Demystifying Containers

About Me

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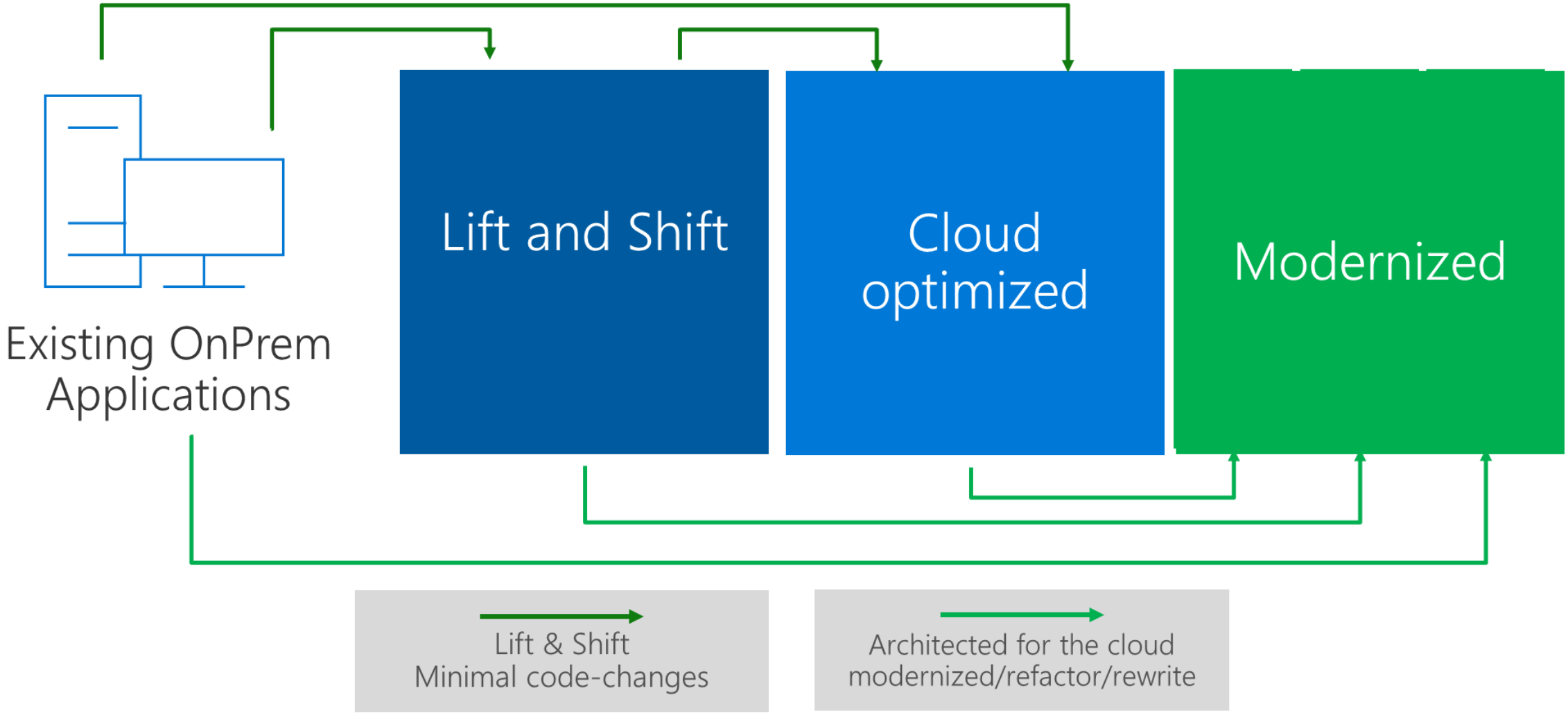
Agenda

