Chapter-4 (Introduction to Docker)

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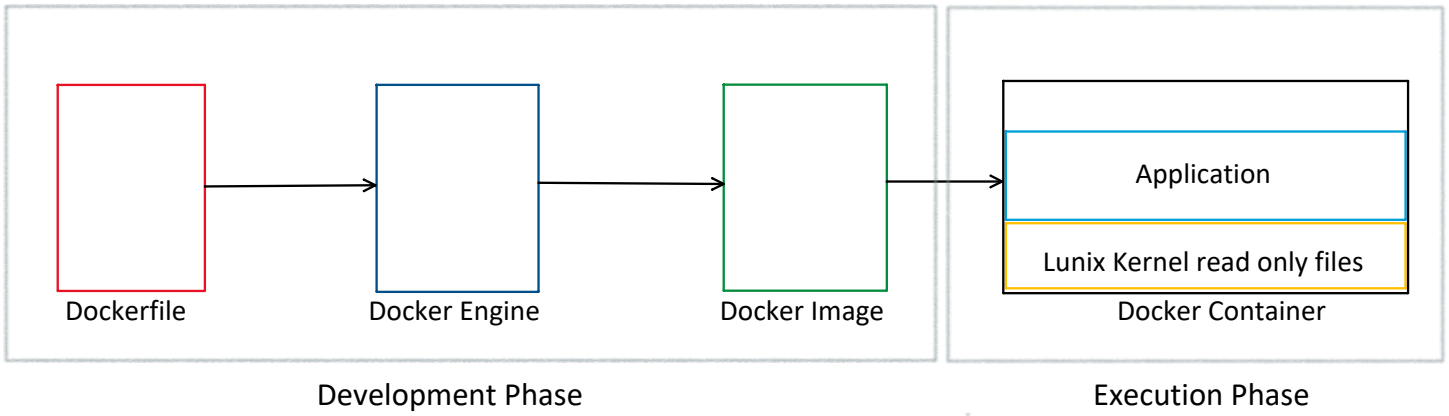
What is Docker ?

Docker is a set of platform as a service products that use OS-level virtualization to deliver **software in packages** called containers.

Workflow of docker ?



What are Containers ?

Containers are executable units of software in which application code is packaged, along with its libraries and dependencies, in common ways so that it can be run anywhere, whether it be on desktop, traditional IT, or the cloud.

What is an Image ?

A Docker image is a file archive used to execute code in a Docker container. Docker images act as a set of instructions to build a Docker container, like a template. Docker images also act as the starting point when using Docker. An image is comparable to a snapshot in virtual machine (VM) environments.

What is Dockerfile ?

A Dockerfile is a text document that contains all the commands a user could call on the command line to run its application when it gets a fresh installed machine.

Running 'Hello World' program of java inside Docker container ?

Steps :

Download Java from **Docker Registry** & Install on fresh machine

Execute class file by firing java command

1. Create Java File and compile it to generate .class file
2. Now create docker file:

```
FROM openjdk:17-alpine
ADD HelloWorld.class HelloWorld.class
CMD ["java","HelloWorld"]
```

Add class file to working directory

3. Build docker image using below command: (verify by command : docker images)

   docker build /c/Users/Admin/Desktop/ -t helloworld:v1
4. Create container using following command: (verify by command : docker container ls -a)

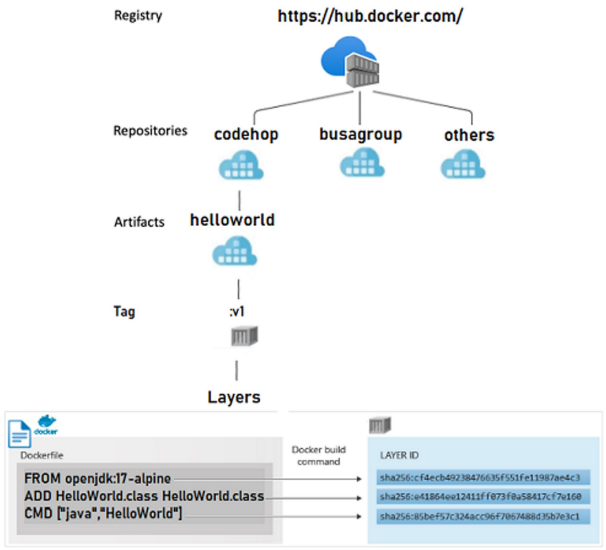
   docker run - -name helloworld_container helloworld:v1

Docker Registry :

Docker registries are services that provide locations from where we can store and download images.

- A Docker registry contains Docker repositories that host one or more Docker Images.
- Their are two type of Registries:
  - Private Registries (Gitlab Container Registry).
  - Public Registries, which include two components, namely:

- Docker Hub
- Docker Cloud etc.



Repository :

A repository is a collection of container images or other artifacts in a registry that have the same name, but different tags.
For example, the following three images are in the helloworld artifacts:

- helloworld:latest
- helloworld:v1
- helloworld:v2

Artifact :

A container image or other artifact within a registry is associated with one or more tags, has one or more layers, and is identified by a manifest. Understanding how these components relate to each other can help you manage your registry effectively.

Tag :

The tag for an image or other artifact specifies its version. A single artifact within a repository can be assigned one or many tags.
*NOTE : The repository plus a tag defines an image's name.

Layer :

Container images and artifacts are made up of one or more layers. Different artifact types define layers differently. For example as shown above.
Artifacts in a registry share common layers, increasing storage efficiency. For example, several images in different repositories might have a common **openjdk:17-alpine** base layer, but only one copy of that layer is stored in the registry.
*NOTE : To provide secure isolation and protection from potential layer manipulation, layers are not shared across registries.

Is Docker containers OS independent ?

Precisely. No. All though some claim it to be.