Web Technology and Services

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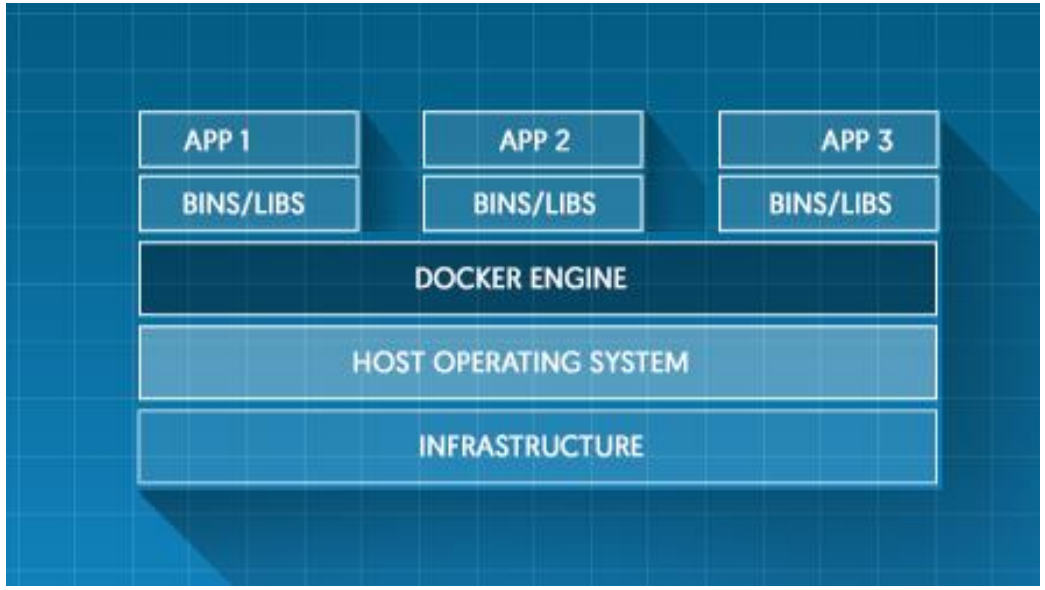
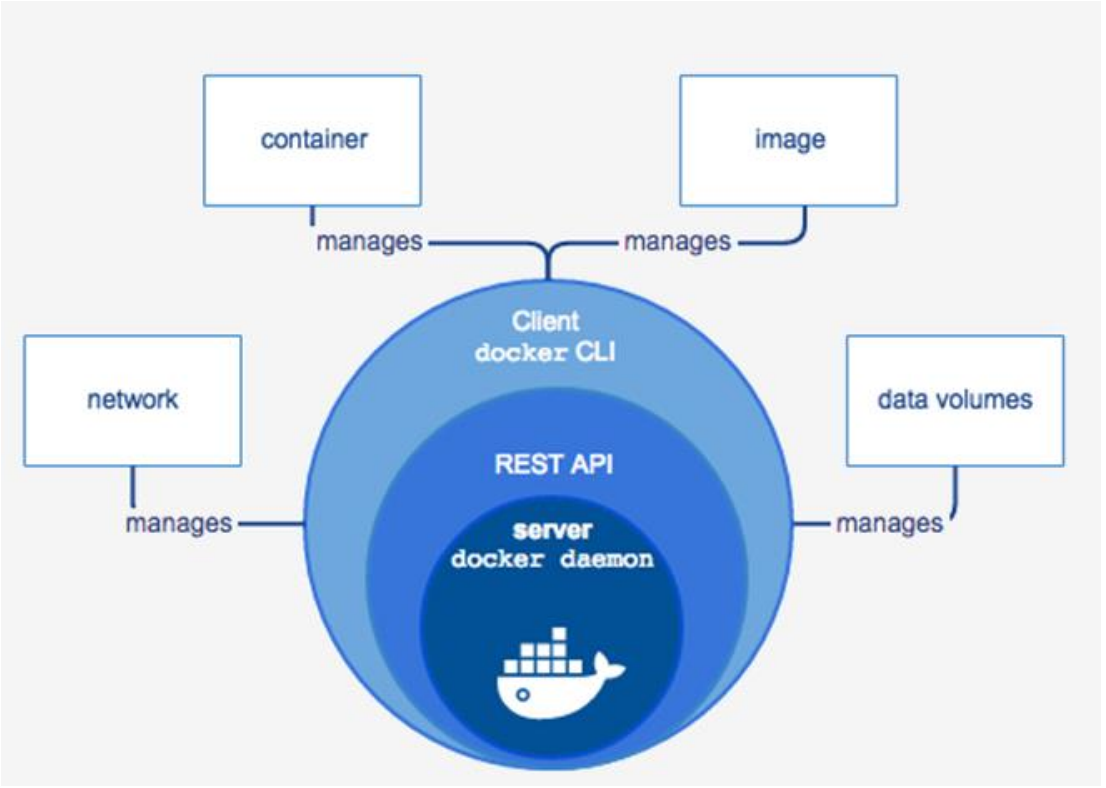
Introduction to Containers, VM-s and Docker

