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Title
Automated Security Audit For Container Based Cisco Virtualization Platforms

Session ID
DEVWKS-1428

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Learning Objectives

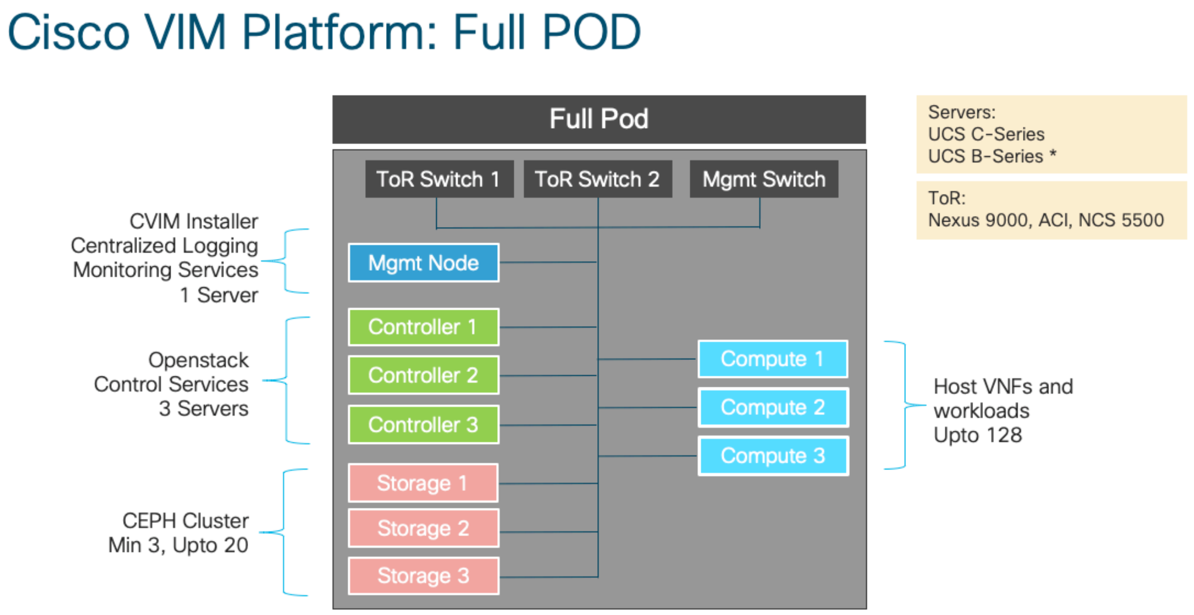
Upon completion of this lab, you will be able to:

- Understand CVIM Platform
- OpenStack (Queens) running as containers
- CIS Benchmark for Docker containers
- Validating CIS Benchmark with Docker commands

Scenario

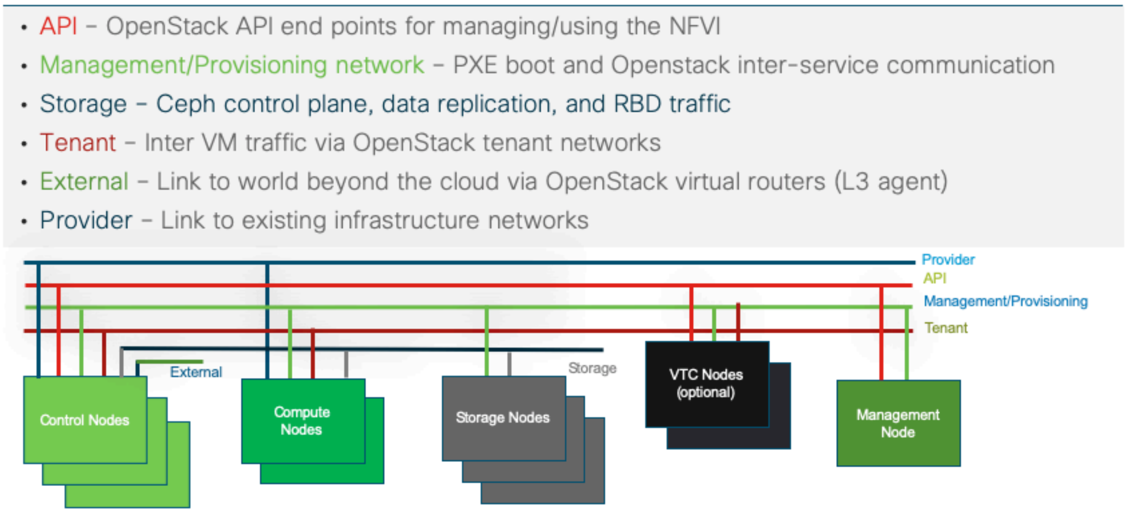
In this lab activity, you will learn how to access Cisco Virtual Infrastructure Manager(CVIM) and validate the OpenStack platform provided in CVIM.
OpenStack Platform

Network Diagram



Cisco VIM Platform: Full POD

Segregated Networks :



- API – OpenStack API end points for managing/using the NFVI
- Management/Provisioning network – PXE boot and Openstack inter-service communication
- Storage – Ceph control plane, data replication, and RBD traffic
- Tenant – Inter VM traffic via OpenStack tenant networks
- External – Link to world beyond the cloud via OpenStack virtual routers (L3 agent)
- Provider – Link to existing infrastructure networks

Task 1: Access CVIM Management Node via Jump Server

Use the information given below to access the CVIM management node using jump server.

Step 1: Jump server information for lab users

Use the IP address assigned to you (CLUSER1 to CLUSER8) in the table above.

Note: Please note the session date and time!

June 12, 2019 04:00PM PDT

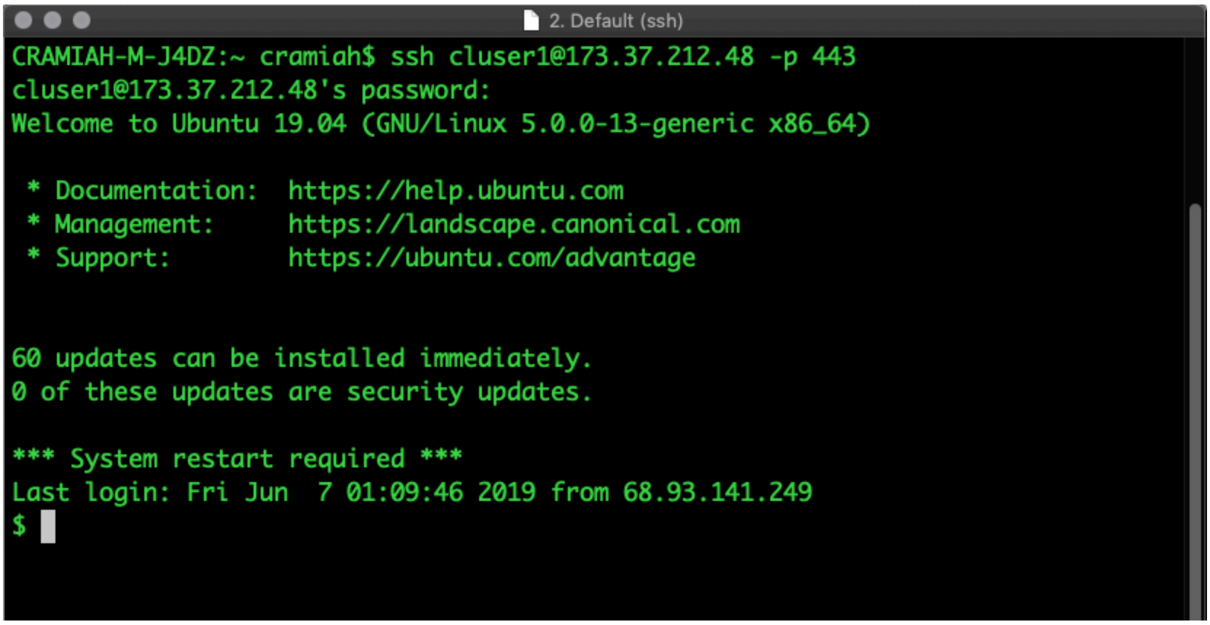
Jump Server	Username	Password	User (Session 1)
173.37.212.48	cluser1	cluser1	Yasser
173.37.212.48	cluser2	cluser2	Michael
173.37.212.48	cluser3	cluser3	Joshua
173.37.212.48	cluser4	cluser4	Anthony
173.37.212.48	cluser5	cluser5	Dana
173.37.212.48	cluser6	cluser6	Richard
173.37.212.48	cluser7	cluser7	Chris
173.37.212.48	cluser8	cluser8	Yu

June 13, 2019 01:00PM PDT

Jump Server	Username	Password	User (Session 2)
173.37.212.48	cluser1	cluser1	Virginia
173.37.212.48	cluser2	cluser2	James
173.37.212.48	cluser3	cluser3	Nick
173.37.212.48	cluser4	cluser4	Seng Wei
173.37.212.48	cluser5	cluser5	Cindy
173.37.212.48	cluser6	cluser6	Tim
173.37.212.48	cluser7	cluser7	Ed
173.37.212.48	cluser8	cluser8	Jeremy

Command to use: From your terminal(Mac) or cmd (Windows) do

"ssh cluser<Number>@173.37.212.48 -p 443"



```
CRAMIAH-M-J4DZ:~ cramiah$ ssh cluser1@173.37.212.48 -p 443
cluser1@173.37.212.48's password:
Welcome to Ubuntu 19.04 (GNU/Linux 5.0.0-13-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage


60 updates can be installed immediately.
0 of these updates are security updates.

*** System restart required ***
Last login: Fri Jun  7 01:09:46 2019 from 68.93.141.249
$ 
```

Step 2: Access Management node of CVIM

Use the IP address assigned to you (CLUSER1 to CLUSER8) in the table below.

