

BEYOND CONTAINERS

THE FOSS FILES SEASON 3 | EPISODE 2

Ops Unleashed



🎙 Pranay Bhangre

🎙 Vikas Gouda

🎙 Tushar Rathod

🎙 Aradhyा Pitlawar



A DEEP DIVE INTO

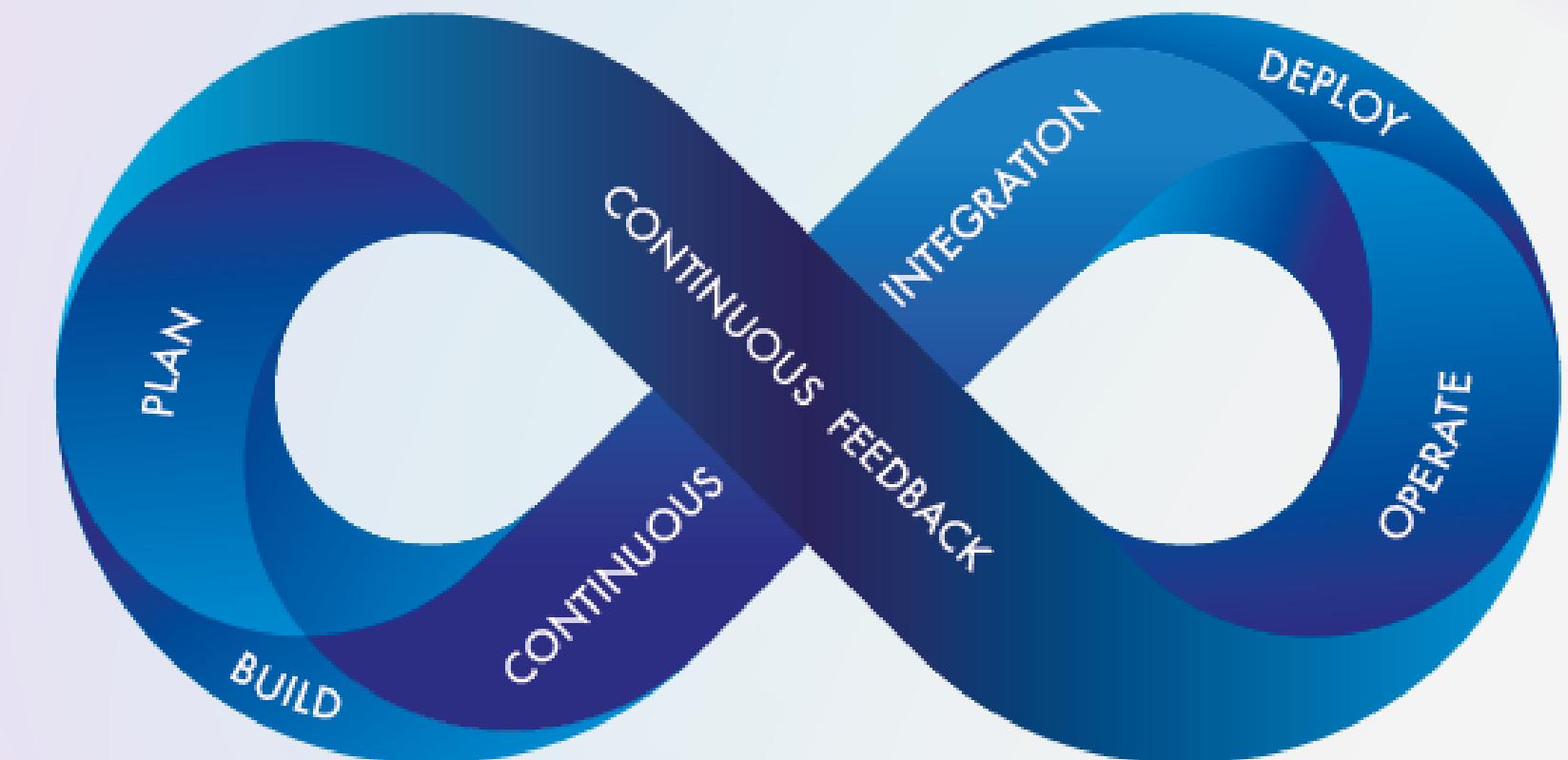


1	Docker
2	Kubernetes
3	Introduction to orchestration
4	Popular orchestration tools
5	Future trends
6	Innovations in orchestration

DevOps

Collaboration

DevOps is a set of practices that combines software development and IT operations to automate and streamline the processes of infrastructure provisioning, code development, testing, and deployment for faster and more reliable software delivery

