LAB ASSIGNMENT NO-07

Aim: To understand Docker architecture and container life cycle, install docker , deploy container in docker.

Theory:

1. What is docker?

Docker is a containerization platform that allows developers to package applications and their dependencies into lightweight, portable containers. These containers can run consistently across various environments, such as development laptops, testing servers, and production servers. Docker simplifies application deployment, scaling, and management by isolating applications within containers, ensuring they have everything needed to run, and abstracting away the underlying infrastructure.

Key points about Docker:

Containerization: Docker containers encapsulate an application and its dependencies, including libraries and configuration files, into a single package. This package is isolated from the host system and other containers, ensuring consistent and reliable application execution.

Portability: Docker containers are highly portable. Developers can build a container image on one machine and run it on another without worrying about compatibility issues, thanks to Docker's consistent environment.

Efficiency: Containers are lightweight compared to virtual machines (VMs) because they share the host operating system's kernel. This makes them more resource-efficient and faster to start compared to VMs.

Version Control: Docker images can be versioned and stored in repositories, making it easy to track changes, roll back to previous versions, and collaborate on application development.

Orchestration: Docker provides tools like Docker Compose and Kubernetes for orchestrating and managing containers at scale. This allows for automated deployment, load balancing, and scaling of containerized applications.

DevOps Integration: Docker plays a crucial role in DevOps practices by enabling continuous integration and continuous deployment (CI/CD) pipelines. Containers can be built and deployed automatically, streamlining the development and release process.

Ecosystem: Docker has a vast ecosystem of pre-built container images

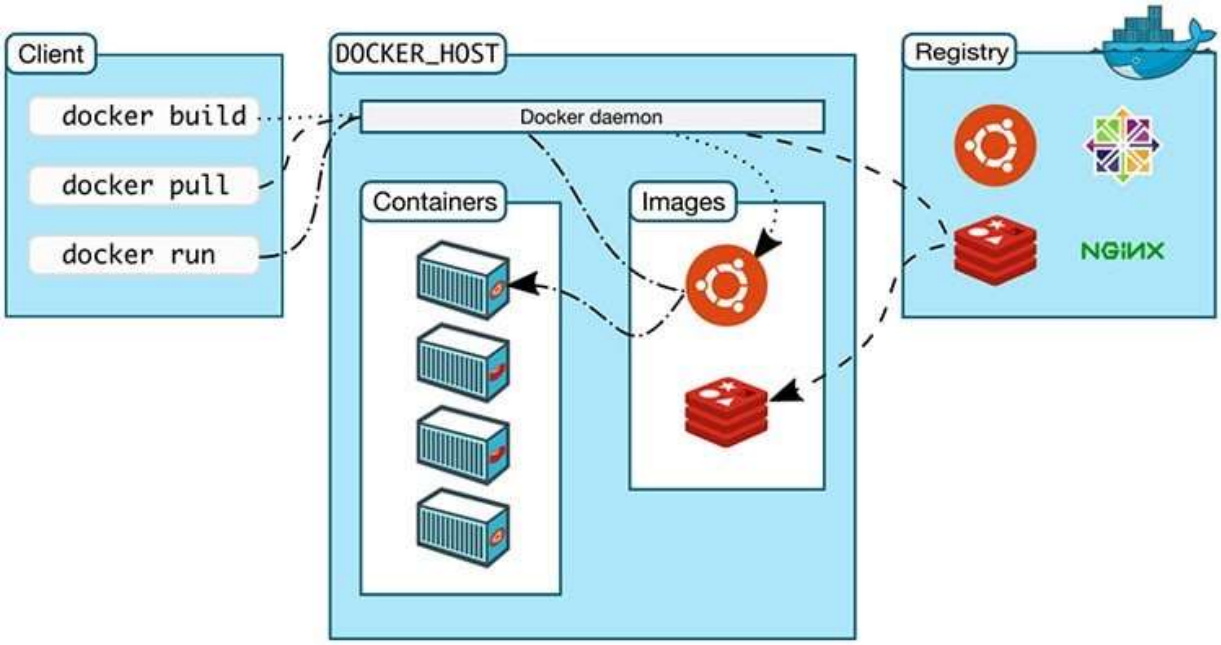
available on Docker Hub, which makes it easy to find and use popular software stacks and services.

Security: Docker containers provide isolation, but proper security practices are essential to ensure containerized applications are not vulnerable to attacks. Docker offers security features like user namespaces, seccomp profiles, and more.