Note: The following command should be executed from the jump server you logged in the step 1.

Command to use:

From your terminal(Mac) or cmd (Windows) do

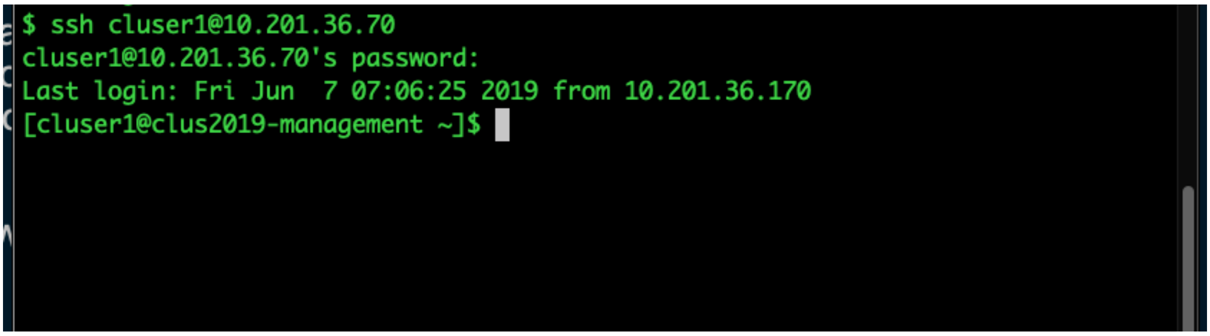
"ssh cluser<Number>@10.201.36.70"

June 12, 2019 04:00PM PDT

Mgmt Node	Username	Password	User (Session 1)
10.201.36.70	cluser1	cluser1	Yasser
10.201.36.70	cluser2	cluser2	Michael
10.201.36.70	cluser3	cluser3	Joshua
10.201.36.70	cluser4	cluser4	Anthony
10.201.36.70	cluser5	cluser5	Dana
10.201.36.70	cluser6	cluser6	Richard
10.201.36.70	cluser7	cluser7	Chris
10.201.36.70	cluser8	cluser8	Yu

June 13, 2019 01:00PM PDT

Mgmt Node	Username	Password	User (Session 2)
10.201.36.70	cluser1	cluser1	Virginia
10.201.36.70	cluser2	cluser2	James
10.201.36.70	cluser3	cluser3	Nick
10.201.36.70	cluser4	cluser4	Seng Wei
10.201.36.70	cluser5	cluser5	Cindy
10.201.36.70	cluser6	cluser6	Tim
10.201.36.70	cluser7	cluser7	Ed
173.37.212.48	cluser8	cluser8	Jeremy



```
$ ssh cluser1@10.201.36.70
cluser1@10.201.36.70's password:
Last login: Fri Jun  7 07:06:25 2019 from 10.201.36.170
[cluser1@clus2019-management ~]$ 
```

Step 3: Set the environment for OpenStack API

Objective:
Introduce Cisco VIM (virtualization platform) and see if you can get in and perform basic commands in OpenStack.

Execute the command:

```
source ~/setlab.sh
clus
cl_os
```

Sample:

```
[cluser1@clus2019-management ~]$ source ~/setlab.sh
[cluser1@clus2019-management ~]$ clus
[cluser1@clus2019-management docker-bench-security]$ cl_os
```

Commands with expected output

COMMAND: 3.1 – Get the servers running in the CVIM pod using openstack API

```
openstack server list
```

OUTPUT: 3.1

```
[cluser1@clus2019-management docker-bench-security]$ openstack server list
+--------------------------------------+------------+--------+----------
-----------------------------------+------------------+----------------+
| ID                                   | Name       | Status | Networks                             |
Image              | Flavor         |
+--------------------------------------+------------+--------+----------
-----------------------------------+------------------+----------------+
| 0b9a7ab4-3bed-4c92-811f-0a9cd53906a2 | clus-1-vm1  | ACTIVE | net-clus-
1=192.167.1.9, 10.201.36.76        | centos-image     | centos-flavor |
| c1542989-4e25-4c75-95b0-7a0a4facccad | TestClient1 | ACTIVE | pns-internal-
net=192.168.1.6                | RHEL-guest-image | vmtp          |
```

COMMAND: 3.2: Get the docker images running in the management node of CVIM

```
sudo docker ps --format "table {{.ID}}\\t{{.Names}}\\t{{.Image}}\\t\\t{{.Status}}"
```

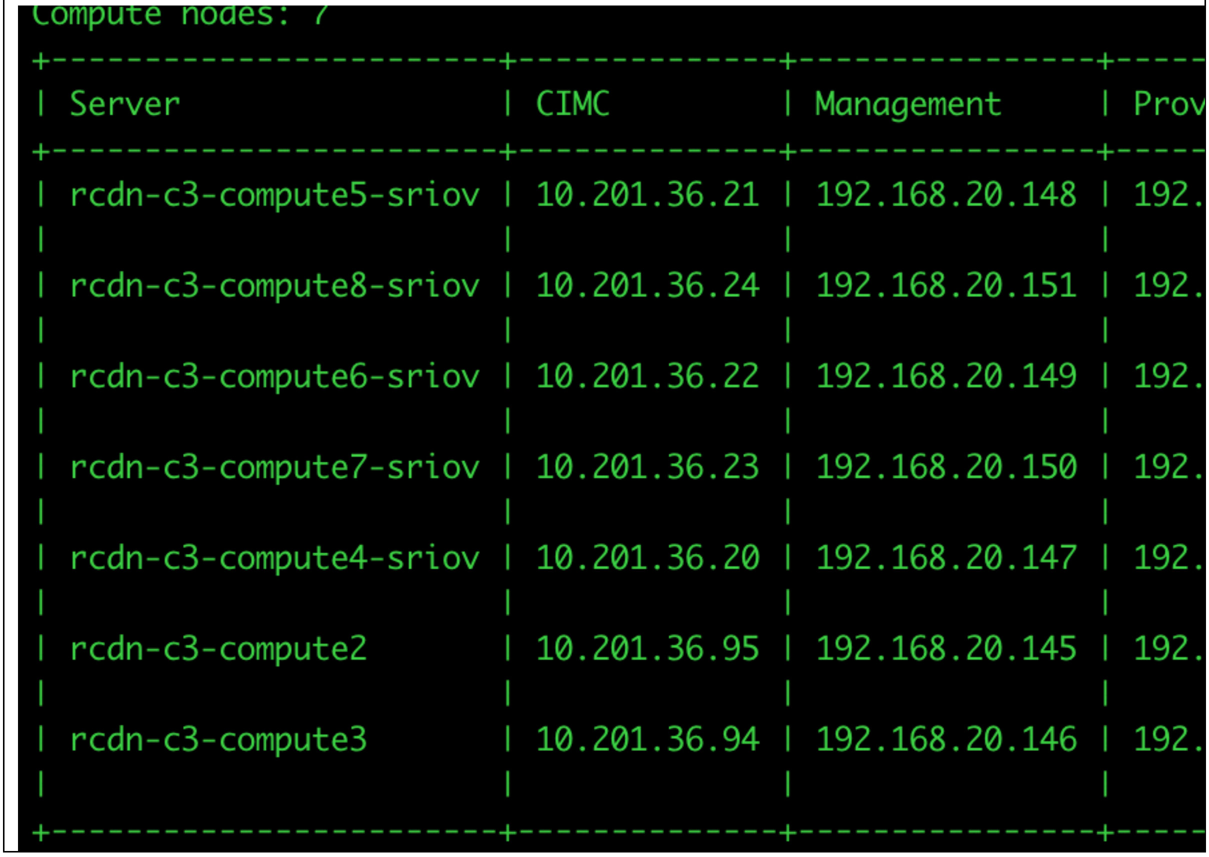
OUTPUT: 3.2

```
[cluser1@clus2019-management ~]$ sudo docker ps --format "table
{{.ID}}\\t{{.Names}}\\t{{.Image}}\\t\\t{{.Status}}"
CONTAINER ID        NAMES               IMAGE
                                        STATUS
54edf2c0a9db        vmtp_16550          192.168.20.105:5000/cvim-rhel7-
osp13/vmtp:16550                        Up 10 days
5d6dff207405        vimconfig_16550     192.168.20.105:5000/cvim-rhel7-
osp13/vim-config:16550                  Up 10 days
```

