



BAIT 3273 Cloud Computing

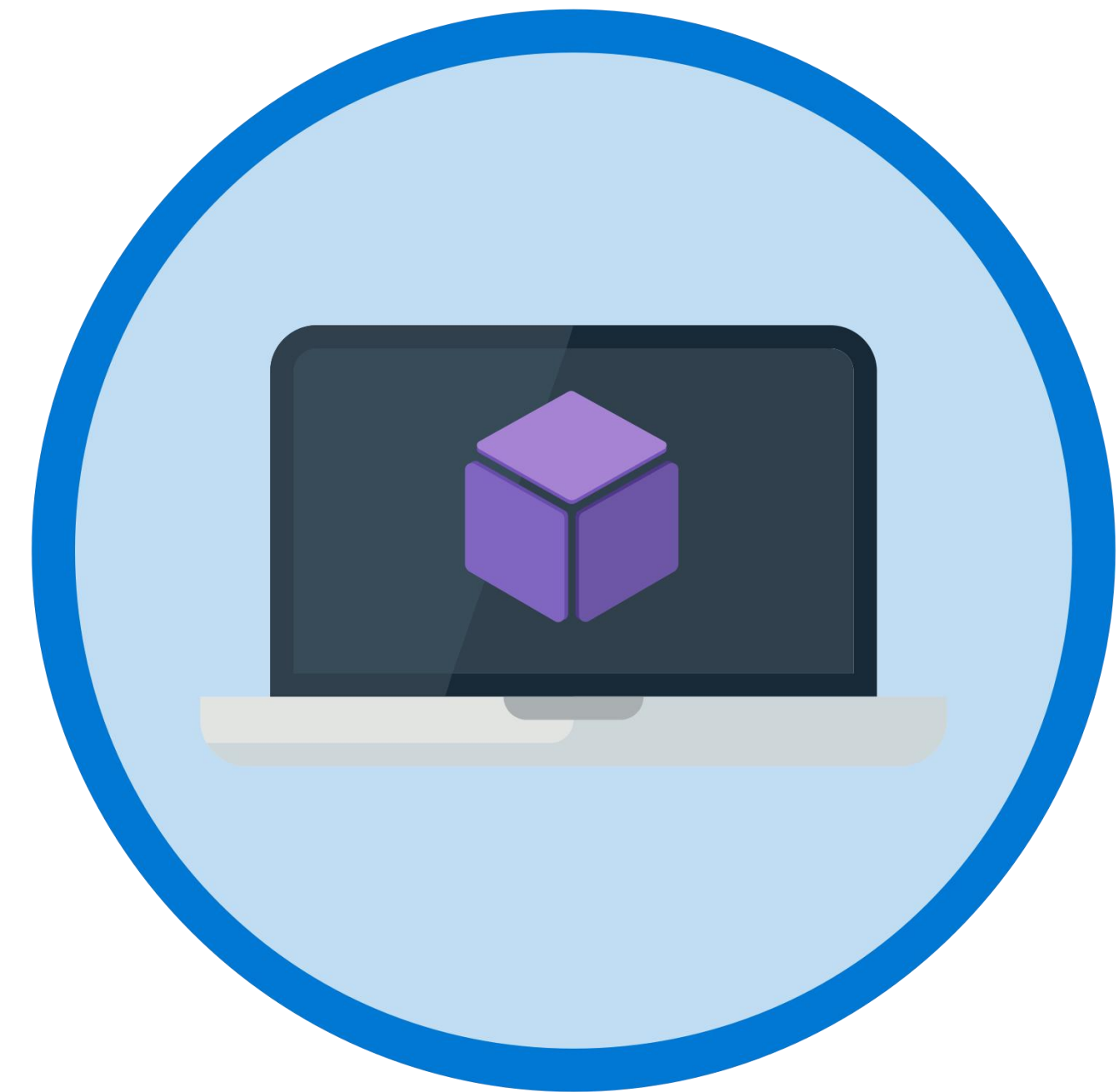
Week 6

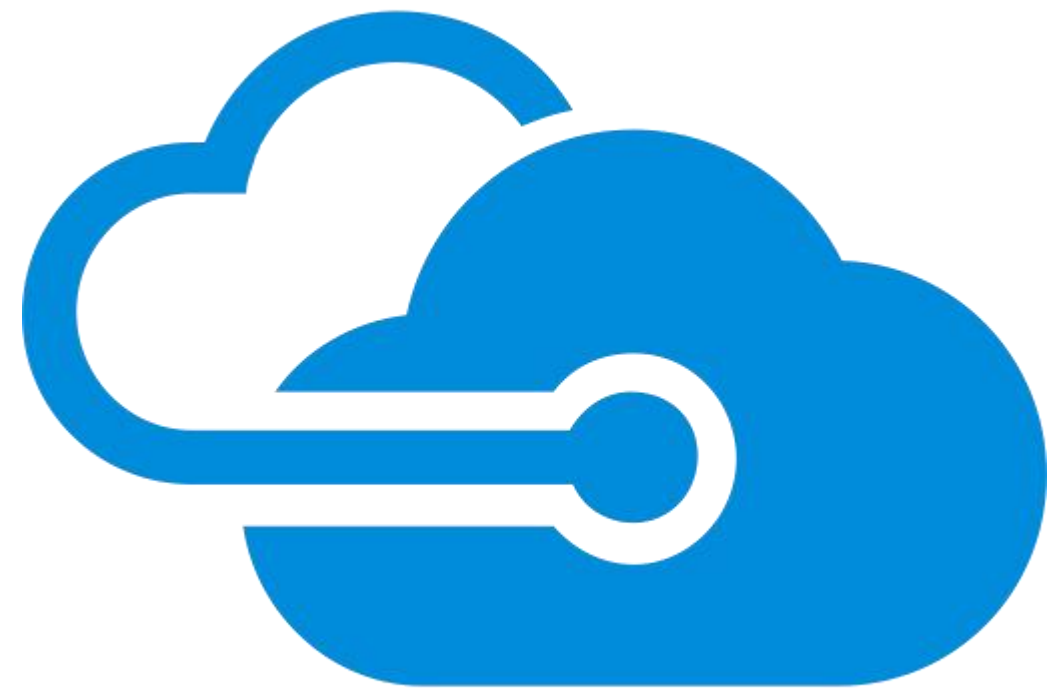
Core Cloud Services

Azure compute options

Lesson Objectives:

- *To identify compute options in Azure*
- *To identify appropriate compute options for your business*





Introduction

- *Allow Azure customers to create compute resources*
- *Does not require to purchase hardware*
- *Pay only for resources used*



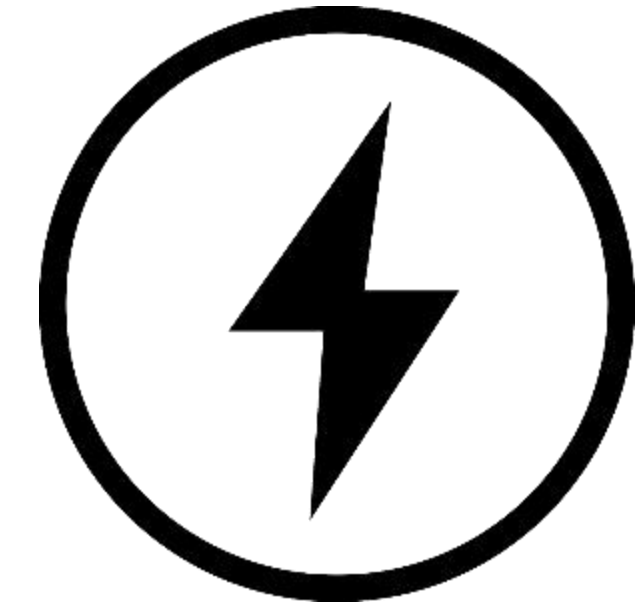
Azure Compute



- On-demand computing service
- Provides computing resources



- Does not require infrastructure configuration



- Can be created in a short period of times



Azure compute includes four common techniques:



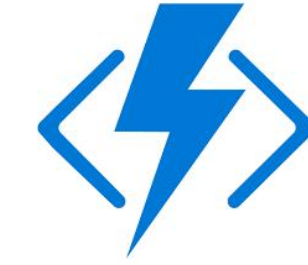
Virtual
Machines



Contain
ers



Azure App
Service



Serverless
Computing

Consideration of Computing Strategy

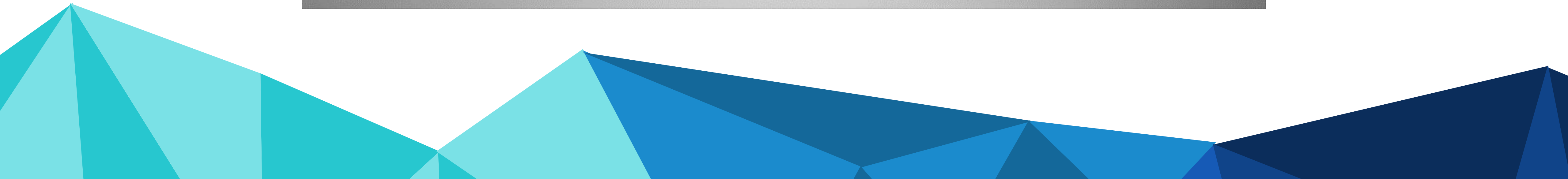


- No need to take an "all or nothing" approach



- Each technique provides benefits as well as trade-offs

Azure Compute Options





Azure Virtual Machines

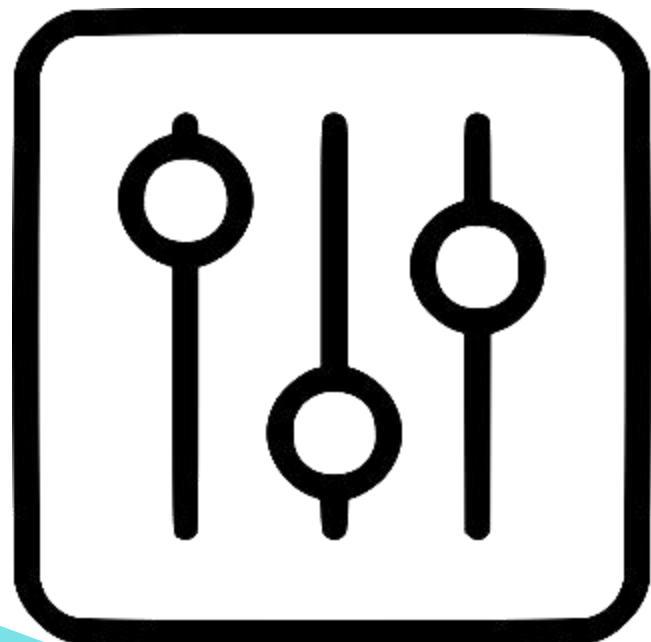
(VMs)

- Infrastructure as a service (IaaS) that used to create VMs in the cloud
- Azure users do not need to purchase and maintain physical hardware

Azure users can create and configure VM in short period of time by selecting pre-configured template

VMs are ideal when users need:

- ✓ Total control over the operating system (OS)
- ✓ The ability to run custom software
- ✓ To use custom hosting configurations



