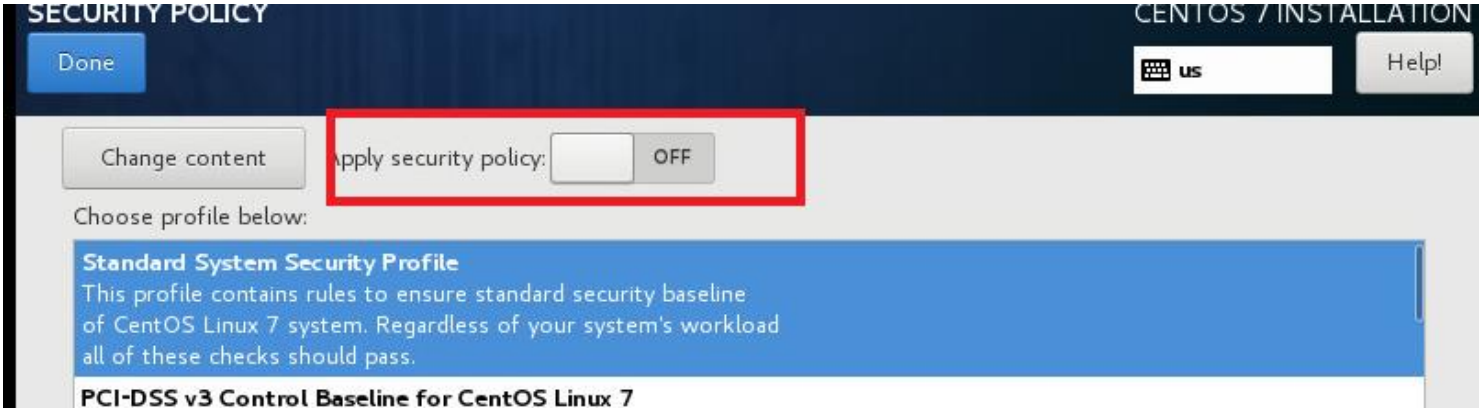
**** Network**

- For MGMT interface, please set fixed static IP, gateway, DNS properly.

