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

The Joy of…

Mike Benkovich
Principal Cloud Engineer
www.benkoTIPS.com

Title for this session...

Joy of sex

Title for this session…

~~Joy of sex~~

Joy of Code

Title for this session…

~~Joy of sex~~

~~Joy of Code~~

Joy of Dot Net Core

Title for this session…

~~Joy of sex~~

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Joy of Microservices

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Joy of Containers

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~~Joy of Containers~~

Joy of Docker

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~~Joy of Containers~~

~~Joy of Docker~~

A Developer’s Dive into AZD and Dotnet Aspire

Title for this session…

A Developer’s Dive into AZD and Dotnet Aspire

A Developer’s Dive into AZD and Dotnet Aspire

Mike Benkovich
Principal Cloud Engineer
www.benkoTIPS.com

Mike Benkovich

- Enterprise Cloud Architect & Consultant
- Live in **Minneapolis**
- Founder of **Imagine Technologies**, Inc.
- Developing Courses for **LinkedIn** Learning
- Blog www.benkoTIPS.com
- Follow @mbenko on **Twitter**
- Send me **Feedback**! mike@benko.com
- Azure **Office Hours** on Fridays! https://bit.ly/BnkAzHrs

Mike Benkovich

Enterprise Cloud Architect, Consultant, Developer Tools Ev...

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**?

What are my Compute Options in **Azure?**

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

Do I need **Orchestration**?

Today

Dotnet Core

Micro Service Oriented Solutions

Containerization

Developer Tooling

Hosting options

Modernizing Compute: Options in Azure

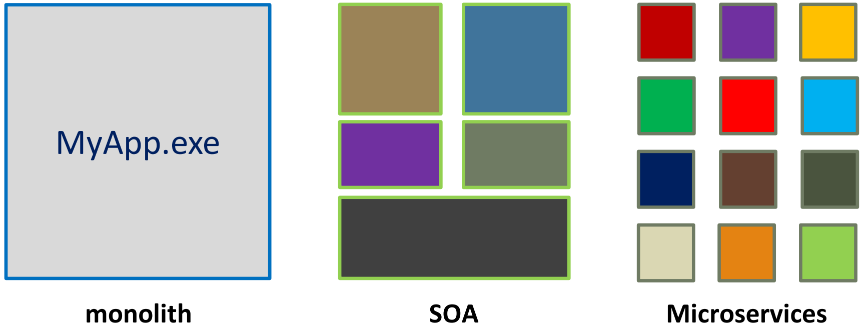
What does **modernize** mean to you?

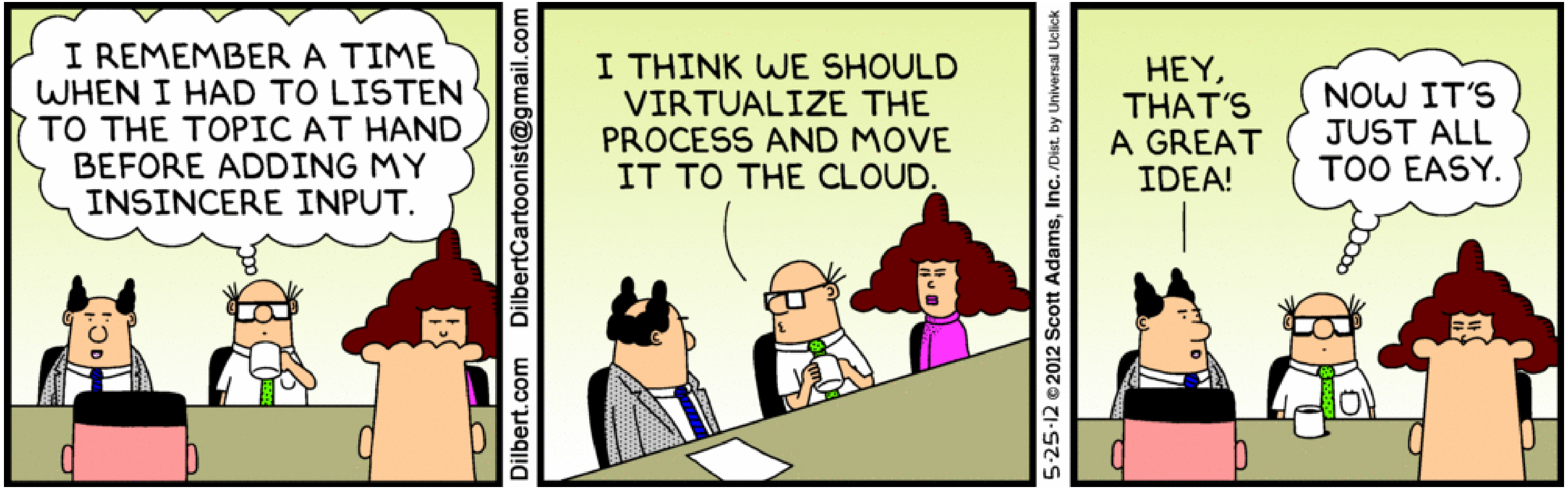
.NET Core Cross Platform opens up choices

Virtual Machines vs **Containers**

Application **architectures** have evolved

- **Mono**lith
- **S**ervice **O**riented **A**rch
- **Micro**services




I REMEMBER A TIME WHEN I HAD TO LISTEN TO THE TOPIC AT HAND BEFORE ADDING MY INSINCERE INPUT.
Dilbert.com DilbertCartoonist@gmail.com
I THINK WE SHOULD VIRTUALIZE THE PROCESS AND MOVE IT TO THE CLOUD.
5-25-12 ©2012 Scott Adams, Inc. /Dist. by Universal Uclick
HEY, THAT'S A GREAT IDEA!
NOW IT'S JUST ALL TOO EASY.