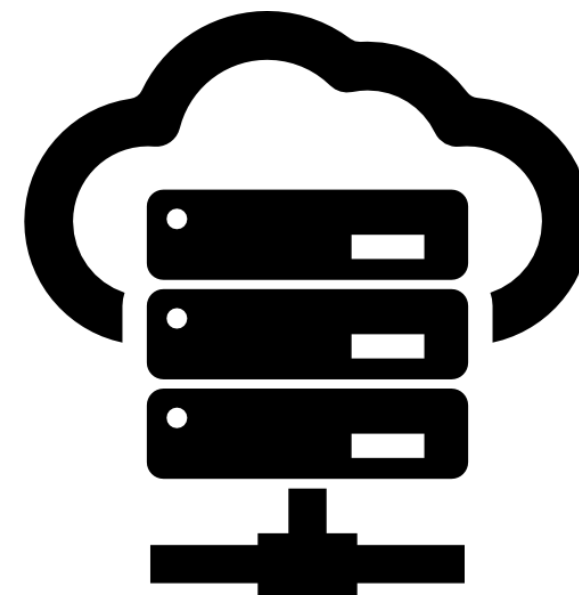
Create Azure VM



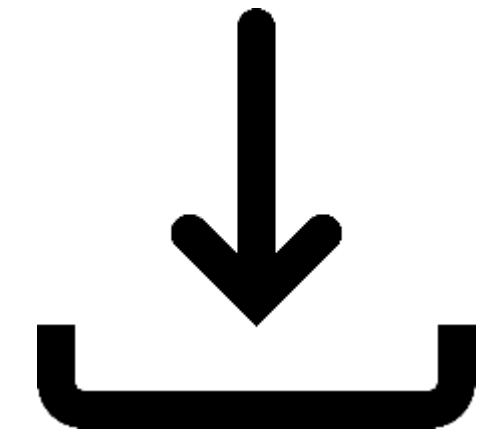
Moving to the cloud with VMs



Great choice when migrating from physical server to cloud.



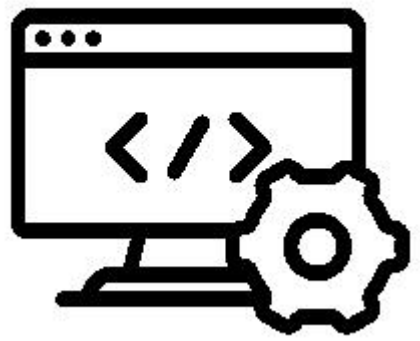
Host physical server in a VM with almost no changes.



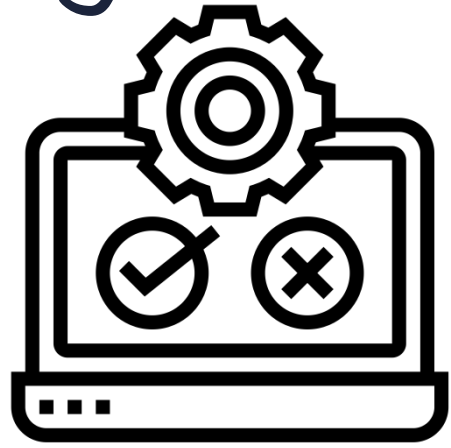
Can install and update the software in the VM.

Scaling VMs in Azure

VMs can be run individually for:



Development



Testing



Minor Tasks

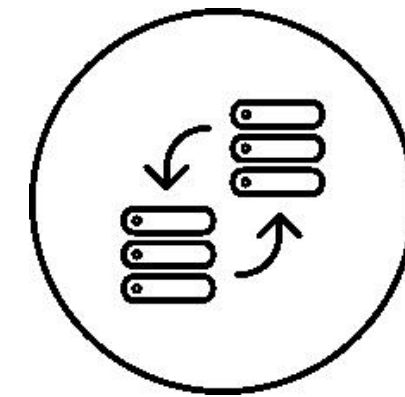
VMs can be combined to achieve:



Availability



Scalability



Redundancy

Azure consist several features that can meet any uptime requirements. These features include:

- Availability sets
- Virtual Machine Scale Sets
- Azure Batch

Availability Sets

An availability set is a logical grouping of two or more VMs that helps keep the application available during planned or unplanned maintenance. There is no cost for the availability set, users only need to pay for the VMs in the availability set.

Planned maintenance



- An event when Azure fabric that hosts VMs is updated
- Availability set allows Azure fabric to update in order when reboot is required