1. Containers Overview
2. Container Orchestration
3. Containers on Azure

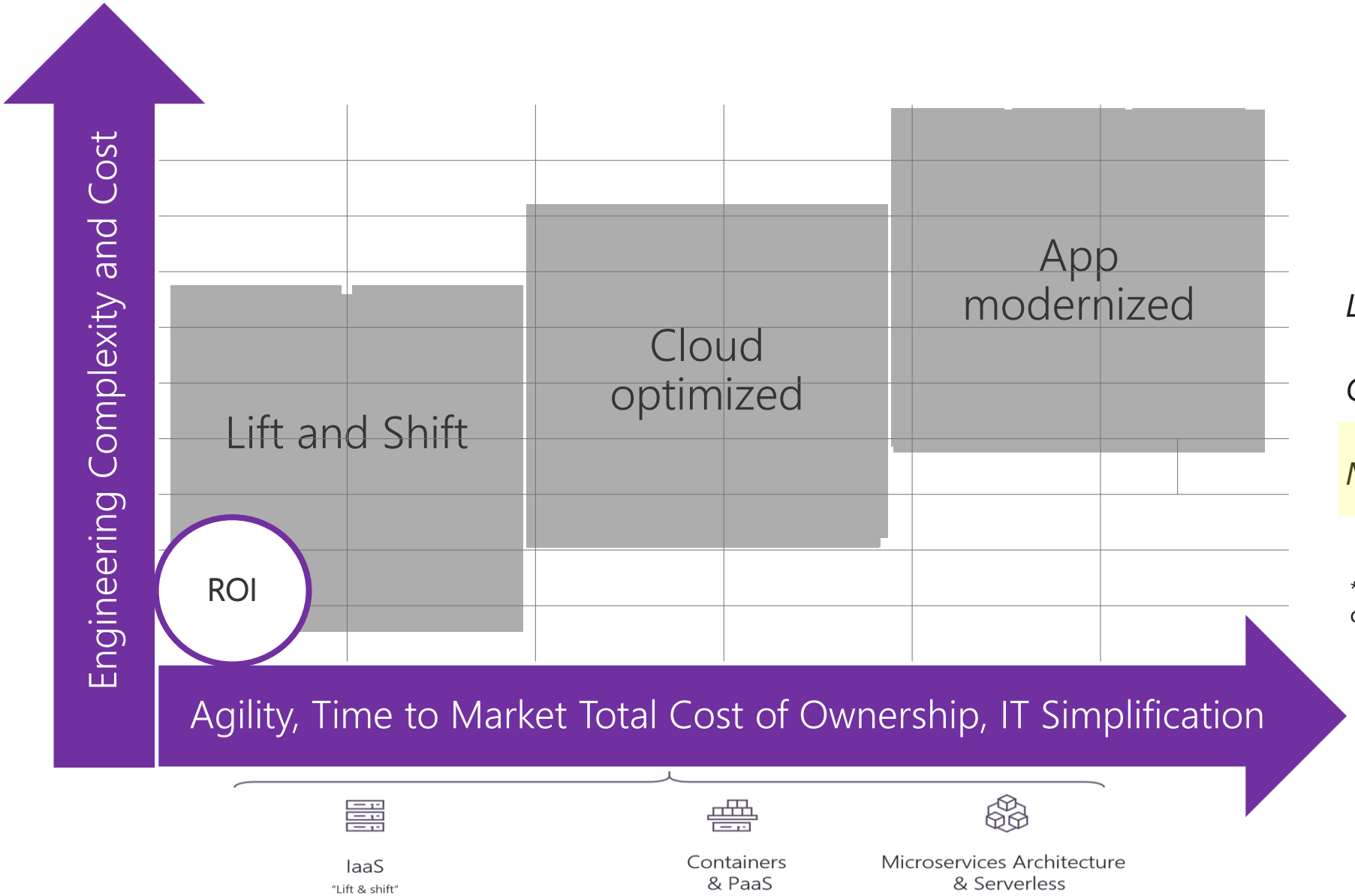
Overview

Gartner predicts that by 2022, more than 75% of global organizations will be running containerized applications in production.