.NET “Core”

.NET 8.0

Cross Platform

Dependency Injection

Configuration

Cleaner code

Better Performance

Tools

Visual Studio

VS Code

Command line (CLI)

DEMO

It was hard but here it is. I just don't get it how we will build a site with this.
Daniel Stori {turnoff.us}

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

Microservices

Loosely coupled

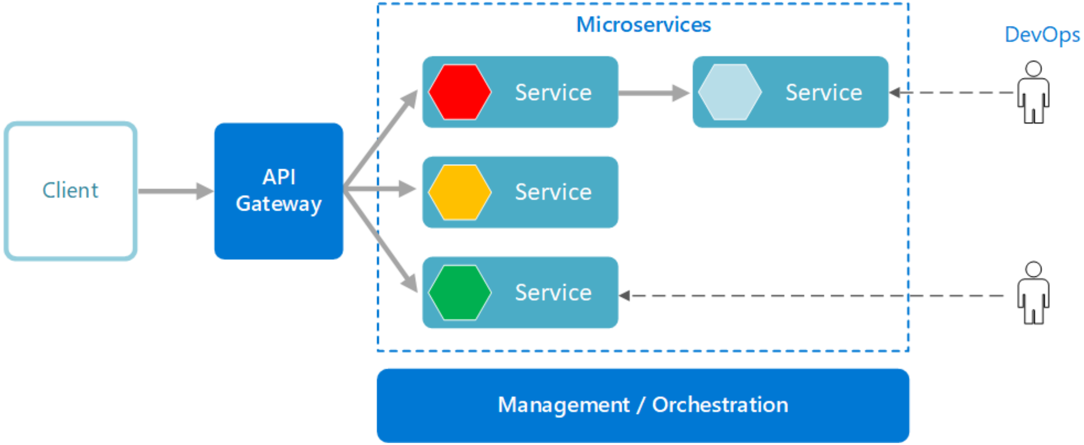
Bounded context

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

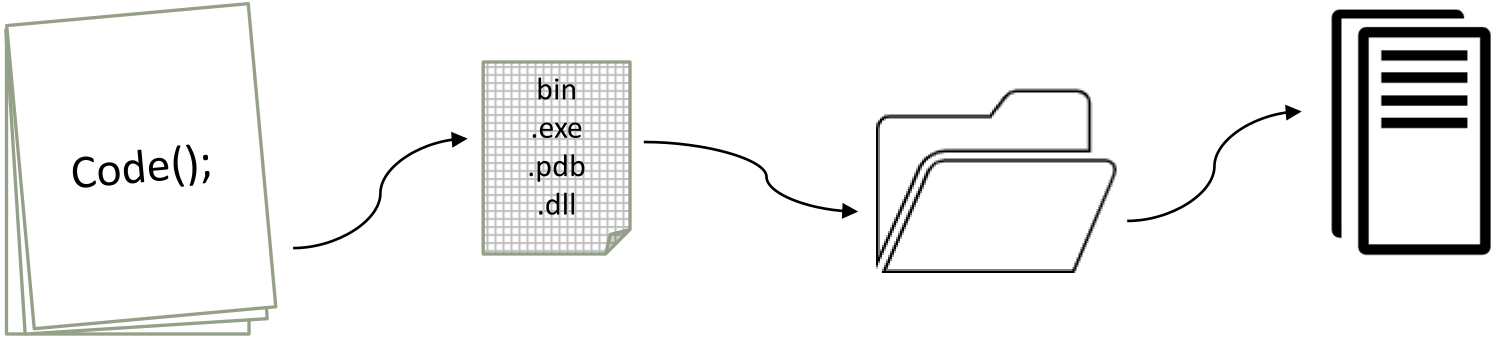
```
> tye run
> tye build
> tye deploy
```

Traditional App Deployment

Build executables into folders

Package **artifacts** .exe, .pdb, etc. according to needs

Copy **code** to running machines



APM TERMINALS
APM TERMINALS
MAERSK LINE
MARSEILLE MÆRSK
KØBENHAVN
MAERSK

Containerization

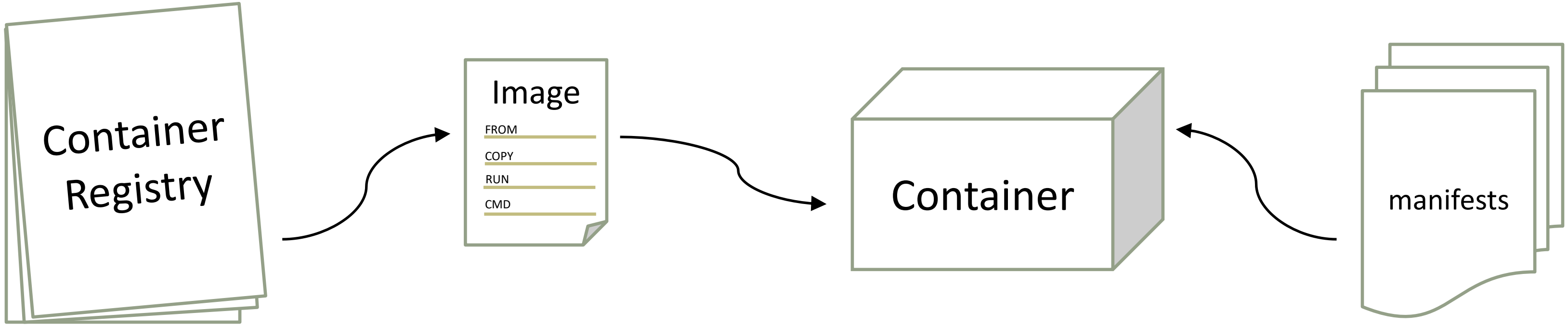
Process Virtualization vs **Machine** Virtualization