Unplanned maintenance



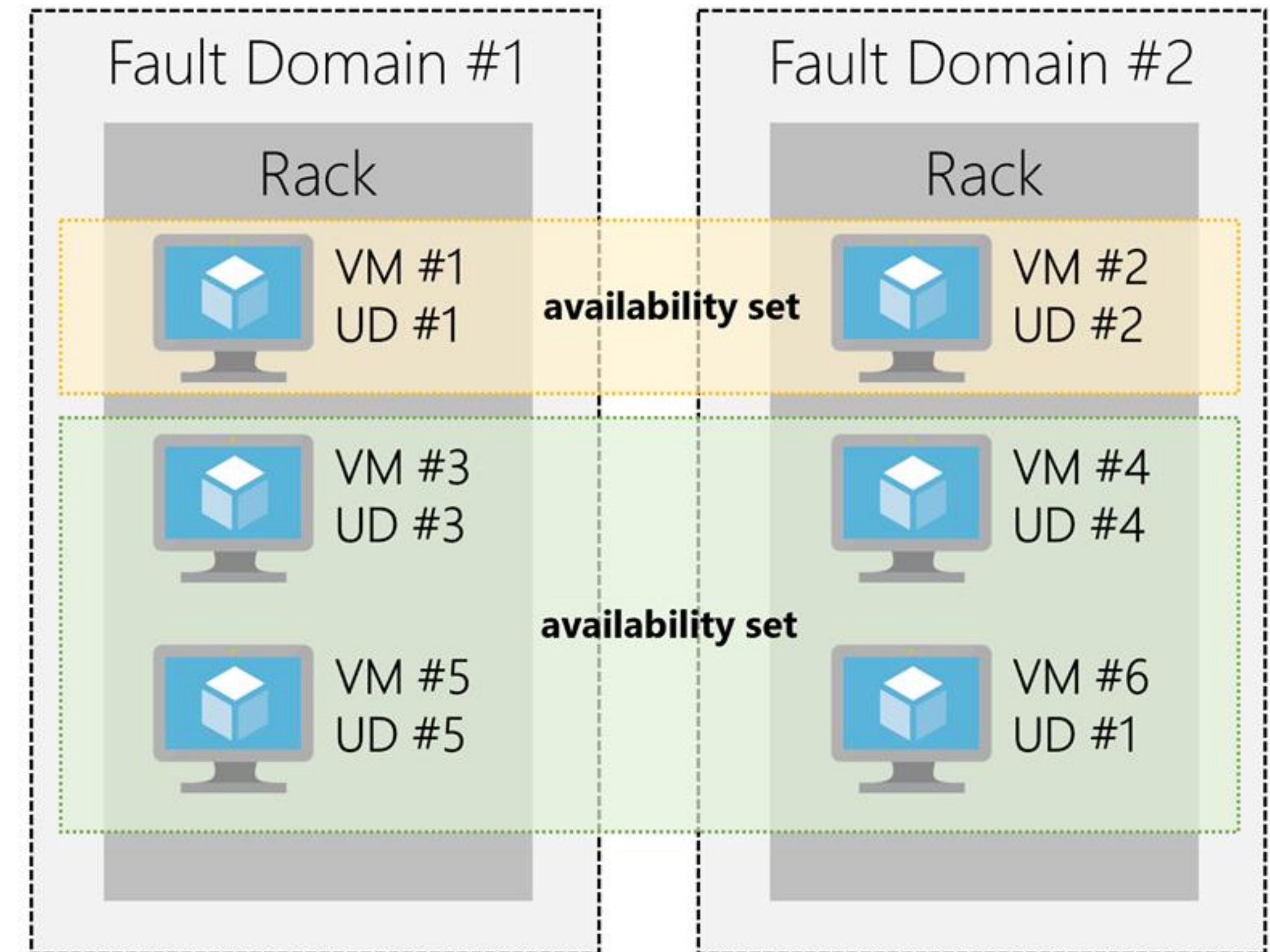
- An event involves hardware failures in datacenter
- Availability set will automatically switch to a functioning server

Update Domain

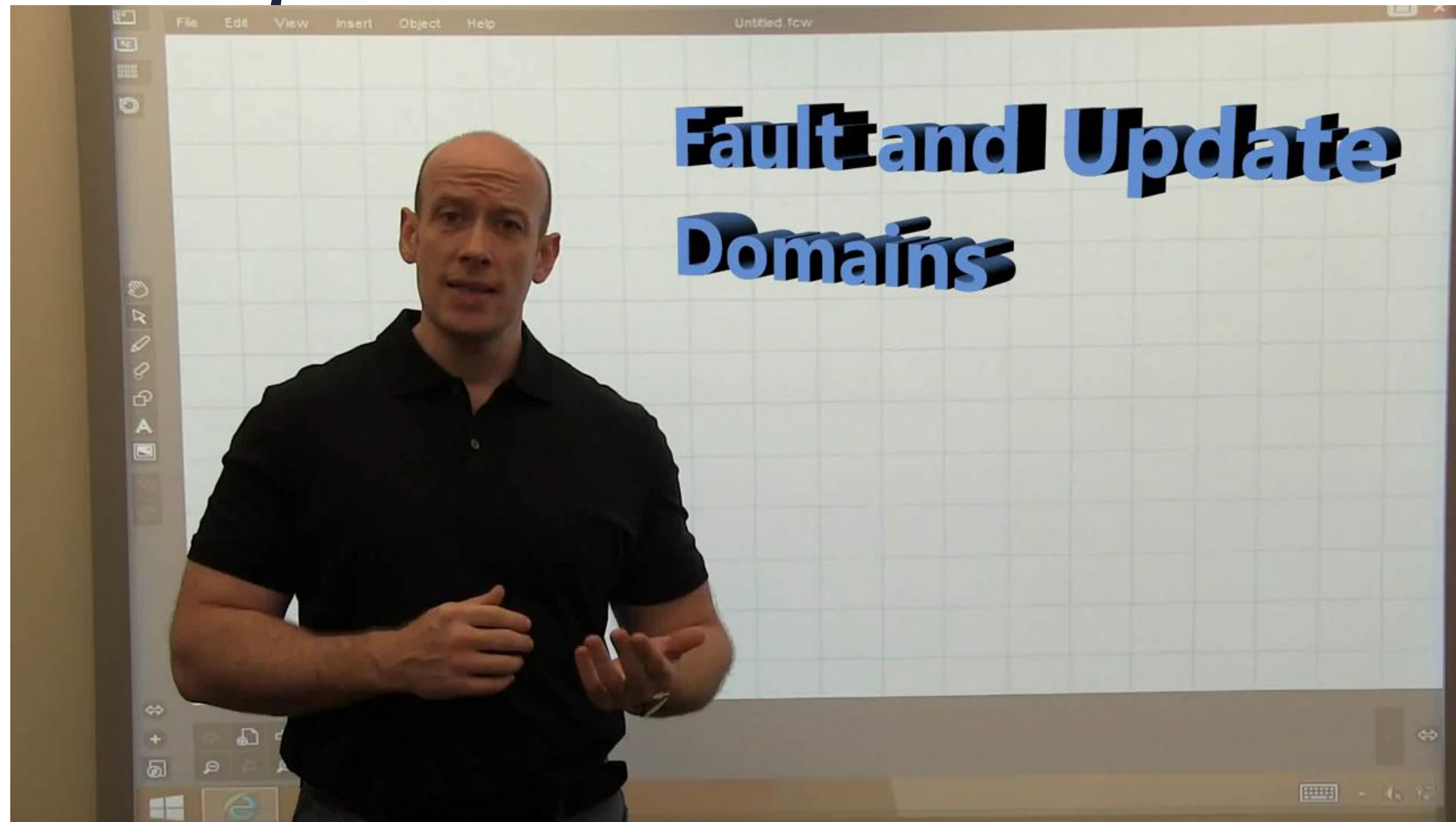
- VMs are put into different update domains.
- Logical part of each datacenter
- Implemented using software and logic.
- Define groups of VMs and underlying physical hardware that can be rebooted simultaneously.

