Introduction to Containerization

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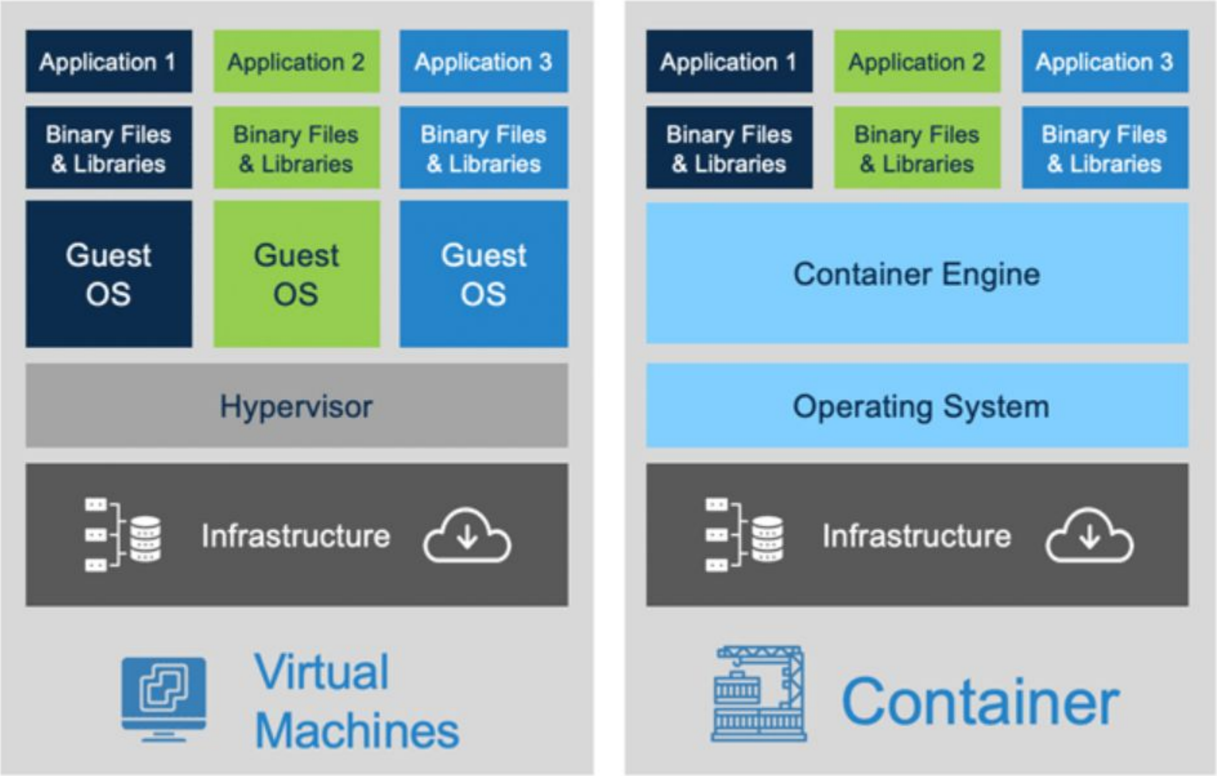
UCDAVIS

What is Containerization?

- Lightweight alternative to virtualization



Application 1
Application 2
Application 3
Binary Files & Libraries
Binary Files & Libraries
Binary Files & Libraries
Guest OS
Guest OS
Guest OS
Hypervisor
Infrastructure
Virtual Machines

Application 1
Application 2
Application 3
Binary Files & Libraries
Binary Files & Libraries
Binary Files & Libraries
Container Engine
Operating System
Infrastructure
Container

Why should we care?