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

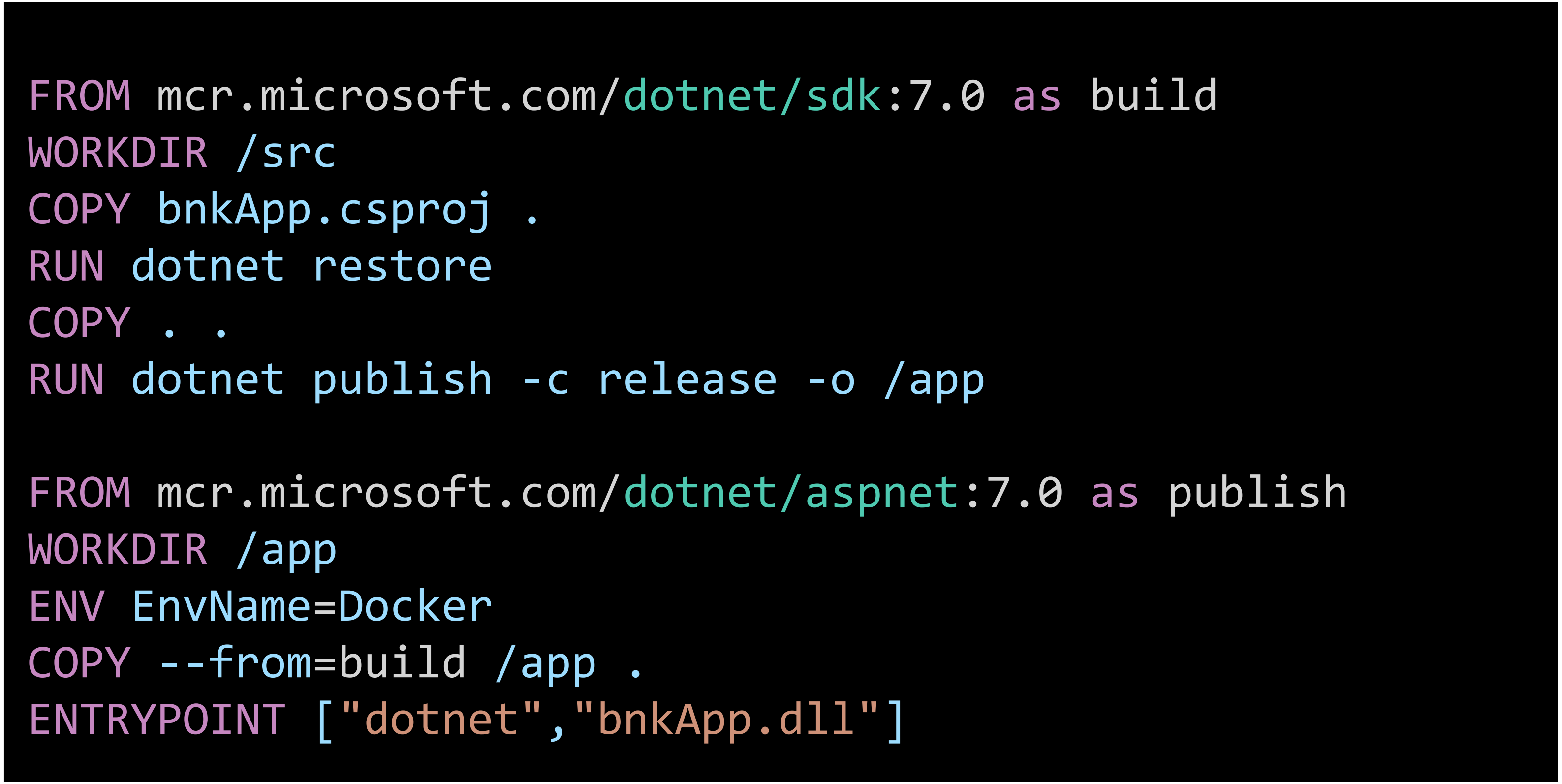
Each layer is diff from previous layer

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

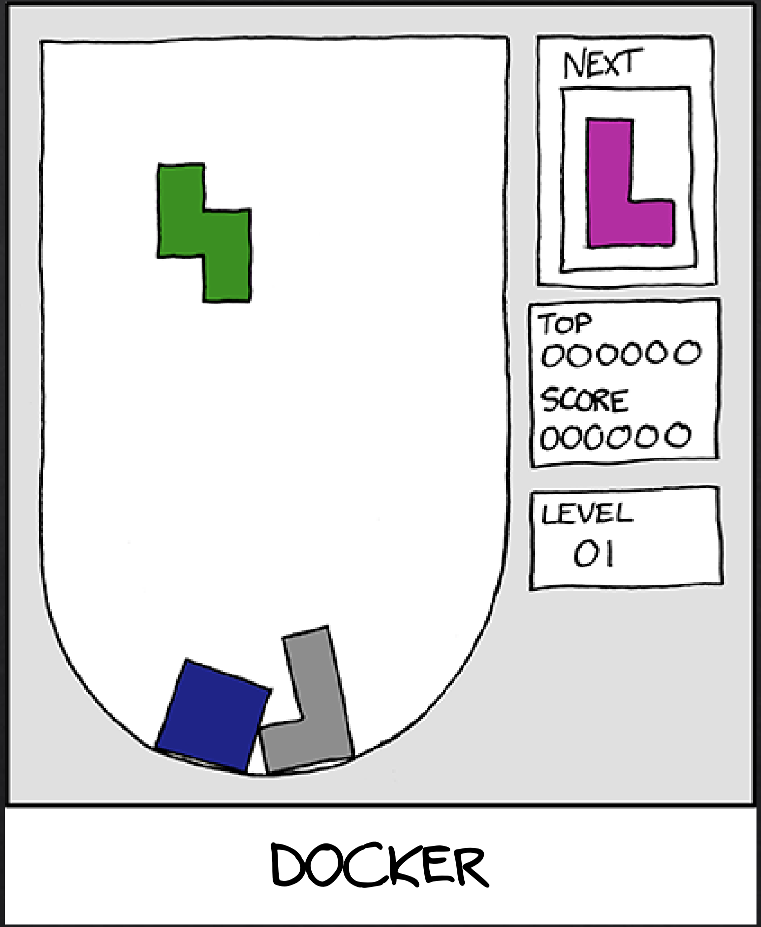


```
FROM mcr.microsoft.com/dotnet/sdk:7.0 as build
WORKDIR /src
COPY bnkApp.csproj .
RUN dotnet restore
COPY . .
RUN dotnet publish -c release -o /app

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

Docker-Compose.yml

```yaml
version:  '3’

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

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

Docker Compose commands

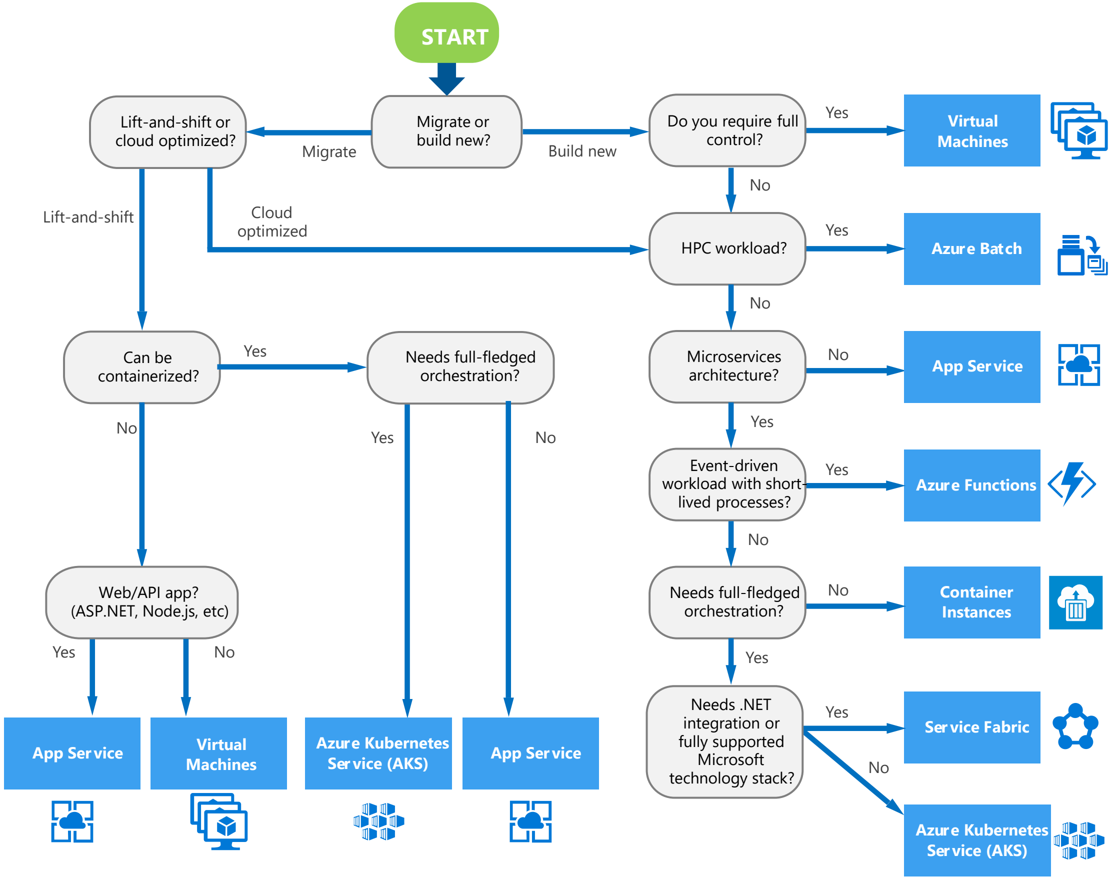
```
> docker-compose build

> docker compose up

> docker compose down
```

