

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**

1. Setup

Prerequisites

- Docker installed on your system
(Check using: `docker --version`)
- Internet access to pull images

2. Basic Docker Commands

Step 1: Verify Installation

```
docker --version
```

```
docker info
```

Expected Output: Docker version and system details.

```
C:\Users\HP>Docker --version  
Docker version 28.3.2, build 578ccf6
```

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```
C:\Users\HP>docker info
Client:
Version:      28.3.2
Context:      desktop-linux
Debug Mode:   false
Plugins:
ai: Docker AI Agent - Ask Gordon (Docker Inc.)
  Version:    v1.9.9
  Path:       C:\Users\HP\.docker\cli-plugins\docker-ai.exe
buildx: Docker Buildx (Docker Inc.)
  Version:    v0.25.0-desktop.1
  Path:       C:\Program Files\Docker\cli-plugins\docker-buildx.exe
cloud: Docker Cloud (Docker Inc.)
  Version:    v0.4.2
  Path:       C:\Program Files\Docker\cli-plugins\docker-cloud.exe
compose: Docker Compose (Docker Inc.)
  Version:    v2.38.2-desktop.1
  Path:       C:\Program Files\Docker\cli-plugins\docker-compose.exe
debug: Get a shell into any image or container (Docker Inc.)
  Version:    0.0.41
  Path:       C:\Program Files\Docker\cli-plugins\docker-debug.exe
desktop: Docker Desktop commands (Docker Inc.)
  Version:    v0.1.11
  Path:       C:\Program Files\Docker\cli-plugins\docker-desktop.exe
extension: Manages Docker extensions (Docker Inc.)
  Version:    v0.2.29
  Path:       C:\Program Files\Docker\cli-plugins\docker-extension.exe
init: Creates Docker-related starter files for your project (Docker Inc.)
  Version:    v1.4.0
  Path:       C:\Program Files\Docker\cli-plugins\docker-init.exe
mcp: Docker MCP Plugin (Docker Inc.)
  Version:    v0.9.9
  Path:       C:\Program Files\Docker\cli-plugins\docker-mcp.exe
model: Docker Model Runner (EXPERIMENTAL) (Docker Inc.)
  Version:    v0.1.33
  Path:       C:\Program Files\Docker\cli-plugins\docker-model.exe
sbom: View the packaged-based Software Bill Of Materials (SBOM) for an image (Anchore Inc.)
  Version:    0.6.0
  Path:       C:\Program Files\Docker\cli-plugins\docker-sbom.exe
scout: Docker Scout (Docker Inc.)
  Version:    v1.18.2
  Path:       C:\Users\HP\.docker\cli-plugins\docker-scout.exe
```

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```
Server:
Containers: 6
  Running: 0
  Paused: 0
  Stopped: 6
Images: 7
Server Version: 28.3.2
Storage Driver: overlayfs
  driver-type: io.containerd.snapshotter.v1
Logging Driver: json-file
Cgroup Driver: cgroupfs
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
Discovered Devices:
  cdi: docker.com/gpu=webgpu
Swarm: inactive
Runtimes: runc io.containerd.runc.v2 nvidia
Default Runtime: runc
Init Binary: docker-init
containerd version: 05044ec0a9a75232cad458027ca83437aae3f4da
runc version: v1.2.5-0-g59923ef
init version: de40ad0
Security Options:
  seccomp
    Profile: builtin
  cgroupns
Kernel Version: 6.6.87.2-microsoft-standard-WSL2
Operating System: Docker Desktop
OSType: linux
Architecture: x86_64
CPUs: 16
Total Memory: 7.592GiB
Name: docker-desktop
ID: 1334dc41-1861-4205-abca-170fd773399d
Docker Root Dir: /var/lib/docker
Debug Mode: false
HTTP Proxy: http.docker.internal:3128
HTTPS Proxy: http.docker.internal:3128
No Proxy: hubproxy.docker.internal
Labels:
  com.docker.desktop.address=npipe://\\.\pipe\docker_cli
Experimental: false
Insecure Registries:
  hubproxy.docker.internal:5555
  ::1/128
  127.0.0.0/8
Live Restore Enabled: false

WARNING: DOCKER_INSECURE_NO_IPTABLES_RAW is set
```

Step 2: Pull an Image from Docker Hub

```
docker pull ubuntu:latest
```

Explanation: Downloads the latest Ubuntu image from Docker Hub.

