Microsoft

Azure

Azure Developer Series

Application Migration to Azure

Peter De Tender

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CEO & Lead Technical Trainer at
007FFFLearning.com

April 2019

About Me...

Peter De Tender – MCT, Azure MVP

- CEO and Lead Technical Trainer of 007FFFLearning.com, +20 years IT experience, mainly datacenters and Microsoft Infrastructure background
- Full-time in Azure since 2013 (Readiness & Architect)
- Azure Advisor, Azure Certified Architect
- Technical Writer, Book author, Courseware Creator
- Living in Belgium, but traveling worldwide 90% of my time, helping larger Microsoft Partners, customers and Microsoft FTEs in learning about and using Azure, by providing workshops with passion

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Microsoft

Azure

Application Migration

Migrating an ASP.NET application to Azure using different Container services

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Migrating an ASP.NET application to Azure using different Container services

Easter Egg Bonus: Migrating a Node.JS app with Mongo DB to Azure Cosmos DB

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Setting the scene

Overview of the workshop

About the workshop content…

About:

In this workshop, you will build a proof of concept (POC) that will transform an existing ASP.NET-based Web application to a container-based application. This POC will deliver a multi-tiered web app solution from a Virtual Machine architecture into Azure, leveraging Azure WebApps and different Azure container solutions available today. You will also migrate the underlying database from a SQL 2014 Virtual Machine architecture to SQL Azure. Easter Bonus: Every now and then, we will showcase similar steps using a Node.JS and MongoDB, migrating to Azure Web Apps, Containers and CosmosDB.

At the end of this workshop, you will have a good understanding of container concepts, Docker architecture and operations, Azure Container Services, Azure Kubernetes Services and SQL Azure PaaS solutioning.

Target Audience:

The workshop is targeted to Cloud Architects, Cloud Solution designers, developers and IT sysadmins, CIO's, CTO's and anybody else who is interested in learning about Azure, containers, application cloud migration and digital transformation.

Focus of the workshop (40%) is getting hands-on experience, complemented with presentations and whiteboard sessions (if in-person delivery).

Time Estimate:

16 hours (+/- 10 hours presentations, 6 hours of optional hands-on labs for attendees)

Workshop Agenda - Presentations

What we will talk about…

- Module 1: Digital App Transformation with Azure
- Module 2: Infrastructure as Code using ARM templates
- Module 3: Azure Database Solutions – SQL Azure (+ Azure Cosmos DB)
- Module 4: Azure App Services – Azure Web Apps (.NET) (+ Node.JS)
- Module 5: Introduction to Docker
- Module 6: Deploying Azure Container Registry / Azure Container Instance
- Module 7: Migrating Apps to Azure Container Services / Kubernetes Services
- Module 8: ACS / AKS Management and Monitoring

Workshop Agenda – Hands-On-Labs

Learn by doing…

- Module 2: Infrastructure as Code using ARM templates
  - **Lab 1:** Setup your Azure subscription and deploy the source Virtual Machine environment with Visual Studio 2017
- Module 3: Azure Database Solutions – SQL Azure
  - **Lab 2:** Migrating a SQL VM database to SQL Azure using SQL Management Studio
- Module 4: Azure App Services – Azure Web Apps
  - **Lab 3:** Migrating your legacy ASP.NET application to Azure Web Apps with Visual Studio 2017
- Module 5: Introduction to Docker
  - **Lab 4:** Containerizing your legacy ASP.NET application with Docker CE for Windows

Workshop Agenda – Hands-On-Labs

Learn by doing…

- Module 6: Deploying Azure Container Registry / Azure Container Instance
  - **Lab 5:** Using Azure Container Registry, Azure Container Instance
- Module 7: Migrating Apps to Azure Container Services / Kubernetes Services
  - **Lab 6:** Deploying Azure Container Services with Kubernetes and running Pods
  - **Lab 7:** Deploying Azure Kubernetes Services
- Module 8: ACS / AKS Monitoring and Operations
  - **Lab 8:** Integrating ACS monitoring with Azure Monitor and Deploying Kubernetes Dashboard

Node.JS and Cosmos DB labs are available on request

Technical Requirements

What you need…

<Could vary based on the actual delivery-method>, but overall:

- Client workstation running recent Windows, Linux or Mac OS and latest internet browser
- Access to ports 80 (HTTP), 443 (HTTPS) and 3389 (Remote Desktop)
- Full Azure subscription (MSDN, AzurePass, Paid subscription, AE, CSP,…)
  Note: Azure trial subscription doesn't work for all required lab steps)
- Lab consumption estimate: $15-35

Questions and HOL support

msdevseriessupport@007FFFLearning.com

Subject: Azure Developer Series – Containers

Response Time: within 4-8 hours

Check GitHub for FAQ and Updates: http://www.github.com/007FFFLearning/MSDevSeriesSupport

Questions Landing Spot

> “…If you want good answers, ask better questions…”

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Why and How does Azure supports digital transformation

Digital Transformation

Key Objectives

What you will learn in this section

- Digital Transformation
- The journey to the cloud
- Introduction to Containers
- Introduction to Microservices
- Technologies covered in this workshop series

Digital Transformation

What is this digital transformation everybody talks about?

- Digital transformation helps organizations to **improve efficiency and effectiveness** of service/products, using the **latest available technology**.

- Instead of replicating an existing platform, we use technology to **transform that service/product into something significantly better.**

Digital Transformation

What does digital transformation mean for

IT Admins?

- Digital Transformation is using technology to **radically change the datacenter**
- Don't focus on **the location of the technology**, but rather focus on **the use of technology**
- **Embrace** the **continuous flow** of updates and changes, and **keep up** with it.

Digital Transformation

What does digital transformation mean for

Developers?

,

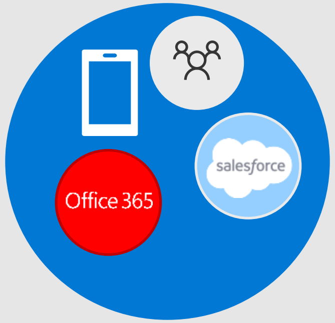
- Digital Transformation is using technology to **radically change your application landscape**
- Don’t focus on **dev language**, but rather focus on **the capabilities a language brings**
- Importantly, think **broader** than just the application,the data,… but how it runs and scales

Digital Transformation is continuously evolving

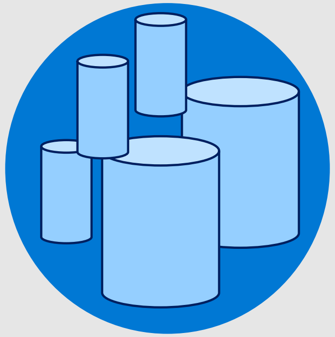
Physical
Datacenter

Virtualized
Datacenter

Virtualized
Datacenter
in public cloud



Mobility and SaaS



BIG Data Solutions

Artificial Intelligence

What is App Modernization?

IT SIMPLIFICATION

- Standardize on the platform and solutions
- Migrate away from legacy systems
- Integrate automation

GROWTH ENABLEMENT

- Focus on the business growth, not the technology
- Easily allow for business scale
- Provide business Insights and Analytics

AGILITY

- Faster deployment to different environments
- Aligned deployment / Less mistakes
- DevOps practices using continuous delivery

REDUCING TCO

- Downsize on infrastructure running cost
- Minimize ongoing maintenance efforts
- Make applications portable

What media should I use to keep backup?

What is the right **size** of **servers** for my business needs?

How do I **deploy** new **code** to my **server**?

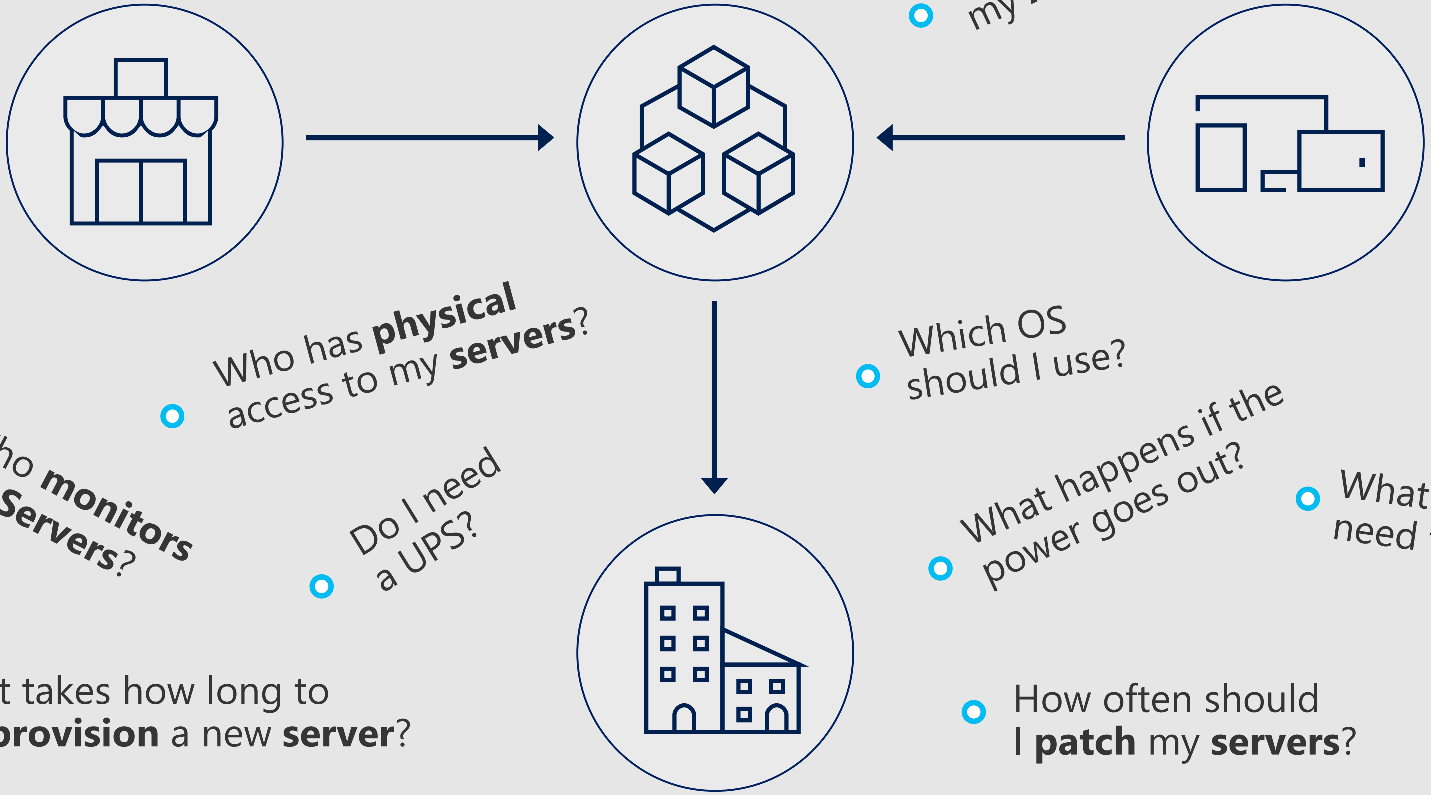
What happens in case of **server hardware** failure?

