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Docker: Containerization

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Objectives

- Docker Introduction
- Docker Architecture
- Docker Setup for Linux
- Docker Commands
- Docker Containers
- Docker Network
- Docker Images
- Docker Container Storage
- Docker Compose
- Docker Registry
- Docker Swarm

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Docker Overview

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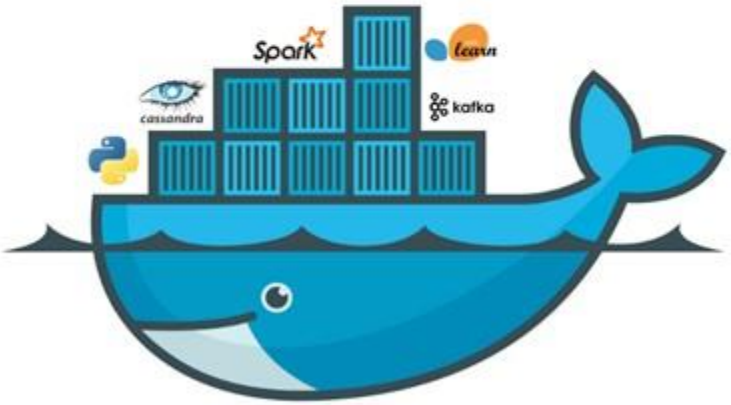
Docker History

- Docker was released in **2013** as an open source project by a company known as **dotCloud**, which was a hosting company that isn't around anymore.
- In fact, within a year of releasing that open source project, it became so big that they changed their company around and basically closed the old company, started a new company called Docker Inc.



Docker is currently the #1 container platform.

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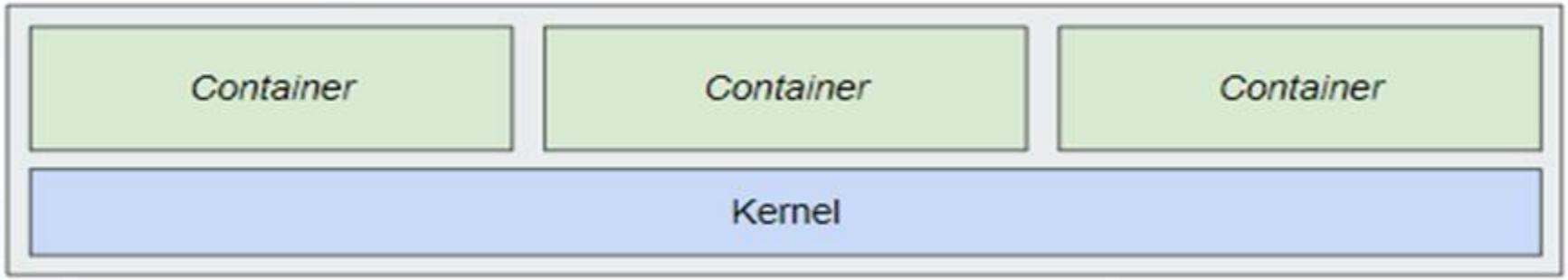
What is Docker?

- It's a platform that lets you package develop run and ship applications in environments called containers.



What is Docker?

- A container is a way of packaging a software into standardized units for development, shipment and deployment.
- A container is like a virtual environment on top of the OS kernel to capture all of its software - libraries, dependencies, etc.

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Why does Docker matter?

- **Portability, Security & Costs**: Package existing apps into containers immediately improves security, reduce costs, and gain cloud portability with no changes to the app code.
- **Microservices**: Containers streamline development and deployment of apps designed with the micro- services architecture pattern.
- **DevOps (CI/CD)**: Accelerate and automate development pipelines with rapid feedback loops while eliminating app conflicts and increasing developer productivity.
- **Infrastructure Optimization**: Containerize apps and improve workload density by running them side-by- side on the same servers. Docker helps reduce costs by consolidating infrastructure, improving utilization, and accelerating cloud migration.
- **Hybrid Cloud**: From private datacenters to public cloud infrastructure, Docker allows apps to be fully portable from one infrastructure to another without rewriting code. Accelerate migration to cloud and enable a hybrid or multi cloud environment.

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Who Does Docker affect most?