Docker Architecture

The Core components of the Docker consists of

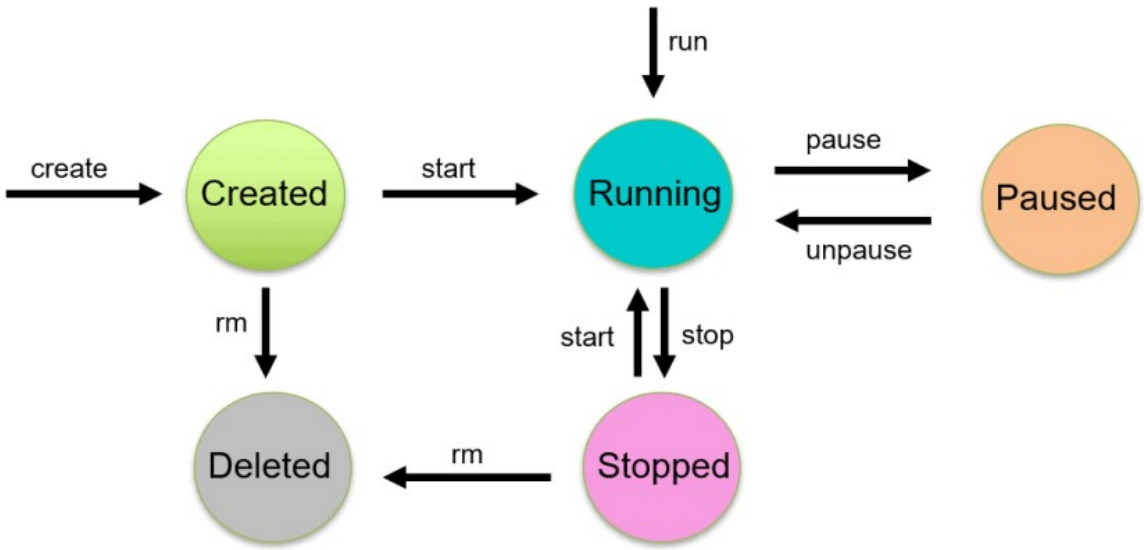
1. Docker daemon
2. Docker client
3. Docker Desktop
4. Docker registry
5. Docker images
6. Docker containers



Docker Container Lifecycle Management

The lifecycle of a docker container consists of five states:

1. Created state
2. Running state
3. Paused state/unpaused state
4. Stopped state
5. Killed/Deleted state



Created state

In the created state, a docker container is created from a docker image.

docker create --name <name-of-container> <docker-image-name>

Running state

In the running state, the docker container starts executing the commands mentioned in the image. To run a docker container, use the docker run command.

docker run <container-id>

or

docker run <container-name>

The docker run command creates a container if it is not present. In this case, the creation of the container can be skipped.

Paused state

In the paused state, the current executing command in the docker container is paused. Use the docker pause command to pause a running container.

docker pause container <container-id or container-name>

Note: docker pause pauses all the processes in the container. It sends the SIGSTOP signal to pause the processes in the container.

Unpaused state

In the unpaused state, the paused container resumes executing the commands once it is unpaused.

Use the docker unpause command to resume a paused container.

Then, Docker sends the SIGCONT signal to resume the process.

docker unpause <container-id or container-name>

Stopped state

In the stopped state, the container's main process is shutdown gracefully. Docker sends SIGTERM for graceful shutdown, and if needed, SIGKILL, to kill thecontainer's main process.

Use the docker stop command to stop a container.

docker stop <container-id or container-name>

Restarting a docker container would translate to docker stop, then docker run, i.e., stop and run phases.

Killed/Deleted state

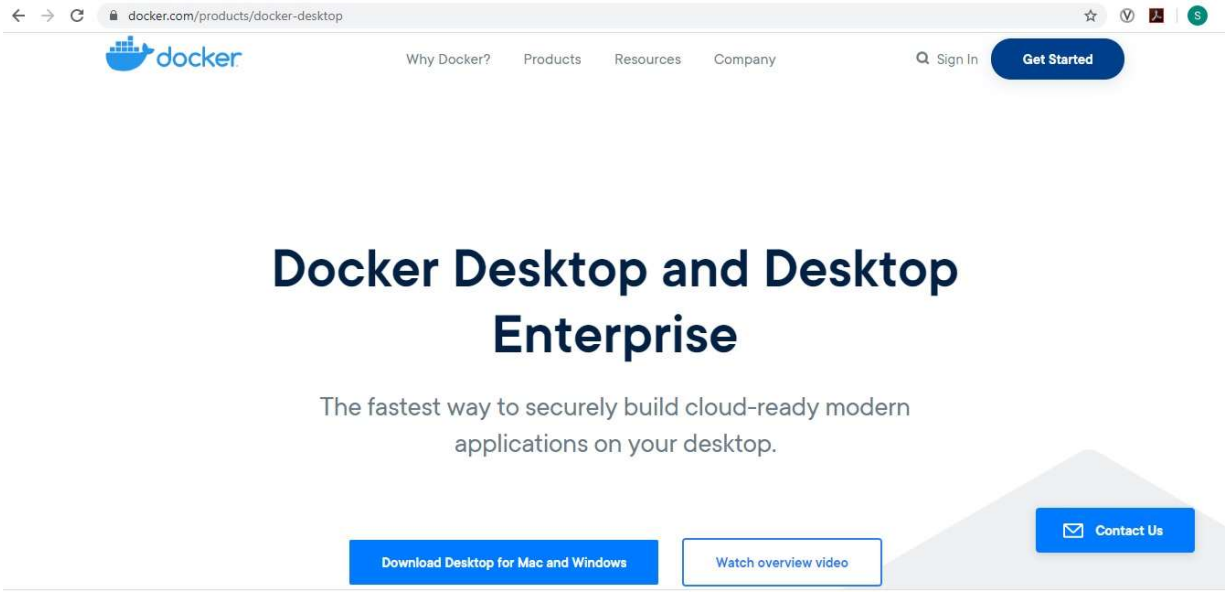
In the killed state, the container's main processes are shutdown abruptly. Docker sends a SIGKILL signal to kill the container's main process.