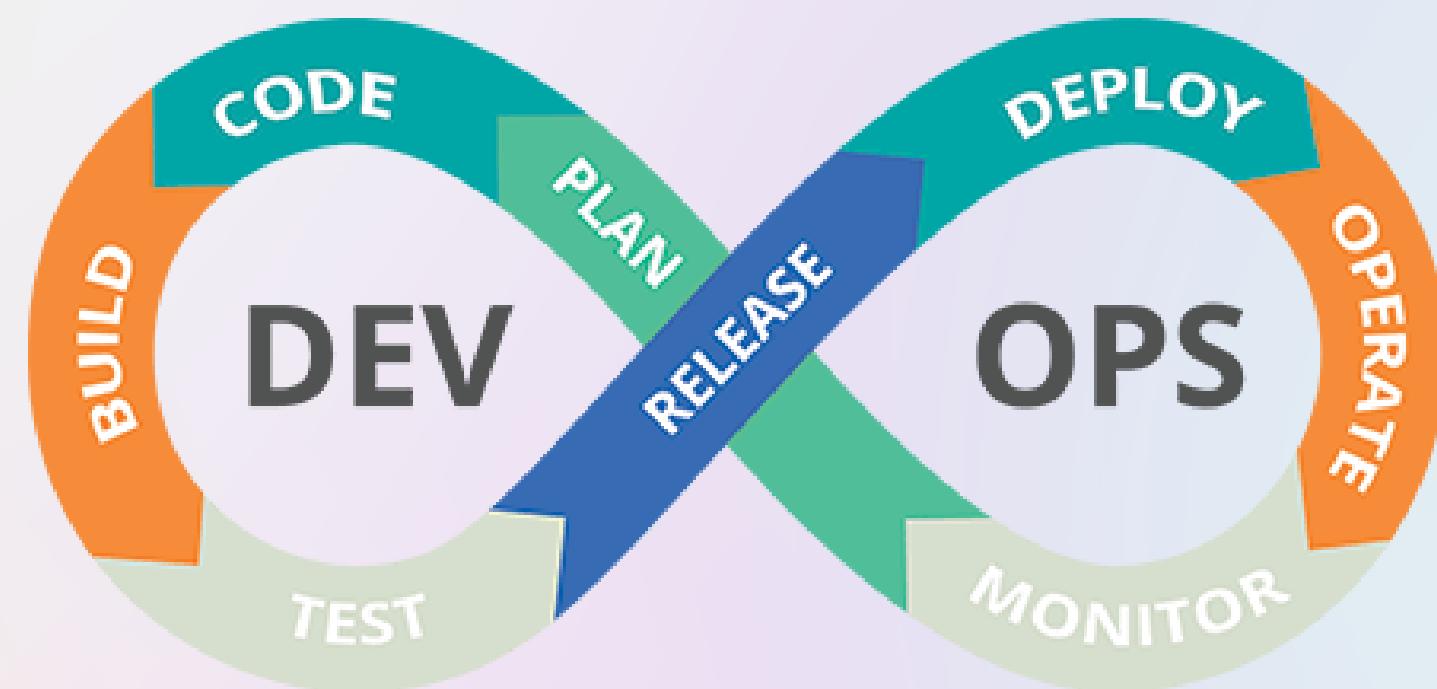


DevOps

Development + Operations

Development

Planning
Code Base
Building Software

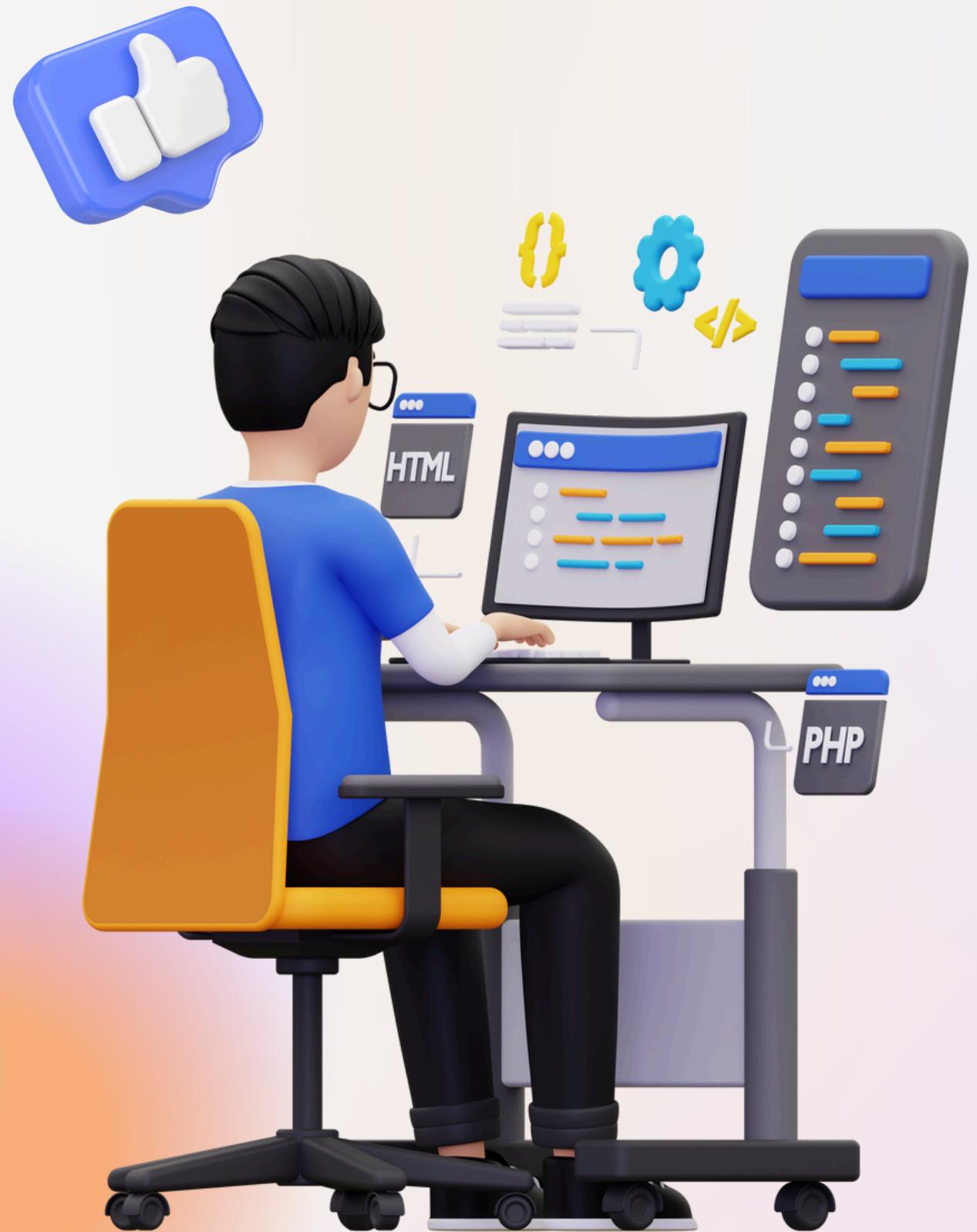


Operations

Deploy
Operate
Monitor

TESTING

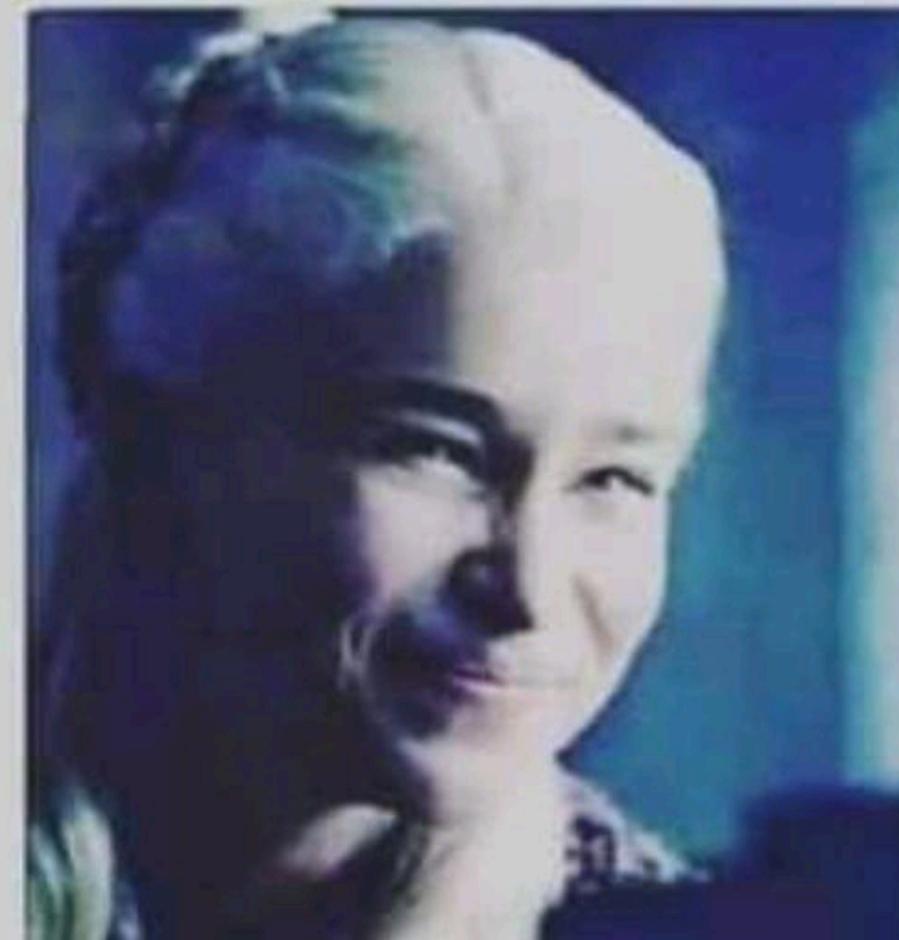
Verification | Validation



TESTING

Verification | Validation

- it works on my computer

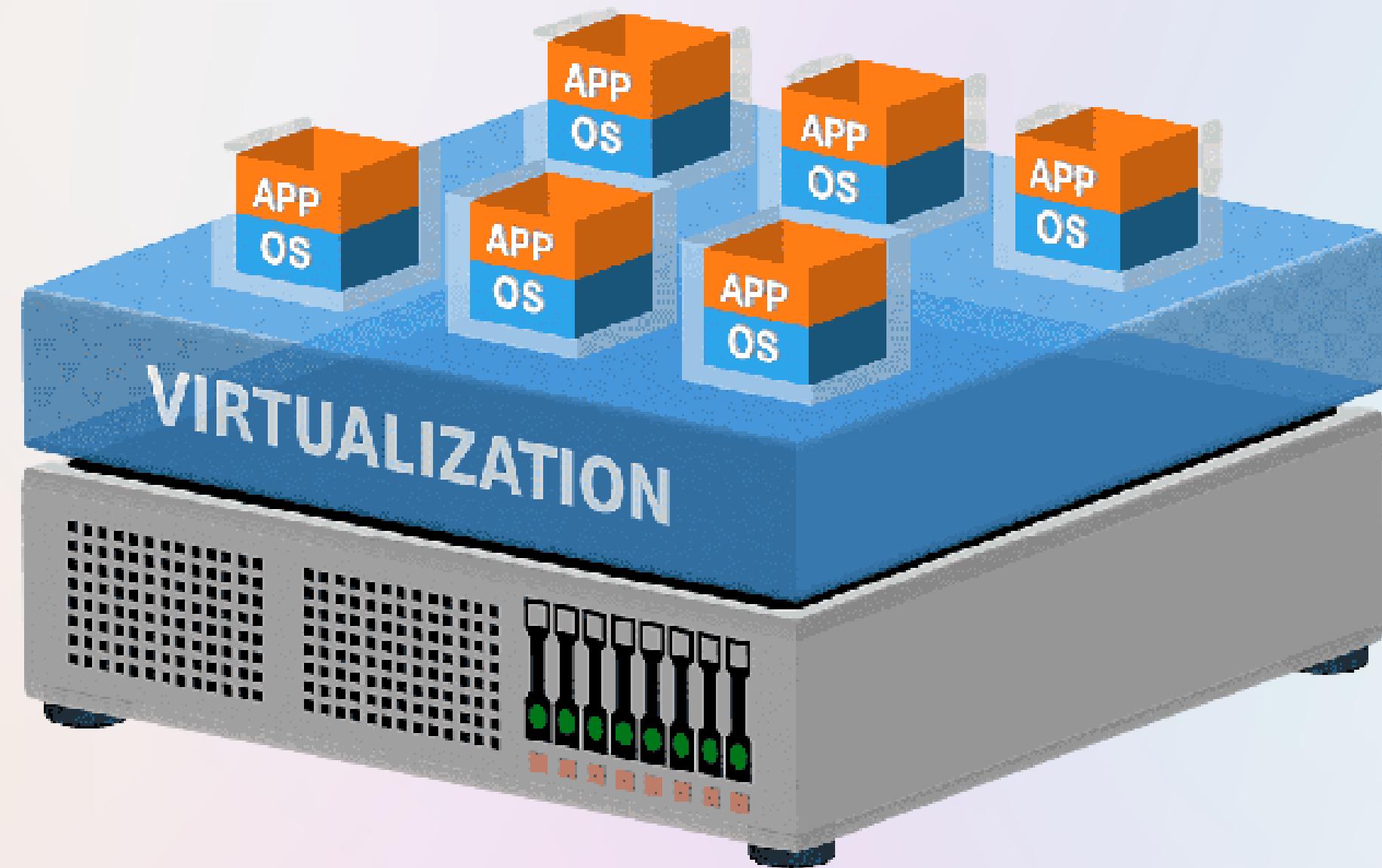


- yes but we are not going to give your computer to the client



Virtual Machine

Hypervisor



DOCKER

Containerization Platform

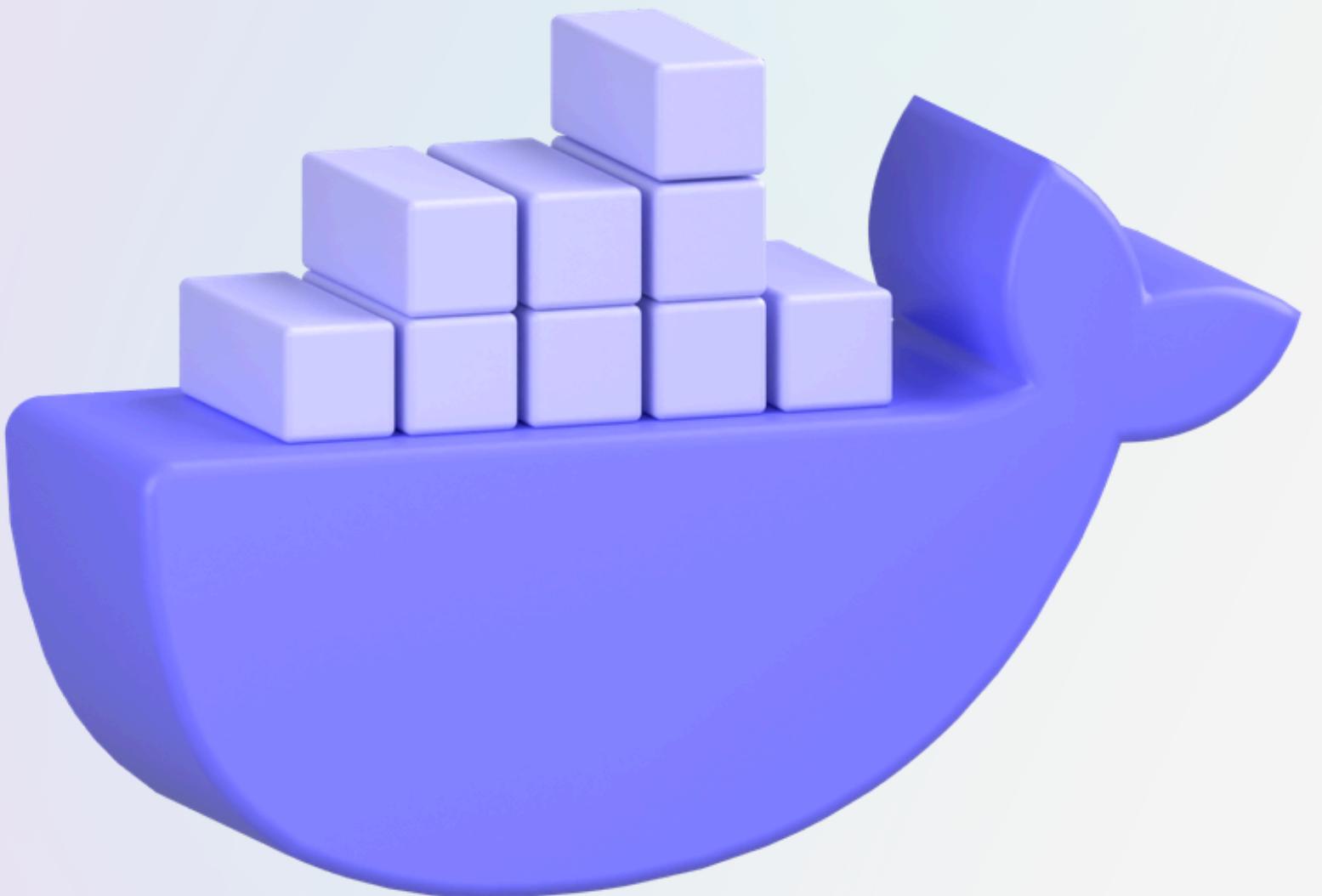
What is Docker ?

Why use Docker ?

When to use Docker ?

How to use Docker ?

How does Docker work ?



