From Core to Containers to Orchestration

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There are only 10 kinds of people
those who understand binary
and those who don’t.

Mike **Benko**vich

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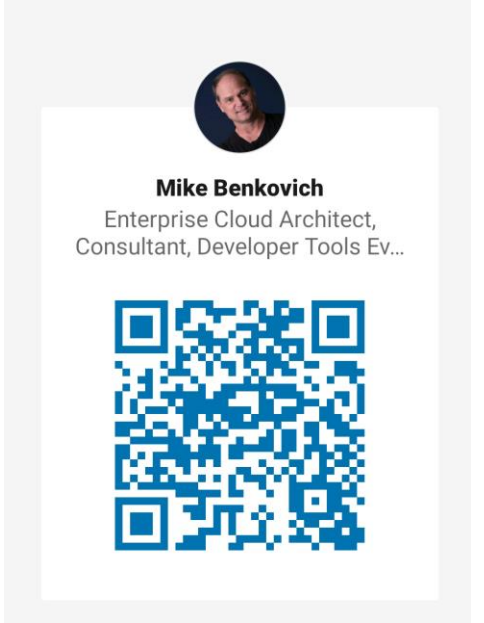
- Live in **Minneapolis**
- Founder of **Imagine Technologies**, Inc.
- **LinkedIn** Learning Instructor
- Blog www.**benkoTIPS**.com
- Follow @mbenko on **Twitter**
- Send me **Feedback**! mike@benko.com



Knowledge is knowing a tomato is a fruit.
Wisdom is not putting it in a fruit salad

Takeaways from today

What does **modernization** mean?

Should I **rewrite** in **.NET Core** ?

What about **Microservices**?

Virtualization vs **Containerize** vs **Cloud Native** ?

Do I need **Orchestration**?

Modernizing Compute: Options in Azure

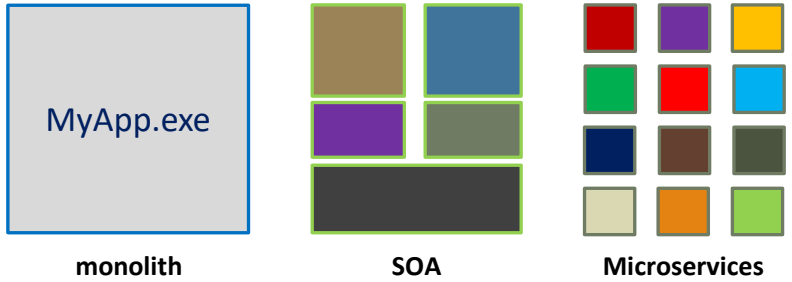
What does **modernize** mean to you?

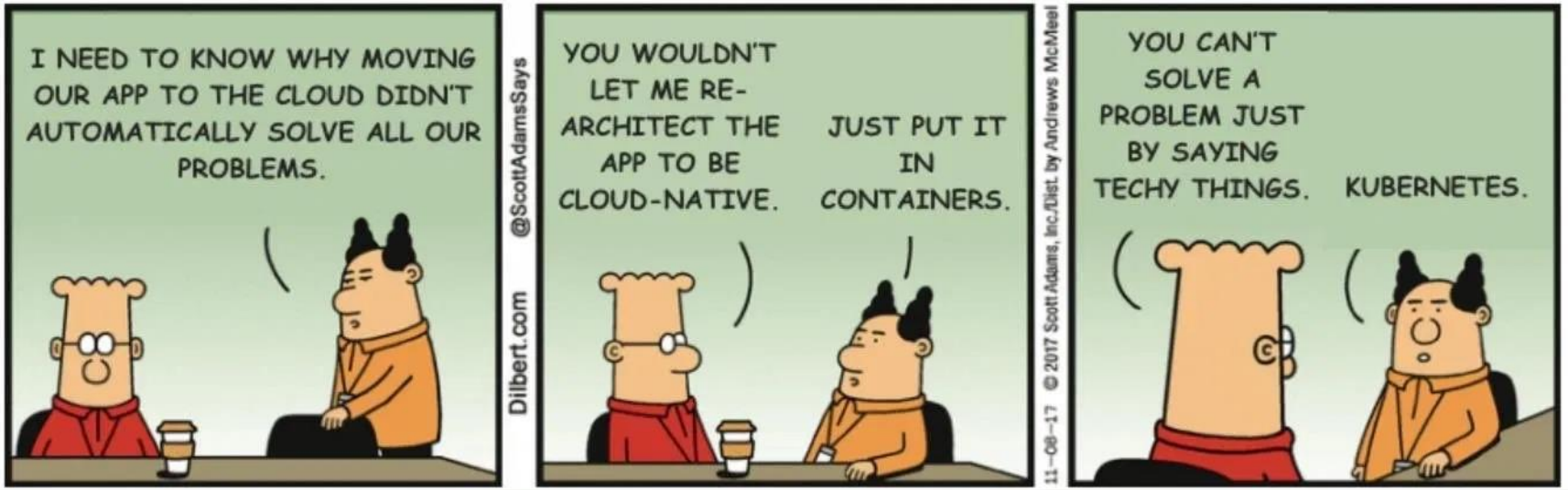
.NET Core Cross Platform opens up choices

Virtual Machines vs **Containers**

Application **architectures** have evolved

- Monolith
- **S**ervice **O**riented **A**rch
- **Micro**services




I NEED TO KNOW WHY MOVING OUR APP TO THE CLOUD DIDN'T AUTOMATICALLY SOLVE ALL OUR PROBLEMS.
Dilbert.com
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YOU WOULDN'T LET ME RE-ARCHITECT THE APP TO BE CLOUD-NATIVE.
JUST PUT IT IN CONTAINERS.
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YOU CAN'T SOLVE A PROBLEM JUST BY SAYING TECHY THINGS.
KUBERNETES.

