

Bring your ASP.NET Core solutions to Kubernetes in Azure



Marco De Sanctis

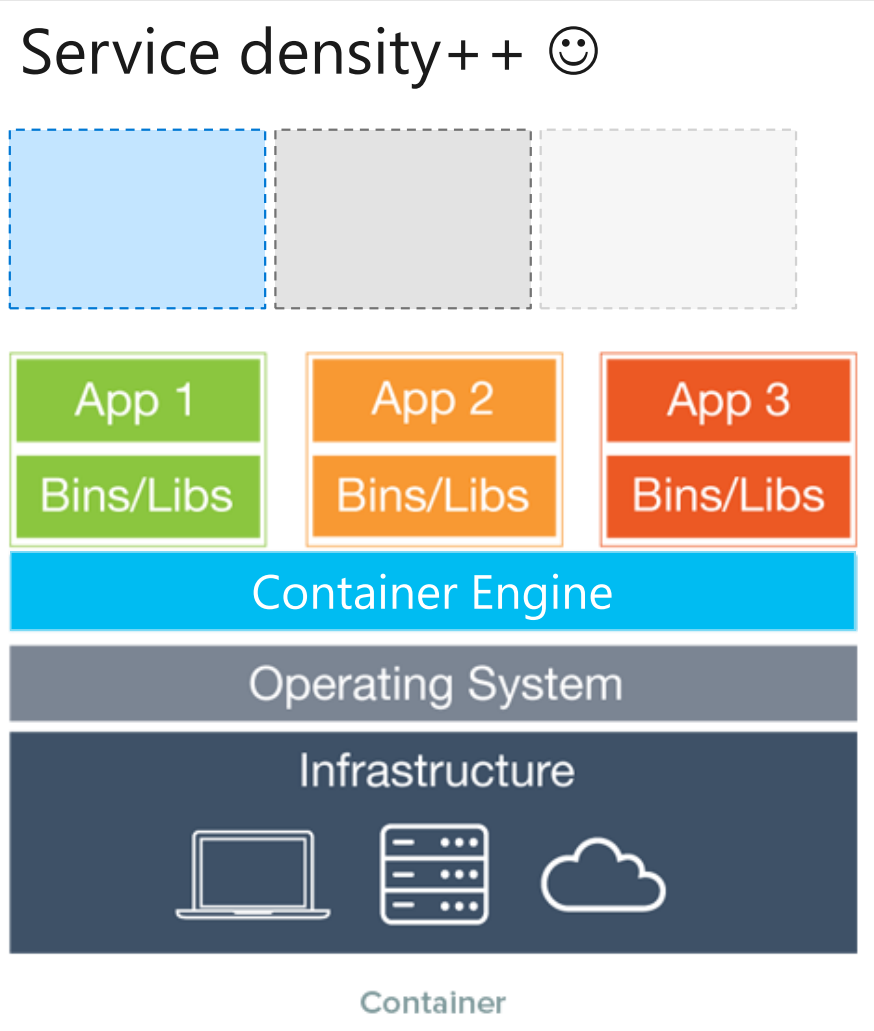
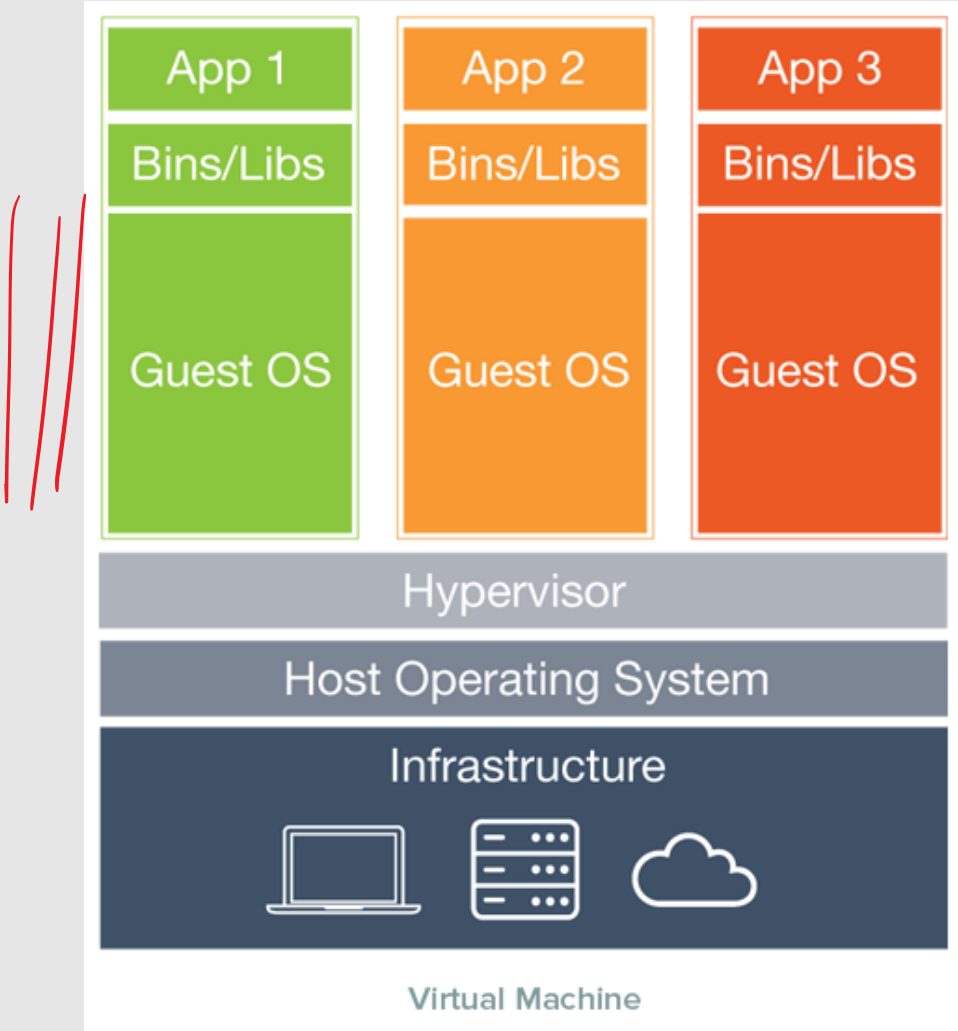
Visual Studio and Development Technologies MVP

