Introduction to Docker

Yong Zhuang

Agenda

- **What is Docker**

- **Virtual Machines vs Containers**

- **Docker Architecture and Workflow**

- **Installing Docker**

- **Development Workflow**

What is Docker?

A platform for building, running, and shipping applications.

What is Docker?

Situation: Your application works on your development machine but doesn't somewhere else. Why?
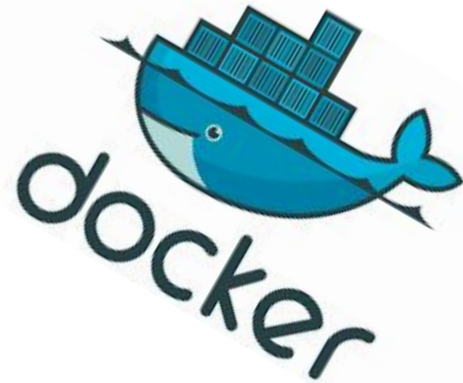
What is Docker?

Situation: Your application works on your development machine but doesn't somewhere else. Why?
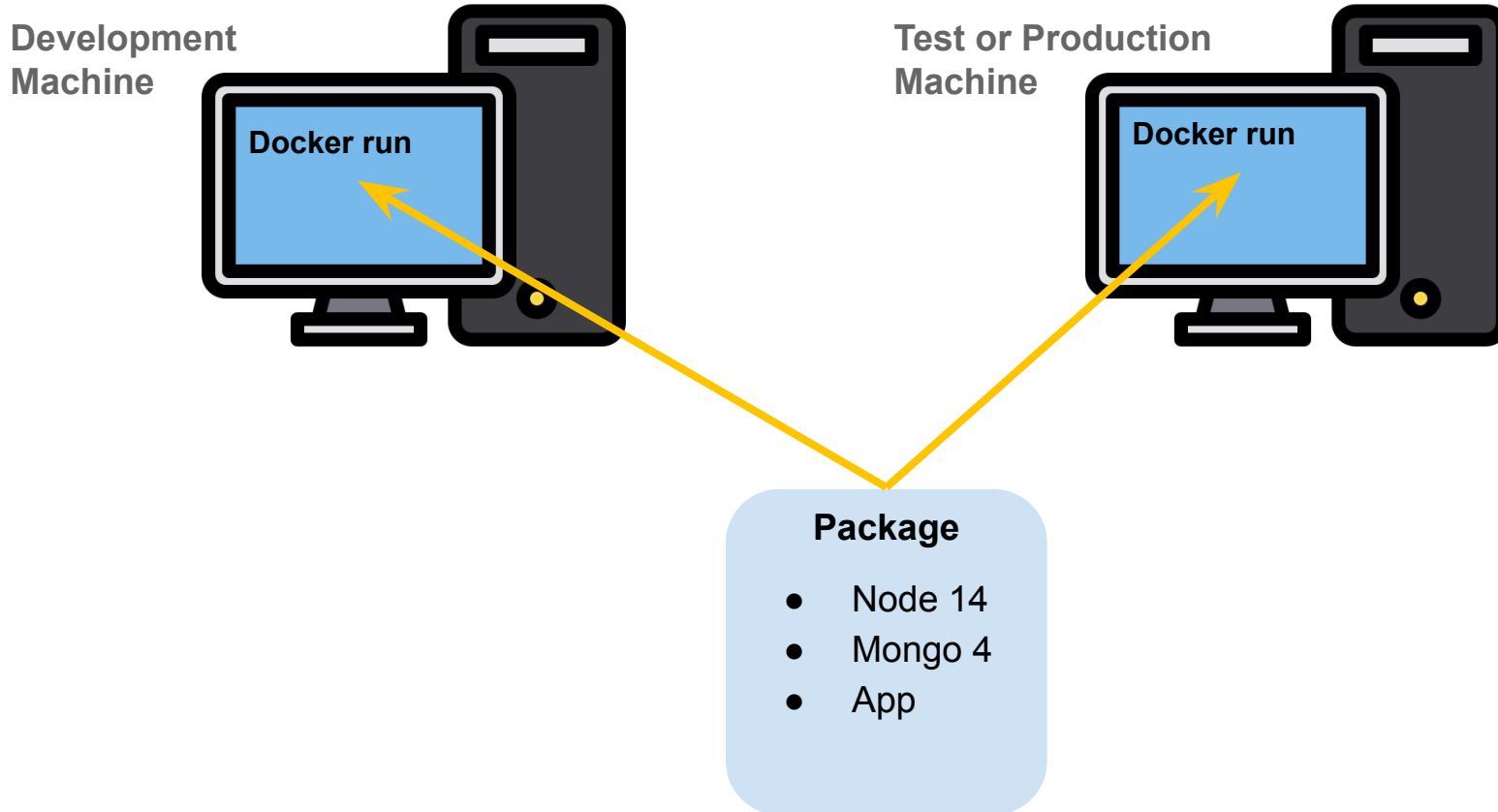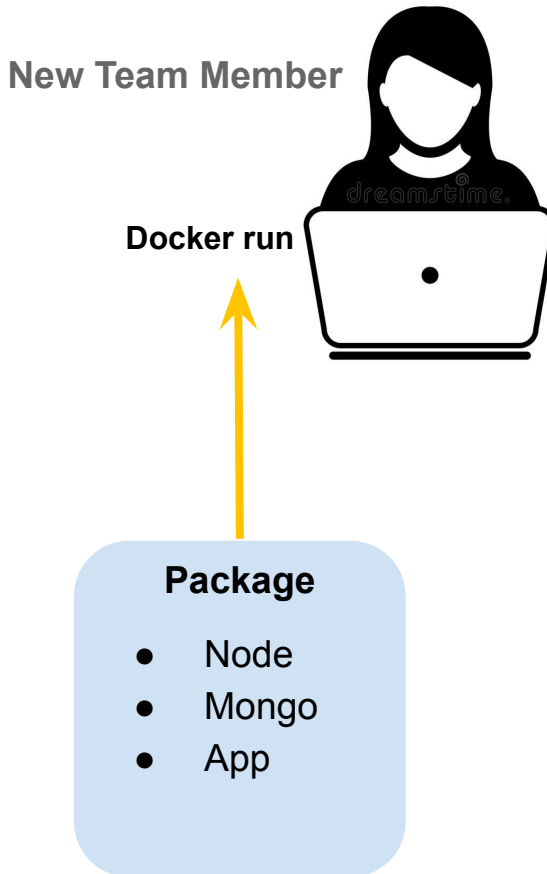
- **One or more files missing**