- For internal interface, I set private 100.0.0/24



**** Security policy : you don't need to set it.**

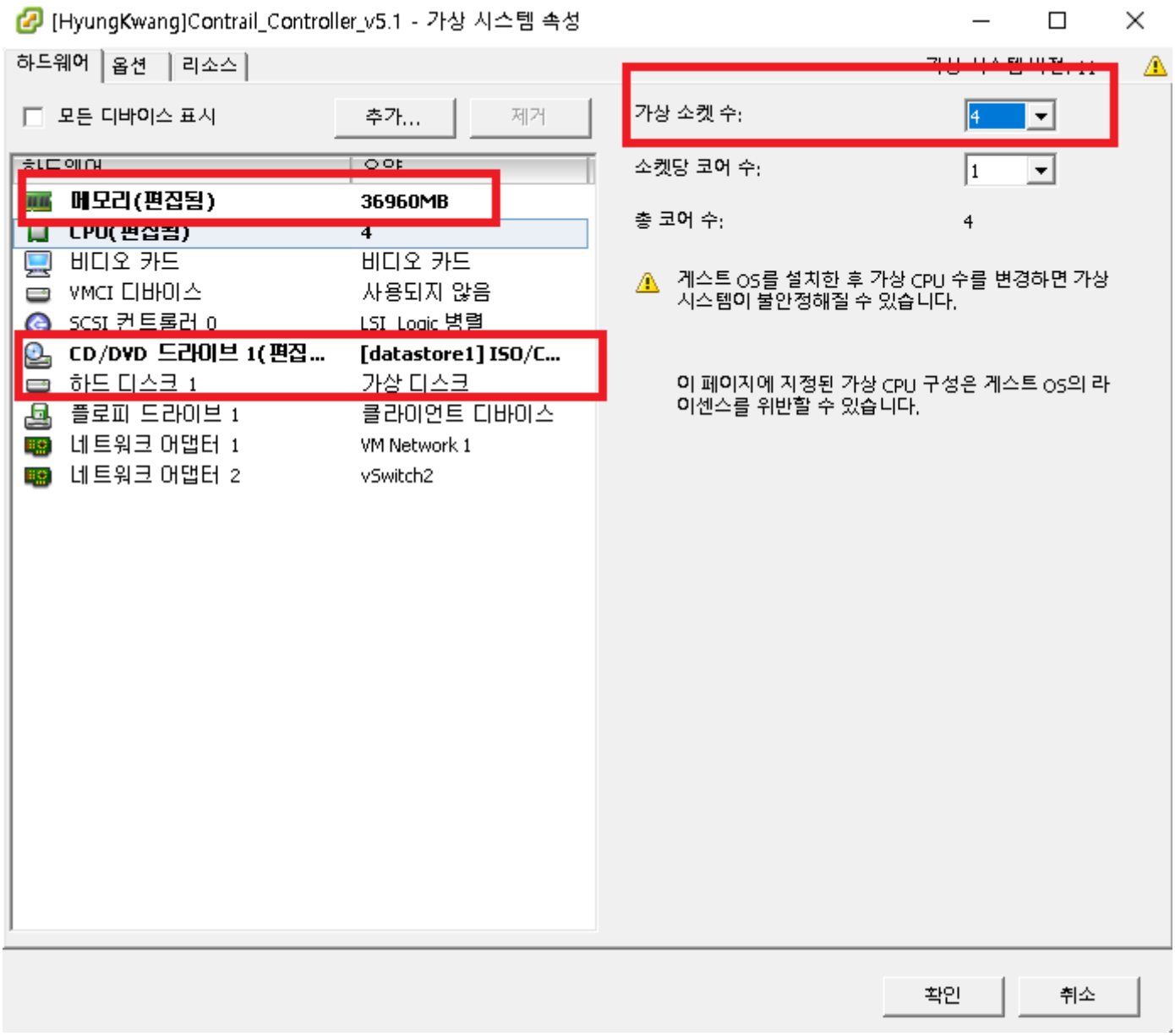


While installing Contrail, Contrail set security policy to permissive. So Security policy of CentOS, you don't need to set.

```
2021-01-18 07:08:51,219 p=54 u=root |  TASK [instance : set selinux to permissive] ************************************
2021-01-18 07:18:59,967 p=54 u=root |  TASK [instance : set firewall service name] ************************************
2021-01-18 07:19:01,965 p=54 u=root |  TASK [instance : stop and disable firewall service] ****************************
```

** **EXSI server VM “Contrail-controller”**

I’ve assigned 36GB of memory and the number of CPU socket 4.



3.3. After CentOS7.7 installation done, please check the version.

- if you installed Mimi image, SSH gets installed by default. telnet and ftp are not installed. At this stage telnet and FTP are not required.
- Check OS version and check DNS server with ping test which you set during installation.

```
[root@controller-222 ~]# cat /etc/redhat-release
CentOS Linux release 7.7.1908 (Core)

[root@CSN-223 ~]# cat /etc/resolv.conf
nameserver 168.126.63.1
```

3.4. Setting : ***Very Very important***

- common things to all server about interface setting.
- for 2nd interface, please check if it's set to "no -> yes"

```
[root@compute01 ~]# cat /etc/sysconfig/network-scripts/ifcfg-enp5s0f0
TYPE="Ethernet"
PROXY_METHOD="none"
BROWSER_ONLY="no"
BOOTPROTO="static"
IPADDR="100.123.1.211"
NETMASK="255.255.0.0"
GATEWAY="100.123.0.1"
DNS1=100.123.0.16
DEFROUTE="yes"
NAME="eth0"
DEVICE="eth0"
ONBOOT="yes"    <=========
ZONE=public

> if you change ONBOOT=NO -> YES, please restart network.
#systemctl restart network
```

** very important**
> /etc/hosts, the settings are different from "contrail_command" server and others. Just look carefully and compare how are they different.
- if you don't' set /etc/hosts files properly, your installation will fail.

```
> on Contrail_Comand server

        [root@contrailcommand-221 ~]# cat /etc/hosts    <==============
        127.0.0.1      localhost localhost.localdomain localhost4 localhost4.localdomain4
        ::1              localhost localhost.localdomain localhost6 localhost6.localdomain6

        [root@contrailcommand-221 ~]# hostname
        contrailcommand-221.juniper.net    <==============

> on Controller, CSN, Compute1, Compute2 server :

        [root@controller-222 ~]# cat /etc/hosts    <==============
        127.0.0.1      localhost localhost.localdomain localhost4 localhost4.localdomain4
        100.0.0.222 controller-222.juniper.net controller-222
        100.0.0.223 CSN-223.juniper.net CSN-223
```

```
100.0.0.224 compute1-224.juniper.net compute1-224
100.0.0.225 compute2-225.juniper.net compute2-225
172.27.122.225 compute2-225.juniper.net compute2-225
172.27.122.222    controller-222.juniper.net controller-222
172.27.122.223 CSN-223.juniper.net CSN-223
172.27.122.224 compute1-224.juniper.net compute1-224

[root@controller-222 ~]# cat /etc/hostname
localhost.localdomain    <==============
```