DEMO

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

Azure Options

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



START

Migrate or build new?

Migrate

Build new

Lift-and-shift or cloud optimized?

Lift-and-shift

Cloud optimized

Can be containerized?

Yes

No

Needs full-fledged orchestration?

Yes

No

Web/API app? (ASP.NET, Node.js, etc)

Yes

No

App Service

Virtual Machines

Azure Kubernetes Service (AKS)

App Service

Do you require full control?

Yes

Virtual Machines

No

HPC workload?

Yes

Azure Batch

No

Microservices architecture?

No

App Service

Yes

Event-driven workload with short-lived processes?

Yes

Azure Functions

No

Needs full-fledged orchestration?

No

Container Instances

Yes

Needs .NET integration or fully supported Microsoft technology stack?

Yes

Service Fabric

No

Azure Kubernetes Service (AKS)

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

Create image with ACR

```
az acr build
  --image $appImg
  --registry $acrName
  -f ./src/$appName/Dockerfile ./src/$appName
  --build-arg tag=latest
```

Choose an Azure container service - Azure Architecture Center | Microsoft Learn - https://bit.ly/azcontaineropts

Container Options in Azure

Web App for Container

- App Service Plan
- Most PaaS
- Least customization and control
- Quick deployment CI/CD
- Automatic Integrations

NOT Best when…

- Complex Microservices
- Granular OS/Network needs

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```
az appservice plan create
  --name $planName
  --resource-group $rg
  --sku B1 --is-linux


az webapp create
  --resource-group $rg
  --plan $planName
  --name myweb-ctr
  --deployment-container-image-name
        $appImg
```

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Azure Container Apps

- Hybrid Paas/IaaS

- Environments

- Host single workload

- Integration with DAPR, KEDA

- Event Scaling

NOT Best when..

- Full K8S features

- Specific Kubernetes tooling

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```
az containerapp up
-n $appName-aca
-g $rg
--environment $env
--image $appImg
--ingress external
```

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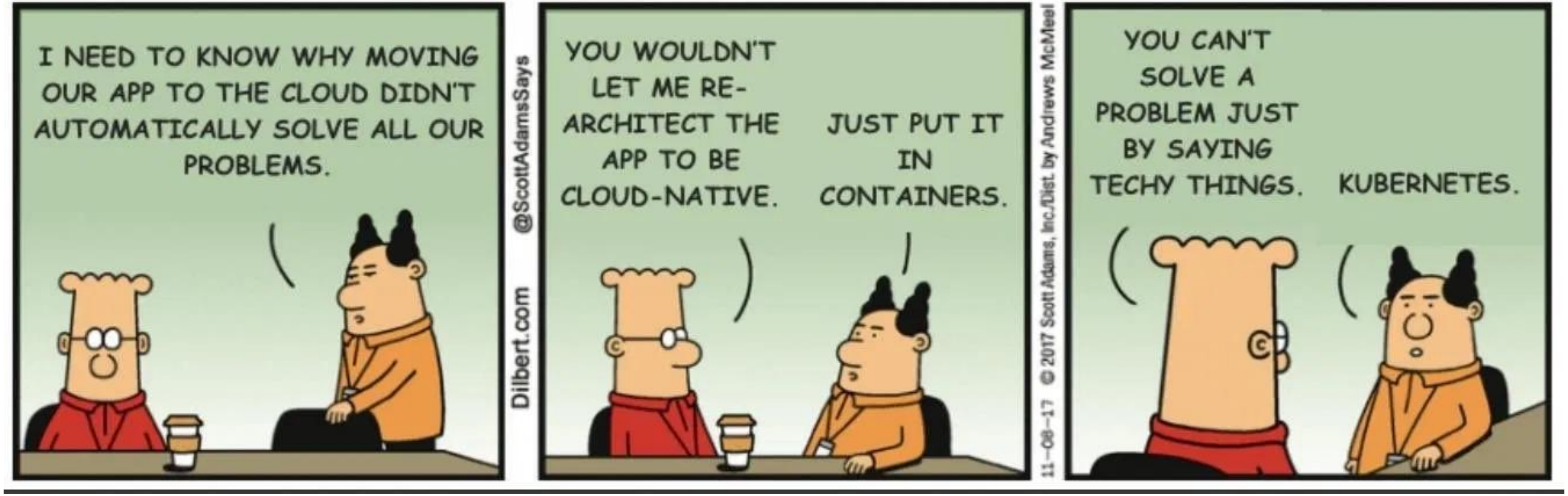

I NEED TO KNOW WHY MOVING OUR APP TO THE CLOUD DIDN'T AUTOMATICALLY SOLVE ALL OUR PROBLEMS.
@ScottAdamsSays
Dilbert.com
YOU WOULDN'T LET ME RE-ARCHITECT THE APP TO BE CLOUD-NATIVE.
JUST PUT IT IN CONTAINERS.
11-08-17 © 2017 Scott Adams, Inc./Dist. by Andrews McMeel
YOU CAN'T SOLVE A PROBLEM JUST BY SAYING TECHY THINGS.
KUBERNETES.