Cloud Maturity Model



Cloud Maturity Model - Benefits



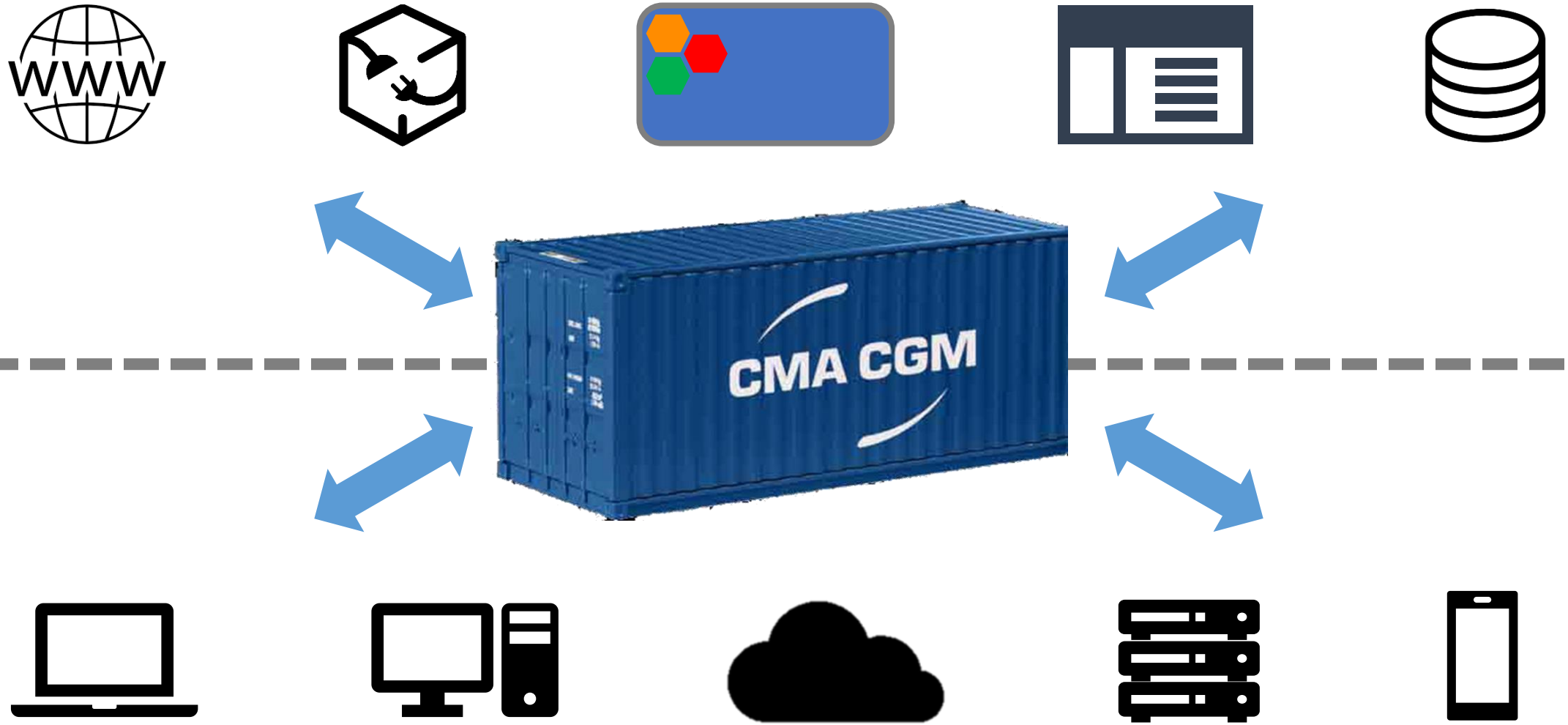
	YEARLY SAVINGS*
Lift and Shift	***30%***
Cloud Optimized	***68%***
Mixed (50/50)	***56%***

* Actual saving may vary depending on applications, complexity and other factors

Container?

What is a **Container?**

What is a **Container?**



Consistent Environment

Run Anywhere

Isolation

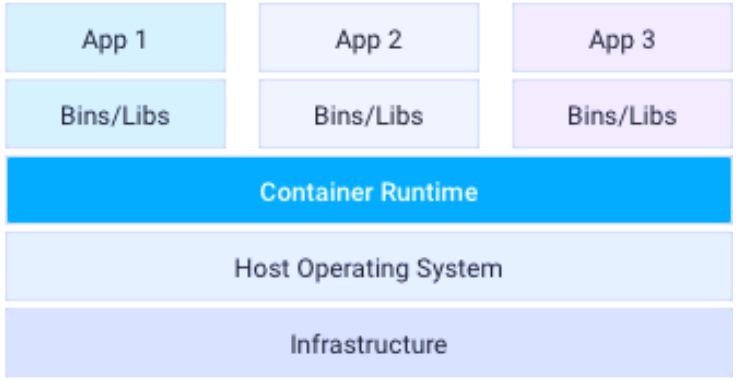
Containers vs Virtual Machines?