Fault Domain

- The group of VMs that share the hardware are put into same fault domain.
- Essentially a rack of servers
- Provides physical isolation of the workload across different power, cooling, and network hardware



Update Domain and Fault

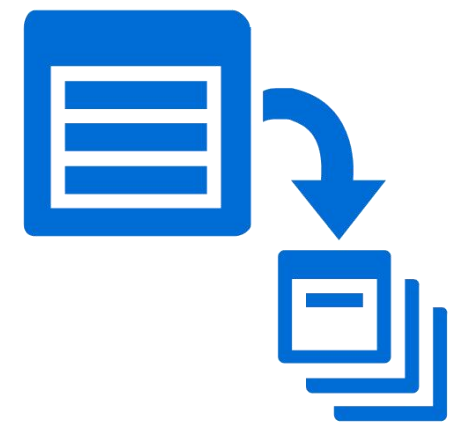


VM scale sets



- Create and manage identical and load-balanced VMs
- Centrally manage, configure and update VMs in short period of time
- Automatically scale the number of instances according to demand or defined schedule

Azure Batch



Azure Batch supports large-scale job planning and calculation management, and can be scaled to tens, hundreds or thousands of VMs.

Batch does the following to run a job:

1. Starts a pool of compute VMs for users
2. Installs applications and staging data
3. Runs jobs with as many tasks as users have
4. Identifies failures
5. Requeues work
6. Scales down the pool as work completes

Scale set vs Availability Set

Azure VM Scale Set
v/s
Availability Set



Containers



- Container is a modified runtime environment built on top of the host operating system.
- Container does not waste resources to simulate virtual hardware
- Container is much more lightweight than VMs

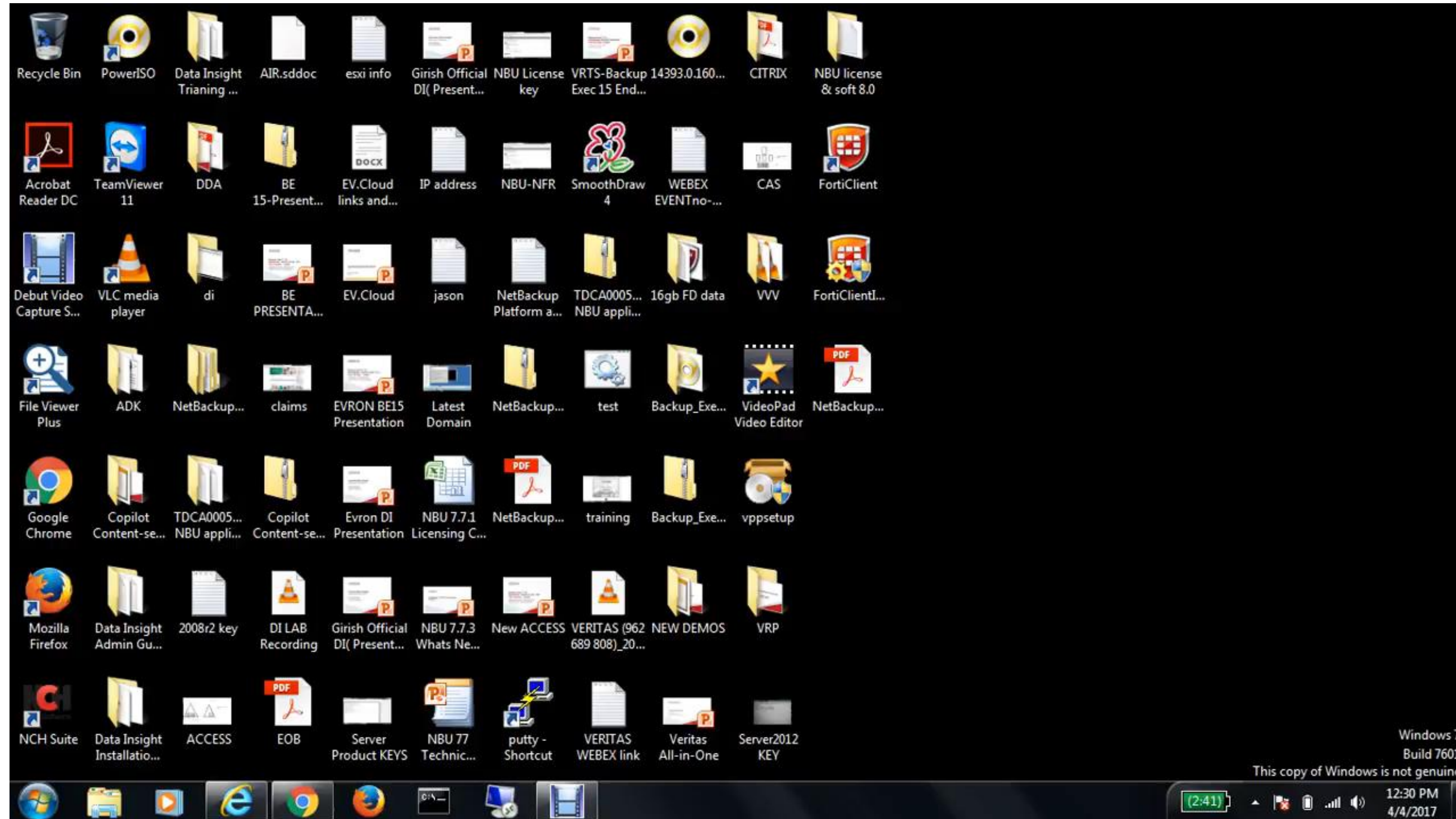
Pros:

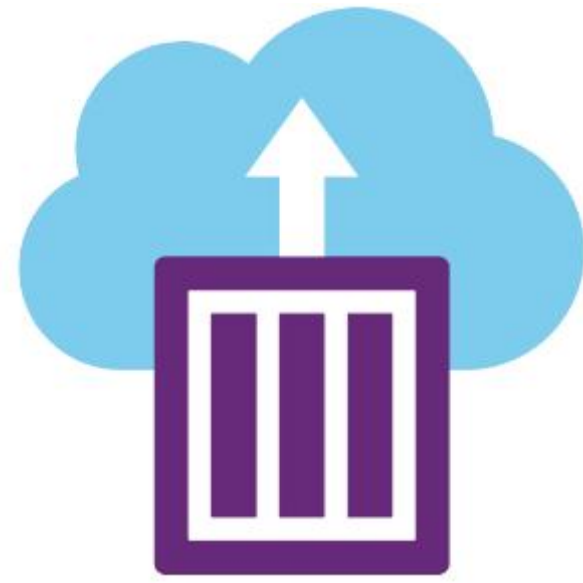
- Quickly respond to changes in demand or failures.
- Able to run multiple isolated applications on a single container host without having to separate servers for each application.

VMs versus containers

vmware®

Create Azure Container





Azure Container Instances (ACI)

- *Fast and Easy*
- *Users do not need to manage VMs or configure services*
- *ACI is a PaaS that supports automatic elastic scale.*



Azure Kubernetes Service (AKS)

- *AKS is an orchestration service*
- *Support automation, manage and interact with multiple containers*

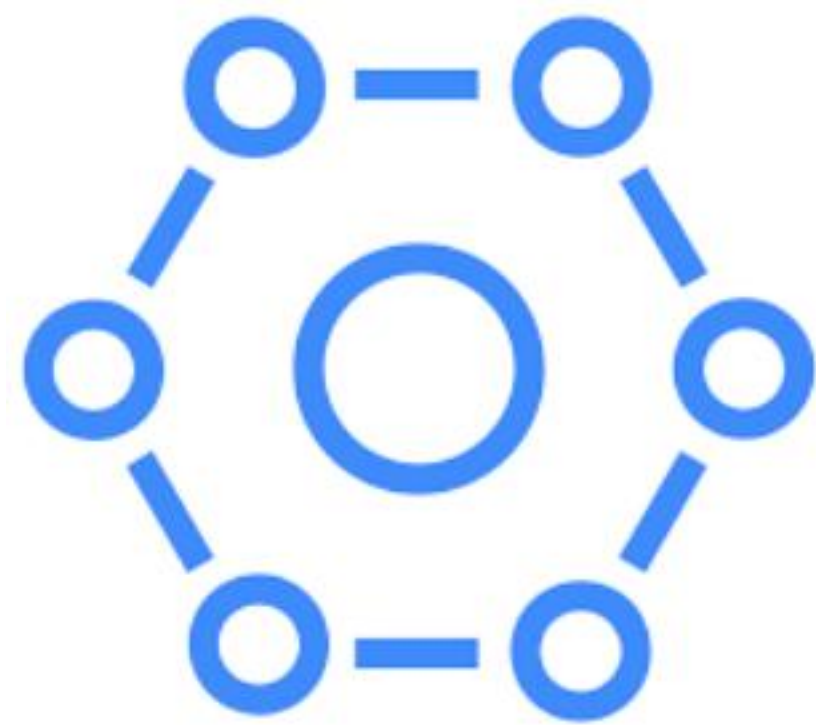
Azure Container Instances



What is Kubernetes?

vmware®

Microservice



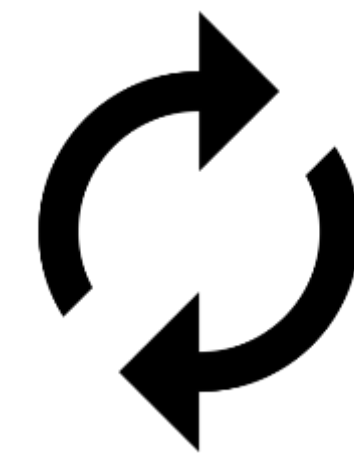
Microservice architecture breaks solution into smaller parts. Each part can be independently:



Maintain
ed



Scale
d

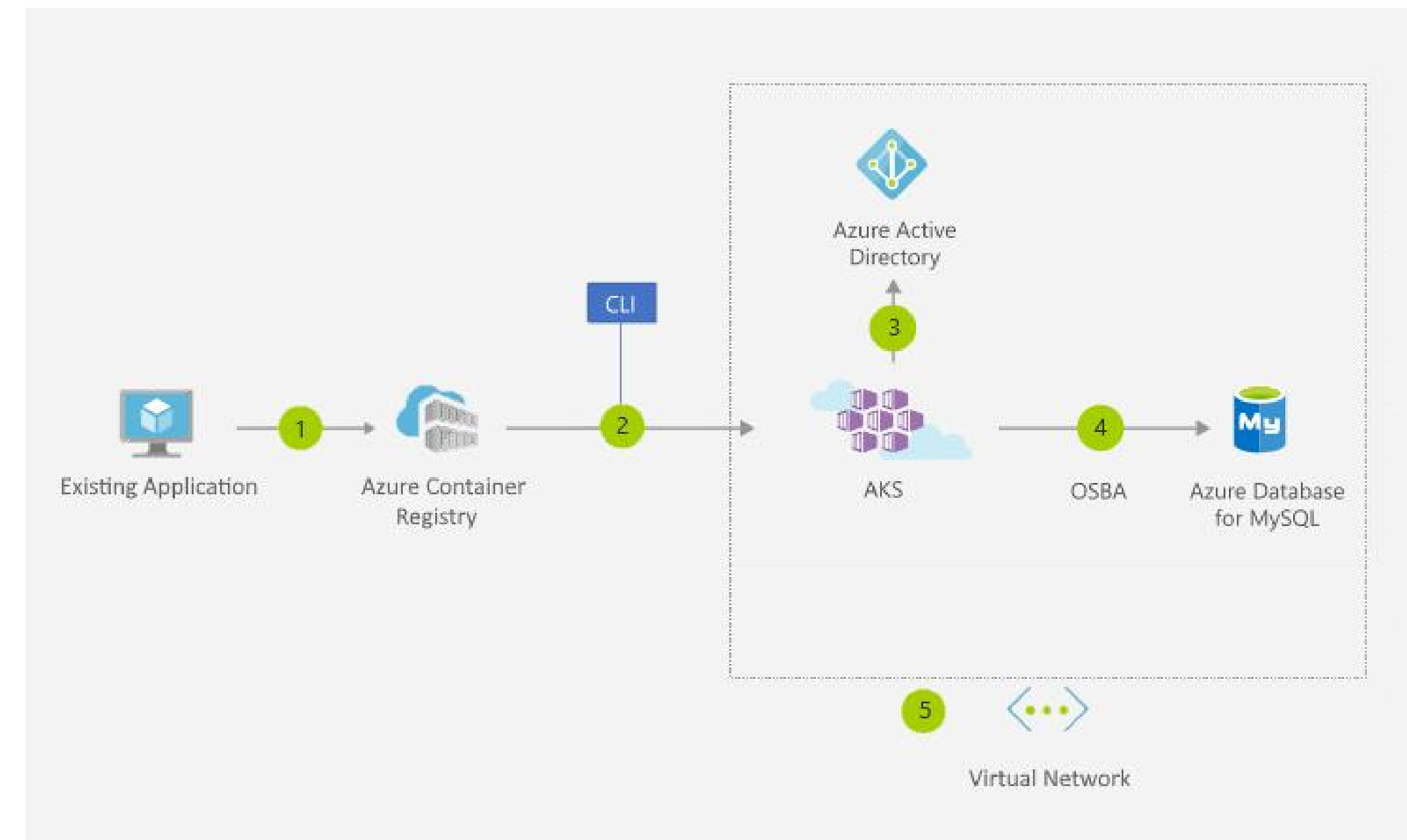


Update
d

Migrating apps to containers

Azure allows the users to migrate the existing applications to containers and run them within AKS. There are several process to migrate applications to containers:

1. Convert an existing application into one or more containers, and then publish one or more container images to the Azure Container Registry.
2. Deploy the container to AKS using Azure portal or command line.
3. Azure AD controls access to AKS resources.
4. Access SLA-backed Azure services, such as Azure Database for MySQL, via OSBA.
5. Optionally, AKS is deployed with a virtual network.



Azure App Service



- Support any programming language
- Support Windows and Linux
- Allows automated deployment from GitHub, Azure DevOps, or Git repo
- Allows users to concentrate on developing the applications without the need to manage infrastructure

App Service Costs



- Users only pay for the resources they used
- E.g. dedicated hardware, shared hardware, memory reserved

Types of app services



Web Apps

- Support ASP.NET, ASP.NET Core, Java, Ruby, Node.js, PHP, or Python.
- Support Windows or Linux



API Apps

- Allow users to use the language and framework they desired
- Full Swagger support
- Support package and publish API in Azure Marketplace
- Support any HTTP(S)-based client



Web Jobs

- Run program or script
- Can be scheduled or run by a trigger
- Run background task



Mobile Apps (back-ends)

Quickly build a back-end for iOS and Android apps. It supports :

- Store information in a cloud-based SQL database
- Authenticate customers against common social providers
- Send push notifications
- Execute custom back-end logic

Azure App Service



What Are Azure App Services?



