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CERTIFIED
kubernetes
APPLICATION
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# Docker & Kubernetes

First Steps

# Brief History

Why are Containers a thing in the first place?

# Rise of the modern Data Center

The 90's Server Room

- Multiple failure points
- Nonuniform, commodity hardware
- High-touch, manual operations
- If it breaks, fix it

Modern Data Center

- Redundancy everywhere
- Uniform, sometimes custom hardware and silicon
- Automated operations
- If it breaks, swap it out for a new one

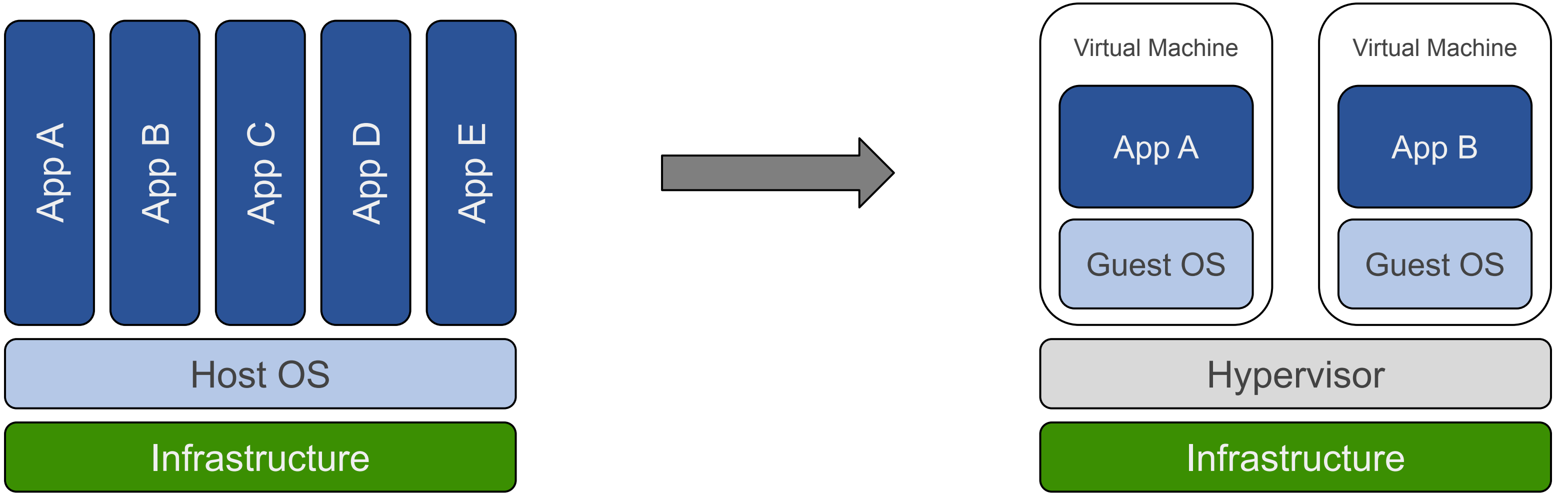
https://www.youtube.com/watch?v=XZmGGAbHqa0
https://discoposse.com/2018/03/20/23-things-only-90s-sysadmins-will-remember/

