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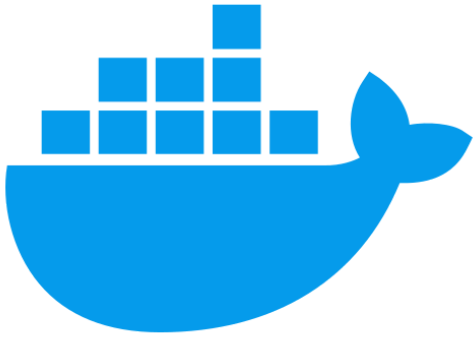
Understanding Docker : Simplifying Application Deployment.

What is Docker?

Docker is an open-source platform for developing, shipping, and running applications in containers. Containers are lightweight, standalone, and executable units that include everything needed to run an application:

✅ Code
✅ Dependencies
✅ Libraries
✅ Configuration

Unlike virtual machines, containers share the host system's kernel, making them faster, more efficient, and portable across various environments.



Key Features of Docker :

1. **Containerization**: Packages applications and their dependencies into lightweight, portable containers.
2. **Portability**: Containers run consistently across different environments (development, testing, production).
3. **Automation**: Simplifies deployment workflows with Dockerfiles and CI/CD pipelines.
4. **Efficiency**: Shares the host OS kernel, making it lightweight and faster than virtual machines.

Core Components of Docker :

1. **Docker Engine:** The runtime that builds and run containers.
2. **Docker Hub:** A registry to find and share container images.
3. **Dockerfile:** A script that defines how to build an image.
4. **Images:** Immutable snapshots used to create containers.
5. **Containers:** Running instances of Docker images.
6. **Docker Swarm:** Native clustering and orchestration tool.

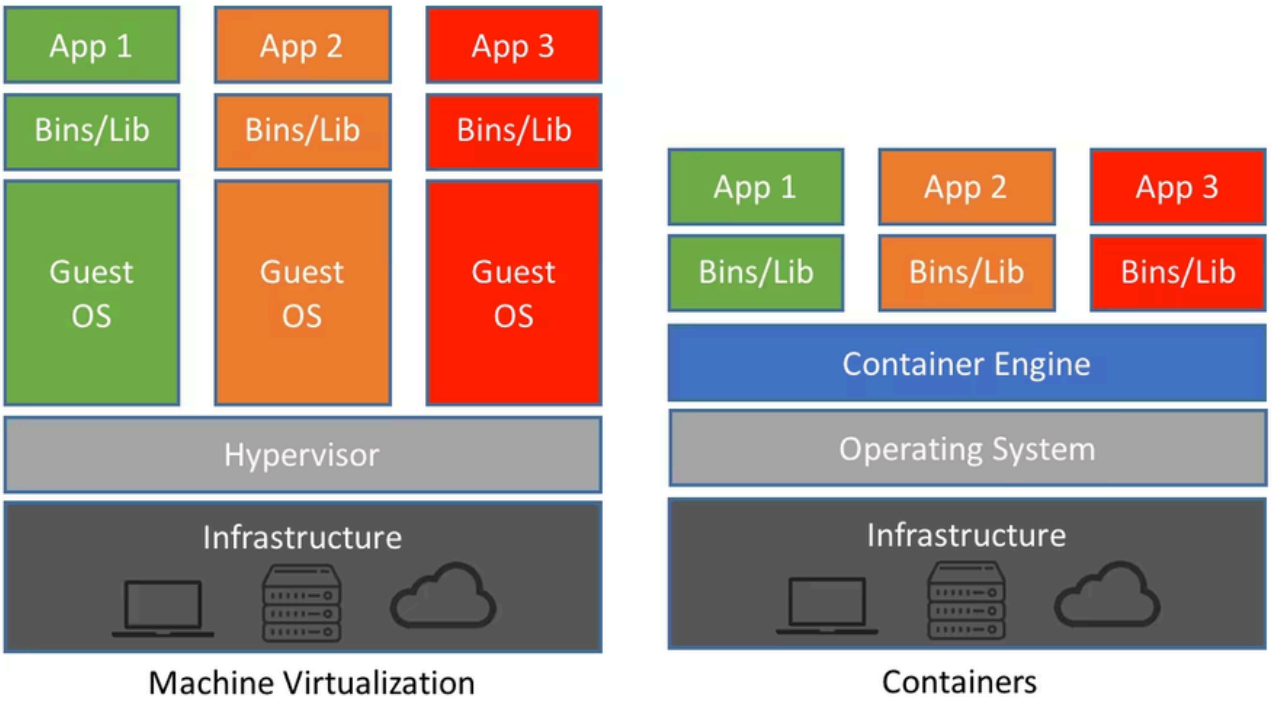
What is Docker Hub?

Docker Hub is a cloud-based registry service provided by Docker, which allows users to store, share, and manage Docker container images. It's essentially a central repository where developers can upload their Docker images for easy access and sharing with others. It hosts both public and private images, enabling developers to find pre-built container images for popular software, or to share their own custom-built images.

What is Container?

A container is a standard unit of software that packages up code and all its dependencies so the application runs quickly and reliably from one computing environment to another. A Docker container image is a lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings.

What is Difference Between Container and Virtual Machine?



Virtual machine :
- Each Virtual Machine has its own Guest OS.
-Requires more CPU, RAM, Storage.
-Larger in size (includes OS, Libraries, and app).

Containers :
-Containers share the Host OS.
-Uses fewer resources as there's no Guest OS.
-Lightweight in size (includes only app & dependencies)

What are the Dependencies in Docker?

In Docker, dependencies are the external libraries, tools, or services that an application needs to function properly. These dependencies are often specified in a Dockerfile or through Docker Compose, ensuring that the required components are available when the container is built or run.

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Setting up Docker on an Ubuntu server hosted on AWS EC2 using a user data script.

```
#!/bin/bash
sudo apt-get update -y
sudo apt-get install -y \
ca-certificates \
curl \
gnupg \
lsb-release
sudo mkdir -m 0755 -p /etc/apt/keyrings
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/docker.gpg
echo \ "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg] https://download.docker.com/linux/ubuntu \
$(lsb_release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
sudo apt-get update -y
sudo apt-get install -y docker-ce docker-ce-cli containerd.io docker-buildx-plugin docker-compose-plugin
sudo systemctl start docker
sudo systemctl enable docker
docker --version
```

Or Else Visit Docker Documentation for Step by Step Installation. 👇
https://docs.docker.com/engine/install/ubuntu/

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Some Basic Docker Commands :

1. **Verify the Version of docker installed on your machine.**
   $docker version
2. **Verify Docker Engine Setup and details.**
   $docker info
3. **Download a Docker image from a registry.**
   $docker pull <image name>
4. **Run a Container from Specified image.**
   $docker run <image name>
5. **List all the running Containers.**
   $docker container ls or $docker ps.
6. **List all Containers. (running and stopped)**
   $docker container ls -a or $docker ps -a.
7. **Stop the running Container.**
   $docker container stop <container_id/name>.
8. **Remove Stopped Container.**
   $docker rm <container_id/name>
9. **Check logs of the specific container**
   $docker container logs <container_id/name>
10. **Open Interactive terminal inside running container.**
    $docker exec -it <container_id> /bin/bash.