



AZ-900T01

Module 02:

Core Azure services



Lesson 01: Learning objectives



Module 2 – Learning objectives

- Understand and describe core Azure architectural components
- Understand and describe core Azure services and products
- Understand and describe Azure solutions
- Understand and describe Azure management tools

Lesson 02: Core Azure architectural components



Regions

- Azure is made up of datacenters located around the globe. These datacenters are organized and made available to end users by country/region
- In reference to datacenters, a *region* is a geographical area on the planet containing at least one—but potentially multiple—datacenters that are in close proximity and networked together with a low-latency network

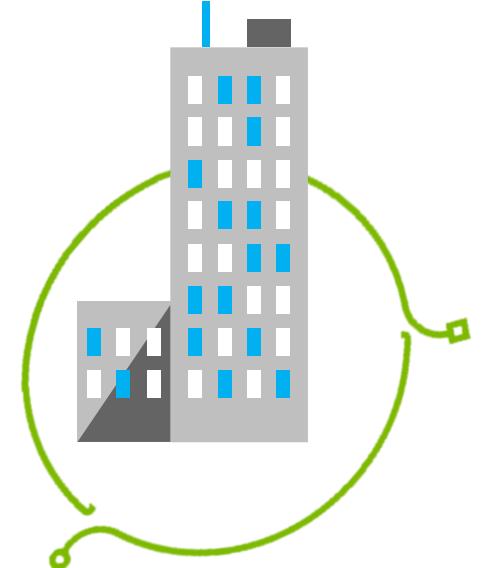


Regions - *continued*

Azure special regions

For applications with specific compliance or legal requirements.

- Azure Government (North America)
- Azure China 21Vianet
- Azure Germany



Region pairs

Each Azure region is paired with another region, within the same geography. Pairing replicates Azure resources to minimize service interruptions from natural disasters, power or network outages.

Geographies

Discrete markets that preserve data residency and compliance boundaries.

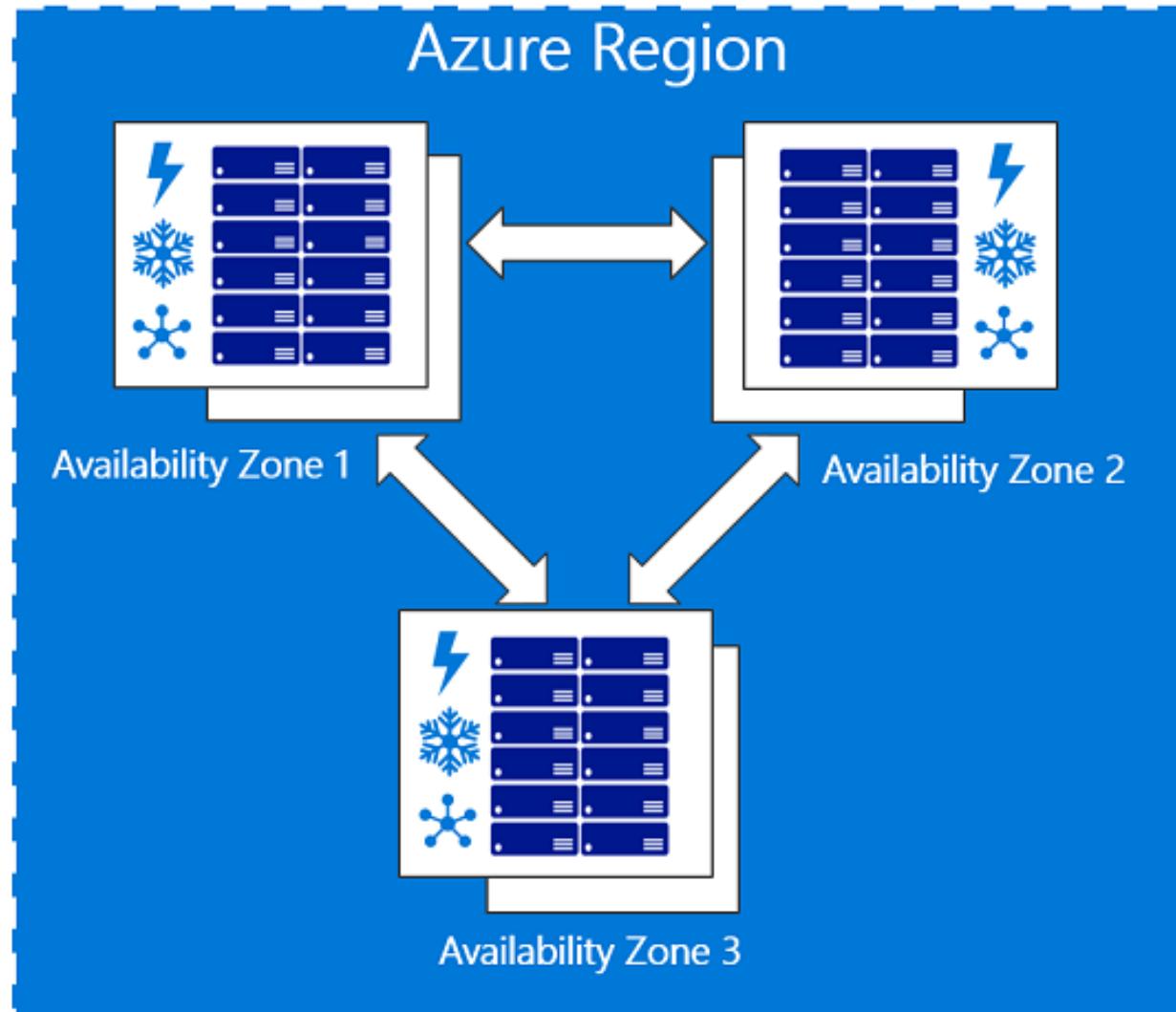
Geography features:

