

## Lab: Managing Docker Containers

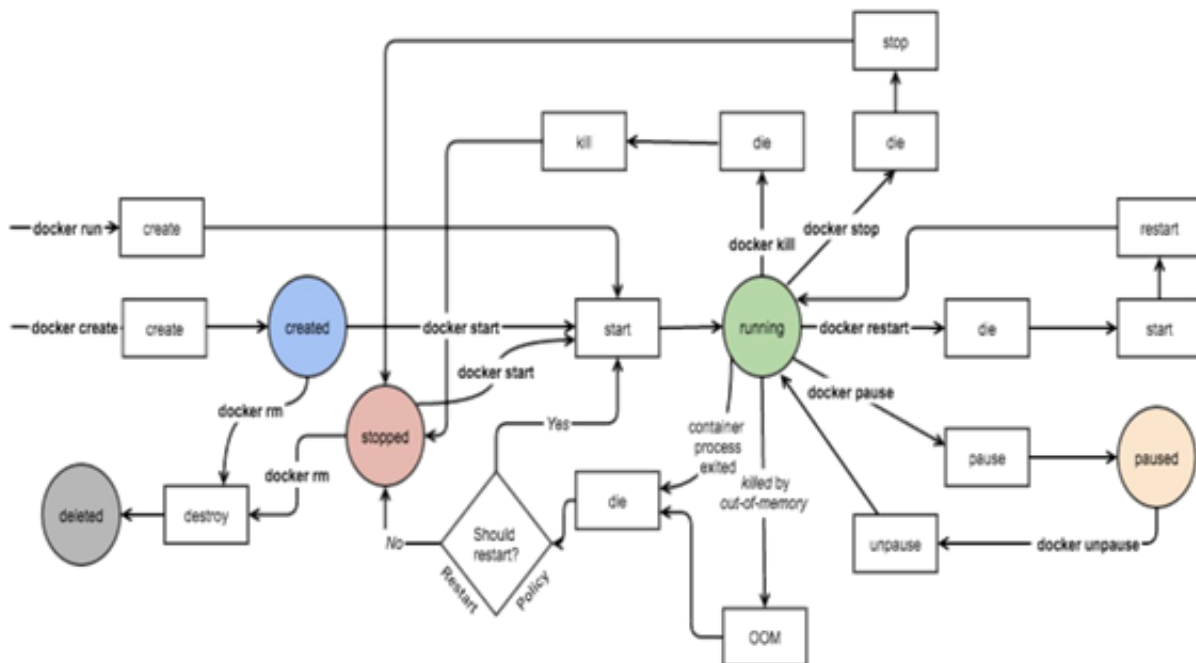
### Introduction

Docker provides the ability to **package** and **run an application** in a isolated environment called a **container**.

In this Lab, you will learn below items:

Objective:

- Create and Manage the Lifecycle of container
- Clean up



1 Ensure that you have logged-in as **root** user with password as **linux**.

1.1 Let us list the containers, by executing the below command.

```
# docker container ls
```

**Output:**

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
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**Note:** As you notice, there are no containers as it is a fresh docker installation.

1.2 Let us create a container, by executing the below command.

```
# docker container create nginx
```

**Output:**

```
[root@centos-docker ~]# docker container create nginx
Unable to find image 'nginx:latest' locally
Trying to pull repository docker.io/library/nginx ...
latest: Pulling from docker.io/library/nginx
852e50cd189d: Pull complete
571d7e852307: Pull complete
addb10abd9cb: Pull complete
d20aa7ccdb77: Pull complete
8b03f1e11359: Pull complete
Digest: sha256:6b1daa9462046581ac15be20277a7c75476283f969cb3a61c8725ec38d3b01c3
Status: Downloaded newer image for docker.io/nginx:latest
cd3fcb4094da244aaf1410bcc78e9610d85705020228876273f1ed45e3194628
```

1.3 Let us list the container created, by executing the below command.

```
# docker container ls
```

**Output:**

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
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**Note:** ls only displays the containers in the up state

```
# docker container ls -a
```

**Output:**

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
cd3fcb4094da	nginx	"/docker-entrypoint..."	3 minutes ago	Created		keen_mayer

**Note:** Docker by default, assigns a random name comprised of two dictionary words separated by a '\_'.

1.4 Let us name the container, by executing the below command.

```
# docker container create --name web01 nginx
```

Output:

```
[root@centos-docker ~]# docker container create --name web01 nginx
e39907b784d9f04a0a462edb7057296b7555a8f26196ce7e28900f24b6848b1a
```

**Note:** As the image was already pulled in the previous steps, it did not pull an image.

1.5 Let us list the container created, by executing the below command.

```
# docker container ls -a
```

Output:

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
e39907b784d9	nginx	"/docker-entrypoin..."	About a minute ago	Created		web01
cd3fcb4094da	nginx	"/docker-entrypoin..."	8 minutes ago	Created		keen_mayer

1.6 Let us start the container created, by executing the below command.

```
# docker container start web01
```

Output:

```
[root@centos-docker ~]# docker container start web01
web01
```

1.7 Let us list the container created, by executing the below command.

```
# docker container ls
```

Output:

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
e39907b784d9	nginx	"/docker-entrypoin..."	5 minutes ago	Up 48 seconds	80/tcp	web01

1.8 Let us create a new container using **run** option, by executing the below command.

```
# docker container run --name server01 centos
```

Output:

```
[root@centos-docker ~]# docker container run --name server01 centos
Unable to find image 'centos:latest' locally
Trying to pull repository docker.io/library/centos ...
latest: Pulling from docker.io/library/centos
3c72a8ed6814: Pull complete
Digest: sha256:76d24f3ba3317fa945743bb3746fbaf3a0b752f10b10376960de01da70685fbd
Status: Downloaded newer image for docker.io/centos:latest
```

**Note:** `docker run` command is the combination of `docker create` + `docker start`.

**1.9** Let us list the container created, by executing the below command.

```
# docker container ls -a
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
d9e3574438d1	centos	"/bin/bash"	57 seconds ago	Exited (0) 55 seconds ago		server01

**Note:** The container is in **exited** status, as containers by default run to completion.

**1.10** Let us create a new container with **interactive terminal** (`-i -t`) option, by executing the below command.

```
# docker container run --name server02 -i -t centos
# ps
# exit
```

**Output:**

```
[root@centos-docker ~]# docker container run --name server02 -i -t centos
[root@85633f56bf55 /]# ps
  PID TTY          TIME CMD
    1 ?           00:00:00 bash
   14 ?           00:00:00 ps
[root@85633f56bf55 /]# exit
exit
```

**Note:** The container is created and interactive terminal is displayed. You can run commands inside the container and exit out.

**1.11** Let us list the container, by executing the below command.

```
# docker container ls -a
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
85633f56bf55	centos	"/bin/bash"	About a minute ago	Exited (0) About a minute ago		server02

**1.12** Let us create a new container with **detached interactive terminal** (`-i -t`) option, by executing the below command.

```
# docker container run --name server03 -dit centos
```

**Output:**

```
[root@centos-docker ~]# docker container run --name server03 -dit centos
69644093eefb6e62dd8edc48db670c44b4f44f190ea76e7aeae6db16667bba22
```

**Note:** The container was created in background as we had mentioned -d (detach) option.

**1.13** Let us list the container, by executing the below command.

```
# docker container ls -a
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	2 minutes ago	Up 2 minutes		server03

**1.14** Let us now attach the container server03, by executing the below command.

```
# docker container attach server03
# ps
Press ctrl+p,q
```

**Output:**

```
[root@centos-docker ~]# docker container attach server03
[root@69644093eefb /]# ps
```

PID	TTY	TIME	CMD
1	?	00:00:00	bash
14	?	00:00:00	ps

```
[root@69644093eefb /]# [root@centos-docker ~]#
```

**1.15** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	10 minutes ago	Up 10 minutes		server03

**Note:** The container continues to run as we had used ctrl+p ctrl+q to exit from the container.

**1.16** Let us run a command inside the container using **exec** option.

```
# docker container exec server03 cat /etc/resolv.conf
```

**Output:**

```
[root@centos-docker ~]# docker container exec server03 cat /etc/resolv.conf
# Generated by NetworkManager
nameserver 192.168.100.2
```

**1.17** Let us rename the existing container, by executing the below command.

```
# docker container rename server03 server003
```

**1.18** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	19 minutes ago	Up 19 minutes		server003

**1.19** Let us pause the existing container, by executing the below command.

```
# docker container pause server003
```

**Output:**

```
[root@centos-docker ~]# docker container pause server003
server003
```

**1.20** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	22 minutes ago	Up 22 minutes (Paused)		server003

**1.21** Let us unpause the existing container, by executing the below command.

```
# docker container unpause server003
```

**Output:**

```
[root@centos-docker ~]# docker container unpause server003
server003
```

**1.22** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	23 minutes ago	Up 23 minutes		server003

**1.23** Let us stop the existing container, by executing the below command.

```
# docker container stop server003
```

**Output:**

```
[root@centos-docker ~]# docker container stop server003
server003
```

**1.24** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	26 minutes ago	Exited (0) About a minute ago		server003

**1.25** Let us restart the existing container, by executing the below command.