Which packages should be on my **server**?

What size of **servers** should I **buy**?

Who **monitors** my **App**?

How often should I backup my **server**?



How can I **scale** my app?

How can I increase **server** utilization?

Who has **physical** access to my **servers**?

Which OS should I use?

Are my **server** in a secure location?

Do I need secondary network connection?

Who **monitors** my **Servers**?

Do I need a UPS?

What happens if the power goes out?

What storage I need to use?

How many **servers** do I need?

It takes how long to **provision** a new **server**?

How often should I **patch** my **servers**?

How can I dynamically configure my app?

The “evolution” of application platforms

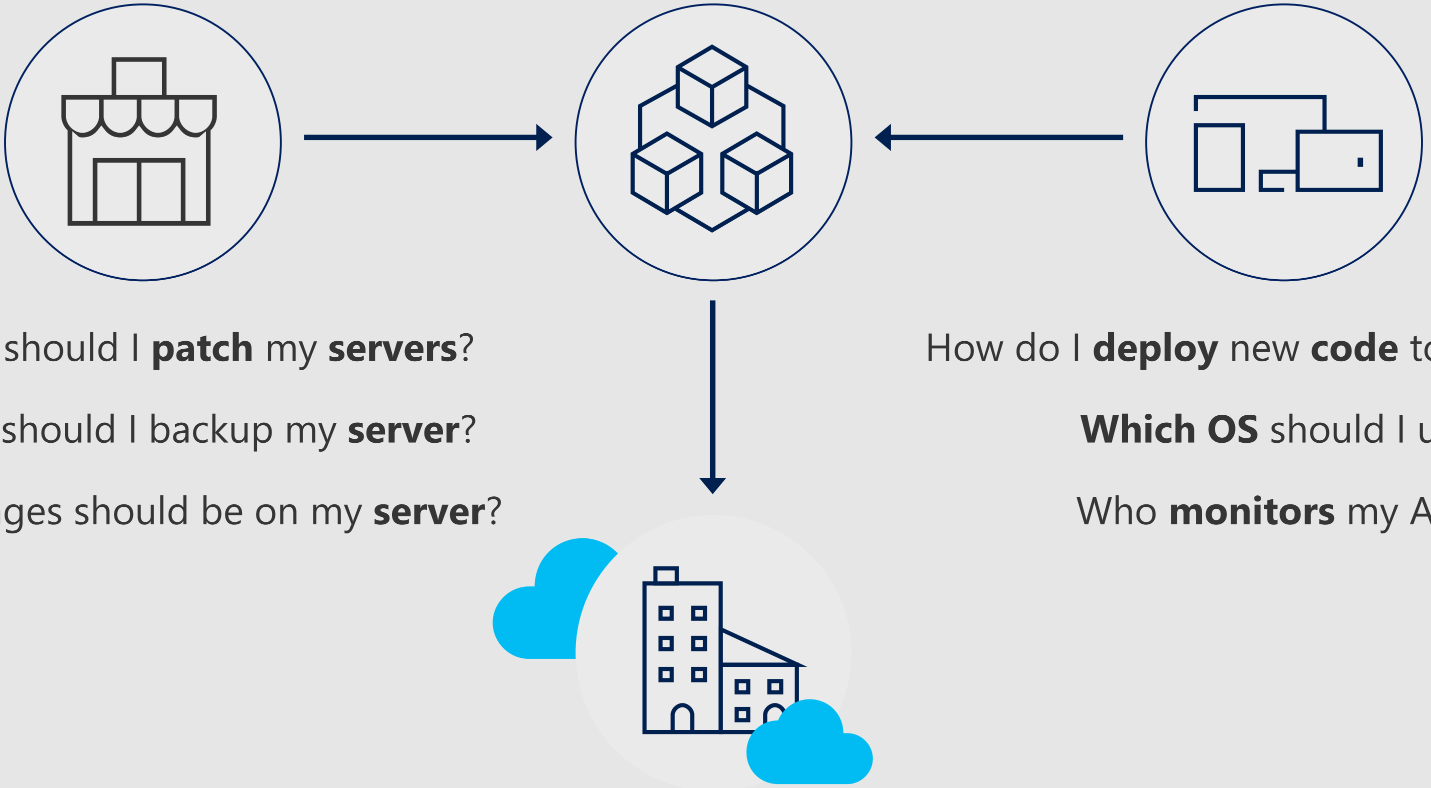
On-Premises

What is the right **size** of **servers** for my business needs?

How can I increase **server** utilization?

How many **servers** do I need?

How can I **scale** my app?



How often should I **patch** my **servers**?

How often should I backup my **server**?

Which packages should be on my **server**?

How do I **deploy** new **code** to my **server**?

Which OS should I use?

Who **monitors** my App?

The “evolution” of application platforms

On-Premises

IaaS

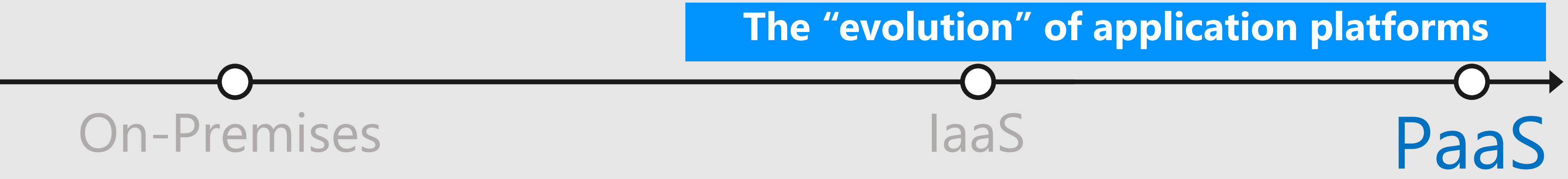
What is the right **size** of **“servers”** for my business needs?

How can I increase **“server”** utilization?

How many **“servers”** do I need?

How can I **scale** my app?

What are **containers**?



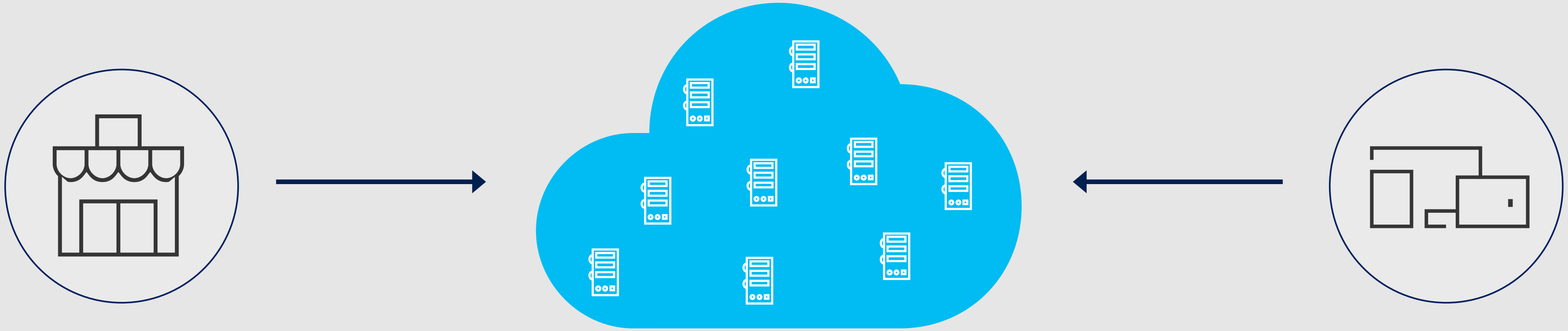
The “evolution” of application platforms

On-Premises

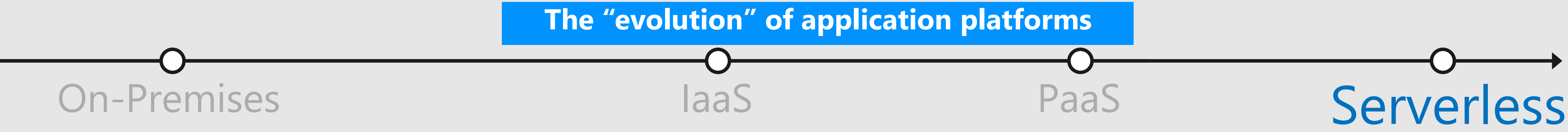
IaaS

PaaS

How do I **(re)architect** my app?



