EMERGING TRENDS IN SOFTWARE ENGINEERING

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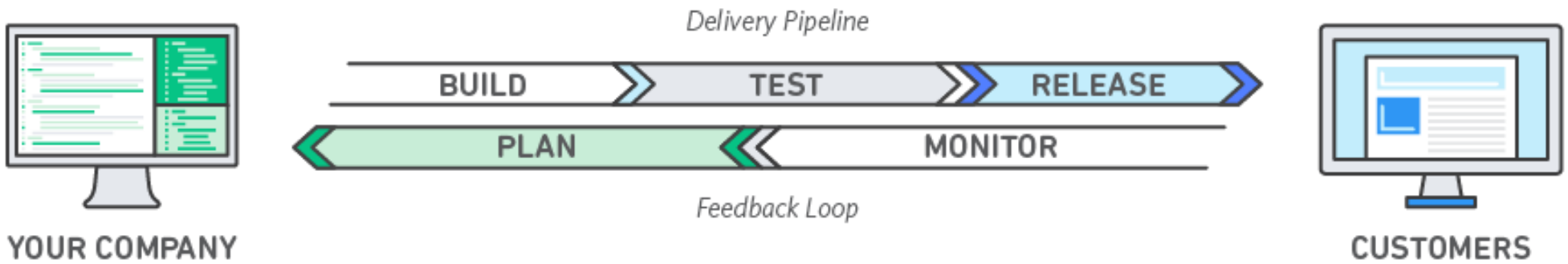
What is DevOps?

- DevOps is a combination of cultural philosophies, methods and tools that increase the ability to deliver applications and services at high speed, enabling organizations to develop and improve products faster than organizations using traditional software development and infrastructure management processes. This speed allows organizations to better serve their customers and compete more effectively in the marketplace.


Delivery Pipeline
BUILD
TEST
RELEASE
PLAN
MONITOR
Feedback Loop
YOUR COMPANY
CUSTOMERS

How DevOps Works

- In a DevOps model, development and operations teams are no longer disconnected. Sometimes these two teams are combined into one, and engineers on the team acquire a set of skills that are not restricted to a single function as they work across the entire lifecycle of an application, from development and testing to deployment and operations.
- In some DevOps models, quality assurance and security teams are also more closely integrated with the development and operations team throughout the application lifecycle. If everyone on a DevOps team focuses on security, this is sometimes called DevSecOps.

How DevOps Works

- These teams use applications that automate processes that were previously performed manually and took a long time. They use a technology stack and tools that help them run and develop applications quickly and reliably. These tools also help engineers independently perform tasks that would normally require help from other teams (such as deploying code or provisioning infrastructure), further increasing the speed of the teams.