Orchestration – Kubernetes (AKS)

Portability

Deployment options

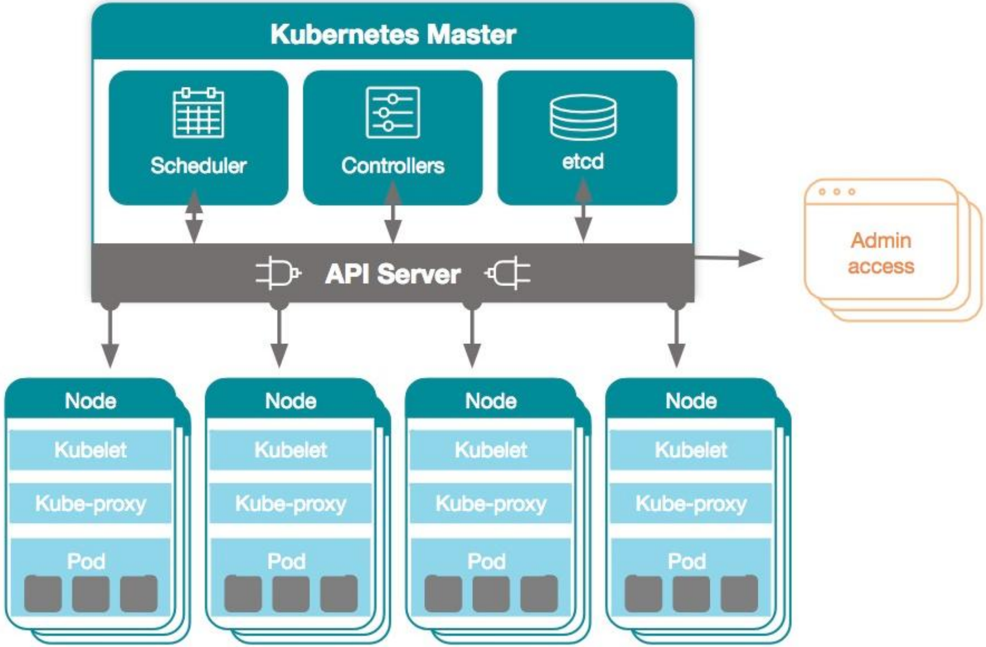
Self-healing

Scheduling

Scalability

Availability

Service discovery



Kubernetes

Cluster

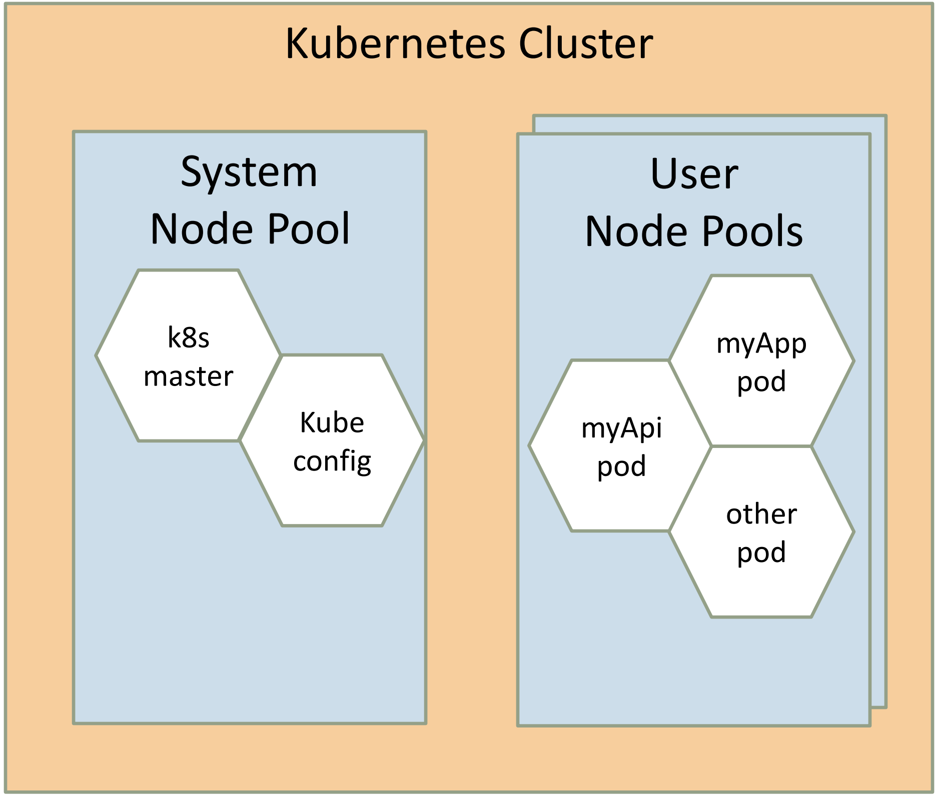
Node Pools

Nodes (VM Scale Set)