- Standardized Systems
  - Development and Production systems can be very similar
- Easy deployment
  - Open source tools for deployment (Kubernetes)

Different Services

- Docker → Most popular, and widely used
- Podman → Developed by RedHat
- OCI (Open Container Initiative)
  - Allows Docker and Podman to be compatible with each other

Docker Terminology

- Container → Lightweight executable unit that packages application with dependencies
- Image → Blueprint to create containers
- Dockerfile → Definition file to build images
- Volume → To store data outside of container
- Network → Virtual Network to connect containers

Architecture of Docker

- Two Main Components
  - Docker Engine → Backend of Docker
  - Docker CLI → Frontend of Docker

Docker Engine

- Daemon → Long running background program
- Handles all the complexity of container management
- REST API that Docker CLI interacts with

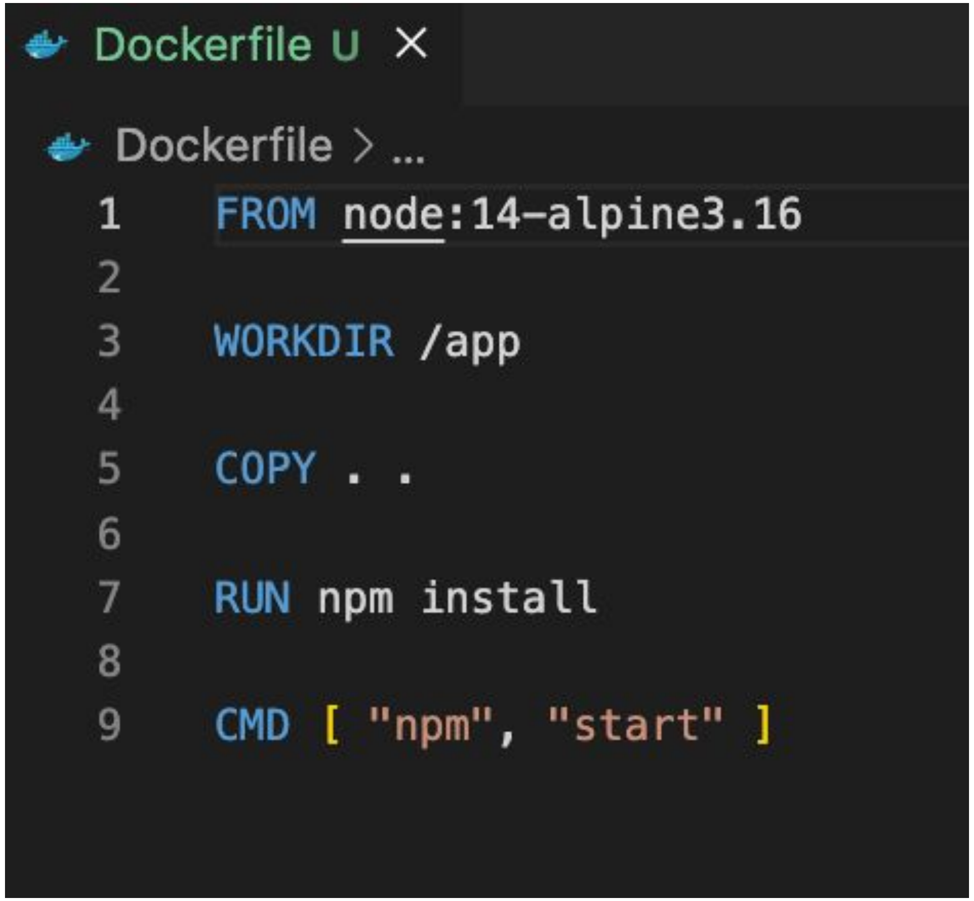
Docker CLI

- Frontend of Docker (What developers use)
- All commands issued by the CLI are sent to Docker Engine for execution

Basic Docker Commands

- docker pull <registry url> → Pull an image
- docker images → List all docker images locally
- docker build → Used to create image
- docker run → Used to create a container
- docker ps → View all running docker containers

Basic Dockerfile



```
FROM node:14-alpine3.16

WORKDIR /app

COPY . .

RUN npm install

CMD [ "npm", "start" ]
```

Docker Live Demo

Github Link for Demo:

https://github.com/divteaching/ecs198f_lecture5_inclass_coding

Thank You!

Next Time: Docker Compose