Docker

Docker is a computer program that performs operating-system-level virtualization.





Advantages

- Docker is a popular evolving software with excellent community support and built for microservices
- It is lightweight when compared to VMs making it cost and resource effective
- It provides uniformity across development and production environments making it a suitable fit for building cloud-native applications
- It provides facilities for continuous integration and deployment
- Docker is not going anywhere; it provides integration with popular tools and services such as AWS, Microsoft Azure, Ansible, Kubernetes, Istio etc.

Docker Architecture

- Docker Engine
- Docker Images
- Registries
- Docker Containers
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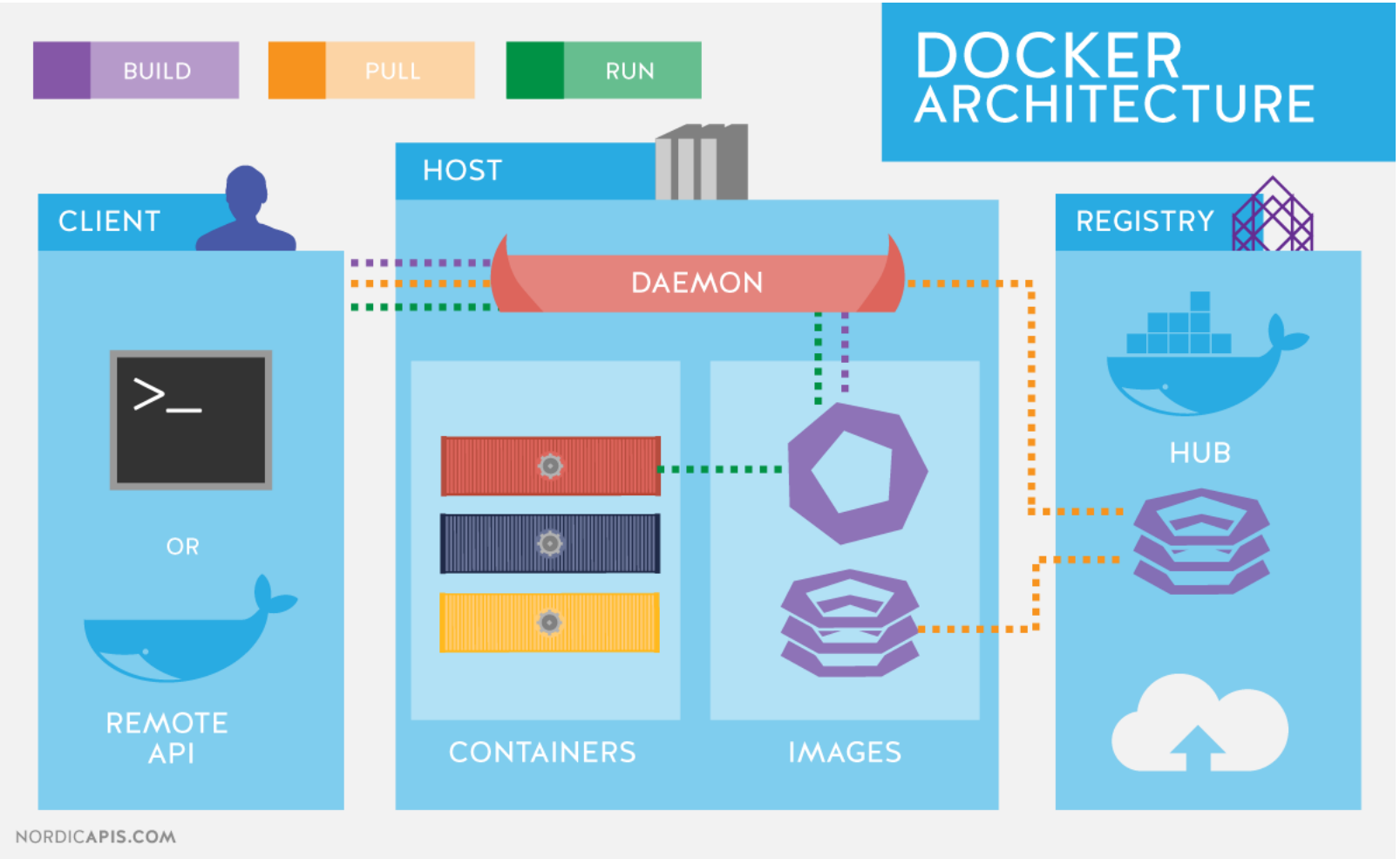
Docker Architecture

