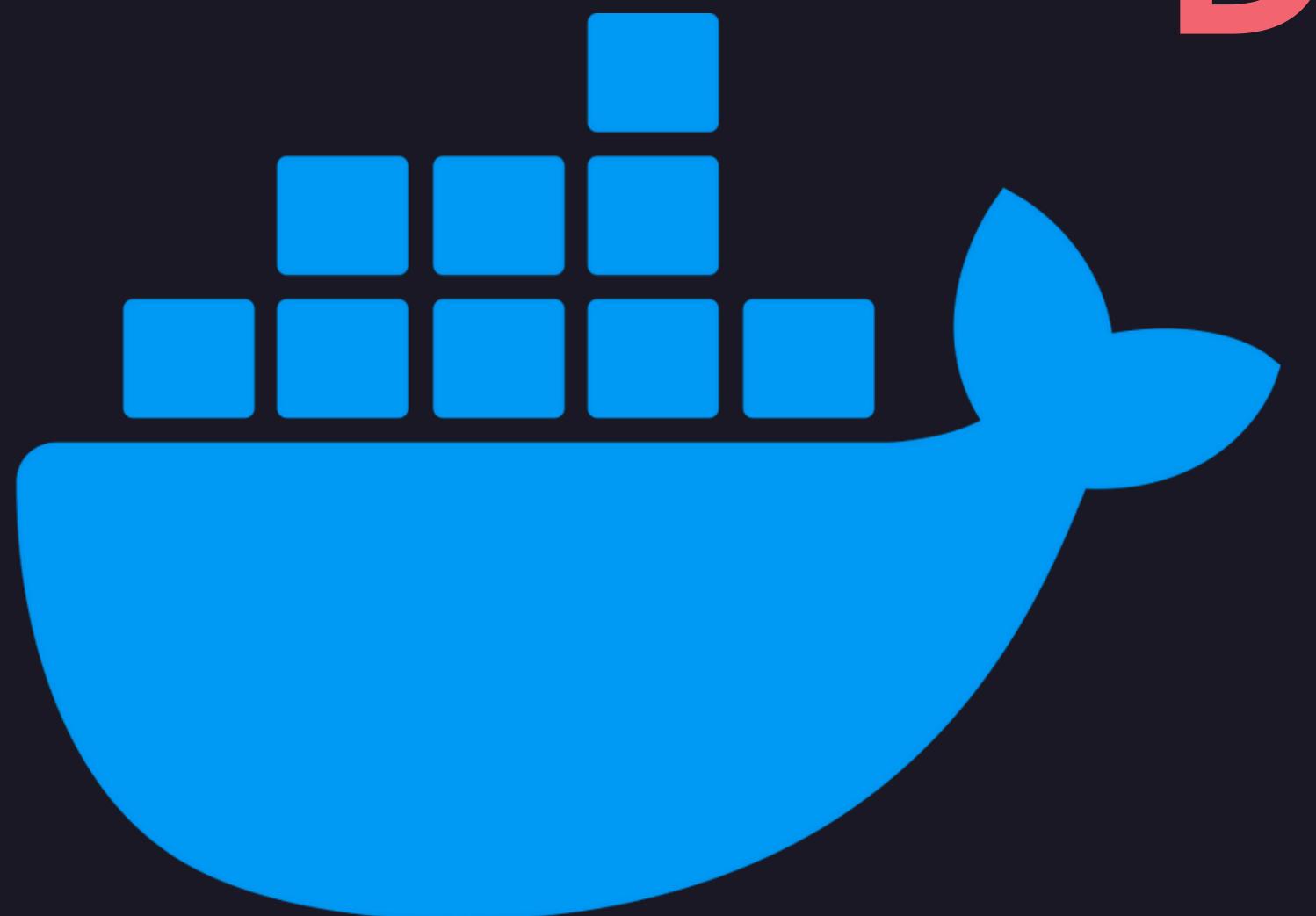


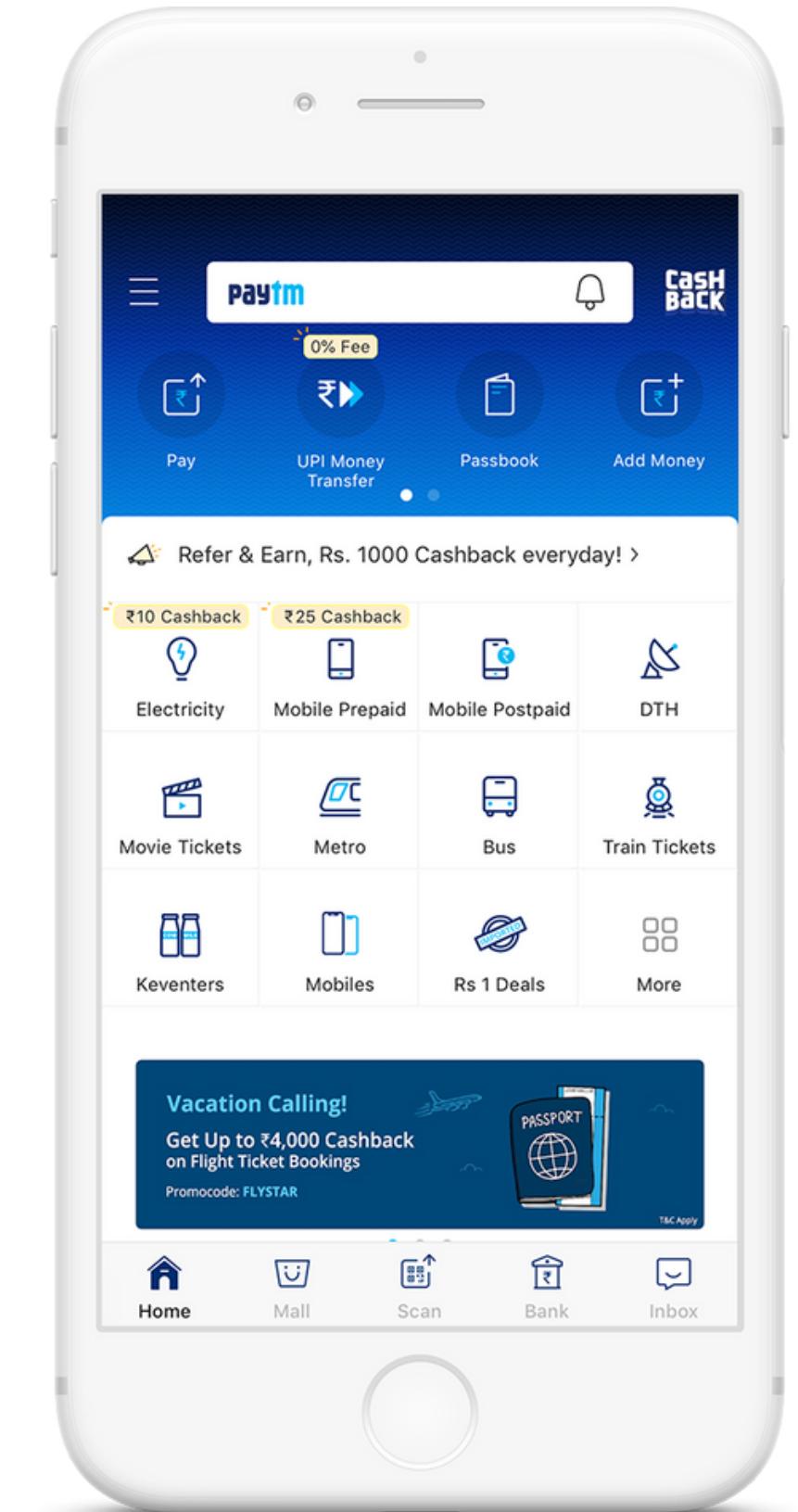
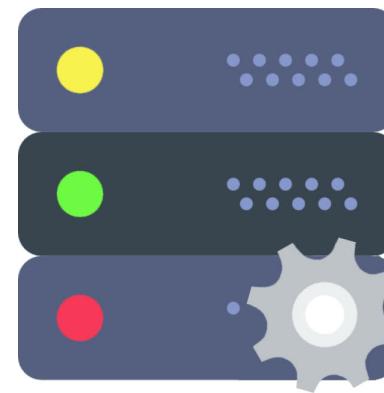
DOCKER



why we use it?

MONOLITHIC

If an application contains N number of services (Let's take Paytm has Money Transactions, Movie Tickets, Train tickets, etc..) If all these services are included in one server then it will be called Monolithic Architecture. Every monolithic Architecture has only one database for all the services.

