AZ-305

Tag2

Designing Microsoft Azure Infrastructure Solutions

Guten Morgen!

AZ-305 Agenda

M365 Copilot — M365 · MS Graph (API)

Resource Graph · ARM API · Portal SDK · Azure
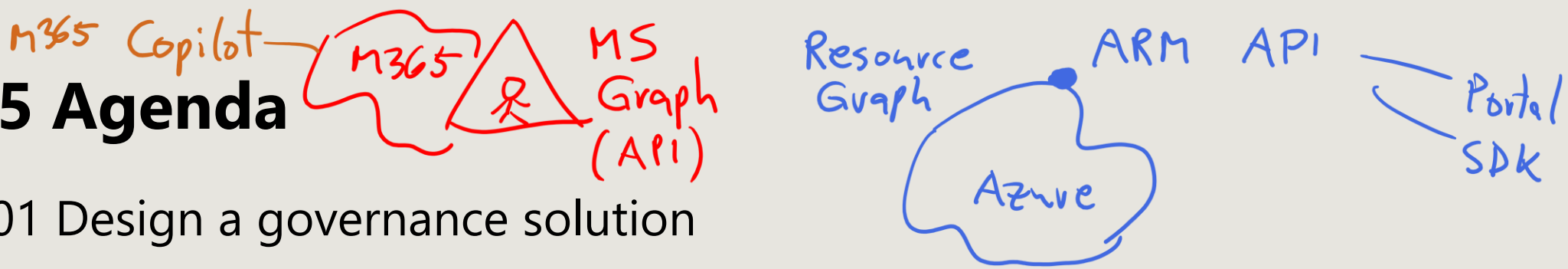
Module 01 Design a governance solution

Module 02 Design a compute solution ←

Module 03 Design a non-relational data storage solution

Module 04 Design a data storage solution for relational data

Module 05 Design a data integration solution

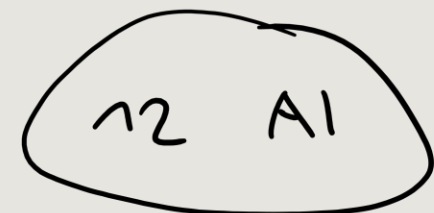Module 06 Design an application architecture solution

Module 07 Design Authentication and Authorization Solutions

Module 08 Design a solution to log and monitor Azure resources

Module 09 Design a network infrastructure solution

Module 10 Design a business continuity solution

Module 11 Design a migration solution

12 AI

Design a compute solution

VM

Lift & Shift

OS
:x

Docker Container

Cont

ACI

Kubernetes
ഠ൧൧൧ഠ

Azure
Rekhat (IBN)
Openshift
ARO

AKS

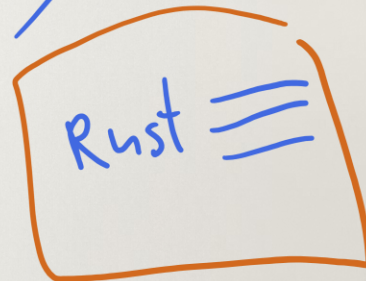Container
Apps

PaaS

App Service
.Net   node   PHP   Java   Rust   Python

Rust ≡

Learning Objectives

- Choose a compute service
- Design for Azure virtual machine solutions
- Design for Azure Batch solutions
- Design for Azure App Services solutions
- Design for Azure Container Instances solutions
- Design for Azure Kubernetes Service solutions
- Design for Azure Function solutions
- Design for Azure Logic App solutions
- Case study
- Learning recap

AZ-305: Design Infrastructure Solutions (30-35%)

Design compute solutions

- Specify components of a compute solution based on workload requirements
- Recommend a virtual machine-based solution
- Recommend a container-based solution
- Recommend a serverless-based solution
- Recommend a compute solution for batch processing

Choose a compute solution
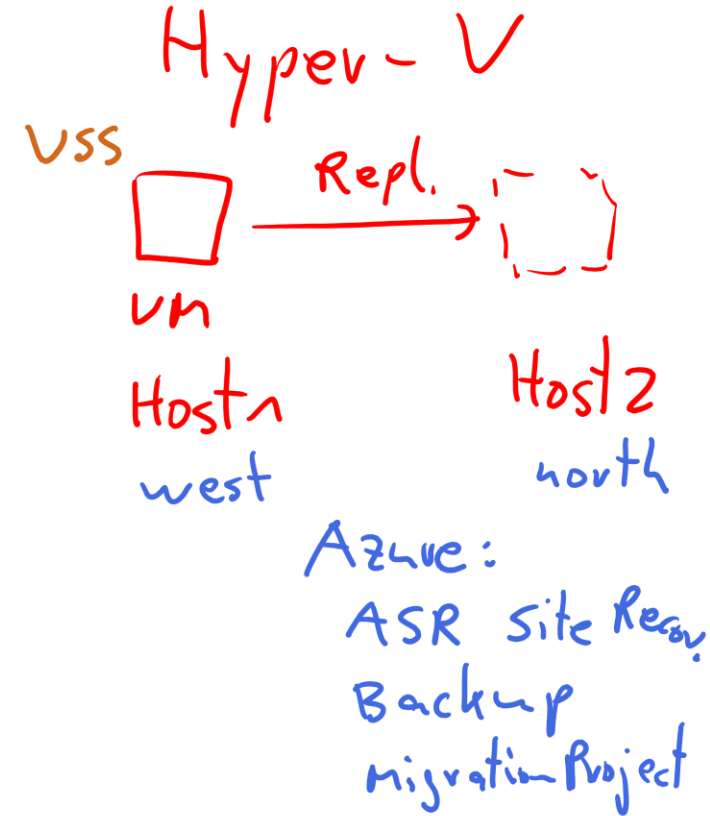
Choose a compute service for your application
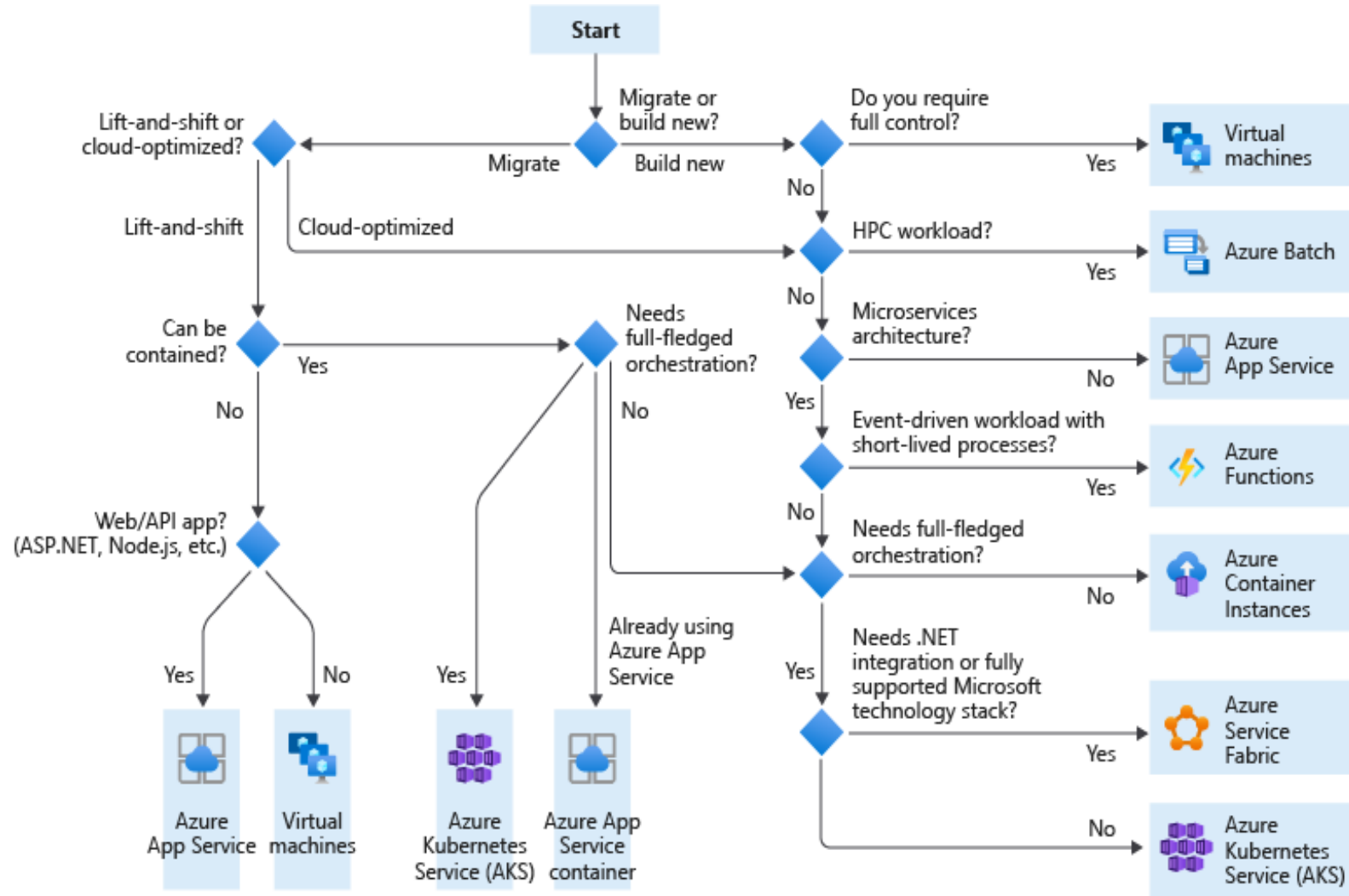
Design for Azure virtual machine solutions

