

## QUESTION 1 : Introduction to containerization and Docker fundamentals, Basic Commands

**Soln:**

### 1. Introduction to Containerization

**Containerization is a lightweight form of virtualization that allows you to run applications in isolated environments called containers. Unlike virtual machines, containers share the host OS kernel, making them faster, more efficient, and portable.**

#### **Benefits of Containerization**

- Lightweight
- Faster deployment
- Environment consistency
- Portability across systems
- Scalable microservices architecture

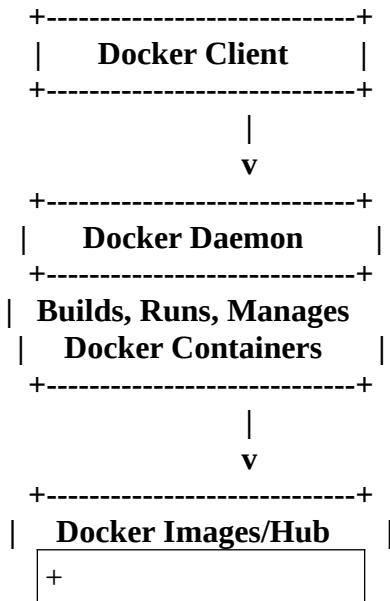
### 2. What is Docker?

**Docker** is the most popular containerization platform. It allows developers to package applications and their dependencies into containers that run consistently across environments.

#### **Docker Ecosystem:**

- **Docker Engine:** Core container runtime
- **Docker CLI:** Command line interface
- **Docker Hub:** Public container registry
- **Docker Compose:** Tool to manage multi-container apps

### 3. Docker Architecture

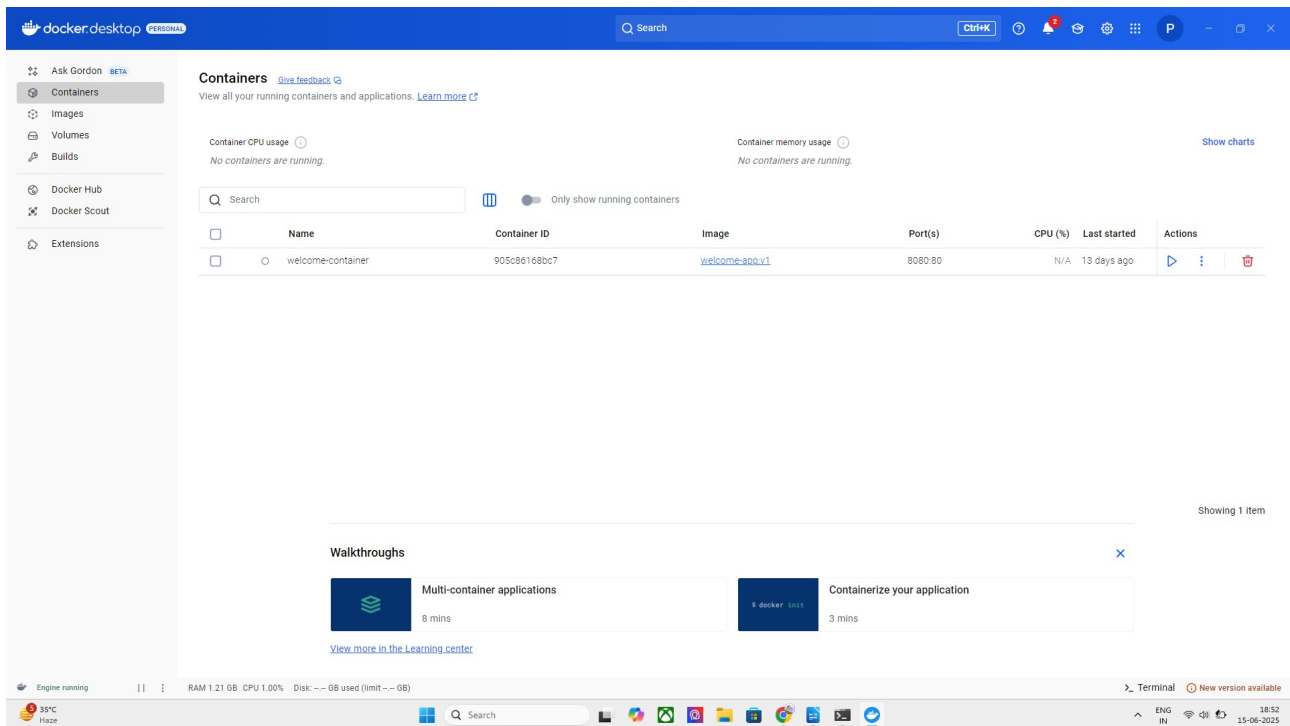


#### 4. Basic Docker Workflow

- Write code
- Create a Dockerfile
- Build image: `docker build`
- Run container: `docker run`
- Push to registry (optional): `docker push`

#### 5. Basic Docker Commands

Command	Description
<code>docker --version</code>	Check Docker version
<code>docker pull &lt;image&gt;</code>	Download image from Docker Hub
<code>docker images</code>	List local images
<code>docker ps</code>	Show running containers
<code>docker ps -a</code>	Show all containers
<code>docker run &lt;image&gt;</code>	Run container from image
<code>docker build -t name .</code>	Build image from Dockerfile
<code>docker exec -it &lt;container_id&gt; bash</code>	Enter container shell
<code>docker stop &lt;container_id&gt;</code>	Stop a running container
<code>docker rm &lt;container_id&gt;</code>	Remove a container
<code>docker rmi &lt;image_id&gt;</code>	Remove an image