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Agenda

- The Basics of Docker and why I should care
- Running ASP.NET Core in Docker
- Let's port a non-trivial project to Docker and AKS

How did we get here

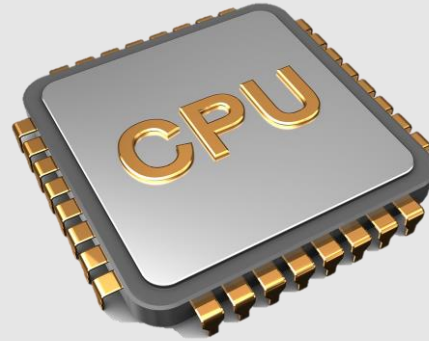


Containers == Virtualized Operating System

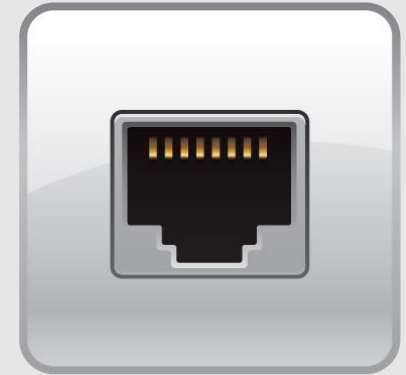
Kernel namespaces (Linux e Windows)



Virtual File System

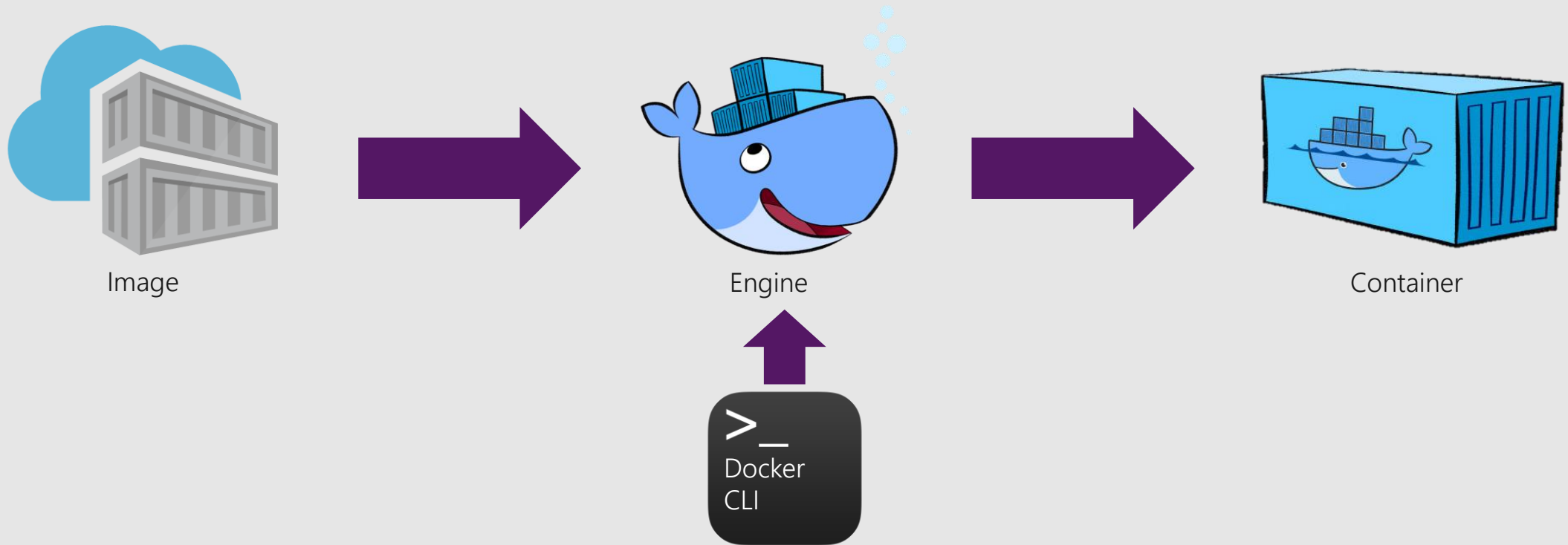


Virtual Process Tree



Virtual Network

How does a container-based flow work?



