



WALCHAND COLLEGE OF ENGINEERING, SANGLI

WALCHAND LINUX USERS' GROUP



LIMITED SEATS

Navigating the DevOps Wave

EXCITING PRIZES



Let's Dock It!

SESSION 1

DockerVerse

SESSION 2

15 & 16 FEB



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Sailing to K8s

SESSION 3

Pod Power

SESSION 4

WARGAMES

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IT'S FOSS

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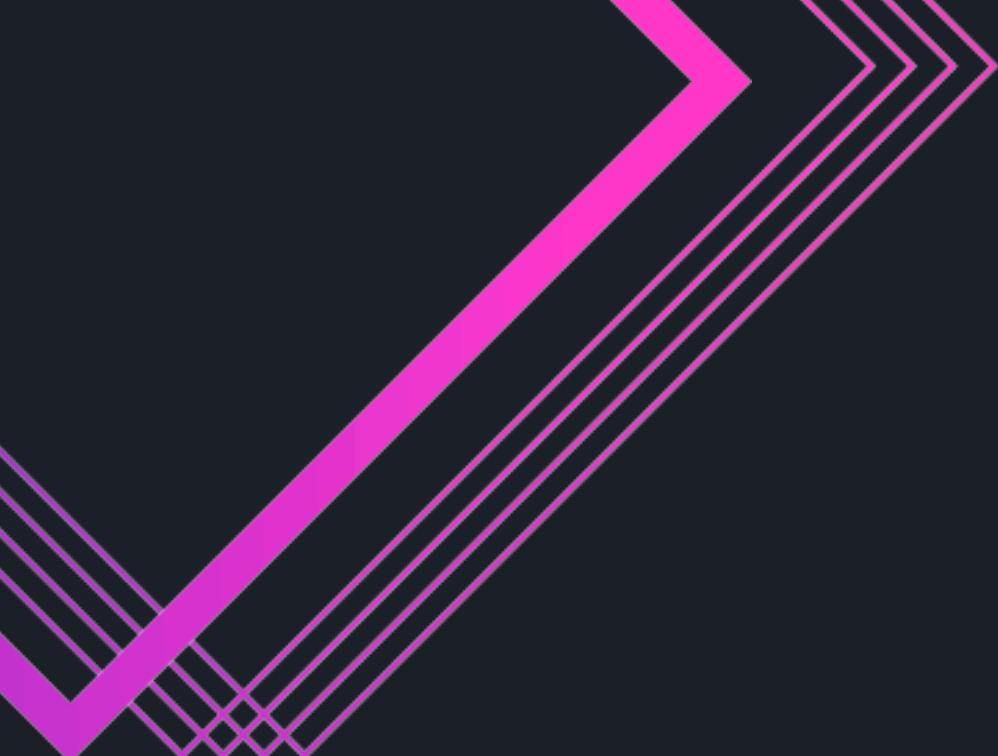
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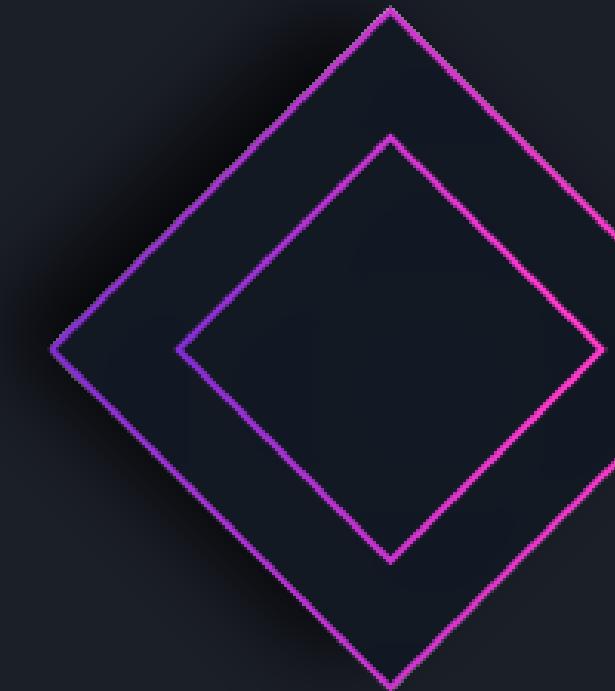
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LET'S DOCK IT!

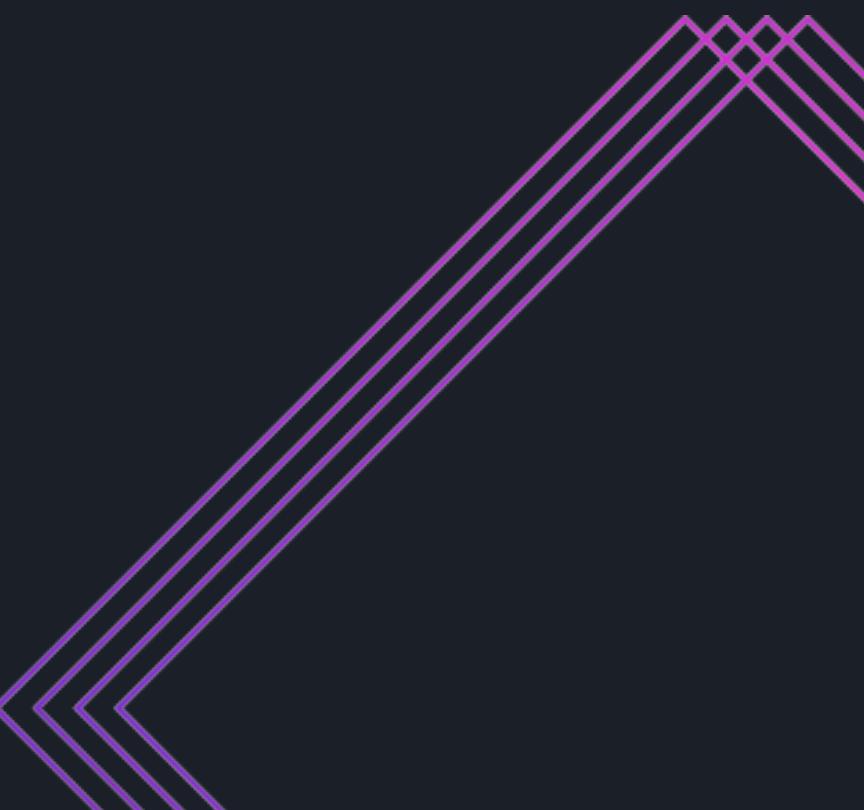


CONTENTS

- ❖ Devops Introduction
- ❖ Virtualization and Hypervisor
- ❖ Introduction to Containerization
- ❖ Introduction to Docker
- ❖ Docker Components
- ❖ Docker Installation



INTRODUCTION TO DEVOPS



DEV + OPS

Development Team



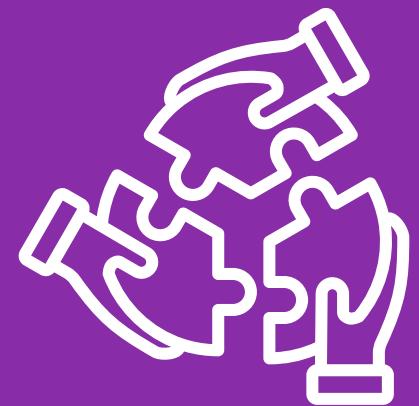
- ❖ Developers (SDEs)
- ❖ Testers (QAs)
- ❖ Business Analysts
- ❖ UI/UX Designers

Operations Team

- ❖ System Administrators
- ❖ Project Managers
- ❖ Release Managers
- ❖ Security Engineers



CHALLENGES BEFORE DEVOPS



Poor
collaboration



Insufficient
testing



Inconsistent
environments

DevOps

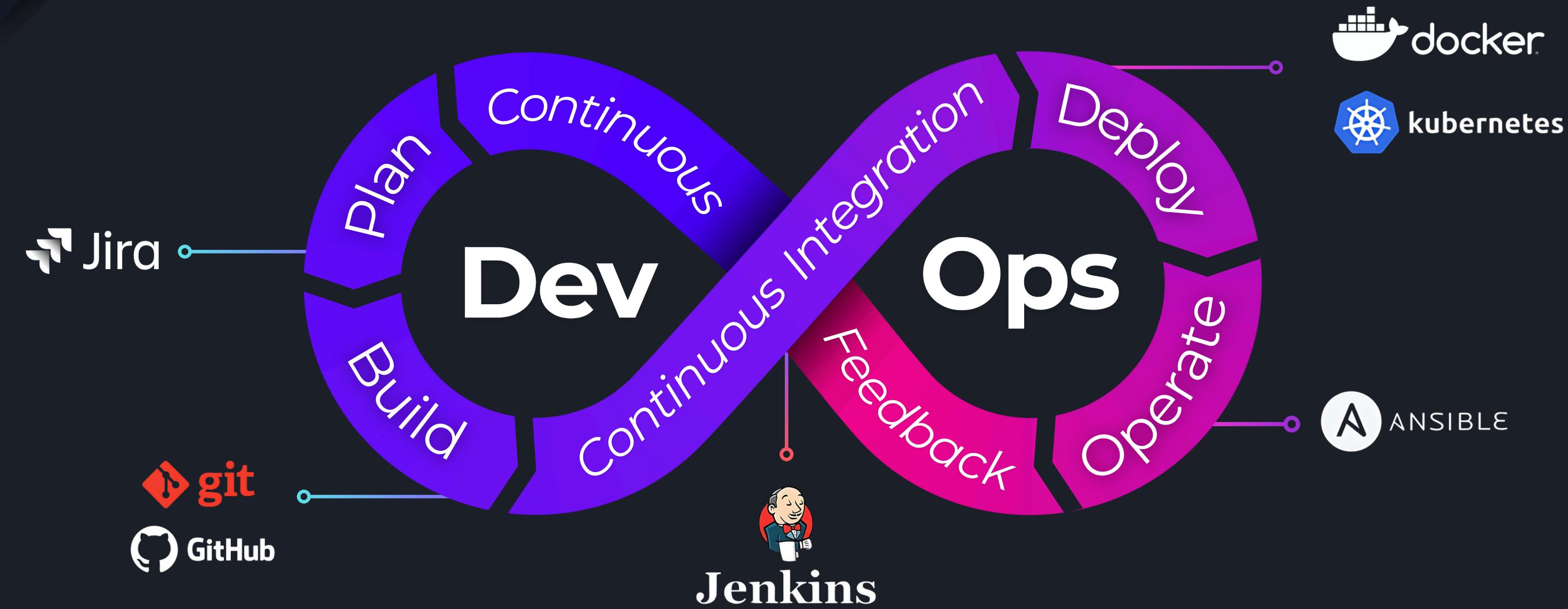
DevOps is a set of tools and practices that integrates and automates development and IT operations

Development
Team



IT
Operations

DEVOPS TOOLS





VIRTUALIZATION & HYPERVISOR



Traditional Architecture



APPLICATIONS

OPERATING SYSTEM

???