```
# docker container restart server003
```

**Output:**

```
[root@centos-docker ~]# docker container restart server003
server003
```

**1.26** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	28 minutes ago	Up 2 seconds		server003

**1.27** Let us verify the top running process inside the container, by executing the below command.

```
# docker container top server003
```

**Output:**

```
[root@centos-docker ~]# docker container top server003
```

UID	PID	PPID	C	STIME	TTY	TIME	CMD
root	53681	53664	0	15:57	pts/3	00:00:00	/bin/bas

**1.28** Let us verify the stats of the running containers, by executing the below command.

```
# docker container stats
```

**Output:**

CONTAINER	CPU %	MEM USAGE / LIMIT	MEM %	NET I/O	BLOCK I/O	PIDS
69644093eefb	0.00%	524 KiB / 1.777 GiB	0.03%	656 B / 656 B	0 B / 0 B	1
e39907b784d9	0.00%	1.387 MiB / 1.777 GiB	0.08%	5.41 kB / 656 B	0 B / 12.3 kB	2

Note: Press ctrl+c to exit from the output screen or run the below command to disable streaming stats.

```
# docker container stats --no-stream
```

**Output:**

```
[root@centos-docker ~]# docker container stats --no-stream
```

CONTAINER	CPU %	MEM USAGE / LIMIT	MEM %	NET I/O	BLOCK I/O	PIDS
69644093eefb	0.00%	524 KiB / 1.777 GiB	0.03%	656 B / 656 B	0 B / 0 B	1
e39907b784d9	0.00%	1.387 MiB / 1.777 GiB	0.08%	5.41 kB / 656 B	0 B / 12.3 kB	2

**1.29** Let us verify the logs of the containers, by executing the below command.

```
# docker container logs server003 --timestamps
```

**Output:**

```
[root@centos-docker ~]# docker container logs server003 --timestamps
[root@69644093eefb /]# ps
2020-11-29T10:04:31.488983000Z      PID TTY          TIME CMD
2020-11-29T10:04:31.489201000Z        1 ?           00:00:00 bash
2020-11-29T10:04:31.489358000Z       14 ?           00:00:00 ps
2020-11-29T10:24:22.158543000Z [root@69644093eefb /]# exit
```

**1.30** Let us expose the custom port to the container, by executing the below command.

```
# docker container run --name web02 -dit -p 8080:80 nginx
```

**Output:**

```
[root@centos-docker ~]# docker container run --name web02 -dit -p 8080:80 nginx
e82ea95370e4334e11405fd6f712ce020f2d1a61cae30e496a9c9487771e8216
```



**1.31** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS                    NAMES
e82ea95370e4   nginx    "/docker-entrypoint..." 37 seconds ago Up 37 seconds 0.0.0.0:8080->80/tcp    web02
```

**Note:** The container port is 80 and same is exposed to 8080 port on the host.

**1.32** Let us expose the custom port to the container, by executing the below command.

```
# docker container run --name web03 -dit -P nginx
```

**Output:**

```
[root@centos-docker ~]# docker container run --name web03 -dit -P nginx
284e90a737bf2676e25b82c2fc7aa72afc5e8e23a3455d473daebf649a116b17
```

**1.33** Let us list the container, by executing the below command.

```
# docker container ls
```

**Output:**

```
[root@centos-docker ~]# docker container ls
CONTAINER ID   IMAGE     COMMAND                  CREATED        STATUS        PORTS                    NAMES
284e90a737bf   nginx    "/docker-entrypoint..." 37 seconds ago Up 36 seconds 0.0.0.0:32769->80/tcp    web03
ee7647cf60ae   nginx    "/docker-entrypoint..." 10 minutes ago Up 10 minutes 0.0.0.0:8080->80/tcp    web02
```

**1.34** Let us inspect the container, by executing the below command.

```
# docker container inspect web02 | grep -e "HostPort" -e "IPAddress"
```

**Output:**

```
[root@centos-docker ~]# docker container inspect web02 | grep -e "HostPort" -e "IPAddress"
      "HostPort": "8080"
      "HostPort": "8080"
    "SecondaryIPAddresses": null,
    "IPAddress": "172.17.0.4",
      "IPAddress": "172.17.0.4",
```

**1.35** Let us access the webserver by using the container ip, by executing the below command.

```
# curl 172.17.0.4
```

**Output:**

```
[root@centos-docker ~]# curl 172.17.0.4
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
<style>
```

**1.36** Let us access the webserver by using the docker host ip and port exposed, by executing the below command.

```
# curl 192.168.100.10:8080
```

**Output:**

```
[root@centos-docker ~]# curl 192.168.100.10:8080
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
```