- Typically contain two or more regions.
- Allow customers with specific data-residency and compliance needs to keep their data and applications in close proximity.
- Categorized as Americas, Europe, Asia Pacific, Middle East, and Africa.



Availability zones

- Physically separate locations within an Azure region.
- Made up of one or more datacenters, equipped with independent power, cooling, and networking.
- Act as an isolation boundary.
- If one availability zone goes down, the other continues working.

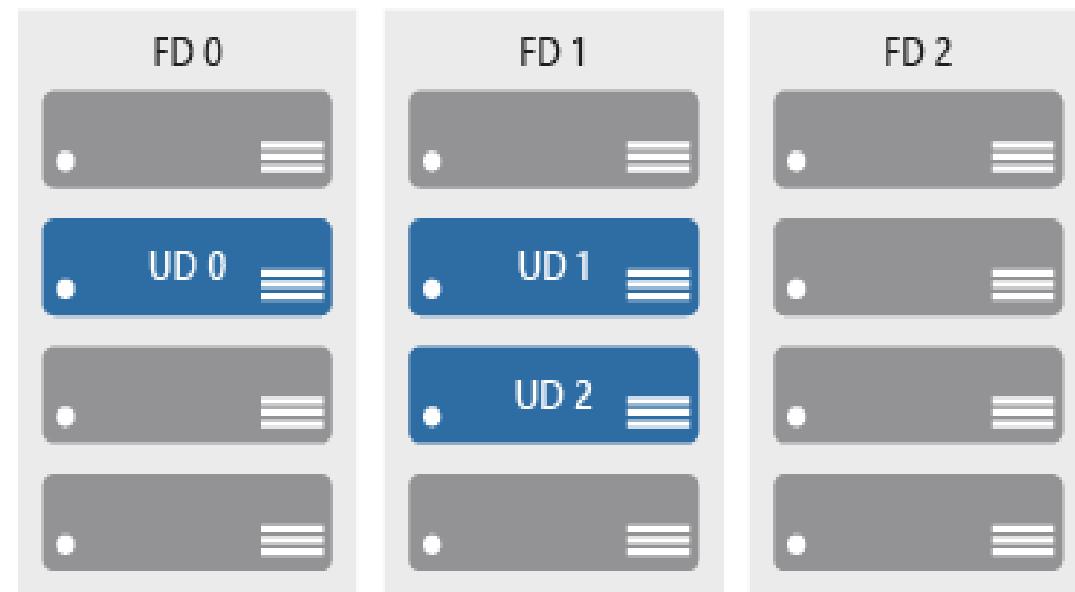


Availability sets

Keep applications online during maintenance or hardware failure.