HARDWARE

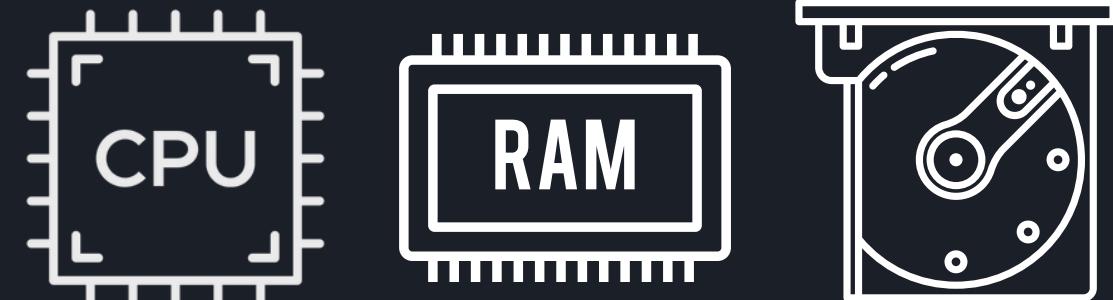
Traditional Architecture



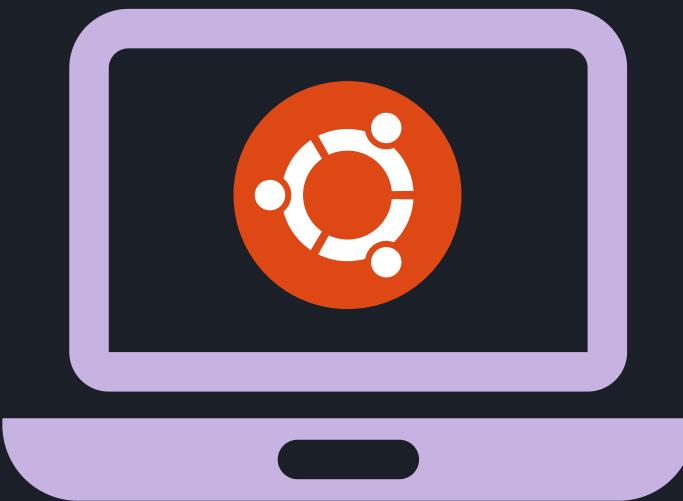
Windows

APPLICATIONS

HOST OS



HARDWARE



Ubuntu



VIRTUALIZATION

Technology that creates virtual versions of physical hardware, operating systems and storage devices

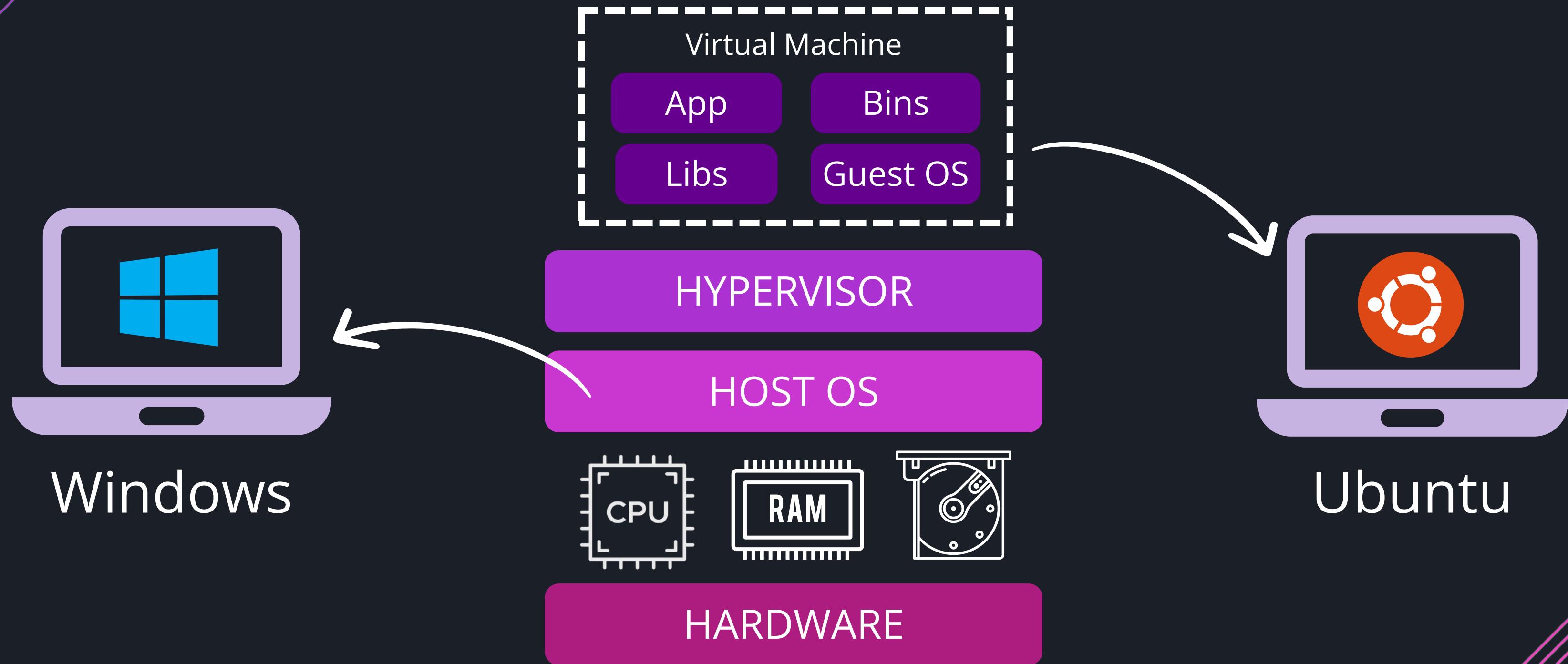


VIRTUAL MACHINE

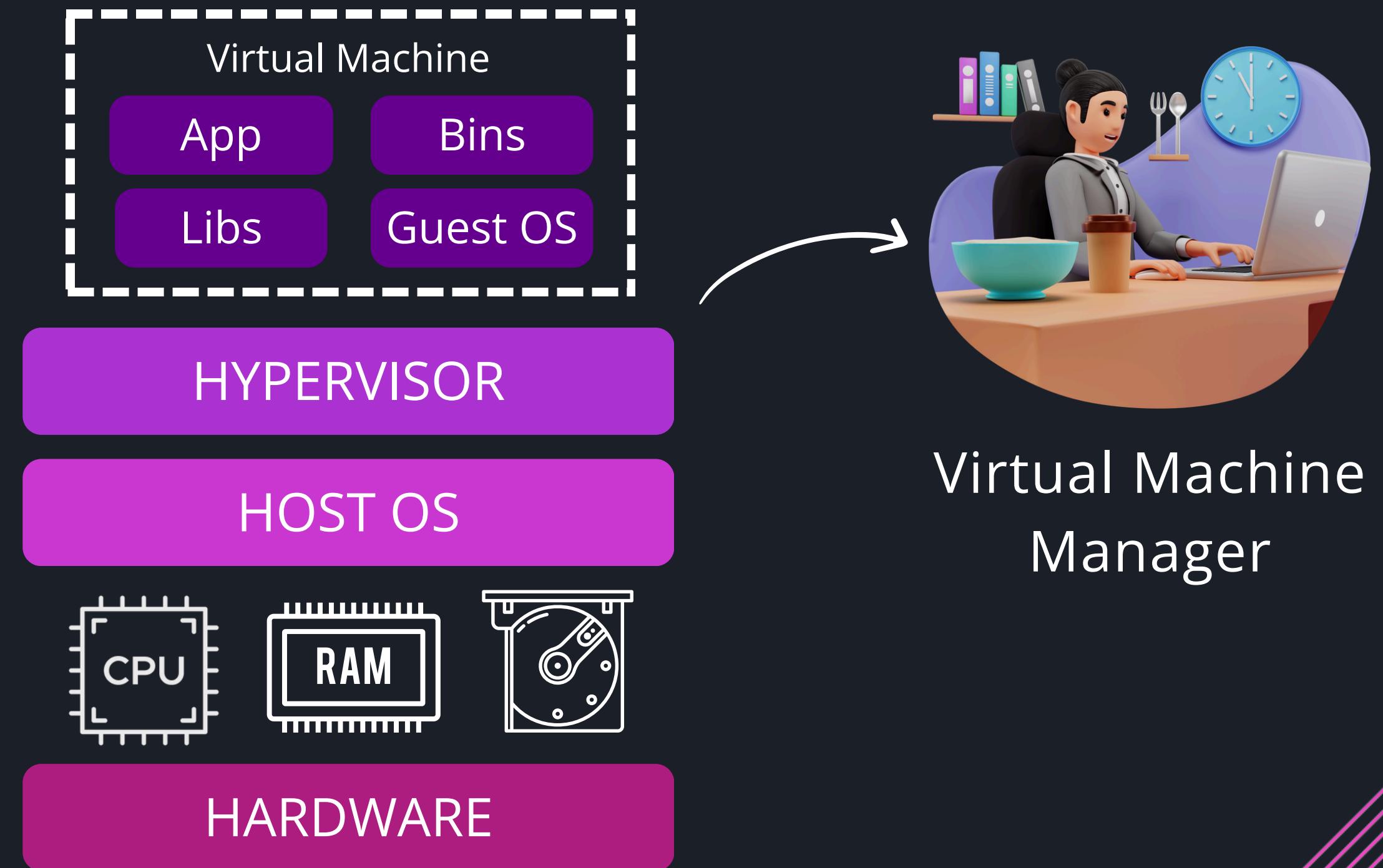
- ❖ Software that functions like an independent computer
- ❖ Specific allotment of processing power, memory and storage
- ❖ Utilizes physical hardware



Virtualization Architecture



Virtualization Architecture

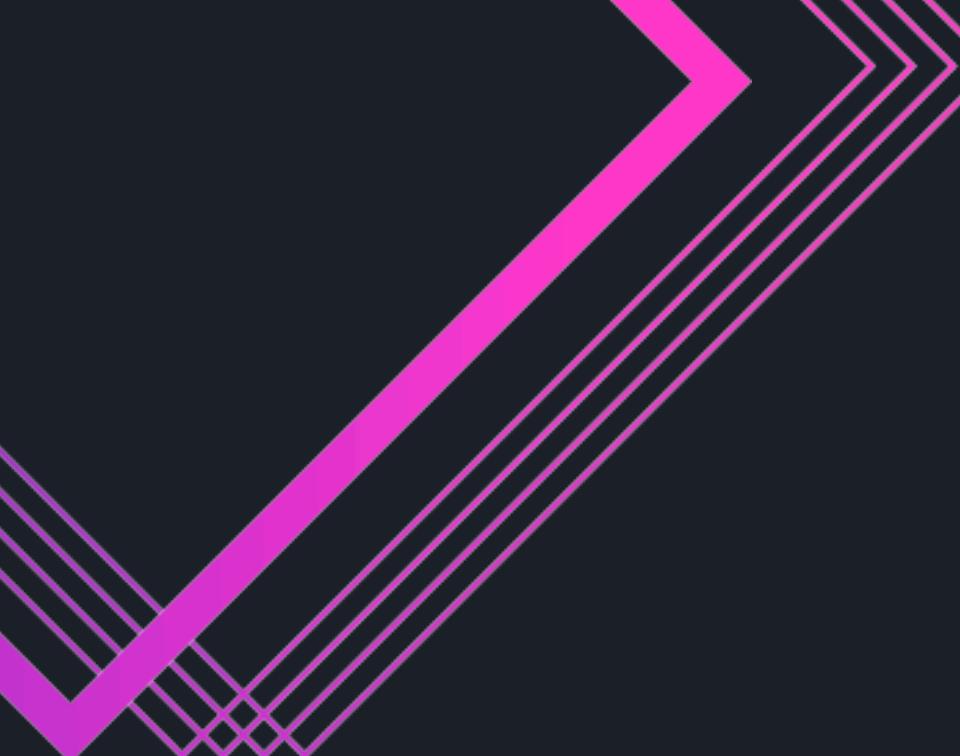




HYPERVERISOR

- ❖ A software or firmware that allows multiple Virtual Machines (VMs) to run on a single physical server
- ❖ Mediates interactions between hardware and VMs
- ❖ Allocates resources and ensures VMs share computing power efficiently
- ❖ Isolates VMs to prevent crashes/errors from affecting others

