

EXPERIMENT NO. : 08

AIM : To understand Docker Architecture and Container Life Cycle, install Docker and execute docker commands to manage images and interact with containers.

THEORY :

The Docker daemon

The Docker daemon (dockerd) listens for Docker API requests and manages Docker objects such as images, containers, networks, and volumes. A daemon can also communicate with other daemons to manage Docker services.

The Docker client

The Docker client (docker) is the primary way that many Docker users interact with Docker. When you use commands such as docker run, the client sends these commands to dockerd, which carries them out. The docker command uses the Docker API. The Docker client can communicate with more than one daemon.

Docker registries

A Docker registry stores Docker images. Docker Hub is a public registry that anyone can use, and Docker is configured to look for images on Docker Hub by default. You can even run your own private registry.

When you use the `docker pull` or `docker run` commands, the required images are pulled from your configured registry. When you use the `docker push` command, your image is pushed to your configured registry.

Docker objects

When you use Docker, you are creating and using images, containers, networks, volumes, plugins, and other objects. This section is a brief overview of some of those objects.

Containers

A container is a runnable instance of an image. You can create, start, stop, move, or delete a container using the Docker API or CLI. You can connect a container to one or more networks, attach storage to it, or even create a new image based on its current state.

By default, a container is relatively well isolated from other containers and its host machine.

DOCKER COMMANDS

1. docker version : Show the Docker version information

```
$ docker version
Client:
 Version:      18.03.1-ce
 API version:  1.37
 Go version:   go1.9.2
 Git commit:   9ee9f40
 Built:        Thu Apr 26 07:12:25 2018
 OS/Arch:      linux/amd64
 Experimental: false
 Orchestrator: swarm

Server:
 Engine:
  Version:      18.03.0-ce
  API version:  1.37 (minimum version 1.12)
  Go version:   go1.10
  Git commit:   0520e24302
  Built:        Fri Mar 23 01:48:12 2018
  OS/Arch:      linux/amd64
  Experimental: false
```

2. docker search apache : Search images with name apache

```
$ docker search apache
```

NAME	OFFICIAL	AUTOMATED	DESCRIPTION	STARS
httpd	[OK]		The Apache HTTP Server Project	3710
tomcat	[OK]		Apache Tomcat is an open source implementati...	3148
maven	[OK]		Apache Maven is a software project managemen...	1268
apache/airflow			Apache Airflow	290
apache/nifi		[OK]	Unofficial convenience binaries and Docker i...	227
apache/zeppelin		[OK]	Apache Zeppelin	150
eboraas/apache-php		[OK]	PHP on Apache (with SSL/TLS support), built ...	144
eboraas/apache		[OK]	Apache (with SSL/TLS support), built on Debi...	92
apacheignite/ignite		[OK]	Apache Ignite - Distributed Database	78
apache/skywalking-oap-server		[OK]	Apache SkyWalking OAP Server	76
apache/superset			Apache Superset	73
apache/pulsar/pulsar			Apache Pulsar - Distributed pub/sub messagin...	49
apache/nifi-registry			Unofficial convenience binaries for Apache N...	30
apache/druid			Apache Druid	28

3. docker search redis : Search images with name redis

NAME	DESCRIPTION	STARS
redis	Redis is an open source key-value store that...	10015
sameersbn/redis		83
grokzen/redis-cluster	Redis cluster 3.0, 3.2, 4.0, 5.0, 6.0, 6.2	79
rediscommander/redis-commander	Alpine image for redis-commander - Redis man...	66
redislabs/redisearch	Redis With the RedisSearch module pre-loaded...	39
redislabs/redisinsight	RedisInsight - The GUI for Redis	35
redislabs/redis	Clustered in-memory database engine compatib...	31
oliver006/redis_exporter	Prometheus Exporter for Redis Metrics. Supp...	30
redislabs/rejson	RedisJSON - Enhanced JSON data type processi...	27
arm32v7/redis	Redis is an open source key-value store that...	25
redislabs/redisgraph	A graph database module for Redis	16
redislabs/redismod	An automated build of redismod - latest Redi...	15
arm64v8/redis	Redis is an open source key-value store that...	15