.NET “Core”

.NET 7.0

Cross Platform

Dependency Injection

Configuration

Cleaner code

Better Performance

Tools

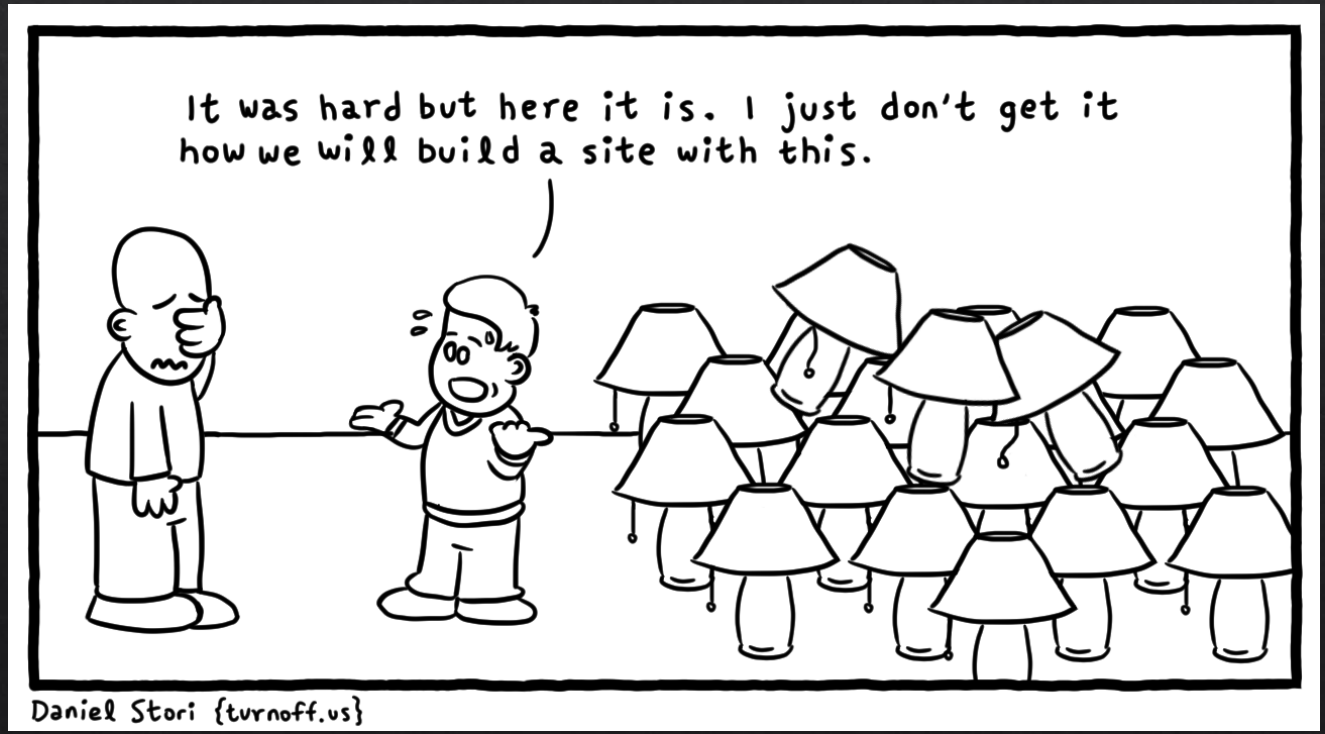
Visual Studio

VS Code

Command line (CLI)

Sensitivity: Confidential

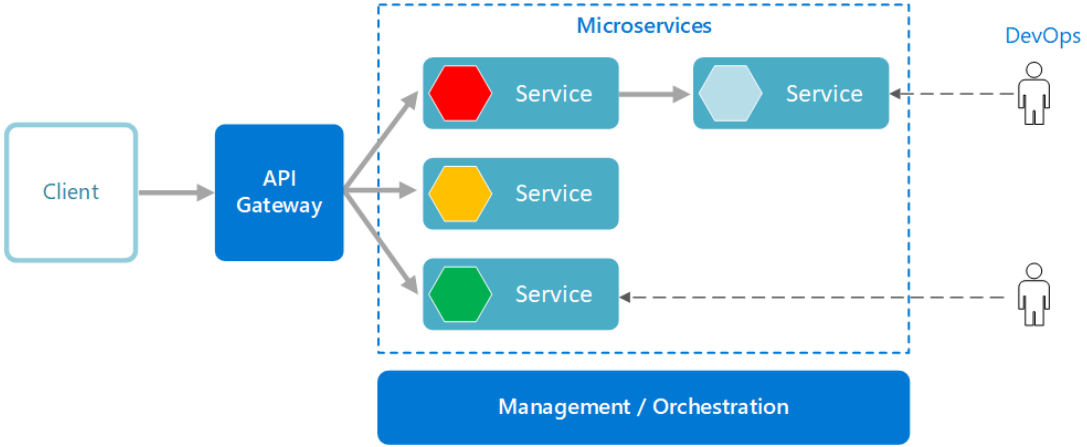
DEMO



http://turnoff.us/geek/wrong-architect/

Microservices

- Loosely coupled
- Bounded context
- Data Isolation
- Polyglot frameworks
- Scalable
- Versioned



A programmer had a problem.
He decided to use Java.
Now he has a **ProblemFactory**.