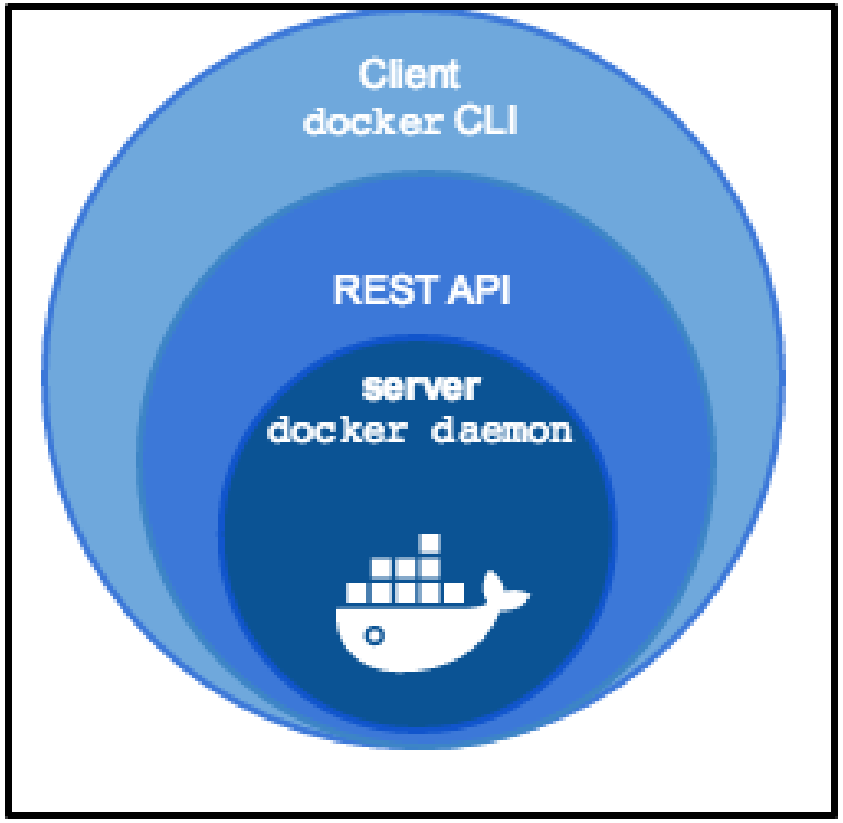


Docker Engine

Docker is the client-server type of application which means we have clients who relay to the server.

So the Docker daemon called: dockerd is the Docker engine which represents the server

The docker daemon and the clients can be run on the same or remote host, and they communicate through command line client binary, as well as a full RESTful API to interact with the daemon: dockerd.