What is Docker?

Situation: Your application works on your development machine but doesn't somewhere else. Why?

- **One or more files missing**
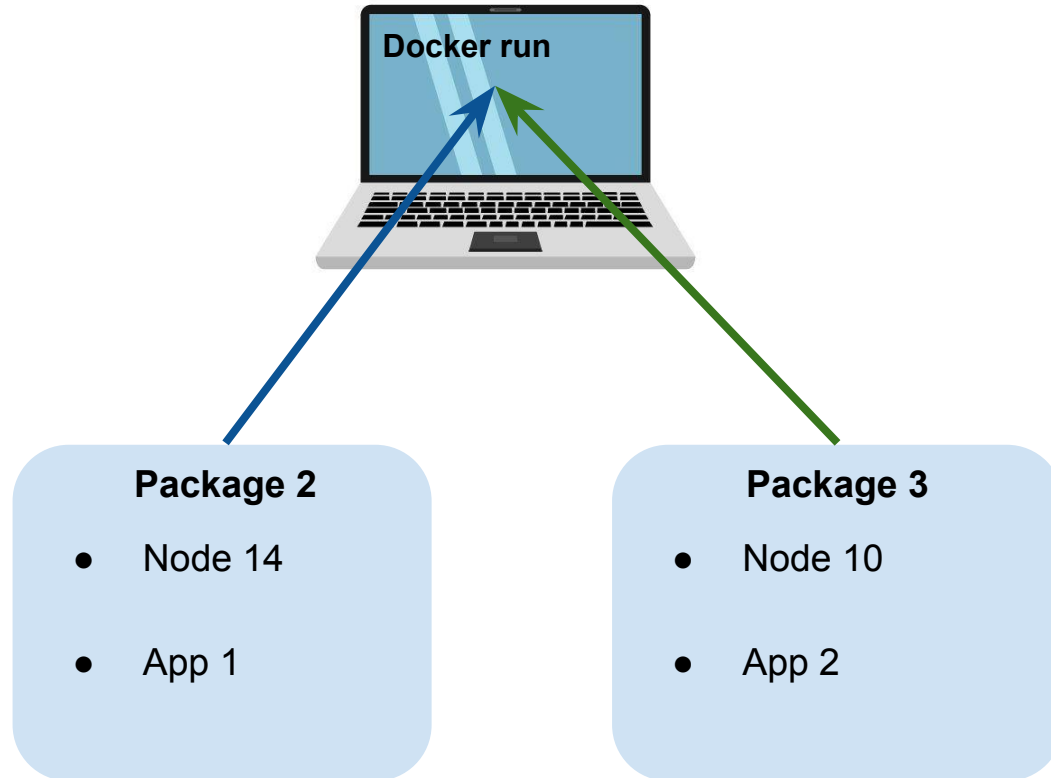
- **Software version mismatch**

What is Docker?