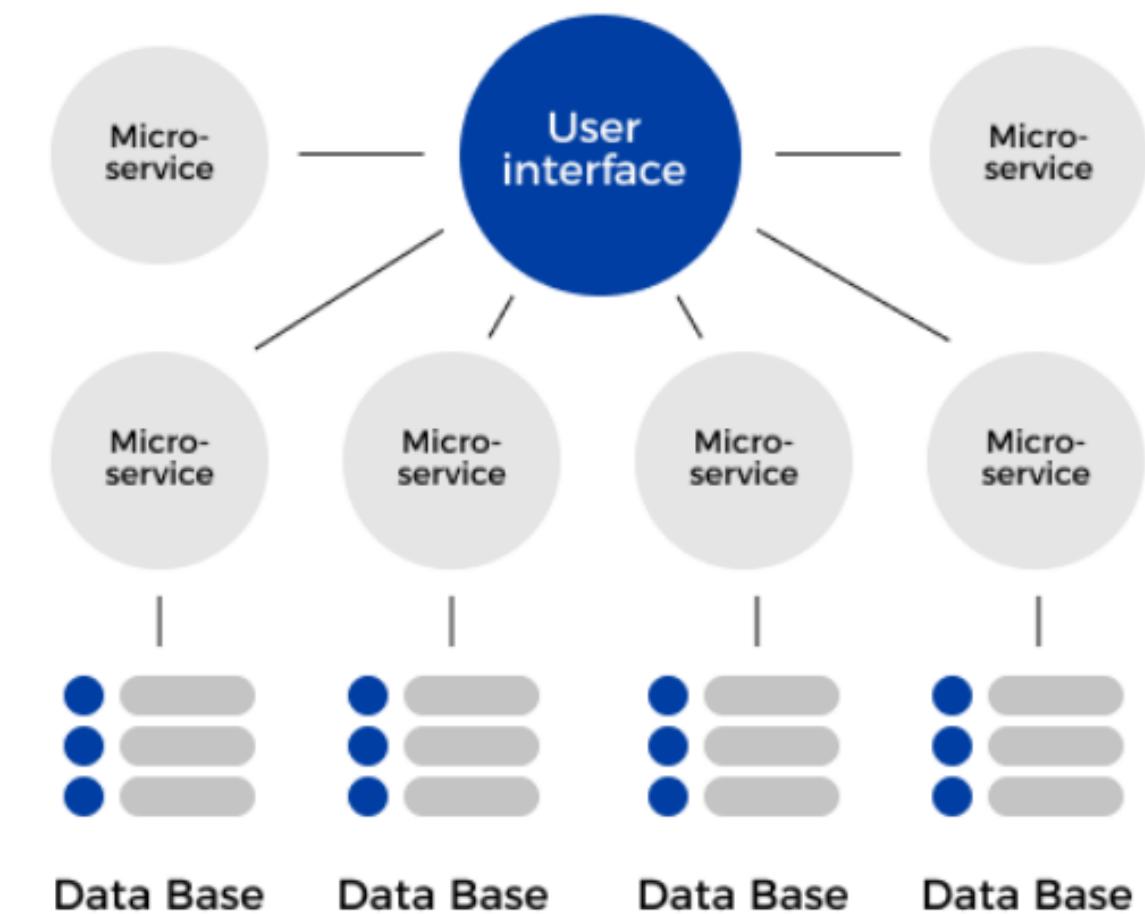


MICRO SERVICE

If an application contains N number of services (Let's take Paytm has Money Transactions, Movie Tickets, Train tickets, etc..) if every service has its own individual servers then it is called microservices. Every microservice architecture has its own database for each service.



MICROSERVICE ARCHITECTURE

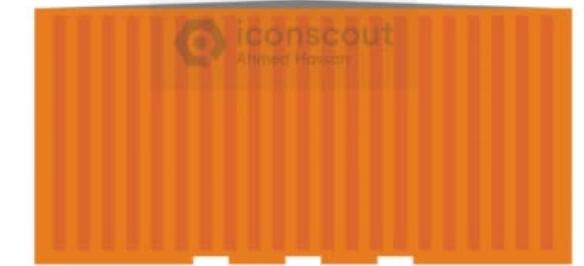


Container:

It's like a Virtual Machine and it doesn't have any OS.

Virtualization:

Process that allows for more efficient utilization of physical computer hardware and the foundation of cloud computing.



Hypervisor:

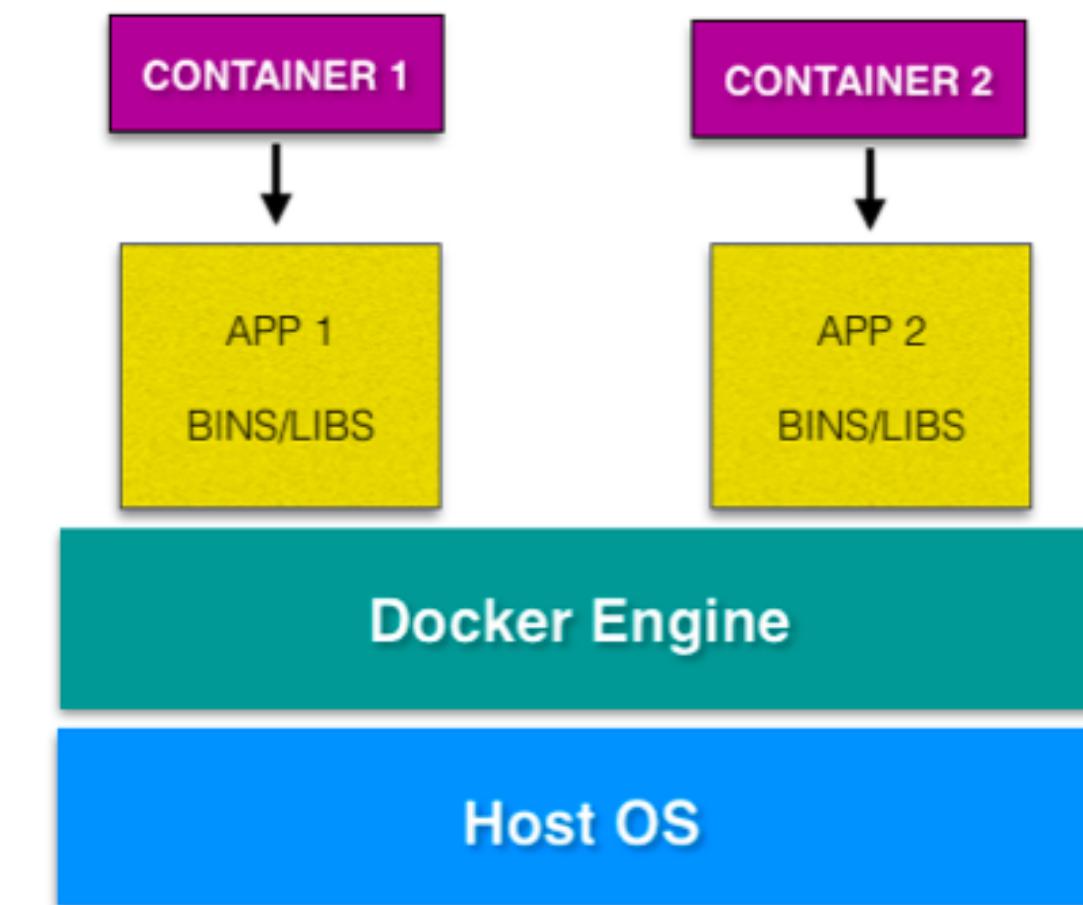
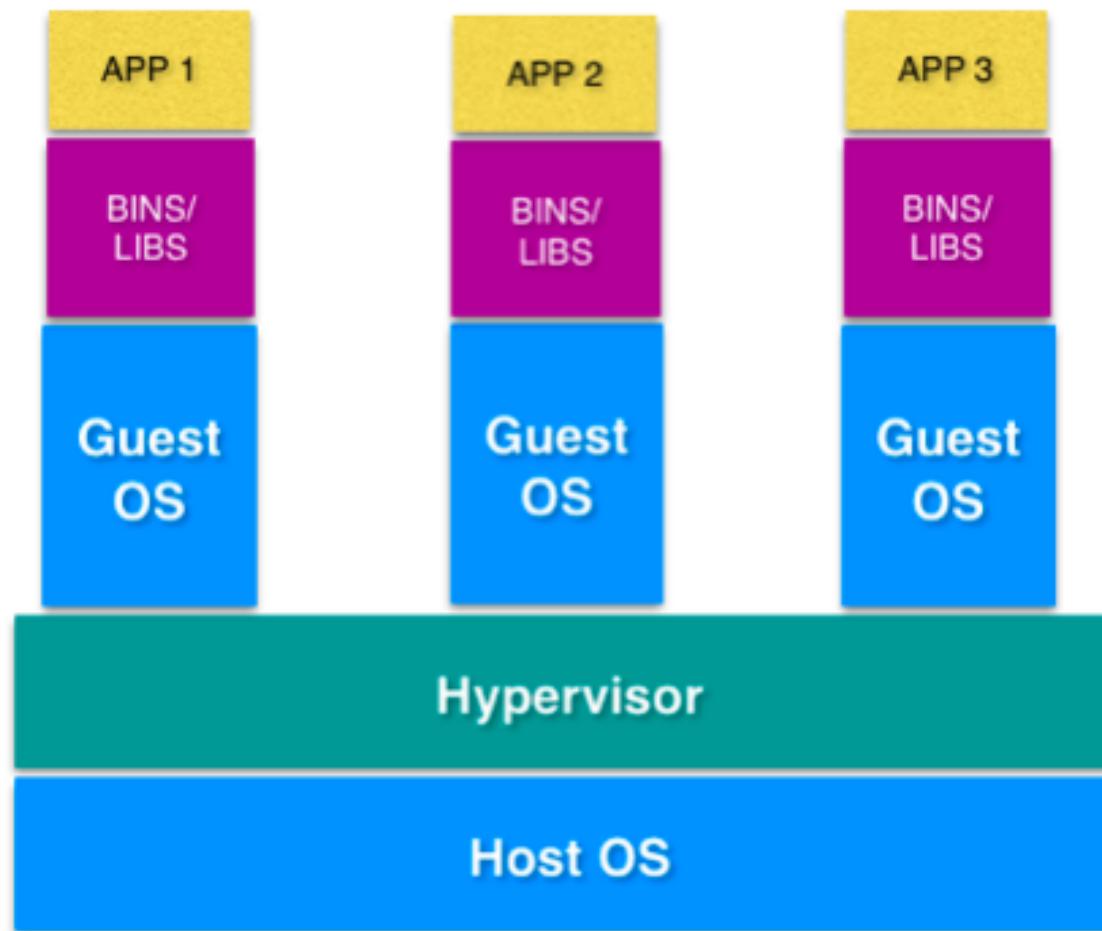
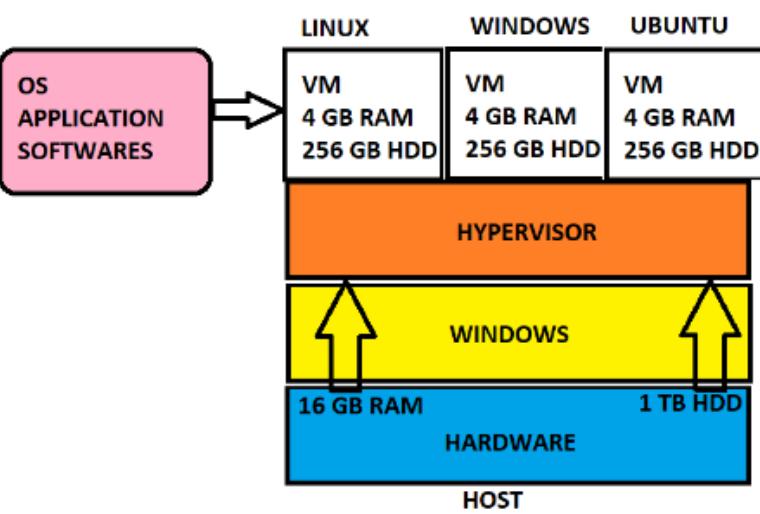
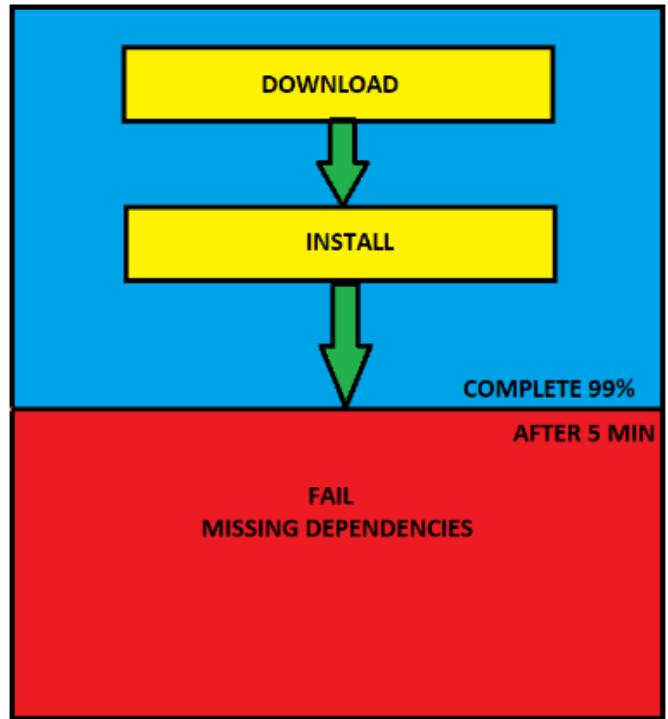
Helps to make virtualization and to create a VM.

Containerization:

Process of packing application along with its dependencies.

Docker:

It is a tool that creates a Container. It is more advanced than Virtualization.

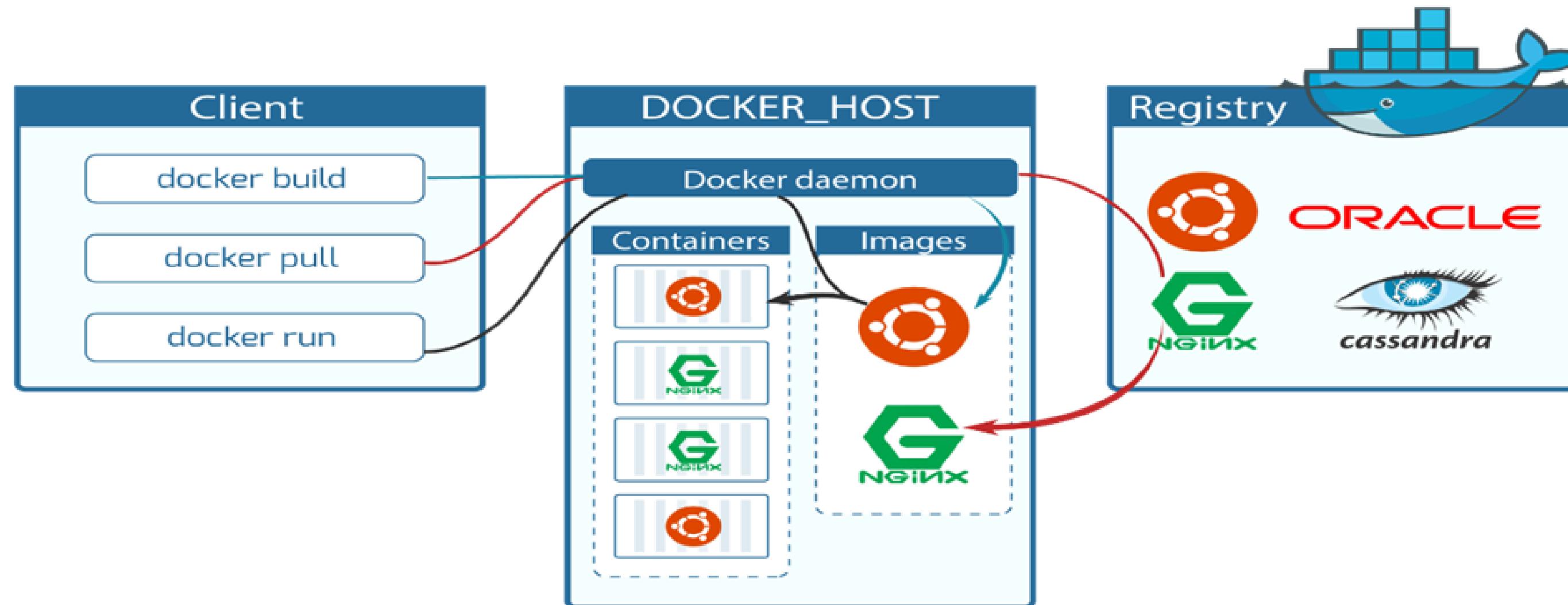


DOCKER

- It is an open source centralized platform designed to create, deploy and run applications.
- Docker is written in the Go language.
- Docker uses containers on host O.S to run applications. It allows applications to use the same Linux kernel as a system on the host computer, rather than creating a whole virtual O.S.
- We can install Docker on any O.S but the docker engine runs natively on Linux distribution.
- Docker performs O.S level Virtualization also known as Containerization.
- Before Docker many users face problems that a particular code is running in the developer's system but not in the user system.
- It was initially released in March 2013, and developed by Solomon Hykes and Sebastian Pahl.
- Docker is a set of platform-as-a-service that use O.S level Virtualization, where as VM ware uses Hardware level Virtualization.
- Container have O.S files but its negligible in size compared to original files of that O.S.