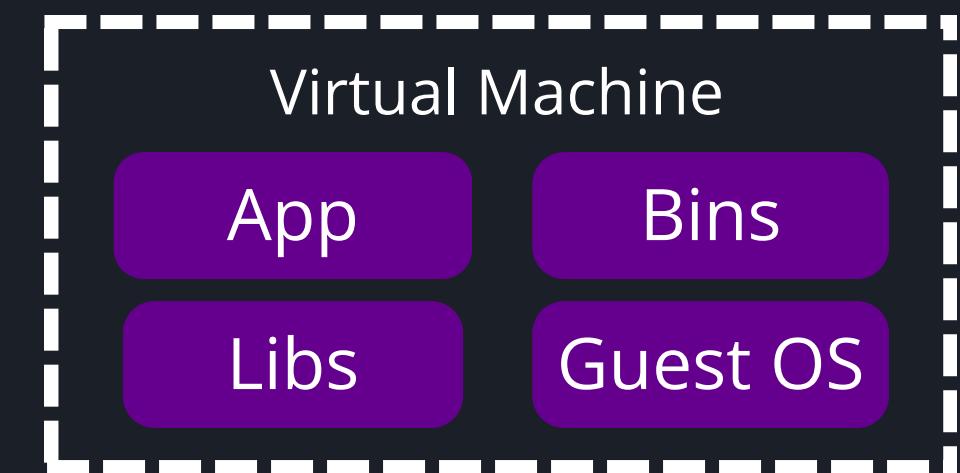




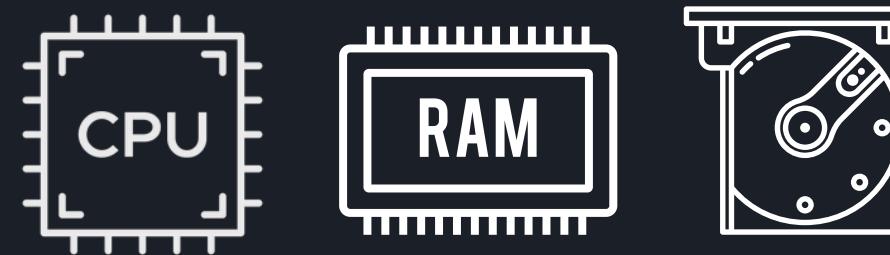
TYPES OF HYPERVISOR



Embedded Hypervisor

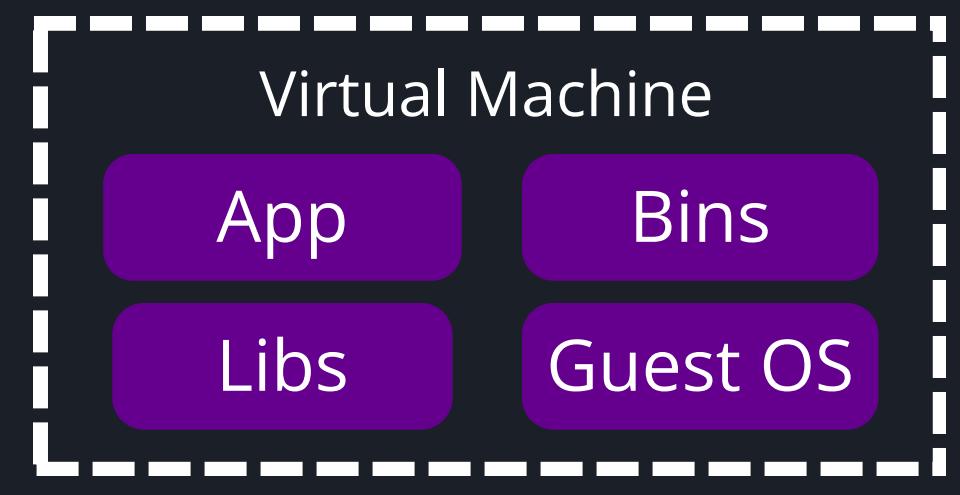


HYPERVISOR



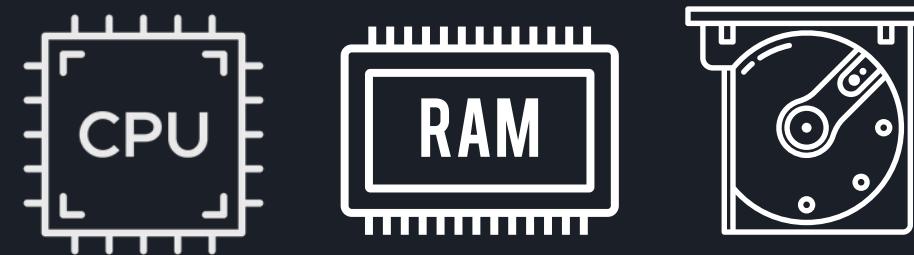
HARDWARE

Hosted Hypervisor



HYPERVISOR

HOST OS



HARDWARE

TYPES OF HYPERVISOR

Embedded Hypervisor

- ❖ Bare metal or Type 1 hypervisor
- ❖ Best suited for large, resource-intensive or fixed-use workloads

Hosted Hypervisor

- ❖ Native or Type 2 hypervisor
- ❖ Best suited for desktop and development environments

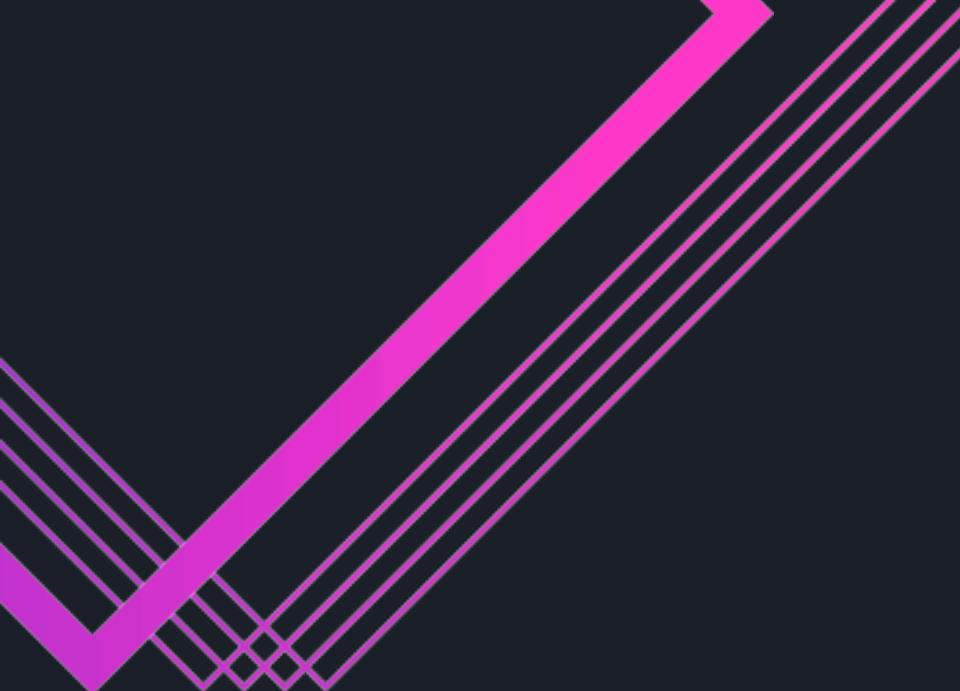
TYPES OF HYPERVISOR

Embedded Hypervisor

- ❖ Can negotiate dedicated resources
- ❖ e.g. VMware ESXi, Microsoft Hyper-V

Hosted Hypervisor

- ❖ Can not negotiate dedicated resources
- ❖ e.g. Oracle VirtualBox, VMware Workstation



PHYSICAL SERVERS VS VIRTUALIZATION



PERFORMANCE

PHYSICAL SERVER

- ❖ More powerful for high-processing tasks

VIRTUALIZATION

- ❖ Prone to performance issues

COST

PHYSICAL SERVER

- ❖ Expensive

VIRTUALIZATION

- ❖ More cost-effective

SCALABILITY

PHYSICAL SERVER

- ❖ Time-consuming to expand

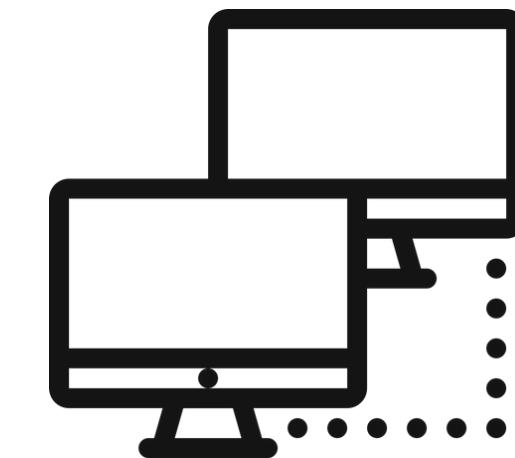
VIRTUALIZATION

- ❖ Easily scalable

ADVANTAGES OF VIRTUALIZATION



Efficiency



**Contingency
planning**



Cost-effective

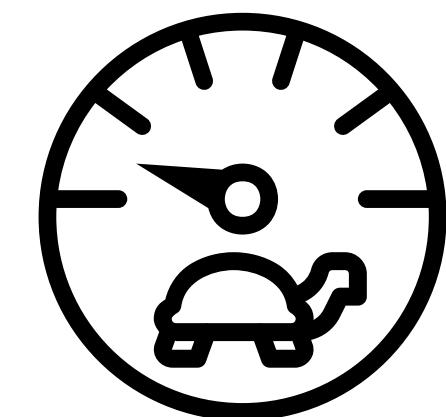
DISADVANTAGES OF VIRTUALIZATION



Server Failure Impact



Security Risks



Slower Performance

Developer:

It works on my computer



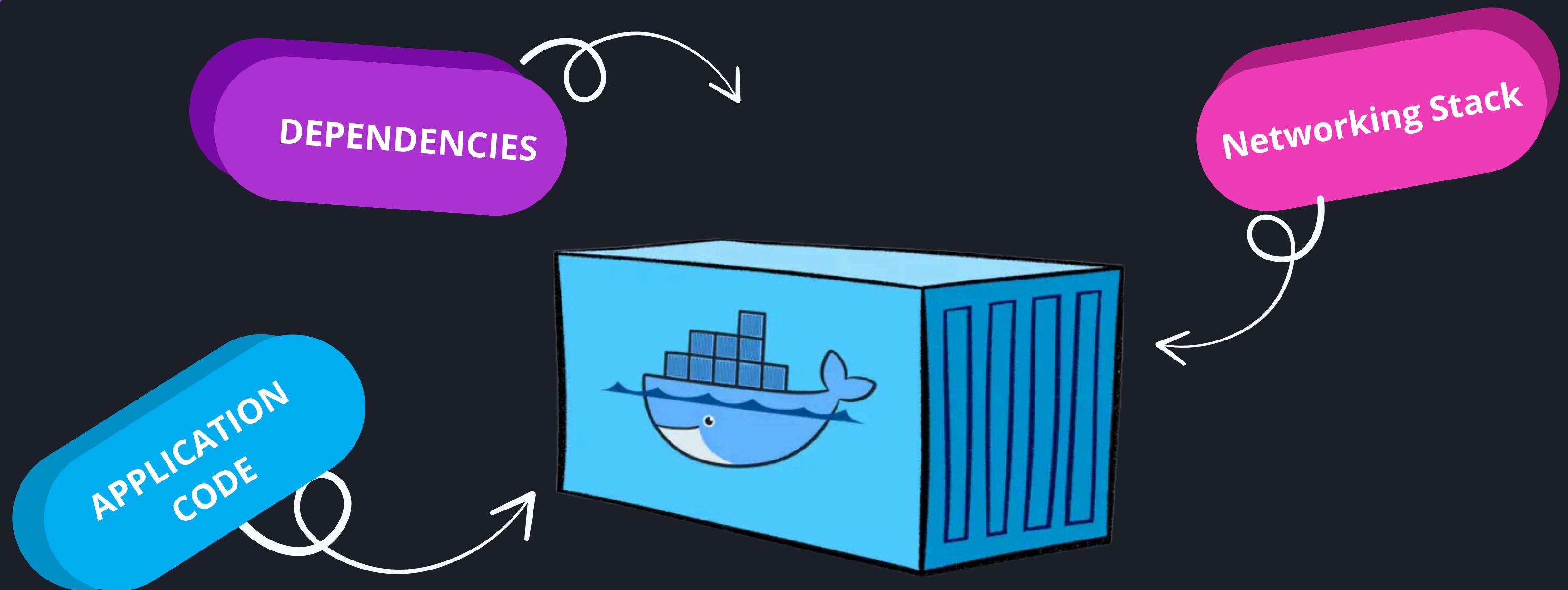
Product Manager:

Yes, but we are not going to give your computer to the customer



INTRO TO CONTAINERIZATION

CONTAINERS



CONTAINERIZATION

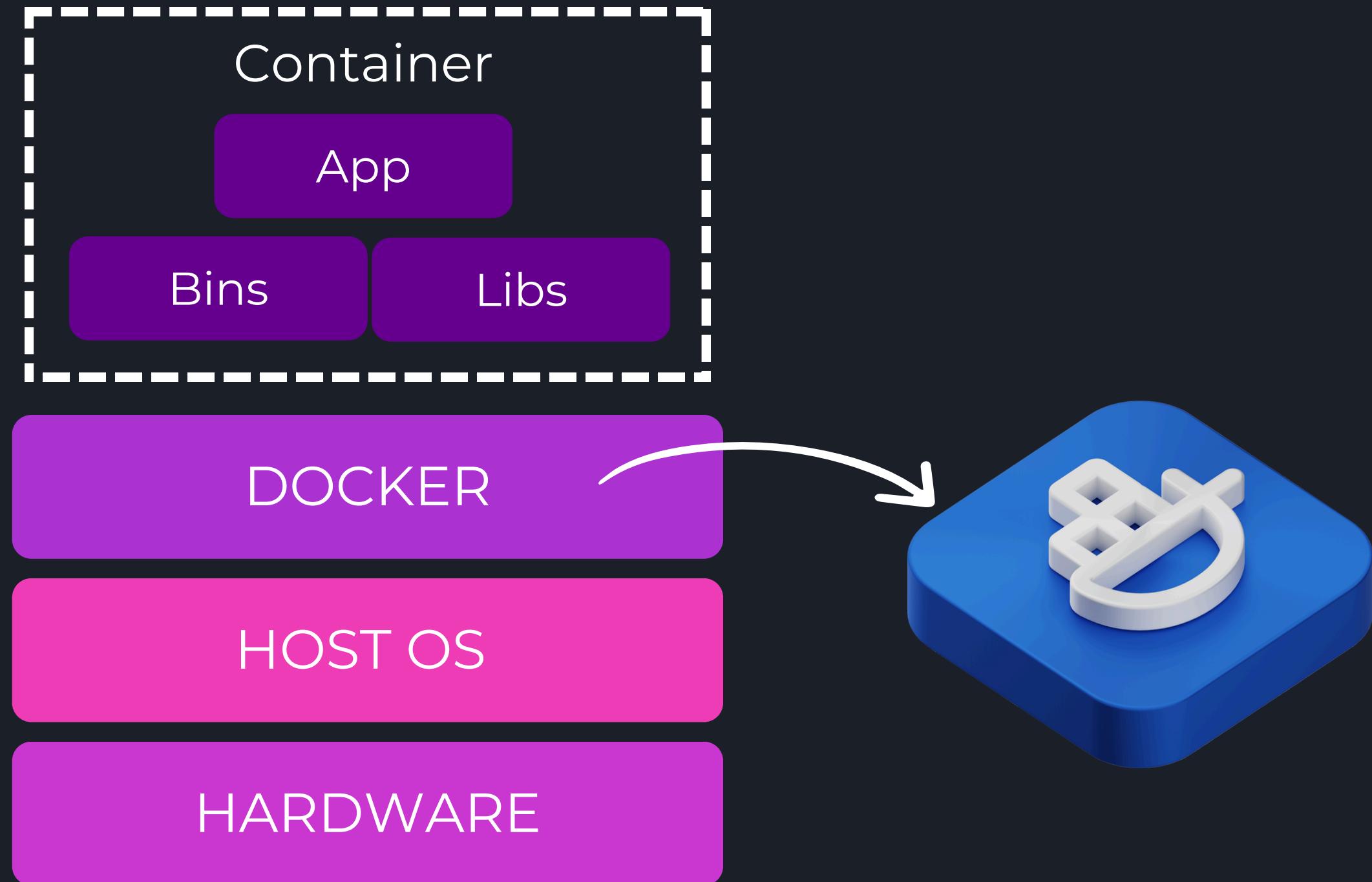
- ❖ Packages code and dependencies for consistent execution across environments
- ❖ Maintains a consistent software environment across development, testing and production

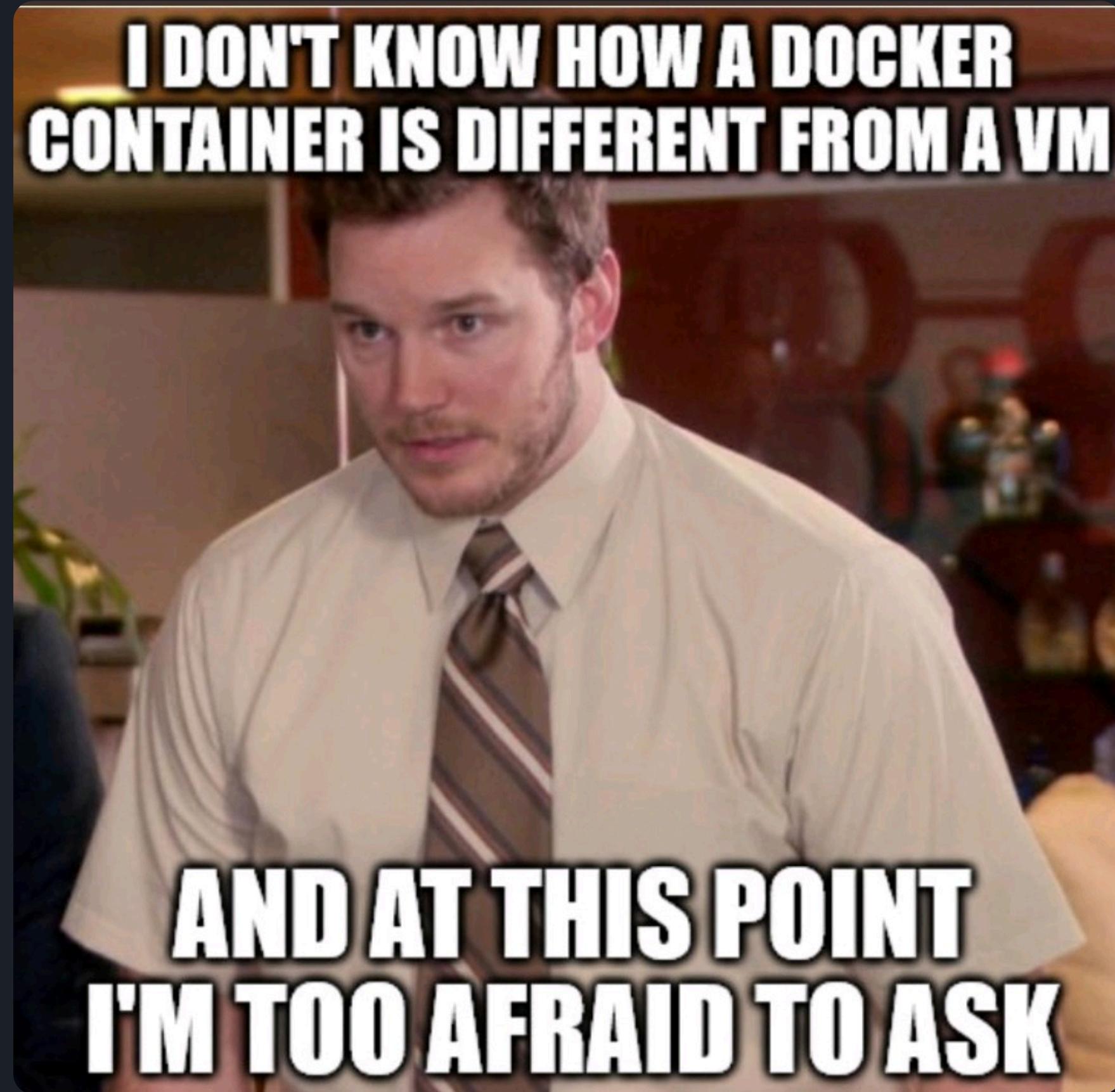
CONTAINERS

A software unit that packages code and its dependencies,
ensuring applications run reliably across environments



Containerization







CONTAINERS

VS



VIRTUAL MACHINES

OPERATING SYSTEM

CONTAINER

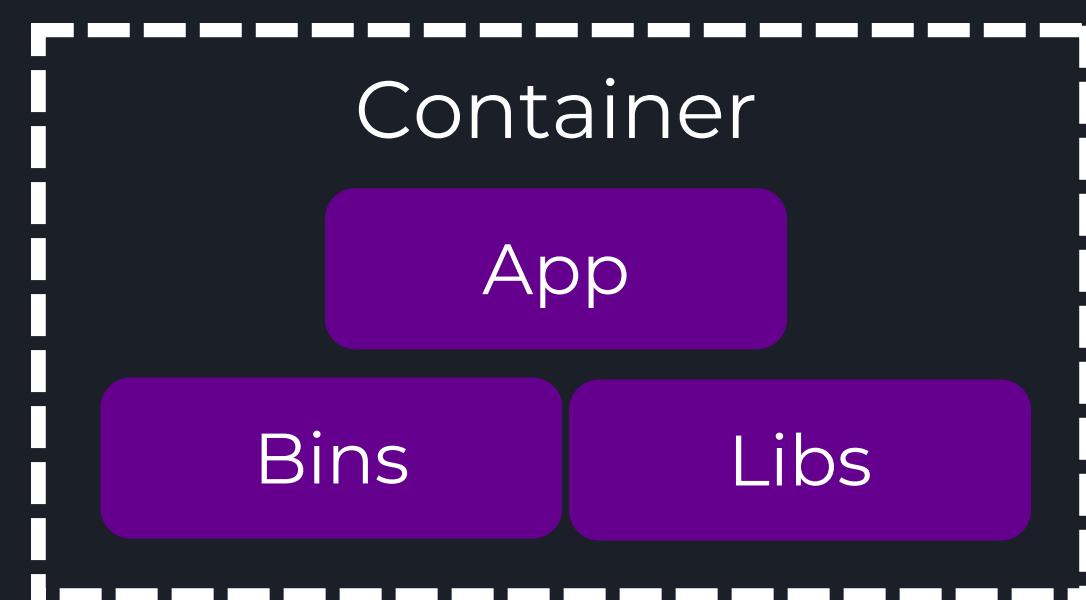
- ❖ Shares the host operating system's kernel

VIRTUAL MACHINE

- ❖ Has its own kernel

ARCHITECTURE

CONTAINER

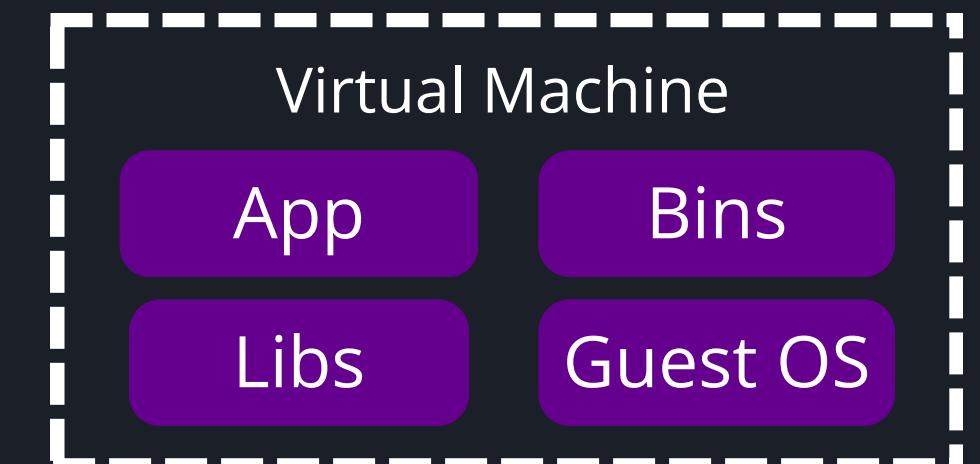


DOCKER

HOST OS

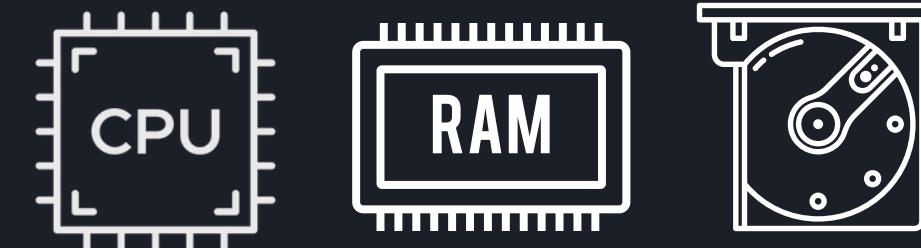
HARDWARE

VIRTUAL MACHINE



HYPervisor

HOST OS



HARDWARE

RESOURCE USAGE

CONTAINER

- ❖ Uses fewer resources

VIRTUAL MACHINE

- ❖ Uses more resources

BRACE YOURSELVES



IT'S DOCKER TIME

WHAT IS DOCKER?