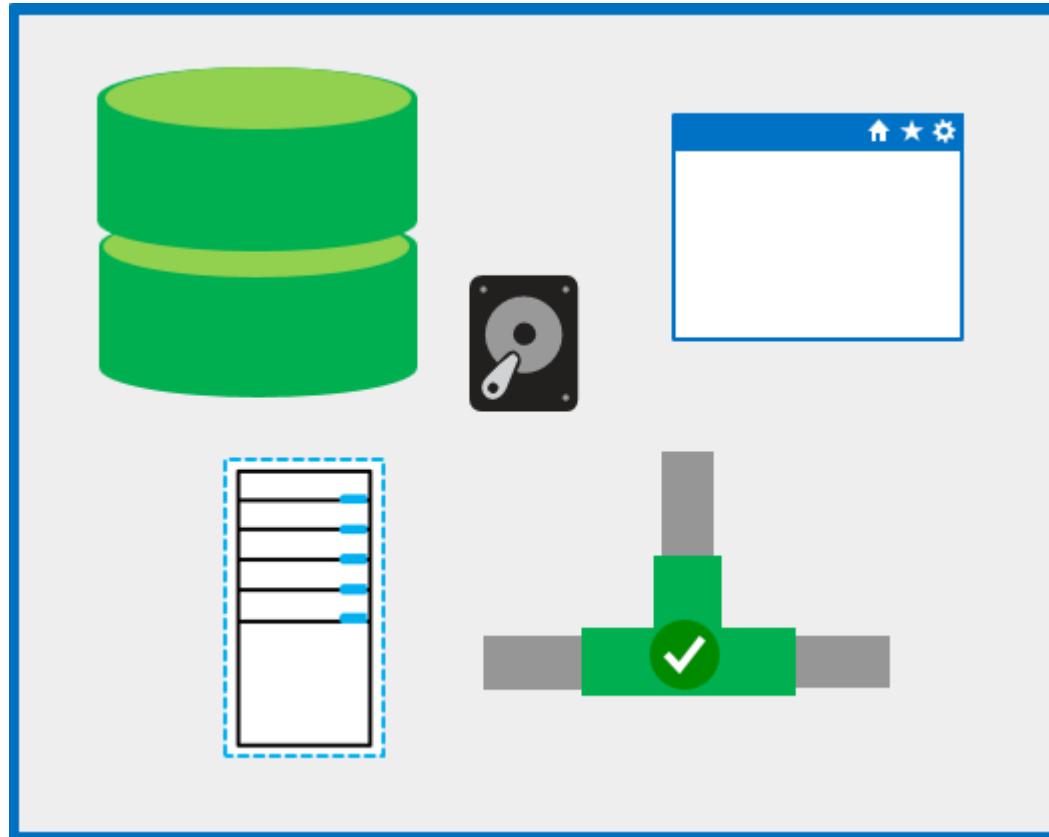
Comprised of:

- **Update domains (UD):** Scheduled maintenance, performance or security updates are sequenced through update domains.
- **Fault domains (FD):** Provide a physical separation of workloads across different hardware in a data center.



Resource groups

A unit of management for resources in Azure.



Resource group features:

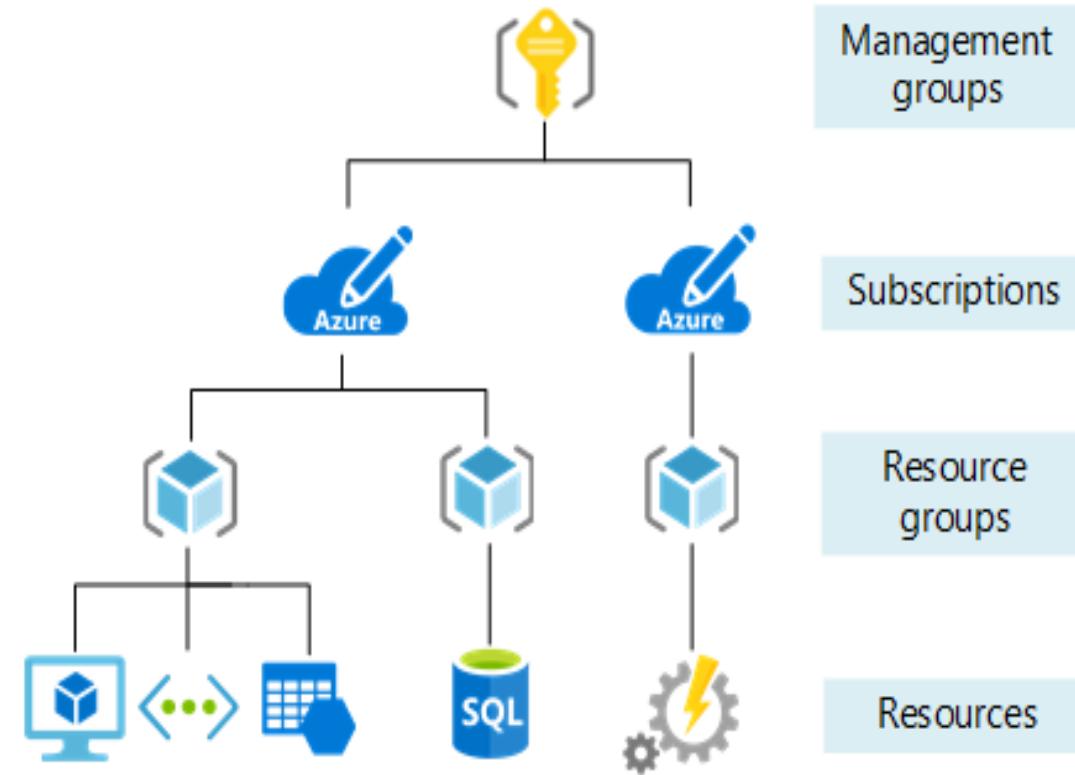
- Act as containers to aggregate the resources required by an application into a single, manageable unit.
- Every Azure resource must exist in one (and only one) Resource Group.