4. docker run docker/whalesay cowsay Hello everyone

```
$ docker run docker/whalesay cowsay Hello everyone
Unable to find image 'docker/whalesay:latest' locally
latest: Pulling from docker/whalesay
e190868d63f8: Pull complete
909cd34c6fd7: Pull complete
0b9bfabab7c1: Pull complete
a3ed95caeb02: Pull complete
00bf65475aba: Pull complete
c57b6bcc83e3: Pull complete
8978f6879e2f: Pull complete
8eed3712d2cf: Pull complete
Digest: sha256:178598e51a26abbc958b8a2e48825c90bc22e641de3d31e18aaf55f3258ba93b
Status: Downloaded newer image for docker/whalesay:latest
```

```
< Hello everyone >
```

\$ 1

5. docker run docker/wehalesay cowsay DevOps

[illegible]

6. `docker ps / docker ps -a` : To list the containers

```
$ docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
	PORTS	NAMES		
27f5051bb140	docker/whalesay	"cowsay Devops"	40 seconds ago	Exited (0)
37 seconds ago		hardcore_ride		
01537cce1567	docker/whalesay	"cowsay Hello everyo..."	3 minutes ago	Exited (0)
3 minutes ago		reverent_elion		

```
$
```


7. docker rm : To remove one or more containers

```
$ docker rm 27f5051bb140 01537cce1567
27f5051bb140
01537cce1567
$
```

8. docker rmi docker/whalesay : To remove container

```
$ docker rmi docker/whalesay
Untagged: docker/whalesay:latest
Untagged: docker/whalesay@sha256:178598e51a26abbc958b8a2e48825c90bc22e641de3d31e18aaf55f32b
Deleted: sha256:6b362a9f73eb8c33b48c95f4fcce1b6637fc25646728cf7fb0679b2da273c3f4
Deleted: sha256:34dd66b3cb4467517d0c5c7dbe320b84539fbb58bc21702d2f749a5c932b3a38
Deleted: sha256:52f57e48814ed1bb08a651ef7f91f191db3680212a96b7f318bff0904fed2e65
Deleted: sha256:72915b616c0db6345e52a2c536de38e29208d945889eecef01d0fef0ed207ce8
Deleted: sha256:4ee0c1e90444c9b56880381aff6455f149c92c9a29c3774919632ded4f728d6b
Deleted: sha256:86ac1c0970bf5ea1bf482edb0ba83dbc88fefb1ac431d3020f134691d749d9a6
Deleted: sha256:5c4ac45a28f91f851b66af332a452cba25bd74a811f7e3884ed8723570ad6bc8
Deleted: sha256:088f9eb16f16713e449903f7edb4016084de8234d73a45b1882cf29b1f753a5a
Deleted: sha256:799115b9fdd1511e8af8a8a3c8b450d81aa842bbf3c9f88e9126d264b232c598
Deleted: sha256:3549adbf614379d5c33ef0c5c6486a0d3f577ba3341f573be91b4ba1d8c60ce4
Deleted: sha256:1154ba695078d29ea6c4e1adb55c463959cd77509adf09710e2315827d66271a
$
```


9. docker images : To remove images

```
$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
redis	latest	4760dc956b2d	3 years ago	107MB
ubuntu	latest	f975c5035748	3 years ago	112MB
alpine	latest	3fd9065eaf02	3 years ago	4.14MB

```
$ █
```

10. docker pull centos:latest : To download centos

```
$ docker pull centos:latest
latest: Pulling from library/centos
a1d0c7532777: Pull complete
Digest: sha256:a27fd8080b517143cbbbab9dfb7c8571c40d67d534bbdee55bd6c473f432b177
Status: Downloaded newer image for centos:latest
$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
centos	latest	5d0da3dc9764	3 weeks ago	231MB
redis	latest	4760dc956b2d	3 years ago	107MB
ubuntu	latest	f975c5035748	3 years ago	112MB
alpine	latest	3fd9065eaf02	3 years ago	4.14MB