Serverless, the platform for next gen apps



The “evolution” of application platforms

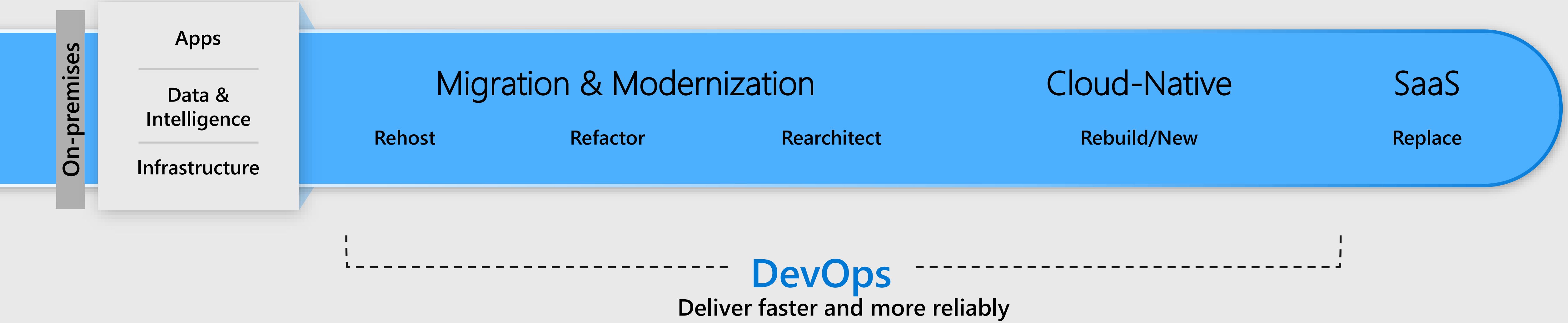
On-Premises

IaaS

PaaS

Serverless

The journey to the cloud



On-premises

Apps

Data & Intelligence

Infrastructure

Migration & Modernization

Rehost

Refactor

Rearchitect

Cloud-Native

Rebuild/New

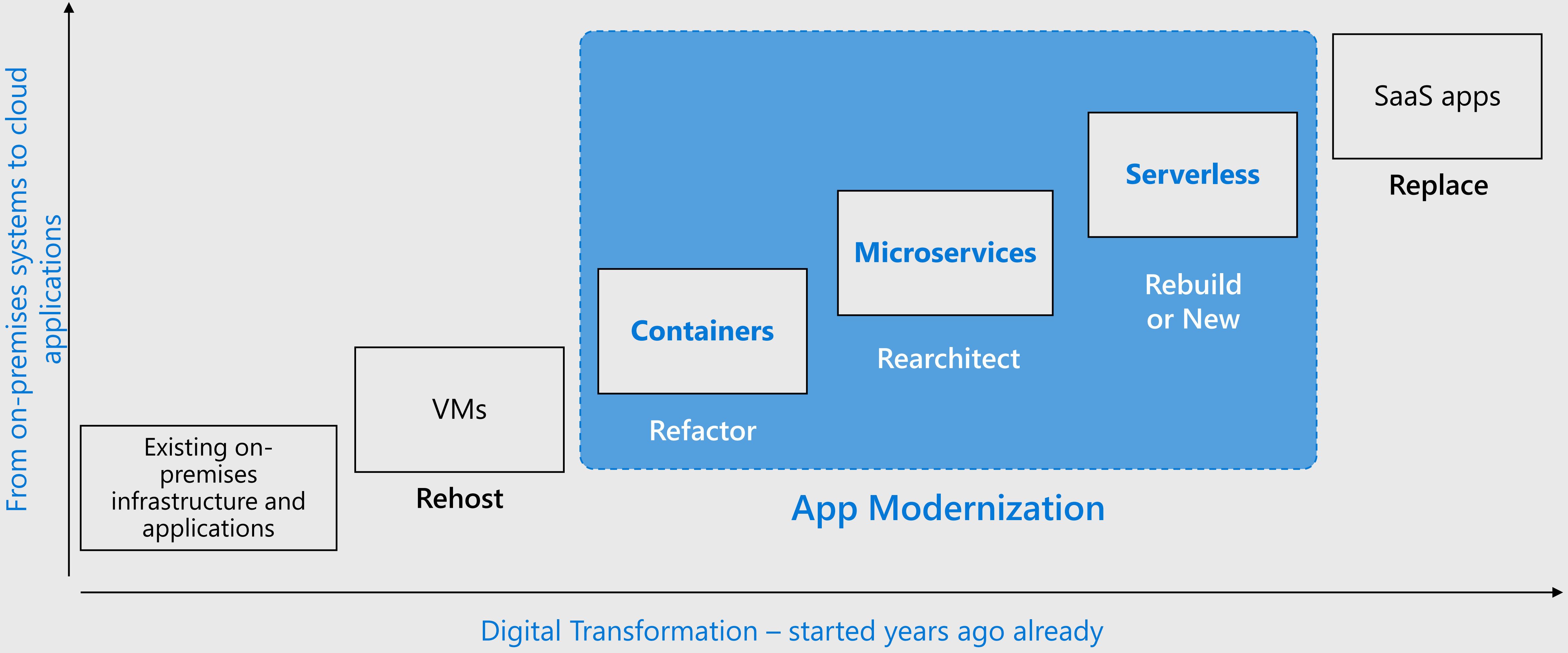
SaaS

Replace

DevOps

Deliver faster and more reliably

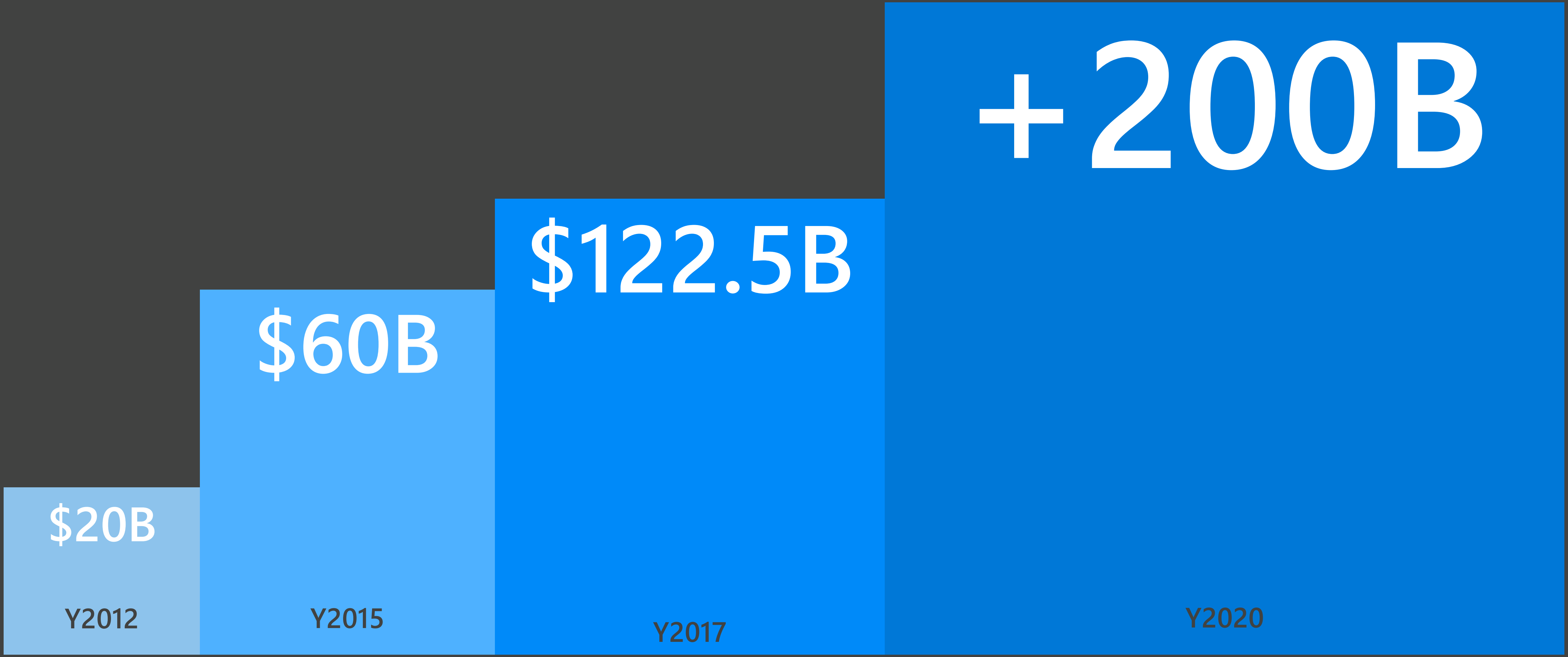
The journey to the cloud


From on-premises systems to cloud applications
Existing on-premises infrastructure and applications
VMs
Rehost
Containers
Refactor
Microservices
Rearchitect
Serverless
Rebuild or New
App Modernization
SaaS apps
Replace
Digital Transformation – started years ago already

The Cloud becomes mainstream

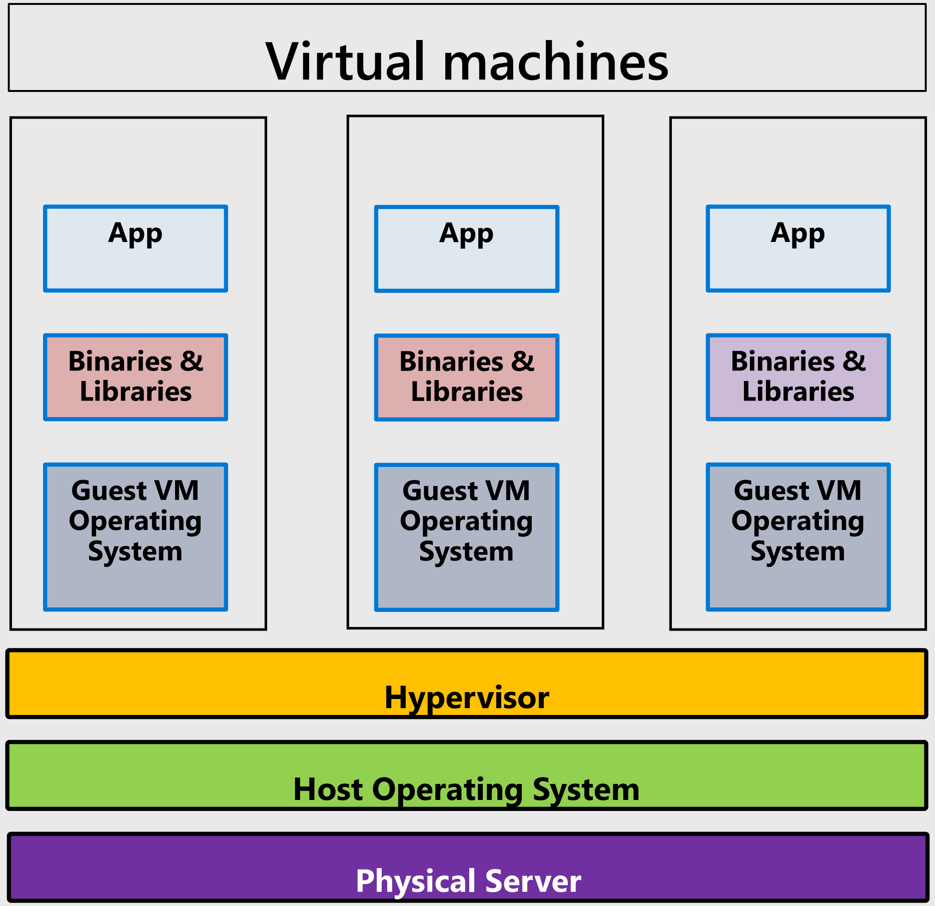
In 2012: “if” we are moving to the cloud