Virtual Machine

Drawbacks of virtual machines (VMs)

Resource Overhead

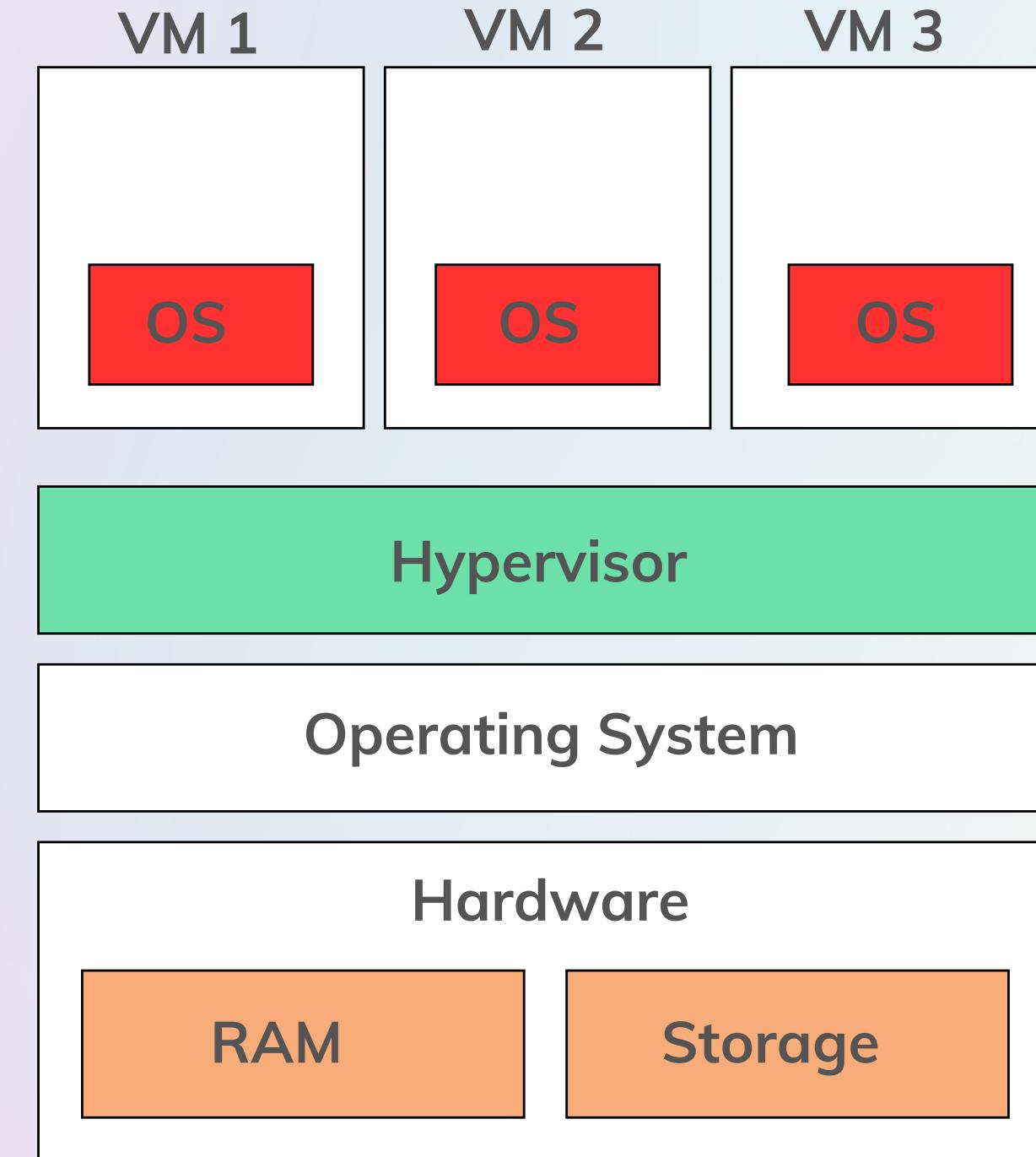
Slower Startup Times

Resource Isolation

Deployment Size

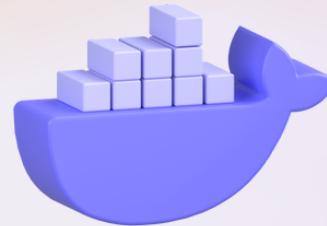
Hypervisor Complexity

Limited Scalability



Virtual Machine

DOCKER



Comparison

Resource Overhead

Slower Startup Times

Resource Isolation

Deployment Size

Hypervisor Complexity

Limited Scalability

Container 1 Container 2 Container 3



Docker Engine

Operating System

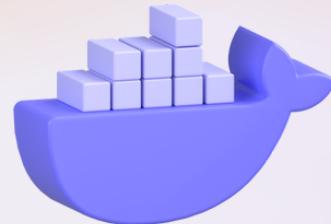
Hardware

RAM

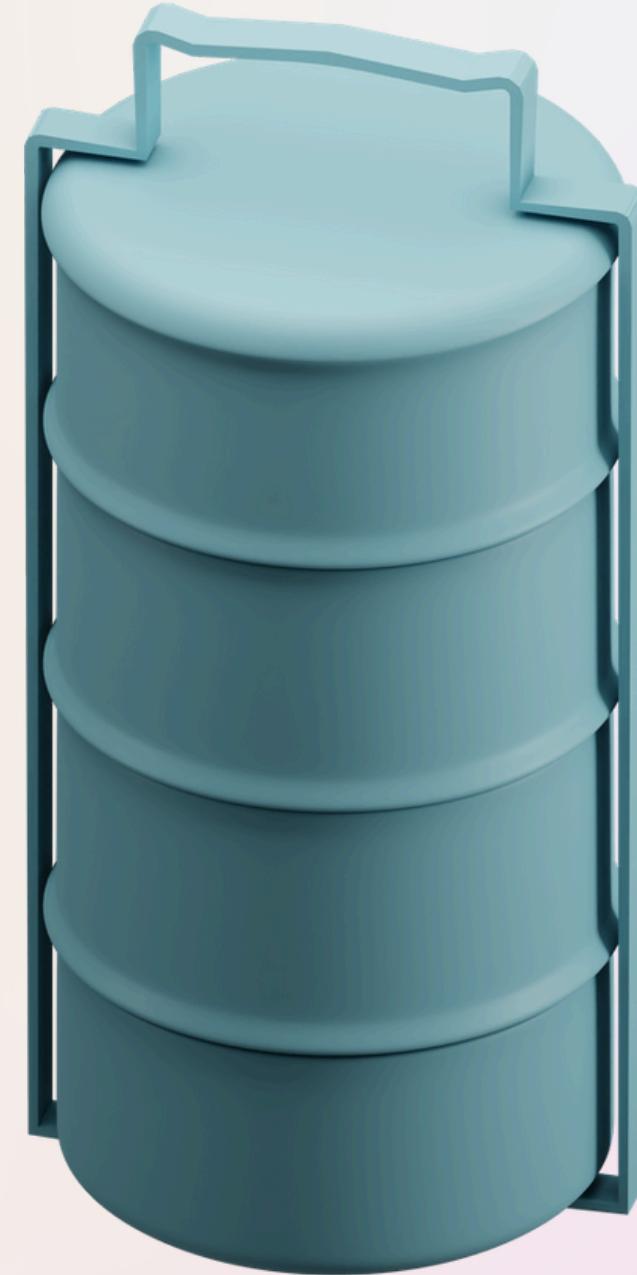
Storage

Docker

DOCKER



Containers



Container 1 Container 2 Container 3



Docker Engine

Operating System

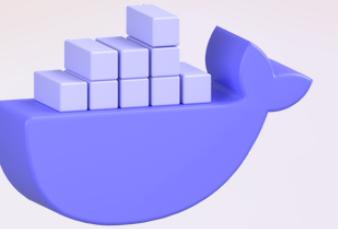
Hardware

RAM

Storage

Docker

DOCKER

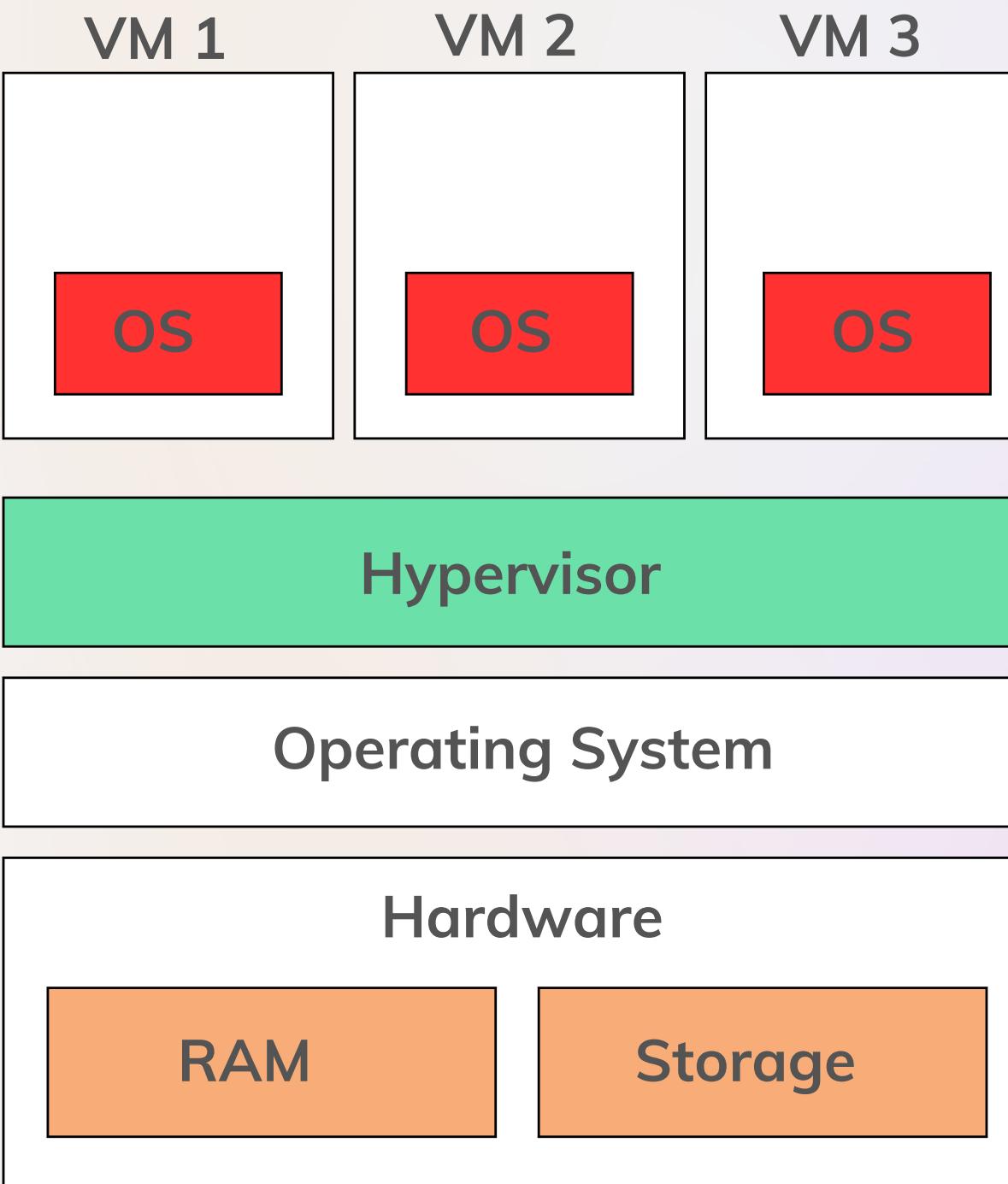


Container

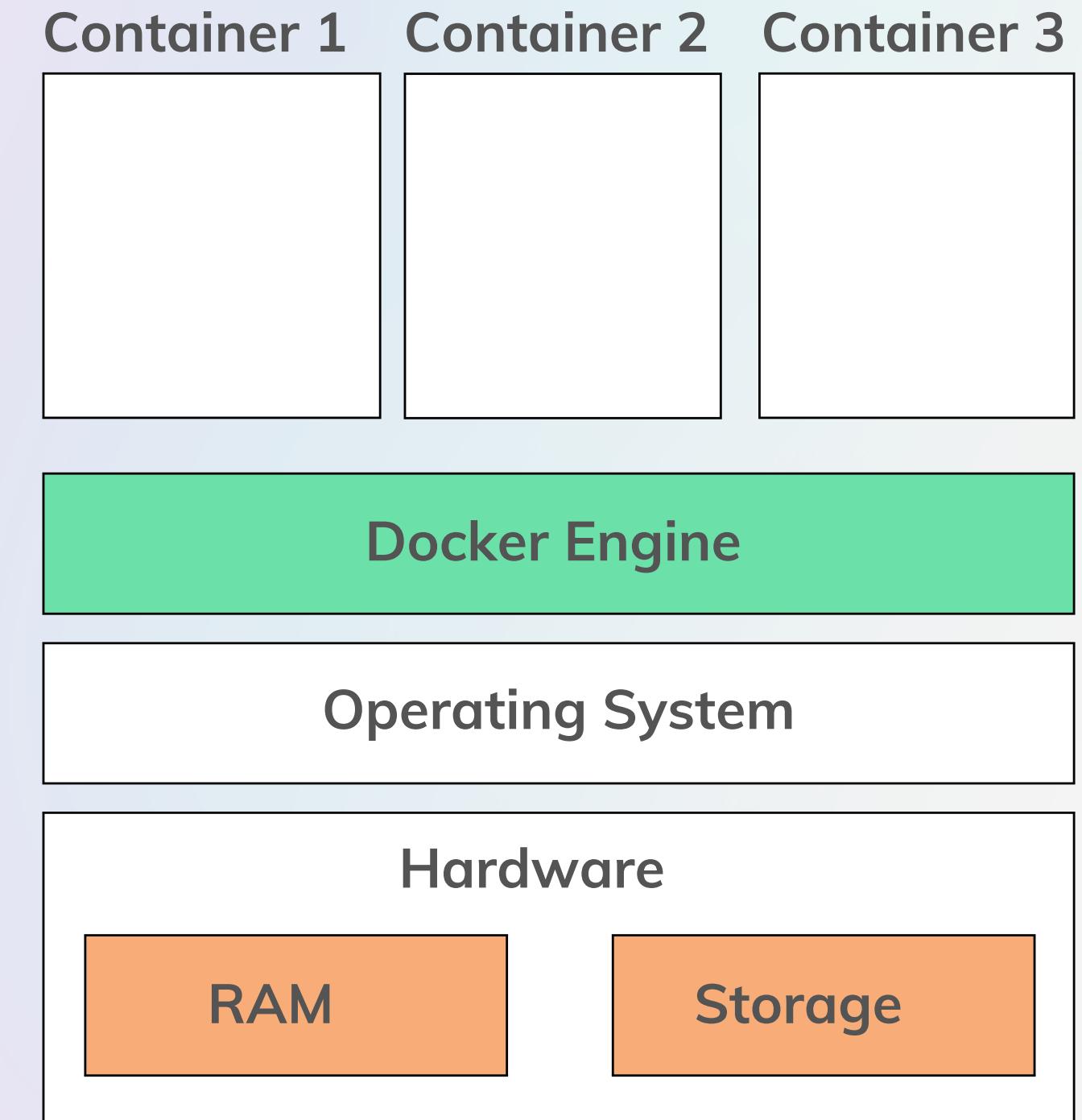