Project Tye – https://github.com/dotnet/tye

Explore containers without knowing about containers

Open source experiment

Service discovery

Streamline Deploy to Kubernetes

```
> tye run
> tye build
> tye deploy
```

Containerization

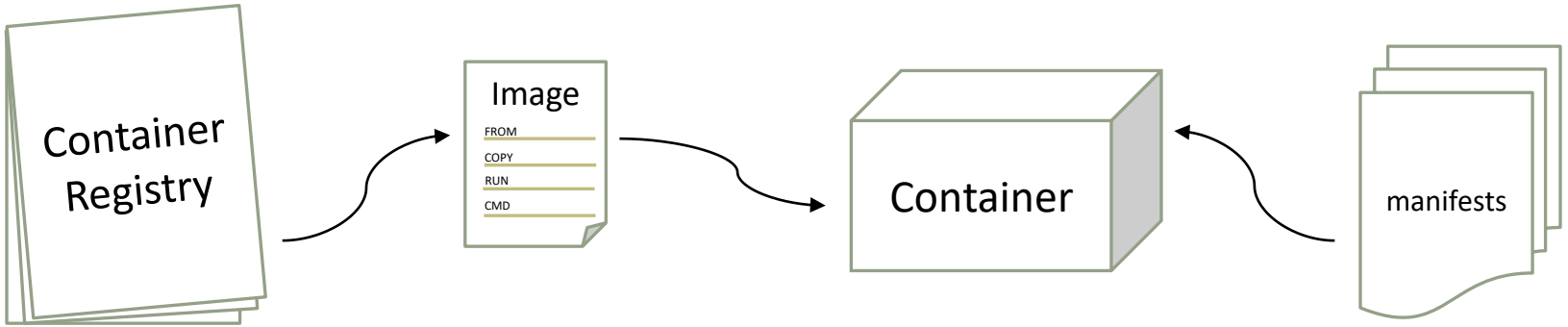
Process Virtualization vs **Machine** Virtualization

Instead of **code** deployment … **Image** delivery

Image is **File System** defined as diffs from base image

Image pushed to **Container Registry**

Pods pull image from Registry to start running **Container**



Docker file system

- Layers defined by commands in dockerfile
- Each layer is diff from previous layer
- Last layer typically is command to run image

Dockerfile - simple

```
FROM mcr.microsoft.com/dotnet/aspnet:7.0

WORKDIR /app

COPY dist .

RUN

ENV EnvName=SimpleDocker
EXPOSE 80

CMD ["dotnet", "myApp.dll"]
```

Dockerfile – vs code

```
FROM mcr.microsoft.com/dotnet/sdk:7.0 as build
WORKDIR /src
COPY bnkApp.csproj .
RUN dotnet restore
COPY . .
RUN dotnet publish -c release -o /app

FROM mcr.microsoft.com/dotnet/aspnet:7.0 as publish
WORKDIR /app
ENV EnvName=Docker
COPY --from=build /app .
ENTRYPOINT ["dotnet","bnkApp.dll"]
```

Docker commands

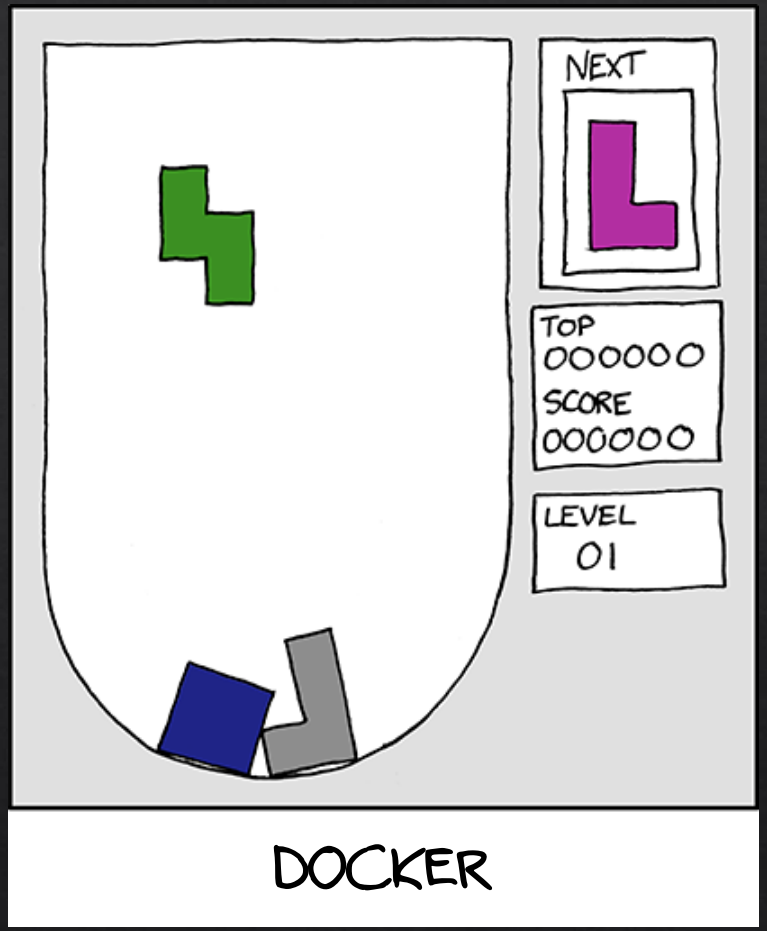
```
> docker build -t imagename .

> docker image list

> docker run   -it --rm -p 5000:80 imagename

> docker push
```