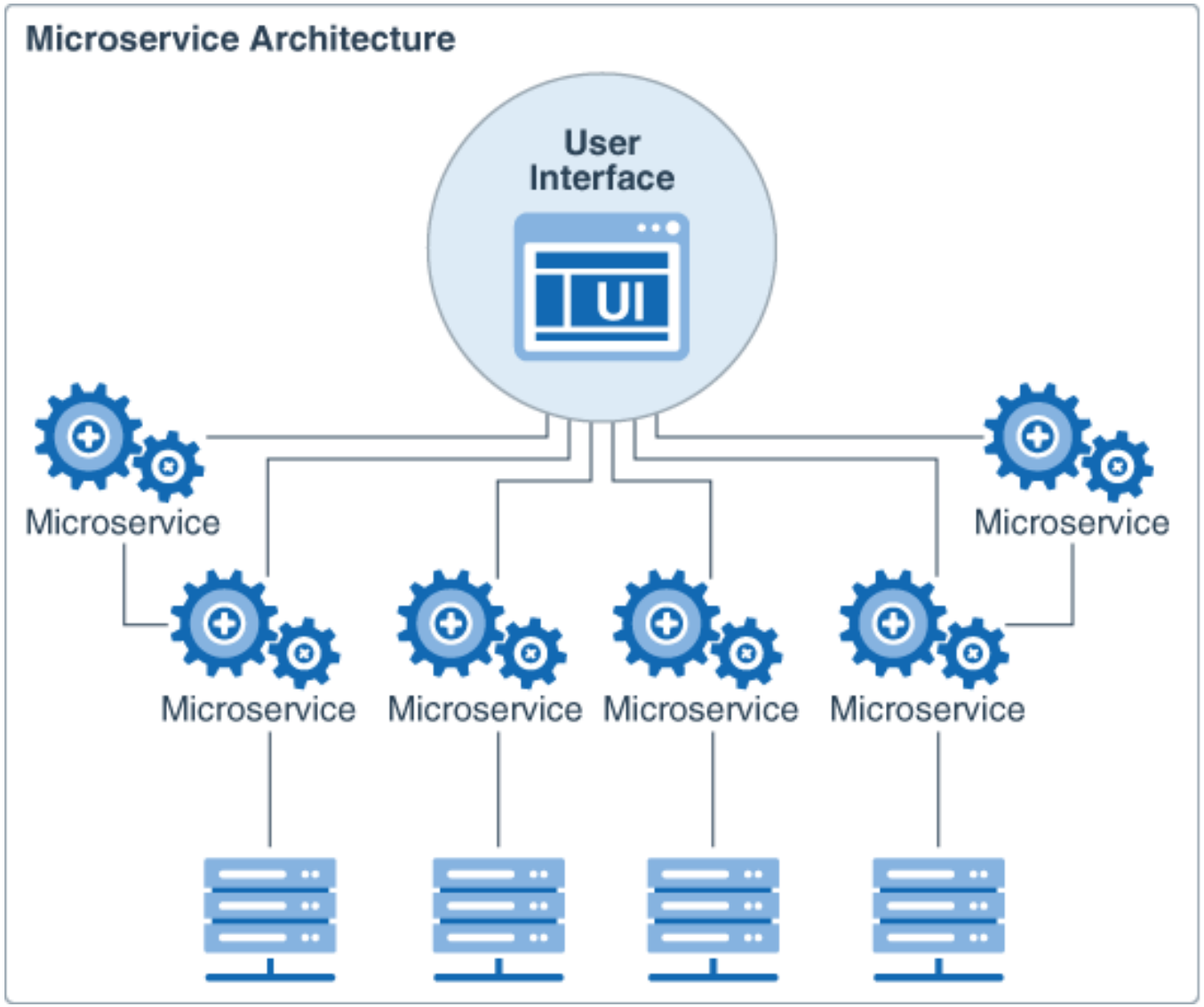
Advantages of DevOps

- Speed
- Fast Delivery
- Reliability
- Scale
- Enhanced Cooperation
- Security

What is Microservice?

- As the name suggests, microservices are basically independent software services that provide a specific feature or function in a software application and serve a single purpose. These services should be independently maintainable, monitorable and deployable.

- Microservices are modular projects that have a single responsibility and do a single job, and only carry out the work related to that job.