A container is a standard unit of software that packages up code and all its dependencies, so the applications runs quickly and reliably from one computing environment to another.

Image

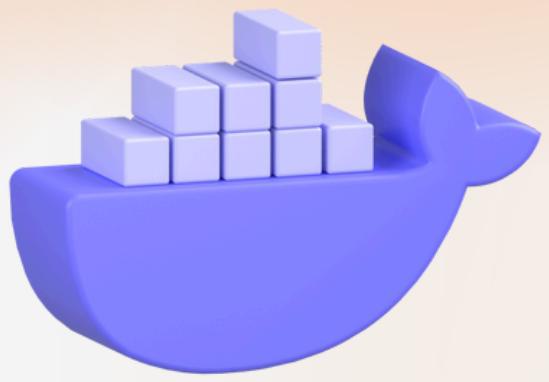
Docker image is like a snapshot or picture of a complete set of instructions and all the necessary stuff (like files and settings) that a computer program needs to run.



Virtual Machine



Docker



DOCKER

Containerization Platform

What is Docker ?

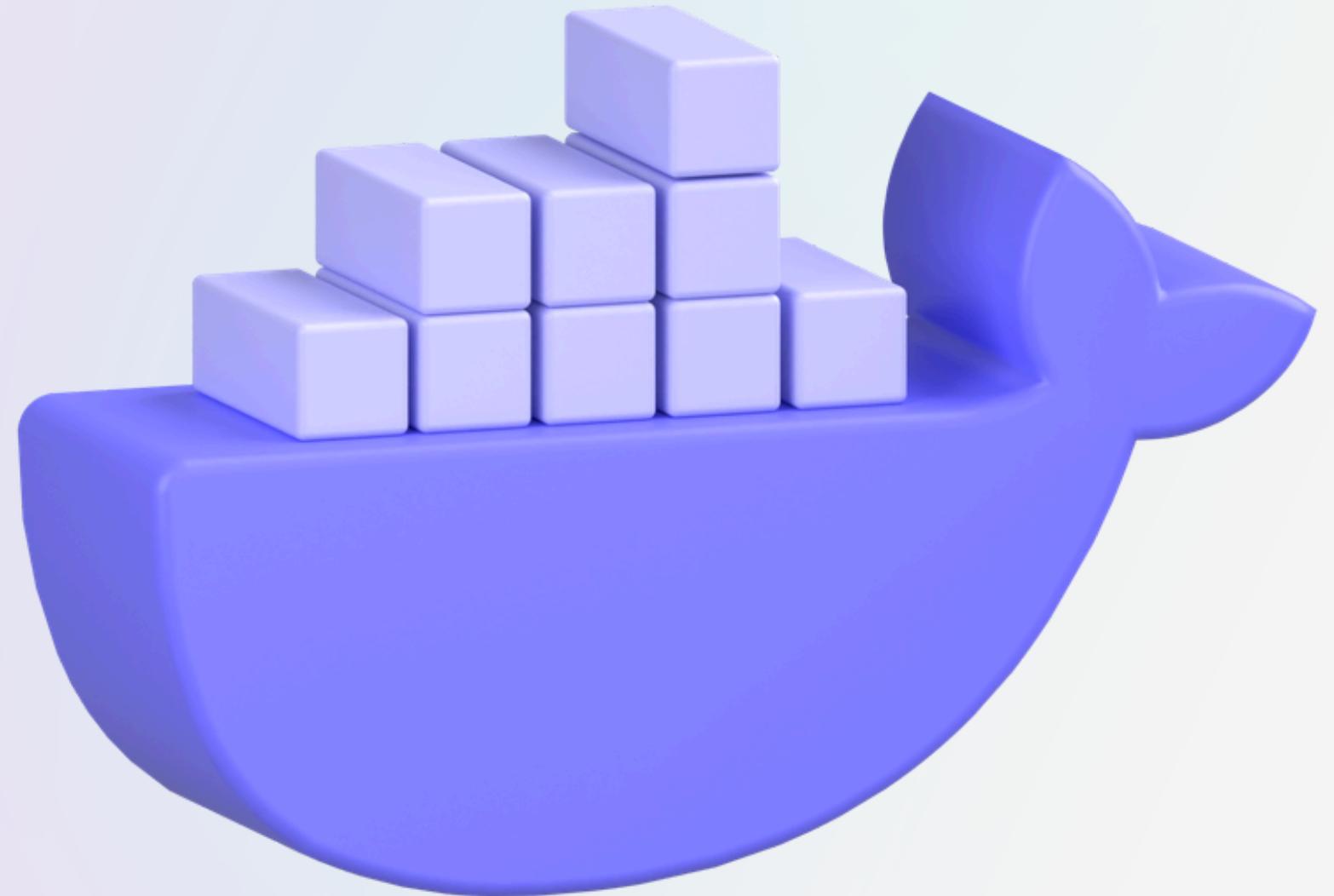


- ◆ Open source platform designed to create, deploy and run applications
- ◆ Docker uses containers on host OS to run applications rather than creating a whole VM
- ◆ Developed in Go Language

DOCKER

Advantages of Docker

- ◆ Resource Efficiency
- ◆ Faster Deployment
- ◆ Portability
- ◆ Version Control and Rollbacks



DOCKER

Containerization Platform

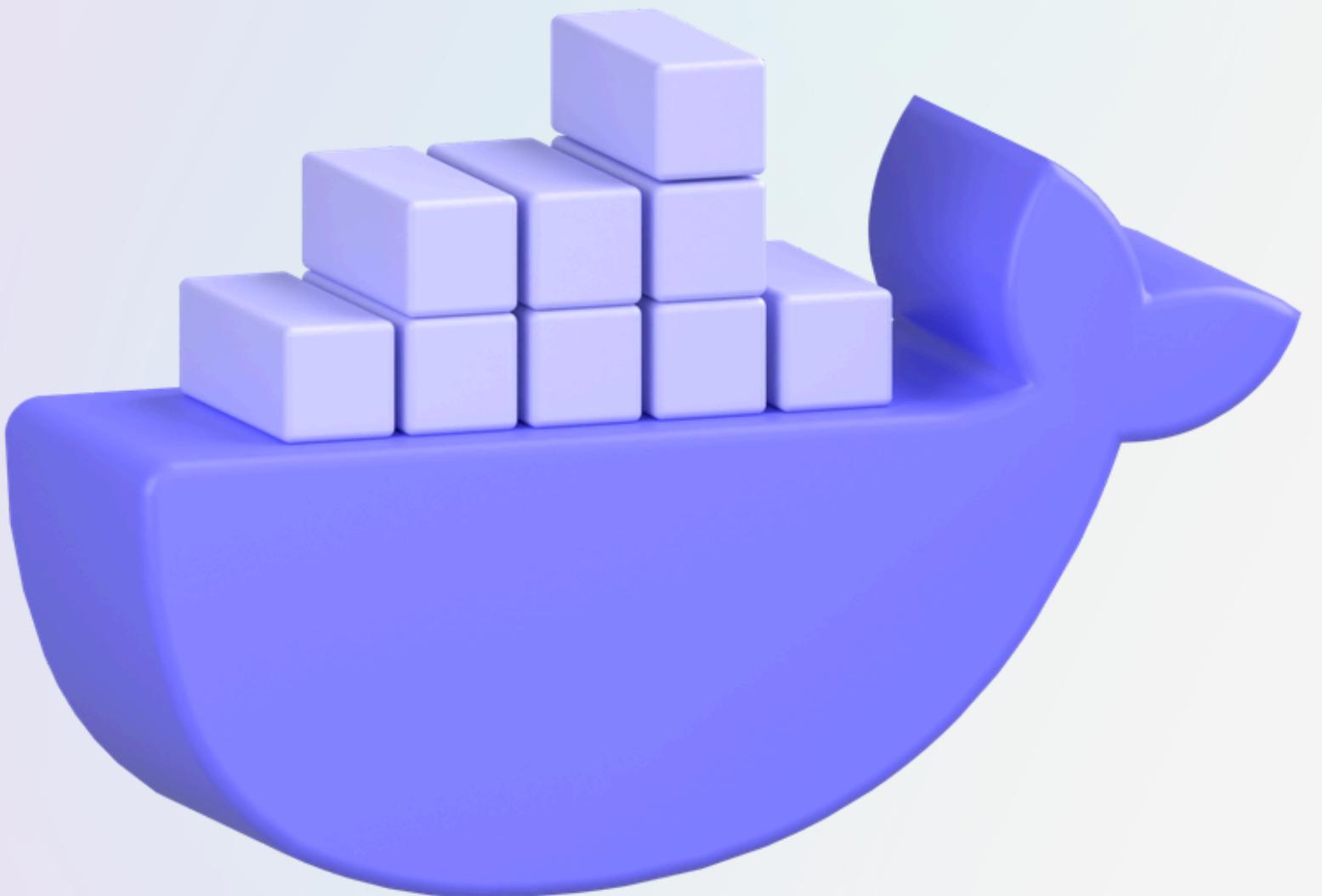
What is Docker ?

Why use Docker ?

When to use Docker ?

How to use Docker ?