**1.37** Let us access the webserver by using the docker host ip and port exposed, by executing the below command.

```
# curl 192.168.100.10:32769
```

**Output:**

```
[root@centos-docker ~]# curl 192.168.100.10:32769
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
```

**Note:** Change the IP address and port number based on your configuration

**1.38** Let us check the space consumed by the container, by executing the below command.

```
# docker container ls -sa
```

**Output:**

```
[root@centos-docker ~]# docker container ls -sa
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
3709caa5a84f	nginx	"/docker-entrypoin..."	14 seconds ago	Up 13 seconds	0.0.0.0:32770->80/tcp	web03
63ed2e96f7b2	nginx	"/docker-entrypoin..."	27 seconds ago	Up 26 seconds	0.0.0.0:8080->80/tcp	web02
1.12 kB (virtual 133 MB)						

**1.39** Let us kill the container, by executing the below command.

```
# docker container kill web02
```

**Output:**

```
[root@centos-docker ~]# docker container kill web02
web02
```

**1.40** Let us list the container, by executing the below command.

```
# docker container ls -a
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
e82ea95370e4	nginx	"/docker-entrypoin..."	13 minutes ago	Exited (137)	52 seconds ago	web02

**1.41** Let us remove all the stopped containers, by executing the below command.

```
# docker container prune
```

**Output:**

```
[root@centos-docker ~]# docker container prune
WARNING! This will remove all stopped containers.
Are you sure you want to continue? [y/N] y
Deleted Containers:
e82ea95370e4334e11405fd6f712ce020f2d1a61cae30e496a9c9487771e8216
85633f56bf55ec633a38326286c4714188d7f28f853c6d116bc07f02463a194b
d9e3574438d12212367839ca0929fe1f876043d8ad1b6e5977a87d588ae0b95a
cd3fcb4094da244aaf1410bcc78e9610d85705020228876273f1ed45e3194628

Total reclaimed space: 1.124 kB
```

**1.42** Let us list the container, by executing the below command.

```
# docker container ls -a
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
69644093eefb	centos	"/bin/bash"	About an hour ago	Up 34 minutes		server003
e39907b784d9	nginx	"/docker-entrypoint..."	About an hour ago	Up About an hour	80/tcp	web01

**1.43** Let us remove the server003 container gracefully, by executing the below command.

```
# docker container stop server003
# docker container rm server003
```

**Output:**

```
[root@centos-docker ~]# docker container stop server003
server003
[root@centos-docker ~]# docker container rm server003
server003
```

**1.44** Let us cleanup, by removing the containers forcefully.

```
# docker container rm web01 -f
```

**Output:**

```
[root@centos-docker ~]# docker container rm web01 -f
web01
```

**1.45** Let us list the container, by executing the below command.

```
# docker container ls -a
```

**Output:**

```
[root@centos-docker ~]# docker container ls -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
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**1.46** Let us also remove the images downloaded, by executing the below command.

```
# docker image rm nginx centos
```

**Output:**

```
[root@centos-docker ~]# docker image rm nginx centos
Untagged: nginx:latest
Untagged: docker.io/nginx@sha256:6b1daa9462046581ac15be20277a7c75476283f969cb3a61c8725ec38d3b01c3
Deleted: sha256:bc9a0695f5712dcaaa09a5adc415a3936ccba13fc2587dfd76b1b8aeea3f221c
Deleted: sha256:a6862ade3b91fdde2aa8a3d77fdcc95b1eb6c606be079c11b7f97f249d0e731d
Deleted: sha256:32bcbe3740b68d0625744e774b404140366c0c4a2b2eadf32280d66ba001b4fb
Deleted: sha256:2dc5e43f496e41a18c016904b6665454a53be22eb4dcc1b468d864b4e2d1f311
Deleted: sha256:5fe6a7c579cd9fbcfa604810974c4c0c16893f4c40bc801545607ebd0accea74
Deleted: sha256:f5600c6330da7bb112776ba067a32a9c20842d6ecc8ee3289f1a713b644092f8
Untagged: centos:latest
Untagged: docker.io/centos@sha256:76d24f3ba3317fa945743bb3746fbaf3a0b752f10b10376960de01da70685fbd
Deleted: sha256:0d120b6ccaa8c5e149176798b3501d4dd1885f961922497cd0abef155c869566
Deleted: sha256:291f6e44771a7b4399b0c6fb40ab4fe0331ddf76eda11080f052b003d96c7726
```

**1.47** Let us cleanup, by executing the below command.

```
# docker container rm `docker container ls -a -q` -f
```

```
# docker image rm `docker images -q` -f
```