In 2017: “when” and “how” we are moving to the cloud

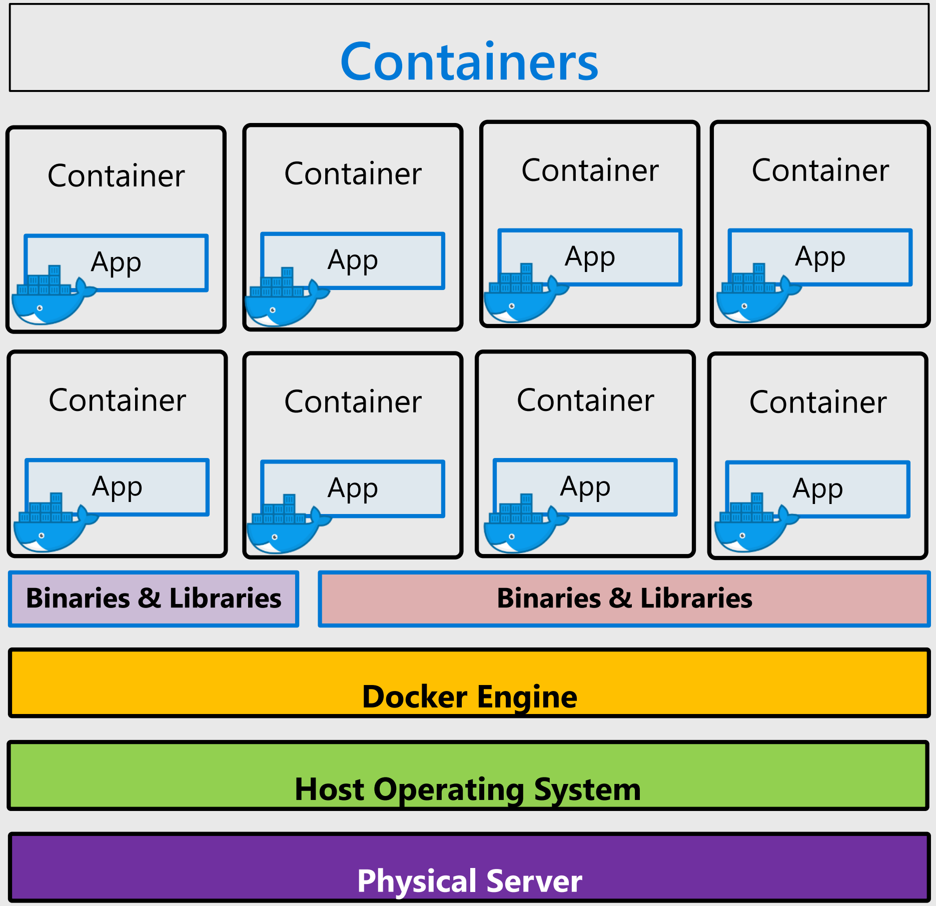


(*) Source: International Data Corporation - 2017

What are containers?



- Virtualize the **hardware**
- **VMs** as units of scaling
- Hypervisor **dependent**
- **Not** easily movable



- Virtualize the **operating system**
- **Applications** as units of scaling
- Platform **independent**
- **Easily** movable across environments (on-premises, multi-cloud)

What are Microservices?

From Monolithic to independent modules

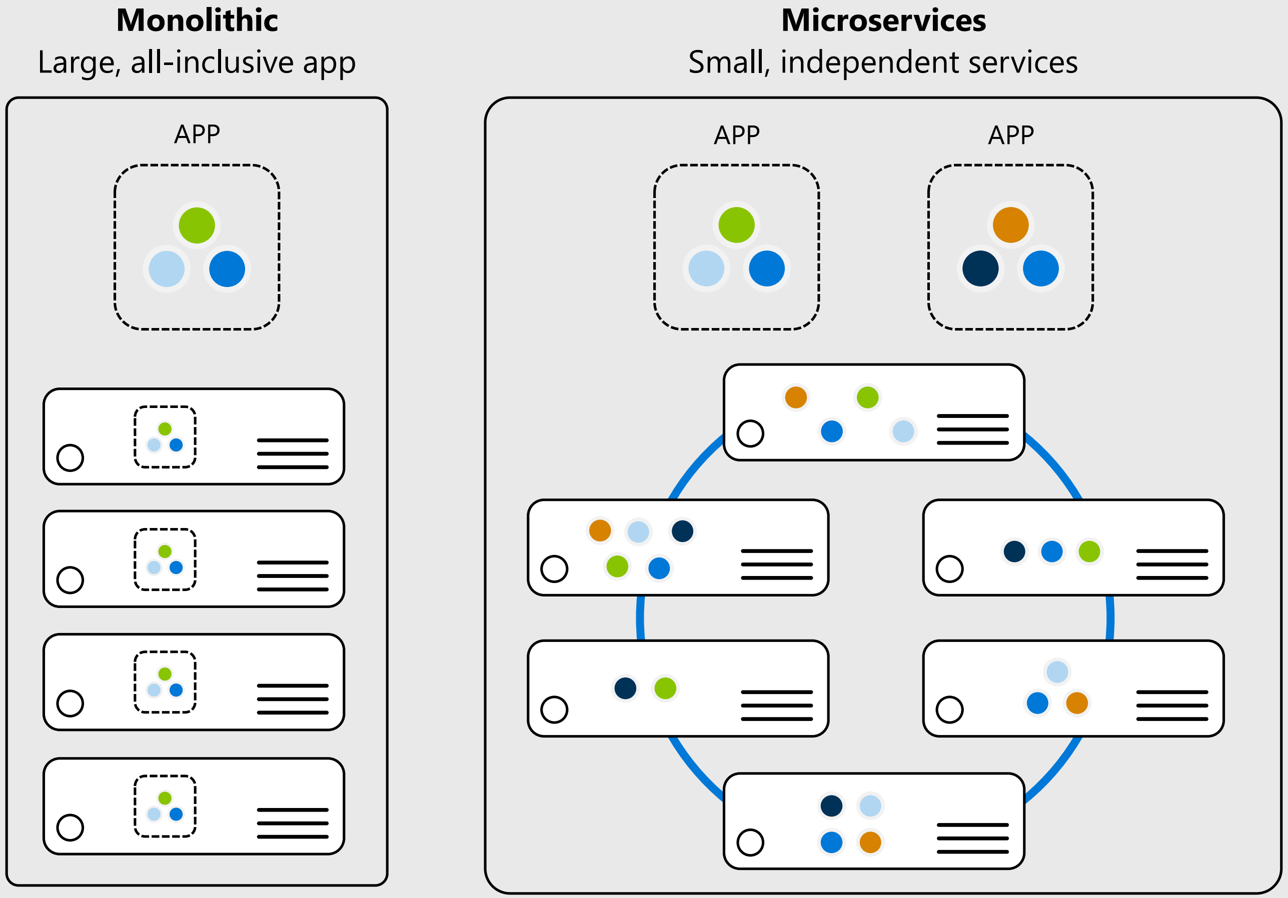
Complex, larger, all-inclusive systems are rearchitected to simpler, smaller, single-purposed modules. Still resulting in a full-fletched application landscape

Each module runs a single functionality

These service modules are highly decoupled building blocks that are small enough to implement a single functionality but together can form larger systems

Independently versioned, deployed & scaled

With a microservices architecture, developers can create, manage and improve application services independently, even using different languages



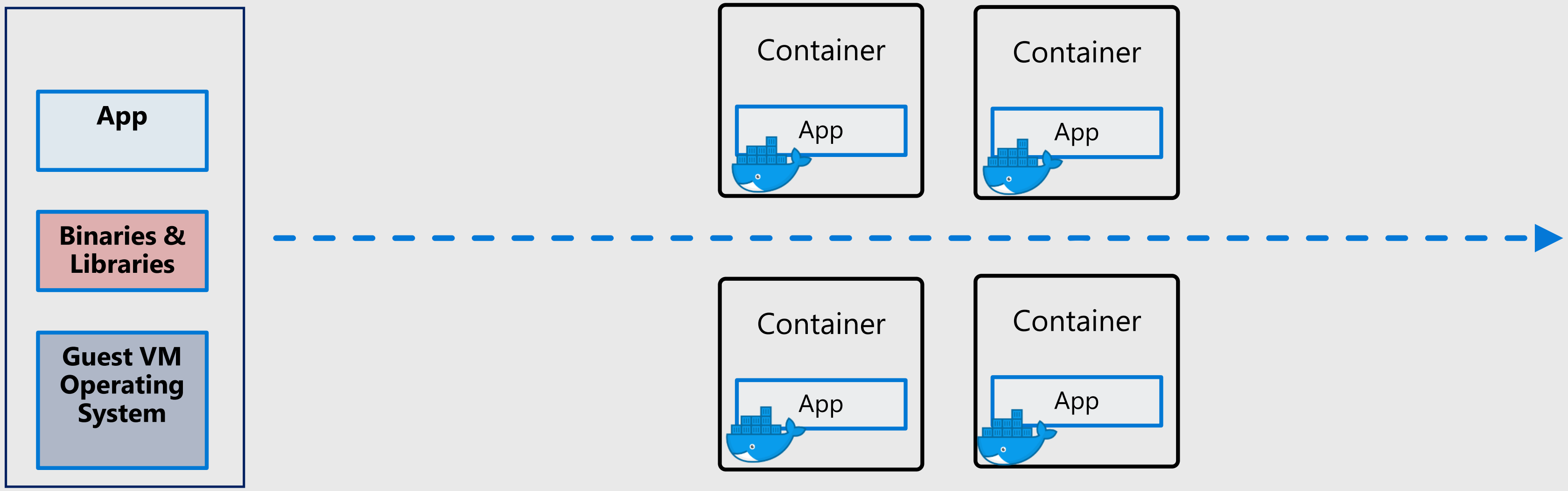
Monolithic
Large, all-inclusive app

Microservices
Small, independent services

Containers provide the consistent format and isolation desired by microservices.

How do containers help in app modernization?

Containers are stand-alone, smaller silos of app instances, running at scale



Existing/New Applications

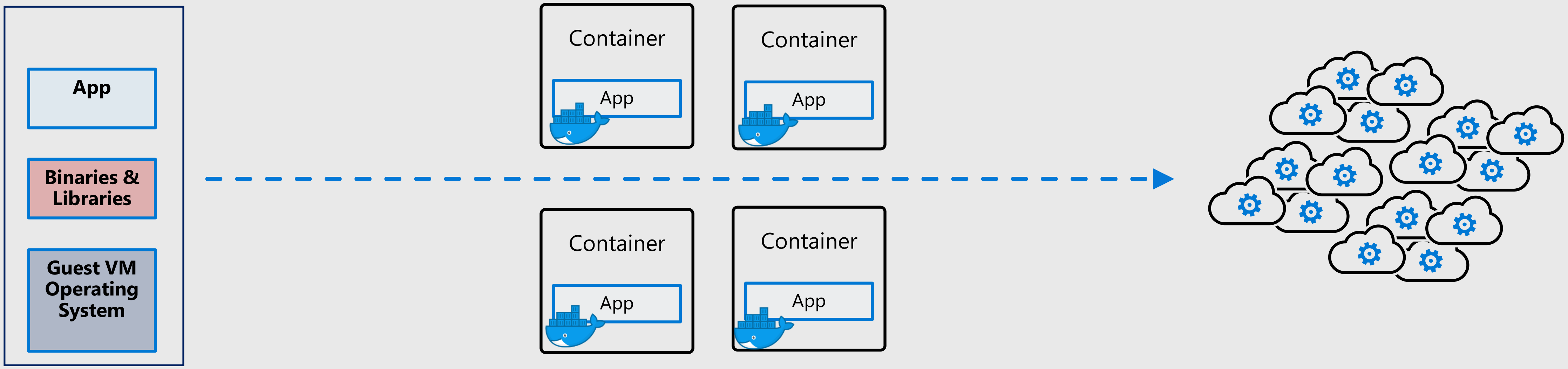
(=rehome)

Lift and shift to containers

(= rehost, refactor)

How do containers help in app modernization?