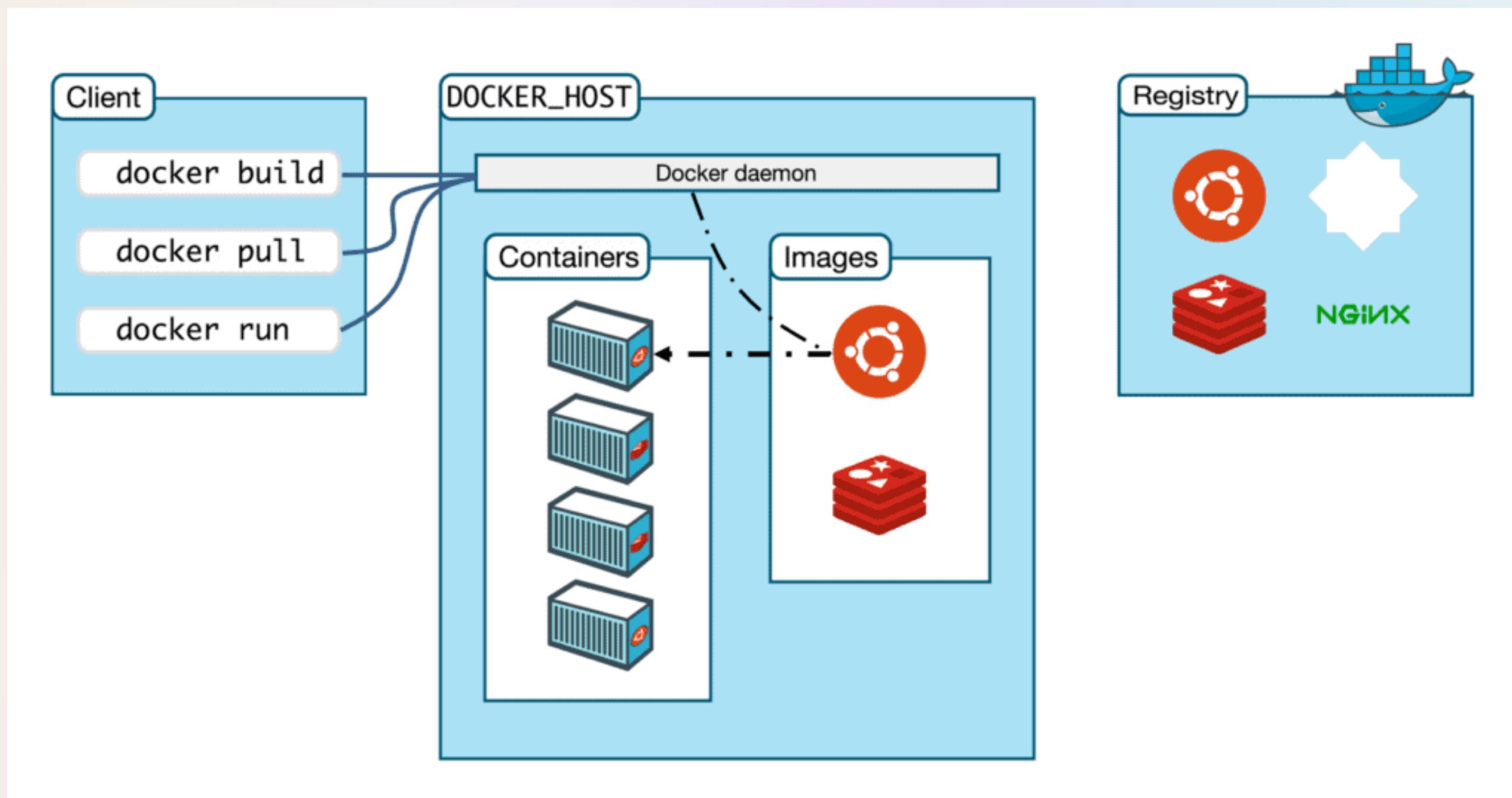
How does Docker work ?





DOCKER

How it works . . .



DOCKER

Containerization Platform

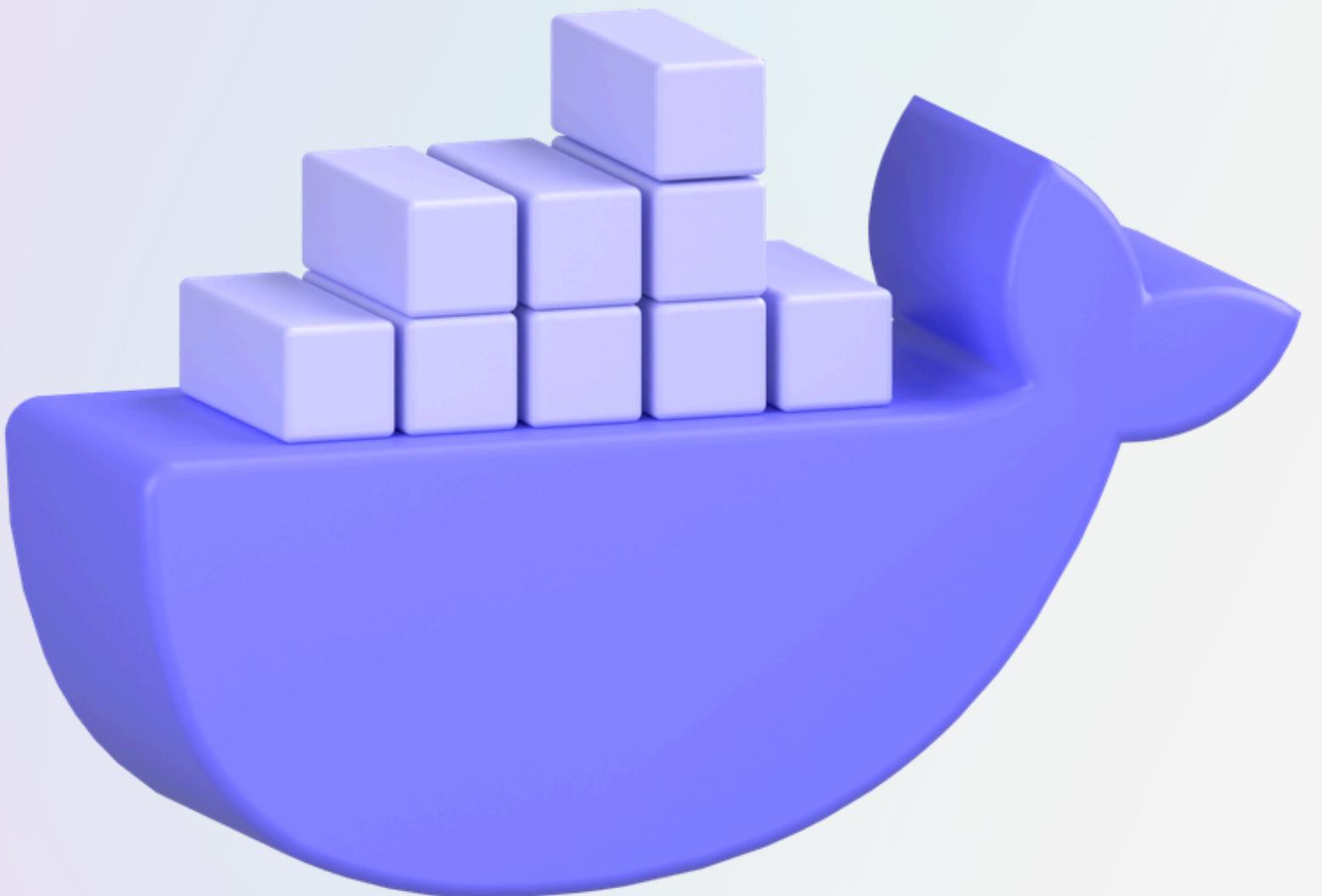
What is Docker ?

Why use Docker ?

When to use Docker ?

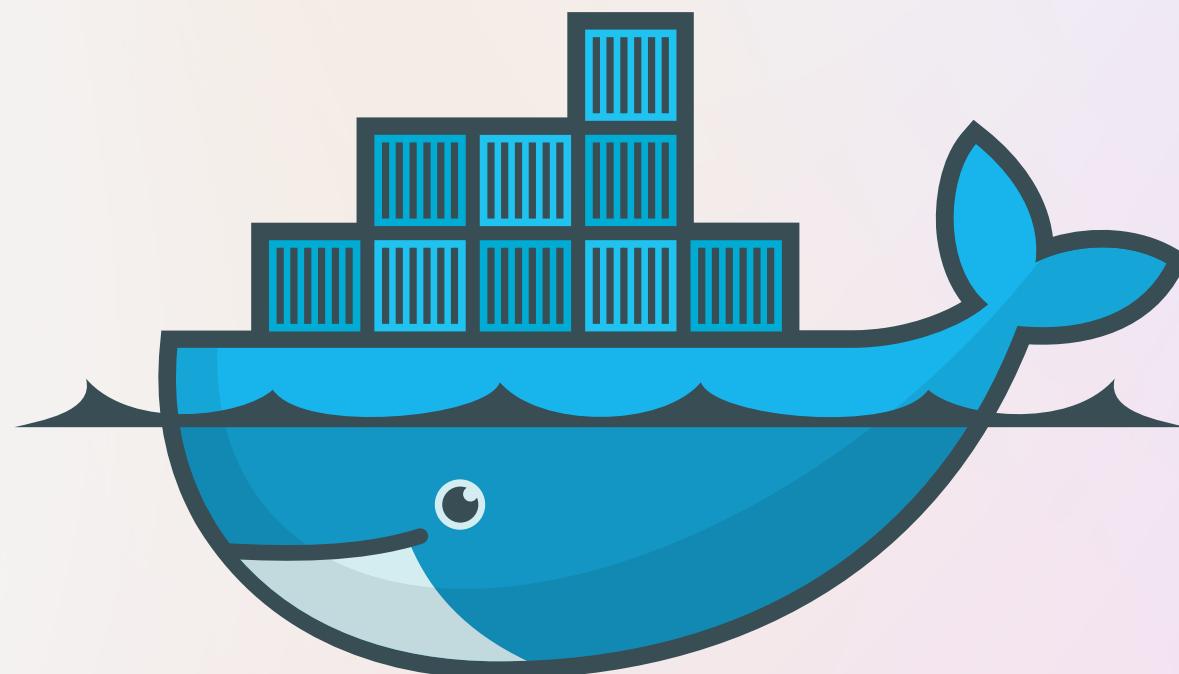
How to use Docker ?

How does Docker work ?