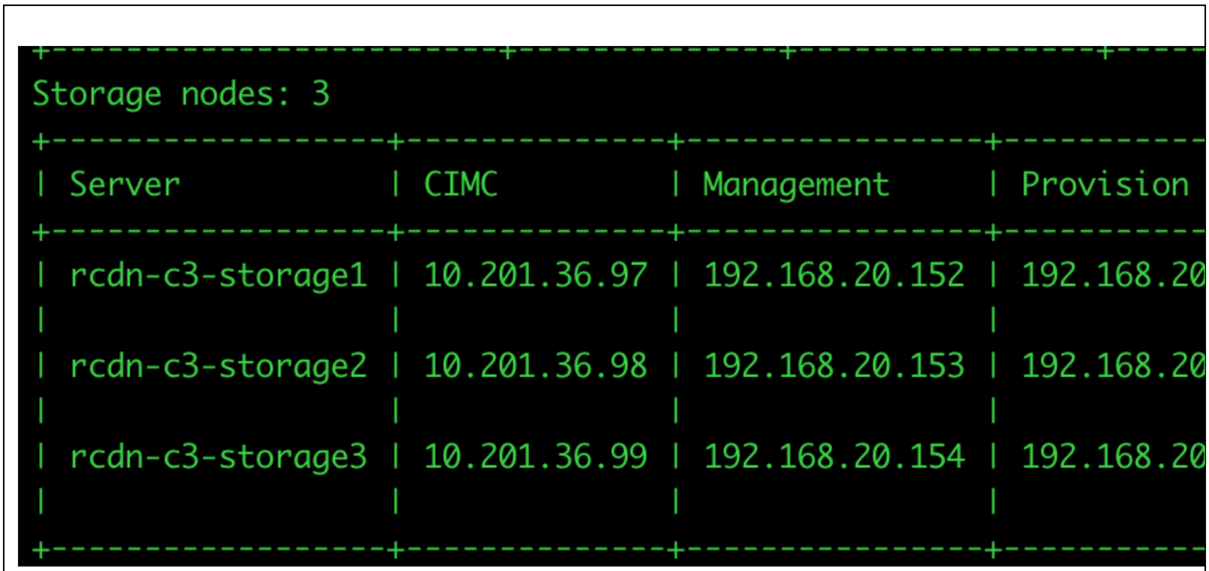
```
ee766b9cfb53       fluentd_aggr_16550    192.168.20.105:5000/cvim-rhel7-
osp13/fluentd-aggr:16550              Up 10 days
9105c99fabc1       curator_16550        192.168.20.105:5000/cvim-rhel7-
osp13/curator:16550                       Up 10 days
3a1da822ed3d       kibana_16550         192.168.20.105:5000/cvim-rhel7-
osp13/kibana:16550                        Up 10 days
bb395e4f8a72       elasticsearch_16550   192.168.20.105:5000/cvim-rhel7-
osp13/elasticsearch:16550               Up 10 days
c399a64cc99c       tftp_server_16550     192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-tftp:16550               Up 10 days
b911873bf263       my_cobbler_16550      192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-app:16550              Up 10 days
0d96613cc5c3       repo_mirror_16550     192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-web:16550              Up 10 days
13362f5a77a0       container_registry    cloud-
docker.cisco.com:8443/redstone/registry-2.6.2:16550               Up 10 days
```

COMMAND: 3.3 [Optional] – Get containers inspected in the compute/storage nodes of OpenStack
OUTPUT:3.3
cat ~/mercury_server_info
Find the storage nodes from the output and try ssh to one of the management IP address shown below

User name: root
Password:C1sc0123



```
Compute nodes: 7
+------------------------+-------------+----------------+-----
| Server                 | CIMC        | Management     | Prov
+------------------------+-------------+----------------+-----
| rcdn-c3-compute5-sriov | 10.201.36.21 | 192.168.20.148 | 192.
|                        |             |                |
| rcdn-c3-compute8-sriov | 10.201.36.24 | 192.168.20.151 | 192.
|                        |             |                |
| rcdn-c3-compute6-sriov | 10.201.36.22 | 192.168.20.149 | 192.
|                        |             |                |
| rcdn-c3-compute7-sriov | 10.201.36.23 | 192.168.20.150 | 192.
|                        |             |                |
| rcdn-c3-compute4-sriov | 10.201.36.20 | 192.168.20.147 | 192.
|                        |             |                |
| rcdn-c3-compute2       | 10.201.36.95 | 192.168.20.145 | 192.
|                        |             |                |
| rcdn-c3-compute3       | 10.201.36.94 | 192.168.20.146 | 192.
|                        |             |                |
+------------------------+-------------+----------------+-----
```



```
+-------------------------+--------------+----------------+-----
Storage nodes: 3
+------------------+-------------+---------------+----------
| Server           | CIMC        | Management    | Provision
+------------------+-------------+---------------+----------
| rcdn-c3-storage1 | 10.201.36.97 | 192.168.20.152 | 192.168.20
|                  |             |               |
| rcdn-c3-storage2 | 10.201.36.98 | 192.168.20.153 | 192.168.20
|                  |             |               |
| rcdn-c3-storage3 | 10.201.36.99 | 192.168.20.154 | 192.168.20
|                  |             |               |
+------------------+-------------+---------------+----------
```

ssh 192.168.20.148 -l root

do simple commands like "dp"

dp is an alias for "alias dp='docker ps -a --format "table {{.Names}}{{.Status}}"'

Step 4: CVIM Lab – Best Practices of Containers – Validate CVIM

Execute the commands in your CVIM Management POD.

Commands with Expected Output
COMMAND: 4.1 – Confirm the experimental features are disabled (set to False) sudo docker version --format '{{ .Server.Experimental }}' **OUTPUT: 4.1** false
COMMAND:4.2 – Get the docker service path to get permissions sudo systemctl show -p FragmentPath docker.service **OUTPUT: 4.2** FragmentPath=/usr/lib/systemd/system/docker.service

COMMAND: 4.3 – Use the docker service path and get permissions

```
sudo stat -c "%a %n" /usr/lib/systemd/system/docker.service
```

OUTPUT: 4.3

```
644 /usr/lib/systemd/system/docker.service
```

COMMAND: 4.4: Get the docker owner and group

```
stat -c %U:%G /etc/docker
```

OUTPUT: 4.4

```
root:root
```

COMMAND: 4.5: Get the docker binary mode permissions

```
stat -c "%a %n" /etc/docker/
```

OUTPUT: 4.5

```
755 /etc/docker/
```

COMMAND: 4.6 – Get the list of Docker images

```
sudo docker images
```

OUTPUT: 4.6

```
[cluser1@clus2019-management ~]$ sudo docker images
REPOSITORY                                                                    TAG
IMAGE ID          CREATED           SIZE
dockbler-keys                                                                latest
2fd49f643c91        7 months ago        788 MB
192.168.20.105:5000/cvim-rhel7-osp13/elasticsearch
16550             752dafd8e7a3        7 months ago        895 MB
192.168.20.105:5000/cvim-rhel7-osp13/vmtp                                      16550
5c64b3f8dbd2        7 months ago        1.93 GB
192.168.20.105:5000/cvim-rhel7-osp13/vim-config
16550             0c37f97a1467        7 months ago        1.44 GB
192.168.20.105:5000/cvim-rhel7-osp13/curator
16550             a2ff0481287a        7 months ago        812 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-web
16550             bf5efff2dfae        7 months ago        788 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-optional-rpms
16550             a61246a8435f        7 months ago        6.21 GB
192.168.20.105:5000/cvim-rhel7-osp13/fluentd-aggr
16550             2f9125458b59        7 months ago        918 MB
```

```
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-openstack-13-
devtools-rpms       16550            8878156f48b0       7 months ago       836 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-app
16550            bd73674074ee       7 months ago       789 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-mercury-cloudpulse-rpms
16550            3db4bb0862db       7 months ago       836 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-mercury-buildnode-rpms
16550            4ec0c31ab262       7 months ago       840 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-rpms
16550            b3c432de09a9       7 months ago       5.91 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-openstack-13-
optools-rpms       16550            e74ec179f723       7 months ago       843 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-extras-rpms
16550            e65cd0472bc3       7 months ago       1.09 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-rh-common-rpms
16550            97fceb0447b3       7 months ago       1.33 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-mercury-thirdparty-hw-binary-
utilities-rpms    16550            b3e1848f8e51       7 months ago       840 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-openstack-13-rpms
16550            eac86e66fe18       7 months ago       4.03 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-rhceph-3-osd-
rpms             16550            8381a16303cd       7 months ago       916 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-7-server-openstack-13-
tools-rpms          16550            b81e428a5ed7       7 months ago       853 MB
192.168.20.105:5000/cvim-rhel7-osp13/kibana
16550            f4b91eead188       7 months ago       1.17 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-cisco-rhel-server-7-openstack-
13-hotfix-rpms   16550            f2807b2cab58       7 months ago       841 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-ha-for-rhel-7-server-rpms
16550            40e762218861       7 months ago       1.17 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-mercury-common-rpms
16550            5cc8701ba677       7 months ago       843 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-tftp
16550            cec4be197d0d       7 months ago       788 MB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-rhel-boot
16550            1441d6414a1a       7 months ago       1.47 GB
192.168.20.105:5000/cvim-rhel7-osp13/dockbler-repofiles
16550            7d93cb352fbd       7 months ago       788 MB
cloud-docker.cisco.com:8443/redstone/registry-2.6.2
16550            a07e3f32a779       19 months ago      33.3 MB
```