Situation: Your application works on your development machine but doesn't somewhere else. Why?

- **One or more files missing**

- **Software version mismatch**

- **Different configuration settings**

What is Docker?

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Advantage: Portability & Faster Deployments

Development Machine

Docker run

Test or Production Machine

Docker run

Package

- Node 14
- Mongo 4
- App

Advantage: Sharing & Simplified dependency

New Team Member

Docker run

Package

- Node
- Mongo
- App

Advantage: Isolation & Security Sandbox

Docker run

Package 2
- Node 14
- App 1

Package 3
- Node 10
- App 2

What is Docker?

What is Docker?

Docker rm container_name
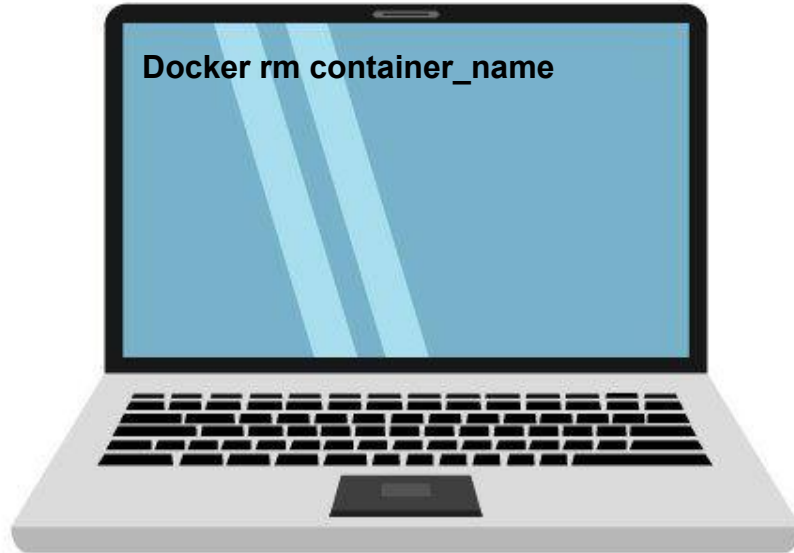
What is Docker?

A platform for

Consistently

building, running, and shipping applications.

Build

Develop an app using Docker containers with any language and any toolchain.

Run

Scale to 1000s of nodes, move between data centers and clouds, update with zero downtime and more.
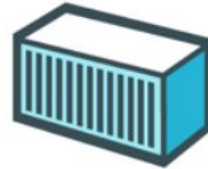
Ship

Ship the "Dockerized" app and dependencies anywhere - to QA, teammates, or the cloud - without breaking anything.

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Virtual Machines

Virtual Machine

An abstraction of a machine
(physical hardware)
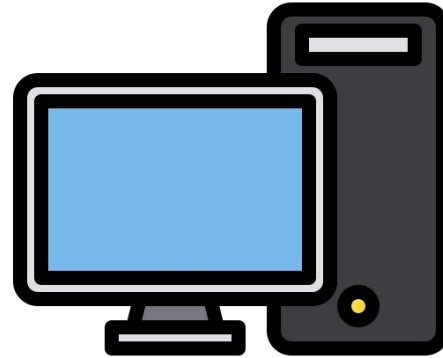
Virtual Machine 1

- Node 14

- App 1

Virtual Machine 2

- Node 10

- App 2

Virtual Machines

VM 1
- App 2
- Bins/Libs
- Guest OS

VM 2
- App 2
- Bins/Libs
- Guest OS

Problems

- **Each VM needs a OS**
- **Slow to start**
- **Resource intensive**

- Hypervisor
- Host OS
- Server
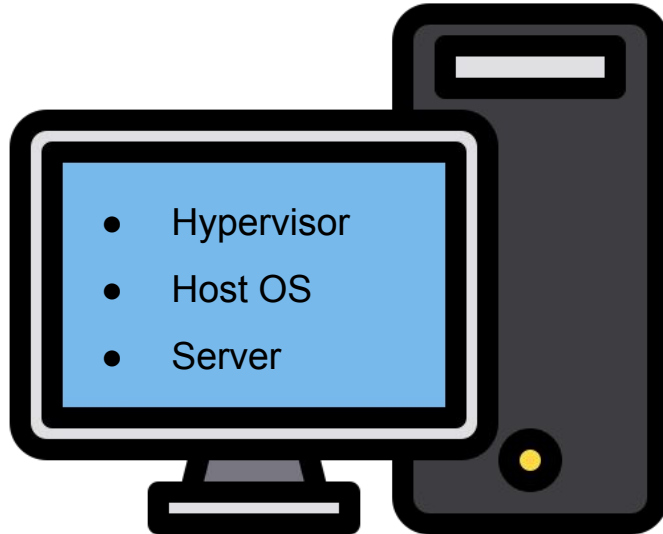
Docker Containers