Azure Resource Manager

Provides a management layer in which resource groups and all the resources within it are created, configured, managed, and deleted

With Azure Resource Manager, you can:

- Create, configure, manage and delete resources and resource groups
- Organize resources
- Control access and resources
- Automate using different tools and SDKs



Lesson 03: Core Azure services and products

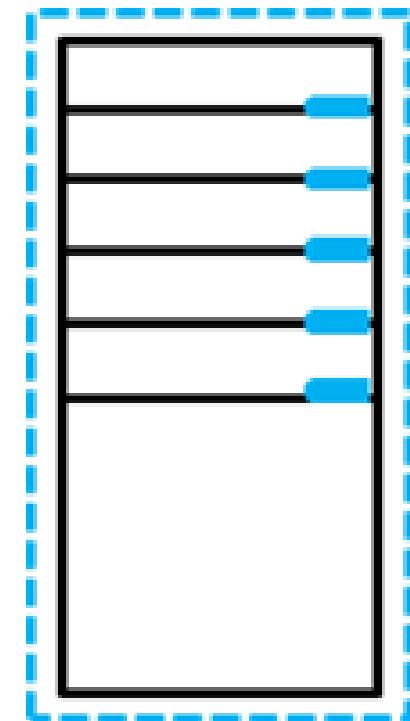


Azure compute services

On-demand computing service for running cloud-based applications.

Azure compute services features:

- provides computing resources such as disks, processors, memory, networking, and operating systems.
- makes resources available in minutes or seconds.
- pay-per-use.
- common on-demand Azure services are :
(a) Virtual Machines, and (b) Containers.



Azure compute services - virtual machine services

VMs are software emulations of physical computers. Examples of Azure services for virtual machines include:



- Azure VMs: Infrastructure as a service (IaaS) to create and use VMs in the cloud
- VM scale sets: Designed for automatic scaling of identical VMs
- App services: Platform as a service (PaaS) offering to build, deploy, and scale enterprise-grade web, mobile, and API apps
- Functions: Creates infrastructure based on an event



Demo: Create an Azure virtual machine



Walkthrough-Create a Virtual machine using Azure Portal

- In this walkthrough task we will create a virtual machine in Azure via the Azure Portal, configure it as a web server and connect to the web server over the internet.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Azure compute services – container services

Containers are a virtualization environment. However, unlike virtual machines, they do not include an operating system. Containers are meant to be lightweight, and are designed to be created, scaled out, and stopped dynamically. Examples of Azure services for containers include:



- Azure Container Instances: A PaaS offering that allows you to upload your containers, which it then will run for you
- Azure Kubernetes Service: A container orchestrator service for managing large numbers of containers



Demo: Deploy Azure Container Instances
(ACI) in Azure Portal.



Walkthrough-Deploy Azure Container Instances (ACI) in Azure Portal

- In this walkthrough, you will create, configure, and deploy a Docker container to **Azure Container Instances** (ACI) in Azure Portal. The container is created from an image template called *microsoft/aci-helloworld*. The image packages a small web application, written in Node.js, and serves a static HTML page
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Azure network services

Networking on Azure allows you to connect cloud and on-premises infrastructure and services.