COMMAND: **4.7 – Get the list of docker images filtered by configured ones**

```
sudo docker images --quiet | xargs sudo docker inspect --format '{{ .Id }}:Image={{ .Config.Image }}'
```

OUTPUT: 4.7

```
[cluser1@clus2019-management docker-bench-security]$ sudo docker images --
quiet | xargs sudo docker inspect --format '{{ .Id }}:Image={{ .Config.Image }}'

sha256:2fd49f643c9123de8305a42c53f06df3a7a3e7f6e9aa476d237521c2ea55ebe6
:
Image=sha256:cbc568dfccd7a2934701a1fb3b8106360ab2c3da88c3f51decc251033
2dad2cf
sha256:752dafd8e7a31ae0b7ce24d693fd0048e993d2b8d721d959019d2cf5614fb57
6 :
Image=sha256:b56b7bace290f3a6d4997be6aed004cb210b77a89fb93068a67ec8c5a
797a6dc
sha256:5c64b3f8dbd287d0fe58dcd8c59d4f0ab68719d9ac10e5228b0311b251e57c7
f :
Image=sha256:040e52257161f170fbc012b6fec032d13633305e31594d15e418307fe
1614feb
sha256:0c37f97a14679eba807c6c7c0a0a6a816fac8de8188b359a419af922b5ae5d8
2 :
Image=sha256:d09c31c592969b39098d78994e9c1adfdd66ad311107e268c4a61c4e
23a13b91
sha256:a2ff0481287a9a10406c31d01ae2a4a2df7d997a815b7211767ed28aadfbe92
b :
Image=sha256:393214748a588f4566125038624f4545202f4d1d49514d82a2d631f85
90e9fbb
sha256:bf5efff2dfaeacd5adfc18ab4980c9255065dbf52cd2dc578d689c5793ec38e9 :
Image=sha256:13a1ffb6bebe940bc809003a0d500131f9ae00890719b8d4f446d7ed6
150f76a
sha256:a61246a8435fe9540d4274ed801fcf5bb442ccefddc7df19bca80aea6c46f454
:
Image=sha256:4bc4b92592389a18a1640d45af249ae83094686ae85e3d72b6570dba
8ea6494d
sha256:2f9125458b5963bd90065bc90906358765387453cda25682f683393f04e875
ad :
Image=sha256:0c64c88cd74aa63c34596cb3f862b97db3898f2dc2a3f18bac04e11d0
ba655a4
sha256:8878156f48b08bc027cebcaec7ebbf1d22f44af72dbb8dd40503d737ec54066
b :
Image=sha256:4ee38232698f0b0af2b09070ba46f706ee1b45eaadb5236739db740f4
5e3fe6e
sha256:bd73674074eeb710e8a1c2d4cf7a0babf1a7f71430d888e78545a1ebeeee70a
f :
Image=sha256:745f26bf7c3874e31ccddbedea7b893688f08ed6c93194c30d2c4b95f
d17b4f4
sha256:3db4bb0862db85a02d2ffa4d2ffbc836feed2774a86f8a31b466c1413d7dce52
:
Image=sha256:a22462e6ecd0f59bc2503c0c8a875c1c103c4eb8458c24540e655eee
050449c1
sha256:4ec0c31ab262c49b31bc388d8fd7829f4c885194536d06a698f81364d15327e
3 :
```

```
Image=sha256:774fcb0167927b628c9b47da8dfc646f061c9ca1b1adc9d5b389c44de
cce1b46
sha256:b3c432de09a984dcb6b2e173b680850fa8eaa802d40be6992b842c6633de25
70 :
Image=sha256:50d795e917a9d1560f1c6f12fa74a4d09a952427bed7f8dd7b33c317c
7846ae2
sha256:e74ec179f723c3ac2b93825b7db3a1cc8c82f5b572d40edd9c0ed28503b87f1
f :
Image=sha256:e01c68bcadaaf96d7acc40c689988d7fe7ea7fcd58015fa8ced2517780
34de28
sha256:e65cd0472bc3a5264c7b83d08e9e8adfe4f6e8f3564ed0af6f5bb57a79681dee
:
Image=sha256:75630a04be6011161d690cb74cb6a514a1fb350e60d18217b5ab2a0c
578e104a
sha256:97fceb0447b3394974f950789efa36666baf37fc1c219472c31038cc645f3aa2
:
Image=sha256:d59178bad6eb564b25eb43421cc397b529816f7f2b8482298b3e50ea
9bd59612
sha256:b3e1848f8e51fc32cd716e5947d54d57fd9c0b562eadbee04d26a75a7b1a494
3 :
Image=sha256:9ff7835ac8bf91f2d743c16a9a5560df43e43c04af17381cf0fd0ea3f074
e389
sha256:eac86e66fe18b6cc972183718ef5742da65f64b3a547847c6b29d99046da328
d :
Image=sha256:ff76078b52aee8512d0ff7fe68d32c3c82989c3125451c2b22c3cdfdefb
26b3b
sha256:8381a16303cd2fe953ae71a8369c2830aa8193baf9098f01ee576d9d7264dc4
0 :
Image=sha256:9b7b6c36abd0776f2599a2ac262479c2d2cbb8972f4db2210ce9b886
40376e6d
sha256:b81e428a5ed7b958e8ef9278d8b242a5fc82f0c580933cf5e197191150134ae
5 :
Image=sha256:5e13983be3b07b5634b68121c25bbf37e55ed5a1a28496583ff155b0b
0068528
sha256:f4b91eead1884f50c3cd559caafaa9b7bc59e512de4b36e840cf8d5ec8fb25c6
:
Image=sha256:d7808c6af3deba12249df66e2d06af64e29f7e72615b96ad12248099a
ec15fbe
sha256:f2807b2cab5803b10fc942ac13830d7cf1091196c0cdf4e65bbc6b24e4fa60aa
:
Image=sha256:26a1bac086356a3bfd97f2456280fbc8e2deaf2cfd9a36503a511e9944
fc2dc8
sha256:40e7622188615bbb7505e121c8230d3517cfab1b08ad5fcbc07d28f7636f053
2 :
Image=sha256:8a8755ec1916228fccaa7e863a03be9d3709796b4a9f505dfa3d7212f0
6b878c
sha256:5cc8701ba6778b4b592064c3e2c4376150e5a68bb746535f7dfc281ad5d75e
db :
```

```
Image=sha256:db7fa000c7a9629e0d60752200f8230a7de0c21d2cd95f8be1fbd8392
0a9f03f
sha256:cec4be197d0dc85d09c8d44d11c6fd565d080b47eeb327e0a052bade637c8d
8f :
Image=sha256:401a47181f211142dff14bb22bb43321ed98b5ab0b2dbc189ba649a66
51adbf2
sha256:1441d6414a1ab6c83b9607f66434d2ee098d2af9986cdc0085efcba79db6e37
0 :
Image=sha256:15157746395237b289d7e9590f325fbecf94f78215f362d5b678fe3b57
cf1b6f
sha256:7d93cb352fbd911d3bc4b2c1ca20b503f1053733f65faa5f828c73ad750bbe72
:
Image=sha256:5a275c90303af899908488d825124e3e272702c8573d400eee8f2318
c002a424
sha256:a07e3f32a779aa924fd47f6797d4d5c93061c50c0eb97d464f08365a3a30200
b :
Image=sha256:a827c74403d090fedc4c3e00f2e3759fe3761fb3fa05b439ec533d5aeb
d3cc39
```

COMMAND: 4.8 – Get the images count based on the configured images

```
sudo docker images --quiet | xargs sudo docker inspect --format '{{ .Id }}:Image={{ .Config.Image }}' | wc -l
```

OUTPUT: 4.8

```
28
```

COMMAND: 4.8 – Get the image count

```
sudo docker images | wc -l
```

OUTPUT: 4.8

```
29
```

COMMAND: 4.9 - Get the images count except dockbler image used internally by CVIM

```
sudo docker images | grep -v dockbler-keys | wc -l
```

OUTPUT: 4.9

```
28
```

COMMAND: 4.10 – Get the Docker containers count

```
sudo docker info --format '{{ .Containers }}'
```

OUTPUT:4.10

```
28
```

COMMAND: 4.11- Get the count of docker images in stopped state

```
sudo docker info | grep "Stopped"
```