Containers

Shared host OS kernel

Portability

Faster scalability

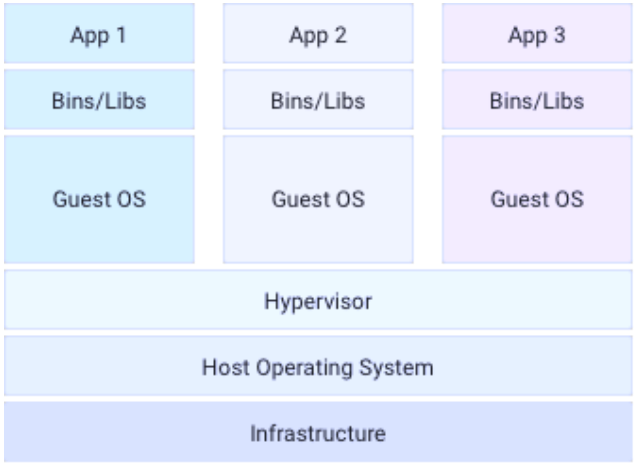


Virtual machines

Separate OS per instance

Large footprint

Slower startup



See: Containers vs. virtual machines | Microsoft Docs

Three things about Container

1.Runtime Isolation

Namespaces

- Mount
- Network

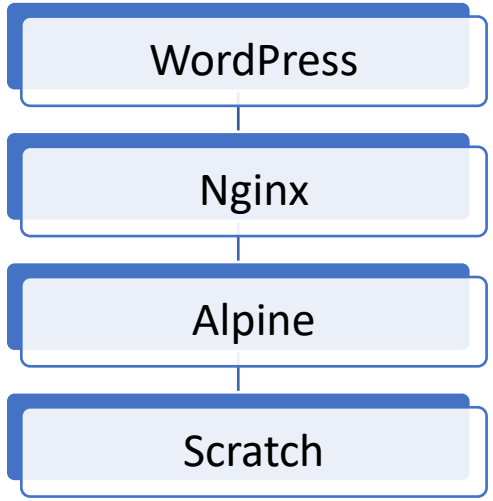
Cgroups

- Memory
- CPU

2.Image

Layer Capability

- Union Filesystem



3.Container Engines

containerd

Definition Image - **Dockerfile**

```
FROM        mcr.microsoft.com/dotnet/aspnet:5.0

WORKDIR     /app

COPY        Contoso/publish .

EXPOSE      80

ENTRYPOINT  ["dotnet", “Contoso.dll"]
```

See: Dockerfile reference | Docker Documentation

Docker

Commands

Build

Build an image from the Dockerfile in the current directory and tag the image

```
docker build -t myimage:1.0 .
```

List all images that are locally stored with the Docker Engine

```
docker image ls
```

Delete an image from the local image store

```
docker image rm alpine:3.4
```

Share

Pull an image from a registry

```
docker pull myimage:1.0
```

Retag a local image with a new image name and tag

```
docker tag myimage:1.0 myrepo/myimage:2.0
```

Push an image to a registry

```
docker push myrepo/myimage:2.0
```

Run

Run a container from the Alpine version 3.9 image, name the running container "web" and expose port 5000 externally, mapped to port 80 inside the container.

```
docker container run --name web -p 5000:80 alpine:3.9
```

Stop a running container through SIGTERM

```
docker container stop web
```

Stop a running container through SIGKILL

```
docker container kill web
```

List the networks

```
docker network ls
```

List the running containers (add `--all` to include stopped containers)

```
docker container ls
```

Delete all running and stopped containers

```
docker container rm -f $(docker ps -aq)
```

Print the last 100 lines of a container's logs

```
docker container logs --tail 100 web
```

See: Docker Cheat Sheet

Docker Demo

Run Commands

Run latest version of nginx in detached mode, name the running container “web” and expose port 8080 externally, mapped to port 80 inside the container.

```
$ docker run --name web -d -p 8080:80 nginx:latest
```

Stop a running container (SIGTERM or use **kill** to terminate immediately SIGKILL)

```
$ docker stop web
```

List the running containers including stopped ones (or docker ps --all)

```
$ docker ls --all
```

Delete containers

```
$ docker rm -f web
```

Lab: aka.ms/Docker-101

Container Registry

Repositories of built container

Public

- hub.docker.com
- …

Private

- **Azure Container Registry (Azure ACR)**
- Amazon Elastic Container Registry (Amazon ECR)
- Google Container Registry
- Docker
- …

Container Registry Demo

Docker Hub & ACR

1. Create new dotnet MVC App (in folder demo)

```
$ dotnet new mvc
```

2. Add Docker File

```
Dockerfile
```

3. Build

```
$ docker build -t kunalbabre/demo:latest .
```

4. Run

```
$ docker run --name web -d -p 8080:80 kunalbabre/demo:latest
```

5. Publish (make sure you have repo created)

```
$ docker push kunalbabre/demo:latest
```

Lab: aka.ms/Docker-101

Container Orchestrators

Container Orchestrators

- Kubernetes
- Docker Swarm
- Service Fabric
- Mesos DC/OS
- Google Borg (proprietary)
- And more…

Self-healing

Load balancing

Scheduling

Service Discovery

Security

Configuration

Monitoring

Scaling

What is **Kubernetes?**

Open-source container orchestrator. Designed to automate deployment, scaling, and management of applications.