DEMO



http://xkcd.com/724/

Docker-Compose

- Run docker commands for you
- Build and run many services
- Define dependencies

Visual Studio LIVE!
EXPERT SOLUTIONS FOR ENTERPRISE DEVELOPERS

Docker-Compose.yml

```
version:  '3’

services:
  bnkapp:
    image: bnkapp
    ports:
    - 5100:80
    environment:
    - EnvName=DockerCompose
    depends_on:
    - bnkapi

 bnkapi:
    image: bnkapi
    ports:
    - 5200:80
```

Docker Compose commands

> docker-compose build

> docker compose up

> docker compose down

DEMO

You do not need a parachute to skydive you need a parachute to skydive twice

Azure Container Options

App Services – Containers

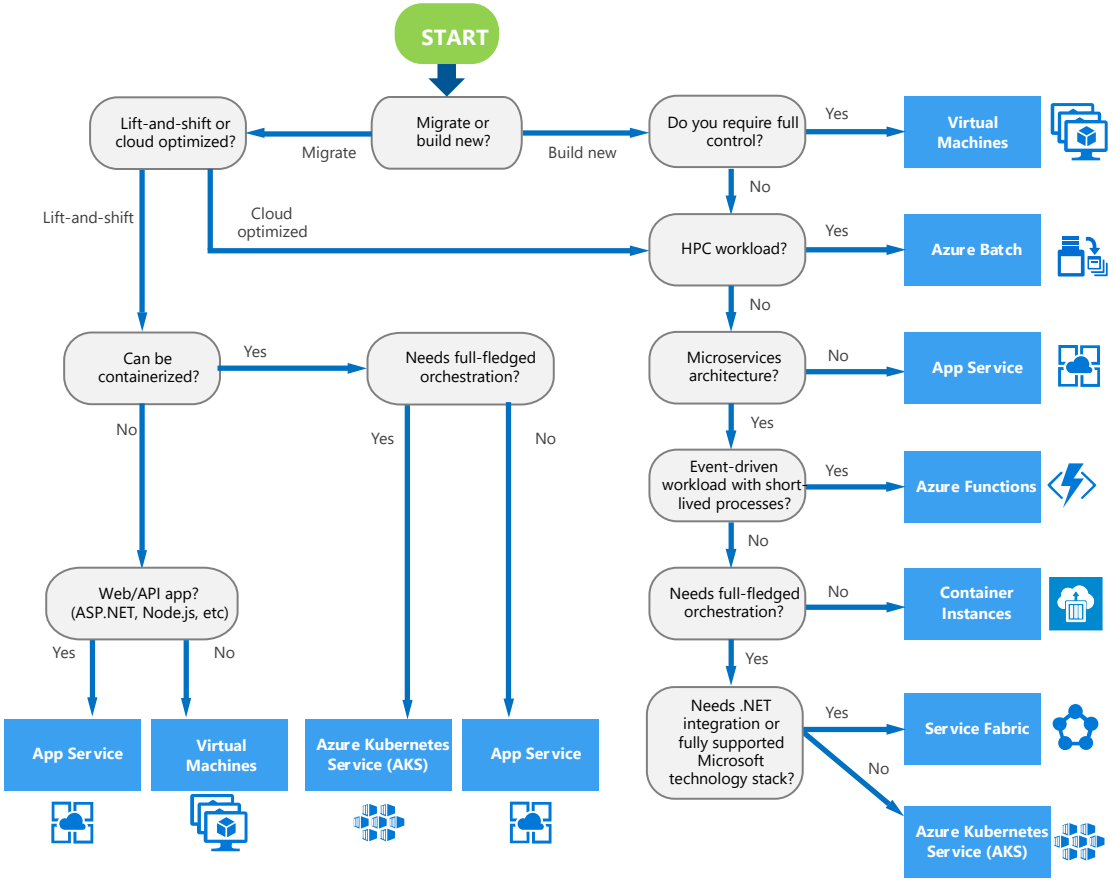
ACI - Azure Container Instances

ACA - Azure Container Apps

AKS – Kubernetes (Orchestration)