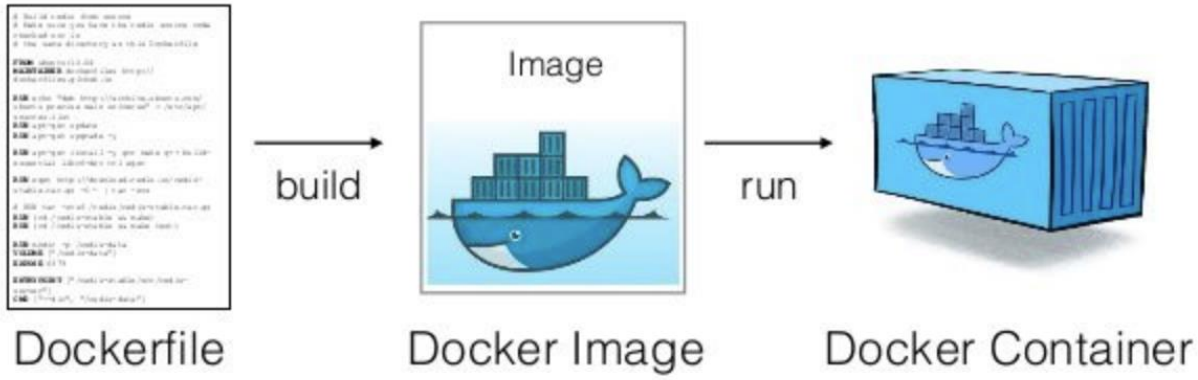


Docker Images

Docker images are the "source code" for our containers; we use them to build containers.

They can have software pre-installed which speeds up deployment.

They are portable, and we can use existing images or build our own.

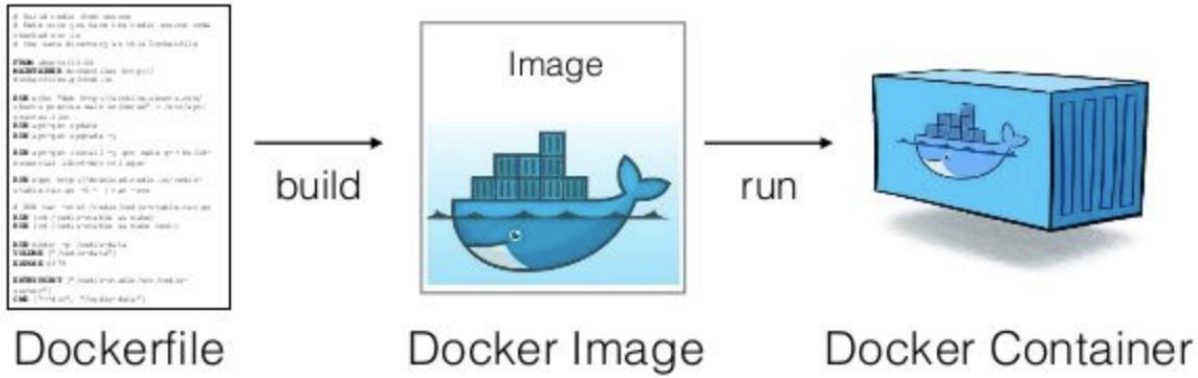


Docker Registries

Docker stores the images we build in registries.

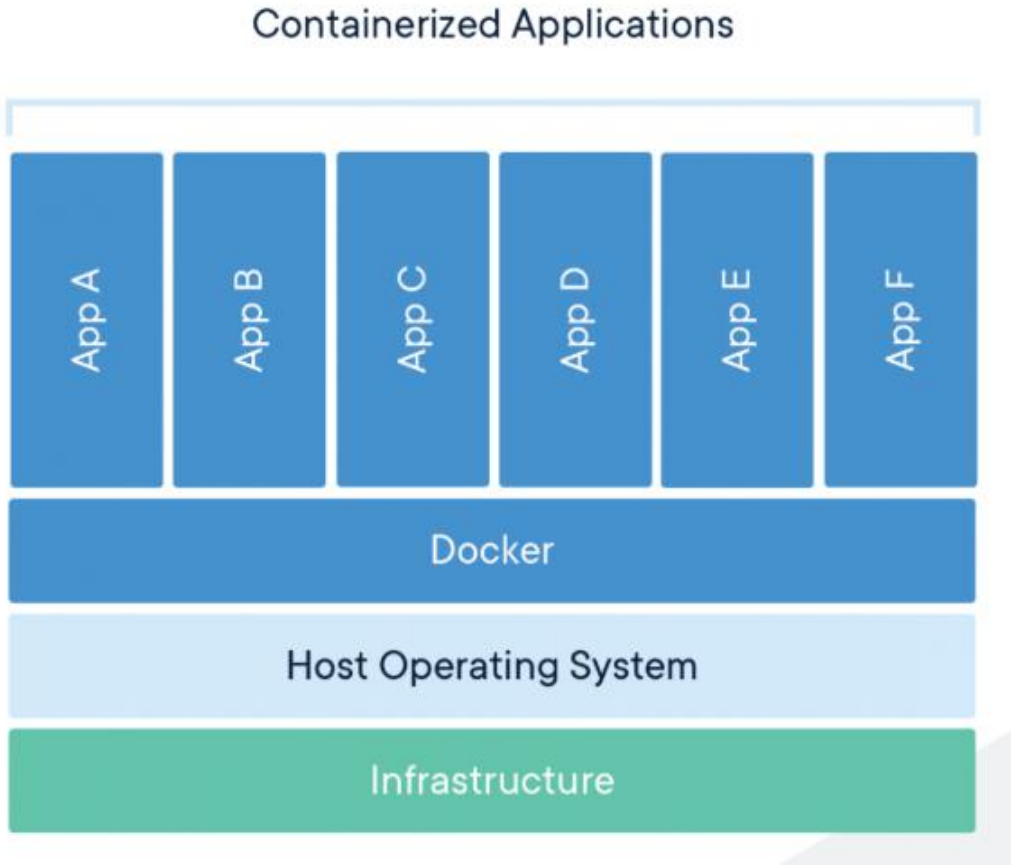
There are public and private registries. Docker company has public registry called Docker hub, where you can also store images privately.

