

## ASSIGNMENT 7

AIM: To understand Docker architecture and container life cycle, install dockers, deploy container in Docker.

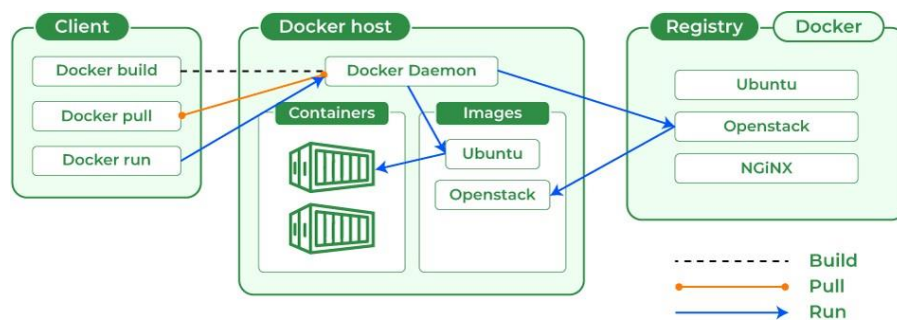
LO MAPPED: LO1, LO5

THEORY:

- **Introduction to Docker-**

In the dynamic realm of software development and deployment, Docker has emerged as a game-changing technology. Docker's containerization approach has streamlined the way applications are packaged, distributed, and executed. It eliminates compatibility issues by encapsulating an application and its dependencies into a single, portable unit called a container. This assignment explores Docker's architecture, provides installation guidance, and guides you through the deployment of your own containers. By the end, you'll have a solid understanding of Docker's core concepts and practical skills for efficient application deployment.

- **Docker Architecture**



Docker's architecture is the backbone of its containerization technology, enabling the efficient creation and management of containers. Understanding Docker's architecture is crucial for harnessing its full potential. Let's delve into the key components that make up Docker's architecture:

1. Docker Engine:

- At the core of Docker is the Docker Engine, which is responsible for creating and running containers. It includes:
- Docker Daemon: This background service manages containers. It listens for Docker API requests and takes care of container operations.
- Docker Client: The command-line tool that allows users to interact with the Docker Daemon. Users issue commands to the Docker Client, which in turn communicates with the Docker Daemon.

## 2 Docker Images:

- Docker containers are based on Docker Images. These images are read-only templates that contain everything needed to run an application, including the code, runtime, libraries, and environment variables. Images are the building blocks of containers and are often shared via Docker registries like Docker Hub.

## 3 Docker Containers:

- Docker Containers are instances of Docker Images. They are lightweight, isolated environments where applications run. Containers can be started, stopped, paused, and deleted, providing a consistent and portable environment for applications.

## 4 Docker Registry:

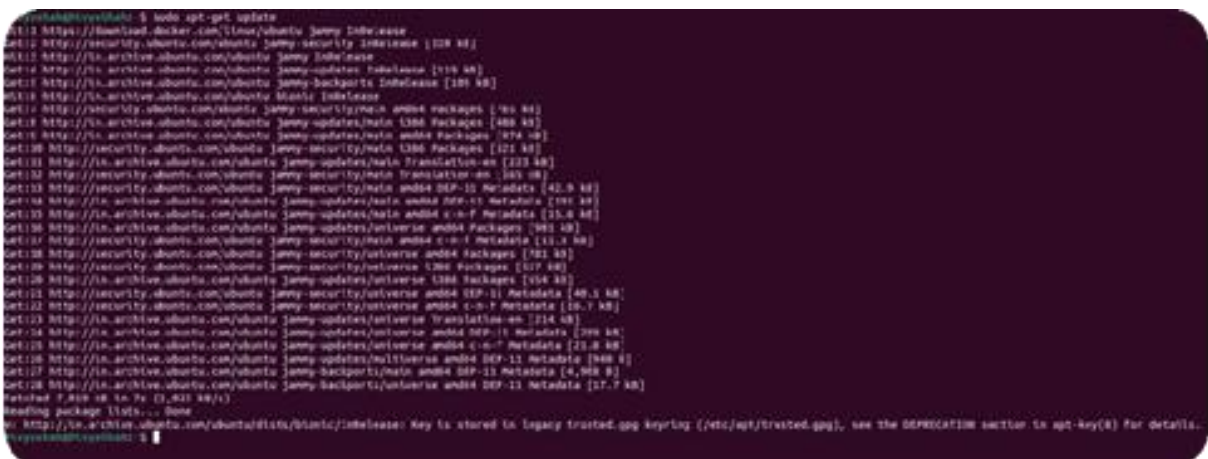
- Docker Registries are repositories for Docker Images. The most commonly used registry is Docker Hub, a public registry that hosts a vast collection of Docker Images. Organizations often set up private registries to store and share their custom images securely.

Understanding this architecture is essential as it forms the basis for working with Docker. In the following sections of this assignment, we will explore how to install Docker, interact with Docker containers, and deploy applications within these containers. This hands-on experience will solidify your grasp of Docker's architecture and its practical applications.