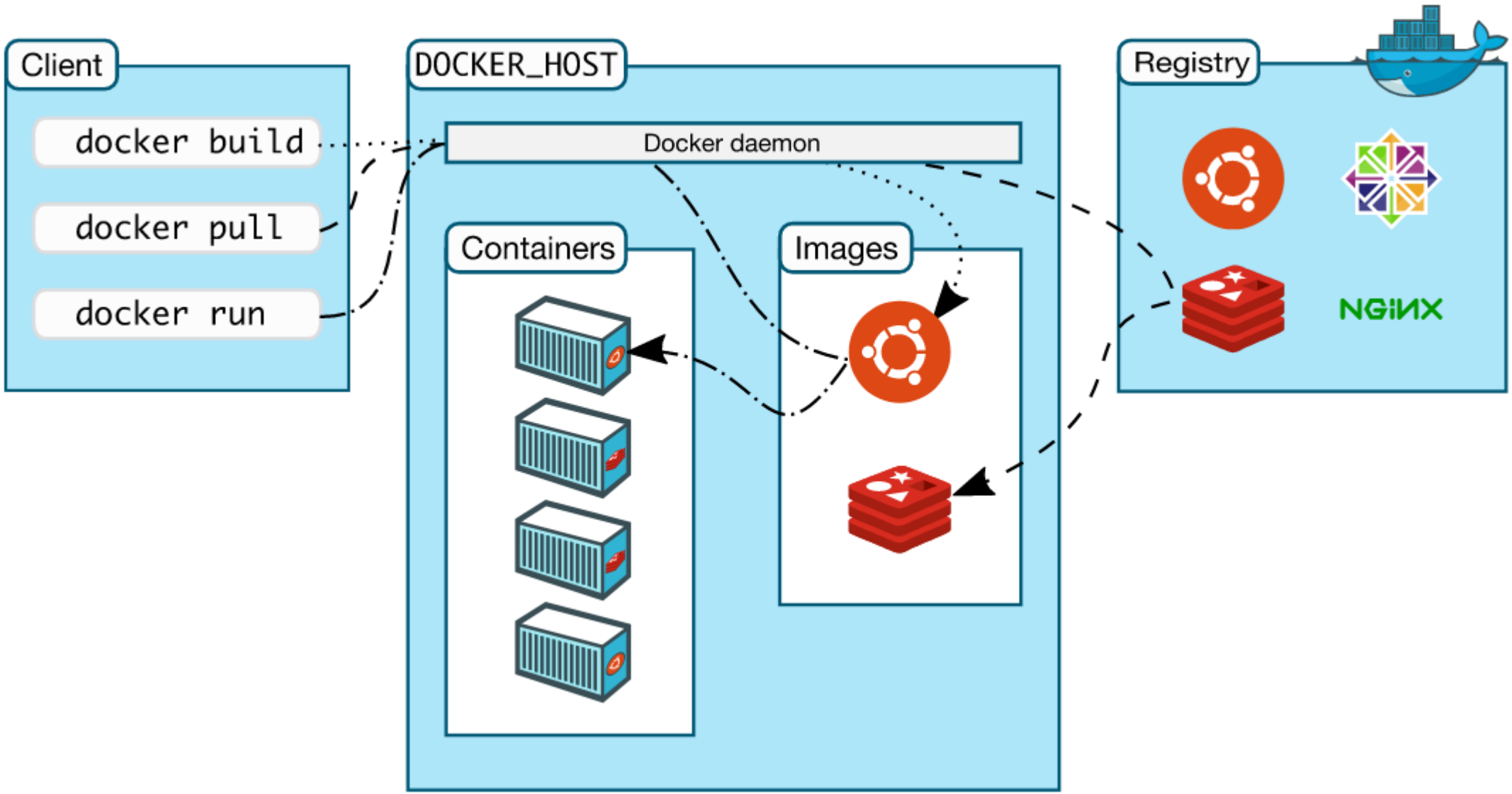

Microservice Architecture
User Interface
UI
Microservice
Microservice
Microservice
Microservice
Microservice
Microservice

Microservice Architecture Features

- Scalability
- Resilience
- Flexibility
- Security
- Speed
- Smaller Teams

What is Docker?

- Docker is an open source container platform for developing, deploying and managing applications in lightweight virtualized environments called containers.
- It is mainly used as a software development platform to develop distributed applications that run efficiently in different environments. Developers don't have to worry about compatibility issues as it frees the software system from obscurity. Packaging applications into isolated environments (containers) also makes them easier to develop, deploy, maintain and use.


Client
docker build
docker pull
docker run
DOCKER_HOST
Docker daemon
Containers
Images
Registry
NGINX