Container 1

- App 2

- Bins/Libs

Container 2

- App 2

- Bins/Libs

- Docker Engine
- Host OS
- Server
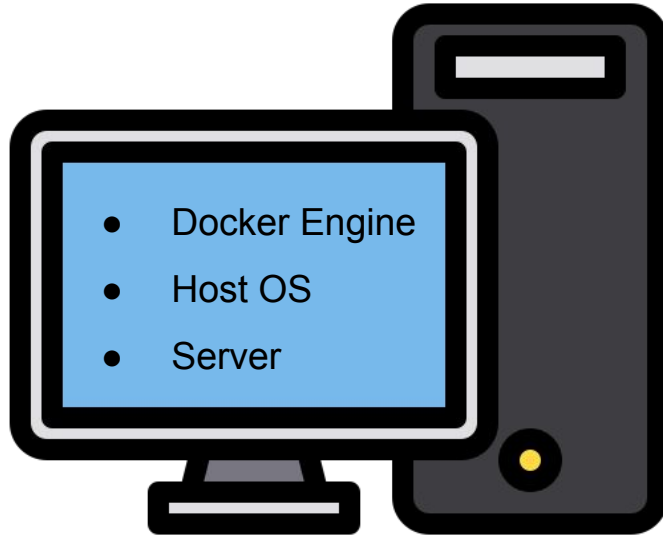
Docker Container

An isolated environment for running an application

- **Allow running multiple apps in isolation**

- **Are lightweight**

- **Use OS of the host**

- **Start quickly**

- **Need less hardware resources**
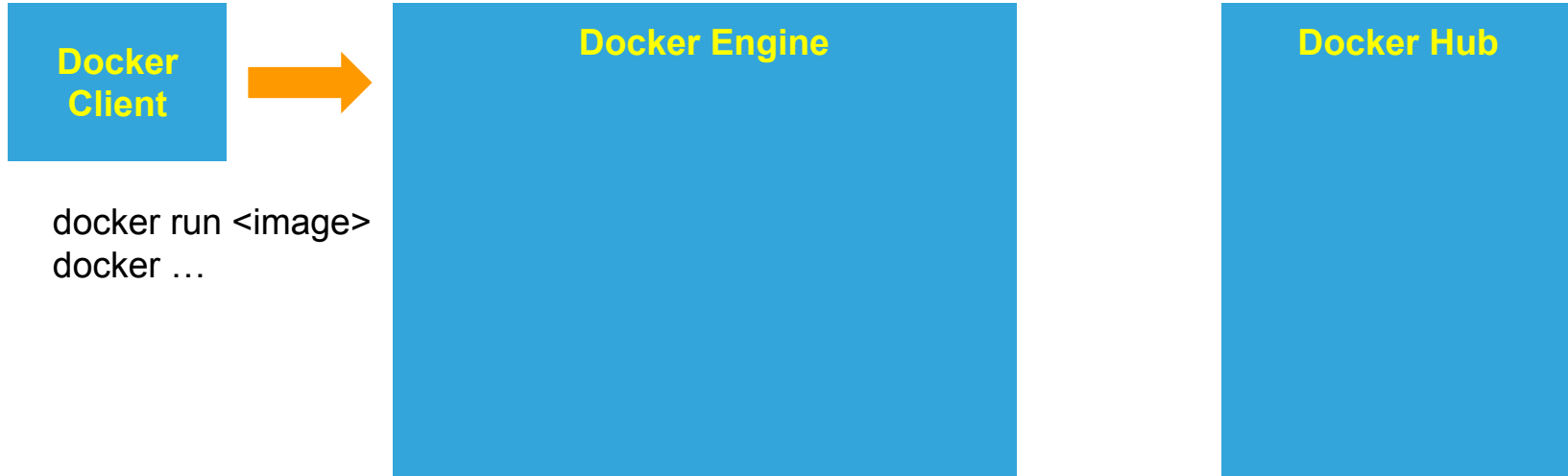
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Docker Architecture and Workflow