Check available images:

```
docker images
```

```
C:\Users\HP>docker pull ubuntu:latest
latest: Pulling from library/ubuntu
a3629ac5b9f4: Pull complete
Digest: sha256:cd1dba651b3080c3686ecf4e3c4220f026b521fb76978881737d24f200828b2b
Status: Downloaded newer image for ubuntu:latest
docker.io/library/ubuntu:latest
```

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```
C:\Users\HP>docker images
REPOSITORY          TAG         IMAGE ID      CREATED        SIZE
ubuntu              latest      cd1dba651b30  5 days ago    117MB
nginx               latest      553f64aecdc3  2 months ago  225MB
demo_app_try        latest      61c28ae23713  2 months ago  80.1MB
sreyassharma/signed_images_jenkins  1.0.1      eba1c7c0314a  2 months ago  80.1MB
jasonish/suricata   latest      fc6cce7683d2  2 months ago  594MB
ghcr.io/zaproxy/zaproxy  stable      84d2459dc305  2 months ago  3.58GB
nginx-html-app       latest      d09021b70462  2 months ago  225MB
hello-world          latest      f7931603f70e  5 months ago  20.3kB
```

Step 3: Run a Container

Run Ubuntu interactively:

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

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

Exit:

```
exit
```

```
C:\Users\HP>docker run -it --name Shivangubuntu ubuntu bash
root@1a06f2e5bdaf:/# exit
exit
```

Step 4: List Containers •

Show running containers:

```
docker ps
```

- Show all containers (including stopped):

```
docker ps -a
```

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

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```
C:\Users\HP>docker ps -a
CONTAINER ID   IMAGE          COMMAND                  CREATED        STATUS        PORTS          NAMES
1a06f2e5bdaf   ubuntu        "bash"                  About a minute ago    Exited (0) 57 seconds ago           Shivangubuntu
4798d53ba747   nginx:latest  "/docker-entrypoint..." 2 months ago    Exited (0) 2 months ago           affectionate_bardeen
d609690dd320   nginx-html-app:latest "/docker-entrypoint..." 2 months ago    Exited (255) 8 weeks ago           loving_hopper
1e09e0349ab5   hello-world:latest "/hello"                2 months ago    Exited (0) 2 months ago           crazy_meninsky
3c71cfcb358d   nginx-html-app:latest "/docker-entrypoint..." 2 months ago    Exited (255) 8 weeks ago           eager_golick
4b2b62e3715e   hello-world:latest "/hello"                2 months ago    Exited (0) 2 months ago           charming_jones
8d41774da765   hello-world   "/hello"                2 months ago    Exited (0) 2 months ago           gallant_dubinsky
```

Step 5: Start / Stop / Remove Containers

```
# Start a stopped container

docker start <container_id> #

Stop a running container

docker stop <container_id> #

Remove a container

docker rm <container_id>
```

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

```
C:\Users\HP>docker start 1a06f2e5bdaf
1a06f2e5bdaf

C:\Users\HP>docker stop 1a06f2e5bdaf
1a06f2e5bdaf

C:\Users\HP>docker rm 1a06f2e5bdaf
1a06f2e5bdaf
```

Step 6: Remove Images

```
docker rmi ubuntu:latest
```

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

```
C:\Users\HP>docker rmi ubuntu:latest
Untagged: ubuntu:latest
Deleted: sha256:cd1dba651b3080c3686ecf4e3c4220f026b521fb76978881737d24f200828b2b
```

```
C:\Users\HP>docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
nginx	latest	553f64aecdc3	2 months ago	225MB
demo_app_try	latest	61c28ae23713	2 months ago	80.1MB
sreyassharma/signed_images_jenkins	1.0.1	eba1c7c0314a	2 months ago	80.1MB
jasonish/suricata	latest	fc6cce7683d2	2 months ago	594MB
ghcr.io/zaproxy/zaproxy	stable	84d2459dc305	2 months ago	3.58GB
nginx-html-app	latest	d09021b70462	2 months ago	225MB
hello-world	latest	f7931603f70e	5 months ago	20.3kB