**docker --version**

```
Microsoft Windows [Version 10.0.26100.4351]
(c) Microsoft Corporation. All rights reserved.

C:\Users\prate>docker --version
Docker version 28.0.4, build b8034c0

C:\Users\prate>
```

**docker pull <image>**

```
C:\Users\prate>docker pull nginx:alpine
alpine: Pulling from library/nginx
f18232174bc9: Already exists
61ca4f733c80: Already exists
b464cfd2a63: Already exists
d7e507024086: Already exists
81bd8ed7ec67: Already exists
197eb75867ef: Already exists
34a64644b756: Already exists
39c2ddfd6010: Already exists
Digest: sha256:65645c7bb6a0661892a8b03b89d0743208a18dd2f3f17a54ef4b76fb8e2f2a10
Status: Downloaded newer image for nginx:alpine
docker.io/library/nginx:alpine

C:\Users\prate>
```

## docker images

```
C:\Users\prate>docker images
REPOSITORY                                TAG      IMAGE ID      CREATED      SIZE
prateekregistry.azurecr.io/welcome-app   v1        dafaec1c9b14  13 days ago  48.2MB
nginx                                      alpine    6769dc3a703c  8 weeks ago  48.2MB

C:\Users\prate>
```

## docker ps/ docker ps -a

```
C:\Users\prate>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS                    NAMES
905c86168bc7   prateekregistry.azurecr.io/welcome-app:v1   "/docker-entrypoint..."  13 days ago    Exited (255)  2 minutes ago    0.0.0.0:8080->80/tcp    welcome-container

C:\Users\prate>docker ps
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS                    NAMES

C:\Users\prate>
```

## docker run <image>

```
C:\Users\prate>docker run prateekregistry.azurecr.io/welcome-app:v1
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2025/06/15 13:26:19 [notice] 1#1: using the "epoll" event method
2025/06/15 13:26:19 [notice] 1#1: nginx/1.27.5
2025/06/15 13:26:19 [notice] 1#1: built by gcc 14.2.0 (Alpine 14.2.0)
2025/06/15 13:26:19 [notice] 1#1: OS: Linux 6.6.87.1-microsoft-standard-WSL2
2025/06/15 13:26:19 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2025/06/15 13:26:19 [notice] 1#1: start worker processes
2025/06/15 13:26:19 [notice] 1#1: start worker process 30
2025/06/15 13:26:19 [notice] 1#1: start worker process 31
2025/06/15 13:26:19 [notice] 1#1: start worker process 32
2025/06/15 13:26:19 [notice] 1#1: start worker process 33
2025/06/15 13:26:19 [notice] 1#1: start worker process 34
2025/06/15 13:26:19 [notice] 1#1: start worker process 35
2025/06/15 13:26:19 [notice] 1#1: start worker process 36
2025/06/15 13:26:19 [notice] 1#1: start worker process 37
2025/06/15 13:26:19 [notice] 1#1: start worker process 38
2025/06/15 13:26:19 [notice] 1#1: start worker process 39
2025/06/15 13:26:19 [notice] 1#1: start worker process 40
2025/06/15 13:26:19 [notice] 1#1: start worker process 41
2025/06/15 13:26:19 [notice] 1#1: start worker process 42
2025/06/15 13:26:19 [notice] 1#1: start worker process 43
2025/06/15 13:26:19 [notice] 1#1: start worker process 44
2025/06/15 13:26:19 [notice] 1#1: start worker process 45
```

## docker rm <container\_id>

```
C:\Users\prate>docker rm 905c86168bc7
905c86168bc7

C:\Users\prate>docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED          STATUS          PORTS          NAMES
859f02866489   prateekregistry.azurecr.io/welcome-app:v1   "/docker-entrypoint..." About a minute ago   Exited (0) About a minute ago           quizzical_wright
1a2f1d4fc5908   prateekregistry.azurecr.io/welcome-app:v1   "/docker-entrypoint..." About a minute ago   Exited (0) About a minute ago           musing_fermi

C:\Users\prate>
```

## Docker image ls

```
C:\Users\prate>docker image ls
REPOSITORY                                TAG          IMAGE ID          CREATED          SIZE
prateekregistry.azurecr.io/welcome-app   v1           dafaec1c9b14     13 days ago     48.2MB
nginx                                     alpine       6769dc3a703c     8 weeks ago     48.2MB

C:\Users\prate>
```

## docker rmi <image\_id>

```
C:\Users\prate>docker rmi -f dafaec1c9b14
Untagged: prateekregistry.azurecr.io/welcome-app:v1
Untagged: prateekregistry.azurecr.io/welcome-app@sha256:34fee5743ad5996563231bf207fde2e62c18be2ca2768bcb67f83f6bfc089498
Deleted: sha256:dafaec1c9b14a39dc0b19a5f5863b7b6df969f7651a41c15b06155e8f89041d0

C:\Users\prate>docker image ls
REPOSITORY  TAG          IMAGE ID          CREATED          SIZE
nginx       alpine       6769dc3a703c     8 weeks ago     48.2MB

C:\Users\prate>
```