Pods

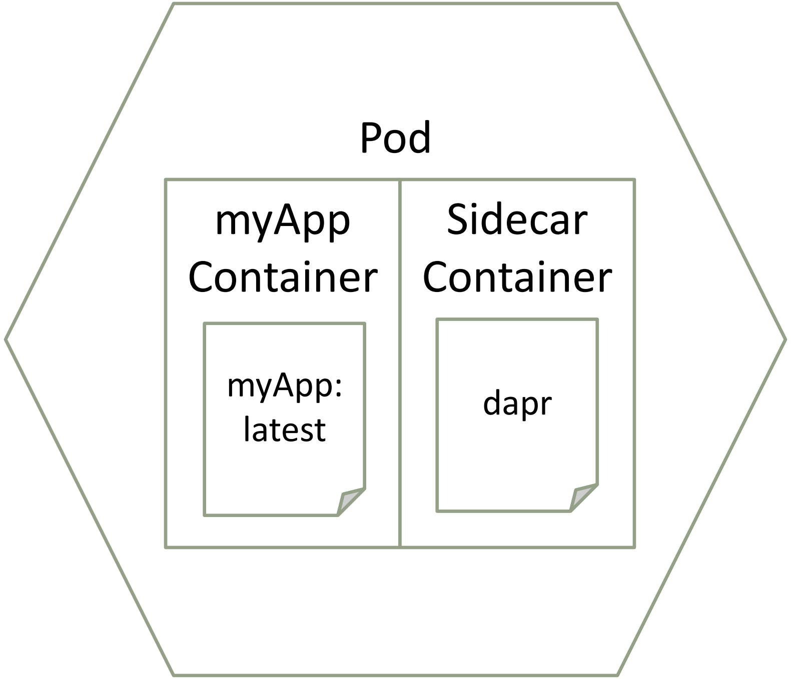
Containers

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

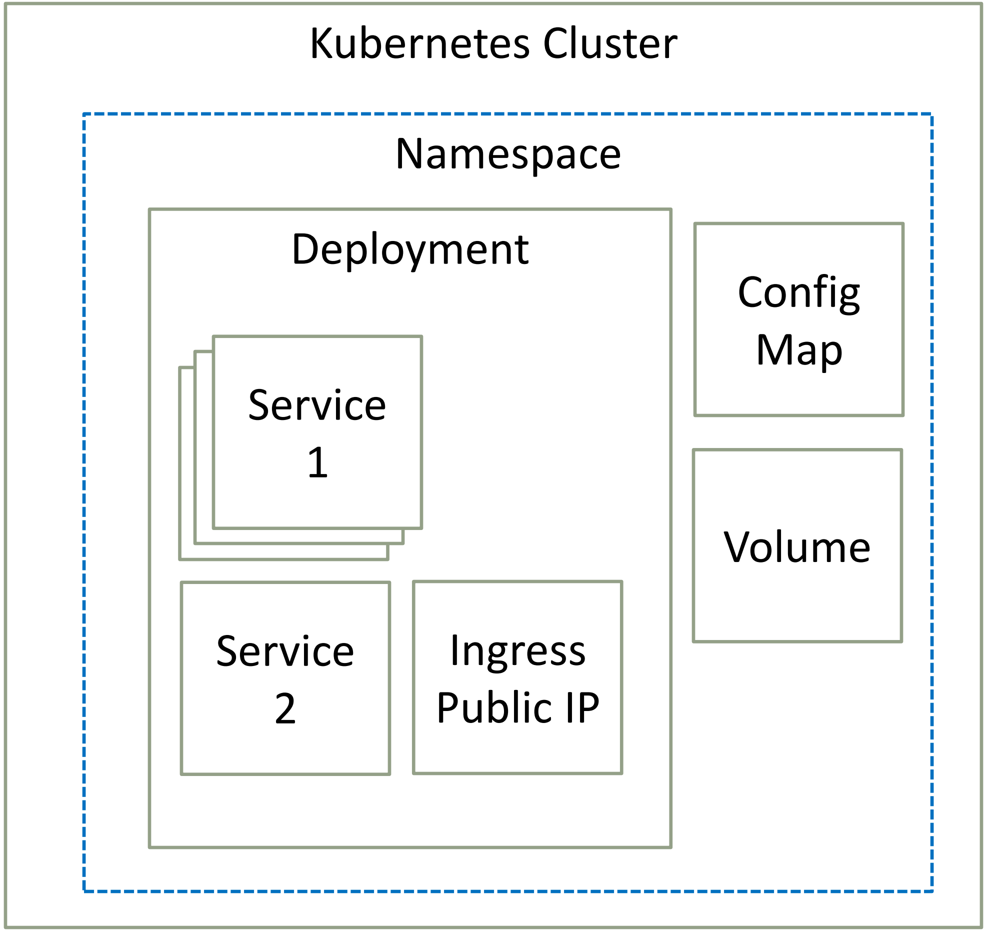