Containers are not the end-state, but an in-between path to Microservices



Existing/New Applications

(=rehome)

Lift and shift to containers

(= rehost, refactor)

Microservices

(=rearchitect)

Questions Landing Spot

> “…If you want good answers, ask better questions…”

© Randy Glasbergen

Running Containers on Azure: a full set of choices

App Service

Deploy web apps or APIs using **containers** in a PaaS environment

Service Fabric

Modernize **.NET applications** to microservices using **Windows Server containers**

Kubernetes Service

Scale and orchestrate **Linux containers using Kubernetes**

Container Instance

Elastically burst from your **Azure Kubernetes Service** (AKS) cluster

Partner Ecosystem

Bring your **Partner solutions** that run great on Azure

Azure Container Registry

Docker Hub

Choice of developer tools and clients

Containers on Azure: covered in this workshop

App Service

Running Docker Containers as Azure Web Apps

Kubernetes Service

Azure Container Services (ACS) with Kubernetes + Azure Kubernetes Service

Container Instance

Running Stand-Alone Docker Containers as a Container Instance

Docker CE

Docker Community Edition on Windows Server 2016/2019

Azure Container Registry

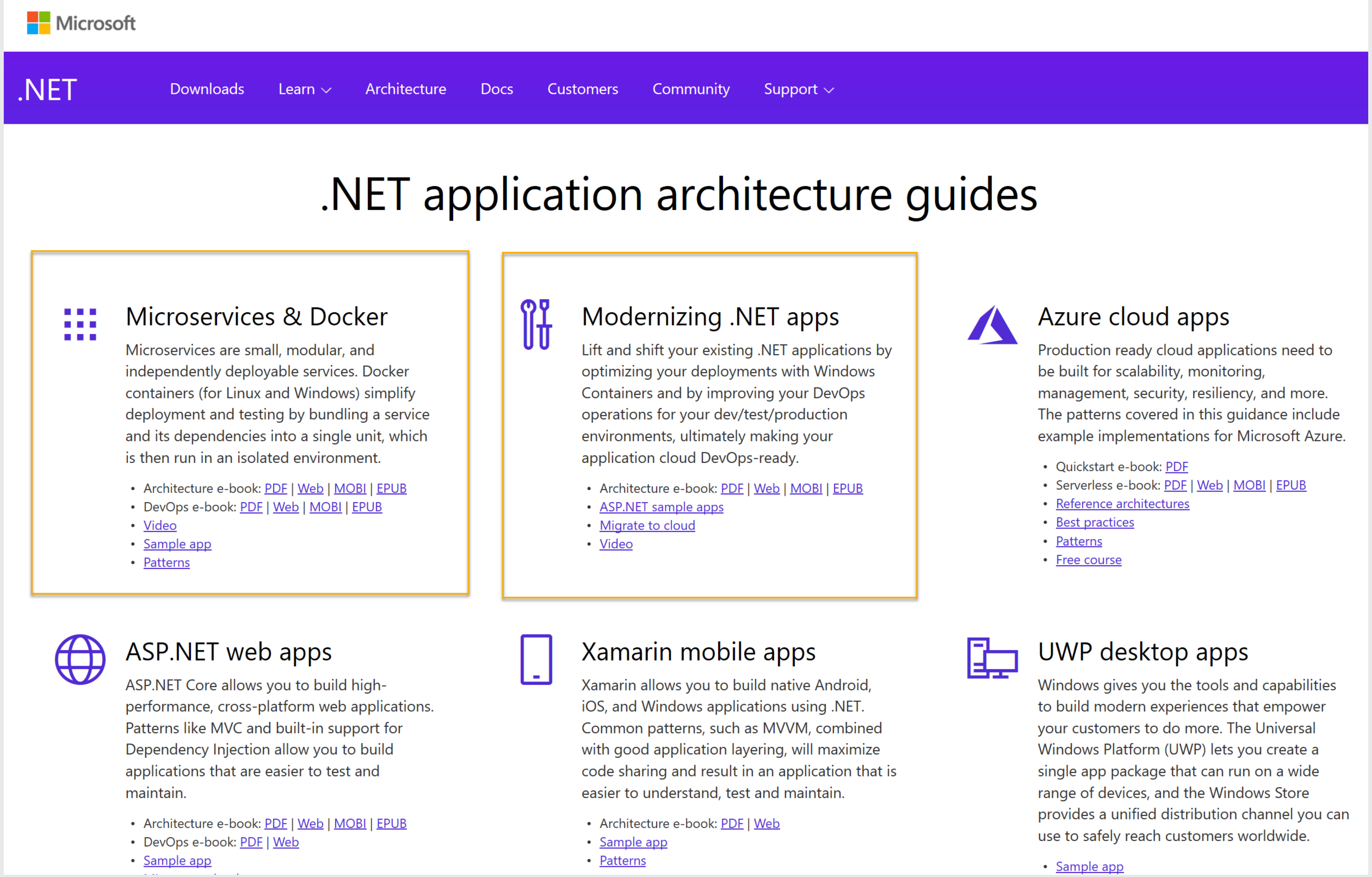
Docker Hub

Choice of developer tools and clients

Isn’t ASP.NET the « easy » example?

- ASP.NET is used for 60% of all global Enterprise Web applications
- Containers are not development language specific
- Remember, digital transformation is focusing on the evolution, not the technology or language behind it
- Examples we use in this workshop are just examples
- The Azure Developer Series workshops offer many different scenarios and covers several different solutions
- Easter Egg Bonus: Node.JS with Mongo DB / Cosmos DB

ASP.Net application architecture guides



Microsoft

.NET Downloads Learn Architecture Docs Customers Community Support

.NET application architecture guides

Microservices & Docker

Microservices are small, modular, and independently deployable services. Docker containers (for Linux and Windows) simplify deployment and testing by bundling a service and its dependencies into a single unit, which is then run in an isolated environment.

- Architecture e-book: PDF | Web | MOBI | EPUB
- DevOps e-book: PDF | Web | MOBI | EPUB
- Video
- Sample app
- Patterns

Modernizing .NET apps

Lift and shift your existing .NET applications by optimizing your deployments with Windows Containers and by improving your DevOps operations for your dev/test/production environments, ultimately making your application cloud DevOps-ready.

- Architecture e-book: PDF | Web | MOBI | EPUB
- ASP.NET sample apps
- Migrate to cloud
- Video

Azure cloud apps

Production ready cloud applications need to be built for scalability, monitoring, management, security, resiliency, and more. The patterns covered in this guidance include example implementations for Microsoft Azure.

- Quickstart e-book: PDF
- Serverless e-book: PDF | Web | MOBI | EPUB
- Reference architectures
- Best practices
- Patterns
- Free course

ASP.NET web apps

ASP.NET Core allows you to build high-performance, cross-platform web applications. Patterns like MVC and built-in support for Dependency Injection allow you to build applications that are easier to test and maintain.

- Architecture e-book: PDF | Web | MOBI | EPUB
- DevOps e-book: PDF | Web
- Sample app

Xamarin mobile apps

Xamarin allows you to build native Android, iOS, and Windows applications using .NET. Common patterns, such as MVVM, combined with good application layering, will maximize code sharing and result in an application that is easier to understand, test and maintain.

- Architecture e-book: PDF | Web
- Sample app
- Patterns

UWP desktop apps

Windows gives you the tools and capabilities to build modern experiences that empower your customers to do more. The Universal Windows Platform (UWP) lets you create a single app package that can run on a wide range of devices, and the Windows Store provides a unified distribution channel you can use to safely reach customers worldwide.

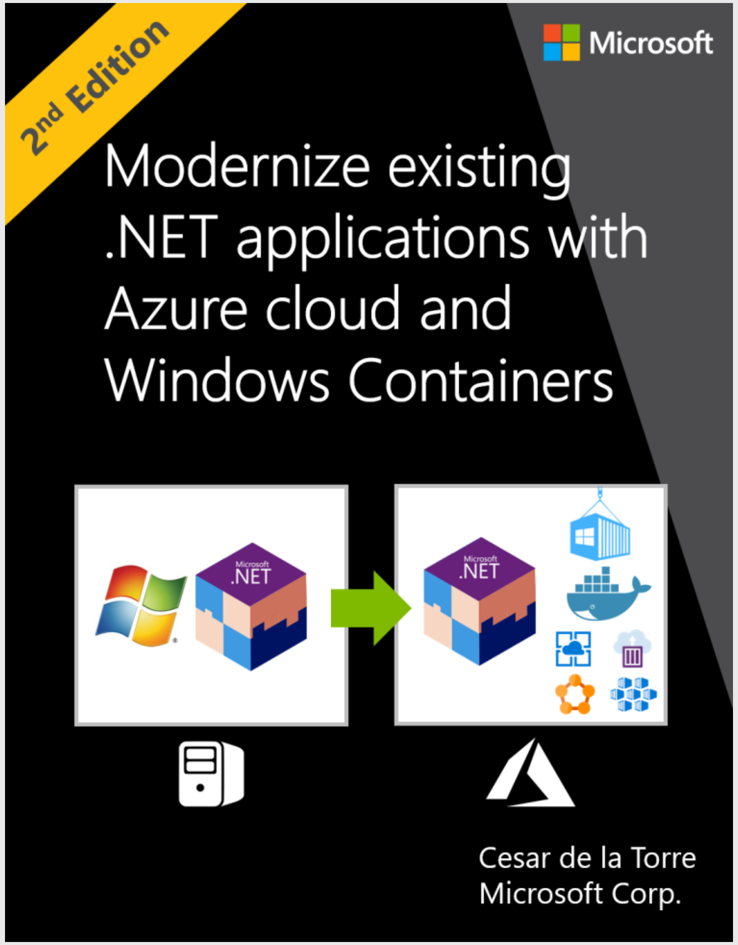
- Sample app

https://www.microsoft.com/net/learn/dotnet/architecture-guides

- Microservices
- Docker
- Windows Containers
- Azure Containers

Guide/eBook and sample apps on Modernize with Windows Containers

eBook/Guide



2nd Edition

Microsoft

Modernize existing .NET applications with Azure cloud and Windows Containers

Cesar de la Torre
Microsoft Corp.