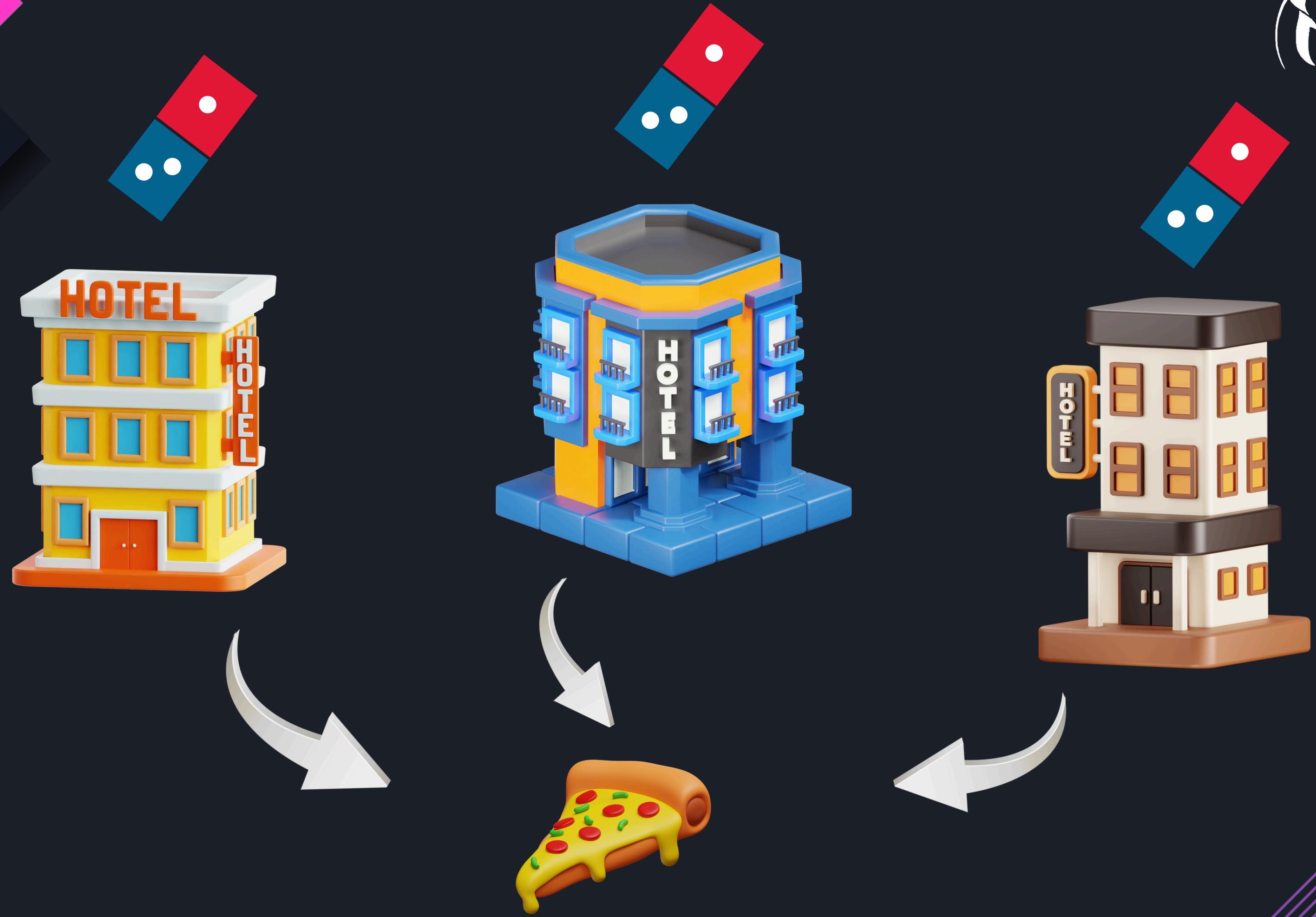


*Code works fine on local machine.

The code in the dev server



imgflip.com





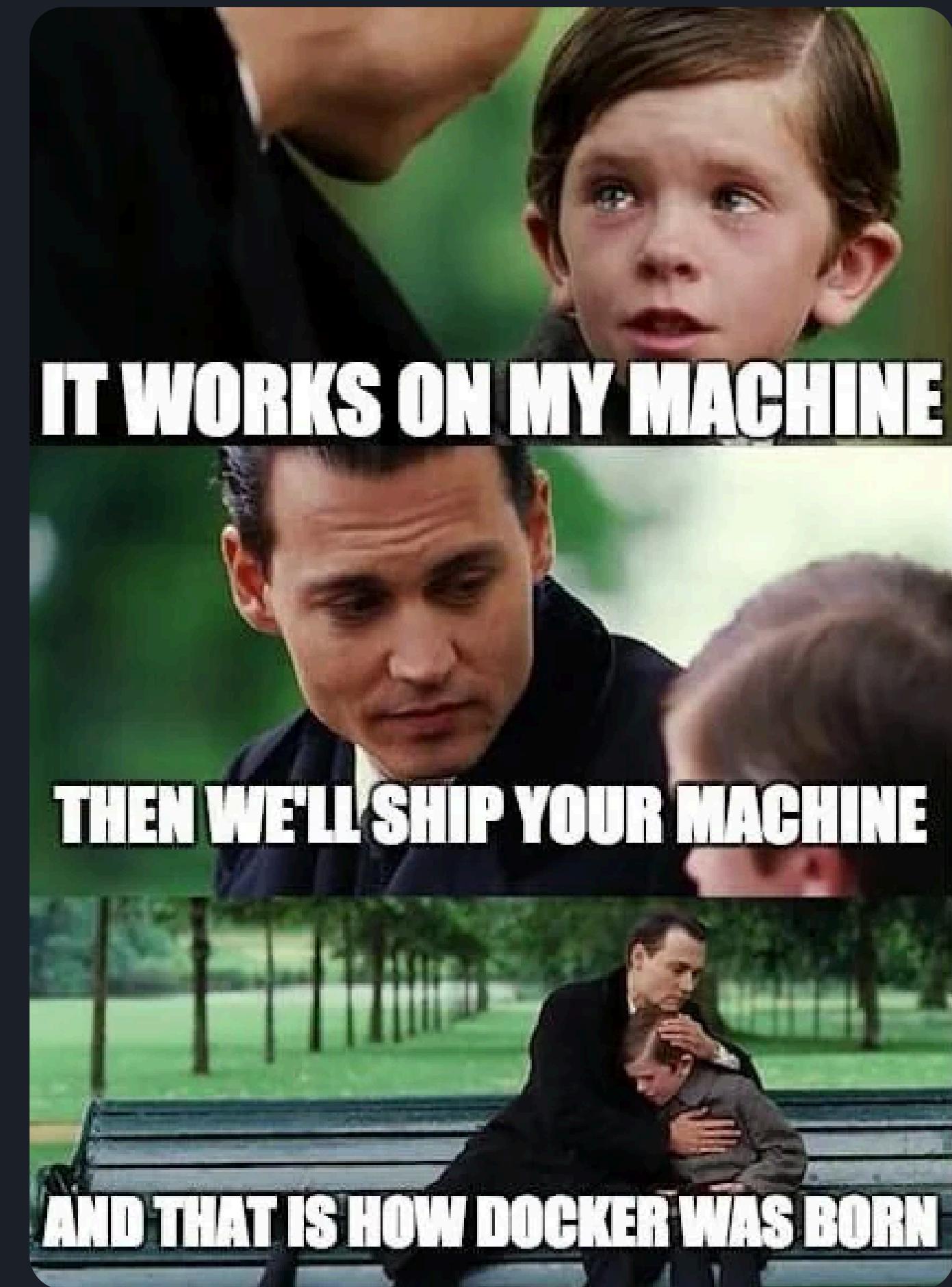
Dough	✓	✓	✓
Cheese	✓	✓	✗
Olives	✓	✗	✗





WHAT IS DOCKER?

- ❖ An Open Source platform designed to make it easier for developing, shipping and running applications
- ❖ Developed by Kamel Founadi, Solomon Hykes and Sebastien Pahl in 2013
- ❖ Written in Go programming language



BASIC COMMANDS

Commands	Description
sudo	Executes a command with superuser (root) privileges
ls	Lists files and directories in the current location
cd	Changes the current directory
pwd	Prints the current working directory path

BASIC COMMANDS

Commands	Description
touch <filename>	Creates or updates a file
mkdir <directory_name>	Creates a new directory
cat <filename>	Displays the content of a file

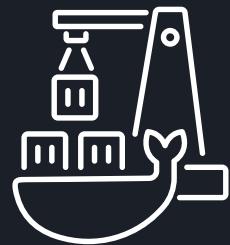
DOCKER COMPONENTS



Docker Client



Docker Host



Docker Daemon



Docker Image



Docker Container



Docker Registry



Make



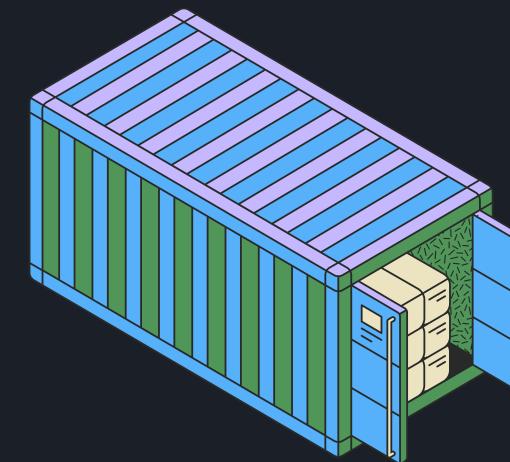
Cook



Build

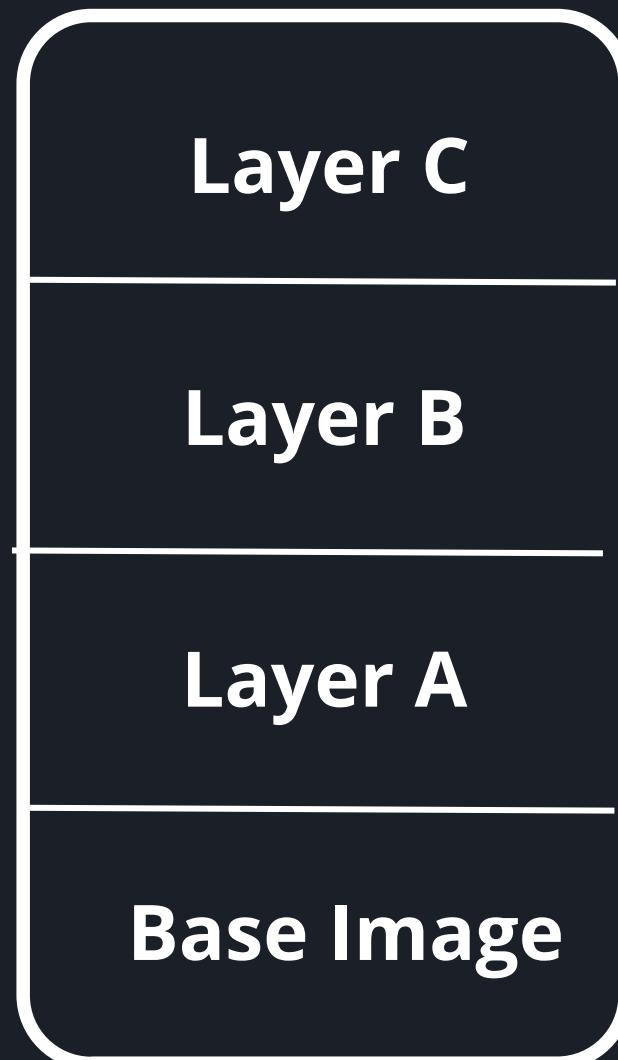


Run



DOCKER IMAGE

- ❖ A standardized package that includes all configurations to run a container
- ❖ Immutable
- ❖ Three ways to access image:
 1. Docker Hub
 2. Existing Containers
 3. Build from Dockerfile