Azure Options

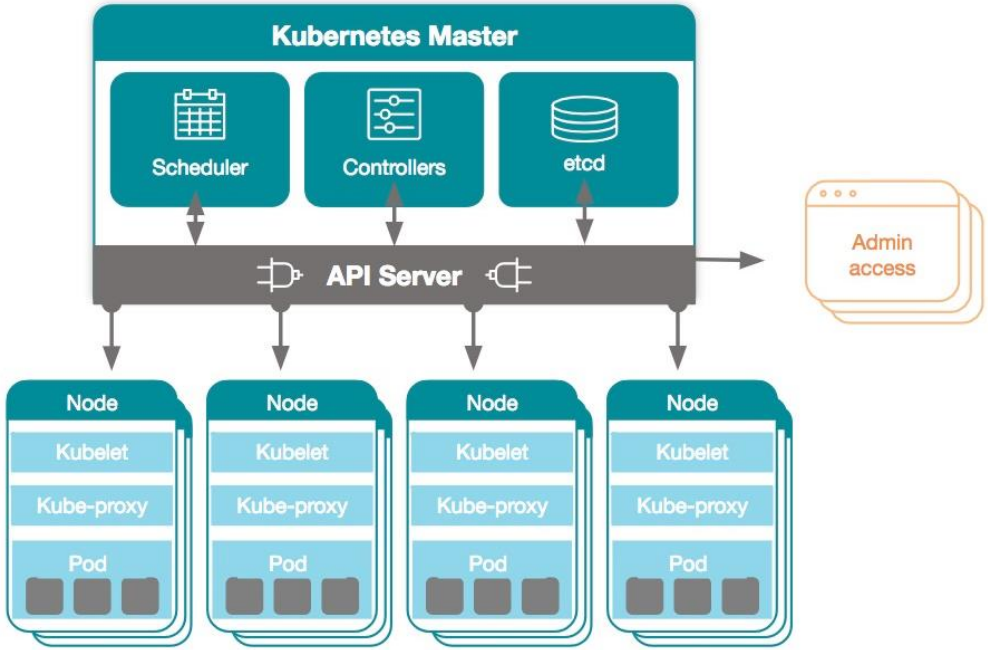
- Is it legacy or green field?
- Do we re-write or port?
- Can it be containerized?
- Monolith vs Microservices?
- Serverless?



https://docs.microsoft.com/en-us/azure/architecture/guide/technology-choices/compute-decision-tree

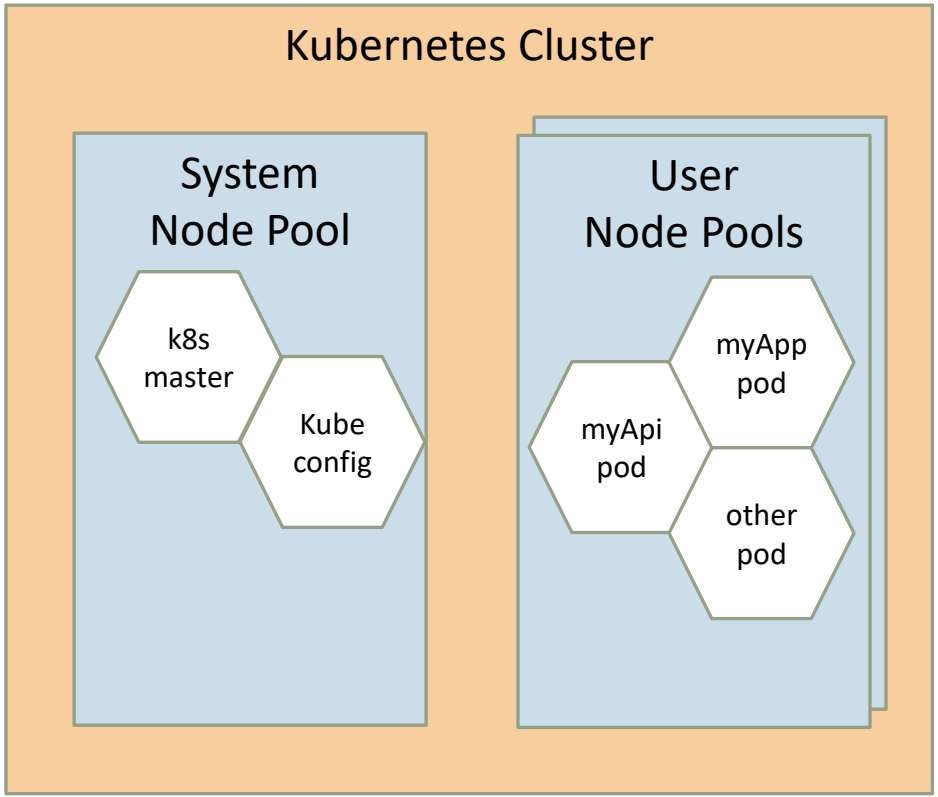
Orchestration – Kubernetes (AKS)

- Portability
- Deployment options
- Self-healing
- Scheduling
- Scalability
- Availability
- Service discovery