- Azure Virtual Network: An IaaS service to create and use VMs in the cloud



- Azure Load Balancer: Designed for automatic scaling of identical VMs



- VPN Gateway: A PaaS offering to build, deploy, and scale enterprise-grade web, mobile, and API apps



- Azure Application Gateway: Creates infrastructure based on an event



- Content Delivery Network: Creates infrastructure based on an event

Walkthrough-Create a virtual network via the Azure Portal

- In this walkthrough task we will create a virtual network, deploy two virtual machines onto that virtual network and then configure them to allow one virtual machine to ping the other over that virtual network.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time

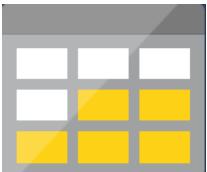


Azure storage services – data categories

Structured data	Semi-structured data	Unstructured data
Adhere to a schema, with same data fields or properties.	Ad hoc schema. Less organized fields and properties than structured data.	No designated schema or data structure.
Storable in relational database tables, with rows and columns.	Non-relational or NoSQL data, not storable in tables, rows and columns.	Non-relational or blob data, with no restrictions on kinds of data blobs contain.
Examples include, sensor or financial data.	Books, blogs, and HTML documents are examples of semi-structured data.	For example, a blob can hold a PDF, JPG, JSON object, or video.

Azure storage services – Azure services

Azure Storage is a service that you can use to store files, messages, tables, and other types of information.



- **Blob storage:** No restrictions on the kinds of data it can hold.
Blobs are highly scalable
- **Disk storage:** Provides disks for virtual machines, applications, and other services
- **File storage:** Azure Files offers fully-managed file shares in the cloud
- **Archive storage:** Storage facility for data that is rarely accessed

Demo: Create Blob storage



Walkthrough-Create Blob storage

- In this walkthrough task we will create a storage account, then create a blob storage container within that storage account, then upload a block blob, view and edit the blob file within the blob container in Azure, and then download the block blob file.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time.



Azure database services

Azure database services are fully-managed PaaS database services that free up valuable time you'd otherwise spend managing your database



- Azure Cosmos DB: A globally-distributed database service that enables you to elastically and independently scale throughput and storage
- Azure SQL Database: A relational database as a service (DaaS) based on the latest stable version of the Microsoft SQL Server database engine
- Azure Database Migration: A fully-managed service designed to enable seamless migrations from multiple database sources to Azure data platforms with minimal downtime



Walkthrough-Create a SQL database

- In this walkthrough task we will create a SQL database in Azure and then query the data in that database.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Azure Marketplace

Connects end users with Microsoft partners, Independent Software Vendors (ISVs), and start-ups that offer solutions and services for Azure.

Azure customers, IT professionals and cloud developers can find, try, purchase, and provision Azure applications and services from certified service providers.

Includes close to 10,000 product listings.



Lesson 04: Azure solutions

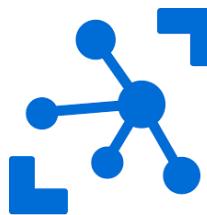


Internet of Things

The internet allows any item that's online-capable to access valuable information. This ability for devices to garner and then relay information for data analysis is referred to as the *Internet of Things* (IoT)



- Microsoft IoT Central: A fully-managed global IoT software as a service (SaaS) solution that makes it easy to connect, monitor, and manage your IoT assets at scale
- Azure IoT Hub: A managed service hosted in the cloud that acts as a central message hub for bidirectional communication between your IoT application and the devices it manages



Demo: Add IoT device to Azure IoT Hub



Walkthrough-Add IoT device to Azure IoT Hub

- In this walkthrough you will set up a new Azure IoT Hub in Azure Portal, and configure the hub to authenticate a connection to an IoT device using the online Raspberry Pi device simulator. Sensor data and messages are passed from the Raspberry Pi simulator to your Azure IoT Hub, and you view metrics for the messaging activity in Azure Portal.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Big data and analytics

Big data refers to large volumes of data that become increasingly hard to make sense of, or consequently make decisions about. Some big data and analytic services in Azure include:



- **Azure SQL Data Warehouse:** A cloud-based Enterprise Data Warehouse that leverages massively parallel processing (mpp) to run complex queries quickly across petabytes of data
- **Azure HDInsight:** A fully-managed, open-source analytics service for enterprises. It is a cloud service that makes it easier, faster, and more cost-effective to process massive amounts of data
- **Azure Data Lake Analytics:** An on-demand analytics job service that simplifies big data. Instead of deploying and tuning hardware, you write queries to transform your data and extract valuable insights.