When to select virtual machines

Know when to use virtual machines

- Quickly test and troubleshoot different configurations

- Use specialty hardware such as high-performance computing

- Extend your on-premises datacenter without purchasing additional hardware

- Run legacy apps on modern hardware

- Access third party software that requires local add-ons or plug-ins

- Quickly migrate apps to the cloud

- Fully control the computing environment

Hyper-V

VSS

Repl.

vm

Host1
west

Host2
north

Azure:
ASR Site Recov.
Backup
Migration Project

VMWare
Azure

Plan the Azure virtual machine deployment

Azure virtual machines scenarios include build new or migrate patterns

- Start with the network

- Name the VM

- Decide the VM location

- Select the VM storage

- Select an VM operating system

- Keep the VM up to date

- Monitor the VM
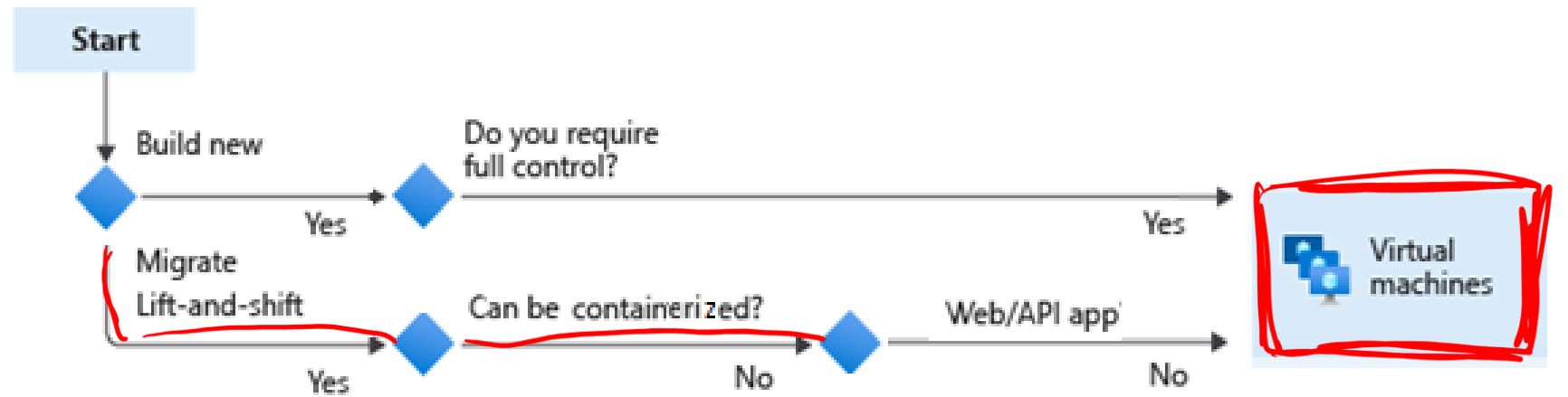
Determine the virtual machine family

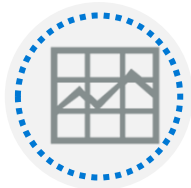## The virtual machine size determines pricing

General purpose

Storage optimized

Compute optimized

GPU

Memory optimized

High performance compute

When to select virtual machine scale sets

Scale sets are built from virtual machines. With scale sets, the management and automation layers are provided to run and scale your applications.

| Scenario	Group of virtual machines	Virtual machine scale sets*
You need to add VM instances for changing workload	Manual process to create, configure, and ensure compliance	Automatically create from central configuration
You need to balance and distribute workloads	Manual process to create and configure Azure load balancer or Application Gateway	Can automatically create and integrate with Azure load balancer or Application Gateway
You need high availability and redundancy	Manually create Availability Set or distribute and track VMs across Availability Zones	Automatic distribution of VM instances across Availability Zone (when zones are selected) and Availability Set
You need to monitor and then scale virtual machines	Manual monitoring and Azure Automation	Autoscale based on host metrics, in-guest metrics, Application Insights, or schedule

* Ensure application supports VMSS

Design for Azure Batch solutions

When to use Azure Batch
Azure Batch enables large-scale parallel and HPC batch jobs
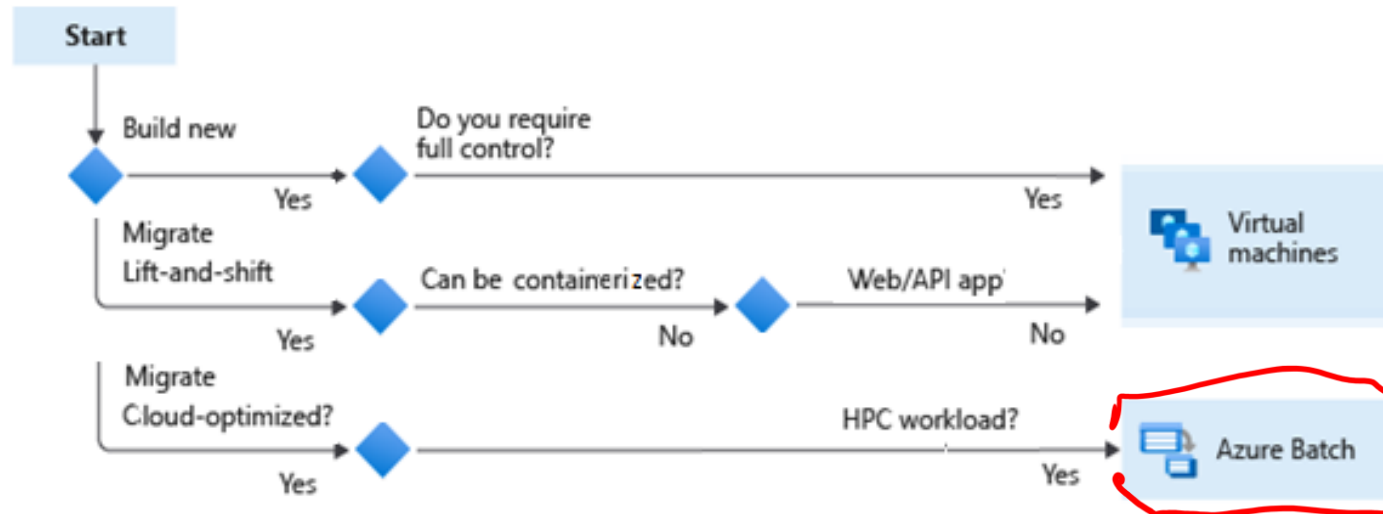
- Compute-intensive tasks and dynamically adjust resources for your solution without managing infrastructure

- Create and manage jobs in a pool of compute nodes (virtual machines)