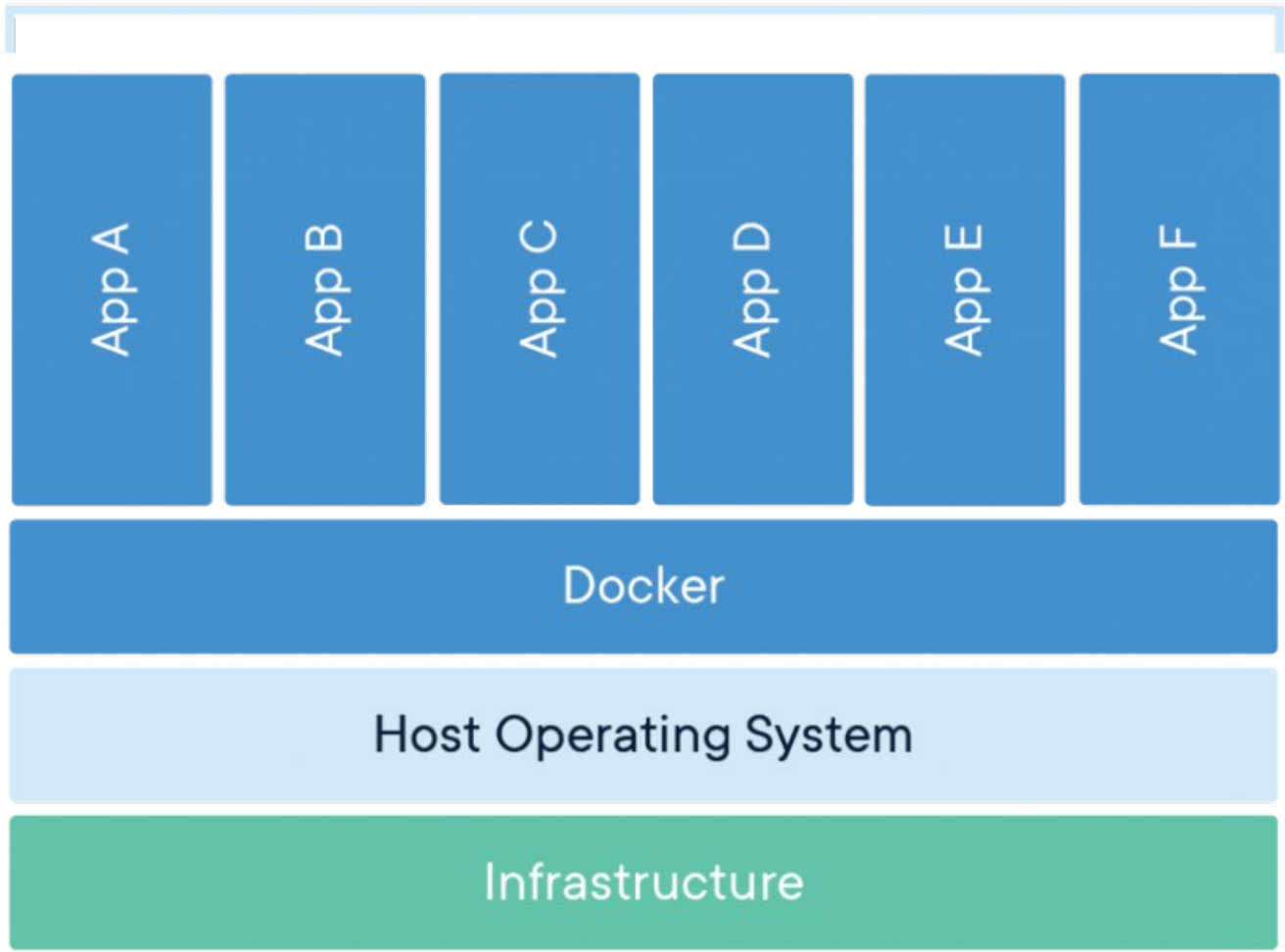
What are the Advantages of Docker?

- Consistency
- Automation
- Faster Deployments
- CI/CD Support
- Rollbacks and Image Version Control
- Modularity
- Resource and Cost Effectiveness

What is DocContainer Technology?

- Docker containers are lightweight virtualized runtime environments for running applications. Each container represents a software package containing the code, system tools, runtime, libraries, dependencies and configuration files needed to run a specific application. It is independent and isolated from the host and other instances running on the host.
- Containers are based on Docker images. You can create a container by running an image in Docker Engine. Since these are the most common Docker terms, you need to make sure you understand the difference between Docker images and Docker containers.