OUTPUT: 4.11

```
WARNING: You're not using the default seccomp profile
Stopped: 18
```

COMMAND: 4.12 = Get the count of docker images in running state

```
sudo docker info | grep "Running"
```

OUTPUT: 4.12

```
WARNING: You're not using the default seccomp profile
 Running: 10
```

COMMAND: 4.13 – Get the Docker information showing all the attributes

```
sudo docker info | more
```

OUTPUT: 4.13

```
WARNING: You're not using the default seccomp profile
Containers: 28
 Running: 10
 Paused: 0
 Stopped: 18
Images: 30
Server Version: 1.13.1
```

```
Storage Driver: overlay2
 Backing Filesystem: xfs
 Supports d_type: true
 Native Overlay Diff: true
Logging Driver: journald
Cgroup Driver: cgroupfs
Plugins:
 Volume: local
 Network: bridge host macvlan null overlay
 Authorization: rhel-push-plugin
Swarm: inactive
Runtimes: docker-runc runc
Default Runtime: docker-runc
Init Binary: /usr/libexec/docker/docker-init-current
containerd version:  (expected: aa8187dbd3b7ad67d8e5e3a15115d3eef43a7ed1)
runc version: 5eda6f6fd0c2884c2c8e78a6e7119e8d0ecedb77 (expected:
9df8b306d01f59d3a8029be411de015b7304dd8f)
init version: fec3683b971d9c3ef73f284f176672c44b448662 (expected:
949e6facb77383876aeff8a6944dde66b3089574)
Security Options:
 seccomp
  Profile: /etc/docker/seccomp.json
 selinux
Kernel Version: 3.10.0-862.11.6.el7.x86_64
Operating System: OpenStack
OSType: linux
Architecture: x86_64
Number of Docker Hooks: 2
CPUs: 48
Total Memory: 251.7 GiB
Name: clus2019-management
ID: MVMZ:3TCQ:X5PR:MQ3D:AQHN:NLL7:7NSB:PFQE:7ZMU:AY2M:4NZH:PIR7
Docker Root Dir: /var/lib/docker
Debug Mode (client): false
Debug Mode (server): false
Registry: https://cloud-docker.cisco.com:8443/v1/
Experimental: false
Insecure Registries:
 192.168.20.105:5000
 127.0.0.0/8
Live Restore Enabled: false
Registries: cloud-docker.cisco.com:8443 (secure), registry.access.redhat.com
(secure)
```

COMMAND: 4.14 – Get the Docker version including API version

```
sudo docker version
```

OUTPUT: 4.14

```
Client:
 Version:         1.13.1
 API version:     1.26
 Package version: docker-1.13.1-68.gitdded712.el7.x86_64
 Go version:      go1.9.2
 Git commit:      dded712/1.13.1
 Built:           Tue Jun 12 18:30:09 2018
 OS/Arch:         linux/amd64

Server:
 Version:         1.13.1
 API version:     1.26 (minimum version 1.12)
 Package version: docker-1.13.1-68.gitdded712.el7.x86_64
 Go version:      go1.9.2
 Git commit:      dded712/1.13.1
 Built:           Tue Jun 12 18:30:09 2018
 OS/Arch:         linux/amd64
 Experimental:    false
```

Step 5: Docker CIS Benchmark Lab

For this lab, please use the OpenStack management Node & VM provided.

Commands with expected output

COMMAND: 5.1 Change the directory to execute the benchmark (CIS)

```
clus
```

OR

COMMAND: 5.2 - Change the directory to execute the benchmark (CIS)

```
cd /home/cluser1/clus19-audit/cis_benchmark/docker-bench-security
```

OUTPUT: 5.1 and 5.2

```
[cluser1@clus2019-management docker-bench-security]$

OR

[cluser1@clus2019-management docker-bench-security]$
```

COMMAND: 5.3 Execute the benchmark (CIS) in the Management Node of CVIM

```
sudo sh docker-bench-security.sh
```