- Docker (aka Moby project) is free and open source, no limitations
- There's an enterprise edition (hosting, support, certification...)
- It's the de-facto standard for container-based applications

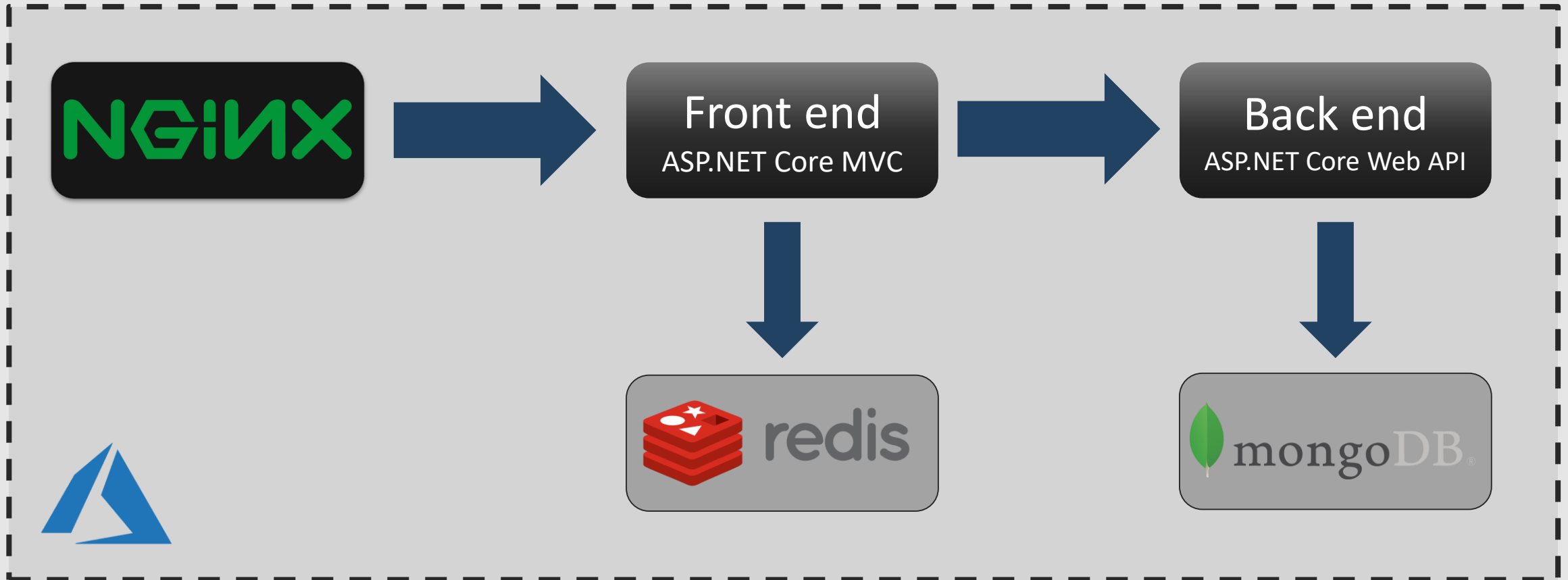
Let's get started 😊

Demo

The application for today

Frontend		
Home		
About		
Contact		
Index		
Create New		
Name	Email	
MarcoDes	marco@des.com	Edit Details Delete
© 2017 - Frontend		

