Lab Exercise 1- Docker Fundamental Commands

Objective

Learn and practice the fundamental Docker CLI commands to:

- Manage images and containers

- Understand container lifecycle

- Build and run applications using Docker

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1. Setup

Prerequisites

- Docker installed on your system

  (Check using: docker --version)

- Internet access to pull images

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2. Basic Docker Commands

Step 1: Verify Installation

```
docker --version

docker info
```

```
shaad@shaadiso:~$ docker --version
Docker version 29.1.5, build 0e6fee6
shaad@shaadiso:~$ docker info
Client: Docker Engine - Community
 Version:    29.1.5
 Context:    default
 Debug Mode: false
 Plugins:
  buildx: Docker Buildx (Docker Inc.)
    Version:  v0.30.1
    Path:     /usr/libexec/docker/cli-plugins/docker-buildx
  compose: Docker Compose (Docker Inc.)
    Version:  v5.0.1
    Path:     /usr/libexec/docker/cli-plugins/docker-compose
  model: Docker Model Runner (Docker Inc.)
    Version:  v1.0.7
    Path:     /usr/libexec/docker/cli-plugins/docker-model

Server:
 Containers: 32
  Running: 0
  Paused: 0
  Stopped: 32
 Images: 3
 Server Version: 29.1.5
 Storage Driver: overlayfs
  driver-type: io.containerd.snapshotter.v1
 Logging Driver: json-file
 Cgroup Driver: systemd
 Cgroup Version: 2
 Plugins:
  Volume: local
  Network: bridge host ipvlan macvlan null overlay
  Log: awslogs fluentd gcplogs gelf journald json-file local splunk syslog
 CDI spec directories:
  /etc/cdi
  /var/run/cdi
 Swarm: inactive
 Runtimes: io.containerd.runc.v2 runc
 Default Runtime: runc
 Init Binary: docker-init
 containerd version: dea7da592f5d1d2b7755e3a161be07f43fad8f75
 runc version: v1.3.4-0-gd6d73eb8
 init version: de40ad0
 Security Options:
  apparmor
  seccomp
   Profile: builtin
  cgroupns
 Kernel Version: 6.17.9-76061709-generic
 Operating System: Pop!_OS 22.04 LTS
 OSType: linux
 Architecture: x86_64
 CPUs: 12
 Total Memory: 15.29GiB
 Name: shaadiso
 ID: 87423bf4-24db-4620-af18-4cdcd53aff12
 Docker Root Dir: /var/lib/docker
 Debug Mode: false
 Experimental: false
 Insecure Registries:
  ::1/128
  127.0.0.0/8
 Live Restore Enabled: false
 Firewall Backend: iptables
```

Step 2: Pull an Image from Docker Hub

```
docker pull ubuntu:latest
```

```
shaad@shaadiso:~$ docker pull ubuntu:latest
latest: Pulling from library/ubuntu
a3629ac5b9f4: Pull complete

1baf05536e37: Download complete

Digest: sha256:cd1dba651b3080c3686ecf4e3c4220f026b521fb76978881737d24f200828b2b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
shaad@shaadiso:~$ ==
```

Explanation: Downloads the latest Ubuntu image from Docker Hub.

Check available images:

```
docker images
```

```
shaad@shaadiso:~$ docker images

IMAGE                   ID              DISK USAGE    CONTENT SIZE    EXTRA
hello-world:latest      d4aaab6242e0        25.9kB          9.52kB     U
mae-backend:latest      a174ad0779b6        614MB           159MB      U
stockfish-api:latest    d9ea32ad2b0b        814MB           254MB      U
ubuntu:latest           cd1dba651b30        119MB           31.7MB
shaad@shaadiso:~$ 
```

Step 3: Run a Container

Run Ubuntu interactively:

```
docker run -it --name myubuntu ubuntu bash
```

```
shaad@shaadiso:~$ docker run -it --name myubuntu ubuntu bash
root@0eb289ba8d63:/# exit
exit
shaad@shaadiso:~$ 
```

Now you're inside a running container (prompt will change).