OUTPUT: 5.3

```
[cluser1@clus2019-management docker-bench-security]$ sudo sh docker-bench-
security.sh
# -----------------------------------------------------------------------
------
# Docker Bench for Security v1.3.4
#
# Docker, Inc. (c) 2015-
#
# Checks for dozens of common best-practices around deploying Docker containers
in production.
# Inspired by the CIS Docker Community Edition Benchmark v1.1.0.
# -----------------------------------------------------------------------
------

Initializing Sat Jun  8 02:00:09 UTC 2019

****************** Section 1 ***************************
[INFO] 1 - Host Configuration
[WARN] 1.1  - Ensure a separate partition for containers has been created
[NOTE] 1.2  - Ensure the container host has been Hardened
[INFO] 1.3  - Ensure Docker is up to date
[INFO]      * Using 1.13.1, verify is it up to date as deemed necessary
[INFO]      * Your operating system vendor may provide support and security
maintenance for Docker
[INFO] 1.4  - Ensure only trusted users are allowed to control Docker daemon
[WARN] 1.5  - Ensure auditing is configured for the Docker daemon
[WARN] 1.6  - Ensure auditing is configured for Docker files and directories -
/var/lib/docker
[WARN] 1.7  - Ensure auditing is configured for Docker files and directories -
/etc/docker
[WARN] 1.8  - Ensure auditing is configured for Docker files and directories -
docker.service
```

```
[INFO] 1.9  - Ensure auditing is configured for Docker files and directories -
docker.socket
[INFO]      * File not found
[INFO] 1.10  - Ensure auditing is configured for Docker files and directories -
/etc/default/docker
[INFO]      * File not found
[WARN] 1.11  - Ensure auditing is configured for Docker files and directories -
/etc/docker/daemon.json
[WARN] 1.12  - Ensure auditing is configured for Docker files and directories -
/usr/bin/docker-containerd
[INFO] 1.13  - Ensure auditing is configured for Docker files and directories -
/usr/bin/docker-runc
[INFO]      * File not found


****************** Section 2 ***************************
[INFO] 2 - Docker daemon configuration
[WARN] 2.1  - Ensure network traffic is restricted between containers on the default
bridge

[PASS] 2.2  - Ensure the logging level is set to 'info'
[PASS] 2.3  - Ensure Docker is allowed to make changes to iptables

[WARN] 2.4  - Ensure insecure registries are not used

[PASS] 2.5  - Ensure aufs storage driver is not used

[INFO] 2.6  - Ensure TLS authentication for Docker daemon is configured
[INFO]      * Docker daemon not listening on TCP
[INFO] 2.7  - Ensure the default ulimit is configured appropriately
[INFO]      * Default ulimit doesn't appear to be set
[WARN] 2.8  - Enable user namespace support

[PASS] 2.9  - Ensure the default cgroup usage has been confirmed
[PASS] 2.10  - Ensure base device size is not changed until needed
[PASS] 2.11  - Ensure that authorization for Docker client commands is enabled
[PASS] 2.12  - Ensure centralized and remote logging is configured

[WARN] 2.13  - Ensure operations on legacy registry (v1) are Disabled
[WARN] 2.14  - Ensure live restore is Enabled
[WARN] 2.15  - Ensure Userland Proxy is Disabled
[INFO] 2.16  - Ensure daemon-wide custom seccomp profile is applied, if needed

[PASS] 2.17  - Ensure experimental features are avoided in production

[WARN] 2.18  - Ensure containers are restricted from acquiring new privileges
```

```
****************** Section 3 ***************************

[INFO] 3 - Docker daemon configuration files
[PASS] 3.1  - Ensure that docker.service file ownership is set to root:root
[PASS] 3.2  - Ensure that docker.service file permissions are set to 644 or more
restrictive
[INFO] 3.3  - Ensure that docker.socket file ownership is set to root:root
[INFO]      * File not found
[INFO] 3.4  - Ensure that docker.socket file permissions are set to 644 or more
restrictive
[INFO]      * File not found
[PASS] 3.5  - Ensure that /etc/docker directory ownership is set to root:root
[PASS] 3.6  - Ensure that /etc/docker directory permissions are set to 755 or more
restrictive
[PASS] 3.7  - Ensure that registry certificate file ownership is set to root:root
[PASS] 3.8  - Ensure that registry certificate file permissions are set to 444 or
more restrictive
[INFO] 3.9  - Ensure that TLS CA certificate file ownership is set to root:root
[INFO]      * No TLS CA certificate found
[INFO] 3.10  - Ensure that TLS CA certificate file permissions are set to 444 or more
restrictive
[INFO]      * No TLS CA certificate found
[INFO] 3.11  - Ensure that Docker server certificate file ownership is set to root:root
[INFO]      * No TLS Server certificate found
[INFO] 3.12  - Ensure that Docker server certificate file permissions are set to 444 or
more restrictive
[INFO]      * No TLS Server certificate found
[INFO] 3.13  - Ensure that Docker server certificate key file ownership is set to
root:root
[INFO]      * No TLS Key found
[INFO] 3.14  - Ensure that Docker server certificate key file permissions are set to
400
[INFO]      * No TLS Key found
[WARN] 3.15  - Ensure that Docker socket file ownership is set to root:docker
[WARN]      * Wrong ownership for /var/run/docker.sock
[PASS] 3.16  - Ensure that Docker socket file permissions are set to 660 or more
restrictive
[PASS] 3.17  - Ensure that daemon.json file ownership is set to root:root
[PASS] 3.18  - Ensure that daemon.json file permissions are set to 644 or more
restrictive
[INFO] 3.19  - Ensure that /etc/default/docker file ownership is set to root:root
[INFO]      * File not found
[INFO] 3.20  - Ensure that /etc/default/docker file permissions are set to 644 or more
restrictive
[INFO]      * File not found

****************** Section 4 ***************************
```

```
[INFO] 4 - Container Images and Build File
[WARN] 4.1  - Ensure a user for the container has been created
[WARN]      * Running as root: container_registry
[NOTE] 4.2  - Ensure that containers use trusted base images
[NOTE] 4.3  - Ensure unnecessary packages are not installed in the container
[NOTE] 4.4  - Ensure images are scanned and rebuilt to include security patches
[WARN] 4.5  - Ensure Content trust for Docker is Enabled
[WARN] 4.6  - Ensure HEALTHCHECK instructions have been added to the container
image
[WARN]      * No Healthcheck found: [dockbler-keys:latest]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/elasticsearch:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/vmtp:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-osp13/vim-
config:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/curator:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-web:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-optional-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/fluentd-aggr:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-devtools-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-app:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-cloudpulse-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-buildnode-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-optools-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-extras-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-rh-common-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-thirdparty-hw-binary-utilities-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-rhceph-3-osd-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-tools-rpms:16550]
```

```
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/kibana:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-cisco-rhel-server-7-openstack-13-hotfix-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-ha-for-rhel-7-server-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-common-rpms:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-tftp:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-boot:16550]
[WARN]      * No Healthcheck found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-repofiles:16550]
[WARN]      * No Healthcheck found: [cloud-
docker.cisco.com:8443/redstone/registry-2.6.2:16550]
[INFO] 4.7  - Ensure update instructions are not use alone in the Dockerfile
[INFO]      * Update instruction found: [dockbler-keys:latest]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/elasticsearch:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/vmtp:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-osp13/vim-
config:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/curator:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-web:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-optional-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/fluentd-aggr:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-devtools-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-app:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-cloudpulse-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-buildnode-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-optools-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-extras-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-rh-common-rpms:16550]
```

```
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-thirdparty-hw-binary-utilities-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-rhceph-3-osd-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-7-server-openstack-13-tools-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/kibana:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-cisco-rhel-server-7-openstack-13-hotfix-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-ha-for-rhel-7-server-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-mercury-common-rpms:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-tftp:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-rhel-boot:16550]
[INFO]      * Update instruction found: [192.168.20.105:5000/cvim-rhel7-
osp13/dockbler-repofiles:16550]
[NOTE] 4.8  - Ensure setuid and setgid permissions are removed in the images
unknown flag: --format
See 'docker history --help'.
 [PASS] 4.9  - Ensure COPY is used instead of ADD in Dockerfile
[NOTE] 4.10  - Ensure secrets are not stored in Dockerfiles
[NOTE] 4.11  - Ensure verified packages are only Installed

****************** Section 5 ***************************


[INFO] 5 - Container Runtime
[WARN] 5.1  - Ensure AppArmor Profile is Enabled
[WARN]      * No AppArmorProfile Found: vmtp_16550
[WARN]      * No AppArmorProfile Found: vimconfig_16550
[WARN]      * No AppArmorProfile Found: fluentd_aggr_16550