Docker hub has millions of images, which you can start using now.



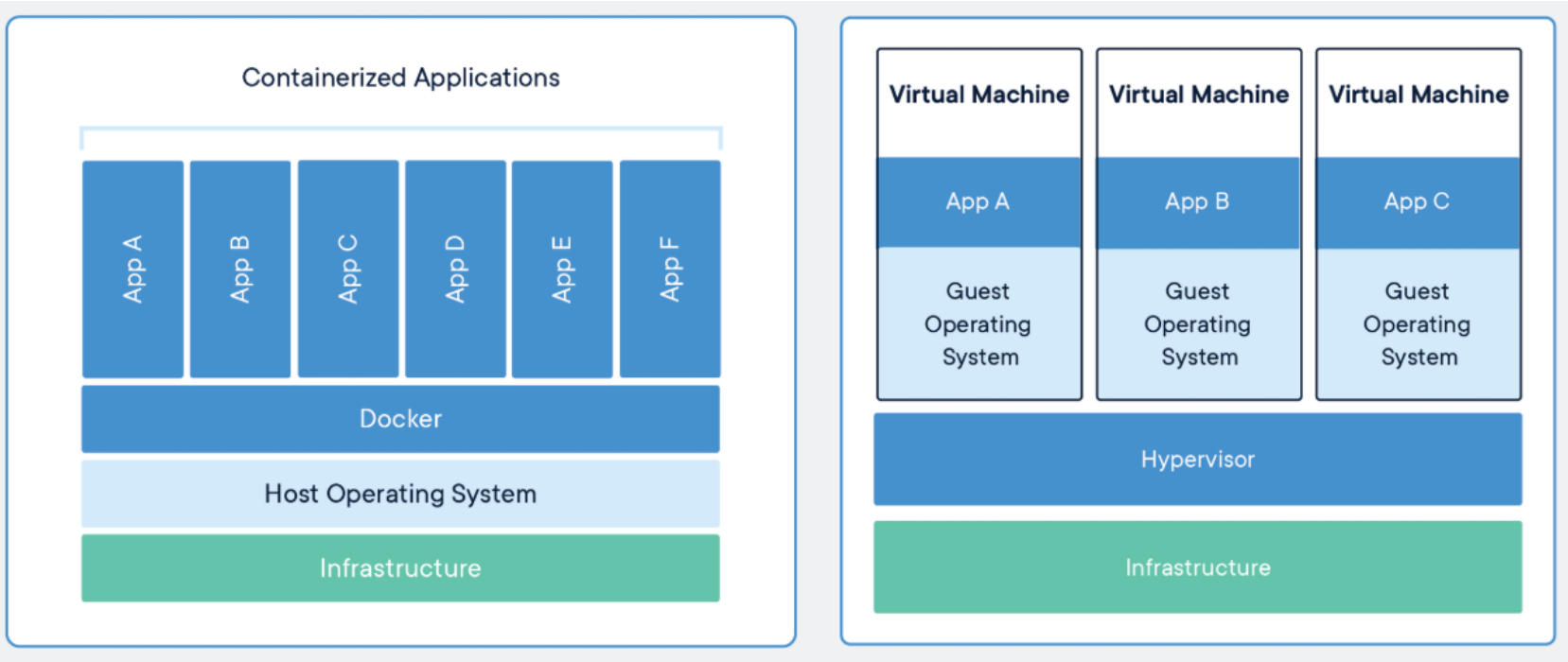
What is a container ?