- Azure Batch can also install the application that you want to run, and schedule jobs to run on the compute nodes
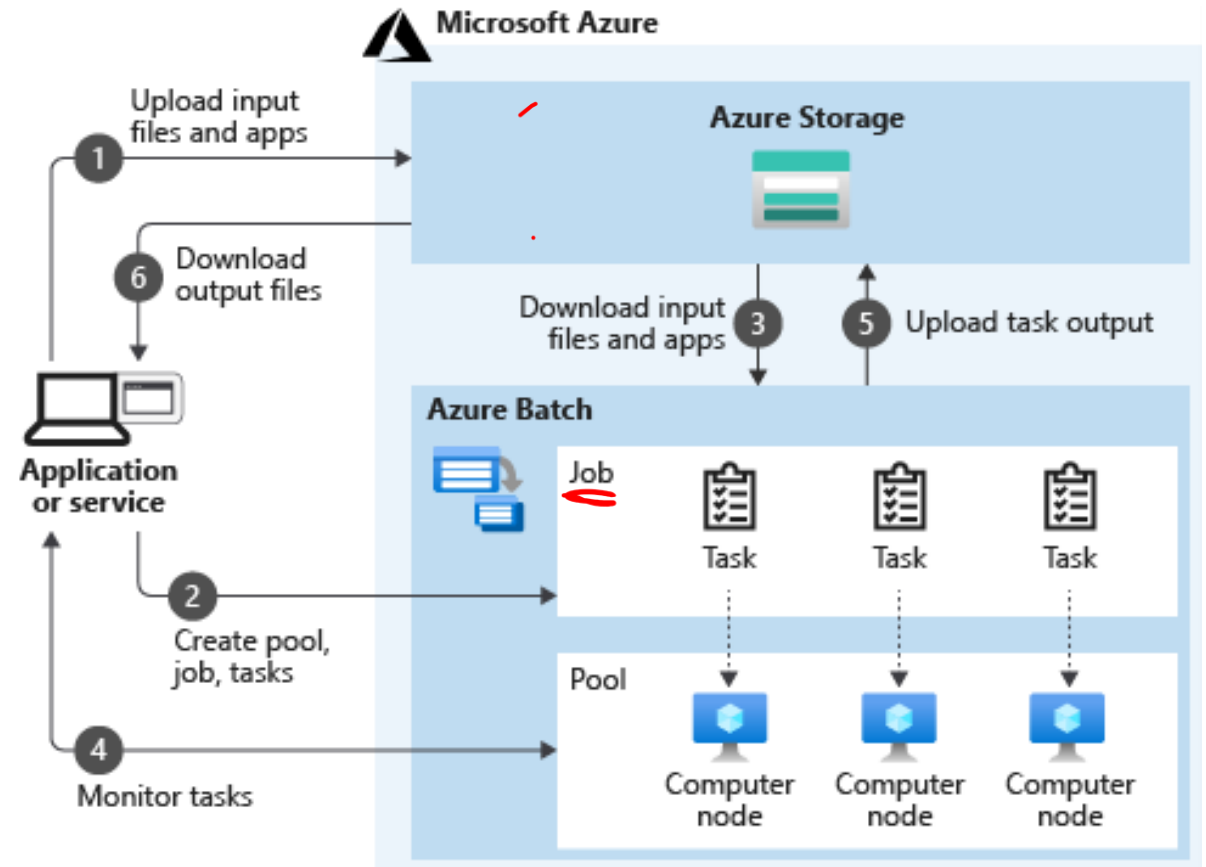
How Azure Batch works

Fortran
Cobol
Numerik

Think of the diagram in two parts:

- **Your service** that uses Azure as the platform

- **Batch as the compute platform behind your service**. Batch uses Azure Storage to fetch applications or data needed to complete a task.

Considerations

- Pools – dynamically allocate jobs, right size the pools

- Nodes – use multiple nodes in the pool, right size the machines

- Jobs – uniquely name the jobs, monitor and log activity

Microsoft Azure

Upload input files and apps ①

⑥ Download output files

Azure Storage

Download input files and apps ③   ⑤ Upload task output

Application or service

② Create pool, job, tasks

④ Monitor tasks

Azure Batch

Job — Task, Task, Task

Pool — Computer node, Computer node, Computer node

Design for Azure App Services solutions

When to use Azure App Services Web Apps
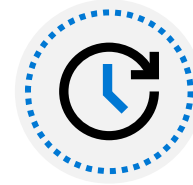## Azure App Service is an HTTP-based service that lets you build and host apps

- Web apps, background jobs, mobile backends, and RESTful APIs.

- Use the programming language of your choice

- Automatic scaling and high availability

- App Service enables automated deployments from GitHub, Azure DevOps, or other source control services
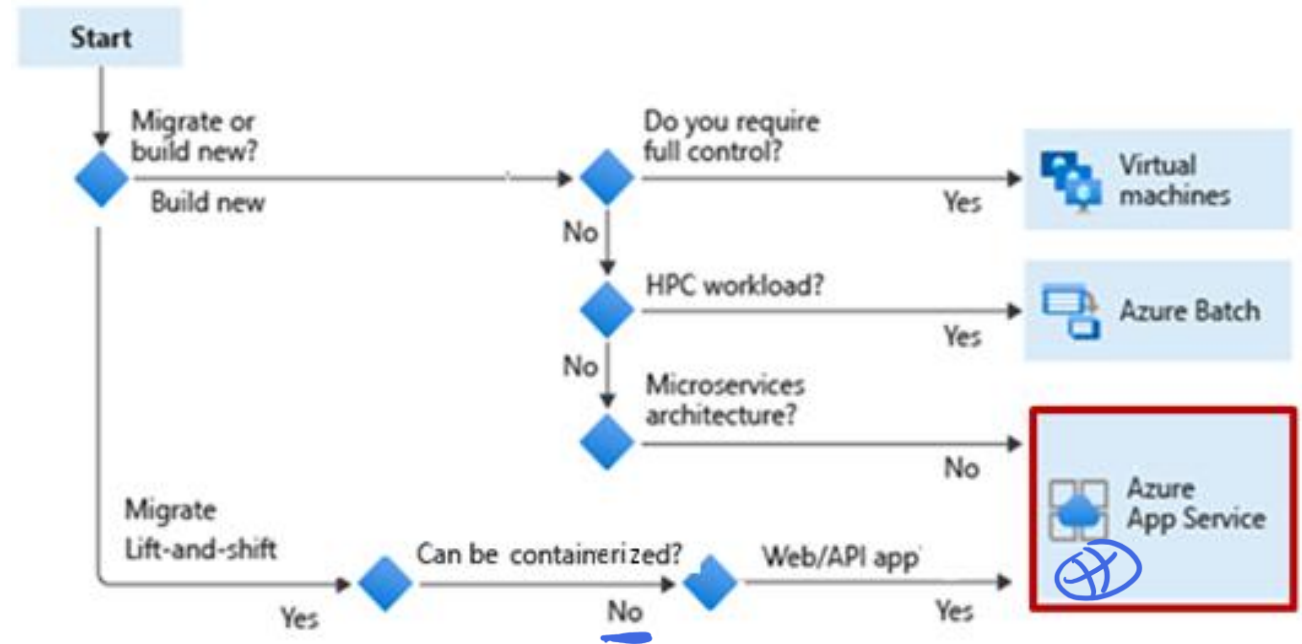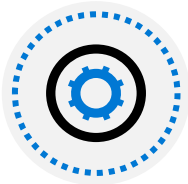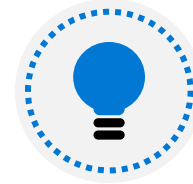
Considerations for App Service Web Apps

Determine the appropriate app service plan – determines cost and scaling
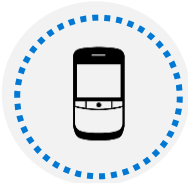
Use App Services deployment slots for continuous deployment

Use the Mobile Apps to build a back end for iOS and Android apps.