- **Developers**
  - Docker automates the repetitive tasks of setting up and configuring development environments so that developers can focus on what matters: **building great software**.
- **DevOps Engineers**
  - Docker streamlines software delivery. Develop and deploy bug fixes and new features without roadblocks. Scale applications in real time.
- **Startups and Enterprises**
  - Lot of their time and resource devoted to developing publishing and hosting the products will become optimize.

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Benefits of Docker

- Docker is all about speed
- Develop Faster
- Build Faster
- Test Faster
- Deploy Faster
- Update Faster
- Recover Faster

Main features

- Create containers and images.
- Docker-compose for multi-container applications.
- Docker swarm to utilize multiple machines running Docker.

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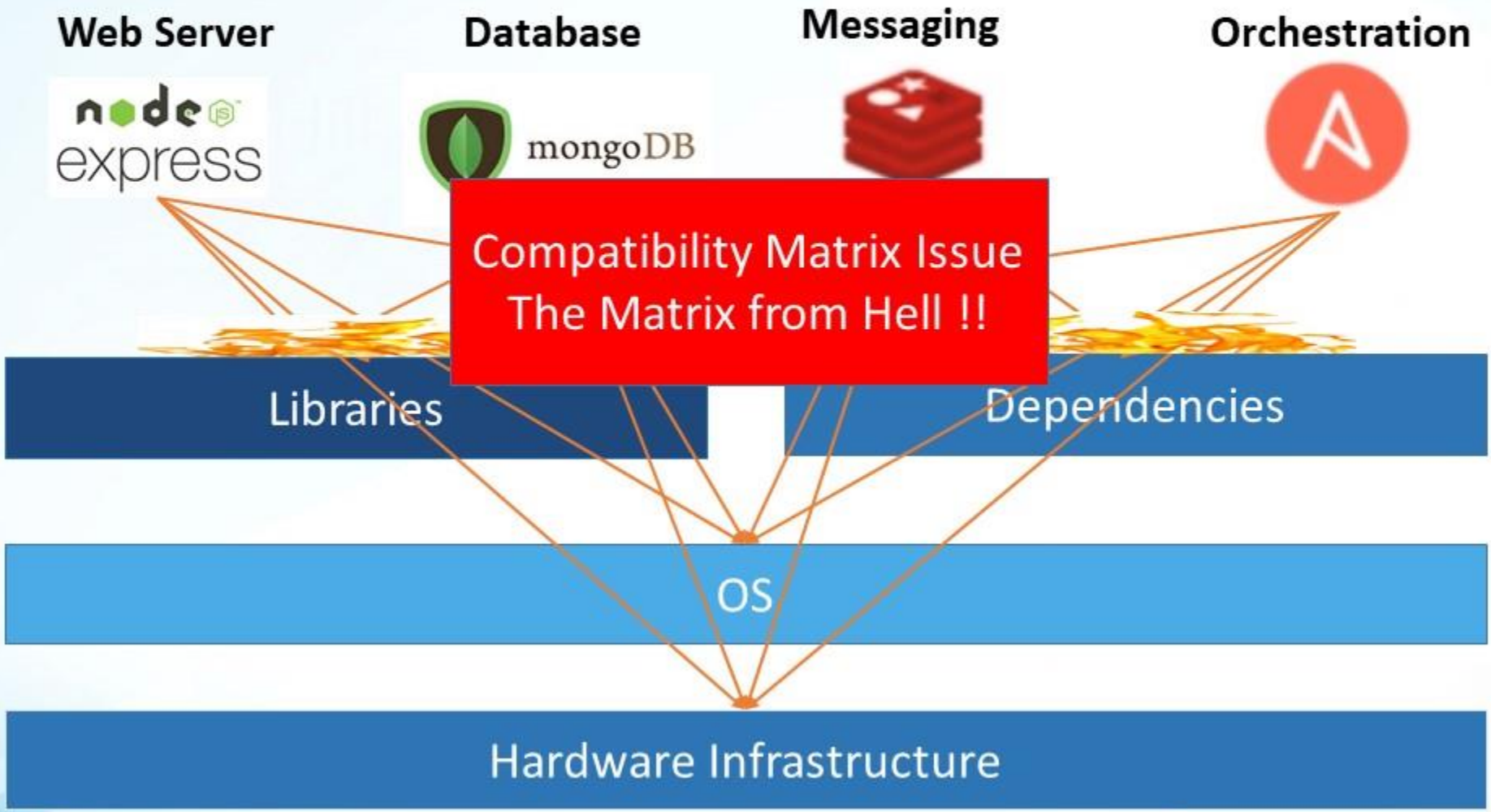
Why do you need containers?