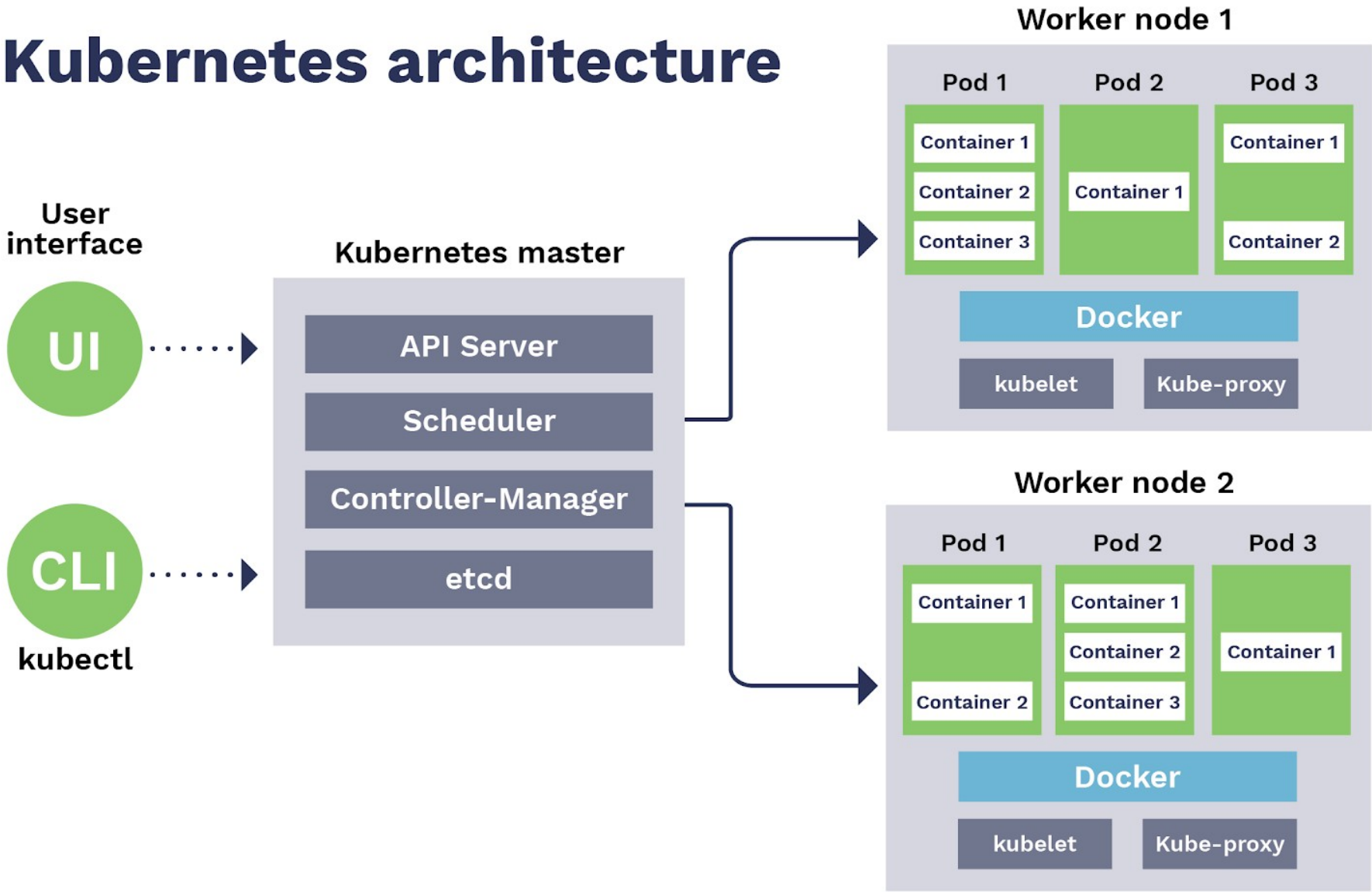
Containerized Applications



What is Kubernetes?

- Kubernetes is a powerful container management tool that groups containers supporting microservices or single applications into a pod. It is an open source toolkit that is typically used to create a fault-tolerant, scalable platform built to automate and manage containerized applications.
- Instead of running containerized applications on a single server, Kubernetes publishes them to a group of machines. Applications running on Kubernetes behave as a single unit, although they may simply contain a paired container arrangement.