Use built-in authentication and authorization capabilities

Build REST-based web apps with the API

Use WebJobs to run a program or script

IaaS   PaaS   CaaS
                    SaaS

customer

↑ Trend

Cloud

Design for Azure Container Instances solutions

ACA

Registry ACR

① ACI   ② AKS   ③
         Cluster   yaml

App
Lib
OS

Pods
Services

Dockerfile
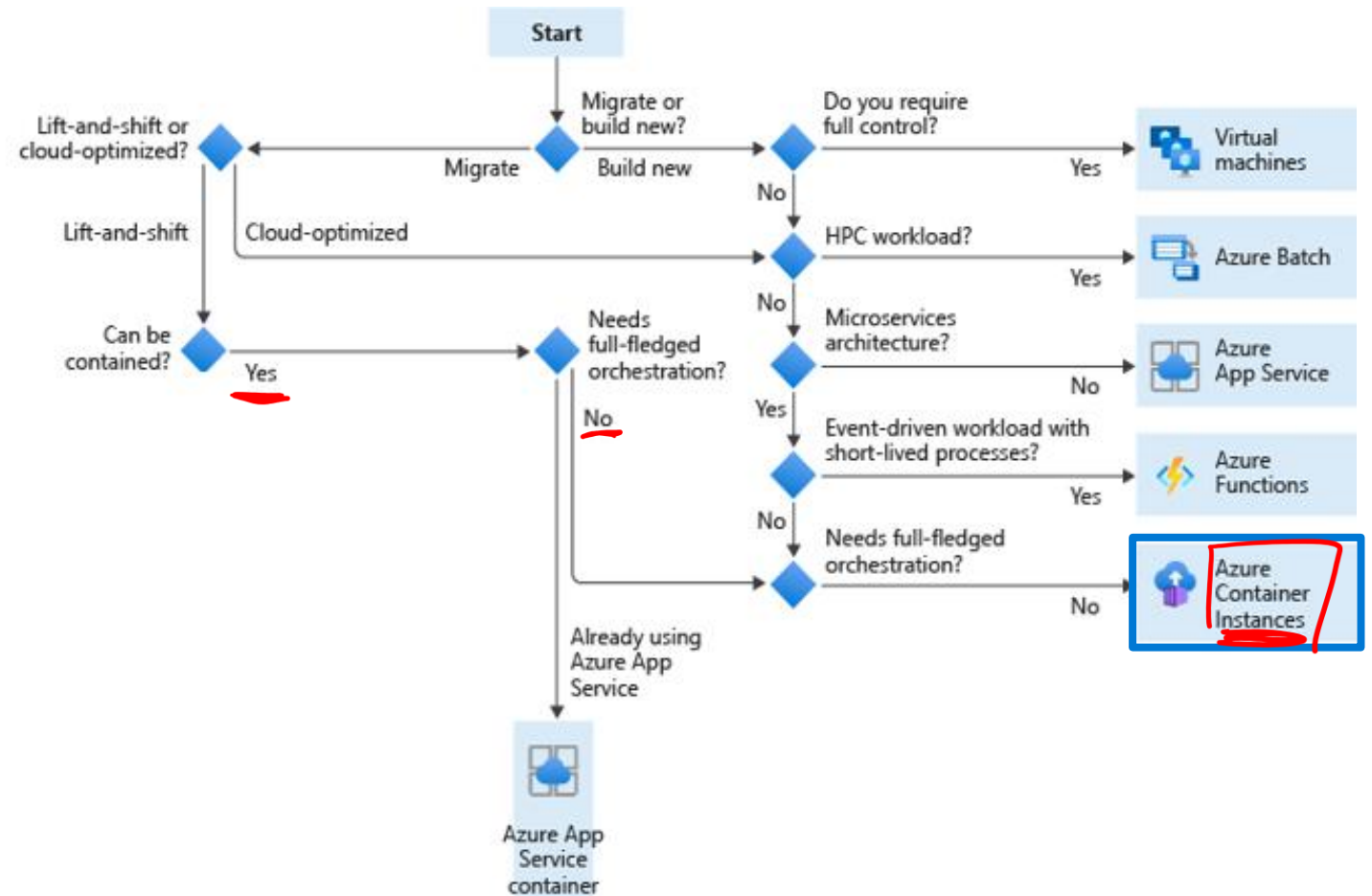
From

What is Azure Container Instance

Azure Container Instances offers a fast and simple way to run a container in Azure, without having to manage any virtual machines and without having to adopt a higher-level service.

- Ensure the integrity of images throughout the lifecycle

- Monitor container resource activity

- Consider container groups

When to use Azure Container Instances

Azure Container Instances are a fast and simple way to run a container on Azure.

Pros:

- Fast and Easy

- Used for testing and development.

- Used for short-lived processes.

- Can be used for AKS overflow

Cons:

- Doesn't scale

- Not designed for microservices

Compare containers to virtual machines
App Services can also run containers

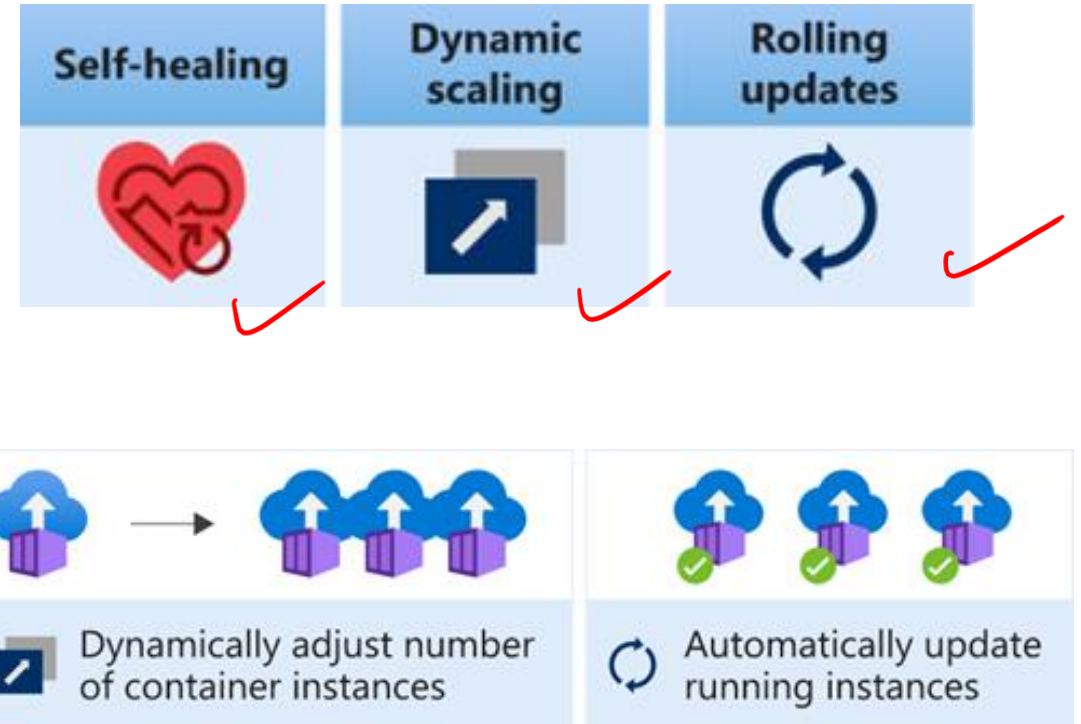| Feature	Containers	Virtual Machines
Isolation	Lightweight isolation from the host and other container.	Complete isolation, strong security boundary, from the host and other VMs.
Operating system	Runs the user mode portion of an operating system	Runs a complete operating system
Deployment	Deploy using Docker	Deploy in the cloud or on-premises – portal, PowerShell, CLI, templates, automation ..
Persistent storage	Azure disks or file share	Virtual hard disk (VHD)or a file share
Fault tolerance	If a cluster node fails, any containers running on it are rapidly recreated by the orchestrator on another cluster node.	VMs can fail over to another server in a cluster, with the VM's operating system restarting on the new server.

Design for Azure Kubernetes Service solutions

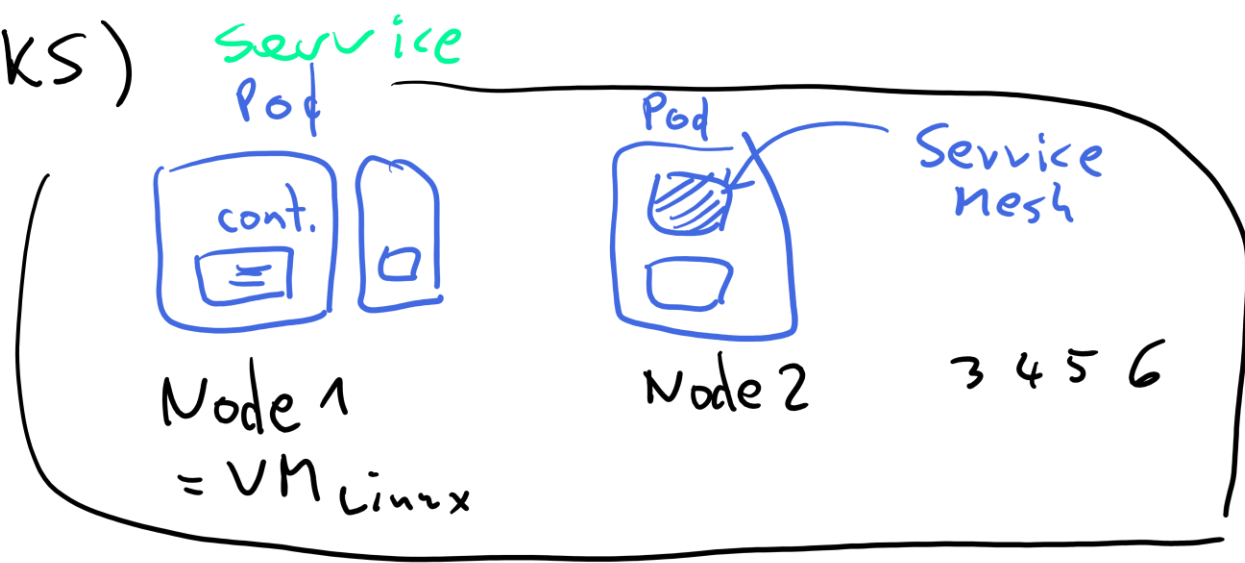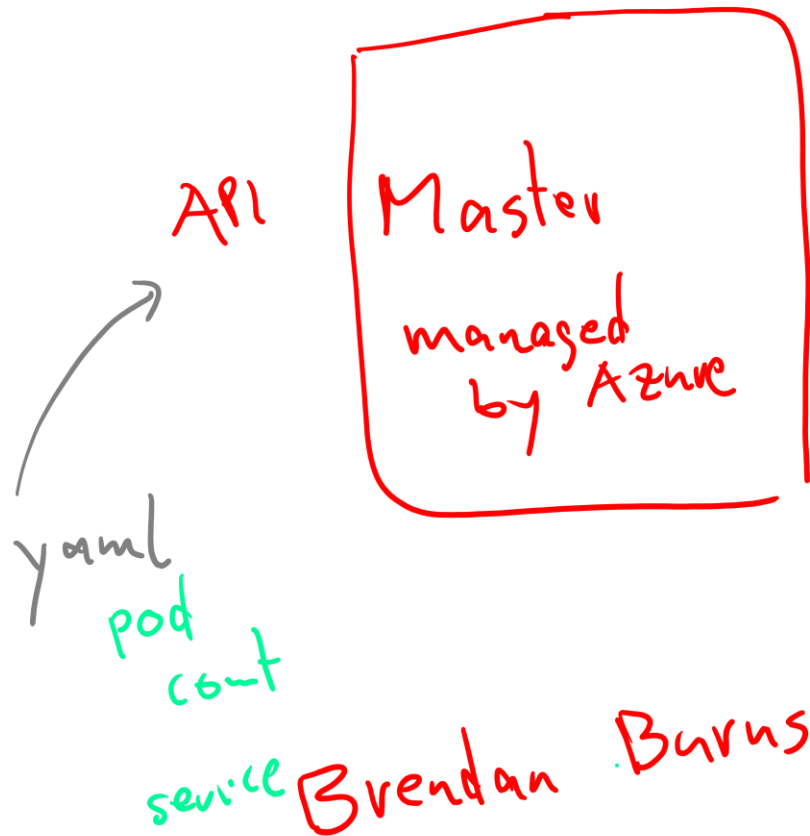# Considerations for Azure Kubernetes Services