Service

Ingress/Load Balancers

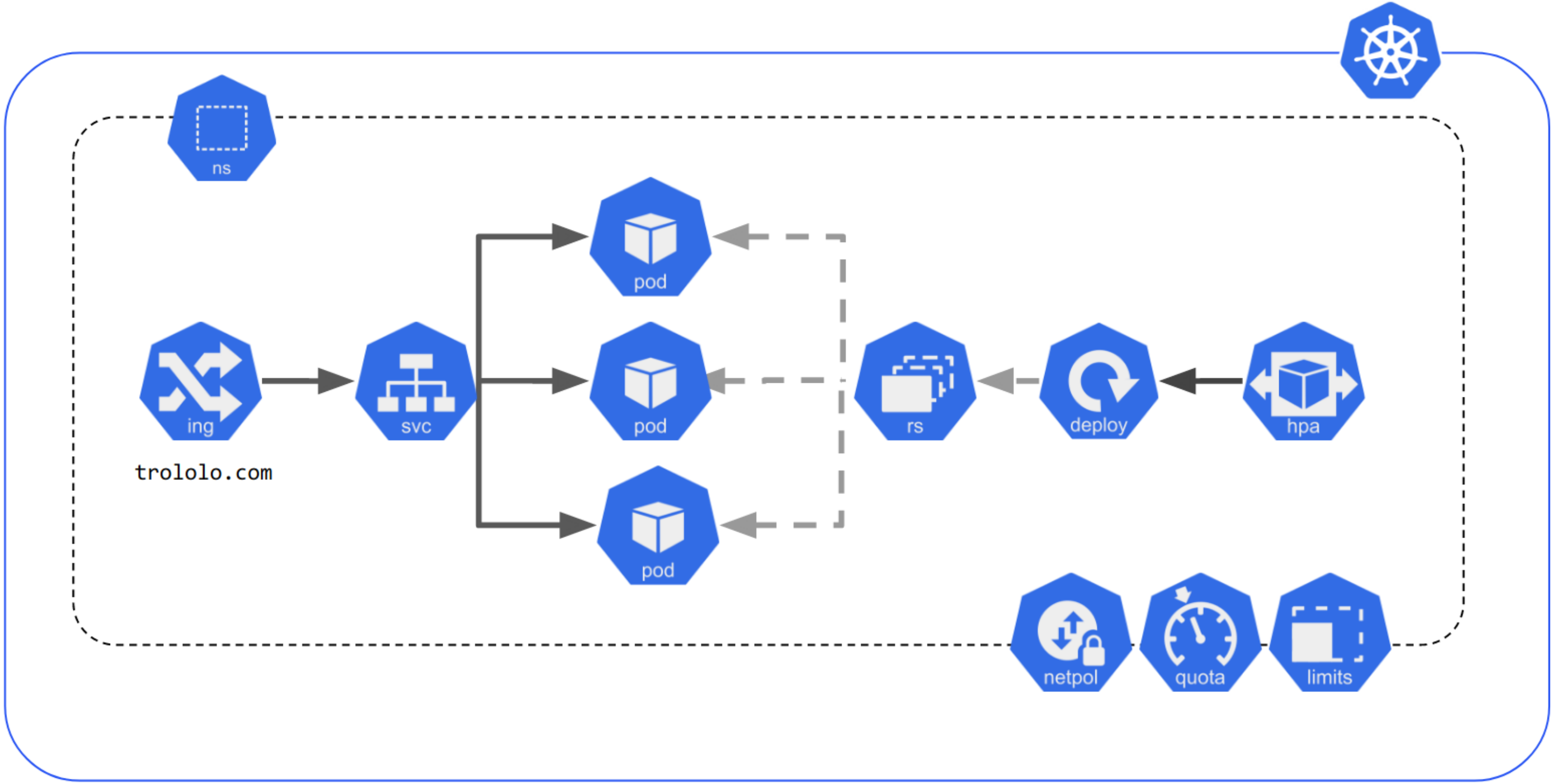
Config Maps

Volumes

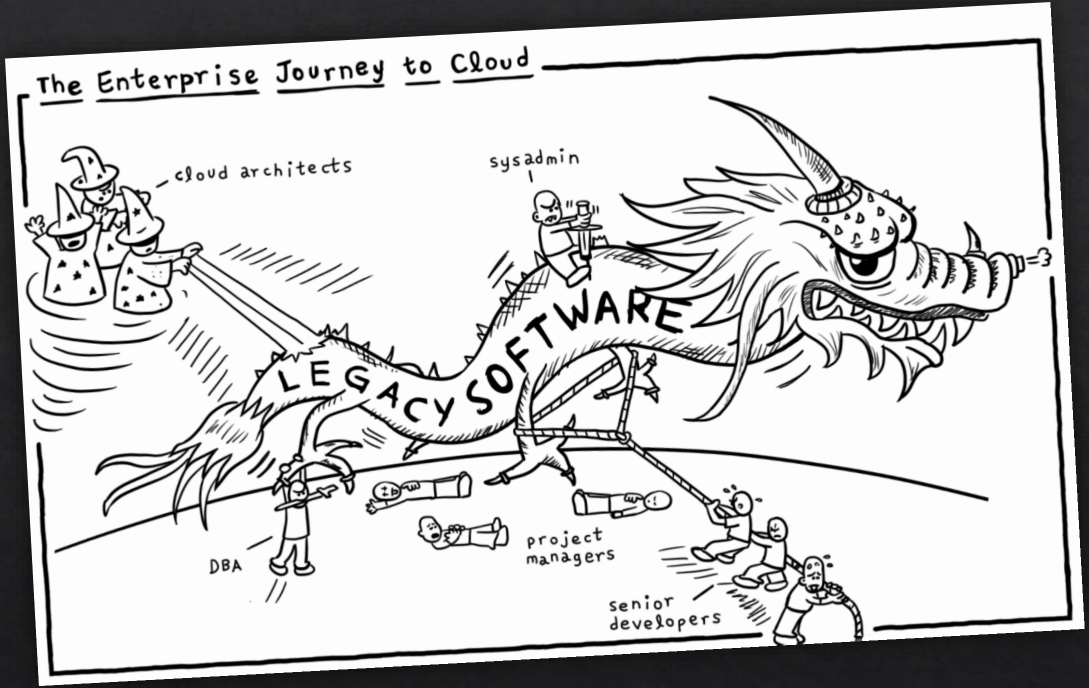
Other…



For example...