> After changing /etc/hosts, do restart

```
[root@localhost ~]#    shutdown -r 0
```

> After all servers boot-up, go to "Contrail_command" server , and do SSH & key copy on to all Servers.
And do ssh login test if you can log-in without password.

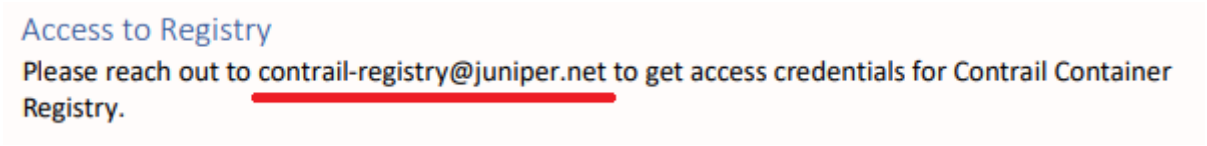
```
[root@contrailcommand-221 ~]# ssh-keygen -t rsa
[root@contrailcommand-221 ~]# ssh-copy-id -i /root/.ssh/id_rsa.pub 172.27.122.222
[root@contrailcommand-221 ~]# ssh-copy-id -i /root/.ssh/id_rsa.pub 172.27.122.223
[root@contrailcommand-221 ~]# ssh-copy-id -i /root/.ssh/id_rsa.pub 172.27.122.224
[root@contrailcommand-221 ~]# ssh-copy-id -i /root/.ssh/id_rsa.pub 172.27.122.225
[root@contrailcommand-221 ~]# ssh-copy-id -i /root/.ssh/id_rsa.pub 172.27.122.222
[root@contrailcommand-221 ~]# ssh 172.27.122.222
[root@contrail-cluster ~]# exit
```

4. Contrail Installation

4.1. Obtain user_name and password for hub.juniper.net

- Please refer to below, how to obtain user_name/password for hub.juniper.net.
  (You must request user_name and password for 'contrail version 2005.62')

https://www.juniper.net/documentation/en_US/contrail19/information-products/topic-collections/release-notes/readme-contrail-19.pdf



> please modify 'command_server.yml' and 'instances.yml' files with username and password properly.

```
[root@contrailcommand-221 ~]# cat command_servers.yml
---
command_servers:
    server1:
        ip: 172.27.122.221  # IP address of server where
        connection: ssh
        ssh_user: root
        ssh_pass: contrail123
        sudo_pass: contrail123
        ntpserver: 66.129.233.81

        registry_insecure: false
        container_registry: hub.juniper.net/contrail
        container_tag: 2005.62
        container_registry_username: JNPR-XXXXXXXXXX
        container_registry_password: XXXXXXXXXXXXXX
        config_dir: /etc/contrail

        contrail_config:
            database:
                type: postgres
                dialect: postgres
                password: contrail123
            keystone:
                assignment:
                    data:
                      users:
                        admin:
                          password: contrail123
            insecure: true
            client:
              password: contrail123
```

```
[root@contrailcommand-221 ~]# cat /root/instances.yml
global_configuration:
  CONTAINER_REGISTRY: hub.juniper.net/contrail
  REGISTRY_PRIVATE_INSECURE: false
  CONTAINER_REGISTRY_USERNAME: JNPR-XXXXXXXXXX
  CONTAINER_REGISTRY_PASSWORD: XXXXXXXXXXXXXX
```

> later during contrail installation, you must put username and password like below.

```
//Download the contrail-command-deployer Docker container image to deploy contrail-command (contrail_command, contrail_psql containers) from hub.juniper.net. Allow Docker to connect to the private secure registry.
//Access container_tag for contrail-command-deployer located at README Access to Contrail Registry .

docker login hub.juniper.net --username JNPR-XXXXX --password XXXXXXXXXX
```

4.2. Check it on all servers

1). Ping reachable among all servers and MX960 lo0 and QFX5110 lo0

- Ping must be reachable between internal 100.0.0.X/24 to lo0 of MX960 and QFX/EX2200.