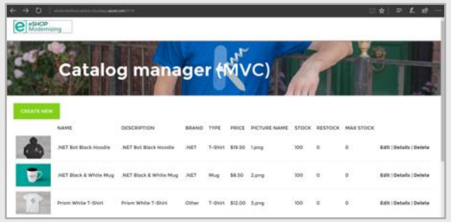
https://aka.ms/liftandshiftwithcontainersebook

Sample Apps for modernization

- Intended for .NET developers and solution architects
- Prescriptive guidance on how to modernize your existing .NET apps and migrate to the Azure cloud
- Accompanied with journeys of modernizing existing ASP.NET web apps (**WebForms**, **MVC**) and N-Tier apps (**WCF** + **WinForms**) on <u>eShopModernizing</u> repository.

Client UI apps

ASP.NET MVC & Web Forms

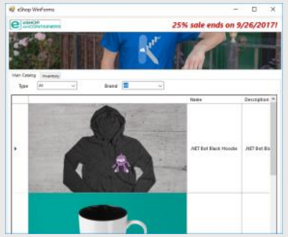


Catalog manager (MVC)

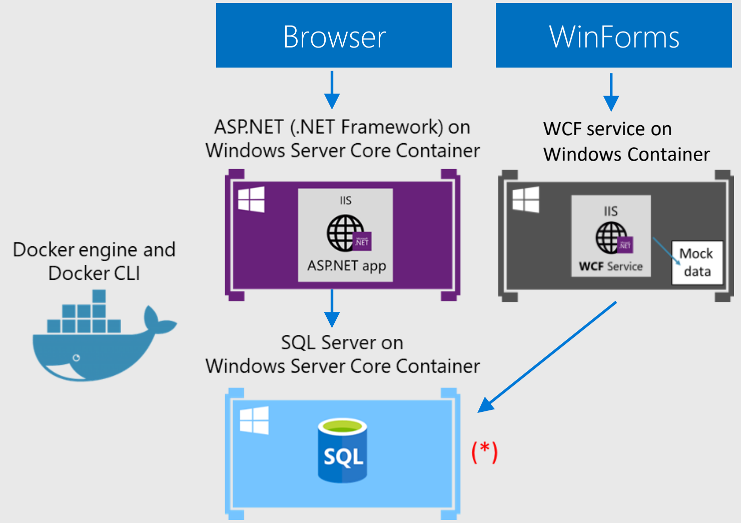
CREATE NEW

	NAME	DESCRIPTION	BRAND	TYPE	PRICE	PICTURE NAME	STOCK	RESTOCK	MAX STOCK	
	.NET Bot Black Hoodie	.NET Bot Black Hoodie	.NET	T-Shirt	$19.50	1.png	100	0	0	Edit | Details | Delete
	.NET Black & White Mug	.NET Black & White Mug	.NET	Mug	$8.50	2.png	100	0	0	Edit | Details | Delete
	Prism White T-Shirt	Prism White T-Shirt	Other	T-Shirt	$12.00	3.png	100	0	0	Edit | Details | Delete

WinForms



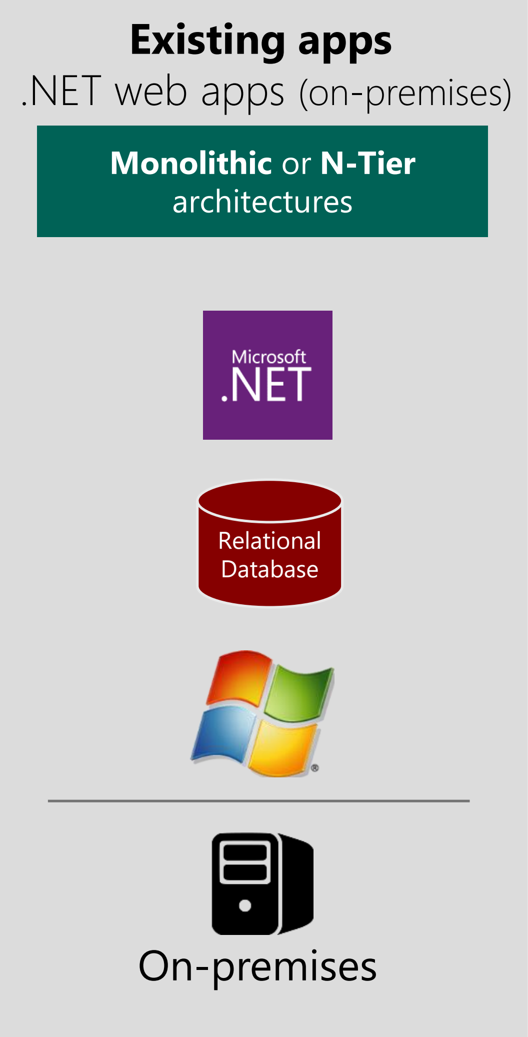
Architecture



Browser
WinForms
ASP.NET (.NET Framework) on Windows Server Core Container
WCF service on Windows Container
IIS
ASP.NET app
IIS
WCF Service
Mock data
Docker engine and Docker CLI
SQL Server on Windows Server Core Container
SQL
(*)

https://github.com/dotnet-architecture/eShopModernizing

Maturity model for .Net applications



Existing apps

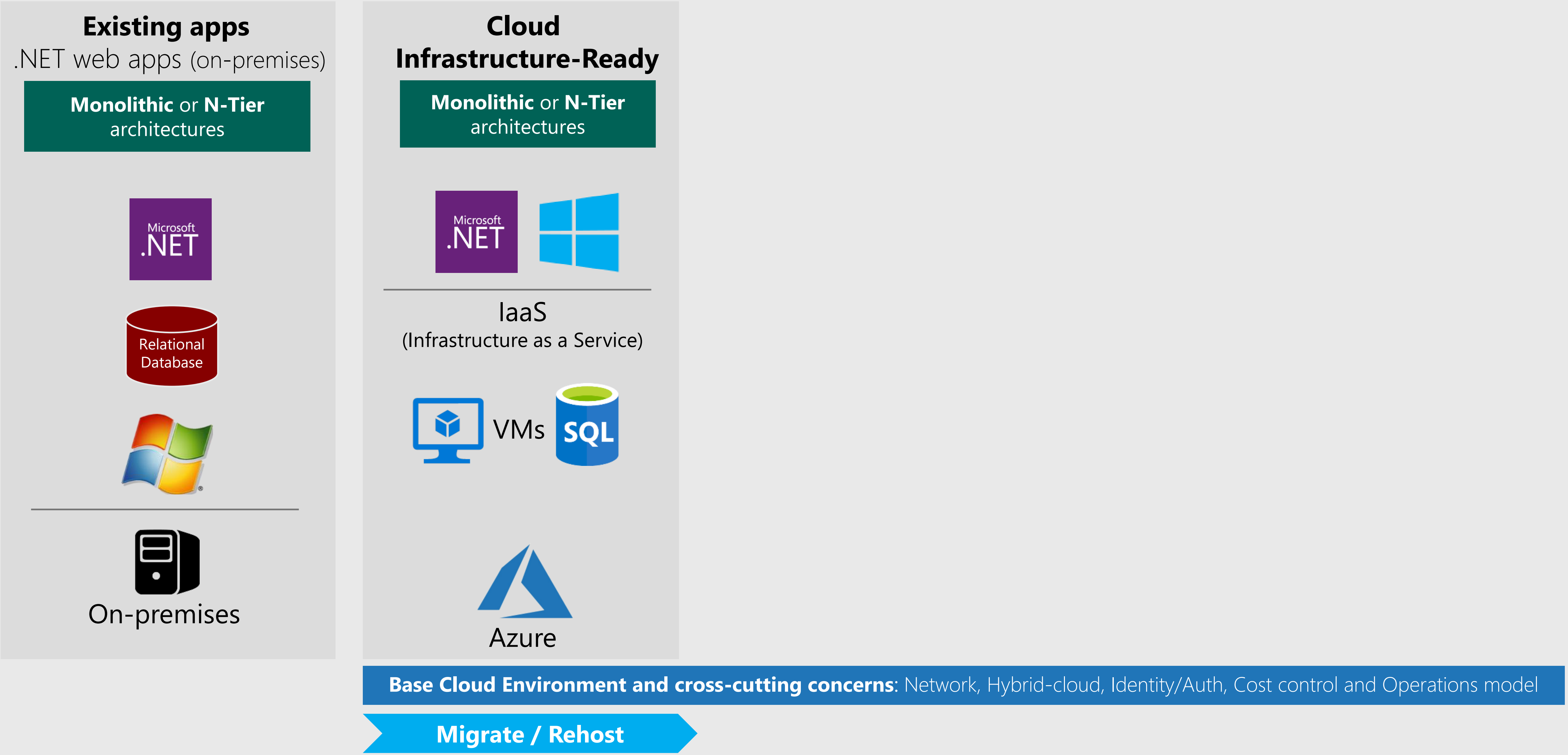
.NET web apps (on-premises)

Monolithic or **N-Tier** architectures

On-premises

Architected for the cloud, needs new code

Maturity model for .Net applications



Existing apps

.NET web apps (on-premises)

Monolithic or **N-Tier** architectures

Microsoft .NET

Relational Database

On-premises

Cloud Infrastructure-Ready

Monolithic or **N-Tier** architectures

Microsoft .NET

IaaS (Infrastructure as a Service)