Kubernetes

- Cluster
- Node Pools
- Nodes (VM Scale Set)
- Pods
- Containers
- Sidecars



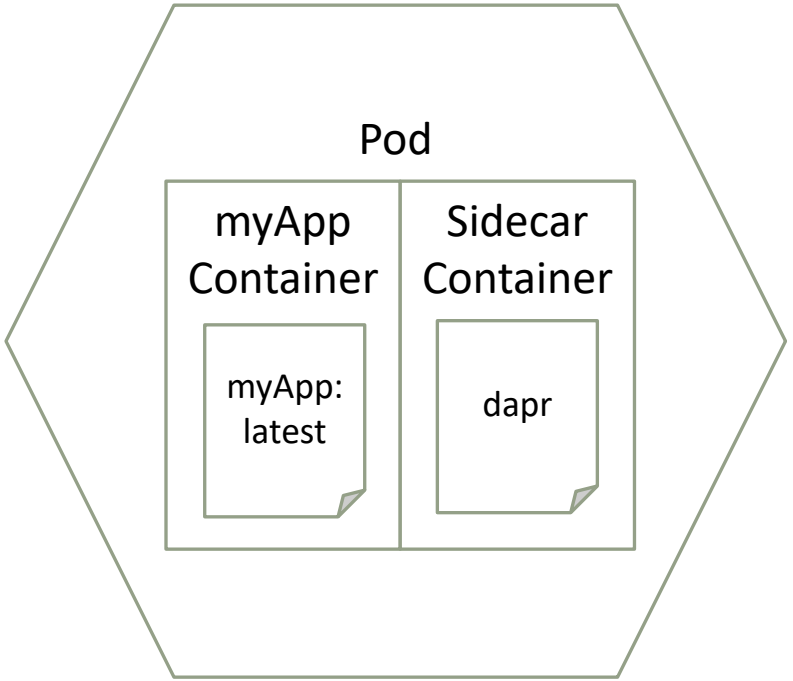
Pod

Runs on a Node

Starts container from image

Container has addressable IP

Consumes memory & cpu



Kubectl – Interact with control plane

Works with Kubernetes objects in form of YML

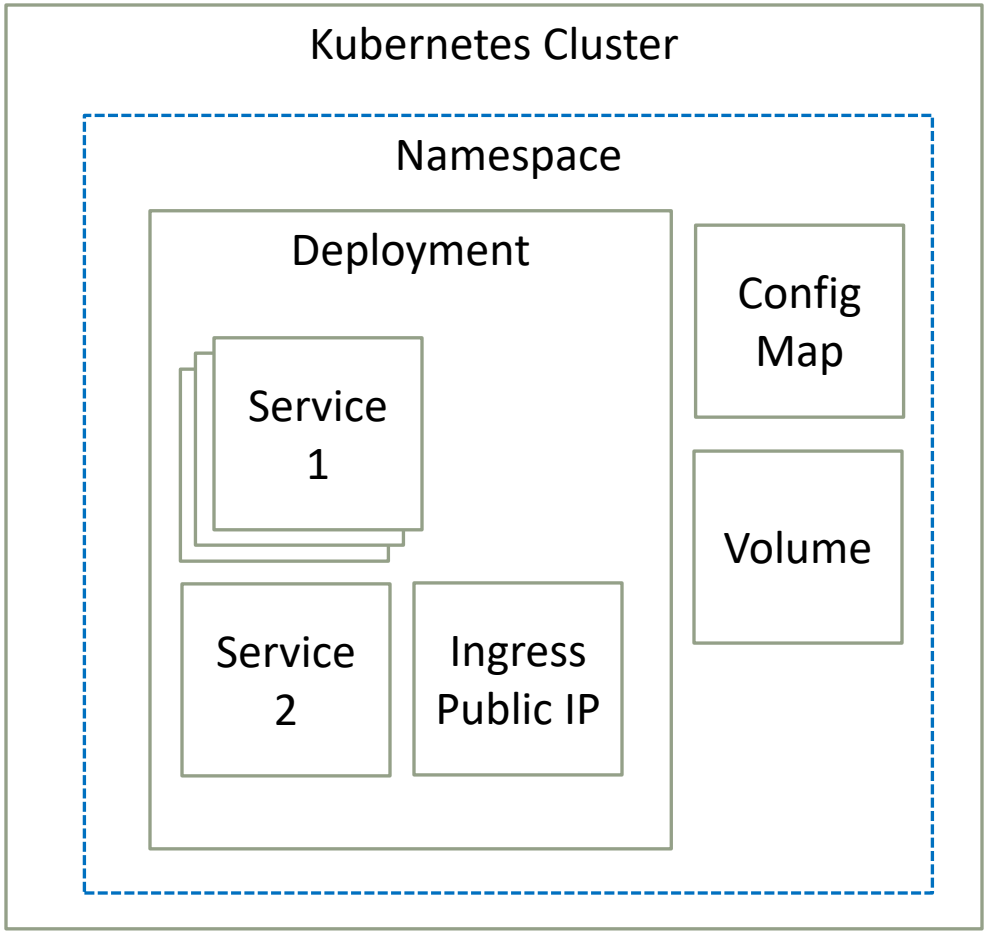
Saves connection info in .kubeconfig in user folder

Set context for cluster before entering commands, for example:

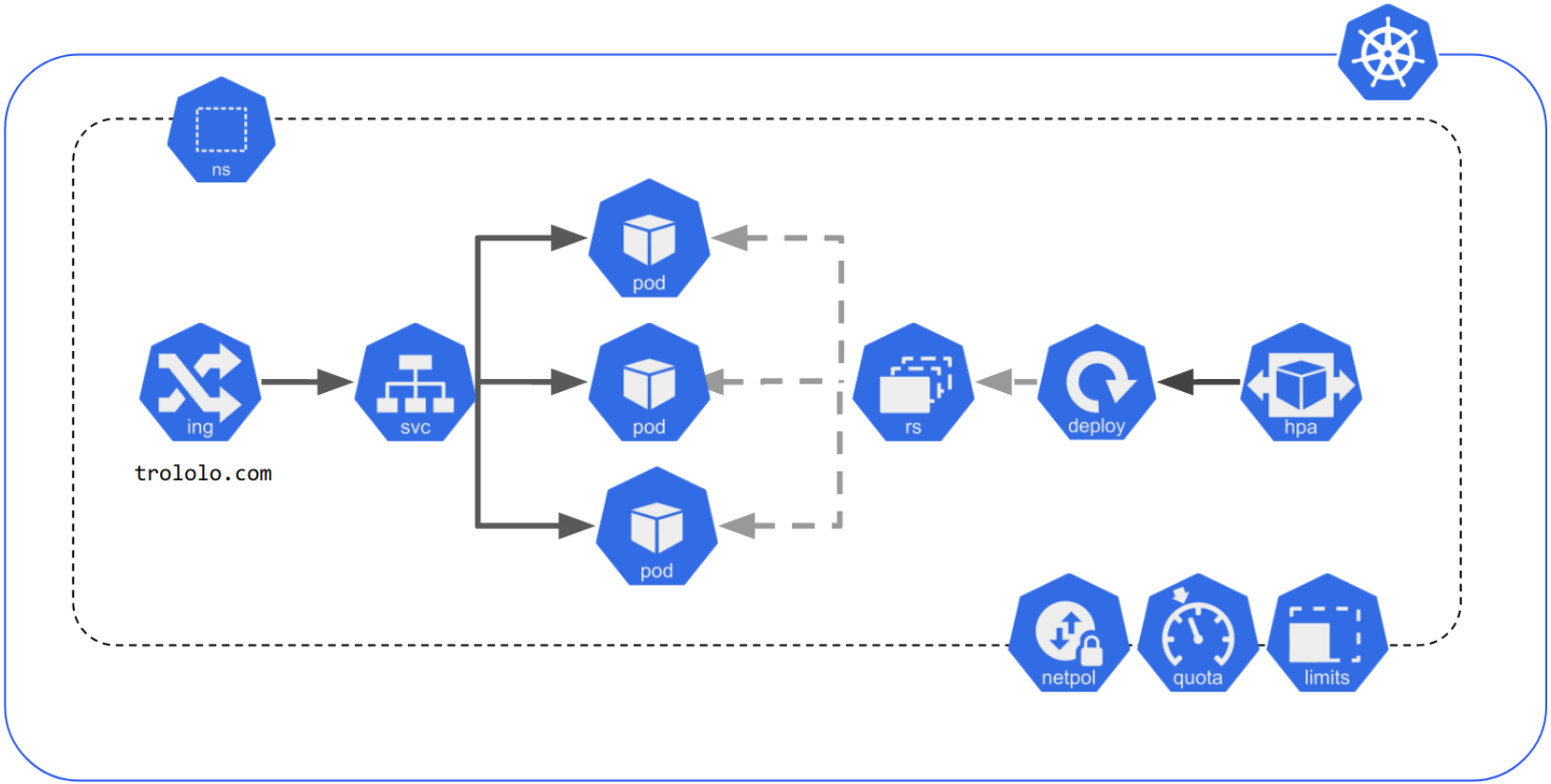
```
kubectl cluster-info
kubectl get all –A
kubectl run myapp-pod --image ghcr.io/mbenko/myapp:latest
kubectl exec -ti myapp-pod -- bash
kubectl port-forward myapp-pod 8080:80
kubectl logs myapp-pod
kubectl apply –f my-service.yml
```

Kubernetes Objects

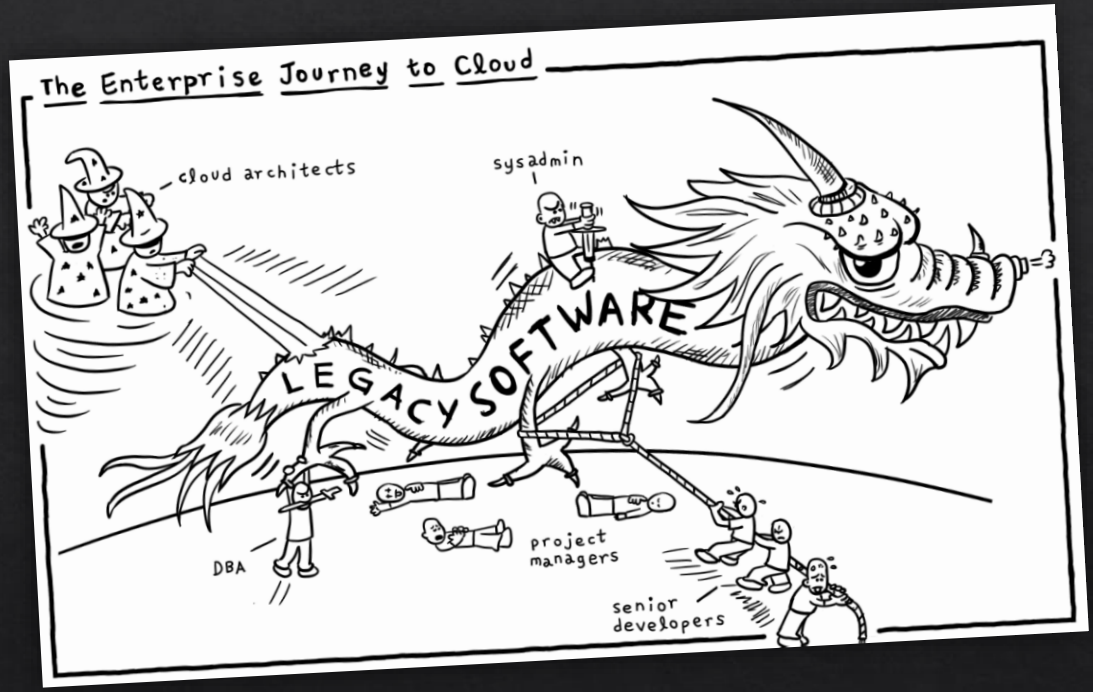
- Namespaces
- Deployment
- Service
- Ingress/Load Balancers
- Config Maps
- Volumes
- Other…



For example...


