Assignment

1. **What is Docker, and why is it used?**
   Docker is a containerization platform that allows to create, deploy, and run applications inside lightweight, portable containers. It helps with consistency and simplifies software deployment.

2. **How is Docker different from a virtual machine (VM)?**
   Docker shares the hosted Operating System and lightweight, while VMs require one OS for each instance, resulting in slower and more resource-consuming.

3. **What are the main components of Docker?**
   Docker Engine, Docker Images, Docker Containers, Docker Hub, and Docker Compose.

4. **Explain the difference between Docker images and Docker containers.**
   - A Docker image is a blueprint of container.
   - A Docker container is a running process of an image.

5. **What is a Dockerfile?**
   A Dockerfile is a script with instructions to build a Docker image.

6. **What command is used to build a Docker image?**
   ```
   docker build -t <image_name>
   ```

7. **How do you run a container from an image?**
   ```
   docker run <image_name>
   ```

8. **How do you list all running containers**?
   ```
   docker ps
   ```

9. **What command is used to stop a running container?**
   ```
   docker stop <container_id>
   ```

10. **How do you remove a Docker container?**
    ```
    docker rm <container_id>
    ```

11. **What is the difference between CMD and ENTRYPOINT in a Dockerfile?**
    - CMD sets the default command, This can be over-ridden
    - ENTRYPOINT defines a mandatory executable that always runs, this cannot be over-ridden.

12. **What is a Docker volume, and why is it used?**
    A **Docker volume** is a storage mechanism that allows data to persist even after a container stops or is removed. It is used to **store and share data** between containers and the host machine. Volumes are managed by Docker.

13. **How do you persist data in Docker containers?**
    By using volumes: `docker run -v myvolume:/data <image_name>`

14. **What is a Docker Compose file? How is it used?**
    A docker-compose.yml file defines multi-container applications and is used with docker-compose up.

15. **How do you scale services using Docker Compose?**
    Using `docker-compose up --scale <service_name>=<number_of_instances>`.

16. **How do you check the logs of a running container?**
    `docker logs <container_id>`

17. **What is the purpose of the `.dockerignore` file?**
    It ignores files from being added to the Docker image, this is similar to the .gitignore.

18. **What are the different networking modes in Docker?**
    Docker provides different networking modes for containers:

a) **Bridge (default)** – Containers communicate through a virtual bridge network (docker0). Used for isolated networking.
b) **Host** – The container shares the host machine's network. No isolation.
c) **None** – The container has no network access.

19. **How do you expose ports in a Docker container?**
    using `-p <host_port>:<container_port>`

20. **What is the difference between `docker stop` and `docker kill`?**
    - `Docker stop` - normally shuts down a container.
    - `Docker kill` - forcefully stops container.