The application for today



Dockerfile explained

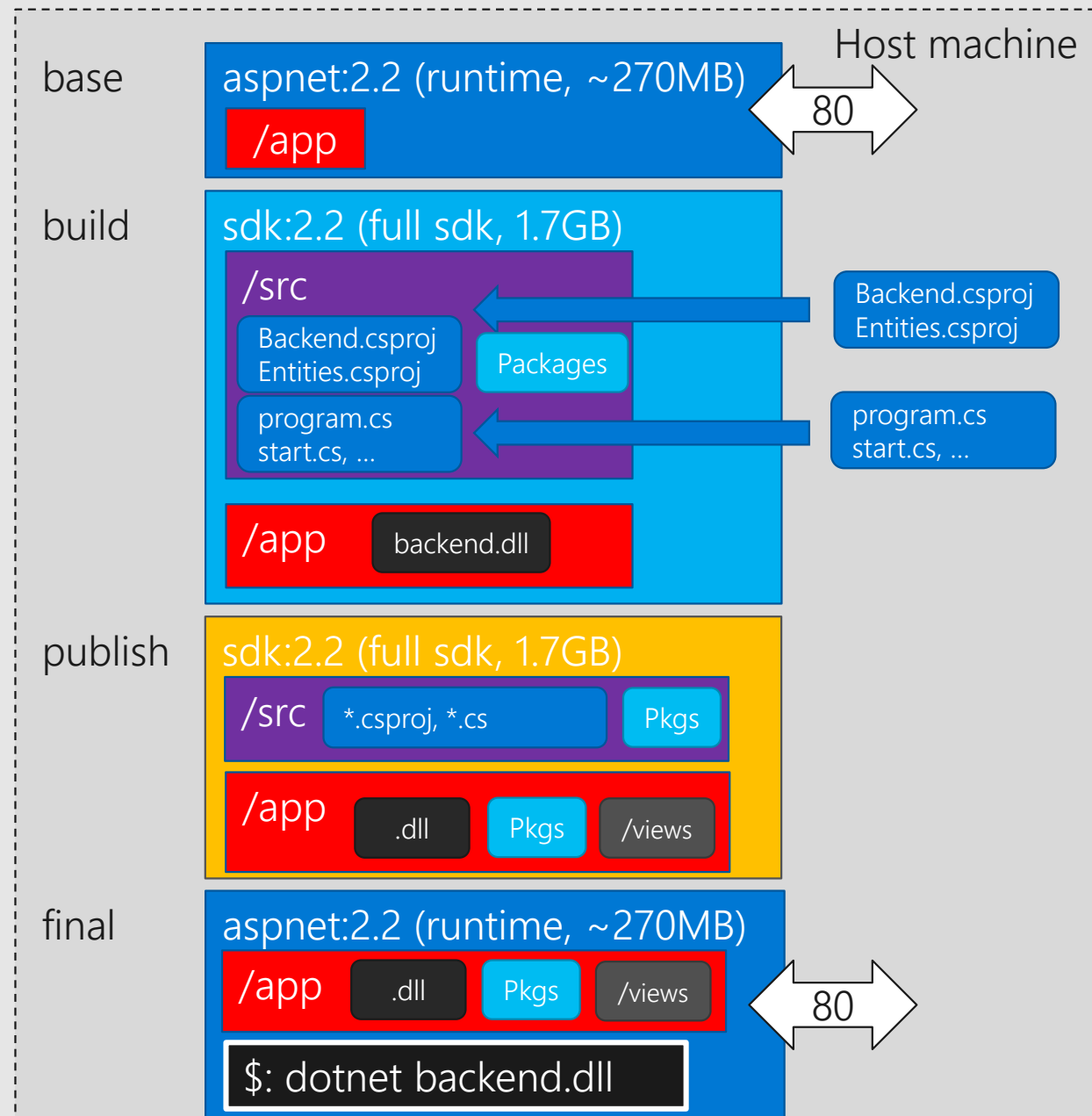
FROM mcr.microsoft.com/dotnet/core/aspnet:2.2 AS base
WORKDIR /app
EXPOSE 80

FROM mcr.microsoft.com/dotnet/core/sdk:2.2 AS build
WORKDIR /src
COPY Backend/Backend.csproj Backend/
COPY Entities/Entities.csproj Entities/
RUN dotnet restore Backend/Backend.csproj

COPY . .
WORKDIR /src/backend
RUN dotnet build -c Release -o /app

FROM build AS publish
RUN dotnet publish -c Release -o /app

FROM base AS final
WORKDIR /app
COPY --from=publish /app .
ENTRYPOINT ["dotnet", "backend.dll"]