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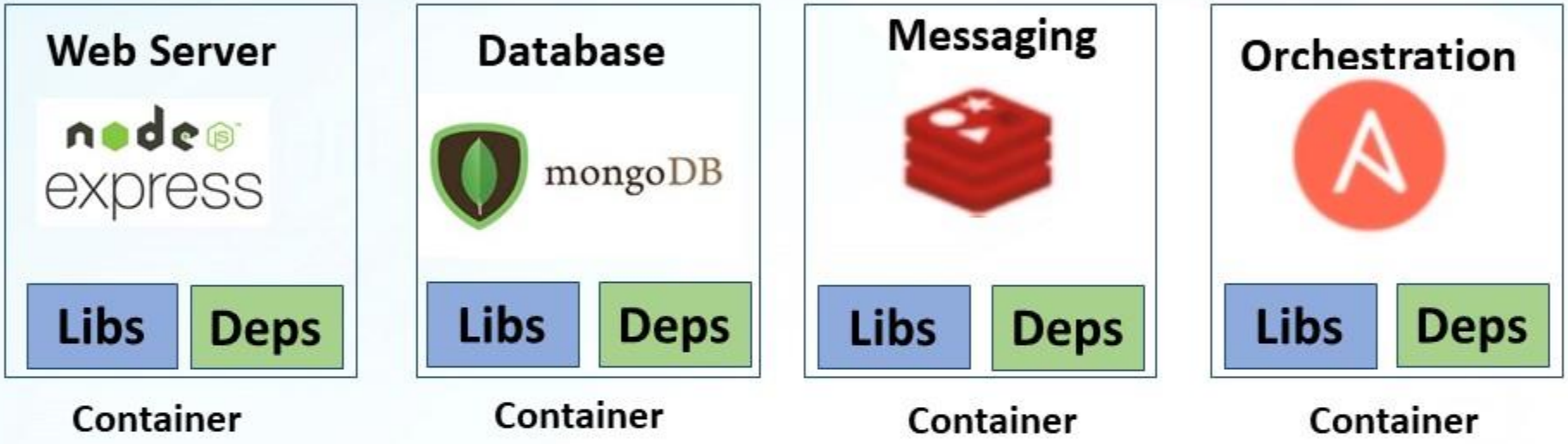
What can it do?



Docker

OS

Hardware Infrastructure

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What are containers?

Processes
Network
Mounts

Processes
Network
Mounts

Processes
Network
Mounts

Processes
Network
Mounts

Docker

OS Kernel

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Operating System

Software | Software | Software | Software

OS Kernel

Sharing the kernel

Docker

OS - Ubuntu

Isn't this a Disadvantage?

NO

Docker is not meant to virtualize and run different operating systems and kernels on the same hardware

Main Purpose of Docker

- Package and containerize application
- Ship Containers
- Run Containers
  - Anywhere
  - Any times

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Containers vs Virtual Machine