Portable

Public, private, hybrid, multi-cloud

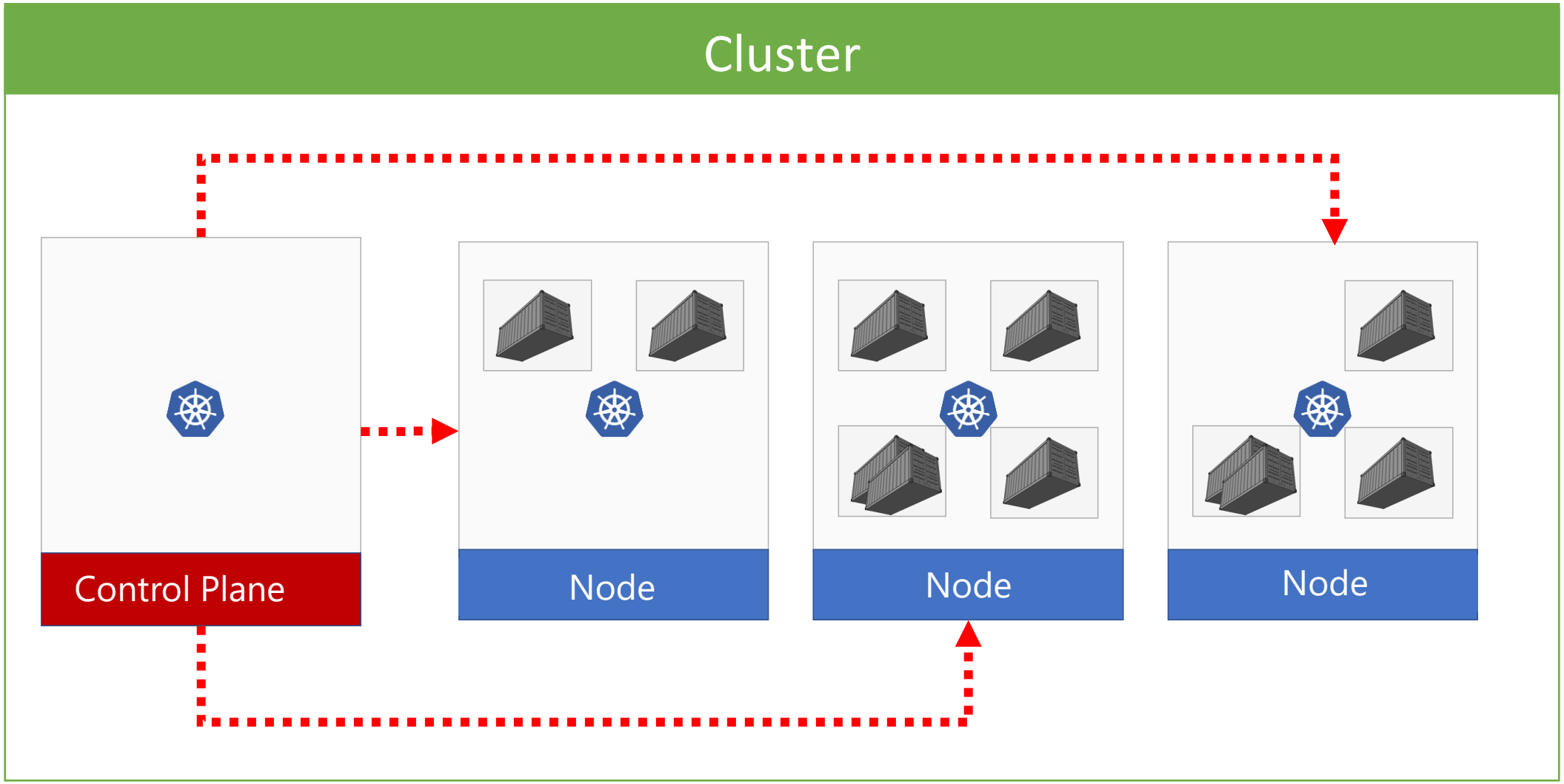