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

DEMO



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

AKS = Azure Kubernetes

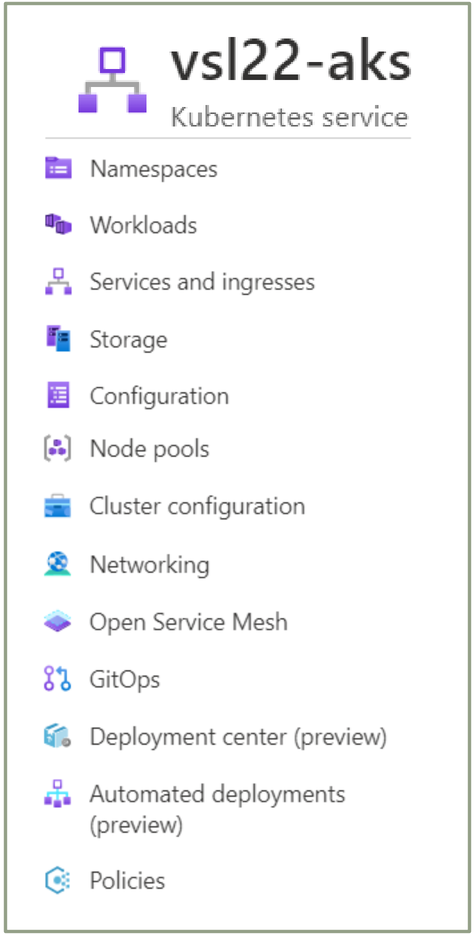
Managed Kubernetes

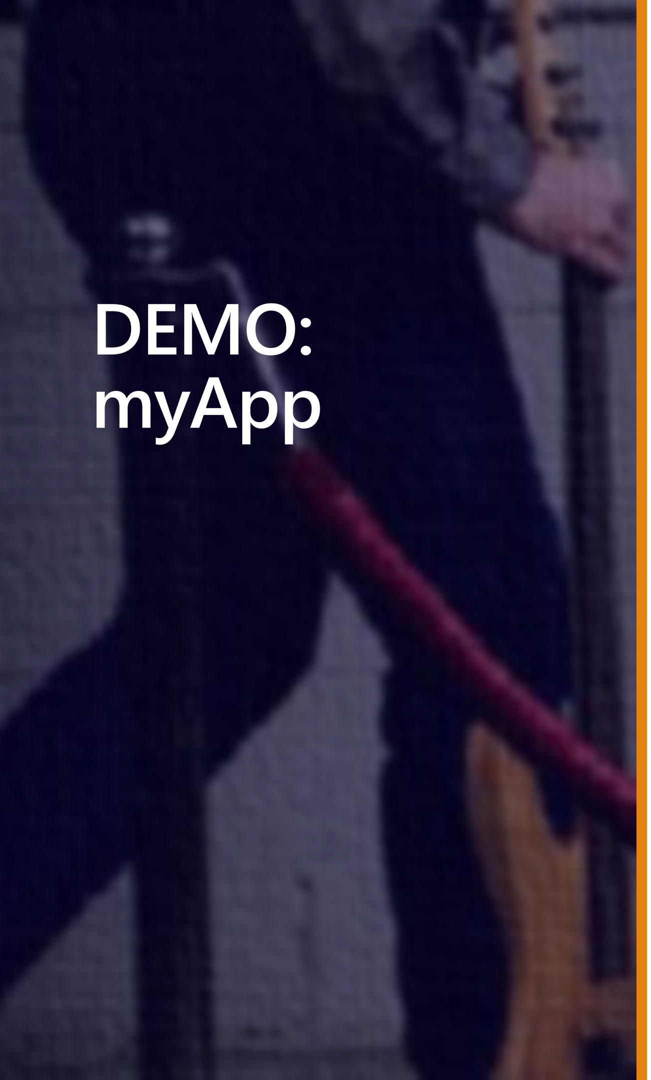
Enables managed identity

Security & compliance done right

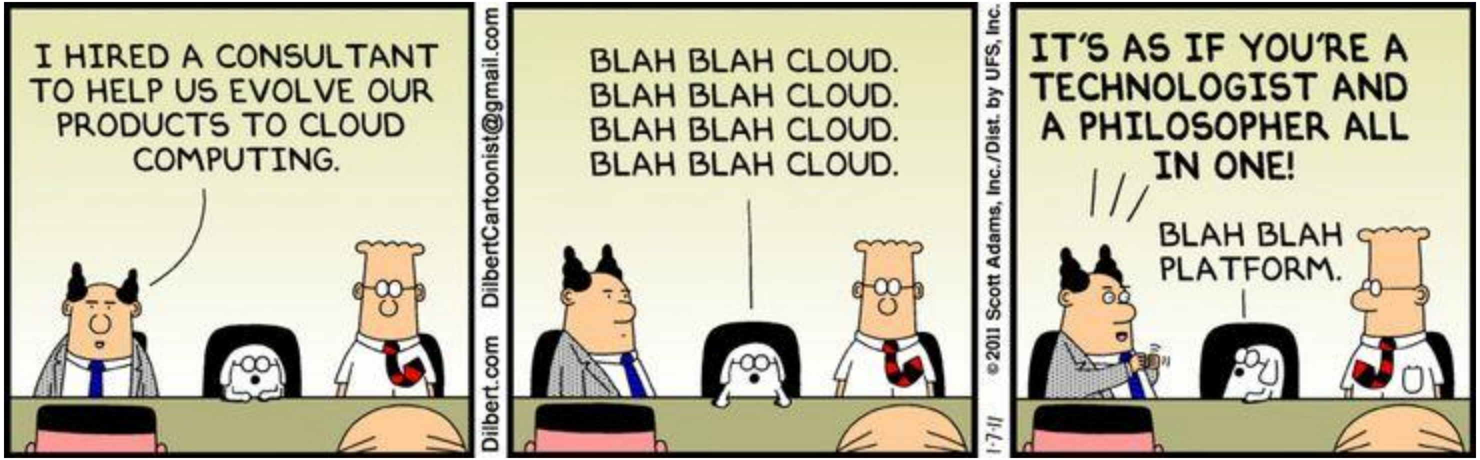
Resource choices

Integrated with Azure Services





DEMO: myApp


I HIRED A CONSULTANT TO HELP US EVOLVE OUR PRODUCTS TO CLOUD COMPUTING.
Dilbert.com DilbertCartoonist@gmail.com
BLAH BLAH CLOUD. BLAH BLAH CLOUD. BLAH BLAH CLOUD. BLAH BLAH CLOUD.
1-7-11 © 2011 Scott Adams, Inc./Dist. by UFS, Inc.
IT'S AS IF YOU'RE A TECHNOLOGIST AND A PHILOSOPHER ALL IN ONE!
BLAH BLAH PLATFORM.

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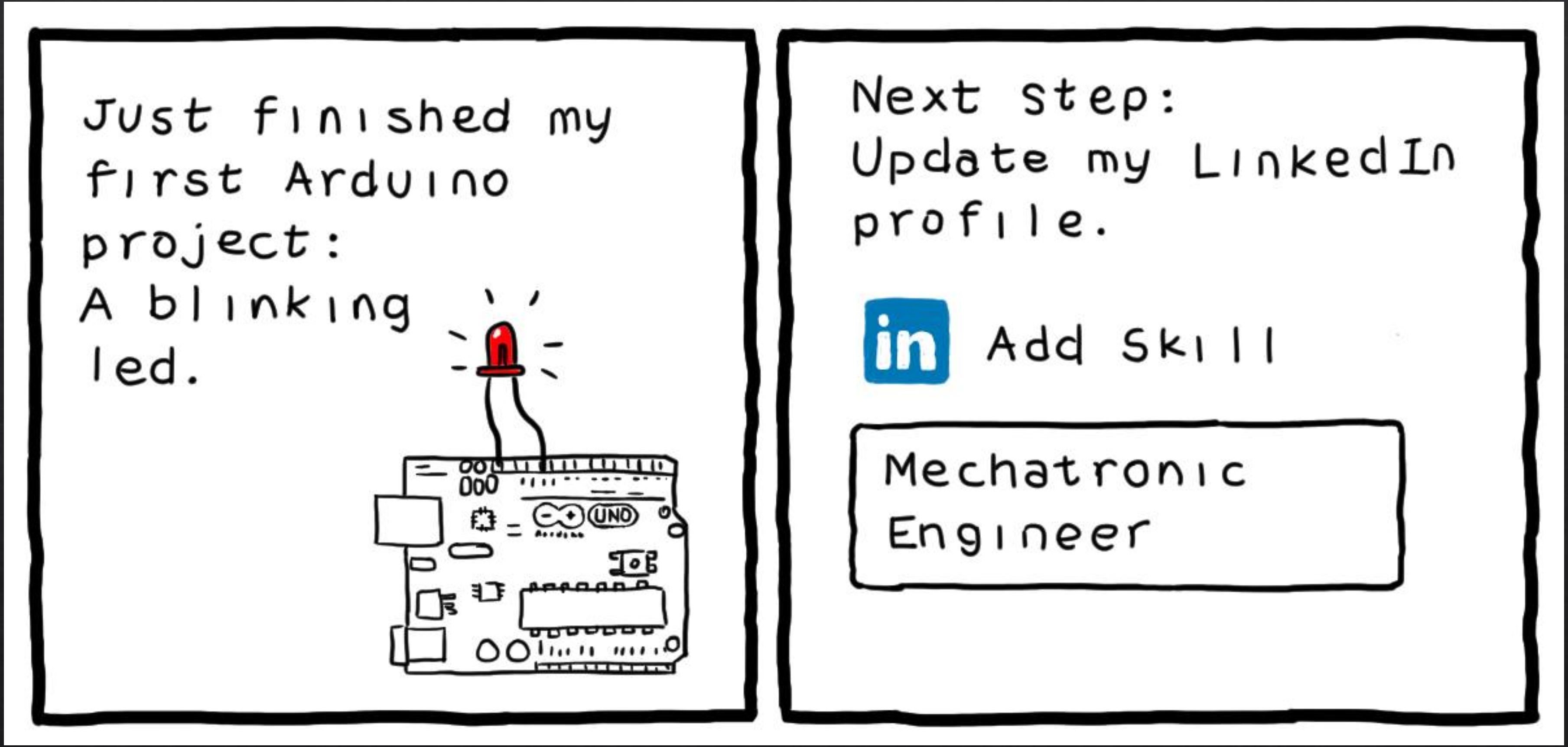
Conclusion

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


Just finished my first Arduino project:
A blinking led.
UNO
Next step:
Update my LinkedIn profile.
in
Add Skill
Mechatronic Engineer

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

Call to Action – Where can I get more info?

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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