Dockerfile explained

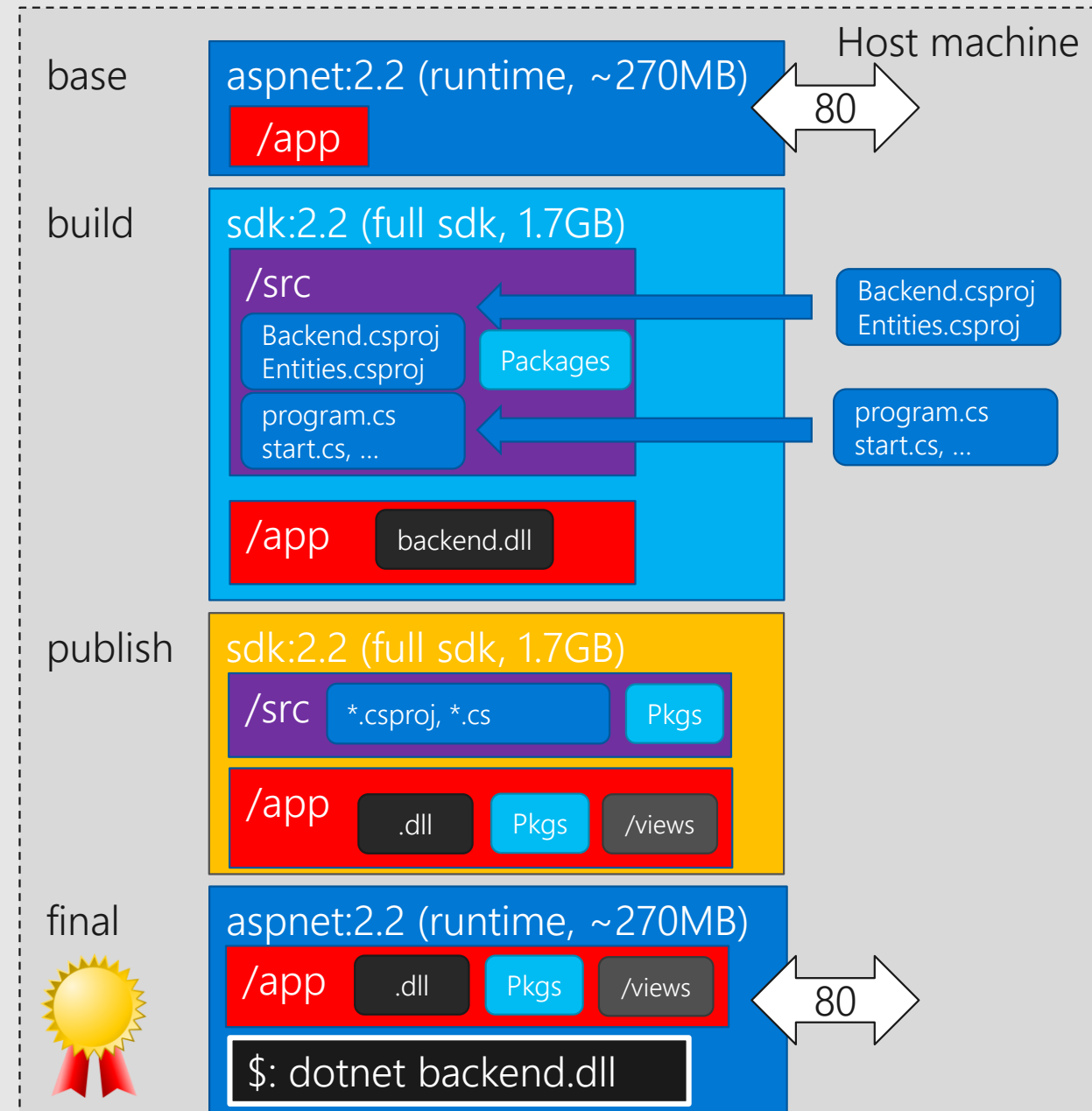
```
FROM mcr.microsoft.com/dotnet/core/aspnet:2.2 AS base
WORKDIR /app
EXPOSE 80
```

```
FROM mcr.microsoft.com/dotnet/core/sdk:2.2 AS build
WORKDIR /src
COPY Backend/Backend.csproj Backend/
COPY Entities/Entities.csproj Entities/
RUN dotnet restore Backend/Backend.csproj
```

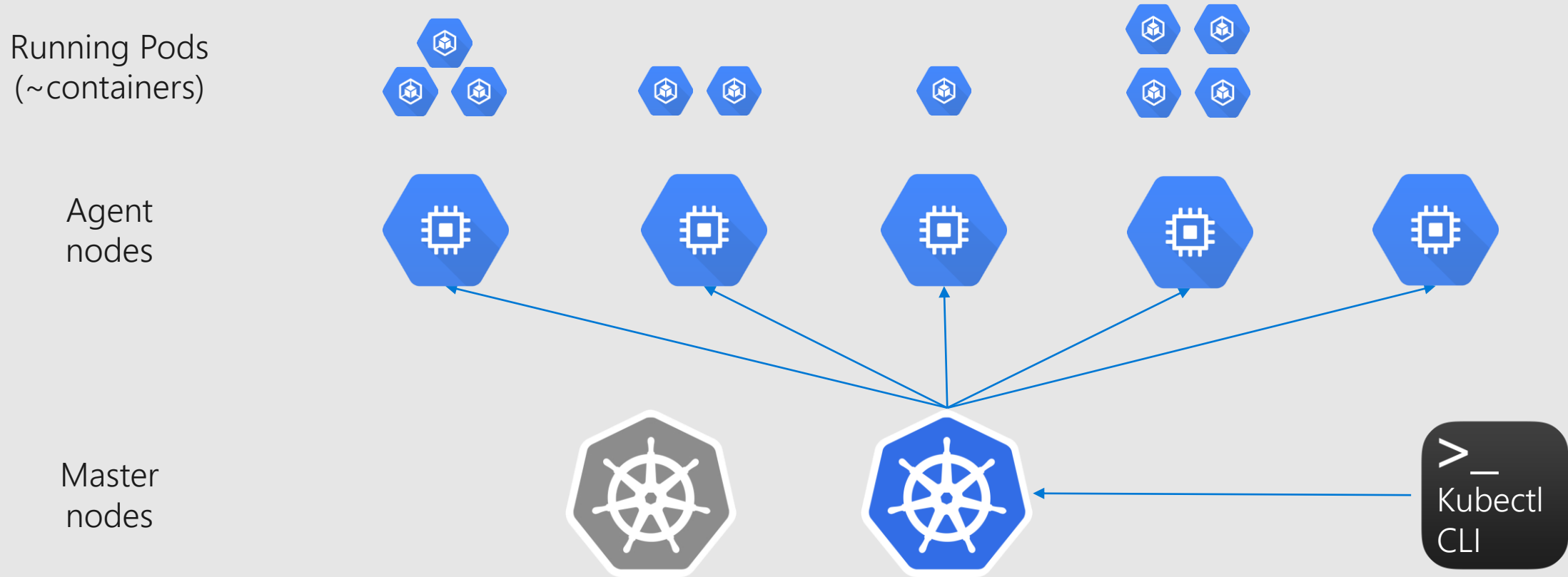
```
COPY . .
WORKDIR /src/backend
RUN dotnet build -c Release -o /app
```

```
FROM build AS publish
RUN dotnet publish -c Release -o /app
```