Azure Kubernetes Service (AKS) orchestrates your containerized applications

- Enterprise scalability
- Automatic cluster node and pod scaling
- Granular network control
- Cluster node upgrades
- Storage volume support
- Ingress with HTTP application routing support
- Private container registry support

| Self-healing | Dynamic scaling | Rolling updates |

| Dynamically adjust number of container instances | Automatically update running instances |

Kubernetes (AKS)

ARC

Service
Pod

Pod

Service
mesh

cont.

Node 1
= VM Linux

Node 2

3 4 5 6

API

Master
managed
by Azure

Node pool
size
Node scale

yaml
pod
cont

service Brendan Burns

Node 7
= VM window

Node pool

# Design a highly available container solution

AKS provides high availability using multiple nodes in a virtual machine scale set.

When planning to implement AKS clusters across multiple region deployments, consider the following:

- AKS region availability
- Azure paired regions
- Service availability

Two ways to synchronize storage.

- Infrastructure-based asynchronous replication
- Application-based asynchronous replication

λ

AWS
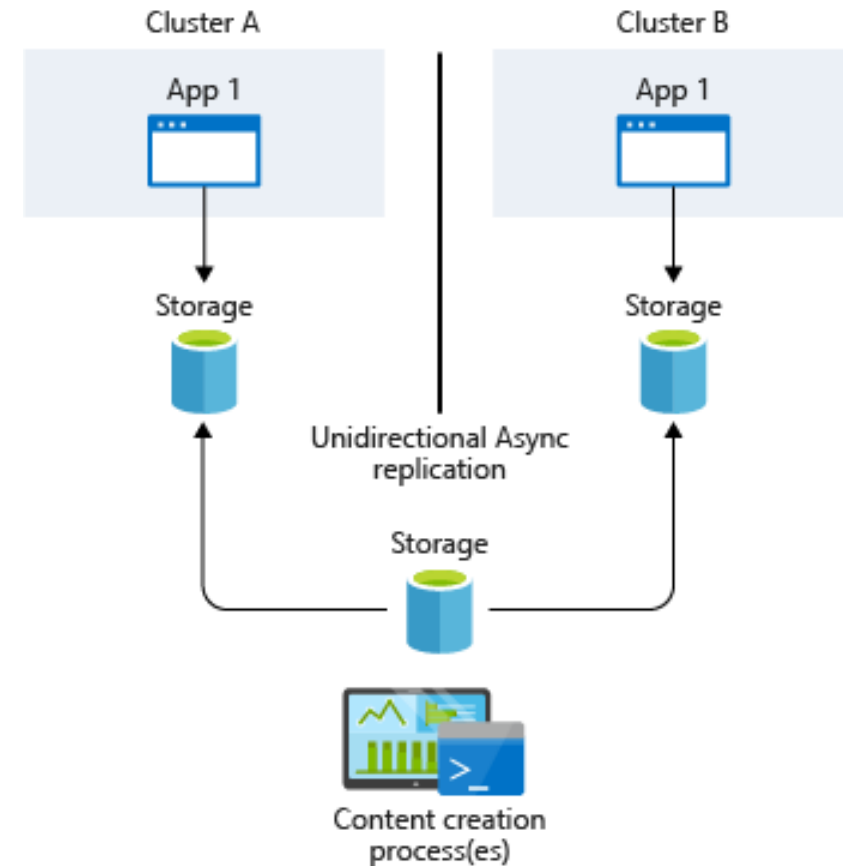
Trigger < Time
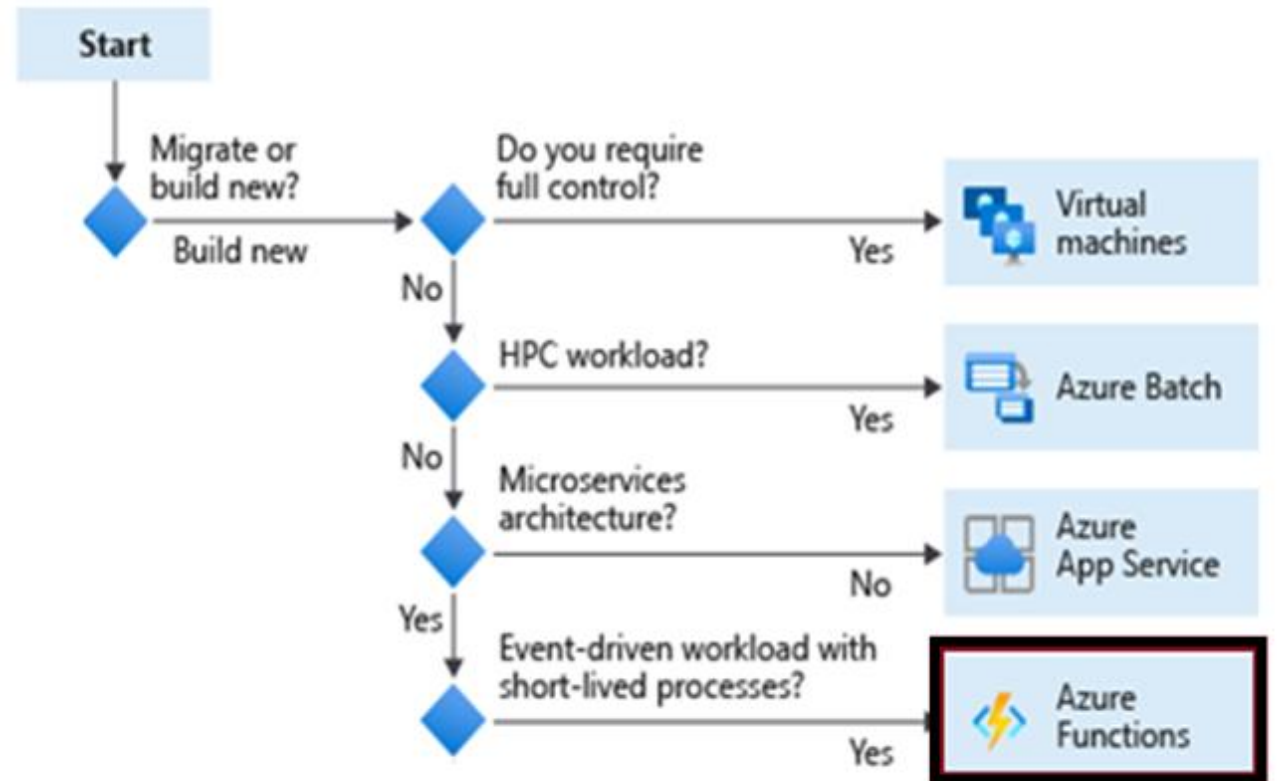   Event Sub
          HTTP