Kubernetes architecture

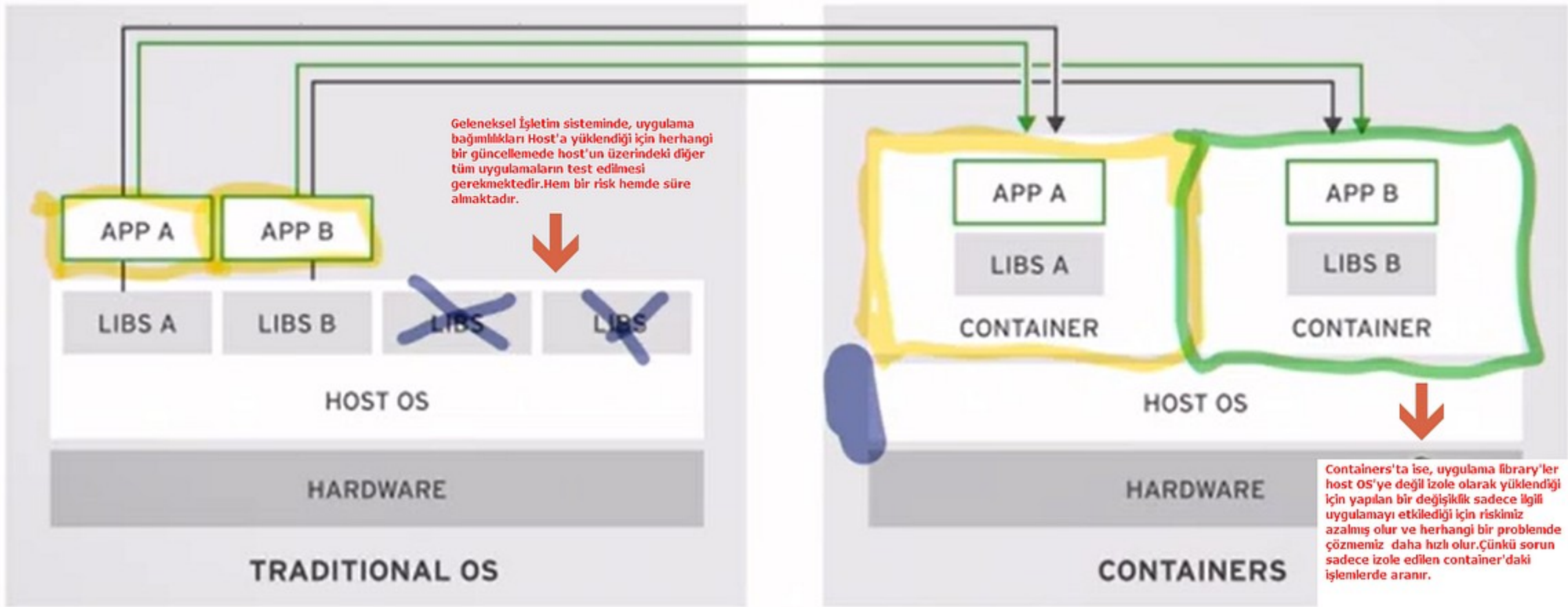


What are the Advantages of Kubernetes?

- It is the largest open source project globally.
- The container is a specialized tool for monitoring health.
- Provides auto-scaling feature support.
- It provides great community support.
- Offers great container distribution.
- Provides effective permanent storage.
- Offers multi-cloud support (Hybrid Cloud).
- Provides calculation resource management.