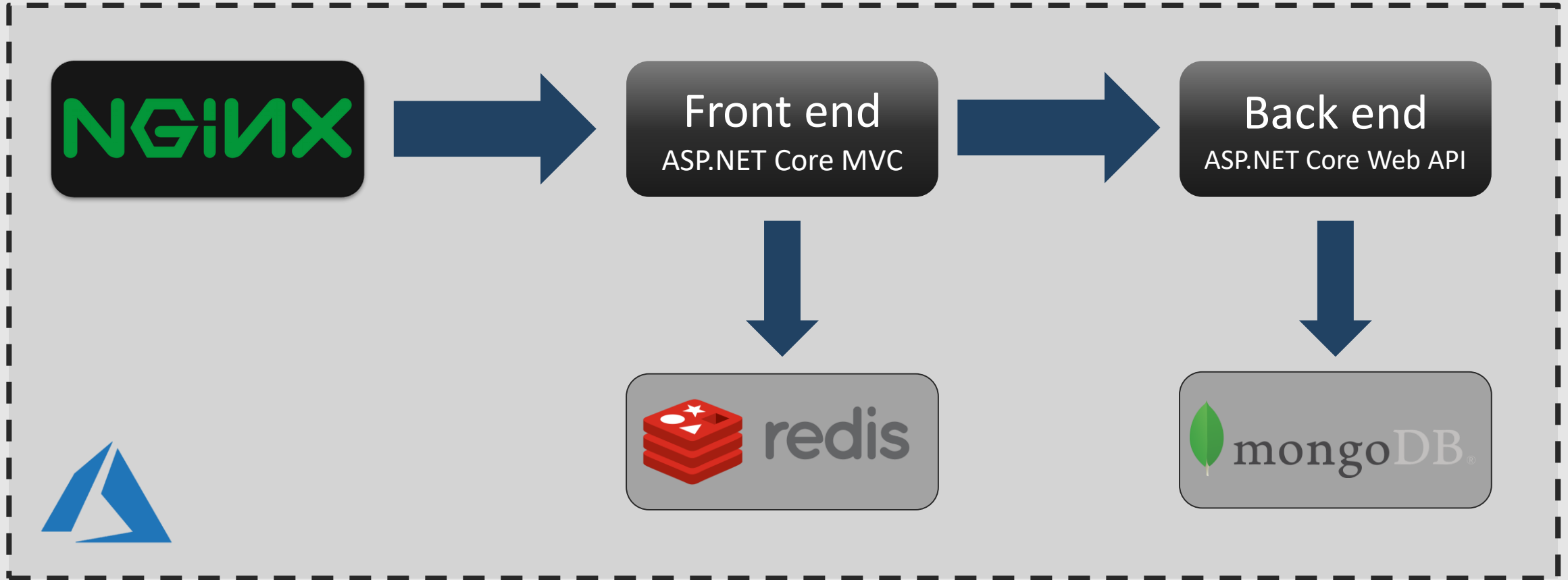
```
FROM base AS final
WORKDIR /app
COPY --from=publish /app .
ENTRYPOINT ["dotnet", "backend.dll"]
```