Docker Client

Docker Engine

Docker Hub

docker run <image>
docker …

Docker Architecture and Workflow

Docker Client

docker run <image>
docker …

Docker Engine

Docker Hub

Image 1

Image 2

Docker Architecture and Workflow

Docker Client

docker run <image>
docker …

Docker Engine

Image 1

Image 2

Docker Hub

Image 1

Image 2
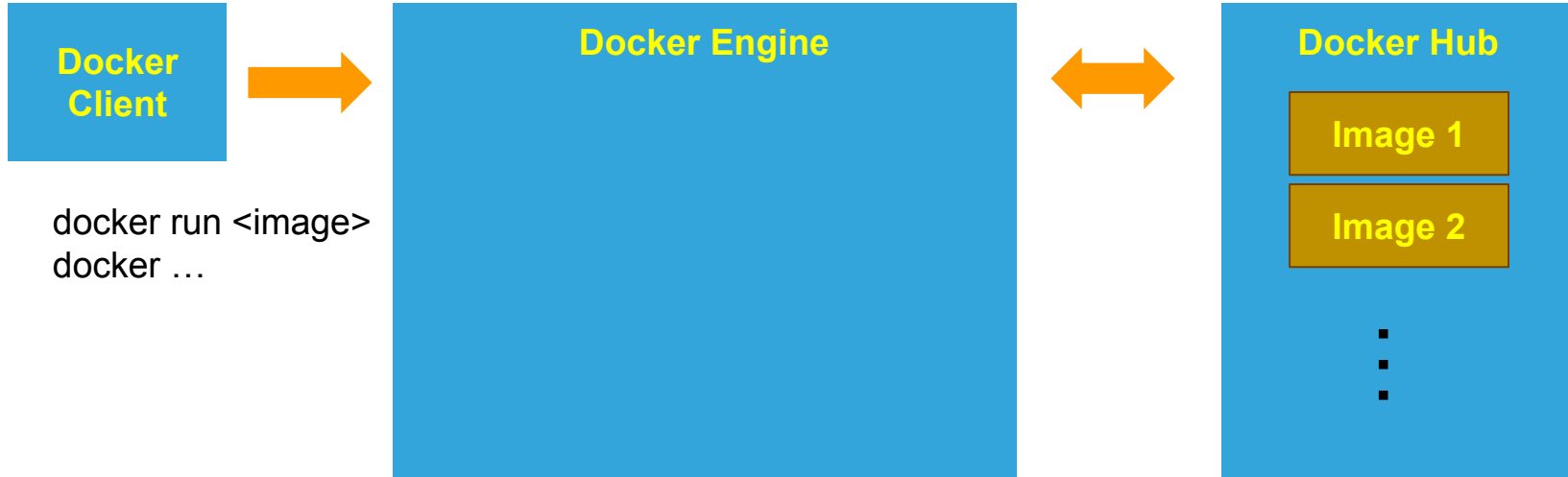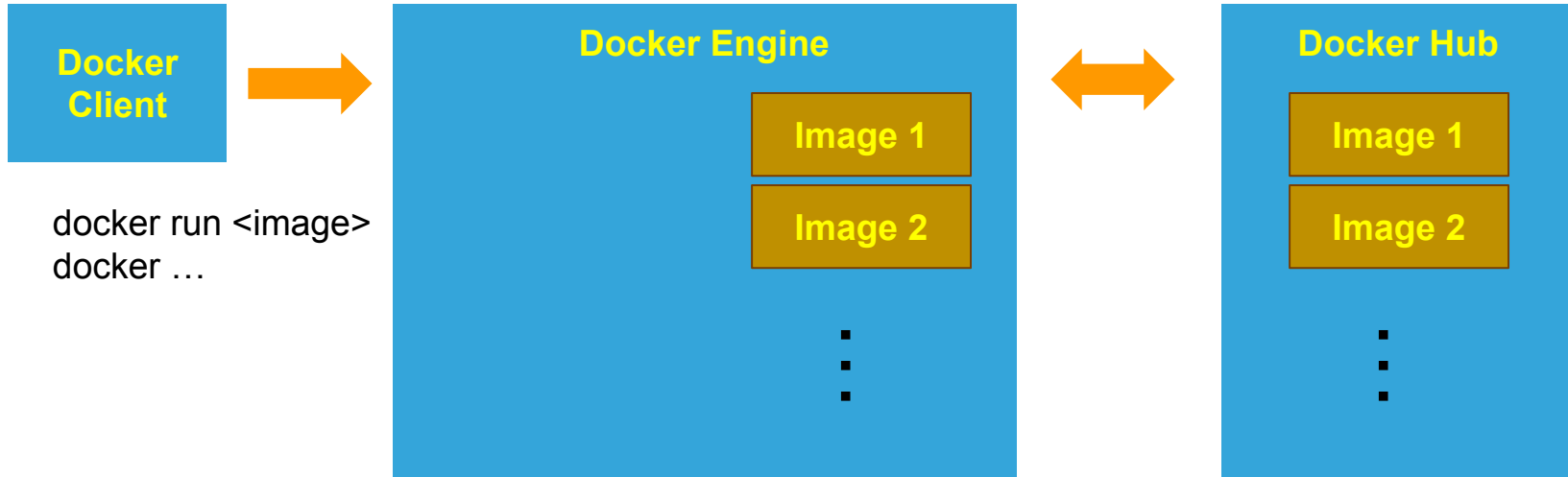
Docker Architecture and Workflow
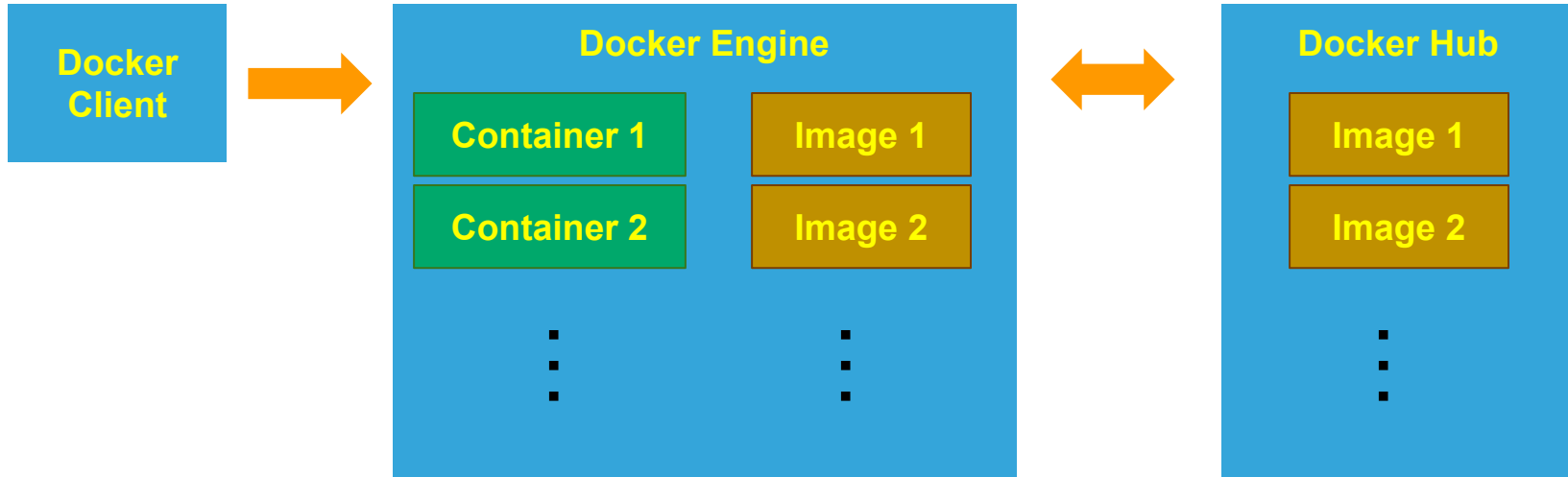
Installing Docker