[WARN]      * No AppArmorProfile Found: curator_16550
[WARN]      * No AppArmorProfile Found: kibana_16550
[WARN]      * No AppArmorProfile Found: elasticsearch_16550
[WARN]      * No AppArmorProfile Found: tftp_server_16550
[WARN]      * No AppArmorProfile Found: my_cobbler_16550
[WARN]      * No AppArmorProfile Found: repo_mirror_16550
[WARN]      * No AppArmorProfile Found: container_registry
[WARN] 5.2  - Ensure SELinux security options are set, if applicable
[WARN]      * No SecurityOptions Found: vimconfig_16550
[WARN]      * No SecurityOptions Found: curator_16550
[WARN]      * No SecurityOptions Found: kibana_16550
[WARN]      * No SecurityOptions Found: tftp_server_16550
```

```
[WARN]      * No SecurityOptions Found: my_cobbler_16550
[PASS] 5.3  - Ensure Linux Kernel Capabilities are restricted within containers
[WARN] 5.4  - Ensure privileged containers are not used
[WARN]      * Container running in Privileged mode: vmtp_16550
[WARN]      * Container running in Privileged mode: fluentd_aggr_16550
[WARN]      * Container running in Privileged mode: elasticsearch_16550
[WARN]      * Container running in Privileged mode: repo_mirror_16550
[WARN]      * Container running in Privileged mode: container_registry
[PASS] 5.5  - Ensure sensitive host system directories are not mounted on
containers
[PASS] 5.6  - Ensure ssh is not run within containers
[PASS] 5.7  - Ensure privileged ports are not mapped within containers
[NOTE] 5.8  - Ensure only needed ports are open on the container
[WARN] 5.9  - Ensure the host's network namespace is not shared
[WARN]      * Container running with networking mode 'host': vmtp_16550
[WARN]      * Container running with networking mode 'host': vimconfig_16550
[WARN]      * Container running with networking mode 'host': fluentd_aggr_16550
[WARN]      * Container running with networking mode 'host': curator_16550
[WARN]      * Container running with networking mode 'host': kibana_16550
[WARN]      * Container running with networking mode 'host': elasticsearch_16550
[WARN]      * Container running with networking mode 'host': tftp_server_16550
[WARN]      * Container running with networking mode 'host': my_cobbler_16550
[WARN]      * Container running with networking mode 'host': repo_mirror_16550
[WARN]      * Container running with networking mode 'host': container_registry
[WARN] 5.10  - Ensure memory usage for container is limited
[WARN]      * Container running without memory restrictions: vmtp_16550
[WARN]      * Container running without memory restrictions: vimconfig_16550
[WARN]      * Container running without memory restrictions: fluentd_aggr_16550
[WARN]      * Container running without memory restrictions: curator_16550
[WARN]      * Container running without memory restrictions: kibana_16550
[WARN]      * Container running without memory restrictions: elasticsearch_16550
[WARN]      * Container running without memory restrictions: tftp_server_16550
[WARN]      * Container running without memory restrictions: my_cobbler_16550
[WARN]      * Container running without memory restrictions: repo_mirror_16550
[WARN]      * Container running without memory restrictions: container_registry
[WARN] 5.11  - Ensure CPU priority is set appropriately on the container
[WARN]      * Container running without CPU restrictions: vmtp_16550
[WARN]      * Container running without CPU restrictions: vimconfig_16550
[WARN]      * Container running without CPU restrictions: fluentd_aggr_16550
[WARN]      * Container running without CPU restrictions: curator_16550
[WARN]      * Container running without CPU restrictions: kibana_16550
[WARN]      * Container running without CPU restrictions: elasticsearch_16550
[WARN]      * Container running without CPU restrictions: tftp_server_16550
[WARN]      * Container running without CPU restrictions: my_cobbler_16550
[WARN]      * Container running without CPU restrictions: repo_mirror_16550
[WARN]      * Container running without CPU restrictions: container_registry
[WARN] 5.12  - Ensure the container's root filesystem is mounted as read only
[WARN]      * Container running with root FS mounted R/W: vmtp_16550
```

```
[WARN]      * Container running with root FS mounted R/W: vimconfig_16550
[WARN]      * Container running with root FS mounted R/W: fluentd_aggr_16550
[WARN]      * Container running with root FS mounted R/W: curator_16550
[WARN]      * Container running with root FS mounted R/W: kibana_16550
[WARN]      * Container running with root FS mounted R/W: elasticsearch_16550
[WARN]      * Container running with root FS mounted R/W: tftp_server_16550
[WARN]      * Container running with root FS mounted R/W: my_cobbler_16550
[WARN]      * Container running with root FS mounted R/W: repo_mirror_16550
[WARN]      * Container running with root FS mounted R/W: container_registry
[PASS] 5.13  - Ensure incoming container traffic is binded to a specific host interface
[WARN] 5.14  - Ensure 'on-failure' container restart policy is set to '5'
[WARN]      * MaximumRetryCount is not set to 5: vmtp_16550
[WARN]      * MaximumRetryCount is not set to 5: vimconfig_16550
[WARN]      * MaximumRetryCount is not set to 5: fluentd_aggr_16550
[WARN]      * MaximumRetryCount is not set to 5: curator_16550
[WARN]      * MaximumRetryCount is not set to 5: kibana_16550
[WARN]      * MaximumRetryCount is not set to 5: elasticsearch_16550
[WARN]      * MaximumRetryCount is not set to 5: tftp_server_16550
[WARN]      * MaximumRetryCount is not set to 5: my_cobbler_16550
[WARN]      * MaximumRetryCount is not set to 5: repo_mirror_16550
[WARN]      * MaximumRetryCount is not set to 5: container_registry
[PASS] 5.15  - Ensure the host's process namespace is not shared
[PASS] 5.16  - Ensure the host's IPC namespace is not shared
[PASS] 5.17  - Ensure host devices are not directly exposed to containers
[INFO] 5.18  - Ensure the default ulimit is overwritten at runtime, only if needed
[INFO]      * Container no default ulimit override: vmtp_16550
[INFO]      * Container no default ulimit override: vimconfig_16550
[INFO]      * Container no default ulimit override: fluentd_aggr_16550
[INFO]      * Container no default ulimit override: curator_16550
[INFO]      * Container no default ulimit override: kibana_16550
[INFO]      * Container no default ulimit override: elasticsearch_16550
[INFO]      * Container no default ulimit override: tftp_server_16550
[INFO]      * Container no default ulimit override: my_cobbler_16550
[INFO]      * Container no default ulimit override: repo_mirror_16550
[INFO]      * Container no default ulimit override: container_registry
[PASS] 5.19  - Ensure mount propagation mode is not set to shared
[PASS] 5.20  - Ensure the host's UTS namespace is not shared
[PASS] 5.21  - Ensure the default seccomp profile is not Disabled
[NOTE] 5.22  - Ensure docker exec commands are not used with privileged option
[NOTE] 5.23  - Ensure docker exec commands are not used with user option
[PASS] 5.24  - Ensure cgroup usage is confirmed
[WARN] 5.25  - Ensure the container is restricted from acquiring additional privileges
[WARN]      * Privileges not restricted: vmtp_16550
[WARN]      * Privileges not restricted: vimconfig_16550
[WARN]      * Privileges not restricted: fluentd_aggr_16550
[WARN]      * Privileges not restricted: curator_16550
[WARN]      * Privileges not restricted: kibana_16550
```

```
[WARN]      * Privileges not restricted: elasticsearch_16550
[WARN]      * Privileges not restricted: tftp_server_16550
[WARN]      * Privileges not restricted: my_cobbler_16550
[WARN]      * Privileges not restricted: repo_mirror_16550
[WARN]      * Privileges not restricted: container_registry
[WARN] 5.26  - Ensure container health is checked at runtime
[WARN]      * Health check not set: vmtp_16550
[WARN]      * Health check not set: vimconfig_16550
[WARN]      * Health check not set: fluentd_aggr_16550
[WARN]      * Health check not set: curator_16550
[WARN]      * Health check not set: kibana_16550
[WARN]      * Health check not set: elasticsearch_16550
[WARN]      * Health check not set: tftp_server_16550
[WARN]      * Health check not set: my_cobbler_16550
[WARN]      * Health check not set: repo_mirror_16550
[WARN]      * Health check not set: container_registry
[INFO] 5.27  - Ensure docker commands always get the latest version of the image
[WARN] 5.28  - Ensure PIDs cgroup limit is used
[WARN]      * PIDs limit not set: vmtp_16550
[WARN]      * PIDs limit not set: vimconfig_16550
[WARN]      * PIDs limit not set: fluentd_aggr_16550
[WARN]      * PIDs limit not set: curator_16550
[WARN]      * PIDs limit not set: kibana_16550
[WARN]      * PIDs limit not set: elasticsearch_16550
[WARN]      * PIDs limit not set: tftp_server_16550
[WARN]      * PIDs limit not set: my_cobbler_16550
[WARN]      * PIDs limit not set: repo_mirror_16550
[WARN]      * PIDs limit not set: container_registry
[PASS] 5.29  - Ensure Docker's default bridge docker0 is not used
[PASS] 5.30  - Ensure the host's user namespaces is not shared
[PASS] 5.31  - Ensure the Docker socket is not mounted inside any containers


[INFO] 6 - Docker Security Operations
[INFO] 6.1  - Avoid image sprawl
[INFO]      * There are currently: 28 images
[INFO] 6.2  - Avoid container sprawl
[INFO]      * There are currently a total of 28 containers, with 10 of them currently running


[INFO] 7 - Docker Swarm Configuration
[PASS] 7.1  - Ensure swarm mode is not Enabled, if not needed
[PASS] 7.2  - Ensure the minimum number of manager nodes have been created in a swarm (Swarm mode not enabled)
[PASS] 7.3  - Ensure swarm services are binded to a specific host interface (Swarm mode not enabled)
```

```
[PASS] 7.4  - Ensure data exchanged between containers are encrypted on different nodes on the overlay network
[PASS] 7.5  - Ensure Docker's secret management commands are used for managing secrets in a Swarm cluster (Swarm mode not enabled)
[PASS] 7.6  - Ensure swarm manager is run in auto-lock mode (Swarm mode not enabled)
[PASS] 7.7  - Ensure swarm manager auto-lock key is rotated periodically (Swarm mode not enabled)
[PASS] 7.8  - Ensure node certificates are rotated as appropriate (Swarm mode not enabled)
[PASS] 7.9  - Ensure CA certificates are rotated as appropriate (Swarm mode not enabled)
[PASS] 7.10  - Ensure management plane traffic has been separated from data plane traffic (Swarm mode not enabled)

[INFO] Checks: 105
[INFO] Score: 13
```