DOCKER CONTAINER

- ❖ An isolated, self-sufficient environment for running applications with dependencies
- ❖ Lightweight and Portable
- ❖ Eliminate the "works only on my machine" problem

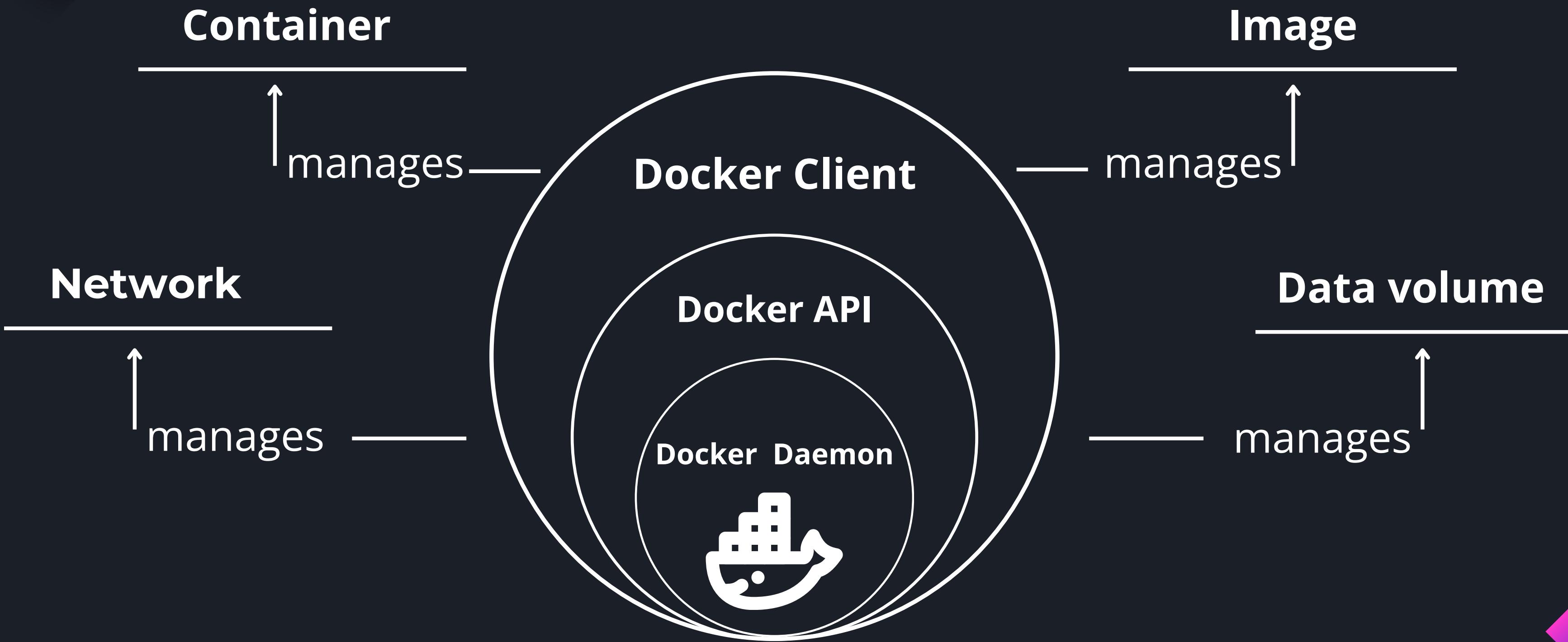


It will not work
on any other machine

But I know
docker containers

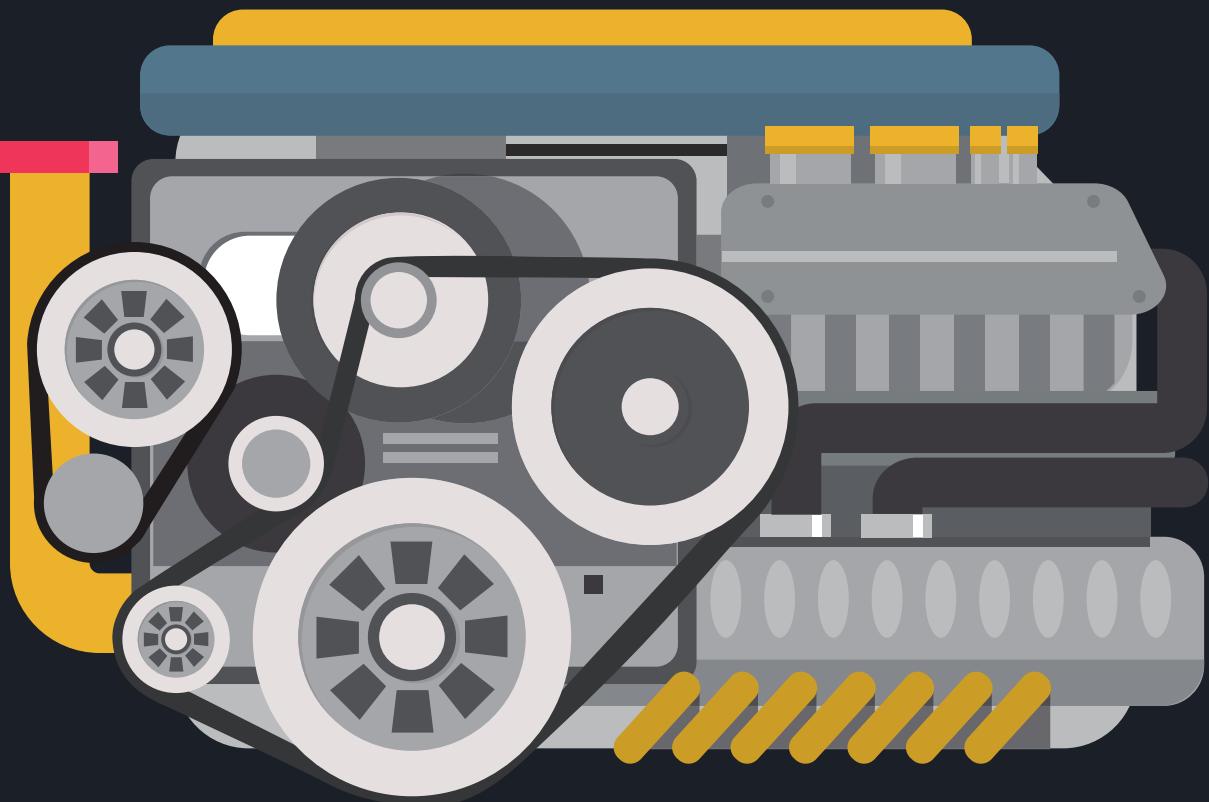


DOCKER HOST





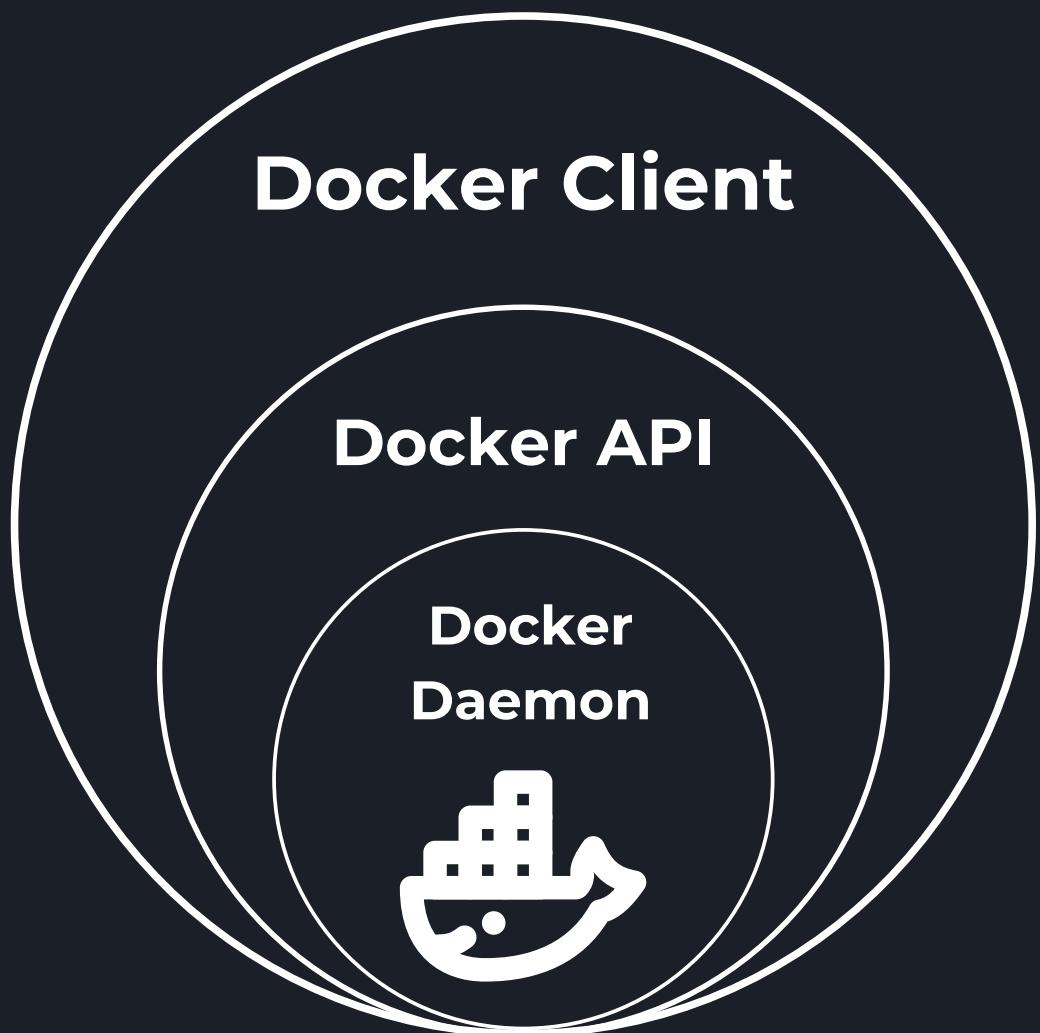
Docker Host



Docker Engine

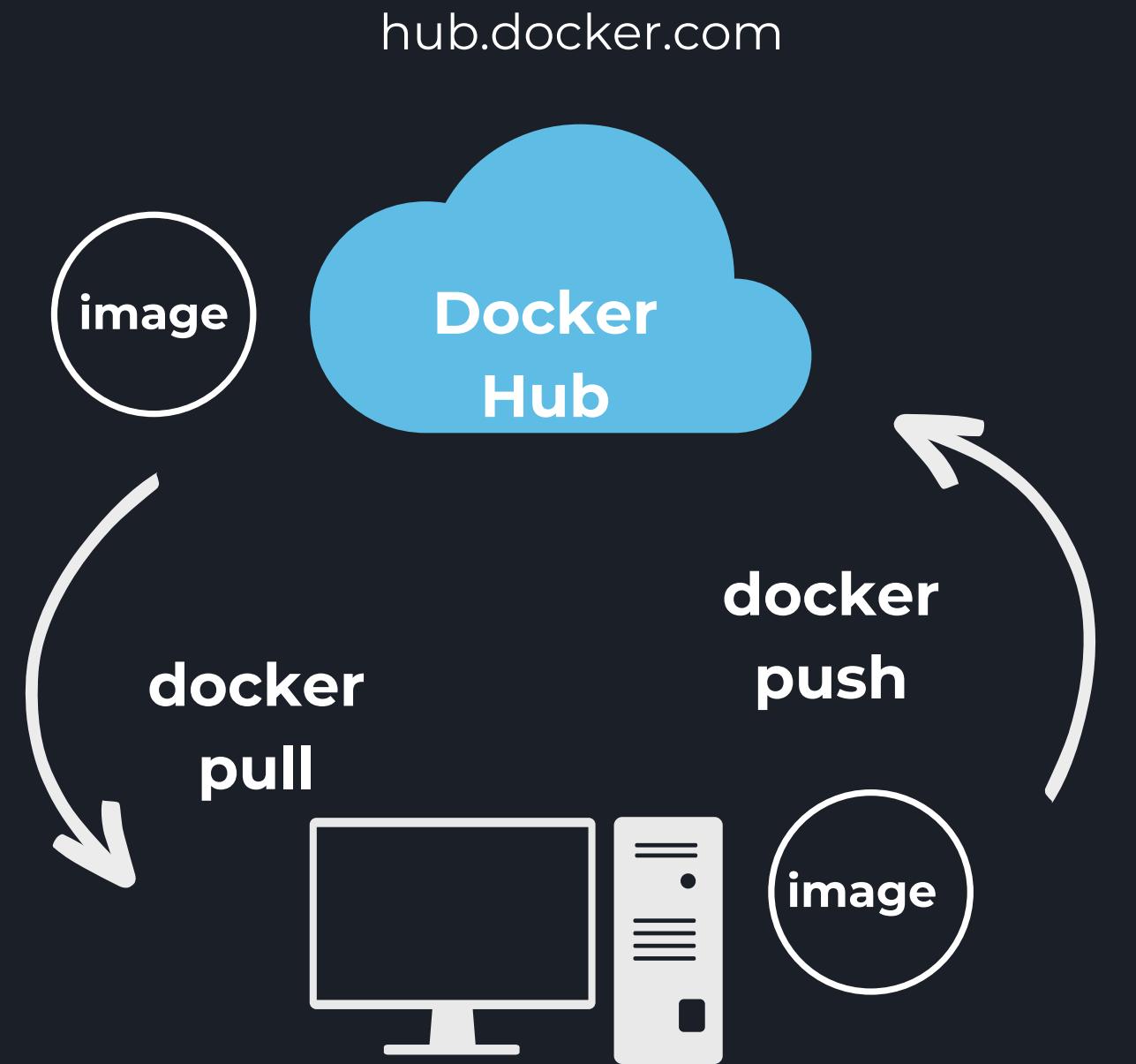
DOCKER ENGINE

- ❖ Manages docker services
- ❖ Communicates with host OS