docker kill <container-id or container-name>

Installing Docker

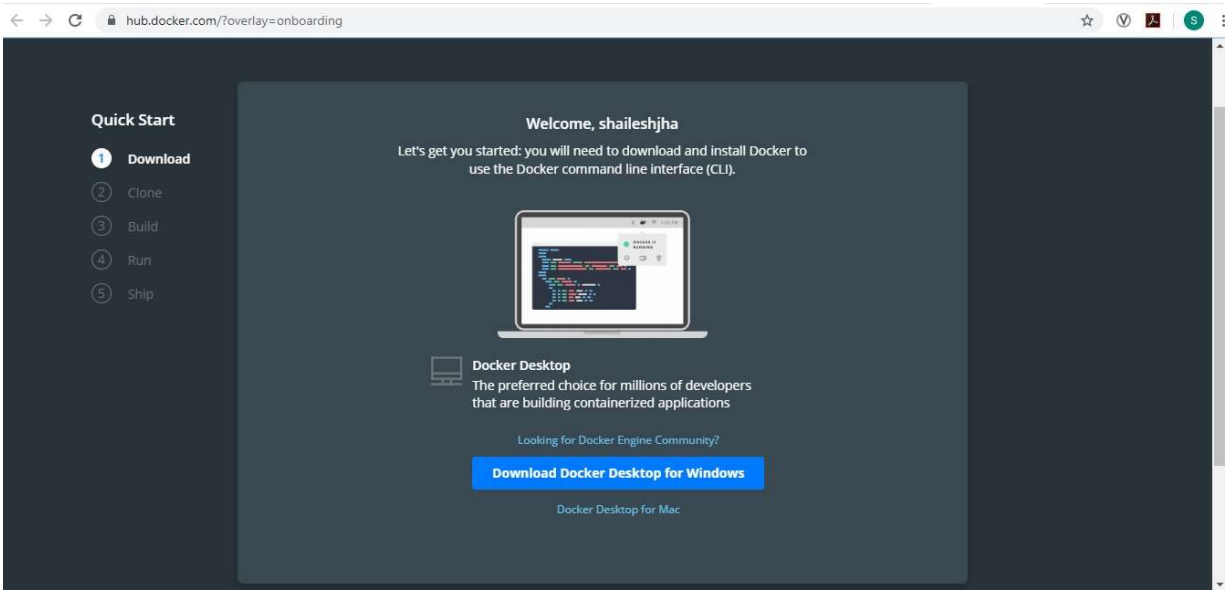
Step 1 – Download Docker

Click on Products-> Docker Desktop on the menu bar. This will take you to the docker desktop product page.