Extensible

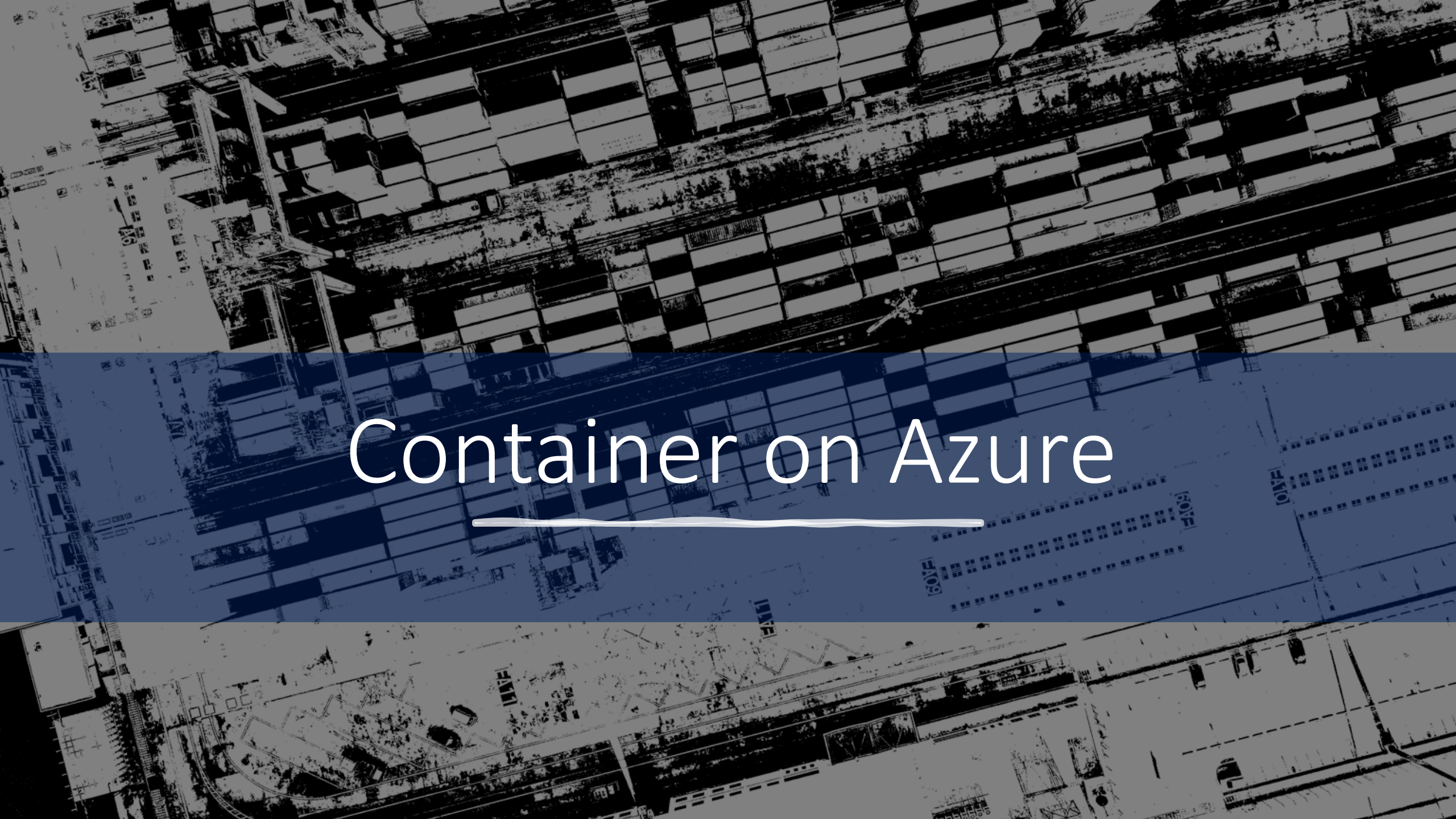
Modular, pluggable, hook able, composable