- 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.



Comparing Containers and Virtual Machines

Containers and virtual machines have similar resource isolation and allocation benefits, but function differently because containers virtualize the operating system instead of hardware. Containers are more portable and efficient.



Comparing Containers and Virtual Machines

CONTAINERS

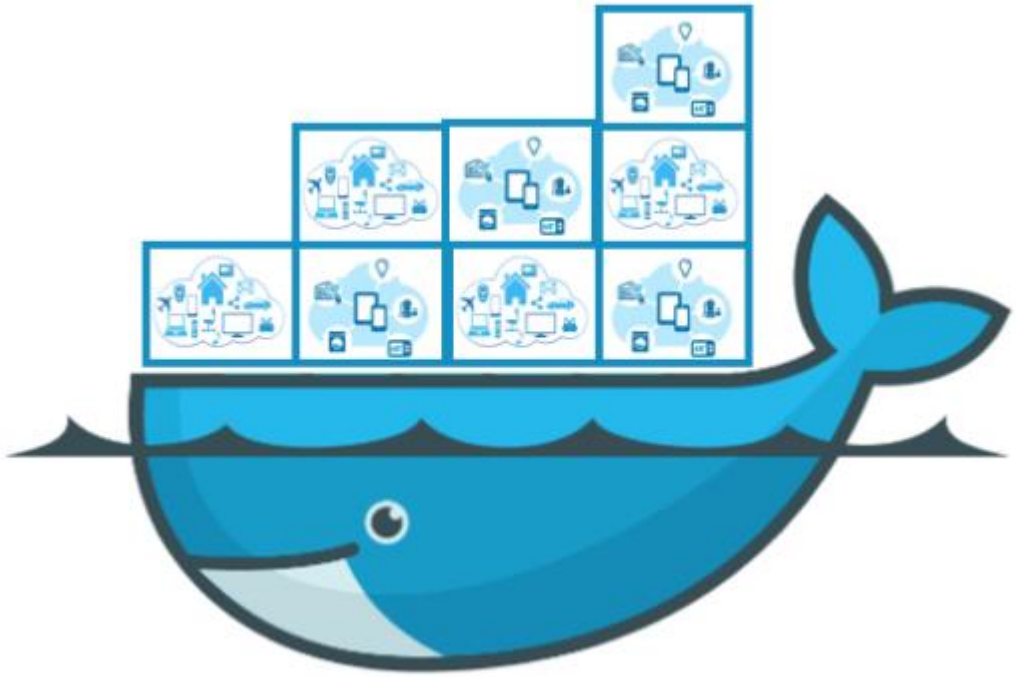
Containers are an abstraction at the app layer that packages code and dependencies together.
Multiple containers can run on the same machine and share the OS kernel with other containers, each running as isolated processes in user space.
Containers take up less space than VMs (container images are typically tens of MBs in size), can handle more applications and require fewer VMs and Operating systems.

VIRTUAL MACHINES

Virtual machines (VMs) are an abstraction of physical hardware turning one server into many servers.

The hypervisor allows multiple VMs to run on a single machine. Each VM includes a full copy of an operating system, the application, necessary binaries and libraries - taking up tens of GBs.
VMs can also be slow to boot and need extra management from DevOPS or Sys Admin

Comparing Containers and Virtual Machines



Basic Docker commands

docker run – Runs a command in a new container.
docker start – Starts one or more stopped containers
docker stop – Stops one or more running containers
docker build – Builds an image form a Docker file
docker pull – Pulls an image or a repository from a registry
docker push – Pushes an image or a repository to a registry
docker export – Exports a container's filesystem as a tar archive
docker exec – Runs a command in a run-time container
docker search – Searches the Docker Hub for images
docker attach – Attaches to a running container
docker commit – Creates a new image from a container's changes

https://www.docker.com/sites/default/files/d8/2019-09/docker-cheat-sheet.pdf

Learn more

- Docker Hub - is the world's easiest way to create, manage, and deliver your teams' container applications: https://hub.docker.com/

- Docker Documentation: https://docs.docker.com/

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