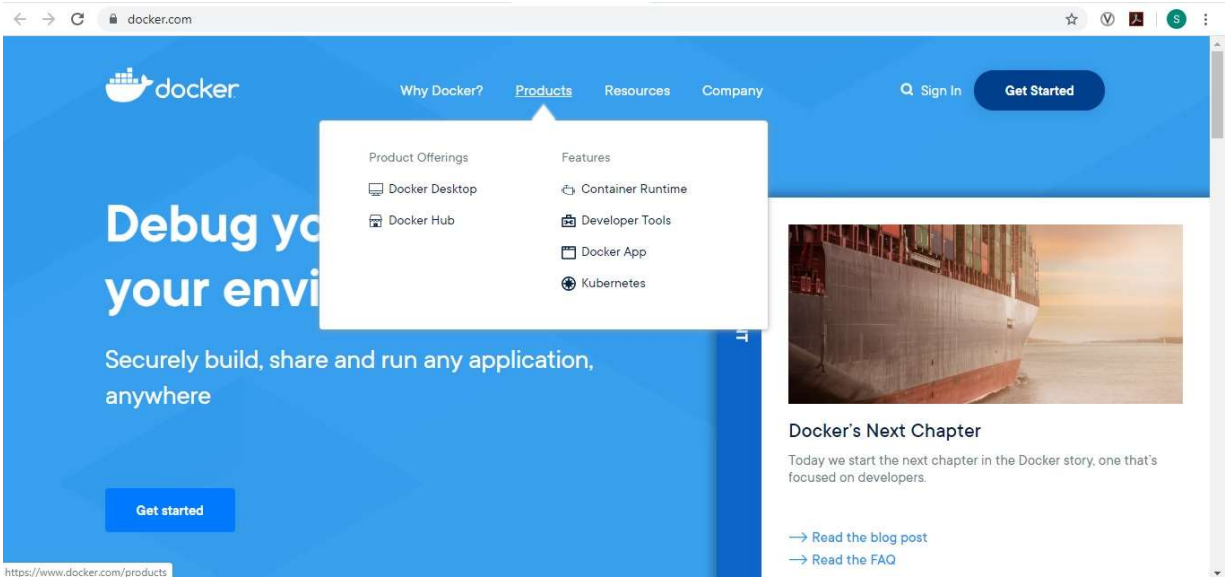


Docker Desktop Product Webpage

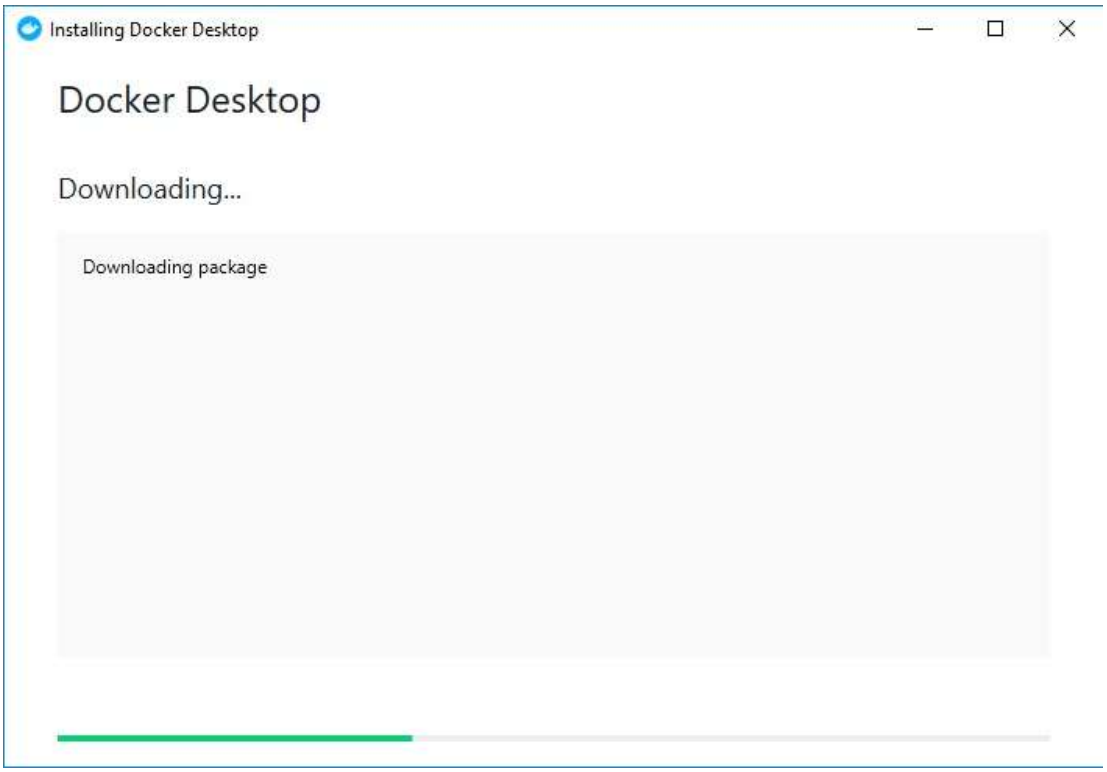
Click on Download Desktop for Mac and Windows.



Docker Hub – download docker web page
The installer file for windows is around 914 MB.