DOCKER

Containerization Platform



KUBERNETES

Container Management Tool



KUBERNETES

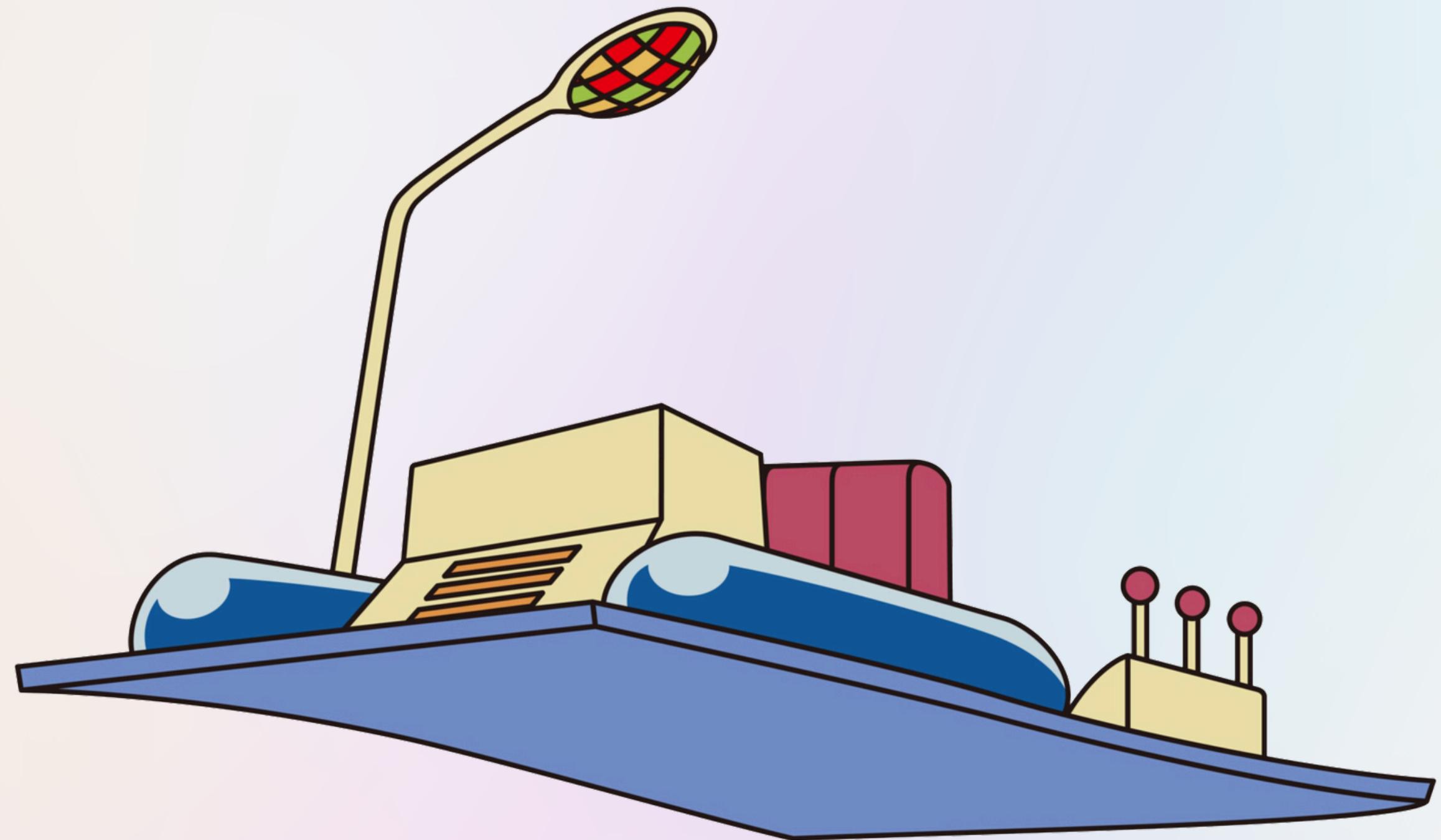
Container Management Tool



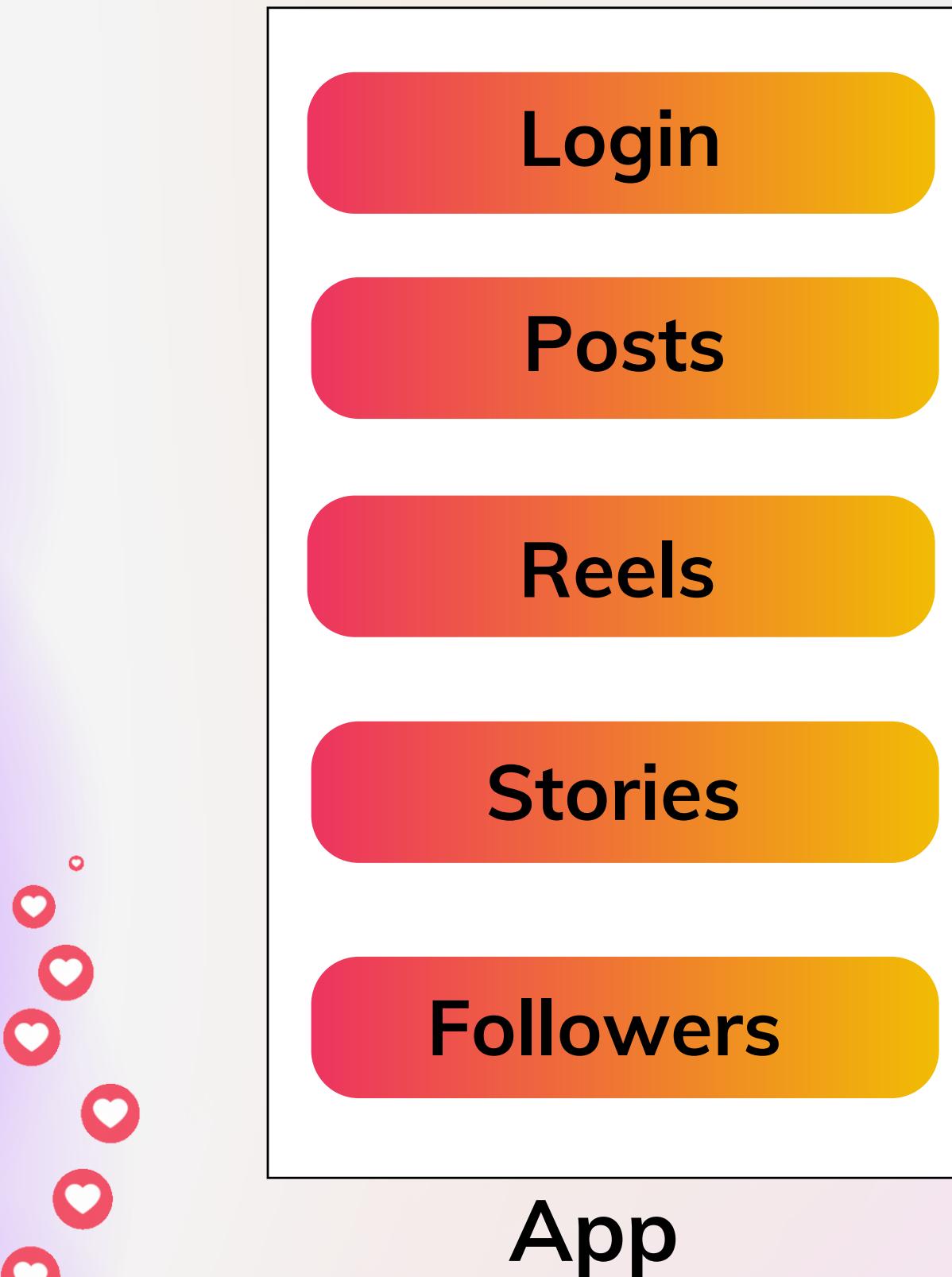
Why is there need to manage containers ?

K8S

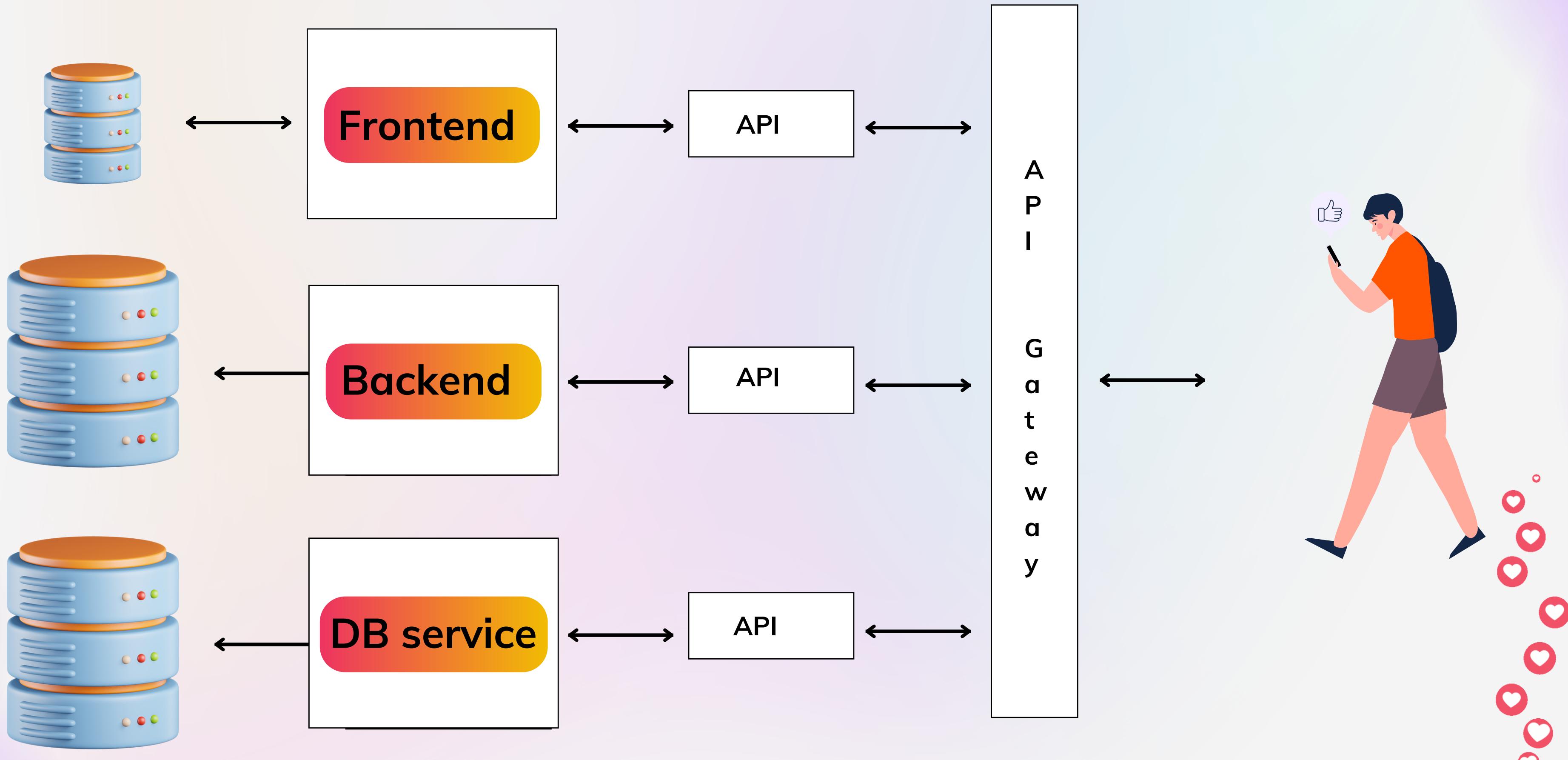
How it works ?



Monolithic Application Model



Micro Services Model





Flipkart



 Disney+
hotstar

prime video


KUBERNETES

Container Management Tool



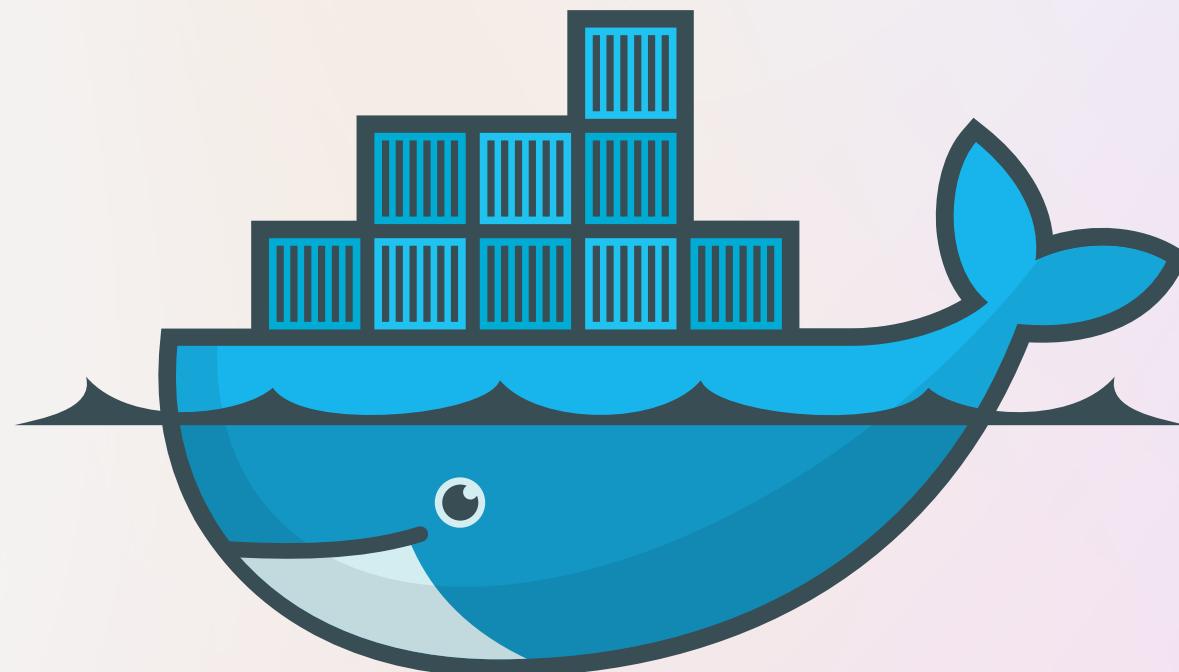
Why is there need to manage containers ?