Compare OpenStack with VM running Docker

Switch to the VM with IP 10.201.36.76

COMMANDS:5.4 – Log into the VM running in CVIM management node

```
ssh <username>@10.201.36.76
cd sec_audit/cisc_benchmark/docker-bench-security
```

COMMAND:5.5 Execute the benchmark (CIS)

```
sudo sh docker-bench-security.sh
```

OUTPUT: 5.5

```
[cluser1@clus-1-vm1 docker-bench-security]$ sudo sh docker-bench-security.sh

We trust you have received the usual lecture from the local System
Administrator. It usually boils down to these three things:

    #1) Respect the privacy of others.
    #2) Think before you type.
    #3) With great power comes great responsibility.

[sudo] password for cluser1:
# ------------------------------------------------------------------------------
# Docker Bench for Security v1.3.4
#
```

```
# Docker, Inc. (c) 2015-
#
# Checks for dozens of common best-practices around deploying Docker containers
in production.
# Inspired by the CIS Docker Community Edition Benchmark v1.1.0.
# ------------------------------------------------------------------------------
------

Initializing Sat Jun  8 14:24:51 UTC 2019


[INFO] 1 - Host Configuration
[WARN] 1.1  - Ensure a separate partition for containers has been created
[NOTE] 1.2  - Ensure the container host has been Hardened
[INFO] 1.3  - Ensure Docker is up to date
[INFO]      * Using 1.13.1, verify is it up to date as deemed necessary
[INFO]      * Your operating system vendor may provide support and security
maintenance for Docker
[INFO] 1.4  - Ensure only trusted users are allowed to control Docker daemon
[INFO]      * docker:x:994:
[WARN] 1.5  - Ensure auditing is configured for the Docker daemon
[WARN] 1.6  - Ensure auditing is configured for Docker files and directories -
/var/lib/docker
[WARN] 1.7  - Ensure auditing is configured for Docker files and directories -
/etc/docker
[WARN] 1.8  - Ensure auditing is configured for Docker files and directories -
docker.service
[INFO] 1.9  - Ensure auditing is configured for Docker files and directories -
docker.socket
[INFO]      * File not found
[INFO] 1.10  - Ensure auditing is configured for Docker files and directories -
/etc/default/docker
[INFO]      * File not found
[WARN] 1.11  - Ensure auditing is configured for Docker files and directories -
/etc/docker/daemon.json
[WARN] 1.12  - Ensure auditing is configured for Docker files and directories -
/usr/bin/docker-containerd
[INFO] 1.13  - Ensure auditing is configured for Docker files and directories -
/usr/bin/docker-runc
[INFO]      * File not found


[INFO] 2 - Docker daemon configuration
[WARN] 2.1  - Ensure network traffic is restricted between containers on the default
bridge


[PASS] 2.3  - Ensure Docker is allowed to make changes to iptables
```

```
[INFO] 2.6  - Ensure TLS authentication for Docker daemon is configured
[INFO]      * Docker daemon not listening on TCP
[INFO] 2.7  - Ensure the default ulimit is configured appropriately
[INFO]      * Default ulimit doesn't appear to be set
[WARN] 2.8  - Enable user namespace support
[PASS] 2.9  - Ensure the default cgroup usage has been confirmed
[PASS] 2.10  - Ensure base device size is not changed until needed
[WARN] 2.11  - Ensure that authorization for Docker client commands is enabled
[PASS] 2.12  - Ensure centralized and remote logging is configured
[WARN] 2.13  - Ensure operations on legacy registry (v1) are Disabled
[WARN] 2.14  - Ensure live restore is Enabled
[WARN] 2.15  - Ensure Userland Proxy is Disabled
[INFO] 2.16  - Ensure daemon-wide custom seccomp profile is applied, if needed
[PASS] 2.17  - Ensure experimental features are avoided in production
[WARN] 2.18  - Ensure containers are restricted from acquiring new privileges


[INFO] 3 - Docker daemon configuration files
[PASS] 3.1  - Ensure that docker.service file ownership is set to root:root
[PASS] 3.2  - Ensure that docker.service file permissions are set to 644 or more
restrictive
[INFO] 3.3  - Ensure that docker.socket file ownership is set to root:root
[INFO]      * File not found
[INFO] 3.4  - Ensure that docker.socket file permissions are set to 644 or more
restrictive
[INFO]      * File not found
[PASS] 3.5  - Ensure that /etc/docker directory ownership is set to root:root
[PASS] 3.6  - Ensure that /etc/docker directory permissions are set to 755 or more
restrictive
[PASS] 3.7  - Ensure that registry certificate file ownership is set to root:root
[PASS] 3.8  - Ensure that registry certificate file permissions are set to 444 or
more restrictive
[INFO] 3.9  - Ensure that TLS CA certificate file ownership is set to root:root
[INFO]      * No TLS CA certificate found
[INFO] 3.10  - Ensure that TLS CA certificate file permissions are set to 444 or more
restrictive
[INFO]      * No TLS CA certificate found
[INFO] 3.11  - Ensure that Docker server certificate file ownership is set to root:root
[INFO]      * No TLS Server certificate found
[INFO] 3.12  - Ensure that Docker server certificate file permissions are set to 444 or
more restrictive
[INFO]      * No TLS Server certificate found
[INFO] 3.13  - Ensure that Docker server certificate key file ownership is set to
root:root
[INFO]      * No TLS Key found
```

```
[INFO] 3.14  - Ensure that Docker server certificate key file permissions are set to
400
[INFO]      * No TLS Key found
[PASS] 3.15  - Ensure that Docker socket file ownership is set to root:docker
[PASS] 3.16  - Ensure that Docker socket file permissions are set to 660 or more
restrictive
[PASS] 3.17  - Ensure that daemon.json file ownership is set to root:root
[PASS] 3.18  - Ensure that daemon.json file permissions are set to 644 or more
restrictive
[INFO] 3.19  - Ensure that /etc/default/docker file ownership is set to root:root
[INFO]      * File not found
[INFO] 3.20  - Ensure that /etc/default/docker file permissions are set to 644 or more
restrictive
[INFO]      * File not found


[INFO] 4 - Container Images and Build File
[WARN] 4.1  - Ensure a user for the container has been created
[WARN]      * Running as root: infallible_albattani
[WARN]      * Running as root: romantic_noether
[NOTE] 4.2  - Ensure that containers use trusted base images
[NOTE] 4.3  - Ensure unnecessary packages are not installed in the container
[NOTE] 4.4  - Ensure images are scanned and rebuilt to include security patches
[WARN] 4.5  - Ensure Content trust for Docker is Enabled
[WARN] 4.6  - Ensure HEALTHCHECK instructions have been added to the container
image
[WARN]      * No Healthcheck found: [docker.io/ubuntu:latest]
[WARN]      * No Healthcheck found: [docker.io/busybox:latest]
[WARN]      * No Healthcheck found: [docker.io/hello-world:latest]
[PASS] 4.7  - Ensure update instructions are not use alone in the Dockerfile
[NOTE] 4.8  - Ensure setuid and setgid permissions are removed in the images
unknown flag: --format
See 'docker history --help'.
unknown flag: --format
See 'docker history --help'.
unknown flag: --format
See 'docker history --help'.
unknown flag: --format
See 'docker history --help'.
[PASS] 4.9  - Ensure COPY is used instead of ADD in Dockerfile
[NOTE] 4.10  - Ensure secrets are not stored in Dockerfiles
[NOTE] 4.11  - Ensure verified packages are only Installed


[INFO] 5 - Container Runtime
[WARN] 5.1  - Ensure AppArmor Profile is Enabled
[WARN]      * No AppArmorProfile Found: infallible_albattani
[WARN]      * No AppArmorProfile Found: romantic_noether
```

```
[WARN] 5.2  - Ensure SELinux security options are set, if applicable
[WARN]      * No SecurityOptions Found: infallible_albattani
[WARN]      * No SecurityOptions Found: romantic_noether
[PASS] 5.3  - Ensure Linux Kernel Capabilities are restricted within containers
[PASS] 5.4  - Ensure privileged containers are not used
[PASS] 5.5  - Ensure sensitive host system directories are not mounted on containers
[PASS] 5.6  - Ensure ssh is not run within containers
[PASS] 5.7  - Ensure privileged ports are not mapped within containers
[NOTE] 5.8  - Ensure only needed ports are open on the container
[PASS] 5.9  - Ensure the host's network namespace is not shared
[WARN] 5.10  - Ensure memory usage for container is limited
[WARN]      * Container running without memory restrictions: infallible_albattani
[WARN]      * Container running without memory restrictions: romantic_noether
[WARN] 5.11  - Ensure CPU priority is set appropriately on the container
[WARN]      * Container running without CPU restrictions: infallible_albattani
[WARN]      * Container running without CPU restrictions: romantic_noether
[WARN] 5.12  - Ensure the container's root filesystem is mounted as read only
[WARN]      * Container running with root FS mounted R/W: infallible_albattani
[WARN]      * Container running with root FS mounted R/W: romantic_noether
[PASS] 5.13  - Ensure incoming container traffic is binded to a specific host interface
[WARN] 5.14  - Ensure 'on-failure' container restart policy is set to '5'
[WARN]      * MaximumRetryCount is not set to 5: infallible_albattani
[WARN]      * MaximumRetryCount is not set to 5: romantic_noether
[PASS] 5.15  - Ensure the host's process namespace is not shared
[PASS] 5.16  - Ensure the host's IPC namespace is not shared
[PASS] 5.17  - Ensure host devices are not directly exposed to containers
[INFO] 5.18  - Ensure the default ulimit is overwritten at runtime, only if needed
[INFO]      * Container no default ulimit override: infallible_albattani
[INFO]      * Container no default ulimit override: romantic_noether
[PASS] 5.19  - Ensure mount propagation mode is not set to shared
[PASS] 5.20  - Ensure the host's UTS namespace is not shared
[PASS] 5.21  - Ensure the default seccomp profile is not Disabled
[NOTE] 5.22  - Ensure docker exec commands are not used with privileged option
[NOTE] 5.23  - Ensure docker exec commands are not used with user option
[PASS] 5.24  - Ensure cgroup usage is confirmed
[WARN] 5.25  - Ensure the container is restricted from acquiring additional privileges
[WARN]      * Privileges not restricted: infallible_albattani
[WARN]      * Privileges not restricted: romantic_noether
[WARN] 5.26  - Ensure container health is checked at runtime
[WARN]      * Health check not set: infallible_albattani
[WARN]      * Health check not set: romantic_noether
[INFO] 5.27  - Ensure docker commands always get the latest version of the image
[WARN] 5.28  - Ensure PIDs cgroup limit is used
[WARN]      * PIDs limit not set: infallible_albattani
[WARN]      * PIDs limit not set: romantic_noether
[INFO] 5.29  - Ensure Docker's default bridge docker0 is not used
```

```
[INFO]      * Container in docker0 network: romantic_noether
[INFO]      * Container in docker0 network: infallible_albattani
[PASS] 5.30  - Ensure the host's user namespaces is not shared
[PASS] 5.31  - Ensure the Docker socket is not mounted inside any containers


[INFO] 6 - Docker Security Operations
[INFO] 6.1  - Avoid image sprawl
[INFO]      * There are currently: 4 images
[INFO] 6.2  - Avoid container sprawl
[INFO]      * There are currently a total of 21 containers, with 2 of them currently
running


[INFO] 7 - Docker Swarm Configuration
[PASS] 7.1  - Ensure swarm mode is not Enabled, if not needed
[PASS] 7.2  - Ensure the minimum number of manager nodes have been created in
a swarm (Swarm mode not enabled)
[PASS] 7.3  - Ensure swarm services are binded to a specific host interface
(Swarm mode not enabled)
[PASS] 7.4  - Ensure data exchanged between containers are encrypted on
different nodes on the overlay network
[PASS] 7.5  - Ensure Docker's secret management commands are used for
managing secrets in a Swarm cluster (Swarm mode not enabled)
[PASS] 7.6  - Ensure swarm manager is run in auto-lock mode (Swarm mode not
enabled)
[PASS] 7.7  - Ensure swarm manager auto-lock key is rotated periodically (Swarm
mode not enabled)
[PASS] 7.8  - Ensure node certificates are rotated as appropriate (Swarm mode
not enabled)
[PASS] 7.9  - Ensure CA certificates are rotated as appropriate (Swarm mode not
enabled)
[PASS] 7.10  - Ensure management plane traffic has been separated from data
plane traffic (Swarm mode not enabled)

[INFO] Checks: 105
[INFO] Score: 17
```