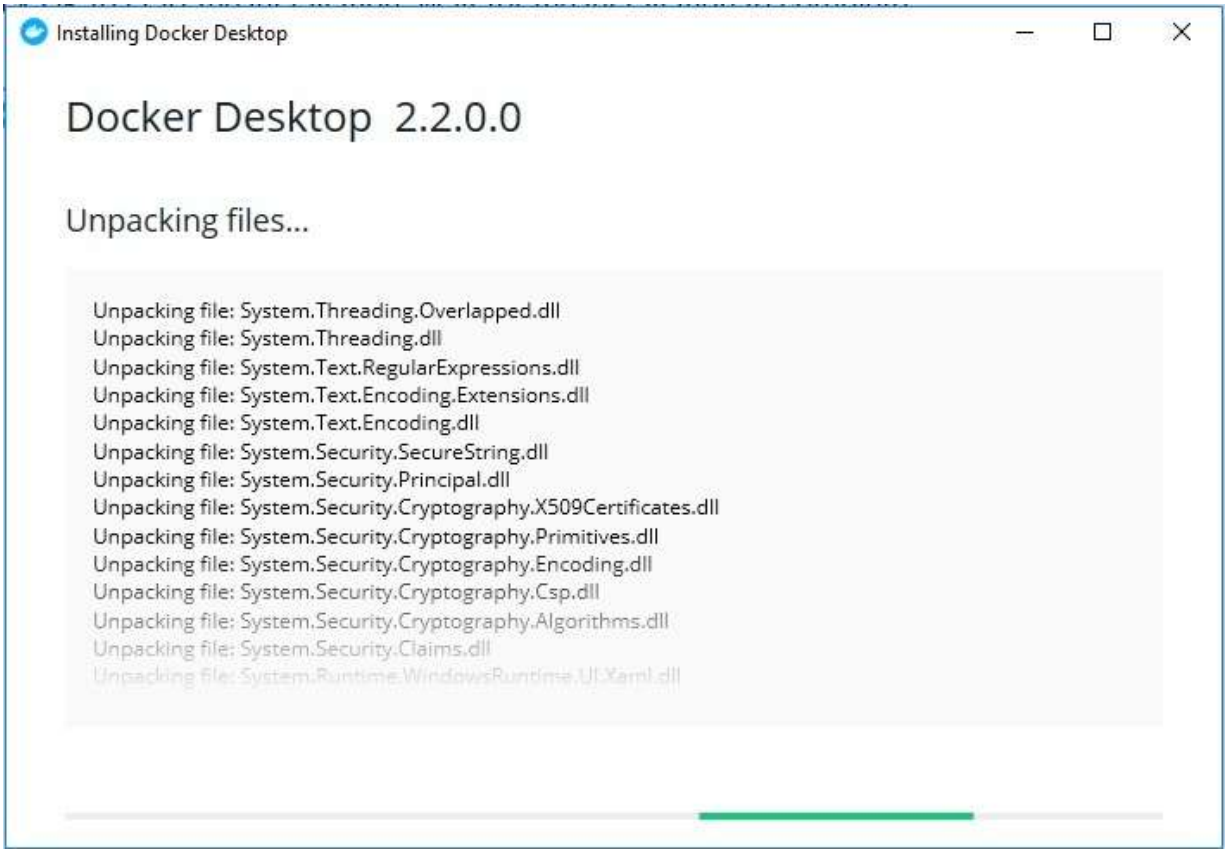
Step 2 – Run the installer



Docker Installation

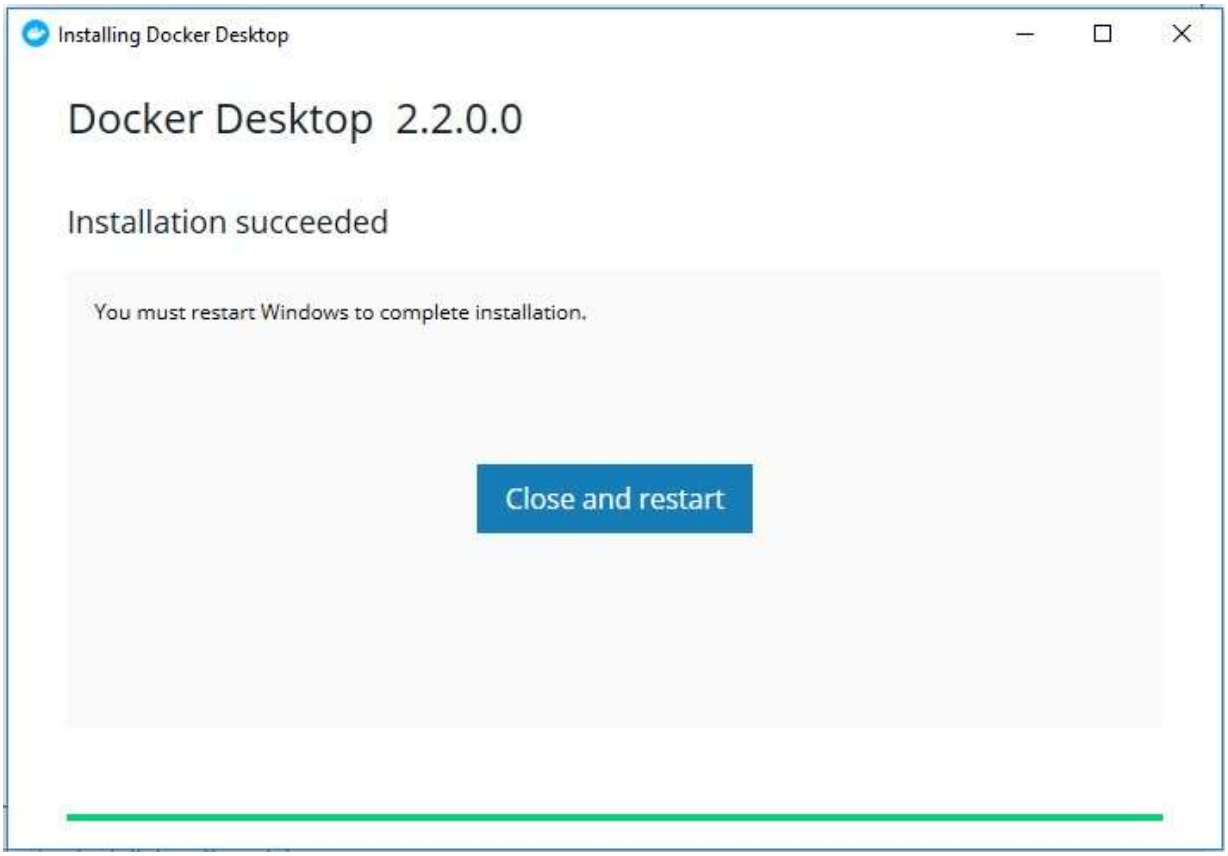
Step 3 – Configuration Settings

Click OK to start the installation. Wait for the installation to complete.



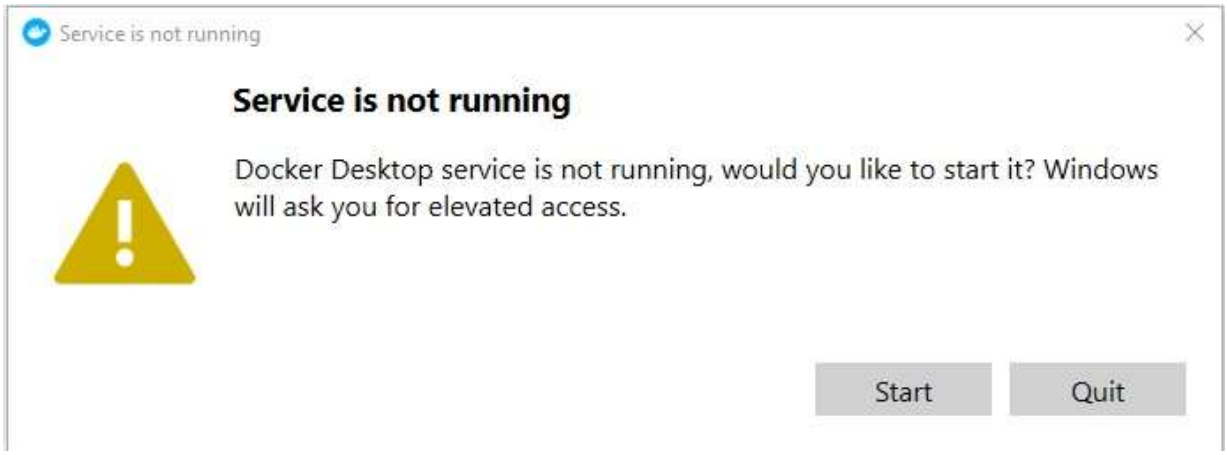
Docker Installation progress

Once the installation completes, click on Close and restart to complete the installation.