K8S

How it works ?

DOCKER

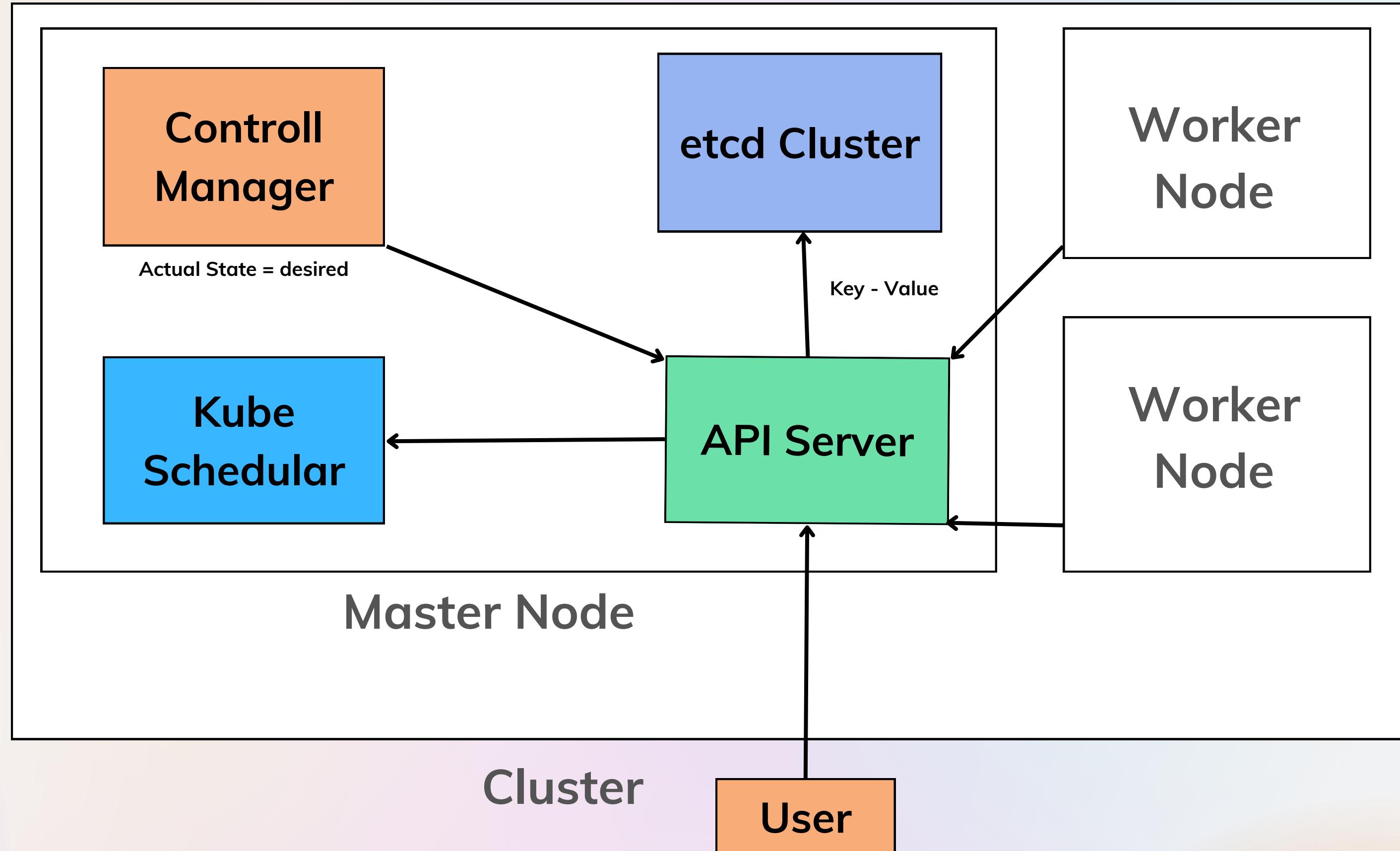
Containerization Platform

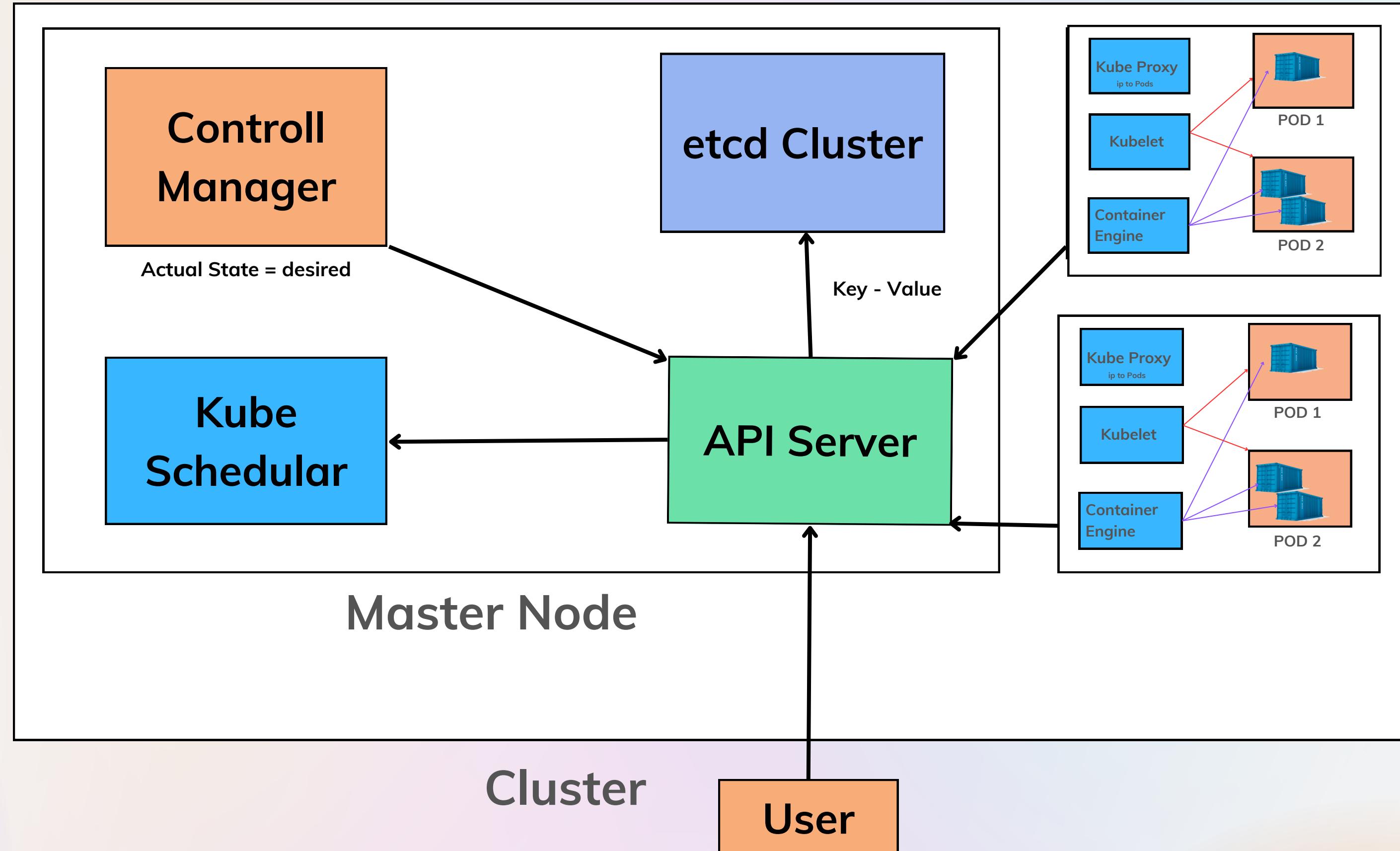


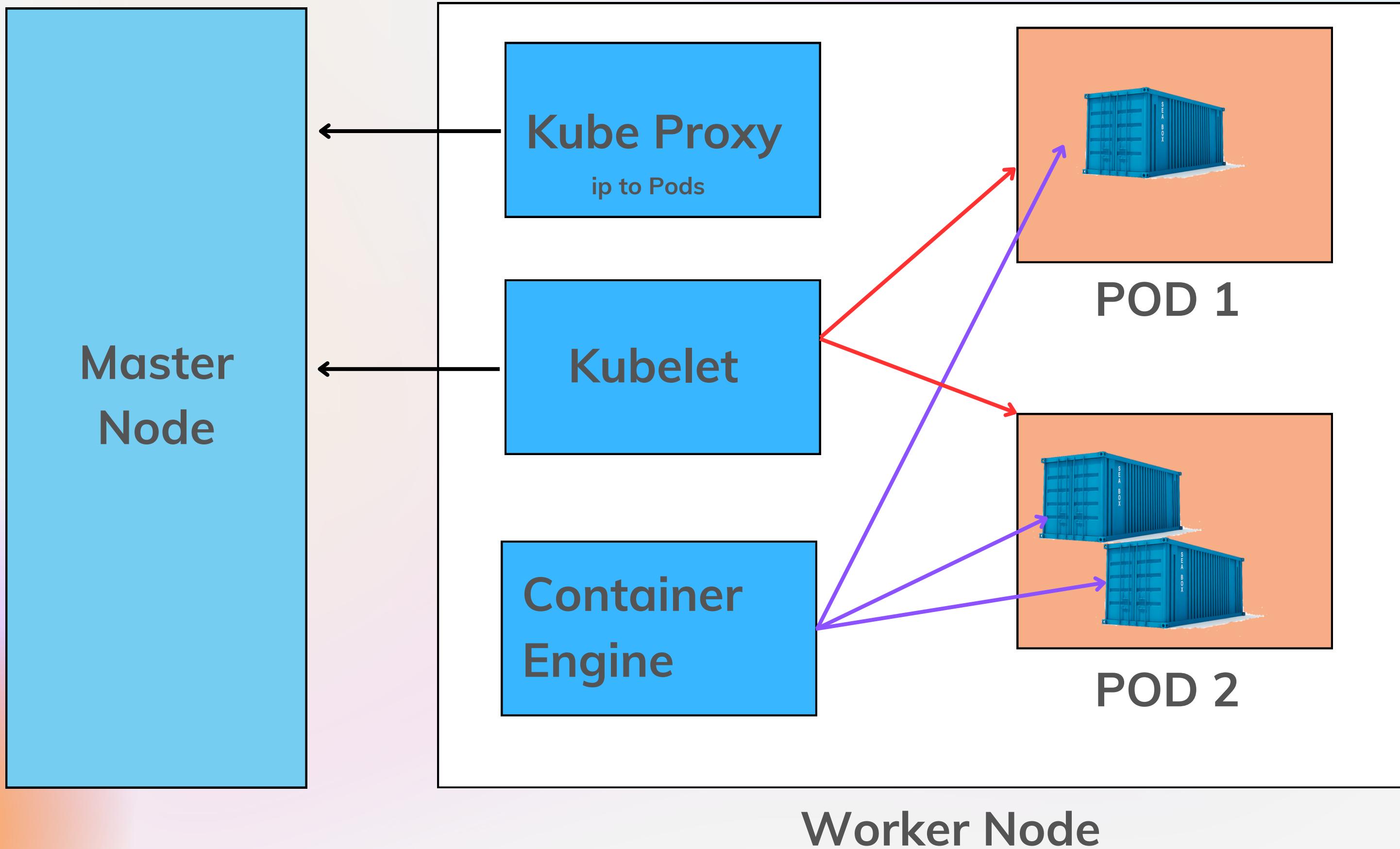
KUBERNETES

Container Management Tool











API Server

For all communications i.e we apply .yaml or json manifest to kube-api server

Kube API server is meant to scale automatically as per load

etcd

Stores metadata and status of cluster

etcd is consistent and high-availability store

Fully replicated



Kube Schedular

When user make request for the creation & management of Pods , it is going to take action on the request

