**Assignment**

1. **What is Docker, and why is it used?**

Docker is an **open-source platform** that enables developers to build, ship, and run applications in **lightweight, portable containers**.

It is used for **fast deployment, consistency across environments, and efficient resource utilization**.

1. **How is Docker different from a virtual machine (VM)?**

**VMs:** Require a **guest OS** for each instance, leading to higher resource consumption.

**Docker:** Uses a **shared OS kernel**, making it lightweight and faster.

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| **Feature** | **Virtual Machine** | **Docker Container** |
| OS Overhead | High (Each VM has its OS) | Low (Shares OS kernel) |
| Performance | Slower (More resource-intensive) | Faster (Lightweight) |
| Startup Time | Minutes | Seconds |
| Isolation | Stronger (Full OS) | Weaker (Process-level) |

1. **What are the main components of Docker?**

**Docker Engine:** Runs and manages containers.

**Docker Images:** Blueprints for containers.

**Docker Containers:** Instances of images.

**Docker Registry (ECR/Docker Hub):** Stores images.

**Docker Compose:** Defines multi-container applications.

1. **Explain the difference between Docker images and Docker containers.**

**Docker Image:** A **read-only template** with application code and dependencies.

**Docker Container:** A **running instance** of an image.

1. **What is a Dockerfile?**

A Dockerfile is a script that defines the **instructions** to build a Docker image.

1. **What command is used to build a Docker image?**

docker build -t <image-name> .

1. **How do you run a container from an image?**

docker run -d -p 80:80 --name mycontainer myimage

1. **How do you list all running containers?**

docker ps

1. **What command is used to stop a running container?**

docker stop <container\_id>

1. **How do you remove a Docker container?**

docker rm <container\_id>

1. **What is the difference between CMD and ENTRYPOINT in a Dockerfile?**

**CMD:** Provides **default commands** but can be overridden.

**ENTRYPOINT:** Used for a **fixed command** that cannot be overridden.

1. **What is a Docker volume, and why is it used?**

A **Docker volume** is a storage mechanism used to **persist data** outside a container’s lifecycle.

1. **How do you persist data in Docker containers?**

Use volumes: docker volume create myvolume

Mount it: docker run -v myvolume:/data myimage

1. **What is a Docker Compose file? How is it used?**

A **YAML file** (docker-compose.yml) that defines multi-container applications.

1. **How do you scale services using Docker Compose?**

Use docker-compose up --scale <service>=<count>

1. **How do you check the logs of a running container?**

docker logs <container\_id>

1. **What is the purpose of the .dockerignore file?**

Excludes unnecessary files when building an image, improving performance.

1. **What are the different networking modes in Docker?**

**Bridge (default), Host, None, Overlay, Macvlan.**

1. **How do you expose ports in a Docker container?**

Use EXPOSE <port> in a Dockerfile or -p <host>:<container> in docker run.

1. **What is the difference between docker stop and docker kill?**

docker stop: **Gracefully** stops a container.

docker kill: **Immediately** stops a container.