ARCHITECTURE:

DOCKER COMPONENTS



DOCKER CLIENT:

It is the primary way that many Docker users interact with Docker. When you use commands such as docker run, the client sends these commands to docker daemon, which carries them out. The docker command uses the Docker API.

DOCKER HOST:

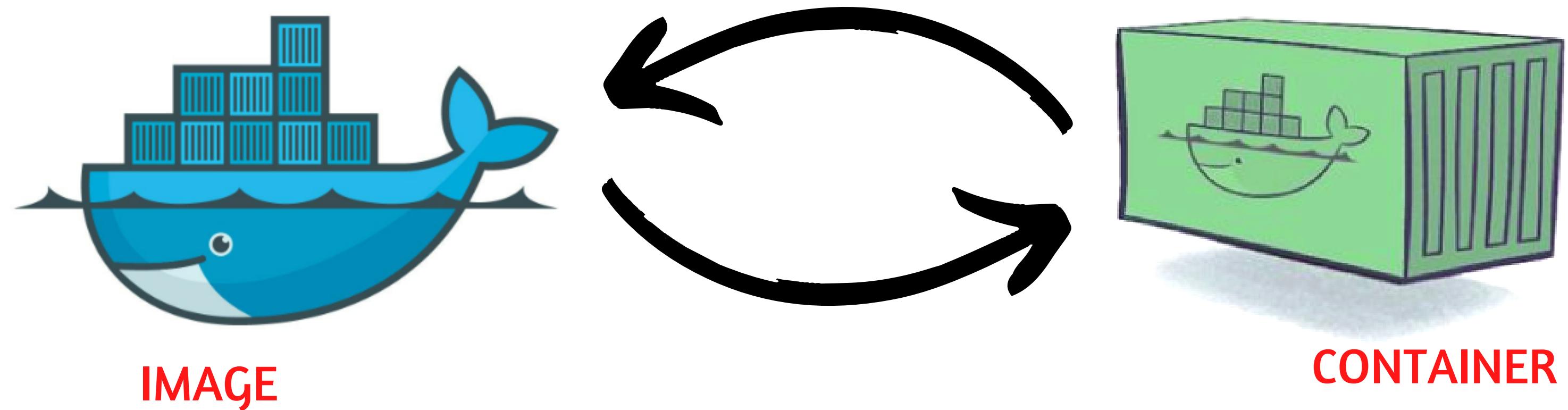
Docker host is the machine where you installed the docker engine.

DOCKER DAEMON:

Docker daemon runs on the host operating system. It is responsible for running containers to manage docker services. Docker daemon communicates with other daemons. It offers various Docker objects such as images, containers, networking, and storage.

DOCKER REGISTRY:

A Docker registry is a scalable open-source storage and distribution system for docker images.



POINTS TO BE FOLLOWED:

- You can't use docker directly, you need to start/restart first (observe the docker version before and after restart)
 - You need a base image for creating a Container.
 - You can't enter directly to Container, you need to start first.
 - If you run an image, By default one container will create.

BASIC DOCKER COMMANDS:

To install docker in Linux : `yum install docker -y`

To see the docker version : `docker --version`

To start the docker service : `service docker start`

To check service is start or not : `service docker status`

To check the docker information : `docker info`

To see all images in local machine : `docker images`

To find images in docker hub : `docker search image name`

To download image from docker hub to local : `docker pull image name`

To download and run image at a time : `docker run -it image name /bin/bash`

To give names of a container : `docker run -it --name raham img-name /bin/bash`

To start container : `docker start container name`

To go inside the container : `docker attach container name`

To see all the details inside container : `cat /etc/os-release`

To get outside of the container : `exit`

To see all containers : `docker ps -a`

To see only running containers : `docker ps (ps: process status)`

To stop the container : `docker stop container name`

To delete container : `docker rm container name`

To stop all the containers : `docker stop $(docker ps -a -q)`

To delete all the stopped containers : `docker rm $(docker ps -a -q)`

To delete all images : `docker rmi -f $(docker images -q)`

DOCKER RENAME:

To rename docker container: Docker rename old_container new_container

To rename docker port:

stop the container

go to path (var/lib/docker/container/container_id)

open hostconfig.json

edit port number

restart docker and start container

DOCKER EXPORT:

It is used to save the docker container to a tar file

Create a file which contains will gets stored: touch
docker/password/secrets/file1.txt

TO EXPORT: docker export -o docker/password/secrets/file1.txt

container_name

SYNTAX: docker export -o path container

BASIC DOCKER COMMANDS:

To see list of containers : `docker container ls`

To see all running containers: `docker container ls -a`

To see latest 2 containers : `docker container ls -n 2`

To see latest container : `docker container ls --latest`

To see all container id's : `docker ls -a -q`

To remove all containers : `docker container rm -f $(docker container ls -aq)`

To see containers with sizes : `docker container ls -a -s`

To stop container after some time: `docker stop -t 60 cont_id`

KILL VS STOP:

KILL: It passes SIGKILL signal to the container and container must be in running state.

STOP: It passes SIGTERM signal to the container and container m

RUNNING A CONTAINER:

- docker run --name cont1 -d nginx
- docker inspect cont1
- curl container_private_ip:80
- docker run --name cont2 -d -p 8081(hostport):80(container port) nginx

docker exec:

- syntax - docker exec cont_name command
- ex-1: docker exec cont1 ls
- ex-2: docker exec cont mkdir devops
- to enter into container: docker exec -it cont_name /bin/bash

CREATE IMAGE FROM CONTAINER:

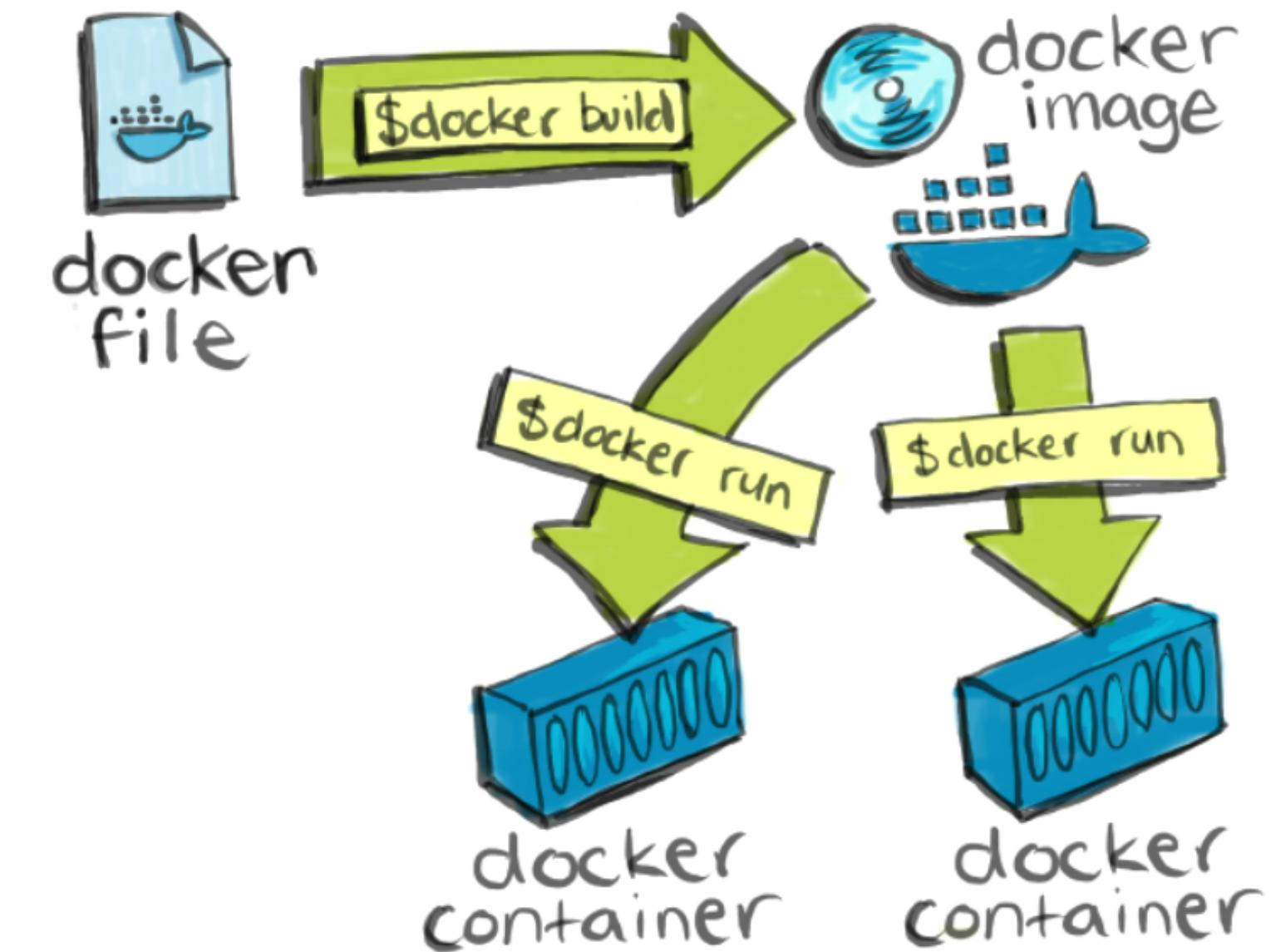
- First it should have a base image - `docker run nginx`
- Now create a container from that image - `docker run -it --name container_name image_name /bin/bash`
- Now start and attach the container
 - go to tmp folder and create some files (if you want to see the what changes has made in that image - `docker diff container_name`)
- exit from the container
- now create a new image from the container - `docker commit container_name new_image_name`
- Now see the images list - `docker images`
- Now create a container using the new image
- start and attach that new container
- see the files in tmp folder that you created in first container.