Utilization

Size

Boot up

Virtual Machine

Application

Libs | Deps

OS

Virtual Machine

Application

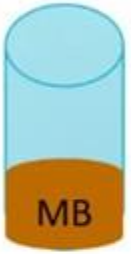
Libs | Deps

OS

Hypervisor

Hardware Infrastructure

Utilization



Size

Boot up

Container

Application

Libs | Deps

Container

Application

Libs | Deps

Docker

OS

Hardware Infrastructure

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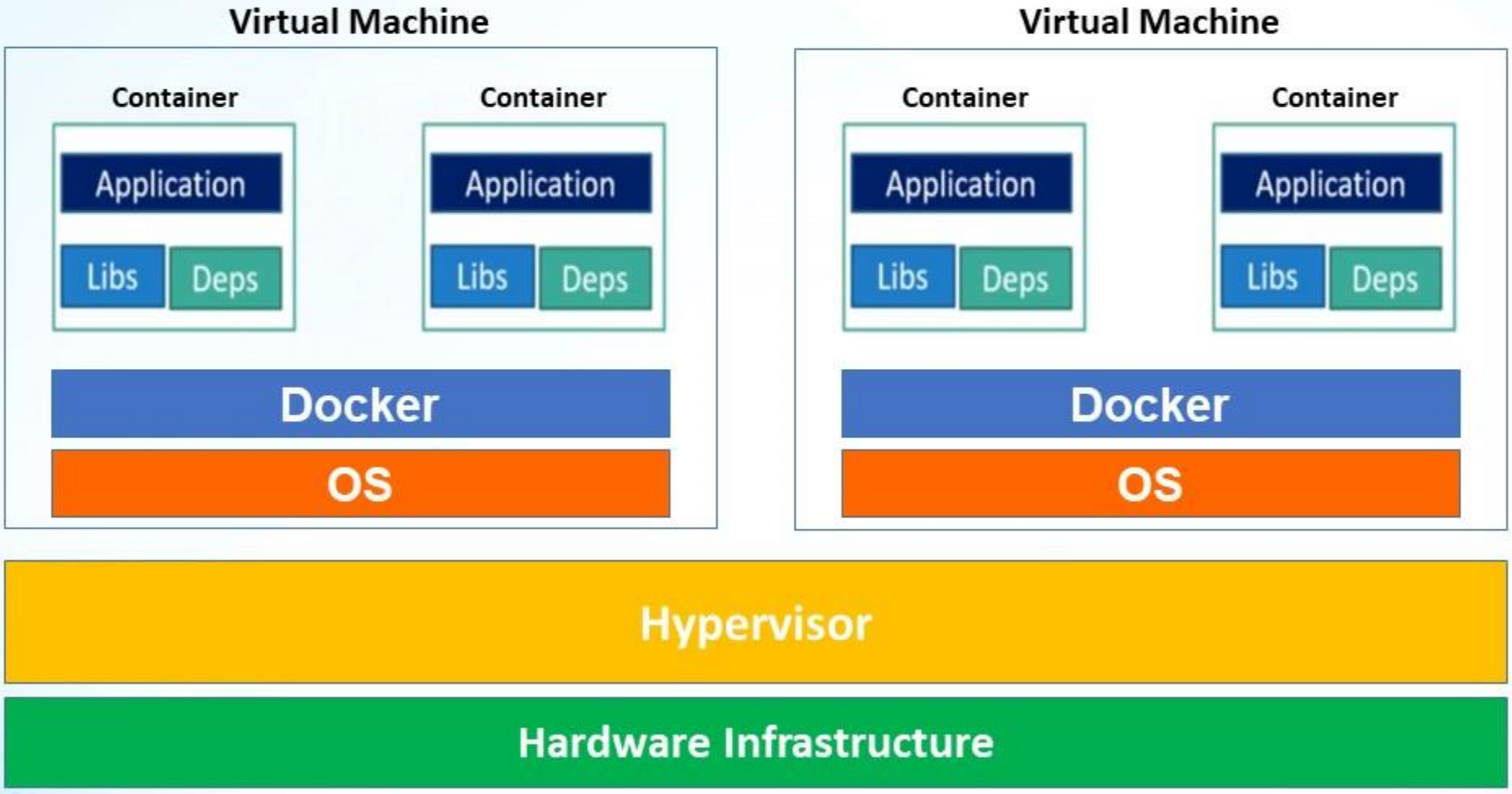
Containers vs Virtual Machine