Design for Azure Functions

Deployment Center

Code

When to use Azure Functions

Azure Functions is a serverless application platform for compute-on-demand
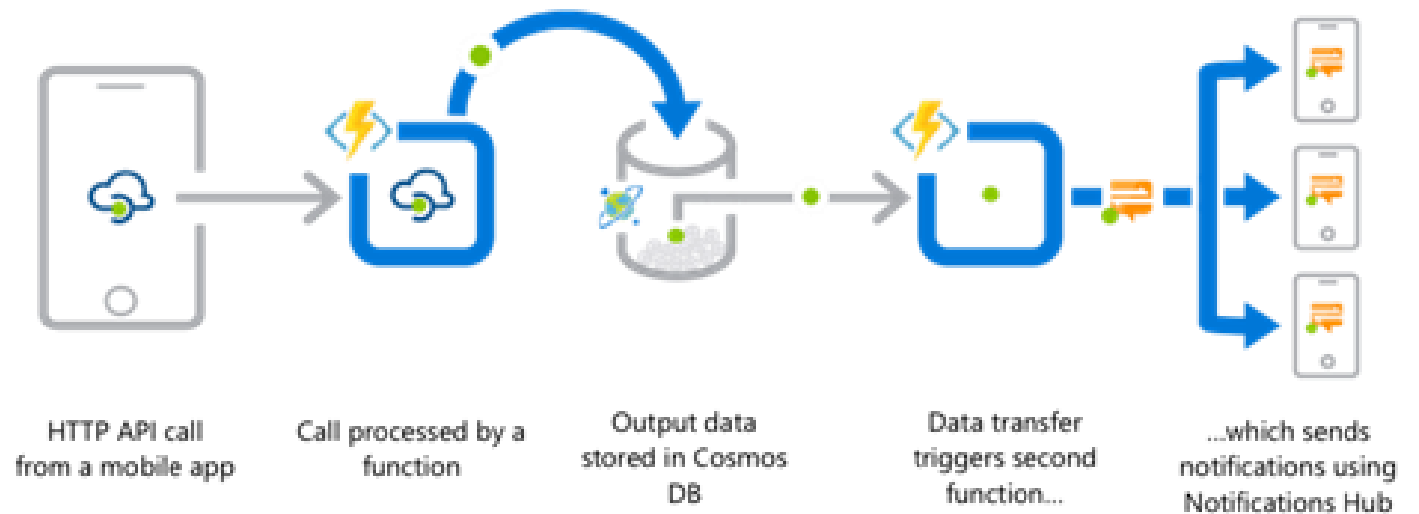
- Implement your system's logic into readily available blocks of code

- Supports a microservice design

- Promotes code reuse

- Scales easily

- Event-driven

Considerations for Azure Functions

Azure Functions are best when handling specific definable actions triggered by an event.

- Avoid long running functions

- Know when to use durable functions

- Organize functions for performance and scaling

- Write defensive functions

HTTP API call from a mobile app

Call processed by a function

Output data stored in Cosmos DB

Data transfer triggers second function...

...which sends notifications using Notifications Hub

Design for Azure Logic App solutions

No Code

When to use Azure Logic Apps

Azure Logic Apps is a cloud-based platform creating and running workflows.

- Send email notifications using Office 365 when a specific event happens

- Route and process customer orders across on-premises systems and cloud services.

- Move uploaded files from an FTP server to Azure Storage.

- Monitor tweets, analyze the sentiment, and create alerts or tasks for items that need review.
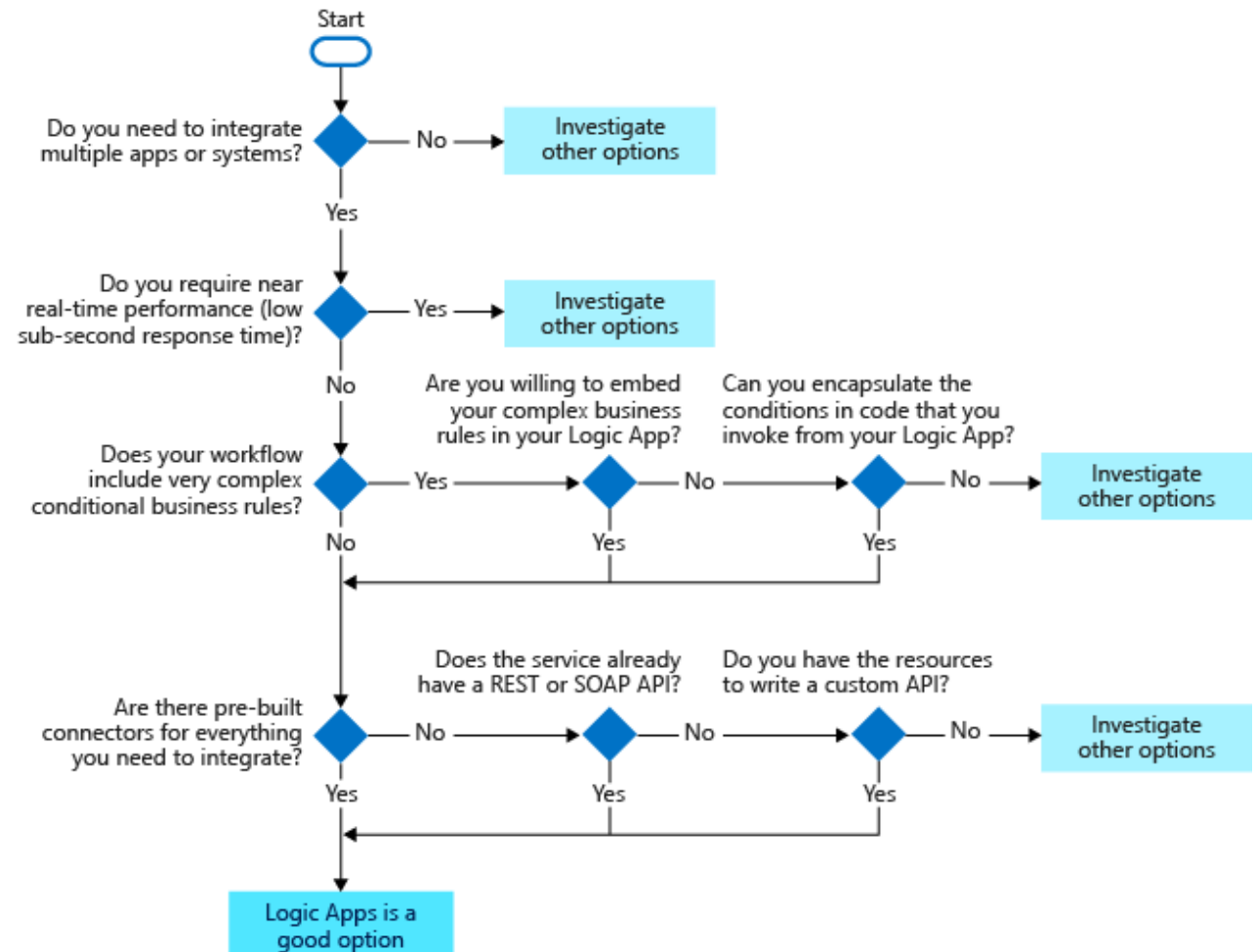
How are Logic Apps different from Functions?
Code-first vs designer-first

workflow

Citizen Developer / Prof. Developer
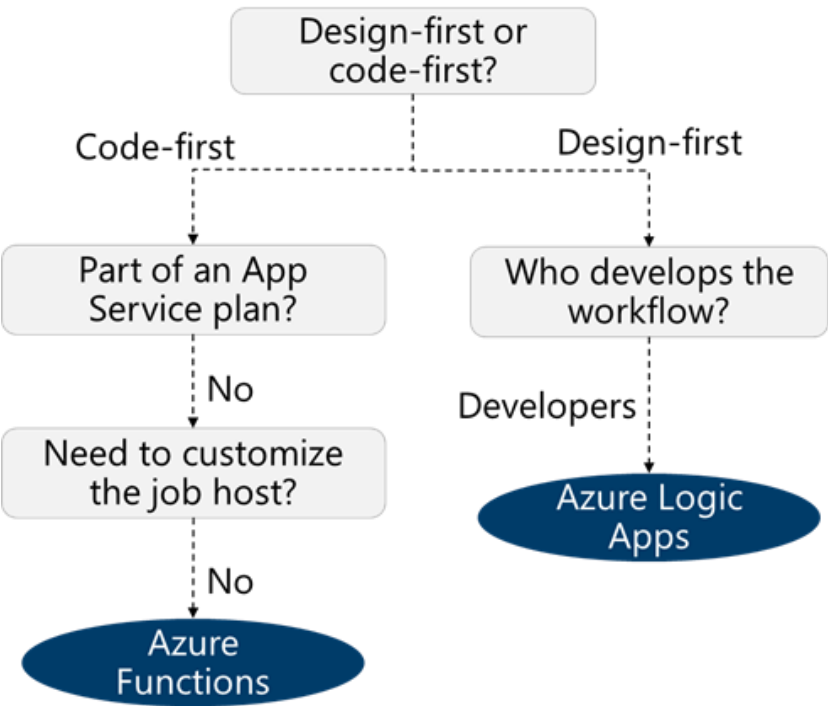
Comparison	Logic Apps	Durable Functions
Development	Designer-first	Code-first
Method	Create orchestrations by using a GUI or editing configuration files	Write code and use the durable functions extension
Connectivity	Large collection of connectors , B2B pack, custom connectors	Large selection of built-in binding types, write code for custom bindings
Monitoring	Azure portal, Azure Monitor logs	Azure Application Insights

Case studies and review

Review - Product and usage case (matching)

Virtual machines

App Service

Azure Container Instances

Usage case?