# When everything starts looking the same ...

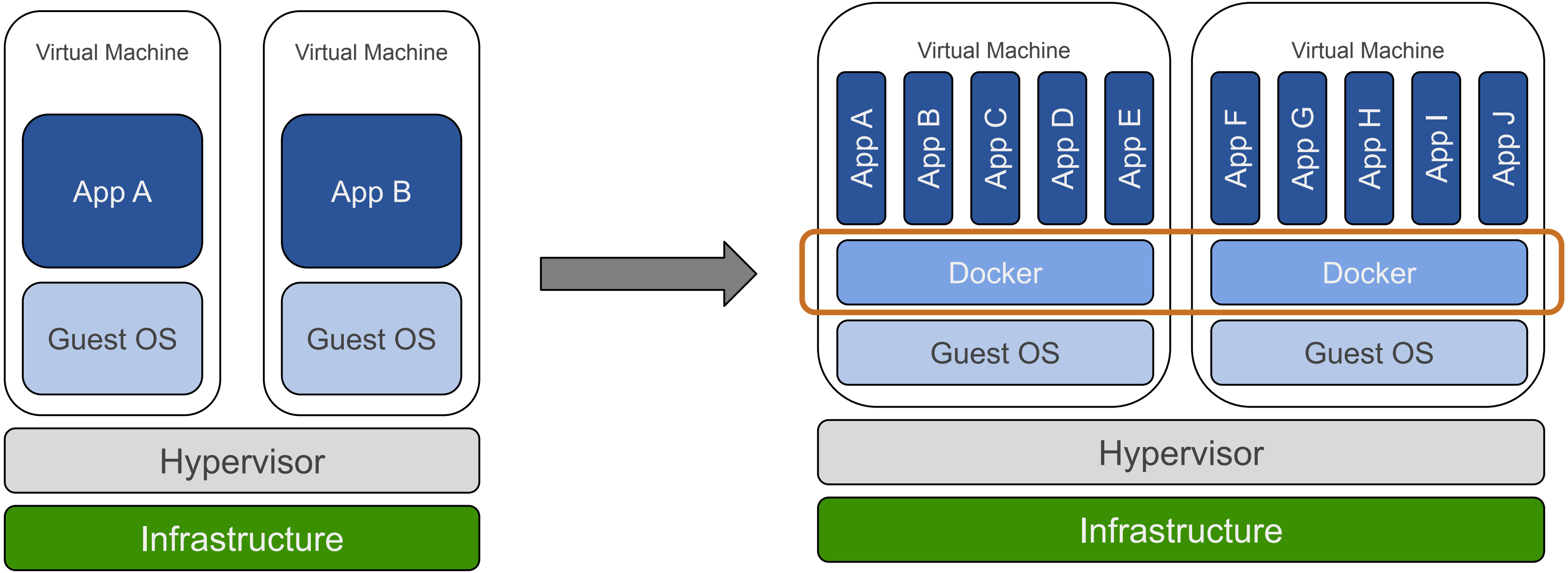
- Hardware interfaces become standardized
  - Compute (CPU / Memory)
  - Storage
  - Network
- Standard interfaces allow for
  - Hot-swappable hardware
  - Abstractions (Virtual Machines)
  - Programmability

https://www.youtube.com/watch?v=XZmGGAbHqa0

# Virtual Machine abstraction



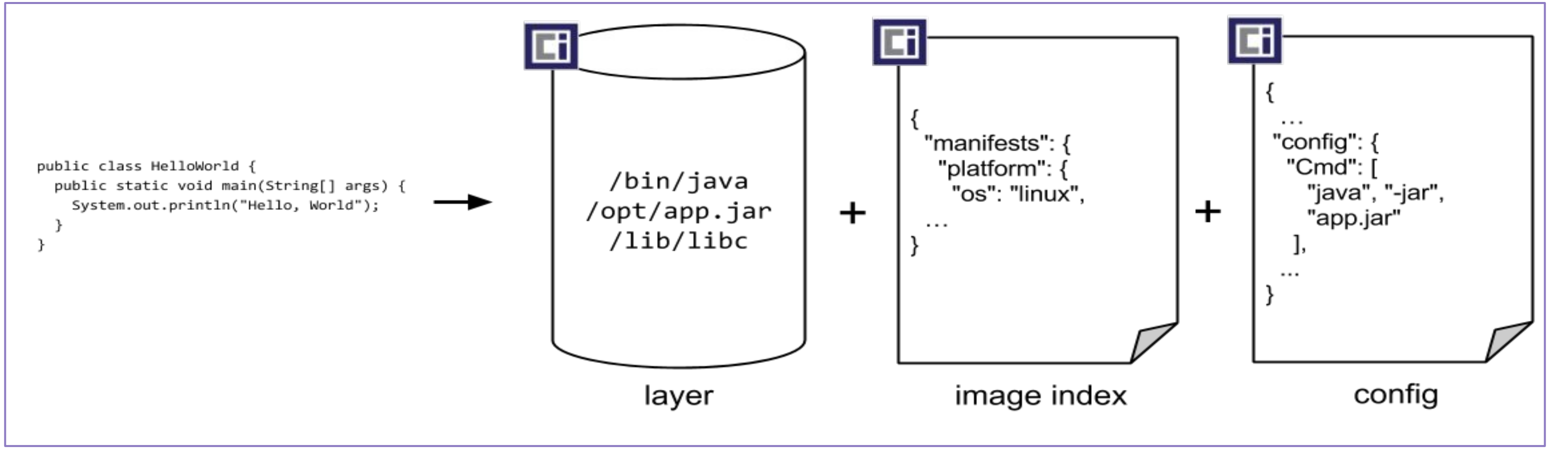
# Container abstraction



# What is Docker?

**Side Note:** Today it is better to ask … What is the Open Container Initiative?

- Image Format Specification - how to specify the manifest, filesystem layers, and configuration of an image
- Image Distribution Specification - how to distribute images
- Container Runtime Specification - how to execute a container on a specific Host OS