- ❖ Provides environment for containerization



DOCKER REGISTRY

- ❖ A cloud-based registry service
- ❖ Share and access official docker images
- ❖ Two types of services provided:
 1. Public Registry
 2. Private Registry
- ❖ Similar to GitHub





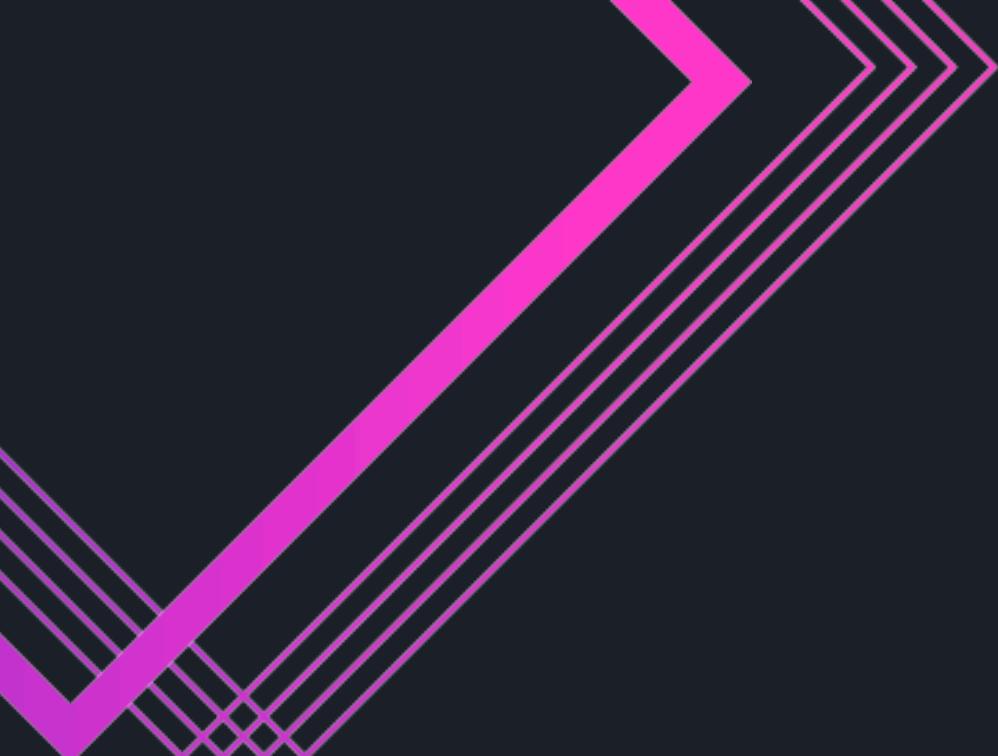
Download

Install

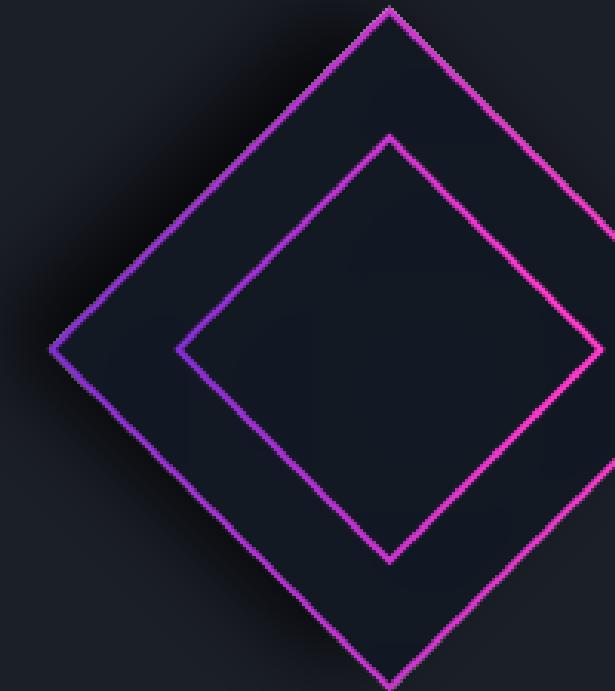
Troubleshoot Issues

Use Docker!

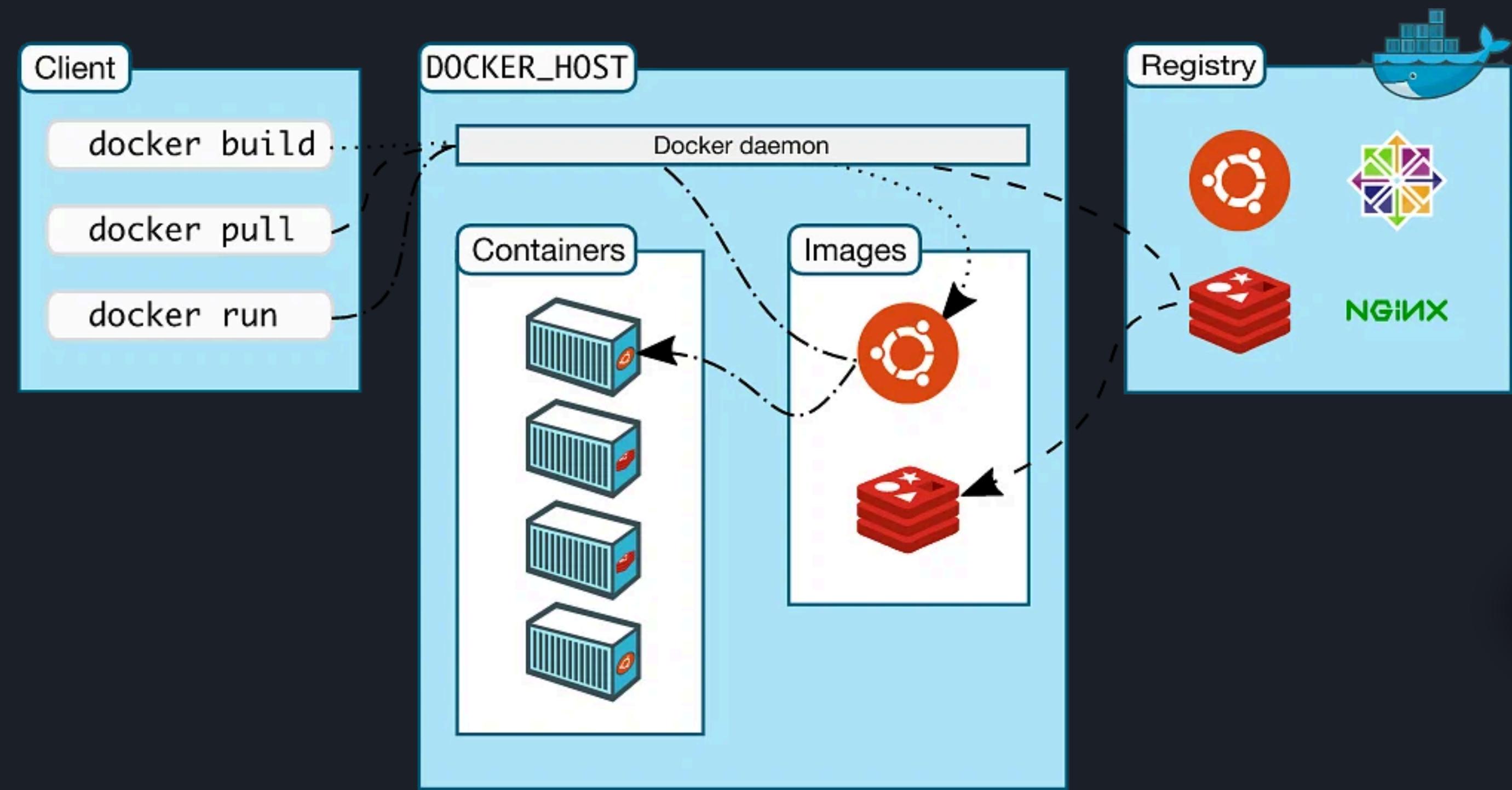


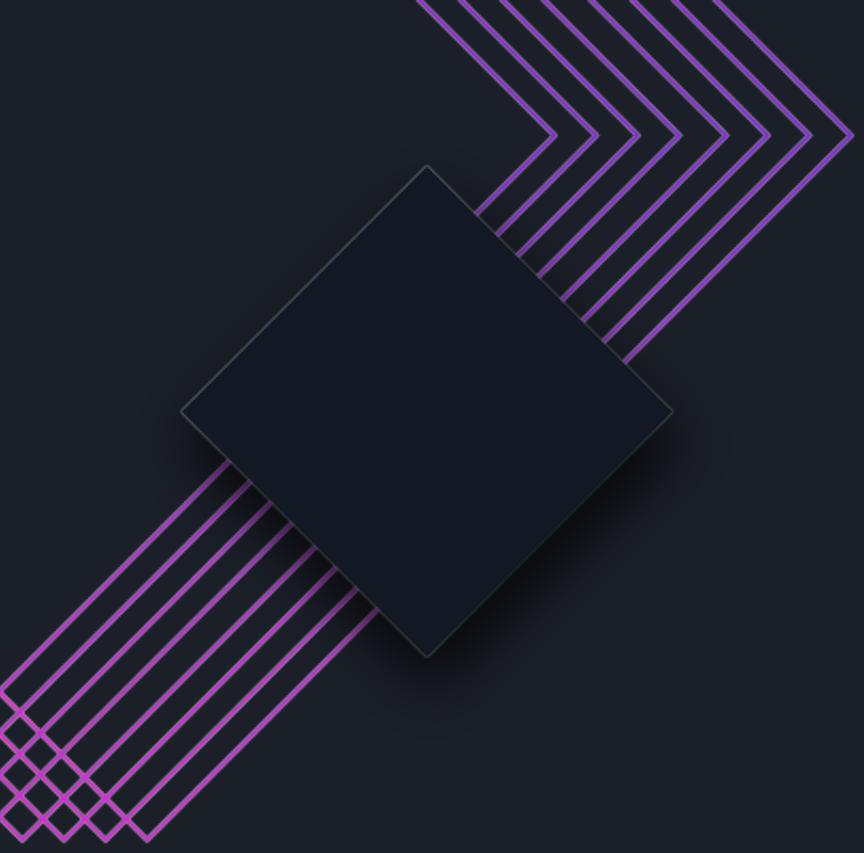


DOCKER ARCHITECTURE



DOCKER ARCHITECTURE





DOCKER COMMANDS



❖ List all images:

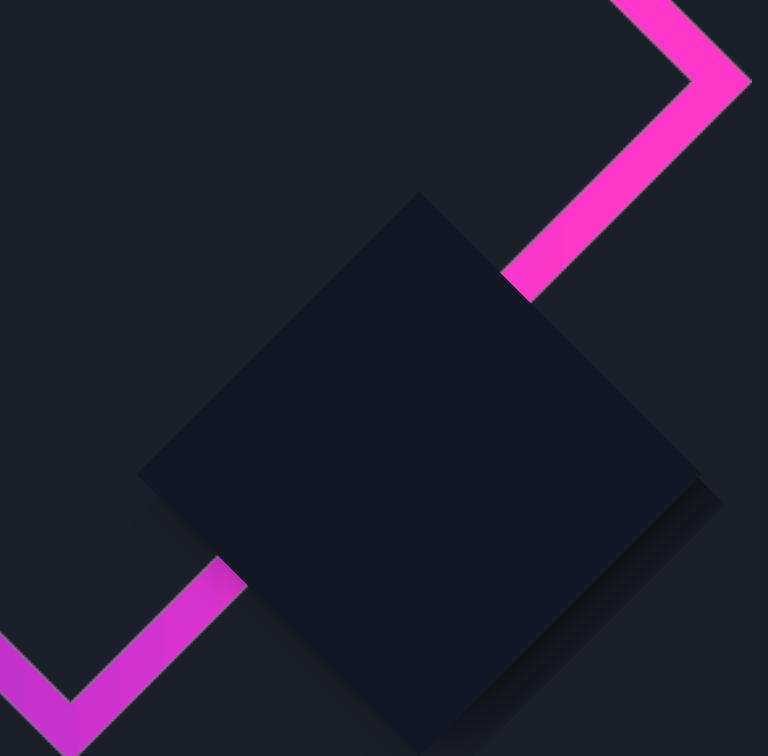


docker images

❖ Pull an image:



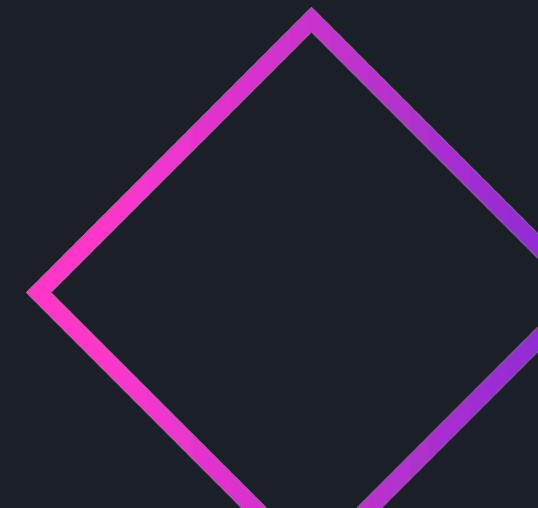
docker pull <image_name>

 Inspect an image:

```
docker inspect <image_name>
```

 Remove an image:

```
docker rmi <image_name>
```



- ❖ List all running containers:



```
docker ps
```

- ❖ List all running and stopped containers:



```
docker ps -a
```

❖ Run an image:



```
docker run <image_name>
```

❖ Run an image in interactive mode:



```
docker run -it <image_name>
```

- ❖ Run an image in detached mode:



```
docker run -d <image_name>
```

- ❖ Start a stopped container:



```
docker start <container_id>
```

❖ Remove a container:

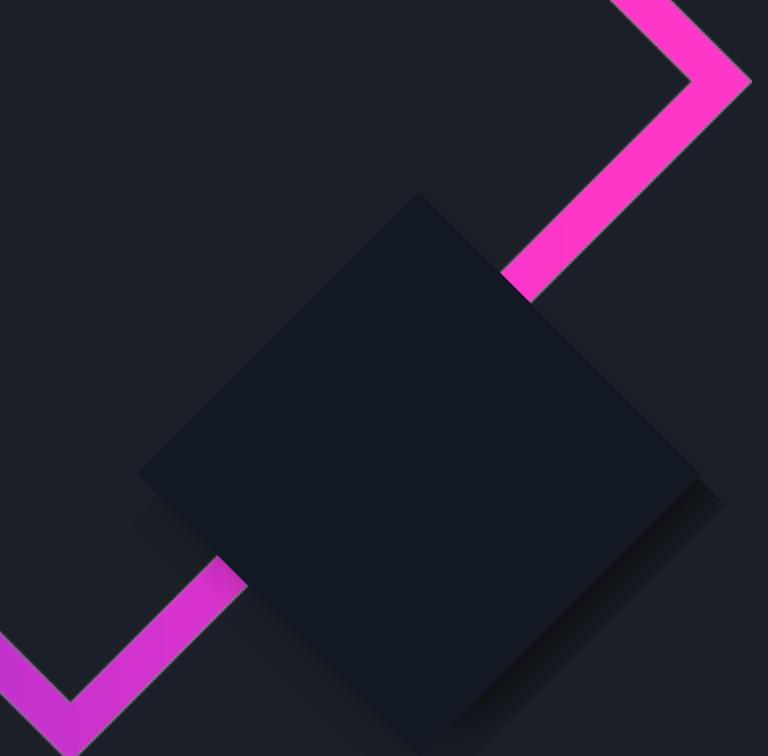


```
docker rm <container_id>
```

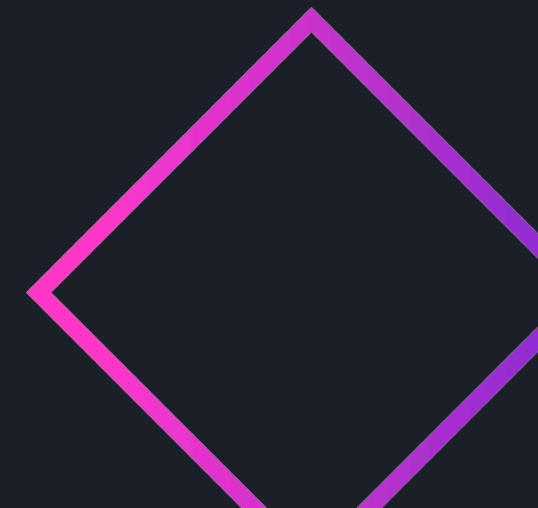
❖ Run a command in a running container interactively:



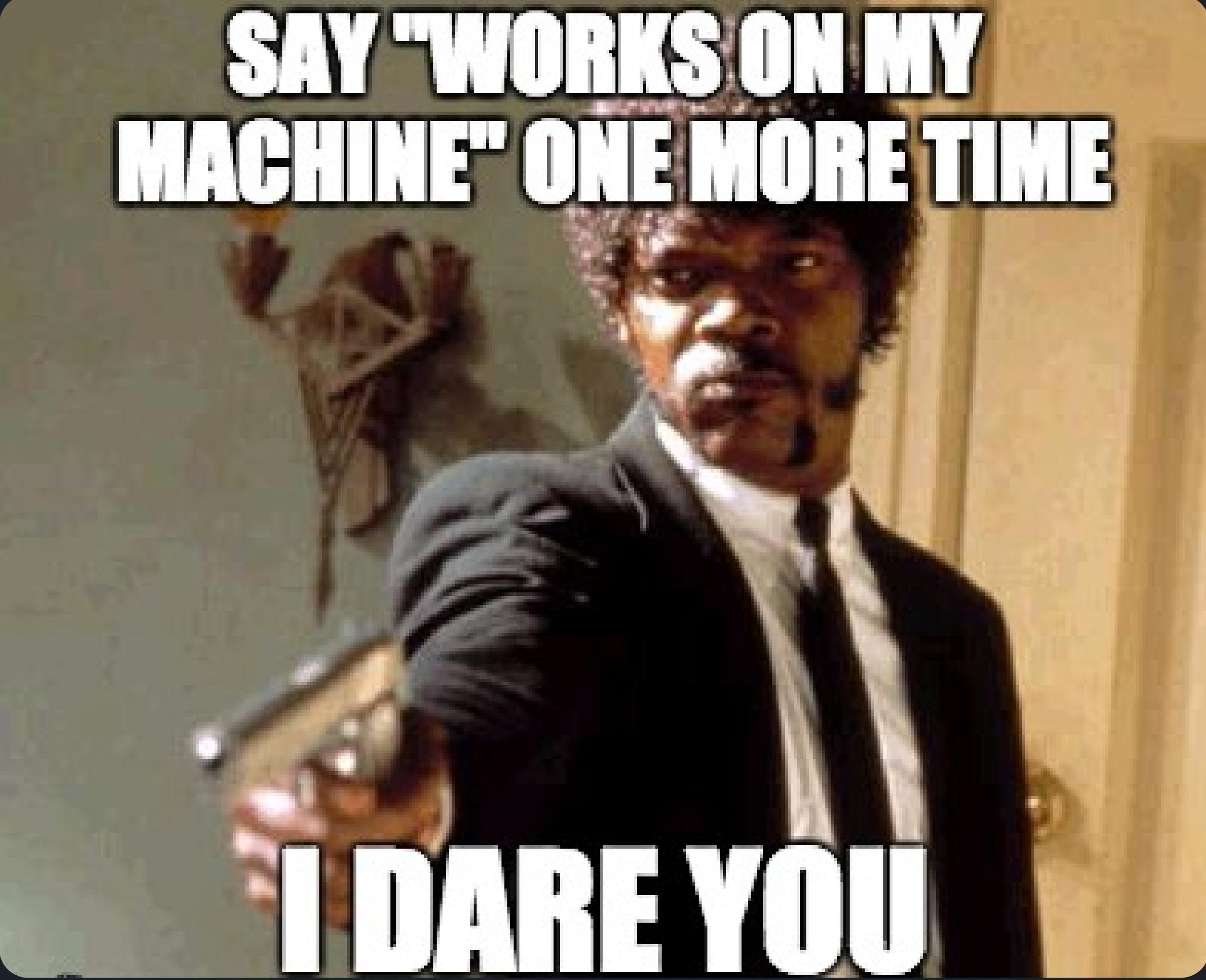
```
docker exec -it <image_name> <command_name>
```

 Inspect a container:

```
docker inspect <container_id>
```



SAY "WORKS ON MY
MACHINE" ONE MORE TIME



I DARE YOU