Self-healing

Auto-placement, auto-restart, auto-replication, auto-scaling

Kubernetes **Architecture**



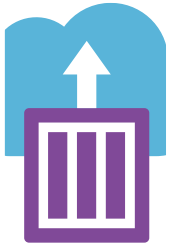


Container on Azure

Running Containers in Azure

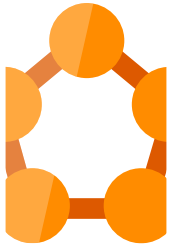
Azure Kubernetes Service (AKS)

App Service
(WebApp & Functions)



Container Instances

Batch

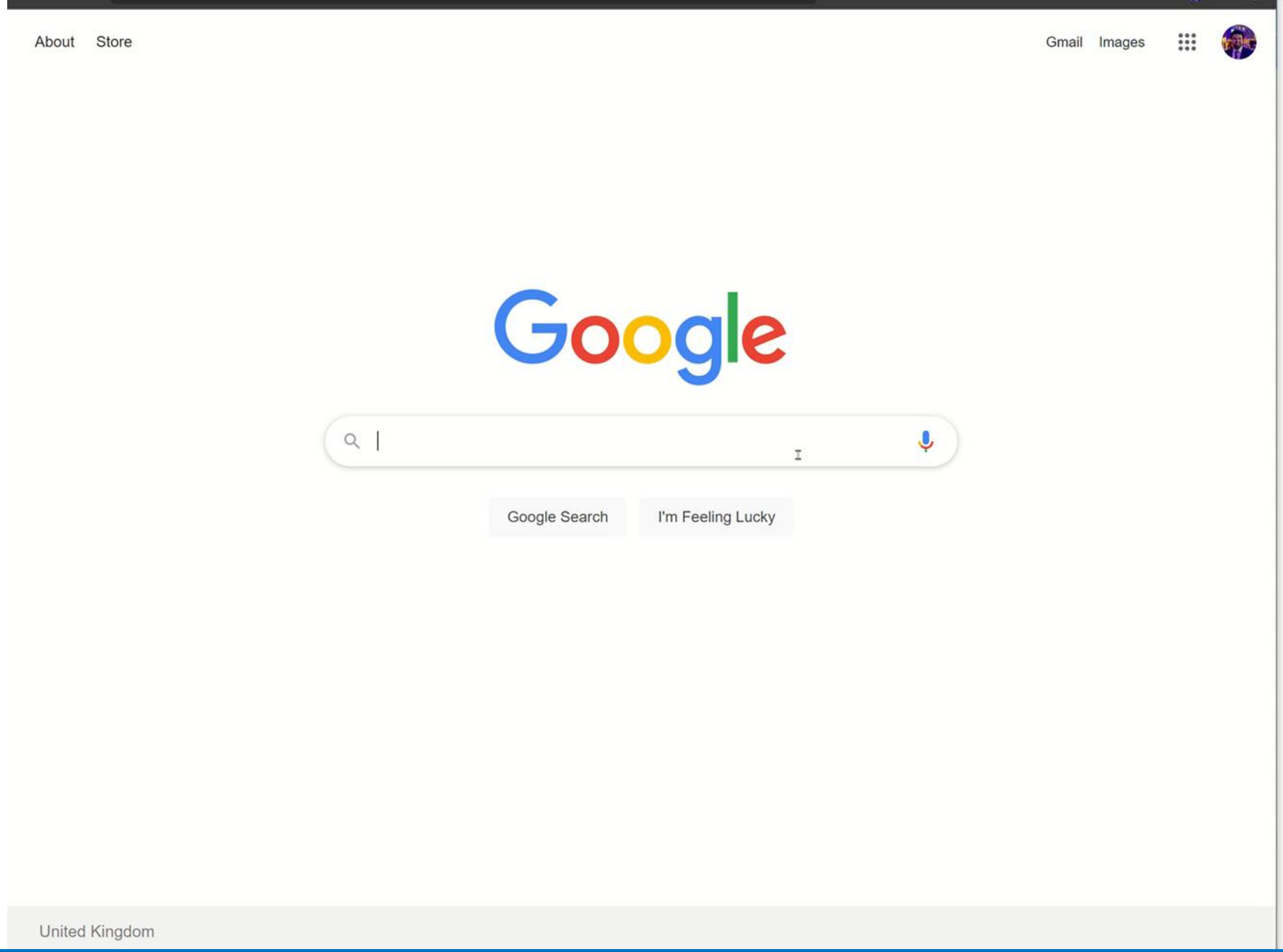


Service Fabric

Azure Red Hat OpenShift