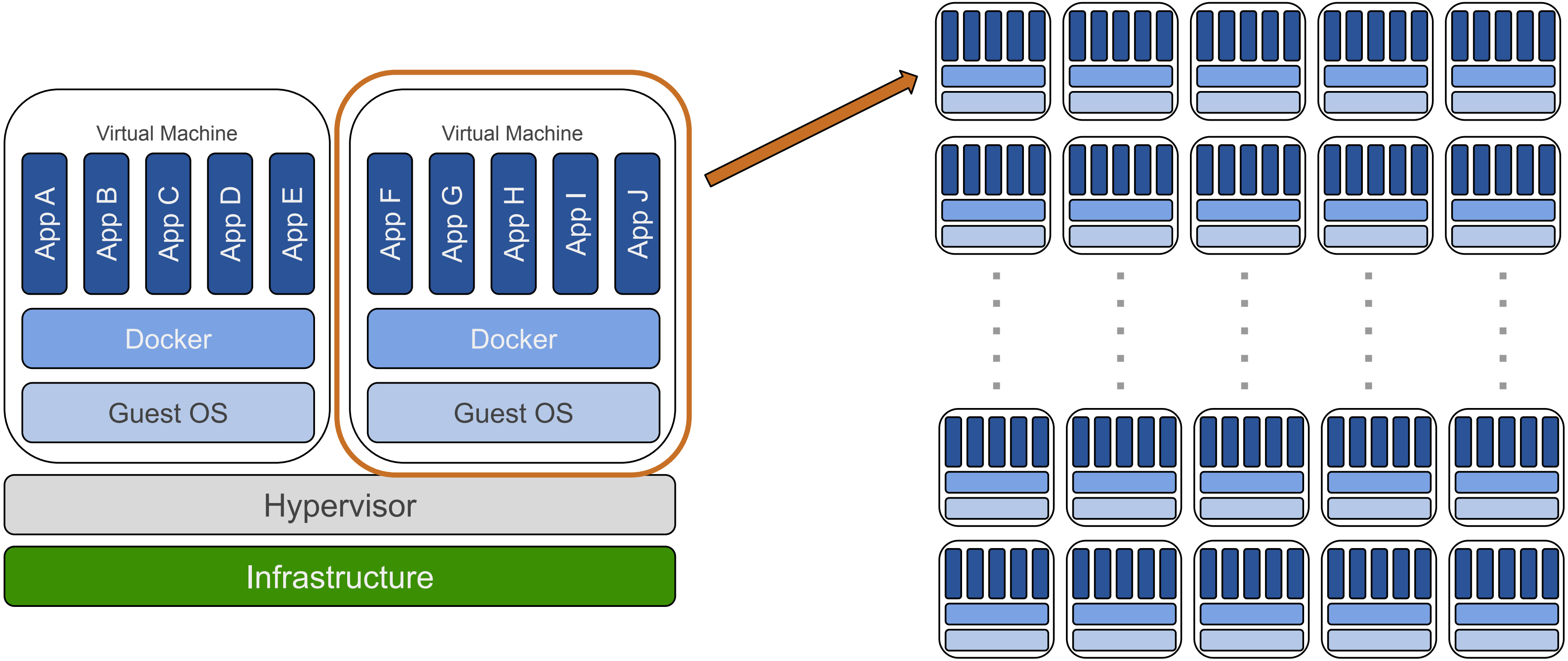
```
public class HelloWorld {
  public static void main(String[] args) {
    System.out.println("Hello, World");
  }
}
```

```
{
  "manifests": {
    "platform": {
      "os": "linux",
  ...
}
```