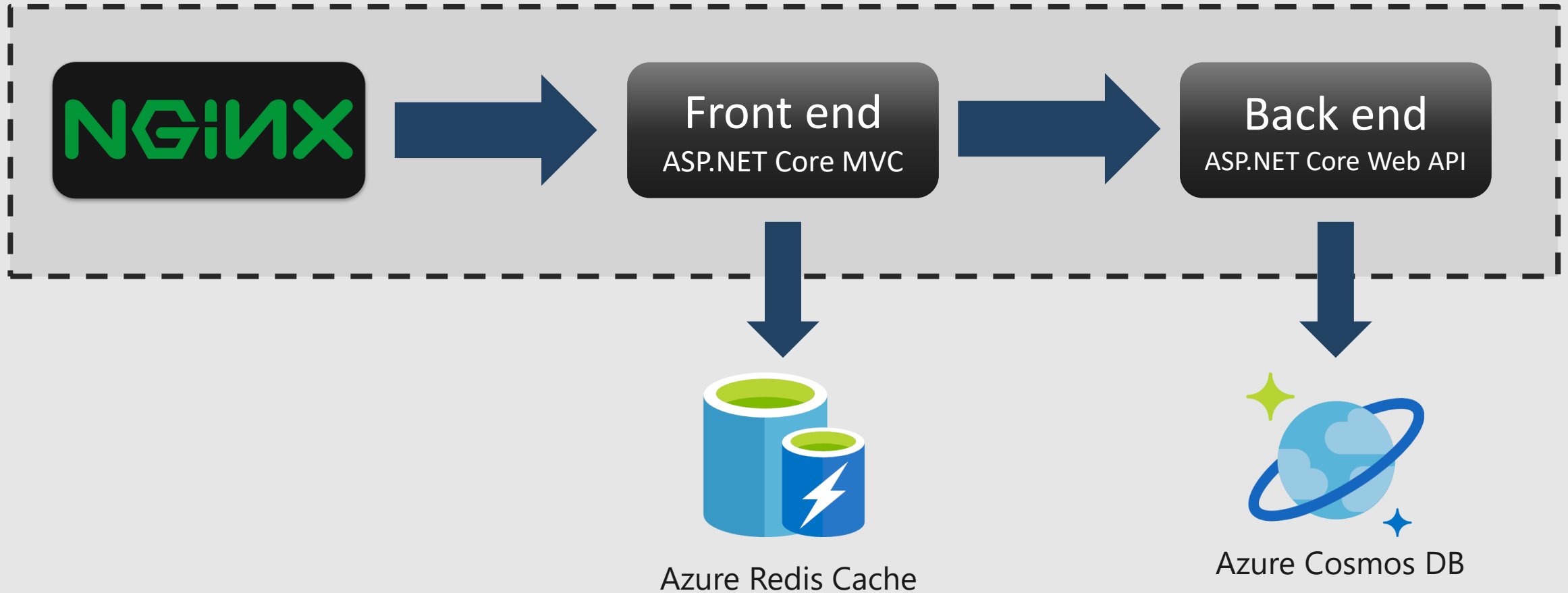
We need an orchestrator: enter Kubernetes and AKS



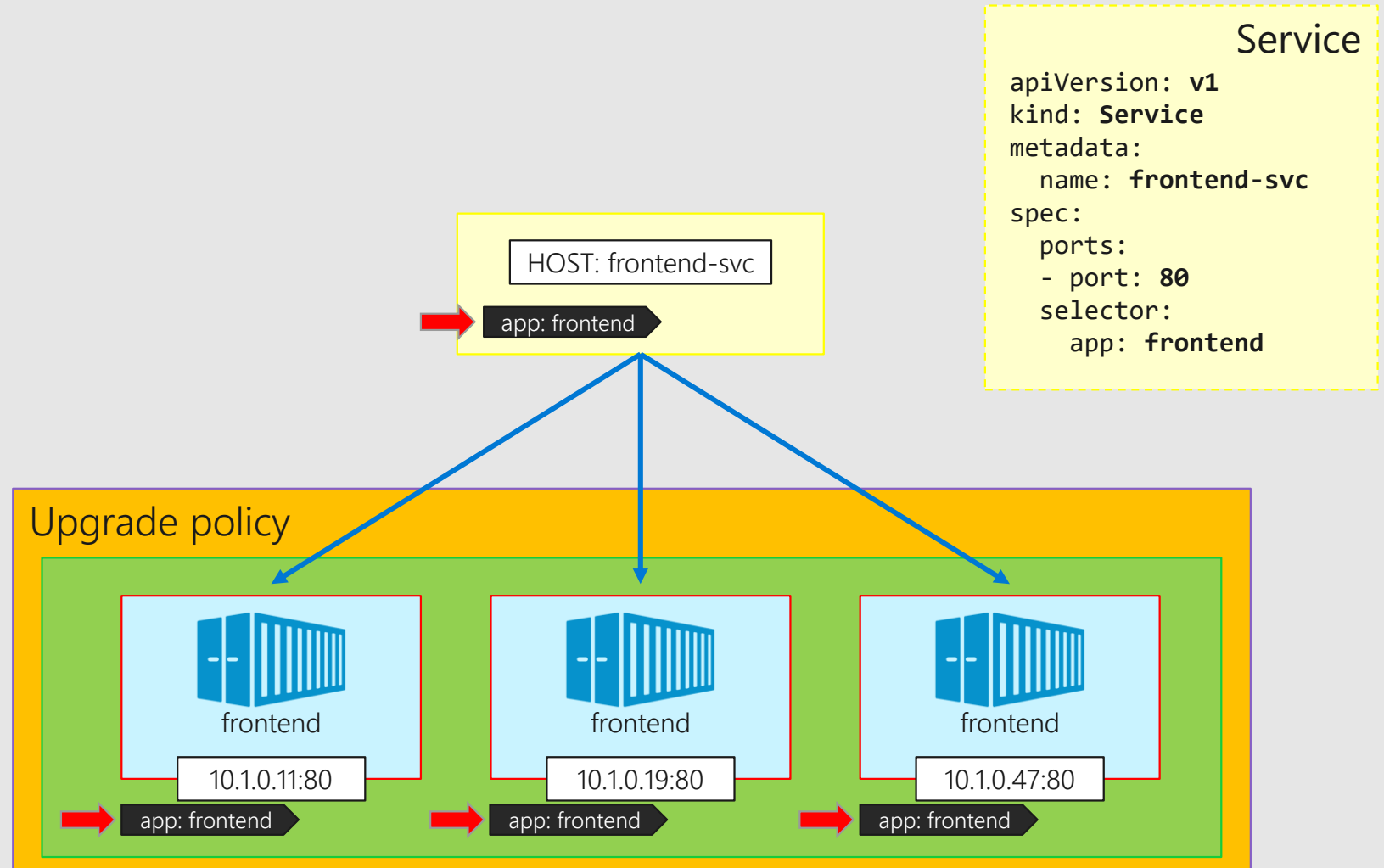
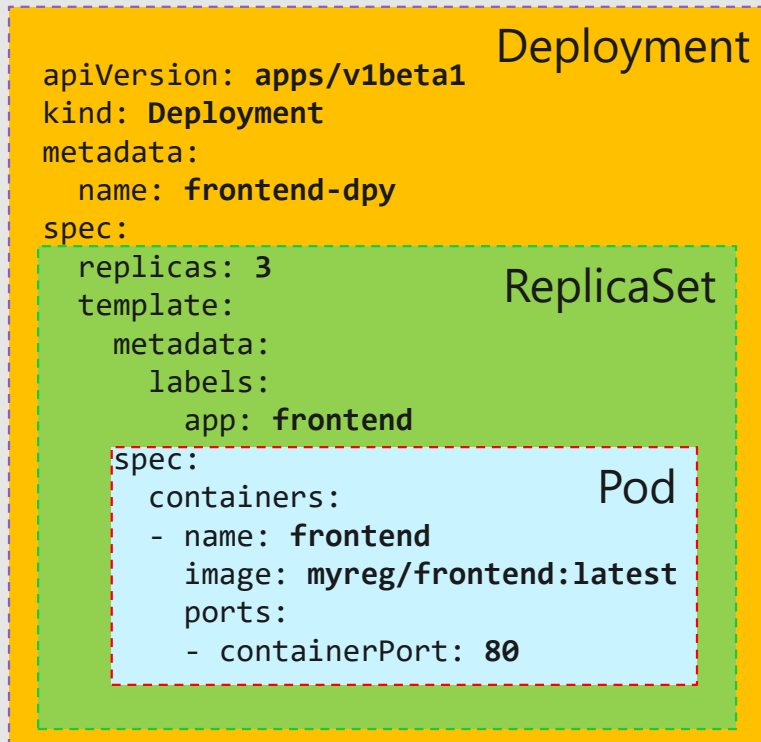
Our application so far...