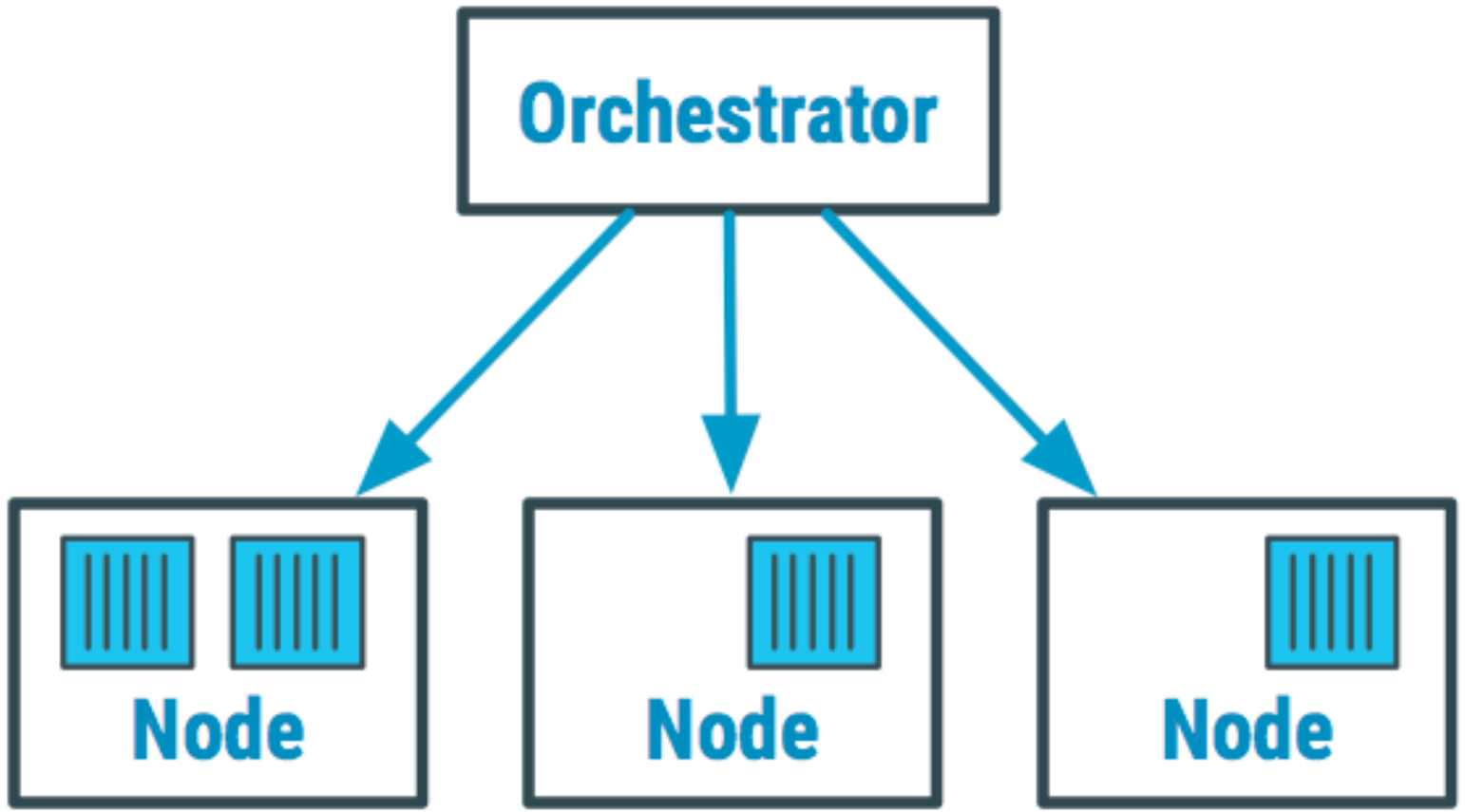
Traditional Operating System & Containers

- In the traditional operating system, application dependencies are installed on the "HOST OS", so any update requires testing all applications on the "HOST OS", which is both a risk and time-consuming to solve if there is a problem.
- In Containers, since the application libraries/dependencies are loaded in isolation to the container and not to the "HOST OS", the risk is reduced because a change only affects the related application and it is faster to solve the problem in case of any problem because the problem is searched only in isolated containers.


APP A
APP B
LIBS A
LIBS B
LIBS
LIBS
HOST OS
HARDWARE
TRADITIONAL OS
Geleneksel İşletim sisteminde, uygulama bağımlılıkları Host'a yüklendiği için herhangi bir güncellemede host'un üzerindeki diğer tüm uygulamaların test edilmesi gerekmektedir.Hem bir risk hemde süre almaktadır.
APP A
LIBS A
CONTAINER
APP B
LIBS B
CONTAINER
HOST OS
HARDWARE
CONTAINERS
Containers'ta ise, uygulama fibrary'ler host OS'ye değil izole olarak yüklendiği için yapılan bir değişiklik sadece ilgili uygulamayı etkilediği için riskimiz azalmış olur ve herhangi bir problemde çözmemiz daha hızlı olur.Çünkü sorun sadece izole edilen container'daki işlemlerde aranır.

Container Orchestration

- It ensures that all servers in the cluster work in a highly accessible structure. When there is a problem on a node where any containers are running, it continues to work without interruption.
- It gives the opportunity to see and manage the infrastructure as a whole. When more than 10 containers are installed on nodes, operations such as resource status, management, scale up/out will be an operational burden.
- Cluster management, resource limitation management, network management, scale out/up operations.


Orchestrator
Node
Node
Node

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