### • **Installation of Docker**

To install Docker on Windows, you can use Docker Desktop, which provides an easy way to set up and manage Docker containers on Windows 10 and Windows 11. Follow these steps to install Docker Desktop on Windows:

*sudo apt -get update*



```
root@ubuntu:~# sudo apt-get update
Hit:1 http://download.docker.com/linux/ubuntu InRelease
Hit:2 http://security.ubuntu.com/ubuntu InRelease
Hit:3 http://us.archive.ubuntu.com/ubuntu InRelease
Get:4 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu InRelease [109 kB]
Get:6 http://security.ubuntu.com/ubuntu InRelease [493 kB]
Get:7 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:8 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:9 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:11 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:12 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:13 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:14 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:15 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:16 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:17 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:18 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:19 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:20 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:21 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:22 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:23 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:24 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:25 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:26 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:27 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:28 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:29 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:30 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:31 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:32 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:33 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:34 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:35 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:36 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:37 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:38 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:39 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:40 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:41 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:42 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:43 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:44 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:45 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:46 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:47 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:48 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:49 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:50 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:51 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:52 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:53 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:54 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:55 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:56 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:57 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:58 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:59 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:60 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:61 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:62 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:63 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:64 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:65 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:66 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:67 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:68 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:69 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:70 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:71 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:72 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:73 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:74 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:75 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:76 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:77 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:78 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:79 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:80 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:81 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:82 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:83 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:84 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:85 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:86 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:87 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:88 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:89 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:90 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:91 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:92 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:93 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:94 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:95 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:96 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:97 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:98 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:99 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Get:100 http://us.archive.ubuntu.com/ubuntu InRelease [519 kB]
Reading package lists... Done
W: http://us.archive.ubuntu.com/ubuntu/dists/kinetic/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATION section in apt-key(8) for details.
```

*sudo apt – get install docker – ce*

```
divyashah@DivyaShah:~$ sudo apt-get install docker-ce
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  gcc-ubuntu12.2-base gcc-12-base gcc-12-base:amd64 libgcc1 libgcc1:amd64 libstdc++6 libstdc++6:amd64 libatomic1 libatomic1:amd64 libquadmath0 libquadmath0:amd64
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  containerd.io docker-ce-cli docker-compose-plugin
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite
The following NEW packages will be installed:
  containerd.io docker-ce docker-ce-cli docker-compose-plugin
0 upgraded, 4 newly installed, 0 to remove and 16 not upgraded.
Need to get 58.9 MB/74.1 MB of archives.
After this operation, 310 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1: https://download.docker.com/linux/ubuntu jammy/stable amd64 containerd.io amd64 1.6.22-1 [29.7 MB]
Get:2: https://download.docker.com/linux/ubuntu jammy/stable amd64 docker-ce amd64 5:24.0.6-1~ubuntu.22.04-jammy [22.5 MB]
Fetched 58.9 MB in 1s (24.0 MB/s)
Selecting previously unselected package containerd.io.
(Reading database ... 238194 files and directories currently installed.)
Preparing to unpack .../containerd.io_1.6.22-1_amd64.deb ...
Unpacking containerd.io (1.6.22-1) ...
Selecting previously unselected package docker-ce-cli.
Preparing to unpack .../docker-ce-cli_5:24.0.6-1~ubuntu.22.04-jammy_amd64.deb ...
Unpacking docker-ce-cli (5:24.0.6-1~ubuntu.22.04-jammy) ...
Selecting previously unselected package docker-ce.
Preparing to unpack .../docker-ce_5:24.0.6-1~ubuntu.22.04-jammy_amd64.deb ...
Unpacking docker-ce (5:24.0.6-1~ubuntu.22.04-jammy) ...
Selecting previously unselected package docker-compose-plugin.
Preparing to unpack .../docker-compose-plugin_2.21.0-1~ubuntu.22.04-jammy_amd64.deb ...
Unpacking docker-compose-plugin (2.21.0-1~ubuntu.22.04-jammy) ...
Setting up containerd.io (1.6.22-1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/containerd.service → /lib/systemd/system/containerd.service.
Setting up docker-compose-plugin (2.21.0-1~ubuntu.22.04-jammy) ...
Setting up docker-ce-cli (5:24.0.6-1~ubuntu.22.04-jammy) ...
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /lib/systemd/system/docker.service.
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /lib/systemd/system/docker.socket.
Processing triggers for man-db (2.10.2-1) ...
divyashah@DivyaShah:~$
```

*sudo snap install docker*

```
divyashah@DivyaShah:~$ sudo snap install docker
docker 20.10.24 from Canonical** installed
divyashah@DivyaShah:~$
```

*For checking docker version installed you can use*

```
divyashah@DivyaShah:~$ docker --version
Docker version 24.0.6, build ed223bc
divyashah@DivyaShah:~$
```

*sudo docker run hello — world*

```
divyashah@DivyaShah:~$ sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
719385e32844: Full complete
Digest: sha256:4f53e2564790c8e7856ec08e364732aa33dc43c52f02952483ef003afbf23db
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
   (amd64)
3. The Docker daemon created a new container from that image which runs the
   executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it
   to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/
divyashah@DivyaShah:~$
```

*sudo docker images*

```
divyashah@DivyaShah:~$ sudo docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
hello-world    latest    9c7a54a9a43c   4 months ago   13.3kB
divyashah@DivyaShah:~$
```

*sudo docker ps -a*

```
divyashah@DivyaShah:~$ sudo docker ps -a
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS          PORTS          NAMES
8368ca9ee1fe   hello-world    "/hello"                 3 minutes ago   Exited (0) 3 minutes ago           jovial_bhabha
divyashah@DivyaShah:~$
```

*sudo docker ps*

```
divyashah@DivyaShah:~$ sudo docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS          NAMES
divyashah@DivyaShah:~$
```

CONCLUSION: By this assignment we understand Docker architecture and container life cycle, install dockers, deploy container in Docker.