VMs

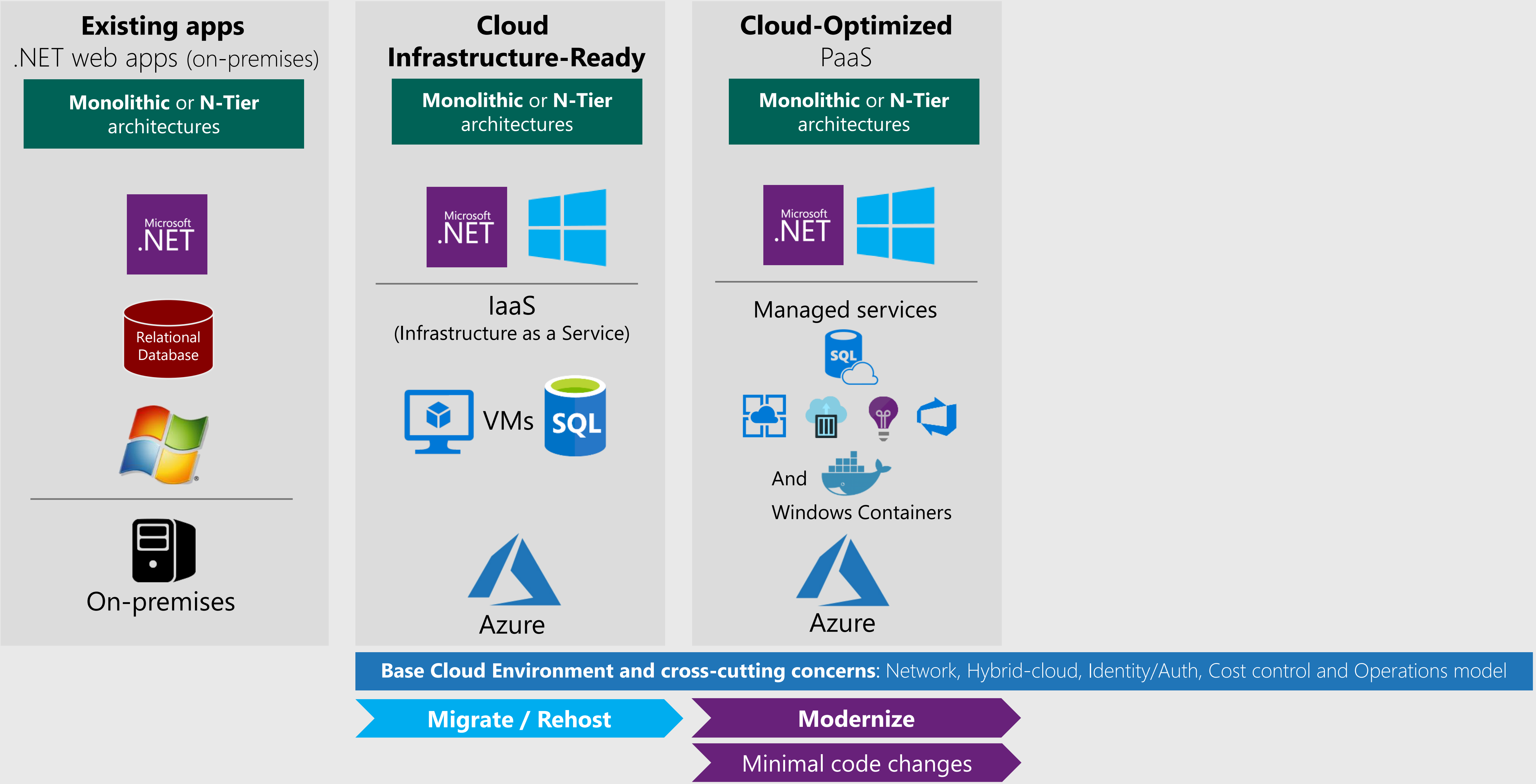
SQL

Azure

Base Cloud Environment and cross-cutting concerns: Network, Hybrid-cloud, Identity/Auth, Cost control and Operations model

Migrate / Rehost

Maturity model for .Net applications



Existing apps
.NET web apps (on-premises)

Monolithic or **N-Tier** architectures

On-premises

Cloud Infrastructure-Ready

Monolithic or **N-Tier** architectures

IaaS
(Infrastructure as a Service)

VMs

Azure

Cloud-Optimized
PaaS

Monolithic or **N-Tier** architectures

Managed services

And
Windows Containers

Azure

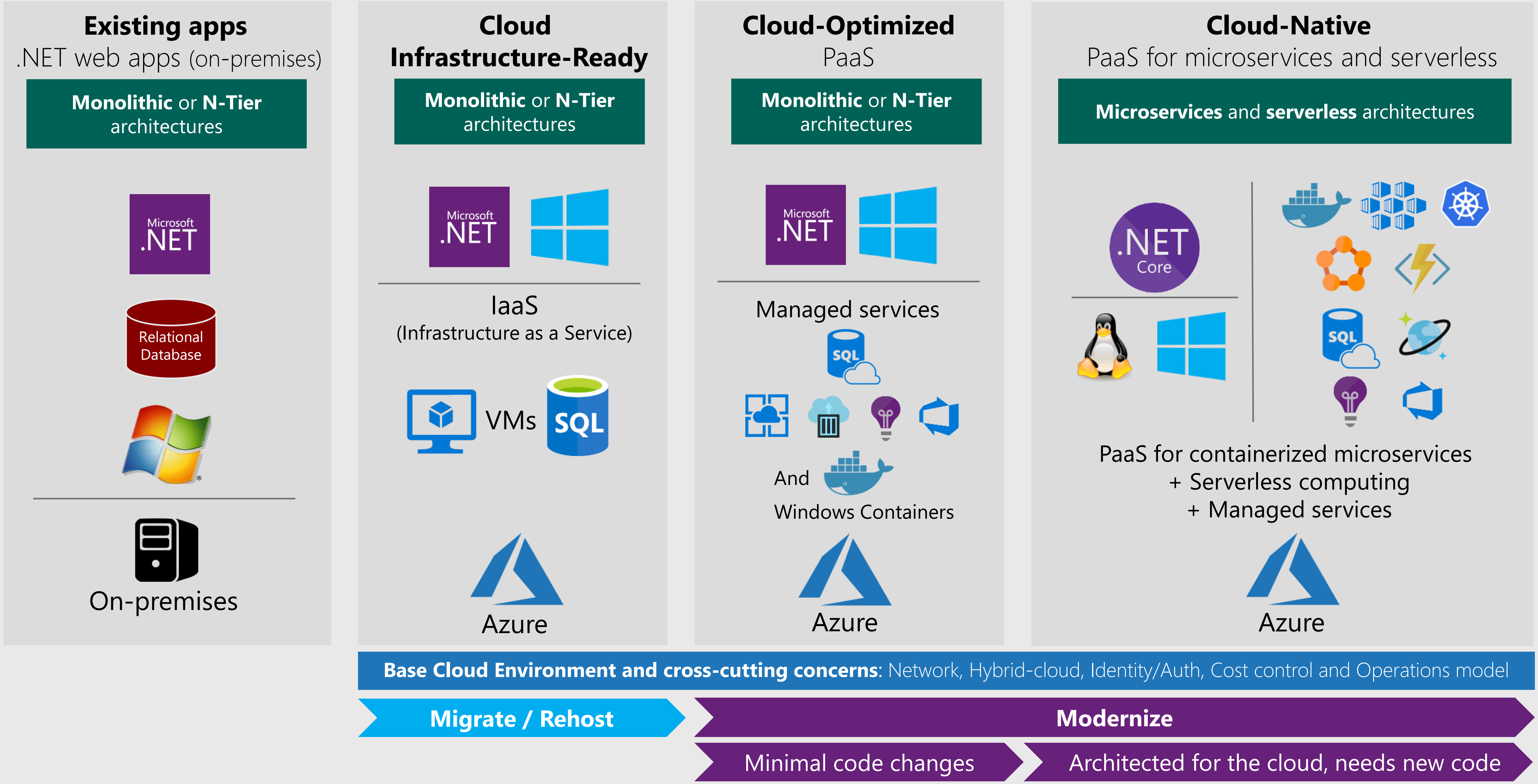
Base Cloud Environment and cross-cutting concerns: Network, Hybrid-cloud, Identity/Auth, Cost control and Operations model

Migrate / Rehost

Modernize

Minimal code changes

Maturity model for .Net applications



Existing apps
.NET web apps (on-premises)

Monolithic or **N-Tier** architectures

On-premises

Cloud Infrastructure-Ready

Monolithic or **N-Tier** architectures

IaaS
(Infrastructure as a Service)

VMs

Azure

Cloud-Optimized
PaaS

Monolithic or **N-Tier** architectures

Managed services

And
Windows Containers

Azure

Cloud-Native
PaaS for microservices and serverless

Microservices and **serverless** architectures

PaaS for containerized microservices
+ Serverless computing
+ Managed services

Azure

Base Cloud Environment and cross-cutting concerns: Network, Hybrid-cloud, Identity/Auth, Cost control and Operations model