Let's take advantage of Azure PaaS



A glimpse into Kubernetes object model



Recap

- Run Mongo & Redis as Docker containers
- Dockerised frontend and backend
- Added nginx
- Described the whole system on docker-compose
- Run all of it on our laptop
- Saved the images on Azure Container Registry
- Configured a CI/CD pipeline for our solution
- Deployed on a Kubernetes cluster in Azure Kubernetes Service (AKS)

Recap - Commands

<code>docker run -p 8080:80 wordpress</code>	Starts a container from an image, exposing it on 8080
<code>docker ps</code>	Lists of all running containers (-a includes stopped ones)
<code>docker start/stop containerName</code>	Starts (and stops) a container
<code>docker rm -f \$(docker ps -q)</code>	Removes all running containers
<code>docker images</code>	Lists all images
<code>docker rmi imageName</code>	Removes an image
<code>docker login myregistry.azurecr.io</code>	Logs in Azure Container Registry
<code>docker tag frontend myregistry.azurecr.io/frontend</code>	Tags an image for Azure Container Registry
<code>docker push myregistry.azurecr.io/frontend</code>	Pushes an image to Azure Container Registry
<code>kubectl apply -f filename</code>	Creates the kubectl objects specified in the file
<code>kubectl get deployments/services/pods</code>	Lists all the deployments/services/pods in the cluster
<code>kubectl proxy --address="0.0.0.0"</code>	Tunnels the cluster's dashboard to http://localhost:8001/api/v1/namespaces/kube-system/services/http:kubernetes-dashboard:/proxy

Recap – On Azure

- **Azure Container Registry**
 - Our private repository where we can store Docker images
 - `docker login myregistry.azurecr.io`
 - <https://docs.microsoft.com/en-us/azure/container-registry/>
- **Azure App Services on Linux**
 - They can either run one container at a time or a docker-compose file
 - Useful for simple scenarios – e.g. Run a small WordPress site with MySQL
 - <https://docs.microsoft.com/en-us/azure/app-service/containers/>
- **Azure Kubernetes Service (AKS)**
 - Fully managed orchestrator
 - Based on Kubernetes
 - <https://docs.microsoft.com/en-us/azure/aks/>
- **Container monitoring solution**
 - Based on Azure LogAnalytics
 - Uses a DaemonSet to track cluster events
 - <https://docs.microsoft.com/en-us/azure/log-analytics/log-analytics-containers>

Thank you! 😊

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Get the code at

<https://github.com/cradle77/DockerGettingStarted>