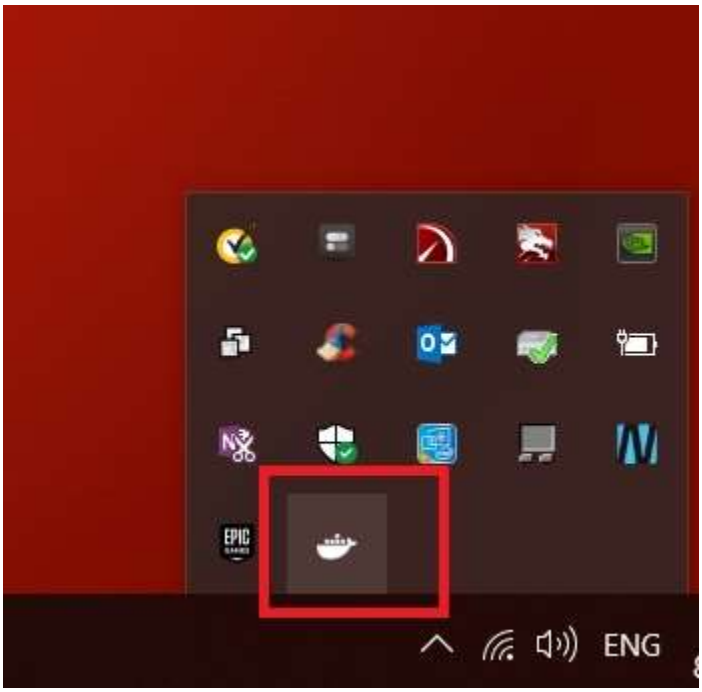


Docker Installation Complete

Step 4 – Run Docker

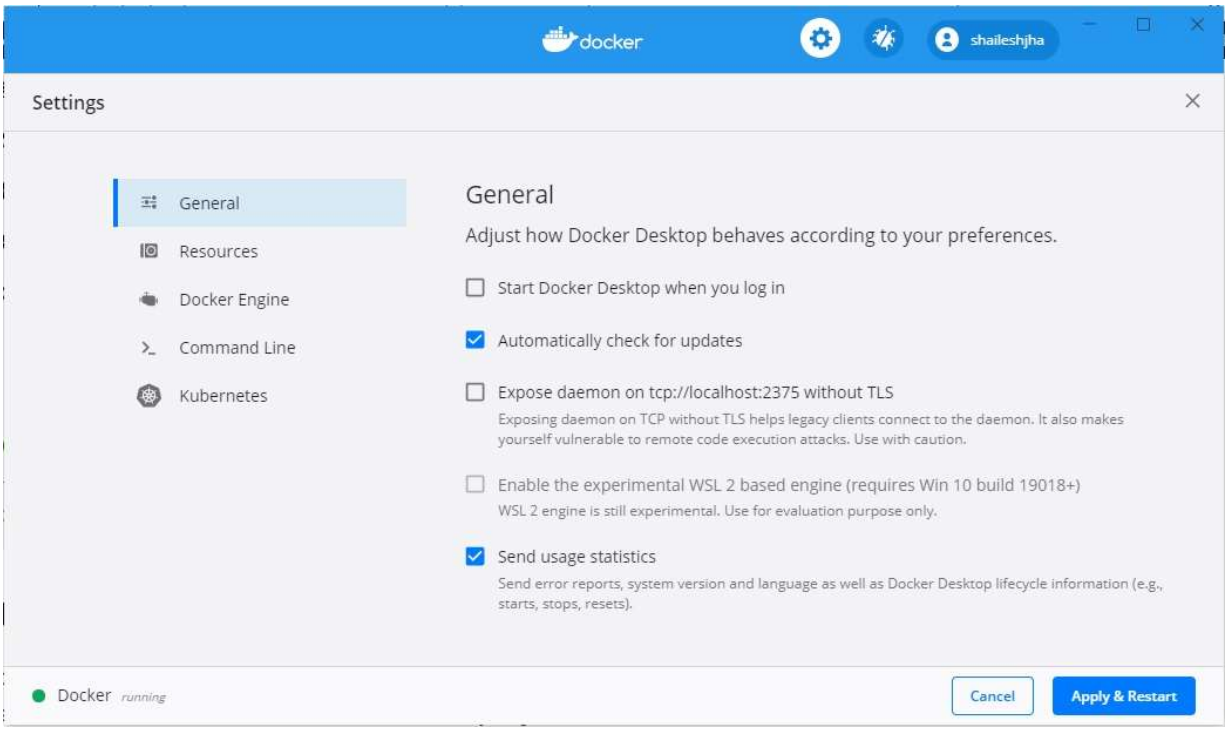


Docker Service not running warning



Docker Icon – Windows task bar

Step 5 – Disable Start Docker at Startup