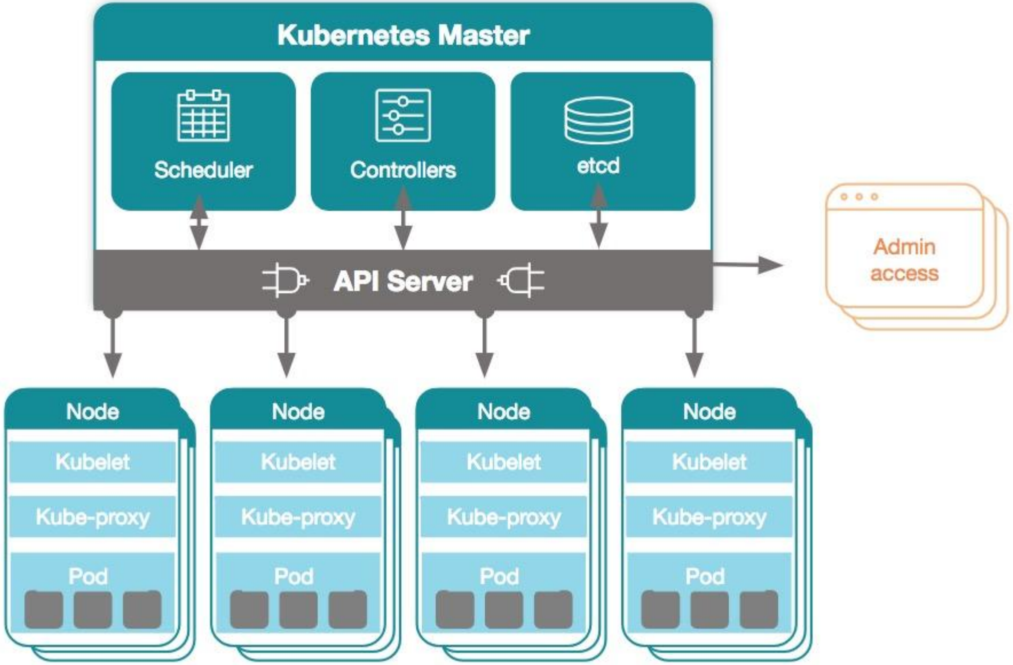
```
{
  ...
  "config": {
    "Cmd": [
       "java", "-jar",
       "app.jar"
    ],
  ...
}
```

# Why Kubernetes?

# Kubernetes - what is it solving?



# Kubernetes Architecture



*Take what runs well locally on a single machine with "docker run …" and do the same reliably and securely across a distributed cluster of potentially hundreds of machines*

**“Container Scheduling & Orchestration”**

Resource Utilization
Configuration
Volume Management
Health Checks
Networking

and so much more ...

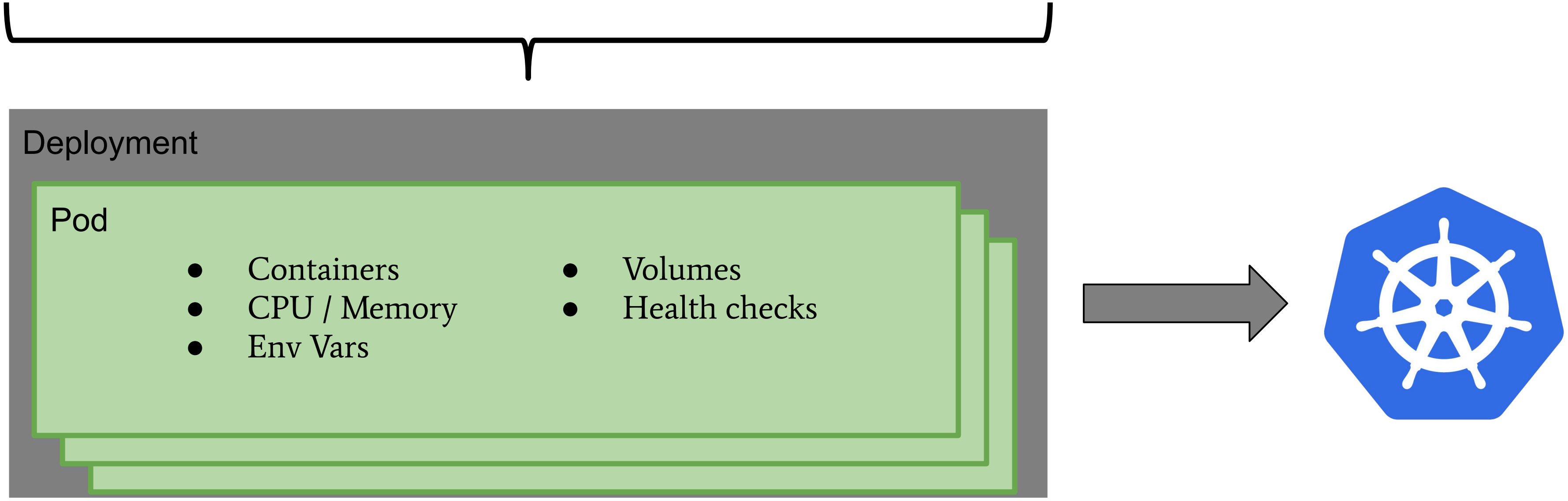
https://blog.newrelic.com/engineering/what-is-kubernetes/

# Kubernetes Deployments

# Kubernetes Deployments

*Take what runs well locally on a single machine with "docker run …" and do the same reliably and securely across a distributed cluster of potentially hundreds of machines*

```
docker run \
  --name my-app \
  --env DATABASE=jdbc:postgresql://localhost/test \
  --volume $(pwd)/conf:/usr/local/etc
  my-app:1.0.0
```



Deployment

Pod

- Containers
- CPU / Memory
- Env Vars
- Volumes
- Health checks