Responsible for finding the best node for that pod to run

Control Manager

Make sure actual state of cluster matches to desired state



Kubelet

Agent running on the node

Listen to master (eg. Pod Creation)

Send success/fail report to master

Container Engine

Work with kubelet

Pulling images

Start stop container



Kube-proxy

Assign IP to each pod

Kube-proxy runs on each node & this make sure that each pod will get its own unique IP address

POD

Smallest unit in kubernetes

Group of one or more containers that are deployed together

ORCHESTRATION

Orchestration in DevOps is like planning the steps to make sure everything happens at the right time and in the right order



ORCHESTRATION

Automated
Deployment

Configuration
Management

Release
Management

Workflow
Automation

Container
Orchestration

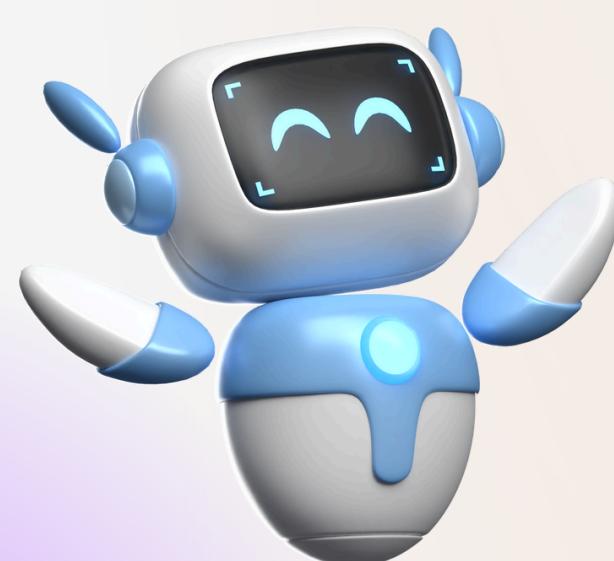
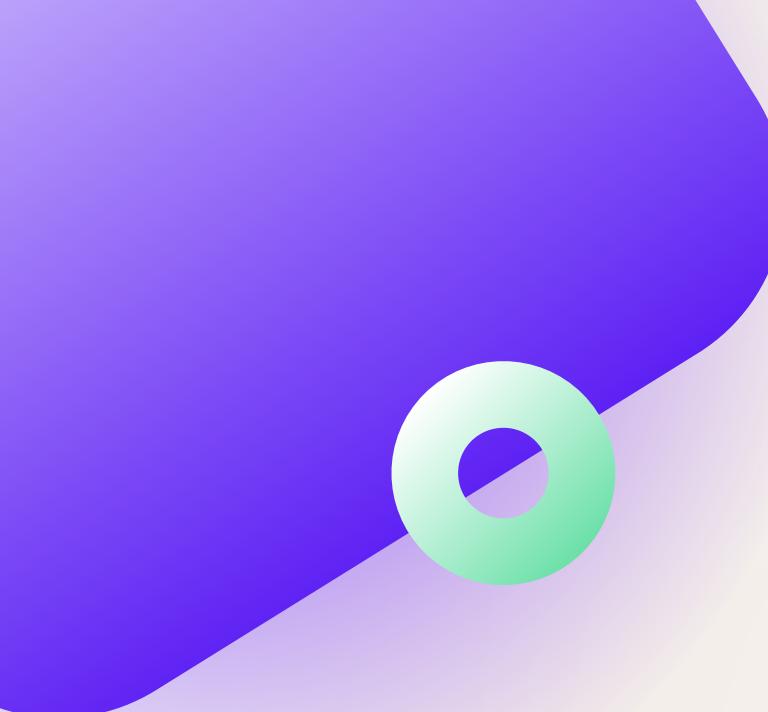
Integration of
Tools

Provisioning
and Scaling

Monitoring and
Logging

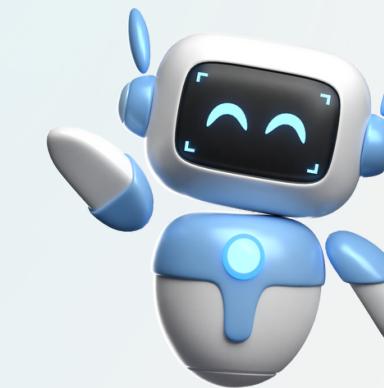
Security
Orchestration

ORCHESTRATION



Automated Deployment

Coordinating the deployment of software applications across various environments, ensuring consistency and reliability



Configuration Management

Managing and maintaining the configuration of servers and infrastructure components to achieve consistency and scalability



ORCHESTRATION

Release Management

Planning, scheduling, and overseeing the release of software updates or new features in a controlled and efficient manner



Workflow Automation

Automating the flow of tasks and processes involved in the development and operations lifecycle, from code commits to testing to deployment

ORCHESTRATION

Container Orchestration

Managing the deployment, scaling, and operation of containerized applications using tools like Kubernetes or Docker Swarm



Integration of Tools

Ensuring that different tools used in the DevOps toolchain, such as version control systems, build systems, and monitoring tools, work together seamlessly

ORCHESTRATION

Provisioning and Scaling

Managing the deployment, scaling, and operation of containerized applications using tools like Kubernetes or Docker Swarm

Monitoring and Logging

Coordinating the collection and analysis of log data and performance metrics to ensure the health and performance of applications and infrastructure

ORCHESTRATION

Security Orchestration

Coordinating security processes and tools to identify
and respond to security threats in an automated and
efficient manner

ORCHESTRATION

In essence, orchestration in DevOps is about creating a well-choreographed symphony of different tools and processes to streamline development, testing, and deployment workflows while maintaining reliability and efficiency

ORCHESTRATION

Significance

Efficiency

Consistency

Scalability

Collaboration

Visibility

Reliability

Adaptability

Compliance

Cost Savings

ORCHESTRATION TOOLS

Orchestrators, such as Kubernetes, Docker Swarm, and Nomad by HashiCorp, provide a centralized platform for automating and optimizing complex distributed systems, enhancing scalability, reliability, and ease of management.

ORCHESTRATION TOOLS

Docker Swarm

Docker Swarm simplifies container orchestration, ensures built-in scalability, and seamlessly integrates with the Docker ecosystem for an efficient and user-friendly deployment experience.



Kubernetes

Kubernetes offers robust and versatile container orchestration, supporting complex deployments, scaling, and automation of containerized applications.



ORCHESTRATION TOOLS

OpenShift

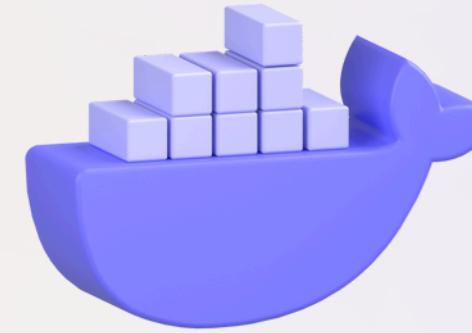
OpenShift provides an enterprise-grade container platform built on Kubernetes, offering additional developer tools, security features, and integration capabilities.



Nomad



Nomad is a lightweight orchestrator by HashiCorp, designed for simplicity in job scheduling and orchestration across diverse infrastructure environments.

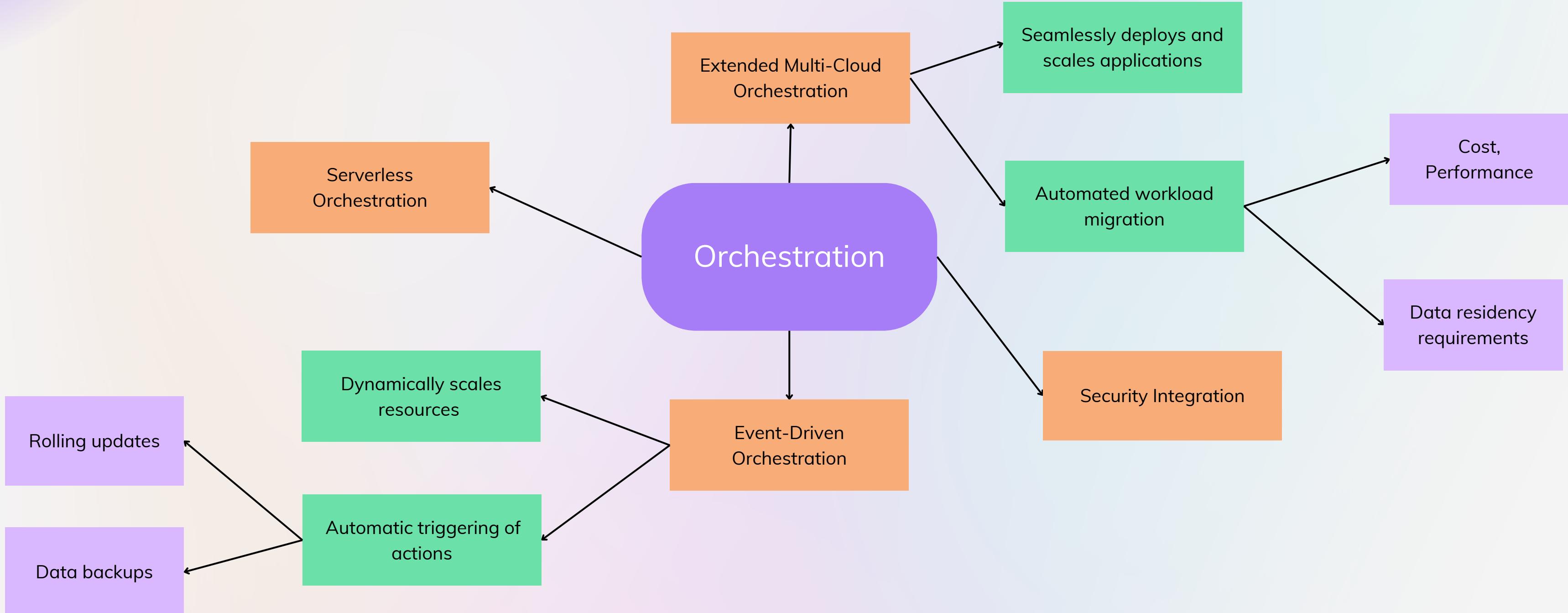


V/S



Docker Swarm	Kubernetes
<ul style="list-style-type: none">• Suitable for smaller projects.• Use for small to medium-sized clusters.• Simplified networking model.• Tied to Docker ecosystem.	<ul style="list-style-type: none">• Rich for complex deployments.• Excels in large, complex setups, scaling seamlessly to thousands of nodes• Advanced networking features, better for complex setups.• Supports various container runtimes

FUTURE TRENDS AND INNOVATIONS IN ORCHESTRATION



Thankyou

Community | Knowledge | Share

Ops Unleashed



Microphone icon **Pranay Bhangre**

Microphone icon **Vikas Gouda**

Microphone icon **Tushar Rathod**

Microphone icon **Aradhyा Pitlawar**