```
$ █
```


11. docker run -it -name webserverdemo centos:latest

```
$ docker run -it --name webserverdemo centos:latest
[root@ab4ab0dfe8ff /]# yum install httpd -y
Failed to set locale, defaulting to C.UTF-8
CentOS Linux 8 - AppStream          16 MB/s | 9.3 MB    00:00
CentOS Linux 8 - BaseOS            23 MB/s | 7.5 MB    00:00
CentOS Linux 8 - Extras            28 kB/s | 10 kB     00:00
Dependencies resolved.

=====
Package                        Arch      Version                                Repository    Size
=====
Installing:
httpd                          x86_64    2.4.37-39.module_el8.4.0+778+c970deab  appstream    1.4 M
Installing dependencies:
apr                            x86_64    1.6.3-11.el8                          appstream    125 k
apr-util                       x86_64    1.6.1-6.el8                           appstream    105 k
brotli                         x86_64    1.0.6-3.el8                           baseos       323 k
centos-logos-httpd            noarch    85.8-1.el8                             baseos       75 k
httpd-filesystem               noarch    2.4.37-39.module_el8.4.0+778+c970deab  appstream    38 k
httpd-tools                    x86_64    2.4.37-39.module_el8.4.0+778+c970deab  appstream    106 k
mailcap                        noarch    2.1.48-3.el8                           baseos       39 k
mod_http2                      x86_64    1.15.7-3.module_el8.4.0+778+c970deab  appstream    154 k
Installing weak dependencies:
apr-util-bdb                   x86_64    1.6.1-6.el8                           appstream    25 k
apr-util-openssl               x86_64    1.6.1-6.el8                           appstream    27 k
Enabling module streams:
httpd                          2.4

Transaction Summary
```

```
Transaction Summary
=====
Install 11 Packages

Total download size: 2.4 M
Installed size: 7.1 M
Downloading Packages:
CentOS Linux 8 - BaseOS          204% [=====] 2.1
(1/11): apr-util-bdb-1.6.1-6.el8.x86_64.rpm    685 kB/s | 25 kB    00:00
(2/11): apr-util-1.6.1-6.el8.x86_64.rpm        2.0 MB/s | 105 kB   00:00
(3/11): apr-util-openssl-1.6.1-6.el8.x86_64.rpm 1.7 MB/s | 27 kB    00:00
(4/11): apr-1.6.3-11.el8.x86_64.rpm            2.1 MB/s | 125 kB   00:00
(5/11): httpd-filesystem-2.4.37-39.module_el8.4.0+778+c970deab.n 2.7 MB/s | 38 kB    00:00
(6/11): httpd-tools-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 7.0 MB/s | 106 kB   00:00
(7/11): mod_http2-1.15.7-3.module_el8.4.0+778+c970deab.x86_64.rp 5.7 MB/s | 154 kB   00:00
(8/11): httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64.rpm    22 MB/s | 1.4 MB    00:00
(9/11): brotli-1.0.6-3.el8.x86_64.rpm          3.3 MB/s | 323 kB   00:00
(10/11): centos-logos-httpd-85.8-1.el8.noarch.rpm 973 kB/s | 75 kB    00:00
(11/11): mailcap-2.1.48-3.el8.noarch.rpm        616 kB/s | 39 kB    00:00
-----
Total                                          4.2 MB/s | 2.4 MB    00:00
warning: /var/cache/dnf/appstream-02e86d1c976ab532/packages/apr-1.6.3-11.el8.x86_64.rpm: Header V
3 RSA/SHA256 Signature, key ID 8483c65d: NOKEY
CentOS Linux 8 - AppStream                  1.6 MB/s | 1.6 kB    00:00
Importing GPG key 0x8483C65D:
  Userid      : "CentOS (CentOS Official Signing Key) <security@centos.org>"
  Fingerprint: 99DB 70FA E1D7 CE22 7FB6 4882 05B5 55B3 8483 C65D
  From        : /etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
Key imported successfully
```