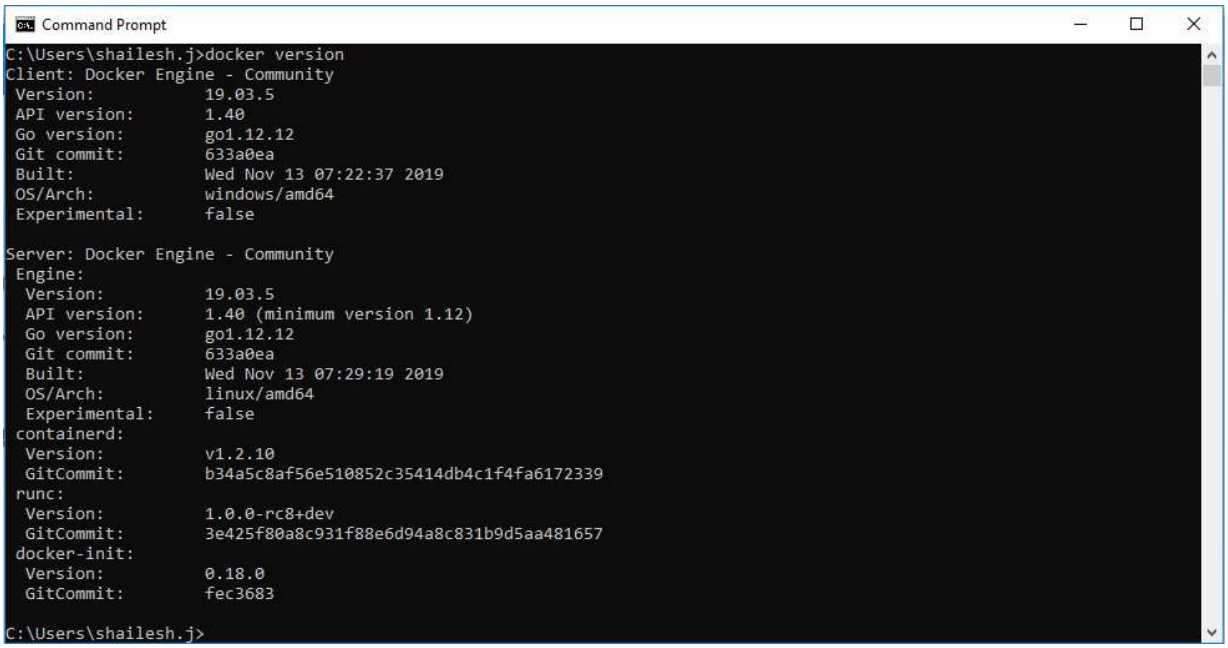
Docker Desktop settings

Step 6 – Check the version of Docker Installed

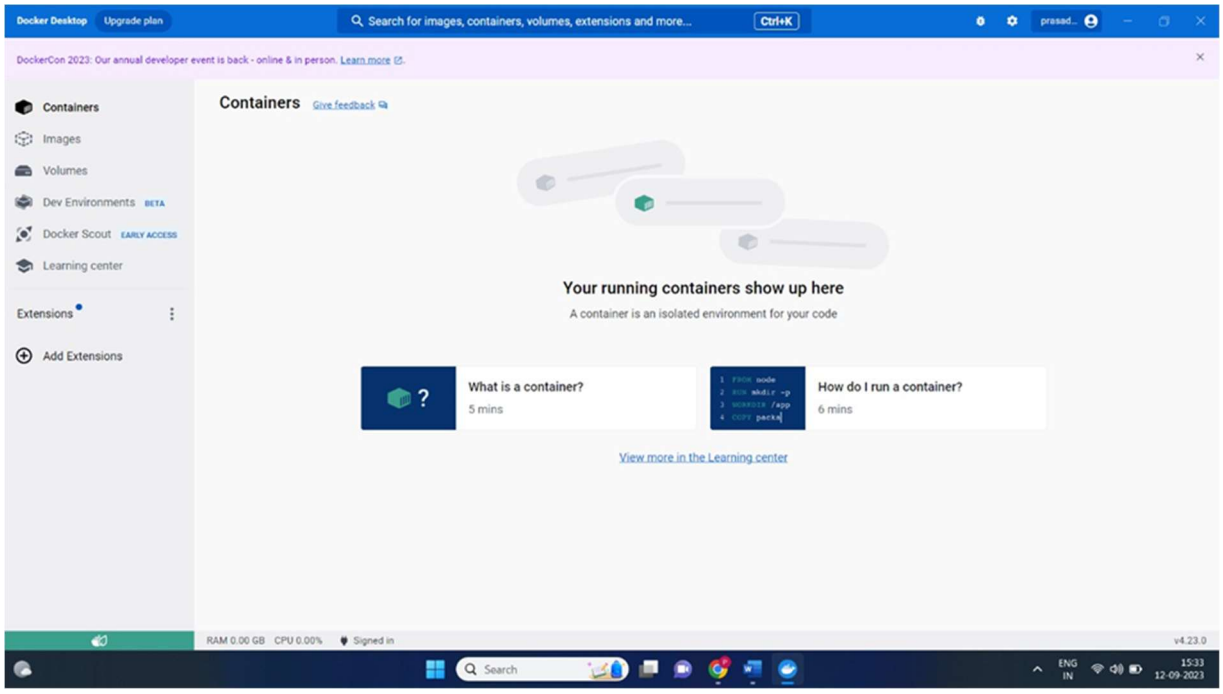
Open Powershell or command prompt and enter the command:

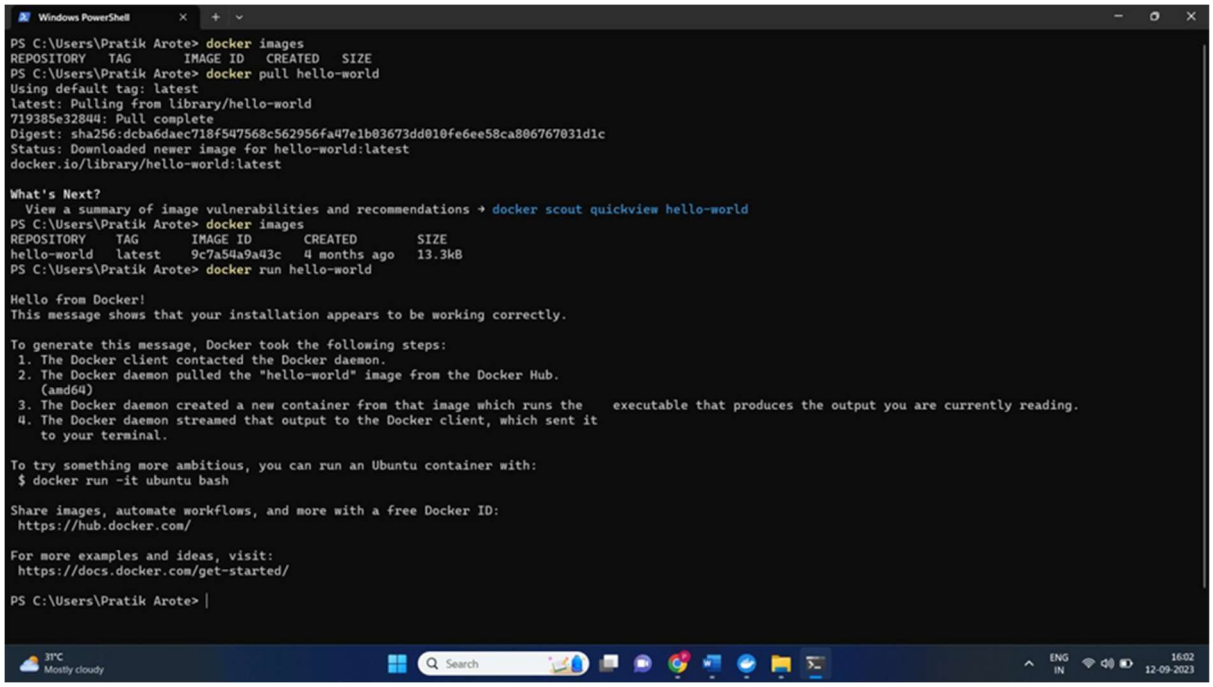
docker version

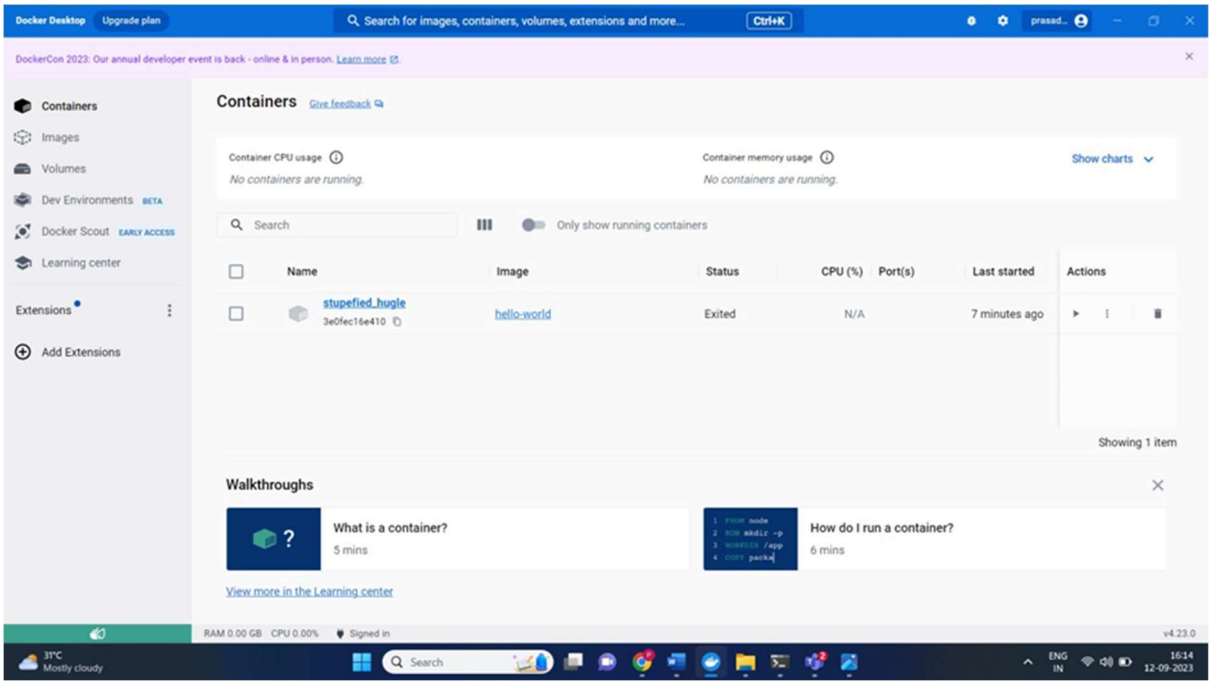
You should see something like this.



Docker Container:







Conclusion: In this experiment We have installed and deployed a container in Docker.

Lab Outcome: **LO1**-To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements.

LO5-To understand concept of containerization and Analyze the containerization of OS images and deployment of applications over Docker.