Please refer to device configuration.

all_config.txt

> On Compute1/Compugte2 Server, to ensure ping reachable to MX960/QFX5100 loopback, you should add routing.

```
[root@compute1-224 ~]#Ip route add 3.3.3.0/24 via 100.0.0240
[root@compute1-224 ~]#ping 3.3.3.71
```

2). Do ping test on all servers (command, controller, CSN, compute1, compute2) to yahoo.com to see if DNS server set is working or not. Ping must be reachable.

```
[root@contrailcommand-221 ~]#ping yahoo.com
```

4.3. Move on to Contrail-Command server

- If your ping tests are successful, go to 'contrail-command' server.
Contrail installation process will go only at 'contrail-command' server, you don't need to do anything on other servers.

Please place 'command_servers.yml' and ' instance.yml' files to /root directory after modifying uername and password

> please find the file attached command_servers.yml and instance.yml sample.

command_servers and instance yml.tx

4.4 put & execute command below step by step on "contrail_command" server

```
curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py
python get-pip.py
```

python2 -m pip install --upgrade --force-reinstall pip
clear

//docker-py Python module is superseded by docker Python module. You must remove docker-py and docker Python packages from all the nodes where you want to install the Contrail Command UI.

pip uninstall docker-py docker

//Install Docker to pull contrail-command-deployer container. This package is required to automate the deployment of Contrail Command software.

yum install -y yum-utils device-mapper-persistent-data lvm2
yum-config-manager --add-repo https://download.docker.com/linux/centos/docker-ce.repo
yum install -y docker-ce-18.06.0.ce
systemctl start docker

pip install setuptools==30.1.0
pip uninstall docker
pip install docker==4.3.1 pyyaml==5.3.1

//Download the contrail-command-deployer Docker container image to deploy contrail-command (contrail_command, contrail_psql containers) from hub.juniper.net. Allow Docker to connect to the private secure registry.
//Access container_tag for contrail-command-deployer located at README Access to Contrail Registry .

docker login hub.juniper.net --username JNPR-XXXXX --password XXXXXXXXXXX

//Pull contrail-command-deployer container from the private secure registry.
//docker pull hub.juniper.net/contrail/contrail-command-deployer:<container_tag>
//Example, for container_tag: 2005.62, use the following command:

docker pull hub.juniper.net/contrail/contrail-command-deployer:2005.62
docker run -td --net host -e action=provision_cluster -v /root/command_servers.yml:/command_servers.yml -v /root/instances.yml:/instances.yml --privileged --name contrail_command_deployer hub.juniper.net/contrail/contrail-command-deployer:2005.62

4.5. Installation monitoring.

1). On 'contrail-command' server, when you docker run, you can see 'contrail_command_deployer container ID' displayed. Then copy & paste container-id, you can monitor it's installation.

.

[root@contrailcommand-221 ~]# **docker run -td --net host -e action=provision_cluster -v /root/command_servers.yml:/command_servers.yml -v /root/instances.yml:/instances.yml --privileged --name contrail_command_deployer hub.juniper.net/contrail/contrail-command-deployer:2005.62**

12816b57c202f5d25759cc9f873f57a46f95765e0de2d9199268d0eae8bb944a ← **when you run docker run above, container id returned.**
[root@contrailcommand-221 ~]#

> monitoring installation
[root@contrailcommand-221 /]# docker logs -f **12816b57c202f5d25759cc9f873f57a46f95765e0de2d9199268d0eae8bb944a**