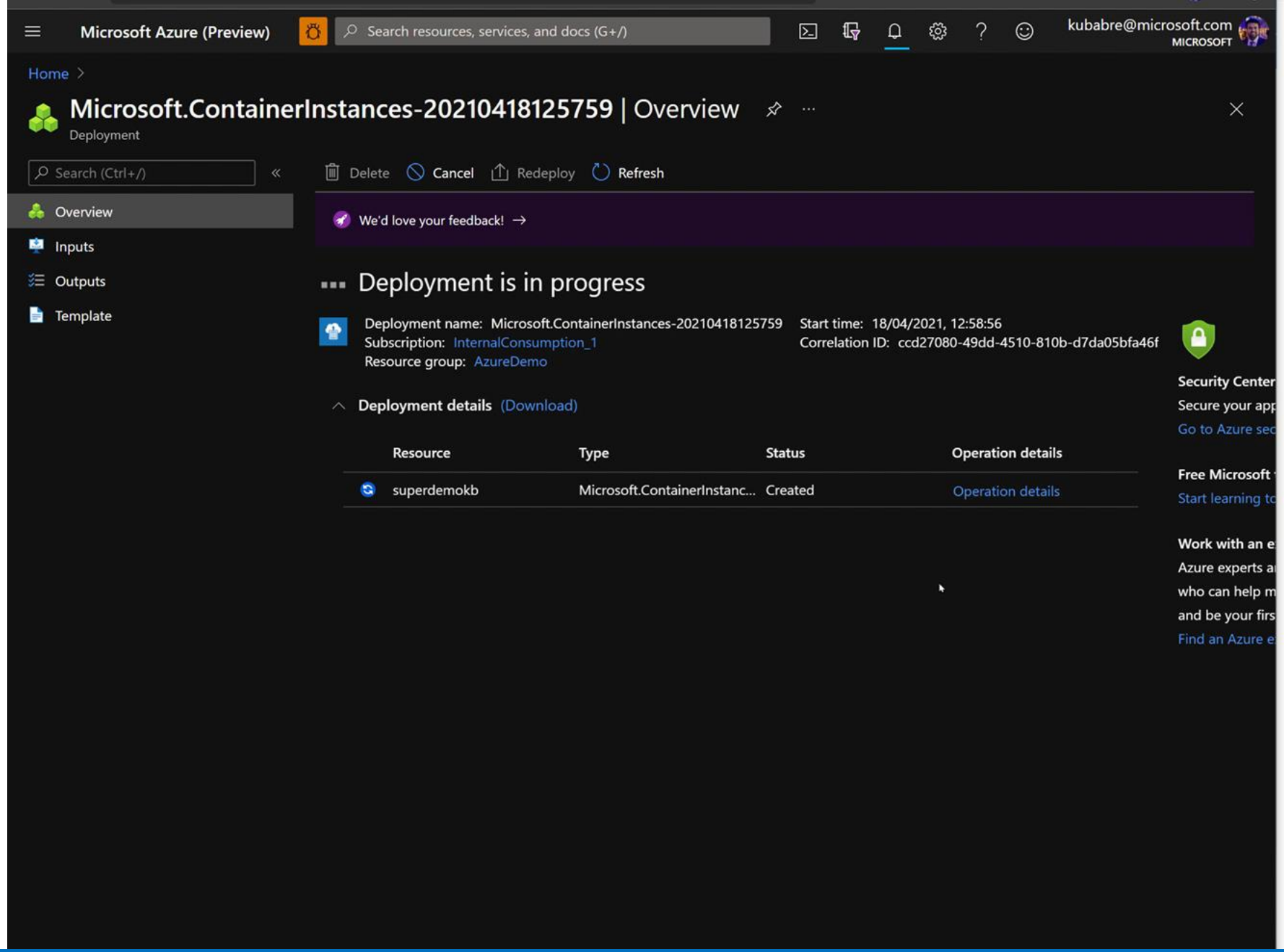
Virtual Machine

See: Azure Containers | Microsoft Azure



1. Search SuperMario Docker
2. Note Image Tag
3. Port Number
4. Deploy in ACI Azure container Instance
5. Play the game

Azure Container Instance Demo



1. Search SuperMario Docker

2. Note Image Tag pengbai/docker-supermario:latest

3. Port Number 8080

4. Deploy in ACI Azure container Instance

5. Play the game

Azure Container Instance Demo

Thank You