DOCKER FILE:

- It is basically a text file which contains some set of instructions.
- Automation of Docker image creation.
- Always D is capital letters on Docker file.
- And Start Components also be Capital letter.

HOW IT WORKS:

- First you need to create a Docker file
- Build it
- Create a container using the image



DOCKER FILE COMPONENTS:

FROM: For base image this command must be on top of the file. Ex: ubuntu, Redis, Jenkins

LABEL: Labeling like EMAIL, AUTHOR, etc.

RUN: To execute commands and commit the layer.

COPY: Copy files/folders from local system (docker VM) where need to provide Source and Destination.

ADD: It can download files from the internet and also, we can extract files at docker image side.

EXPOSE: To expose ports such as 8080 for tomcat and port 80 nginx etc.

WORKDIR: To set working directory for the Container.

CMD: Executes commands but during Container creation.

ENTRYPOINT: The command that executes inside of a container. like running the services in a container.

ENV: Environment Variables.

(Difference b/w Copy and Add is in copy we can't download files from internet and any remote repo)

DOCKER FILE TO CREATE AN IMAGE:

FROM: ubuntu

RUN: touch aws devops linux

FROM: ubuntu

RUN: touch aws devops linux

RUN: echo "hello world">>/tmp/file1

TO BUILD: docker build -t image_name . (. represents current directory)

Now see the image and create a new container using this image.

go to container and see the files that you created.

```
FROM ubuntu
WORKDIR /tmp
RUN echo "hello world!" > /tmp/testfile
ENV myname raham
COPY testfile1 /tmp
ADD test.tar.gz /tmp
```

```
[root@ip-172-31-83-27 ~]# touch testfile1
[root@ip-172-31-83-27 ~]# touch test
[root@ip-172-31-83-27 ~]# ls
Dockerfile test testfile1
[root@ip-172-31-83-27 ~]# tar -cvf test.tar test
test
[root@ip-172-31-83-27 ~]# ls
Dockerfile test testfile1 test.tar
[root@ip-172-31-83-27 ~]# gzip test.tar
[root@ip-172-31-83-27 ~]# ls
Dockerfile test testfile1 test.tar.gz
[root@ip-172-31-83-27 ~]# rm -rf test
[root@ip-172-31-83-27 ~]# ls
Dockerfile testfile1 test.tar.gz
[root@ip-172-31-83-27 ~]# docker build -t raham .
```

docker run -it - -name container name image-name /bin/bash

```
FROM ubuntu:14.04
MAINTAINER abc "abc@abc.com"
RUN apt-get update
RUN apt-get install -y nginx
RUN echo 'Our first Docker image for Nginx' > /usr/share/nginx/html/index.html
EXPOSE 80
```

TO BUILD:

```
docker build -t image1 .
```

TO RUN:

```
docker run -dit --name mustafa -p 8081:80 image1 nginx -g "daemon off;"
```

DOCKER VOLUMES:

- When we create a Container then Volume will be created.
 - Volume is simply a directory inside our container.
 - First, we have to declare the directory Volume and then share Volume.
 - Even if we stop the container still, we can access the volume.
 - Volume will be created in one Container.
 - You can declare directory as a volume only while creating container.
 - We can't create volume from existing container.
 - You can share one volume across many number of Containers.
 - Volume will not be included when you update an image.
 - If Container-1 volume is shared to Container-2 the changes made by Container-2 will be also available in the Container-1.
-
- You can map Volume in two ways:
 - 1.Container < ----- > Container
 - 2.Host < ----- > Container

USES OF VOLUMES:

- Decoupling Container from storage.
- Share Volume among different Containers.
- Attach Volume to Containers.
- On deleting Container Volume will not be deleted.

CREATING VOLUMES FROM DOCKER FILE:

- Create a Docker file and write

```
FROM ubuntu
VOLUME["/myvolume"]
```
- build it - `docker build -t image_name .`
- Run it - `docker run -it - --name container1 ubuntu /bin/bash`
- Now do `ls` and you will see `myvolume-1` add some files there
- Now share volume with another Container - `docker run -it - --name container2(new) - --privileged=true - --volumes-from container1 ubuntu`
- Now after creating `container2`, `my volume1` is visible
- Whatever you do in `volume1` in `container1` can see in another container
- `touch /myvolume1/samplefile1` and exit from `container2`.
- `docker start container1`
- `docker attach container1`
- `ls/volume1` and you will see your `samplefile1`

```
FROM ubuntu
ADD file1 /ubuntu1/file
VOLUME /ubuntu1
~
```

CREATING VOLUMES FROM COMMAND:

- `docker run -it - -name container3 -u /volume2 ubuntu /bin/bash`
- now do `ls` and `cd volume2`.
- Now create one file and exit.
- Now create one more container, and share Volume2 - `docker run -it - -name container4 - -privileged=true - -volumes-from container3 ubuntu`
- Now you are inside container and do `ls`, you can see the Volume2
- Now create one file inside this volume and check in container3, you can see that file

VOLUMES (HOST TO CONTAINER):

- Verify files in `/home/ec2-user`
- `docker run -it - -name hostcont -u /home/ec2-user:raham - -privileged=true ubuntu`
- `cd raham` [raham is (container-name)]
- Do `ls` now you can see all files of host machine.
- Touch `file1` and exit. Check in ec2-machine you can see that file.

SOME OTHER COMMANDS:

- `docker volume ls`
- `docker volume create <volume-name>`
- `docker volume rm <volume-name>`
- `docker volume prune` (it will remove all unused docker volumes).
- `docker volume inspect <volume-name>`
- `docker container inspect <container-name>`

MOUNT VOLUMES:

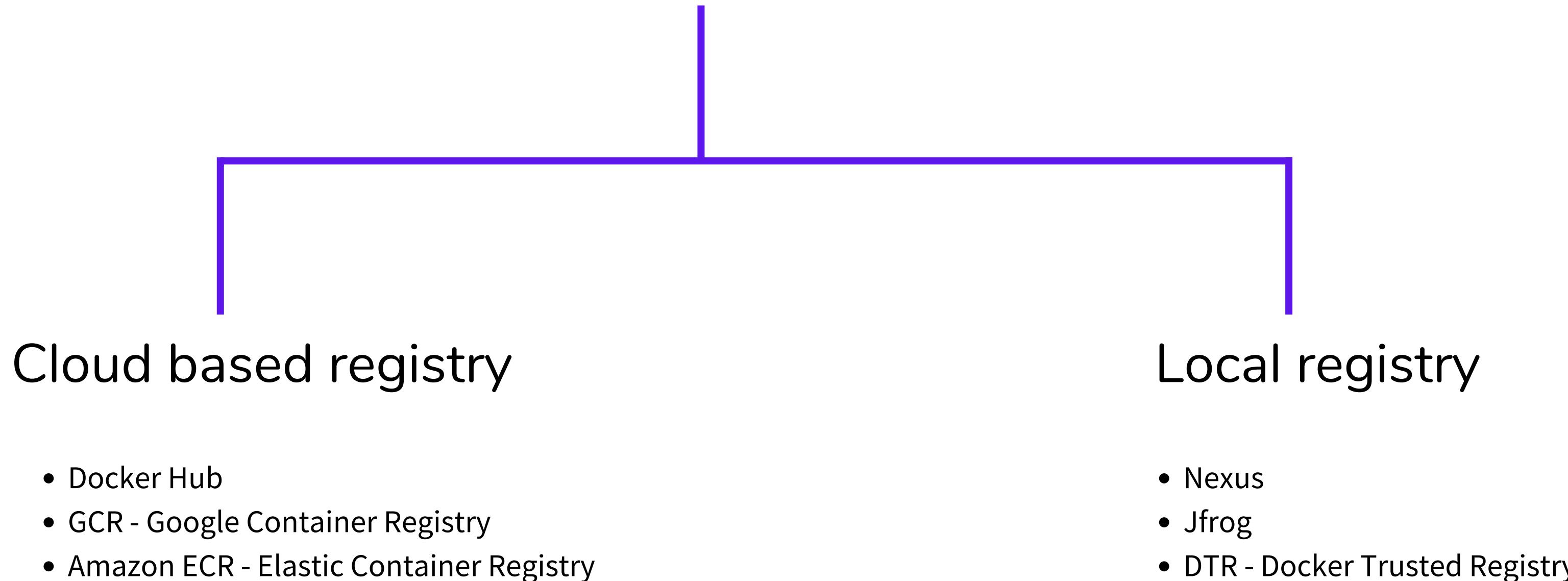
- To attach a volume to a container: `docker run -it --name=example1 --mount source=vol1,destination=/vol1 ubuntu`
- To send some files from local to container:
 - create some files
 - `docker run -it --name cont_name -v "$(pwd)":/my-volume ubuntu`
- To remove the volume: `docker volume rm volume_name`
- To remove all unused volumes: `docker volume prune`

BASE VOLUMES:

STEPS

- create a volume : `docker volume create volume99(volume-name)`
- mount it: `docker run -it -v volume99:/my-volume --name container1 ubuntu`
- now go to my-volume and create some files over there and exit from container
- mount it: `docker run -it -v volume99:/my-volume-01 --name container2 ubuntu`

DOCKER REGISTRY: It is used to store the images. Docker hub is the default registry



DOCKER PUSH:

- Select an image that includes docker and S.G SSH and HTTP enable anywhere on it.
- `docker run -it ubuntu /bin/bash`
- Create some files inside the container and create an image from that container by using - `docker commit container-name image1`
- now create a docker hub account
- Go to ec2-user and log in by using `docker login`.
- Enter username and password.
- Now give the tag to your image, without tagging we can't push our image to docker.
- `docker tag image1 rahamshaik/new-image-name (ex: project1)`
- `docker push rahamshaik/project1`
- Now you can see this image in the docker hub account.
- Now create one instance in another region and pull the image from the hub.
- `docker pull rahamshaik/project1`
- `docker run -it - -name mycontainer rahamshaik/project1 /bin/bash`
- Now give ls and `cd tmp` and ls you can see the files you created.
- Now go to docker hub and select your image -- > settings -- > make it private.
- Now run `docker pull rahamshaik/project1`
- If it is denied then login again and run it.
- If you want to delete image settings -- > project1 -- > delete

JENKINS SETUP USING DOCKER IMAGE:

DESCRIPTION: By using the docker file, we can set up the Jenkins dashboard without installing any dependencies.

- Login to docker hub
- search for Jenkins then you will get Jenkins official image.



- Click on the image



- copy the code : `docker pull jenkinsci/jenkins:lts`
- run this code in docker engine
- now see docker images then you will get jenkins image
- create container using that image
- Now exit from the container and start the container again
- Inspect the container : [`docker inspect jenkins`](#)
- now go to jenkins image in docker hub and scroll down you will get command



Jenkins

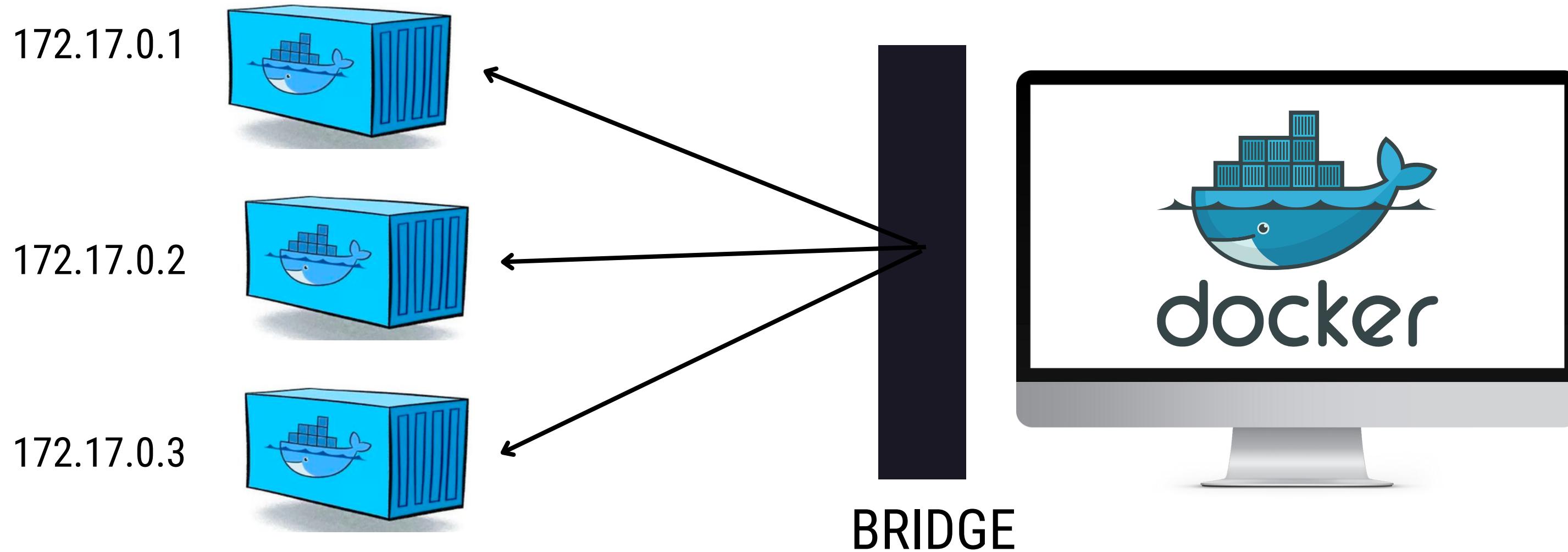
How to use this image

```
docker run -p 8080:8080 -p 50000:50000 jenkins
```

- run this command on docker engine and connect with Jenkins dashboard (public ip:8080)

DOCKER NETWORK:

it allows you to attach your container into many networks, it is used to isolate the containers.