Azure Kubernetes Service

Azure Functions

Azure Logic Apps

Move your independent docker containers to a PaaS offering
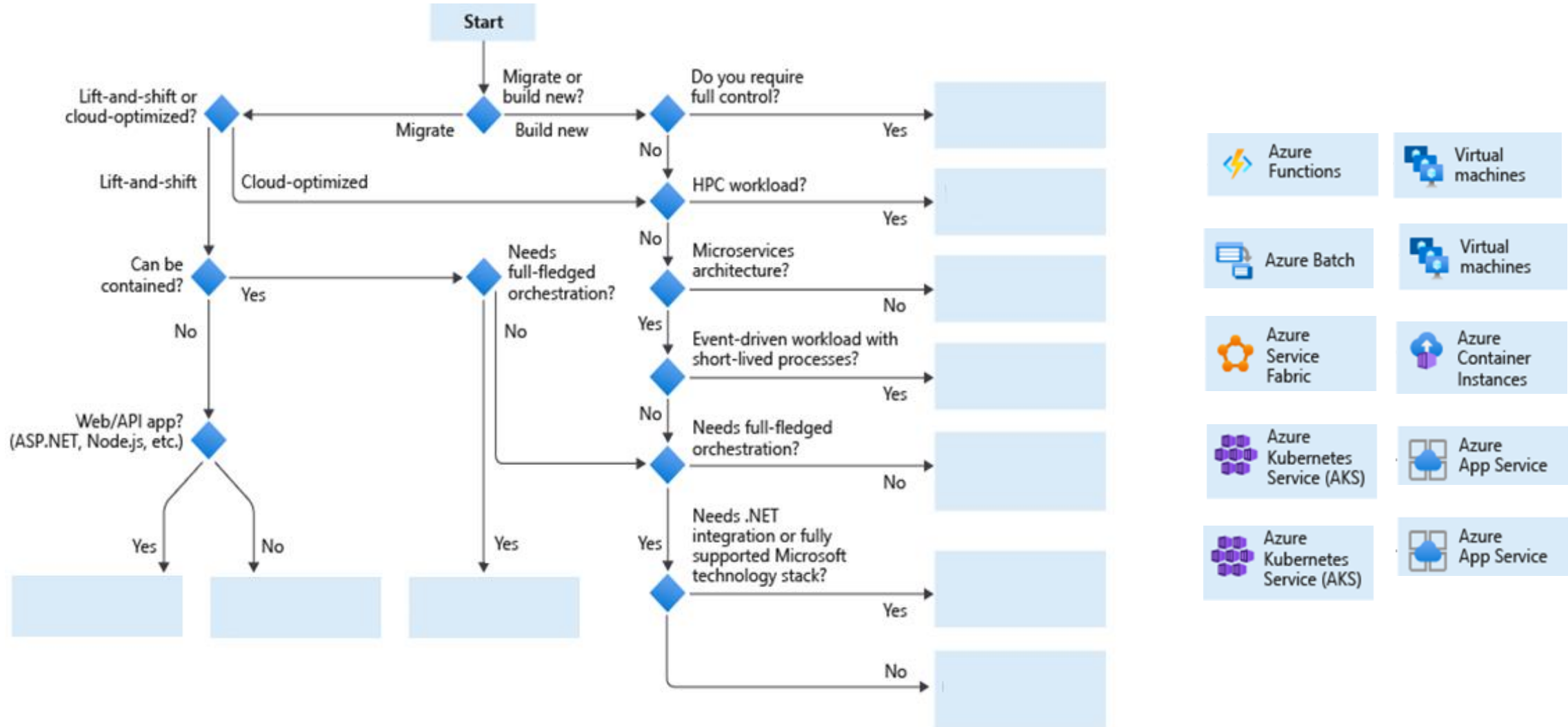
Schedule tasks and messages