Artificial Intelligence

Artificial Intelligence (AI), in the context of cloud computing, is based around a broad range of applications, including Machine Learning, which use existing data to forecast future behaviors, outcomes, and trends. Using machine learning, computers learn without being explicitly programmed. Some AI services in Azure include:



- **Azure Machine Learning service:** Provides a cloud-based environment used to develop, train, test, deploy, manage, and track machine learning models
- **Azure Machine Learning Studio:** A collaborative, drag-and-drop visual workspace where you can build, test, and deploy machine learning solutions without needing to write code

Serverless computing

Serverless computing is a cloud-hosted execution environment that runs your code but abstracts the underlying hosting environment. Some serverless services in Azure include:



- **Azure Functions:** Concerned with the code running your service and not the underlying platform or infrastructure. Creates infrastructure based on an event.
- **Azure Logic Apps:** A cloud service that helps you automate and orchestrate tasks, business processes, and workflows when you need to integrate apps, data, systems, and services across enterprises or organizations.
- **Azure Event Grid:** A fully-managed, intelligent event routing service that uses a publish-subscribe model for uniform event consumption.



Demo: Run serverless code with Azure Functions in Azure portal



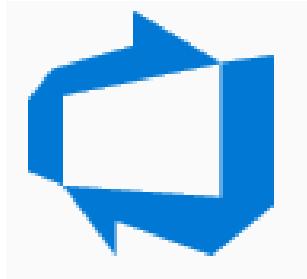
Walkthrough-Run serverless code with Azure Functions in Azure portal

- In this walkthrough you will write and run serverless code inside an *Azure Function App* in Azure portal.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



DevOps

DevOps allows you to create build and release pipelines that provide continuous integration, delivery, and deployment for applications.



- **Azure DevOps services:** Provides development collaboration tools including pipelines, Git repositories, Kanban boards, and extensive automated and cloud-based load testing.
- **Azure DevTest Labs:** Allows you to quickly create environments in Azure while minimizing waste and controlling cost

Lesson 05: Azure management solutions



Azure management tools

Configure and manage Azure using a broad range of tools and platforms.

Azure management tools include:



- Azure Portal : Management website accessed via a web browser.



- Azure PowerShell : Command shell scripting language.



- Azure Command-Line Interface (CLI) : Cross-platform, command-line scripting program for Windows, Linux, or MacOS.



- Azure Cloud Shell : Browser-based scripting environment.

Demo: Customize the Azure Portal



Walkthrough-Working with the Azure CLI

- In this walkthrough task we will install the Azure CLI on our local machine, then create a virtual machine using the Azure CLI and an Azure Resource Manager template, then verified that deployment using the Azure CLI in the Azure Cloud Shell
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Demo: Create VMs from a script with Azure PowerShell



Walkthrough-Create VMs from a script with Azure PowerShell

- In this walkthrough you will write and run a local PowerShell script. The PowerShell script uses the *Azure PowerShell* module to create three virtual machines (VMs) in Azure from a Linux Ubuntu image.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Demo: Install IIS webserver on a VM with
Azure Cloud Shell



Walkthrough-Install IIS webserver on a VM with Azure Cloud Shell

- In this walkthrough, you use *Azure Cloud Shell* to automate the installation of the Windows *Internet Information Services* webserver (IIS) on a new virtual machine (VM). Azure Cloud Shell creates a VM and uses the *Custom Script Extension* to install IIS.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Azure Advisor

Analyzes your deployed Azure resources and recommends ways to improve availability, security, performance, and costs.

With Azure Advisor, you can:



- Get proactive, actionable, and personalized best practice recommendations.
- Improve the performance, security, and availability of your resources.
- Identify opportunities to reduce your Azure costs.

Demo: Save a recommendations report with Azure Advisor



Walkthrough-Save a recommendations report with Azure Advisor

- In this walkthrough, you create and save a personalized recommendations report with Azure Advisor. You deploy a Virtual Machine (VM) and network resources, which Azure Advisor analyzes, to get recommendations and generate the report.
- You can complete this walkthrough task by completing the steps outlined below, or you can simply read through them, depending on your available time



Lesson 06: Module 2 review questions



Module 2 review questions

1. What are the core architectural components of Azure?
2. Every resource created in Azure must exist in one and only one what?
3. You need to deploy a legacy application in Azure that has some customizations that are needed to ensure it runs successfully. The application will run on a VM running the Windows operating system.

Which Azure service do you recommend running the virtual machine in?