To create a network: `docker network create network_name`

To see the list: `docker network ls`

To delete a network: `docker network rm network_name`

To inspect: `docker network inspect network_name`

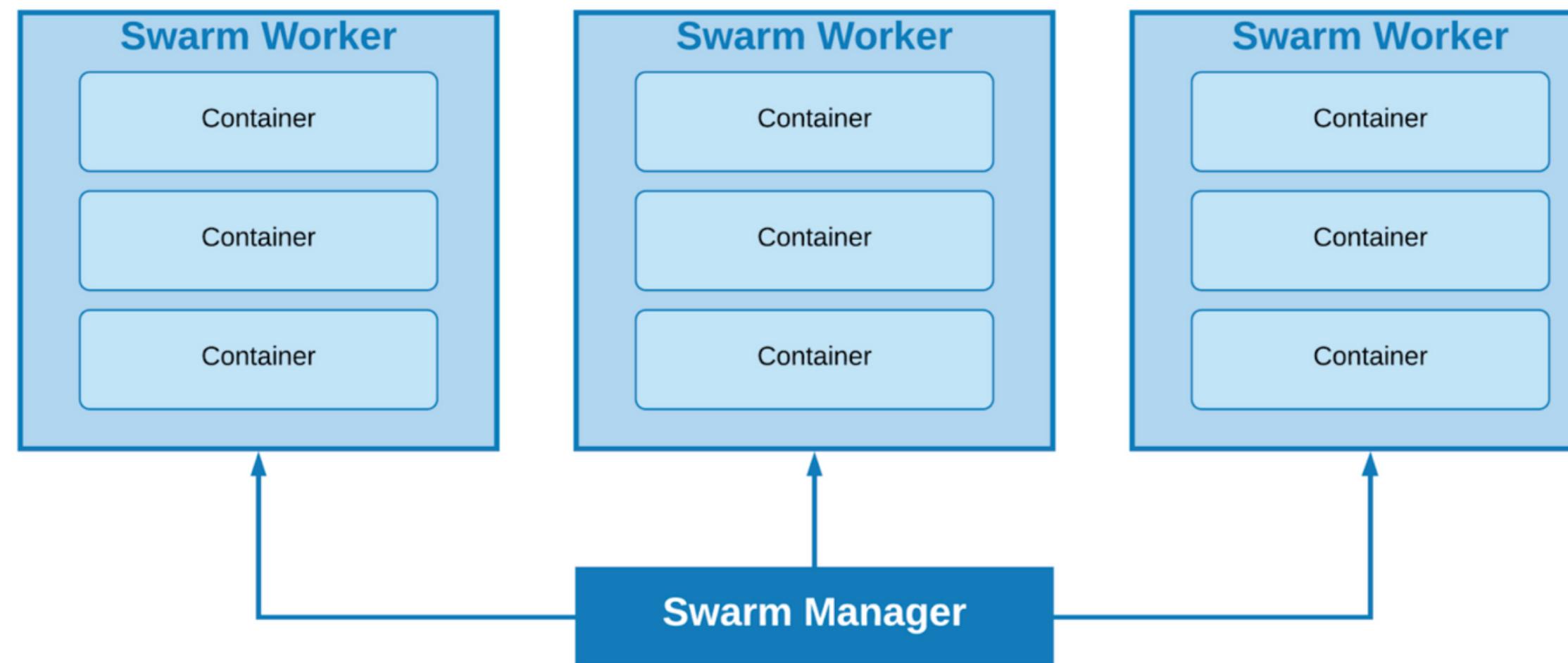
To connect a container to the network: `docker network connect network_name container_id/name`

To disconnect from the container: `docker network disconnect network_name container_name`

To prune: `docker network prune`

DOCKER SWARM:

- Docker swarm is an orchestration service within docker that allows us to manage and handle multiple containers at the same time.
- It is a group of servers that runs the docker application.
- It is used to manage the containers on multiple servers.
- This can be implemented by the cluster.
- The activities of the cluster are controlled by a swarm manager, and machines that have joined the cluster is called swarm worker.



Docker Engine helps to create Docker Swarm.

There are mainly worker nodes and manager nodes.

The worker nodes are connected to the manager nodes.

So any scaling or update needs to be done first it will go to the manager node.

From the manager node, all the things will go to the worker node.

Manager nodes are used to divide the work among the worker nodes.

Each worker node will work on an individual service for better performance.

DOCKER SWARM COMPONENTS:

SERVICE: Represents a part of the feature of an application.

TASK: A single part of work.

MANAGER: This manages the work among the different nodes.

WORKER: Which works for a specific purpose of the service.

SETUP:

Create 3 node one is manager and another two are workers

Manager node: docker swarm init --advertise-addr (private ip)

Run the below command to join the worker nodes

To check nodes on docker swarm: docker node ls

Here * Indicates the current node like master branch on git

Now we created the docker swarm cluster

docker info : To see all the docker info running on our machine.

docker swarm leave : To down the docker node (need to wait few sec)

docker node rm node-id : To remove the node permanently

docker swarm leave : To delete the swarm but will get error

docker swarm leave –force : To delete the manager forcefully

docker swarm join-token worker. : To get the token of the worker

docker swarm join-token manager : To get the token of the worker

SWARM SERVICE:

Now we want to run a service on the swarm
So we want to run a specific container on all these nodes
To do that we will use a docker service command which will create a service for us .
That service is nothing but a container.
We have a replicas here when one replica goes down another will work for us.
Atleast one of the replica needs to be up among them.

`docker service create --name raham --replicas 3 --publish 80:80 httpd`
raham : service name replicas : nodes publish : port reference image: apache

`docker service ls` : To list the services

`docker service ps service-name` : To see where the services are running

`docker ps` : To see the containers (Check all nodes once)

`docker rm -f names` : To remove the service (it will come again later)

public ip on browser : To check its up and running or not

`docker service rm service-name` : To remove the service

To create a service: `docker service create --name devops --replicas 2 image_name`

Note: image should be present on all the servers

To update the image service: `docker service update --image image_name service_name`

Note: we can change image,

To rollback the service: `docker service rollback service_name`

To scale: `docker service scale service_name=3`

To check the history: `docker service logs`

To check the containers: `docker service ps service_name`

To inspect: `docker service inspect service_name`

To remove: `docker service rm service_name`

DOCKER COMPOSE:

- It is a tool used to build, run and ship the multiple containers for application.
- It is used to create multiple containers in a single host.
- It uses YAML file to manage multiple containers as a single service.
- The Compose file provides a way to document and configure all of the application's service dependencies (databases, queues, caches, web service APIs, etc).

COMMANDS:

Start all services: Docker Compose up.

Stop all services: Docker Compose down.

Run Docker Compose file: Docker-compose up -d.

List the entire process: Docker ps.

COMPOSE FILE:

The Docker Compose file includes Services, Networks and Volumes.

The Default Path is ./docker-compose.yml

It contains a service definition which configures each container started for that service.

COMPOSE INSTALLATION:

```
sudo curl -L "https://github.com/docker/compose/releases/download/1.29.2/docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
```

```
sudo chmod +x /usr/local/bin/docker-compose
```

```
sudo ln -s /usr/local/bin/docker-compose /usr/bin/docker-compose
```

```
docker-compose --version
```

COMPOSE FILE:

- version - specifies the version of the Compose file.
- services - it the services in your application.
- networks - you can define the networking set-up of your application.
- volumes - you can define the volumes used by your application.
- configs - configs lets you add external configuration to your containers. Keeping configurations external will make your containers more generic.

CREATING DOCKER-COMPOSE.YML:

```
version: '3'
services:
  webapp1:
    image: nginx
    ports:
      - "8000:80"
```

vim docker-compose.yml

Version: It is the compose file format which supports the relavent docker engine

Services: The services that we are going to use by this file (Webapp1 is service name)

Image: Here we are taking the Ngnix image for the webserver

Ports: 8000 port is mapping to container port 80

Docker-compose up -d

Public-ip:8000 --> You can see the Nginx image

Docker network ls --> you can see root_default

Docker-compose down --> It will delete all the Created containers

```
version: '3'
services:
  webapp1:
    image: nginx
    ports:
      - "8000:80"
  webapp2:
    image: nginx
    ports:
      - "8001:80"
```

Docker-compose up -d

Public-ip:8000 & public-ip:8001--> You can see the Nginx image on both ports

Docker container ls

Docker network ls

CHANGING DEFAULT FILE:

mv docker-compose.yml docker-compose1.yml

docker-compose up -d

You will get some error because you are changing by default docker-compose.yml

Use the below command to overcome this error

docker-compose -f docker-compose1.yml up -d

docker-compose -f docker-compose1.yml down

```
version: "3.1"
services:
  mobile_recharge:
    image: nginx
    ports:
      - "9999:80"
    volumes:
      - "mobile-recharge-volume1"
    networks:
      - "mobile-recharge-network"

  mobile_recharge2:
    image: nginx
    ports:
      - "9998:80"
networks:
  mobile-recharge-network:
    driver: bridge
```

~

docker-compose up -d - used to run the docker file

docker-compose build - used to build the images

docker-compose down - remove the containers

docker-compose config - used to show the configurations of the compose file

docker-compose images - used to show the images of the file

docker-compose stop - stop the containers

docker-compose logs - used to show the log details of the file

docker-compose pause - to pause the containers

docker-compose unpause - to unpause the containers

docker-compose ps - to see the containers of the compose file

DOCKER STACK:

It is used when you want to launch the whole software together.