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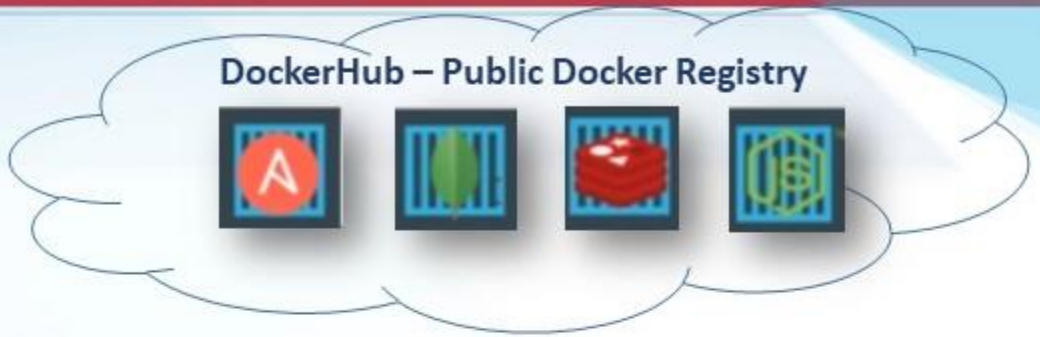
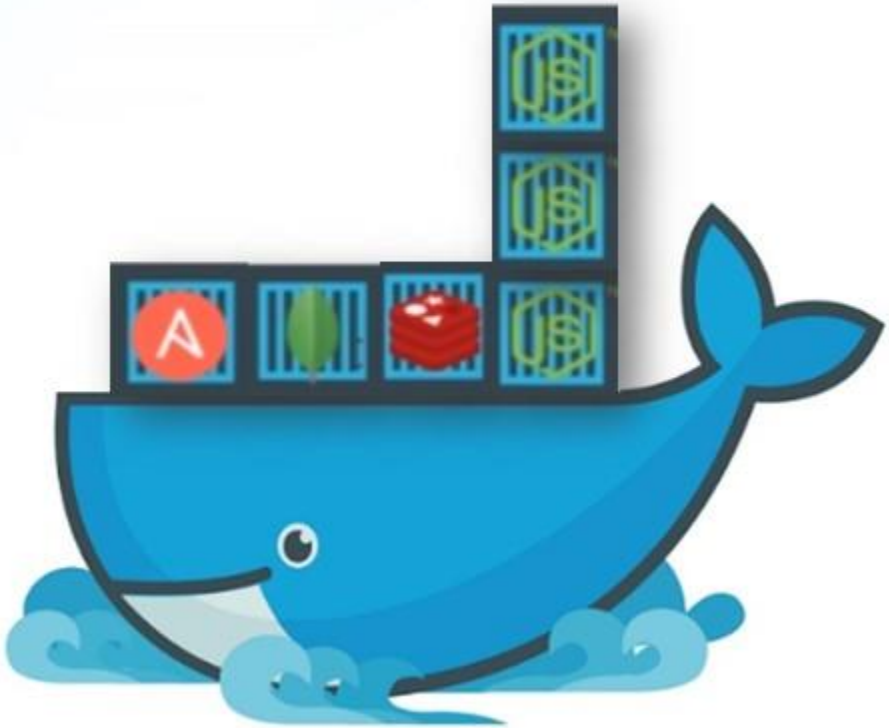
How is it done?



docker run ansible
docker run mongodb
docker run redis
docker run nodejs
docker run nodejs
docker run nodejs



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Container vs image

Docker Container #1

Docker Container #2

Docker Image

Package
Template
Plan

Docker Container #3

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Container Advantage

Developer

App.war

Guide

Operations

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Container Advantage

Developer

Guide

Operations

Container Advantage

Developer

Operations

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Container Advantage

Dev

Ops

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Setup Docker

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Docker Installation

- Open https://docs.docker.com
- Click Download and Install
- Select your operating system
- We are going to use Docker on Linux
- Select the Operating System “Ubuntu”
- Remove Any previous versions of Docker

```
sudo apt-get remove docker docker-engine docker.io containerd runc
```

- Follow the manual steps one by one or scroll down to “Install using the convenience script”

```
curl -fsSL https://get.docker.com -o get-docker.sh
sudo sh get-docker.sh
```

Docker Installation: Extras

- To avoid typing sudo every time

  `sudo usermod -aG docker $USER`

- Check Docker version

  `docker version`

- Docker Configuration information

  `docker info`

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Docker Installation: Verify

- Run a container and verify installation
  - Open https://hub.docker.com
  - Search whalesay
  - This is a simple docker image like HelloWorld applications in development
  - Run the command

    docker run docker/whalesay cowsay Hello-Prabhav!!!

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Thank You