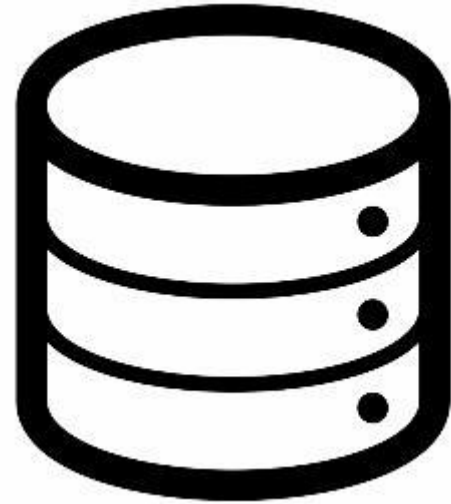
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Serverless Computing

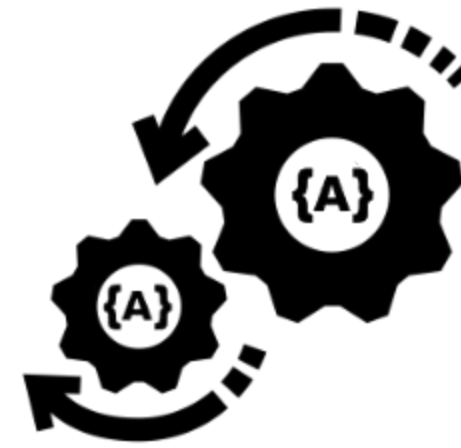
- Abstraction of servers, infrastructure and operating systems
- Automatically allocating or deallocating resources
- Scaling and performance are handled automatically
- Only pay for resources used

Serverless computing encompasses three ideas:



Abstraction of servers

- Serverless computing manages the server instance
- Each execution is transparent
- High availability



Event-driven scale

- Respond to incoming events
- Write a function instead of whole application
- Automatically schedule and scale based on incoming events



Micro-billing

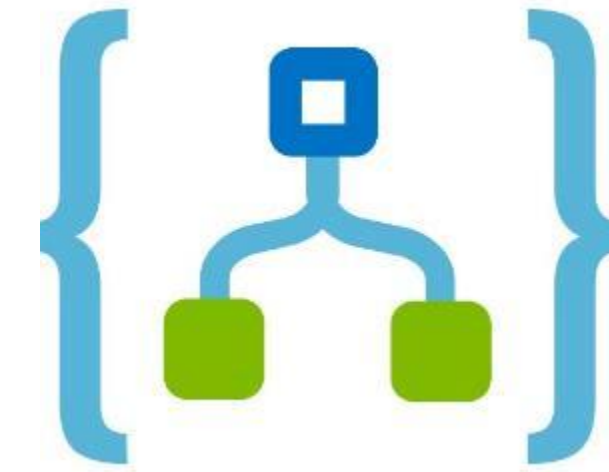
- Pay only for the time used to run the codes
- Do not need to pay for inactive function

Azure has two implementations of serverless computing.



Azure
functions

- Support almost all modern languages
- Ideal choice when users concern with code rather than platform or infrastructure
- Support fast response to an event
- Automatically scaled based on demand
- Only pay for CPU time used while the function is running
- Can be stateless or stateful



Azure Logic
Apps

- Execute workflows that automate business scenarios and built from predefined logic blocks
- Every workflow begins with a trigger, these triggers include basic scheduling capabilities
- Support data conversions and flow controls
- Provides over 200 different connectors

Functions vs. Logic Apps

–	Functions	Logic Apps
State	Usually stateless, but Durable Functions provide state	Stateful
Development	Code-first (imperative)	Designer-first (declarative)
Connectivity	About a dozen built-in binding types, write code for custom bindings	Large collection of connectors, Enterprise Integration Pack for B2B scenarios, build custom connectors
Actions	Each activity is an Azure function; write code for activity functions	Large collection of ready-made actions
Monitoring	Azure Application Insights	Azure portal, Log Analytics
Management	REST API, Visual Studio	Azure portal, REST API, PowerShell, Visual Studio
Execution context	Run locally or in the cloud	Runs only in the cloud.

Serverless computing in Azure



Summary

- Azure provides various cloud computing services
- Each service provides benefits as well as trade-offs
- Users need to choose the right service depends on business needs.



Check your knowledge

1. Suppose you have an existing application running locally on your own server. You need additional capacity but prefer to move to Azure instead of buying upgraded on-premises hardware. Which compute option would likely give you the quickest route to getting your application running in Azure?

- ☐ Serverless computing
- ☐ Containers
- ☐ Virtual machines

2. Imagine that you work on a photo-sharing application that runs on millions of mobile devices. Demand is unpredictable because you see a spike in usage whenever a locally or nationally significant event occurs. Which Azure compute resource is the best match for this workload?

- ☐ Serverless computing
- ☐ Containers
- ☐ Virtual machines

3. The compute options give you different levels of control over the configuration of the environment in which your application runs. Which of the following lists the compute options in order of your control from "most control" to "least control"?

- ☐ Serverless computing, containers, virtual machines
- ☐ Containers, serverless computing, virtual machines
- ☐ Virtual machines, containers, serverless computing

Answer

1. Suppose you have an existing application running locally on your own server. You need additional capacity but prefer to move to Azure instead of buying upgraded on-premises hardware. Which compute option would likely give you the quickest route to getting your application running in Azure?

- ☐ Serverless computing
- ☐ Containers
- ☒ Virtual machines

You have full control over the VM setup, so you can configure it to match your on-premises server. This control will allow your existing application to run on the Azure VM with little or no change.

2. Imagine that you work on a photo-sharing application that runs on millions of mobile devices. Demand is unpredictable because you see a spike in usage whenever a locally or nationally significant event occurs. Which Azure compute resource is the best match for this workload?

- ☒ Serverless computing
- ☐ Containers
- ☐ Virtual machines

The photo-sharing app is event driven and needs to handle unpredictable demand. Serverless computing is a good fit for this situation because it is event-based and can scale instantly to process spikes in traffic. It should also be a cost-effective choice because you will pay for compute time only when processing user data.

3. The compute options give you different levels of control over the configuration of the environment in which your application runs. Which of the following lists the compute options in order of your control from "most control" to "least control"?

- ☐ Serverless computing, containers, virtual machines
- ☐ Containers, serverless computing, virtual machines
- ☒ Virtual machines, containers, serverless computing

Virtual machines give you full control over the environment. Containers give you limited control. Serverless computing does not allow you to do any infrastructure configuration.



Thanks!