Exit:

```
exit
```

Step 4: List Containers

- Show running containers:

```
docker ps
```

- Show all containers (including stopped):

```
docker ps -a
```

```
shaad@shaadiso:~$ docker ps
CONTAINER ID   IMAGE          COMMAND          CREATED         STATUS                   PORTS      NAMES
shaad@shaadiso:~$ docker ps -a
CONTAINER ID   IMAGE          COMMAND                CREATED         STATUS                   PORTS      NAMES
0eb289ba8d63   ubuntu         "bash"                 49 seconds ago  Exited (0) 41 seconds ago           myubuntu
512e6591aff8   stockfish-api  "uvicorn app.main:ap…" 20 hours ago    Exited (0) 14 hours ago             gracious_noyce
39c7e63dd620   33f347d939d8   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 39 hours ago             dazzling_pike
9786ba4df778   32bada3a174d   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 40 hours ago             vigilant_davinci
5c8ca713ade5   4f1936e0e5fc   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 40 hours ago             bold_sammet
9f6abbfbf5f5   4f1936e0e5fc   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 40 hours ago             nostalgic_clarke
2351933ec2ce   5fb73bd9ed7b   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 40 hours ago             priceless_darwin
7c46f1fe9ad2   83ce6d4a699d   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 40 hours ago             amazing_bhabha
9897b0590367   094cbef6ead8   "uvicorn app.main:ap…" 40 hours ago    Exited (1) 40 hours ago             heuristic_kepler
dd1a353a7f4f   538c525b30bc   "uvicorn app.main:ap…" 40 hours ago    Exited (0) 40 hours ago             blissful_leakey
f6867e0bcbbb   538c525b30bc   "uvicorn app.main:ap…" 40 hours ago    Created                             competent_benz
c5d07b37af61   a9f6845f3309   "uvicorn app.main:ap…" 46 hours ago    Exited (137) 40 hours ago           nifty_dubinsky
c4f43e12de80   d99c45a427d9   "uvicorn app.main:ap…" 46 hours ago    Exited (0) 46 hours ago             serene_chandrasekhar
97da3a93665b   592f20060728   "uvicorn app.main:ap…" 47 hours ago    Exited (0) 46 hours ago             keen_sanderson
f620c7a985e1   315a9e114ae6   "uvicorn app.main:ap…" 47 hours ago    Exited (0) 47 hours ago             brave_khorana
95f5892ed4e0   7d525f9c2ba5   "uvicorn app.main:ap…" 2 days ago      Exited (0) 47 hours ago             pensive_varahamihira
0eb6c10006e2   fed1fc6a994a   "uvicorn app.main:ap…" 2 days ago      Exited (0) 2 days ago               musing_wilbur
b13c3fc515c2   06ffa8228f8a   "uvicorn app.main:ap…" 2 days ago      Exited (0) 2 days ago               interesting_dijkstra
2f1e9ff8d03a   3c651286c7b7   "uvicorn app.main:ap…" 2 days ago      Exited (0) 2 days ago               upbeat_jepsen
6a288f1878e2   mae-backend    "uvicorn app.main:ap…" 3 days ago      Exited (137) 40 hours ago           clever_tu
290d1b2d013a   mae-backend    "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               inspiring_kepler
9bb9083165e6   mae-backend    "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               zealous_yalow
261b53b94ce4   b78d6bd1b772   "uvicorn app.main:ap…" 3 days ago      Exited (0) 2 days ago               dazzling_meninsky
6c19dd42c85c   d863ab777789   "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               nice_kare
0f97f40042d7   mae-backend    "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               youthful_jones
728758d3dec7   mae-backend    "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               happy_elion
23b1abd3dbf1   mae-backend    "uvicorn app.main:ap…" 3 days ago      Created                             bold_nash
43146e846e82   276c99cec6a8   "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               flamboyant_bell
2dc831ac6a22   89508c1830b7   "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               interesting_chebyshev
824527eda051   35ca46cac4d5   "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               jovial_black
e19b46dc31af   d2e01e2fad0e   "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               hopeful_montalcini
771152c3106b   59dbf5f7d5bb   "uvicorn app.main:ap…" 3 days ago      Exited (0) 3 days ago               affectionate_dhawan
ae6eb7728277   hello-world    "/hello"               4 weeks ago     Exited (0) 4 weeks ago              boring_jennings
shaad@shaadiso:~$ 
```

Step 5: Start / Stop / Remove Containers

Start a stopped container

docker start <container_id>

```
shaad@shaadiso:~$ docker start 0eb289ba8d63
0eb289ba8d63
shaad@shaadiso:~$
```

Stop a running container

docker stop <container_id>

```
shaad@shaadiso:~$ docker stop 0eb289ba8d63
0eb289ba8d63
shaad@shaadiso:~$
```

Remove a container

docker rm <container_id>

```
shaad@shaadiso:~$ docker rm 771152c3106b
771152c3106b
shaad@shaadiso:~$
```

Tip: Use docker ps -a to get container IDs.

Step 6: Remove Images

```
docker rmi ubuntu:latest
```

```
shaad@shaadiso:~$ docker rm 0eb289ba8d63
docker rmi ubuntu:latest
0eb289ba8d63
Untagged: ubuntu:latest
Deleted: sha256:cd1dba651b3080c3686ecf4e3c4220f026b521fb76978881737d24f200828b2b
shaad@shaadiso:~$
```

Note: You must stop and remove all containers using that image first.