2). Once **contrail_command_deployer installation done**, **contrail_command_deployer goes to** 'Exited'. And then the next installation process, "contrail-kolla-ansible-deployer:2005.62" will start.

```
[root@contrailcommand-221 /]# docker ps -a
CONTAINER ID        IMAGE                                                    COMMAND                  CREATED
STATUS              PORTS               NAMES
befabc168465        hub.juniper.net/contrail/contrail-kolla-ansible-deployer:2005.62   "/bin/bash"              4 minutes ago       Up 4
minutes                                 ansible-player_20210118015923
02714fd5901e        hub.juniper.net/contrail/contrail-command:2005.62                  "/bin/commandappserv     9 minutes ago       Up
8 minutes                               contrail_command
b18b4f209f9a        circleci/postgres:10.3-alpine                                      "docker-entrypoint.s     11 minutes ago
Up 10 minutes                           contrail_psql
12816b57c202        hub.juniper.net/contrail/contrail-command-deployer:2005.62         "/entrypoint.sh /bin     16 minutes ago
Exited (0) 5 minutes ago                contrail_command_deployer

> monitoring installation
[root@contrailcommand-221 /]# docker exec ansible-player_20210118015923 tail -f /var/log/ansible.log
```

5. How to remove contrail only (on all servers)

2 method

1. Just re-image CentOS7.7

or

2. Just remove containers, volume and images, and docker on all node

```
docker stop $(docker ps -qa)
docker rm $(docker ps -qa)
docker rmi $(docker images -q)
docker volume rm $(docker volume ls -q)

=> if volume is not removed

root@contrailcommand-221:/var/lib/docker[root@contrailcommand-221 docker]# cd /var/tmp
root@contrailcommand-221:/var/tmp[root@contrailcommand-221 tmp]# ls
contrail_cluster systemd-private-1bd5187c4c7f45c4a521a29f4c7661d5-ntpd.service-hTd972
root@contrailcommand-221:/var/tmp[root@contrailcommand-221 tmp]# rm -rf contrail_cluster/

docker system prune
pip uninstall docker

yum list installed | grep docker
      docker-ce.x86_64                    18.03.1.ce-1.el7.centos          @dockerrepo

yum erase    docker-ce.x86_64

cd /var/lib/docker
rm -rf *
cd /var/run
rm docker.sock docker.pid
rm -rf docker

then reboot
```

> For Compute node, to delete Docker, you need some more steps.

With above commands, you can remove docker related. But on Compute node it's not sufficient. The reason why after you done, if you enter a command with "ip a", you can see vRouter related interface still there. It's not deleted.
So for Compute node, you need some more.

```
docker stop $(docker ps -qa)
docker rm $(docker ps -qa)
docker rmi $(docker images -q)
docker volume rm $(docker volume ls -q)

=> if volume is not removed

root@contrailcommand-221:/var/lib/docker[root@contrailcommand-221 docker]# cd /var/tmp
root@contrailcommand-221:/var/tmp[root@contrailcommand-221 tmp]# ls
contrail_cluster systemd-private-1bd5187c4c7f45c4a521a29f4c7661d5-ntpd.service-hTd972
root@contrailcommand-221:/var/tmp[root@contrailcommand-221 tmp]# rm -rf contrail_cluster/

docker system prune
pip uninstall docker
```

```
yum list installed | grep docker
      docker-ce.x86_64                        18.03.1.ce-1.el7.centos          @dockerrepo

yum erase    docker-ce.x86_64


rm -rf /etc/sysconfig/network-scripts/dhclient-vhost0.conf

rm -rf /etc/sysconfig/network-scripts/ifdown-vhost

rm -rf /etc/sysconfig/network-scripts/ifup-vhost

rm -rf /etc/sysconfig/network-scripts/ifcfg-vhost0

rm -rf /lib/modules/3.10.0-1062.el7.x86_64/kernel/net/vrouter

cd /etc/sysconfig/network-scripts/

ex)
[root@comp01:q-pod08-vmm /etc/sysconfig/network-scripts]# cat ifcfg-eth2
# BEGIN ANSIBLE MANAGED BLOCK
DEVICE=eth2
#commented_by_contrailBOOTPROTO=static
ONBOOT=yes
#commented_by_contrailUSERCTL=yes
#commented_by_contrailPEERDNS=yes
#commented_by_contrailIPV6INIT=no
#commented_by_contrailIPADDR=192.168.200.21
#commented_by_contrailNETMASK=255.255.255.0
# END ANSIBLE MANAGED BLOCKNM_CONTROLLED=no
BOOTPROTO=none


sed -i 's/#commented_by_contrail//g' ifcfg-eth2        <==this is your server interface name

cd /var/lib/docker
rm -rf *
cd /var/run
rm docker.sock docker.pid
rm -rf docker

reboot the compute node
```

Figure 1: Contrail Networking Overview