Run mobile apps

Manage container orchestration

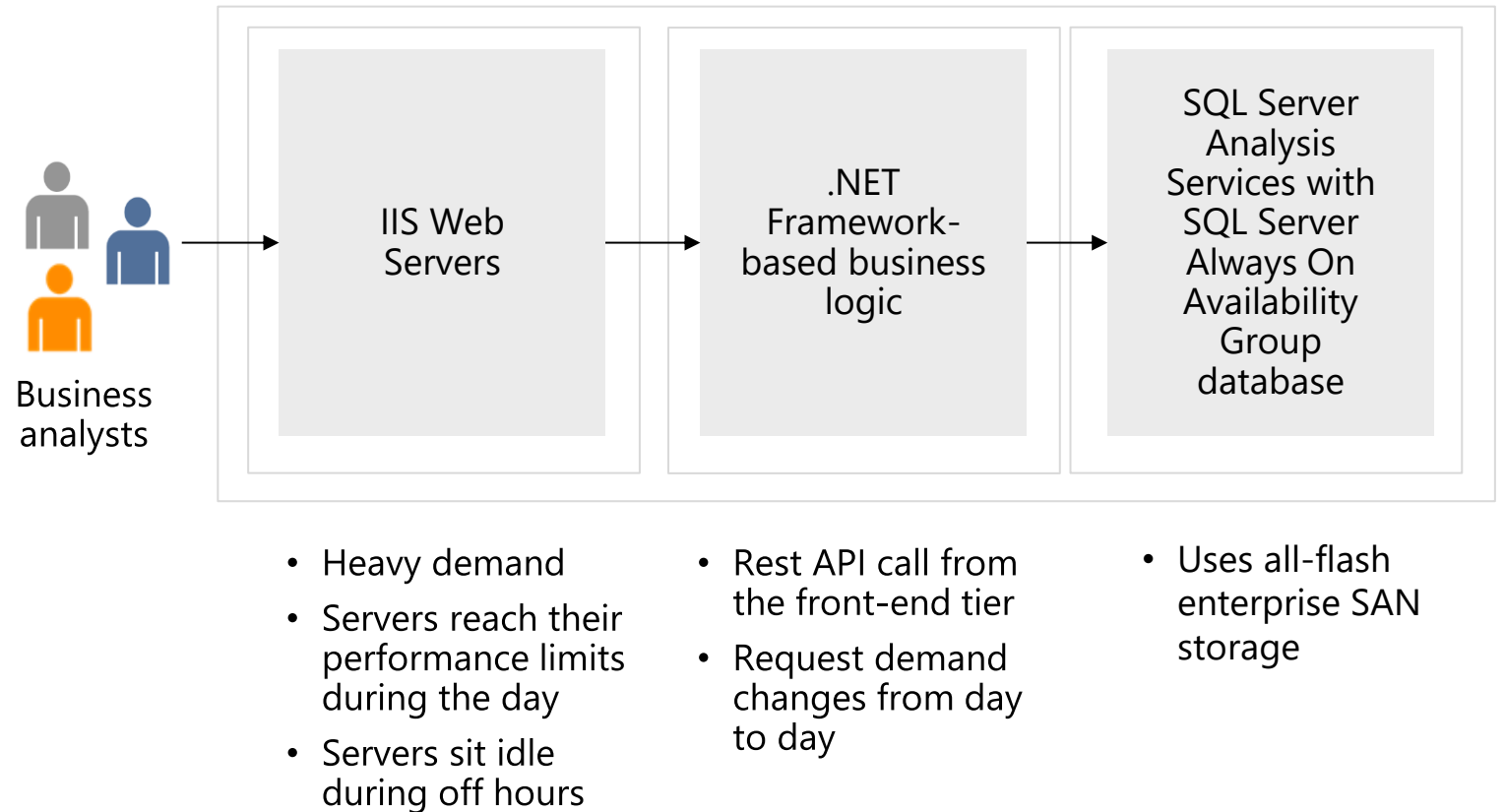Provide full operating system access

Trigger a workflow based on an event

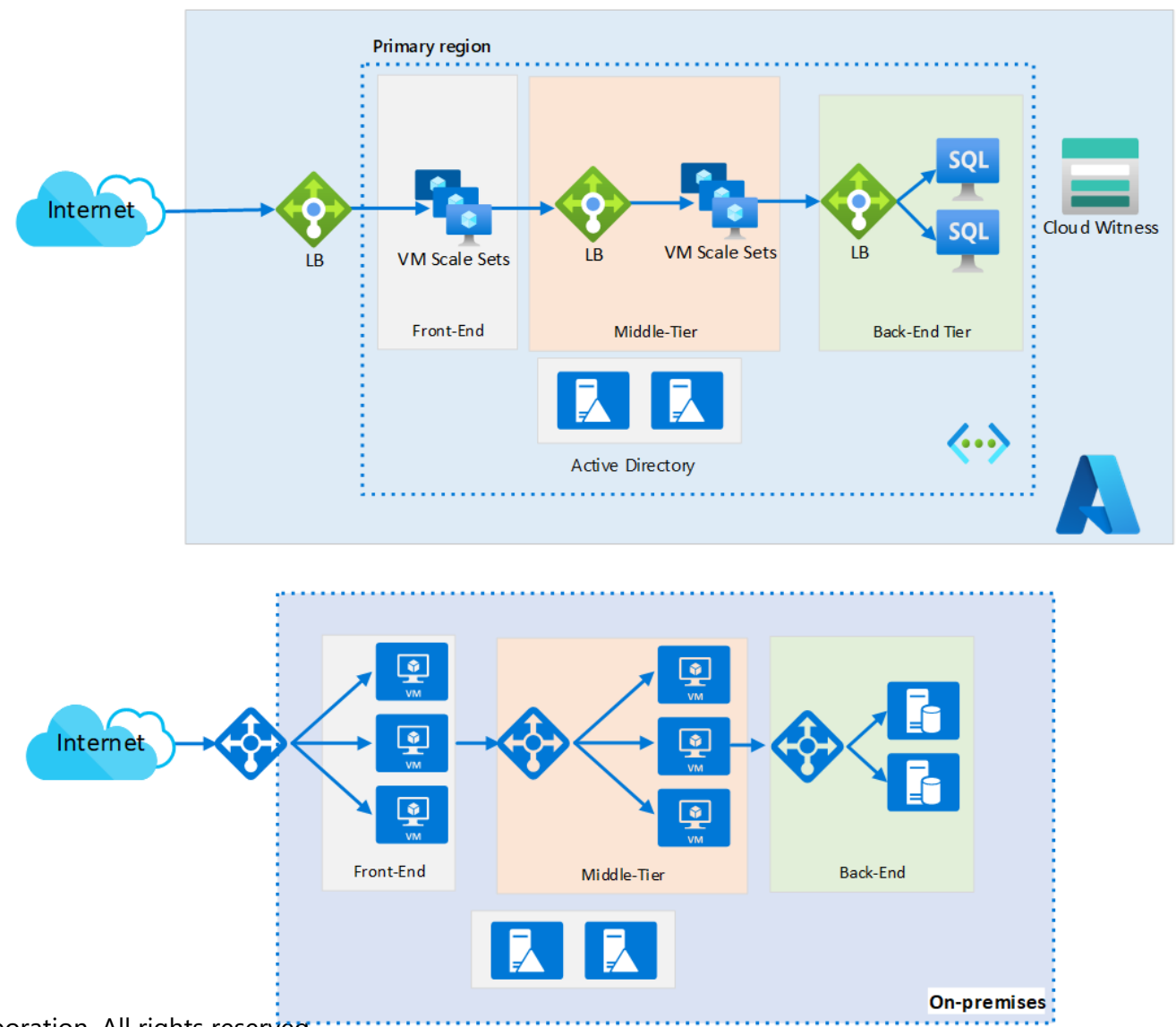# Review – Choose a compute service (drag and drop)
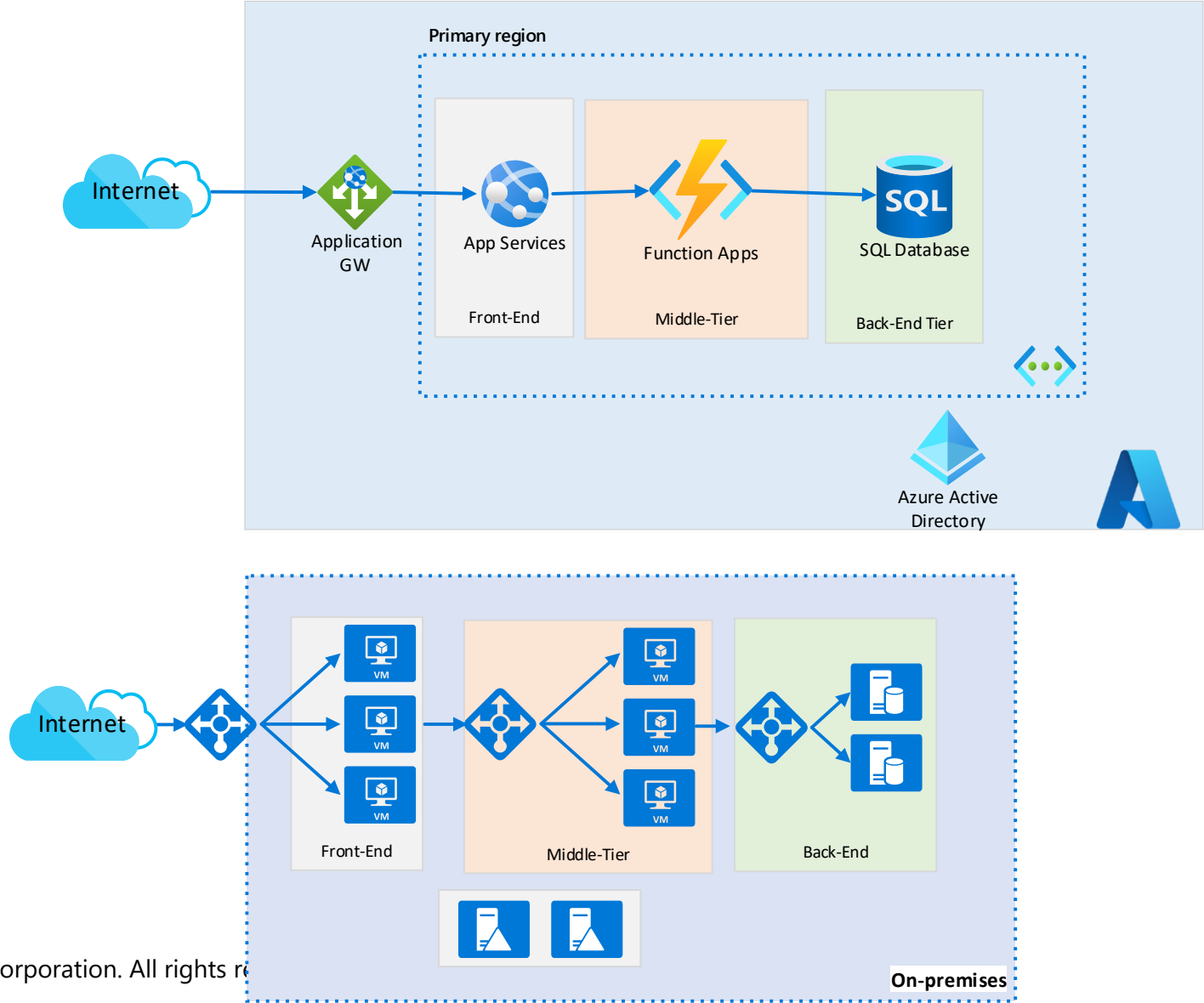
Case study – Compute solutions

- Which Azure compute service would you recommend for the front-end tier? Address both the workload hosting and the web application.

- Which Azure compute service would you recommend for the middle tier application? Diagram what you decide and explain your solution.

Business analysts → IIS Web Servers → .NET Framework-based business logic → SQL Server Analysis Services with SQL Server Always On Availability Group database

- Heavy demand
- Servers reach their performance limits during the day
- Servers sit idle during off hours

- Rest API call from the front-end tier
- Request demand changes from day to day

- Uses all-flash enterprise SAN storage

Instructor Solution – IaaS Version

Instructor Solution – PaaS Solution

Learning recap – compute solutions
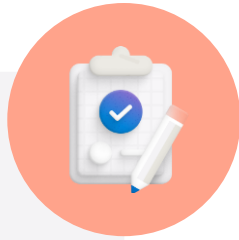
Check your knowledge questions and review

- [Choose the best Azure service to automate your business processes](#)
- [Create serverless logic with Azure Functions](#)
- [Introduction to Azure Logic Apps](#)
- [Host a web application with Azure App Service](#)
- [Introduction to Azure Kubernetes Service](#)

Optional hands-on exercises:

- [Create a web app in the Azure portal](#)
- [Create a Windows virtual machine](#)
- [Create the social media tracker Logic App](#)

End of presentation