You will write all the services and launch them together.

```
docker stack deploy -c demo.yml demostack
```

demo.yml = name of file & demostack = name of stack

now see the services by using docker service ls all of the services are running

```
docker service scale id=no.of_replicas : To scale the services
```

```
docker service ps stackname : To see the the services running
```

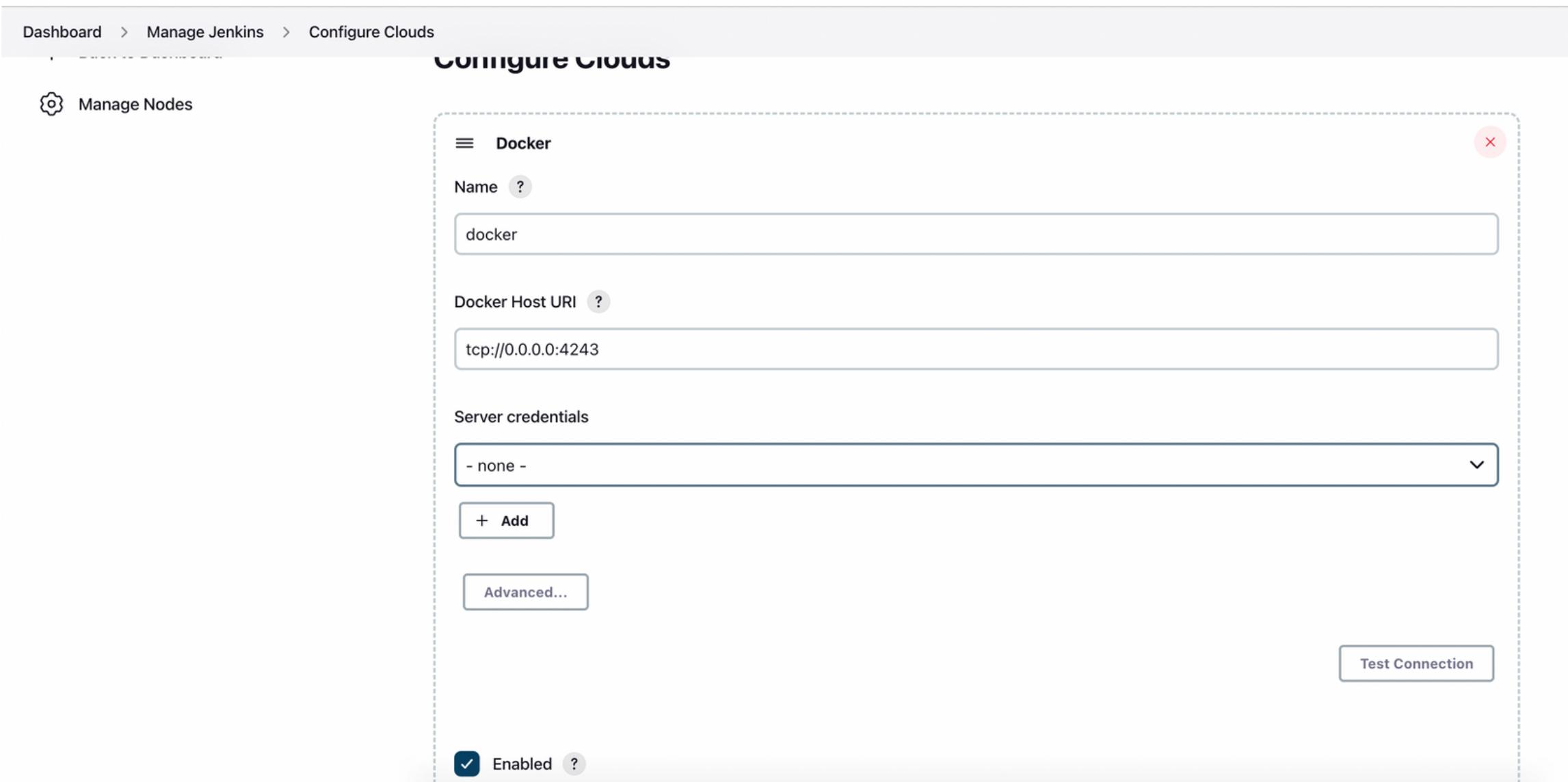
DOCKER INTEGRATION WITH JENKINS

- Install docker and Jenkins in a server.
- vim /lib/systemd/system/docker.service

```
[Service]
Type=notify
# the default is not to use systemd for cgroups because the delegate issues still
# exists and systemd currently does not support the cgroup feature set required
# for containers run by docker
ExecStart=/usr/bin/dockerd -H tcp://0.0.0.0:4243 -H unix:///var/run/docker.sock
ExecReload=/bin/kill -s HUP $MAINPID
TimeoutSec=0
RestartSec=2
Restart=always
```

- Replace the above line with
 - ExecStart=/usr/bin/dockerd -H tcp://0.0.0.0:4243 -H unix:///var/run/docker.sock
- systemctl daemon-reload
- service docker restart
- curl http://localhost:4243/version

- Install Docker plugin in Jenkins Dashboard.
- Go to manage jenkins>Manage Nodes & Clouds>>Configure Cloud.
- Add a new cloud >> Docker
- Name: Docker
- add Docker cloud details.



- Add Docker Agent Template

Dashboard > Manage Jenkins > Configure Clouds

List of Images to be launched as agents

Docker Agent templates

Labels ?

dev

Enabled ?

Name ?

dev

Docker Image ?

image1

[Registry Authentication...](#)

[Container settings...](#)

Instance Capacity ?

Save **Apply**

Remote File System Root ?

/home/jenkins/

Usage ?

Use this node as much as possible



Idle timeout ?

10

Connect method ?

Connect with SSH



→ Prerequisites:

- The docker container's mapped SSH port, typically a port on the docker host, has to be accessible over network *from* the master.
- Docker image must have [sshd](#) installed.
- Docker image must have [Java](#) installed.
- Log in details configured as per [ssh-slaves](#) plugin.

SSH key ?

Use configured SSH credentials



Save

Apply

The screenshot shows the Jenkins 'Configure Clouds' page under the 'Manage Jenkins' section. The page is titled 'Configure Clouds' and has a sub-section 'Docker'. The configuration includes:

- SSH Credentials:** Set to 'jenkins/*********'.
- Host Key Verification Strategy:** Set to 'Non verifying Verification Strategy'.
- Advanced...** button for additional settings.
- Stop timeout:** Set to '10'.
- Remove volumes:** An unchecked checkbox.
- Pull strategy:** Set to 'Pull all images every time'.

At the bottom are 'Save' and 'Apply' buttons.

- Save it and do and watch the container in Jenkins dashboard.
- Manage Jenkins>>Docker (last option)

DEPLOYMENT DOCKER FILE:

Create 2 files:

1. Dockerfile
2. index.html file

Dockerfile consists of

```
FROM UBUNTU  
RUN APT-GET UPDATE  
RUN APT-GET INSTALL APACHE2 -Y  
COPY INDEX.HTML /VAR/WWW/HTML/  
CMD ["/USR/SBIN/APACHECTL", "-D", "FOREGROUND"]
```

Index.html file consists of

```
<H1>HI THIS IS MY WEB APP</H1>
```

Add these files into GitHub and Integrate with Jenkins by declarative code pipeline.

```
pipeline {
    agent any
    stages {
        stage ("git") {
            steps {
                git branch: 'main', url: 'https://github.com/devops0014/dockabnc.git'
            }
        }
        stage ("build") {
            steps {
                sh 'docker build -t image77 .'
            }
        }
        stage ("container") {
            steps {
                sh 'docker run -dit -p 8077:80 image77'
            }
        }
    }
}
```

You will get Permission Denied error while building the code.

To resolve that error you need to follow these steps:

- usermod -aG docker jenkins
- usermod -aG root jenkins
- chmod 777 /var/run/docker.sock

Now you can build the code and it will gets deployed.

DOCKER DIRECTORY DATA:

We use docker to run the images and create the containers. but what if the memory is full in instance. we have to add another volume to the instance and mount it to the docker engine. Lets see how we do this.

- Uninstall the docker - yum remove docker -y
- remove all the files - rm -rf /var/lib/docker/*
- create a volume in same AZ & attach it to the instance
- to check it is attached or not - fdisk -l
- to format it - fdisk /dev/xvdf --> n p 1 enter enter w
- set a path - vi /etc/fstab (/dev/xvdf1 /var/lib/docker/ ext4 defaults 0 0)
- mount -a
- install docker - yum install docker -y && systemctl restart docker
- now you can see - ls /var/lib/docker
- df -h

PORTAINER:

- it is a container organizer, designed to make tasks easier, whether they are clustered or not.
- able to connect multiple clusters, access the containers, migrate stacks between clusters
- it is not a testing environment mainly used for production routines in large companies.
- Portainer consists of two elements, the Portainer Server and the Portainer Agent.
- Both elements run as lightweight Docker containers on a Docker engine

PORTAINER:

- Must have swarm mode and all ports enable with docker engine
- curl -L <https://downloads.portainer.io/ce2-16/portainer-agent-stack.yml> -o portainer-agent-stack.yml
- docker stack deploy -c portainer-agent-stack.yml portainer
- docker ps
- public-ip of swamr master:9000