```

Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      :                                1/11
  Installing     : apr-1.6.3-11.el8.x86_64        1/11
  Running scriptlet: apr-1.6.3-11.el8.x86_64      1/11
  Installing     : apr-util-bdb-1.6.1-6.el8.x86_64 2/11
  Installing     : apr-util-openssl-1.6.1-6.el8.x86_64 3/11
  Installing     : apr-util-1.6.1-6.el8.x86_64     4/11
  Running scriptlet: apr-util-1.6.1-6.el8.x86_64   4/11
  Installing     : httpd-tools-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 5/11
  Installing     : mailcap-2.1.48-3.el8.noarch      6/11
  Installing     : centos-logos-httpd-85.8-1.el8.noarch 7/11
  Installing     : brotli-1.0.6-3.el8.x86_64       8/11
  Running scriptlet: httpd-filesystem-2.4.37-39.module_el8.4.0+778+c970deab.noarch 9/11
  Installing     : httpd-filesystem-2.4.37-39.module_el8.4.0+778+c970deab.noarch 9/11
  Installing     : mod_http2-1.15.7-3.module_el8.4.0+778+c970deab.x86_64 10/11
  Installing     : httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 11/11
  Running scriptlet: httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 11/11
  Verifying      : apr-1.6.3-11.el8.x86_64        1/11
  Verifying      : apr-util-1.6.1-6.el8.x86_64    2/11
  Verifying      : apr-util-bdb-1.6.1-6.el8.x86_64 3/11
  Verifying      : apr-util-openssl-1.6.1-6.el8.x86_64 4/11
  Verifying      : httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 5/11
  Verifying      : httpd-filesystem-2.4.37-39.module_el8.4.0+778+c970deab.noarch 6/11
  Verifying      : httpd-tools-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 7/11
  Verifying      : mod_http2-1.15.7-3.module_el8.4.0+778+c970deab.x86_64 8/11

```

```

Installing      : mod_http2-1.15.7-3.module_el8.4.0+778+c970deab.x86_64 10/11
Installing      : httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 11/11
Running scriptlet: httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 11/11
Verifying      : apr-1.6.3-11.el8.x86_64 1/11
Verifying      : apr-util-1.6.1-6.el8.x86_64 2/11
Verifying      : apr-util-bdb-1.6.1-6.el8.x86_64 3/11
Verifying      : apr-util-openssl-1.6.1-6.el8.x86_64 4/11
Verifying      : httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 5/11
Verifying      : httpd-filesystem-2.4.37-39.module_el8.4.0+778+c970deab.noarch 6/11
Verifying      : httpd-tools-2.4.37-39.module_el8.4.0+778+c970deab.x86_64 7/11
Verifying      : mod_http2-1.15.7-3.module_el8.4.0+778+c970deab.x86_64 8/11
Verifying      : brotli-1.0.6-3.el8.x86_64 9/11
Verifying      : centos-logos-httpd-85.8-1.el8.noarch 10/11
Verifying      : mailcap-2.1.48-3.el8.noarch 11/11

Installed:
apr-1.6.3-11.el8.x86_64
apr-util-1.6.1-6.el8.x86_64
apr-util-bdb-1.6.1-6.el8.x86_64
apr-util-openssl-1.6.1-6.el8.x86_64
brotli-1.0.6-3.el8.x86_64
centos-logos-httpd-85.8-1.el8.noarch
httpd-2.4.37-39.module_el8.4.0+778+c970deab.x86_64
httpd-filesystem-2.4.37-39.module_el8.4.0+778+c970deab.noarch
httpd-tools-2.4.37-39.module_el8.4.0+778+c970deab.x86_64
mailcap-2.1.48-3.el8.noarch
mod_http2-1.15.7-3.module_el8.4.0+778+c970deab.x86_64

Complete!
[root@ab4ab0dfe8ff /]#

```

CONCLUSION : Hence we can conclude that we have learned and implemented Docker Architecture and Container Life Cycle and executed docker commands to manage images and interact with containers.