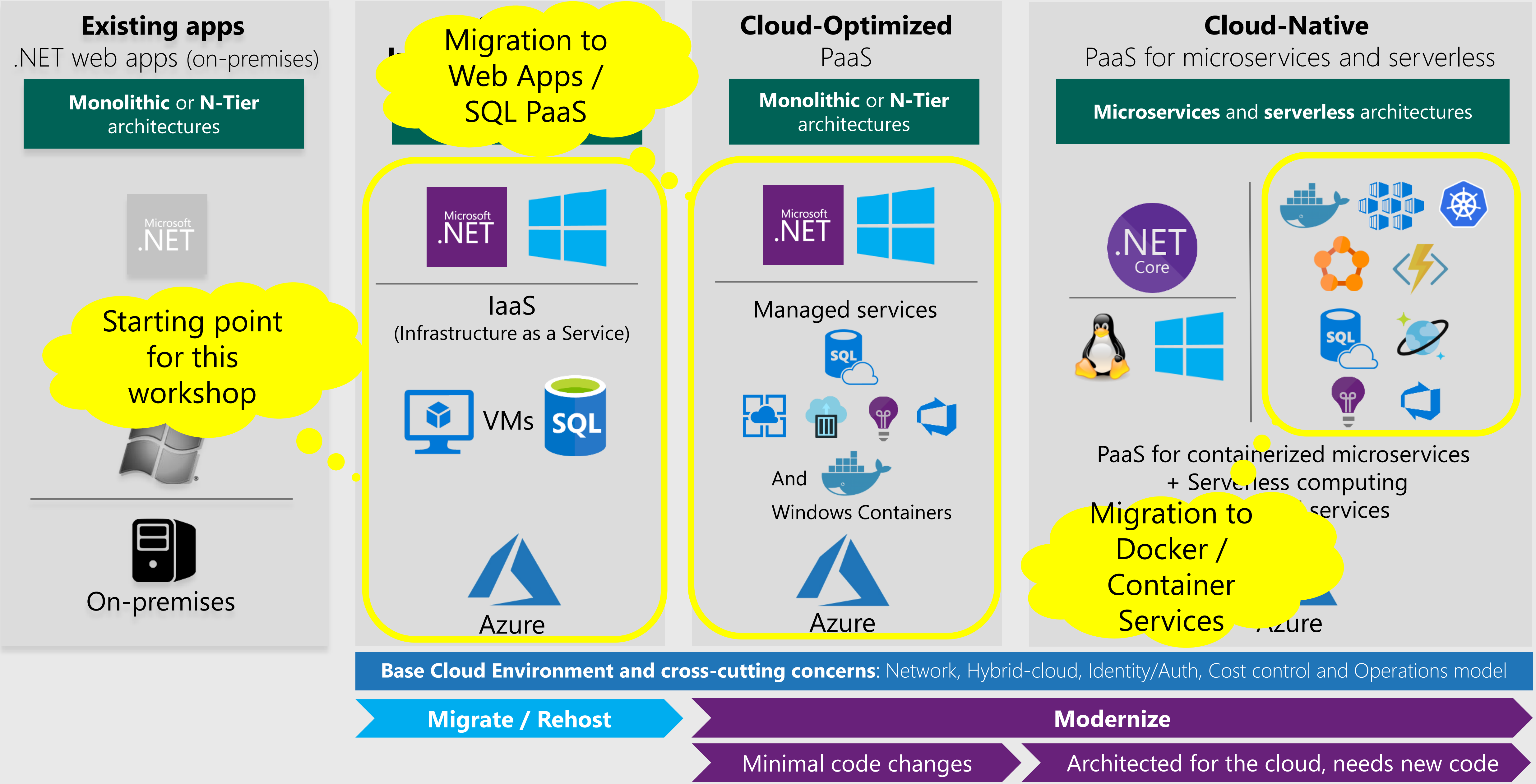
Migrate / Rehost

Modernize

Minimal code changes

Architected for the cloud, needs new code

Maturity model for .Net applications



Existing apps

.NET web apps (on-premises)

Monolithic or **N-Tier** architectures

Starting point for this workshop

On-premises

Migration to Web Apps / SQL PaaS

IaaS

(Infrastructure as a Service)

VMs

Azure

Cloud-Optimized

PaaS

Monolithic or **N-Tier** architectures

Managed services

And

Windows Containers

Azure

Cloud-Native

PaaS for microservices and serverless

Microservices and **serverless** architectures

PaaS for containerized microservices

+ Serverless computing

services

Migration to Docker / Container Services

Azure

Base Cloud Environment and cross-cutting concerns: Network, Hybrid-cloud, Identity/Auth, Cost control and Operations model

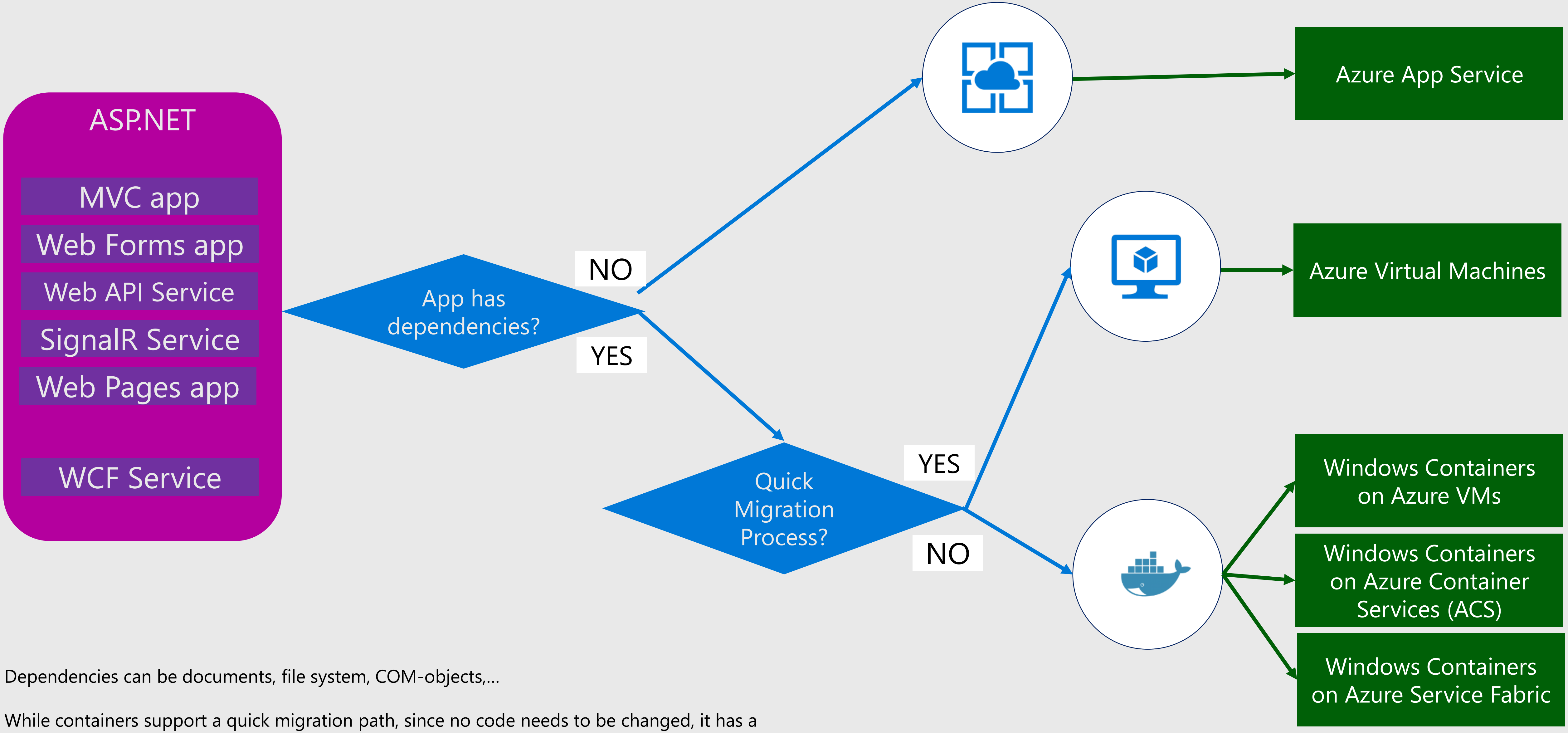
Migrate / Rehost

Modernize

Minimal code changes

Architected for the cloud, needs new code

Azure Compute Decision Tree for .Net Framework app migration



Dependencies can be documents, file system, COM-objects,…

While containers support a quick migration path, since no code needs to be changed, it has a more complex learning curve than migration to Azure VMs

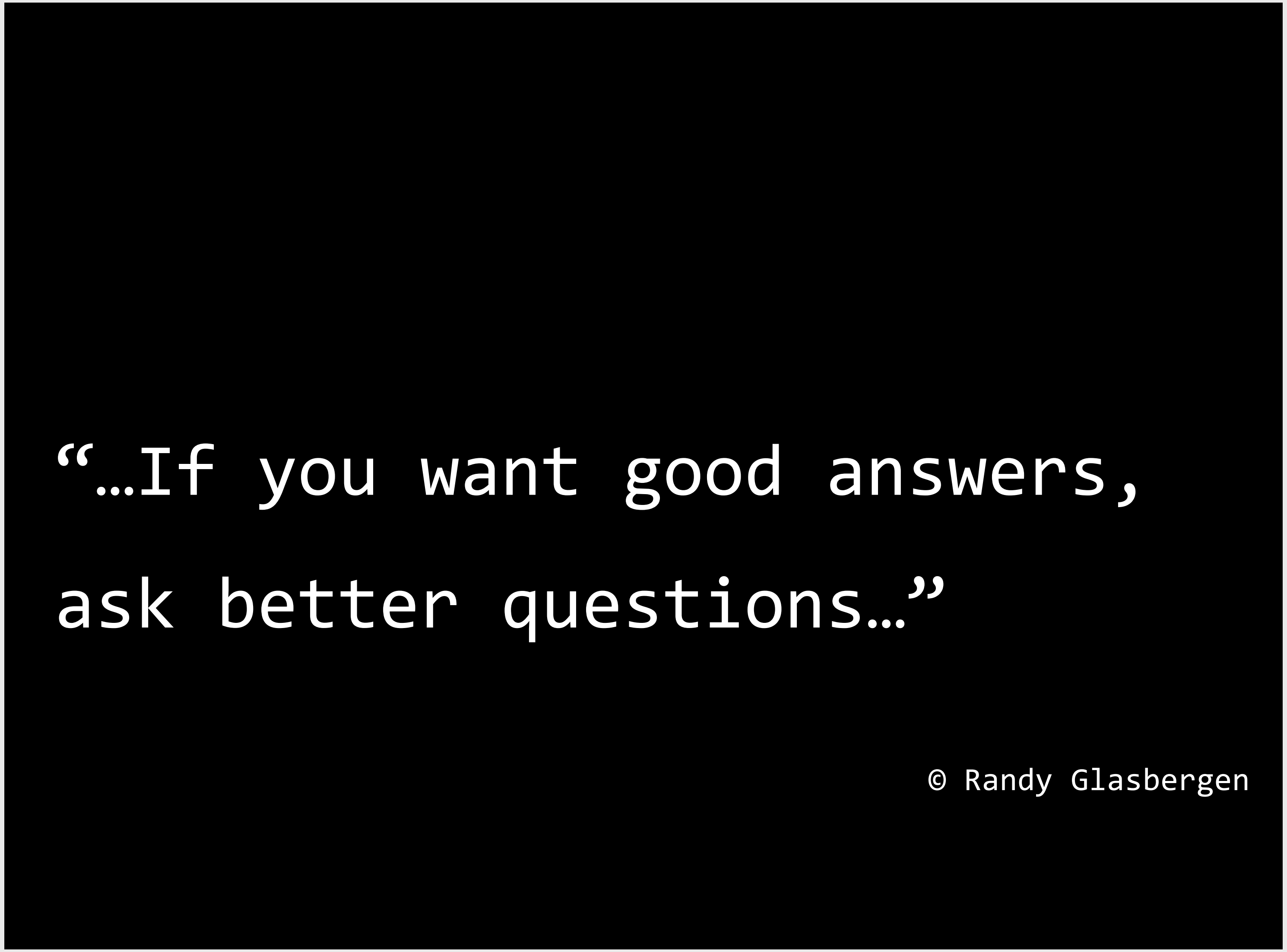
Section Take-Aways

1. Windows Containers are a strategic way to modernize your existing .Net Framework applications

2. Azure provides different choices for app modernization

3. Azure natively provides several Container services and orchestrators

Questions Landing Spot



“…If you want good answers, ask better questions…”

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Questions?

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Next Module…

Infrastructure as Code with ARM Templates

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