docker.com

Installing Docker

https://docs.docker.com/get-docker/

Docker Hub

Visualstudio Code

https://code.visualstudio.com/

Visualstudio Code: Install Docker Extension

Version of Docker

Open a terminal and run: docker version

```
C:\Users\jazz1>docker version
Client:
 Cloud integration: v1.0.29
 Version:           20.10.22
 API version:       1.41
 Go version:        go1.18.9
 Git commit:        3a2c30b
 Built:             Thu Dec 15 22:36:18 2022
 OS/Arch:           windows/amd64
 Context:           default
 Experimental:      true

Server: Docker Desktop 4.16.3 (96739)
 Engine:
  Version:          20.10.22
  API version:      1.41 (minimum version 1.12)
  Go version:       go1.18.9
  Git commit:       42c8b31
  Built:            Thu Dec 15 22:26:14 2022
  OS/Arch:          linux/amd64
  Experimental:     false
 containerd:
  Version:          1.6.14
  GitCommit:        9ba4b250366a5ddde94bb7c9d1def331423aa323
 runc:
  Version:          1.1.4
  GitCommit:        v1.1.4-0-g5fd4c4d
 docker-init:
  Version:          0.19.0
  GitCommit:        de40ad0
```

Development Workflow
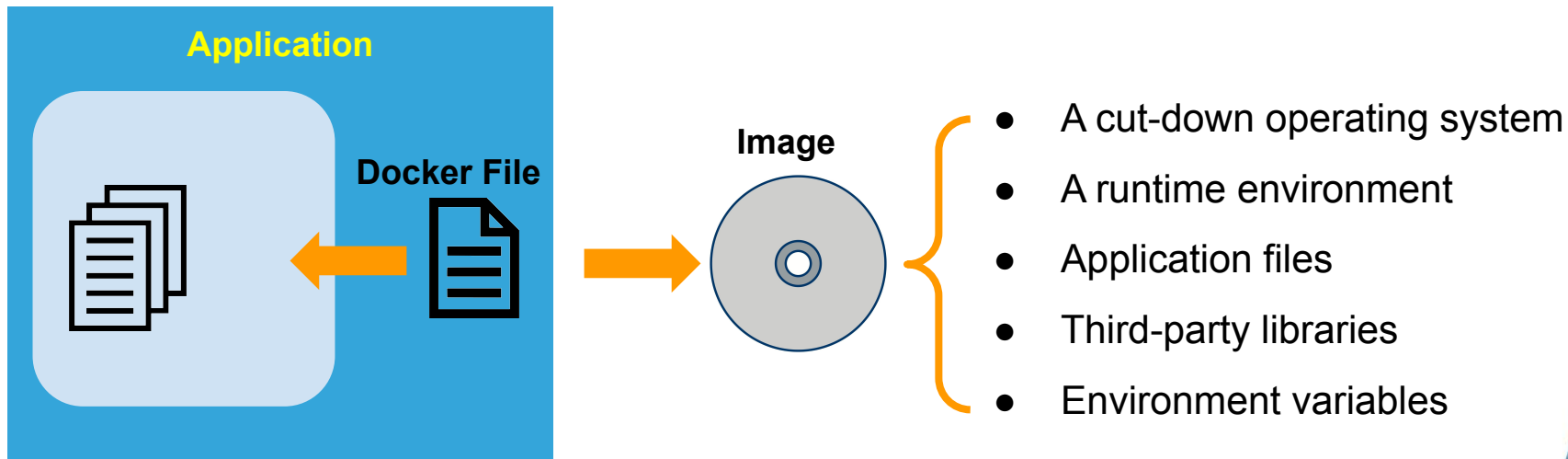
Development Workflow
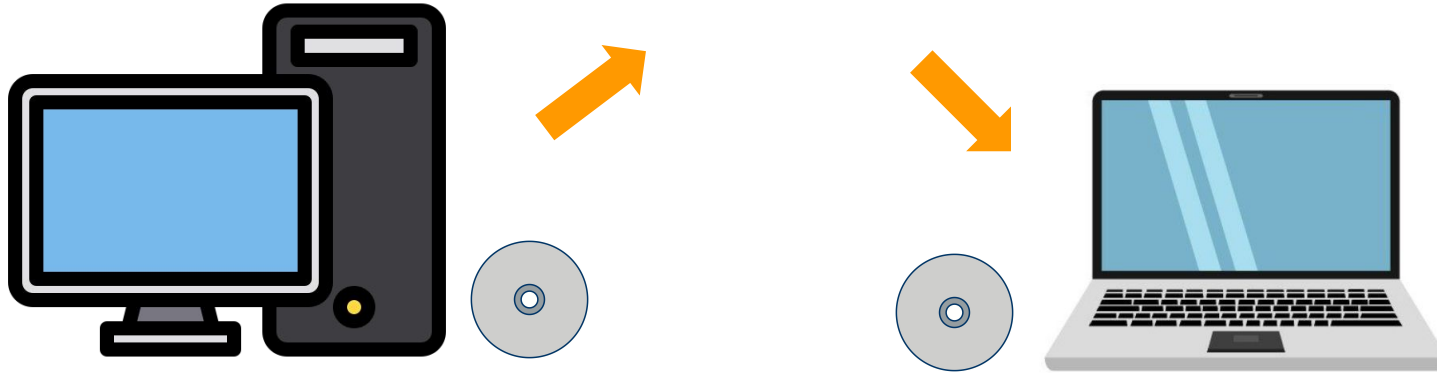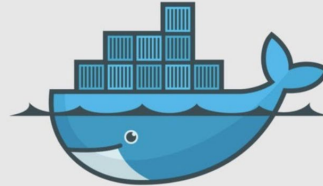
Example
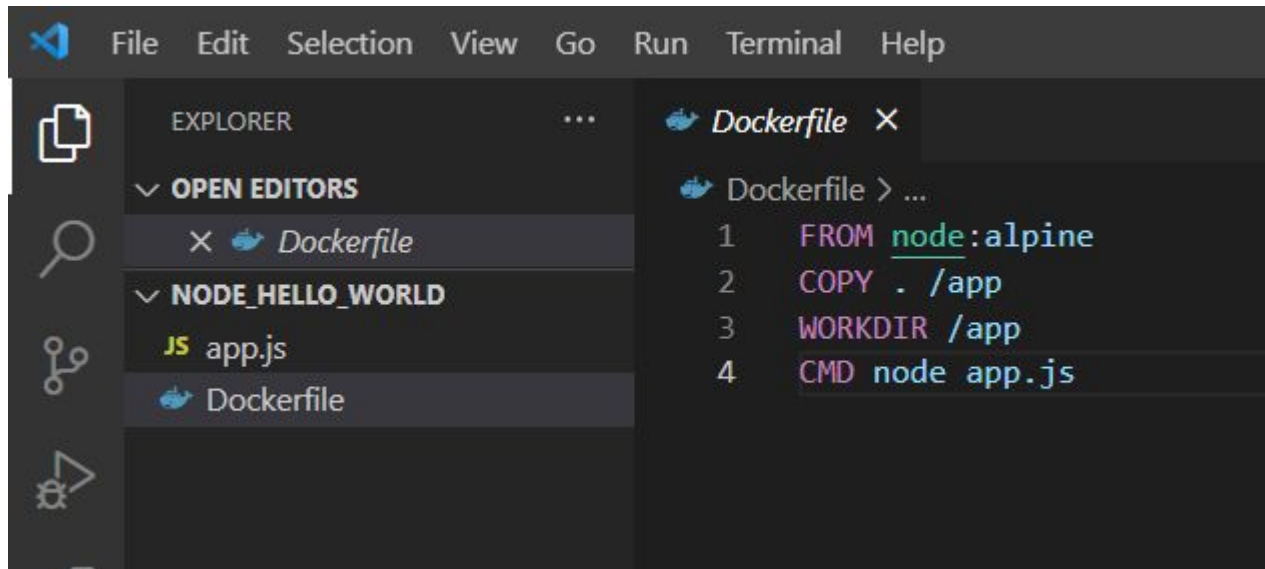
Create a hello world app
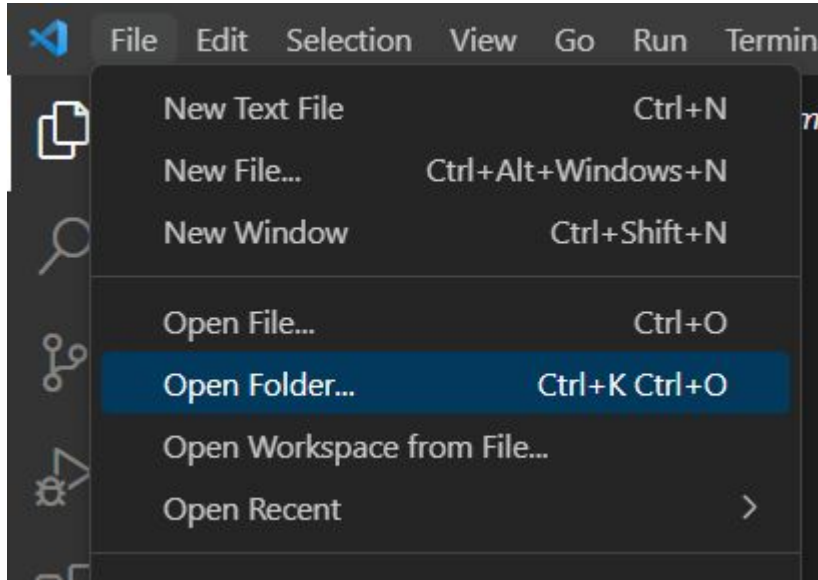
Create a hello world app

Write Dockerfile

Build Image

Images in Docker Desktop

Run app in Docker

Push Docker Image to Dockerhub

Image in Dockhub

Pull image

Pull image in Docker Desktop

Docker commands

https://docs.docker.com/engine/reference/commandline/docker/

Thank You! Questions & Answers