ns
ing
trololo.com
svc
pod
pod
pod
rs
deploy
hpa
netpol
quota
limits

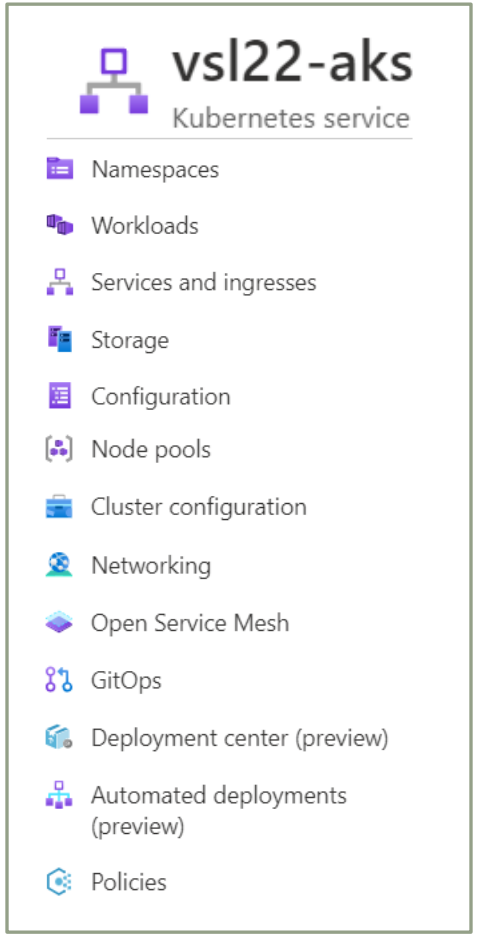
DEMO

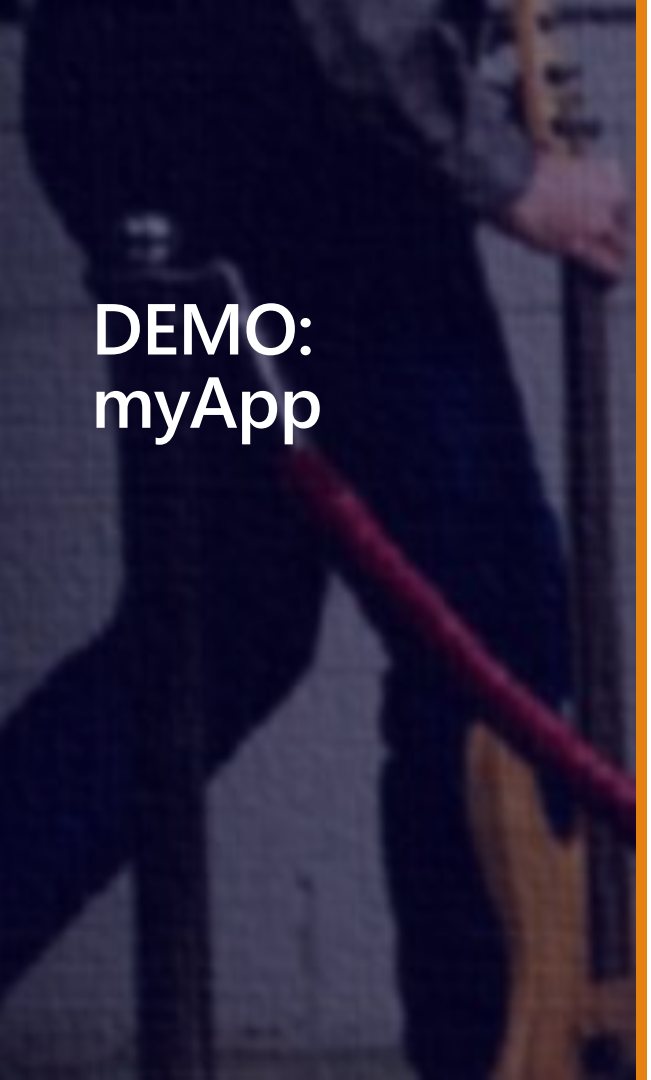


http://turnoff.us/geek/enterprise-vs-startup-journey-to-cloud/

AKS = Azure Kubernetes

- Managed Kubernetes
- Enables managed identity
- Security & compliance done right
- Resource choices
- Integrated with Azure Services





DEMO: myApp

Containers if…

Options for compute

- App Services w/containers
- ACI – Container instances
- ACA – Container apps

Cross Platform a priority

Microservices

Kubernetes if…

Many services

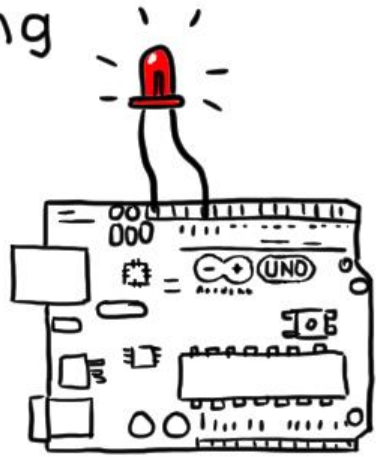
Independent scaling needs

Self-healing

Deployment strategies

Monitoring

Just finished my first Arduino project:
A blinking led.



Next Step:
Update my LinkedIn profile.

Add Skill

Mechatronic Engineer

http://turnoff.us/geek/arduino-project/

Conclusion

The **journey** to the cloud can be challenging

Take it a **step** at a time

Be aware of the **tools** that can ease the way

Call to Action – Where can I get more info?

Visit my blog

www.benkotips.com

Schedule a **workshop** to make your IT workforce cloud aware

mike@benko.com

Try it out with **low hanging fruit** white chips