

AZ-900T0x

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

- A region represents a collection of datacenters.
- Provides flexibility and scale.
- Preserves data residency.
- Select regions close to your users.
- Be aware of region deployment availability.
- There are global services that are region independent.



Worldwide there are 54 regions representing 140 countries

Region Pairs

- Each Azure region is paired with another region.
- Azure prefers at least 300 miles of separation between datacenters in a regional pair.
- Some services provide automatic replication to the paired region.
- In an outage, recovery of one region is prioritized out of every pair.
- Azure system updates are rolled out to paired regions sequentially (not at the same time).
- Paired regions are members of the same geography – except Brazil.

Region	Region
North Central US	South Central US
East US	West US
West US 2	West Central US
US East 2	Central US
Canada Central	Canada East
North Europe	West Europe
UK West	UK South
Germany Central	Germany Northeast
South East Asia	East Asia
East China	North China
Japan East	Japan West
Australia Southeast	Australia East
India South	India Central
Brazil South (Primary)	South Central US

Geographies

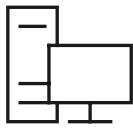
- Discrete markets that preserve data residency and compliance boundaries.
- Typically contain two or more regions.
- Allow customers with specific data-residency and compliance needs to keep their data and applications in close proximity.
- Categorized as Americas, Europe, Asia Pacific, Middle East,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



Availability Options

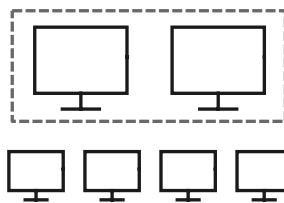
VM SLA

99.9% with Premium Storage



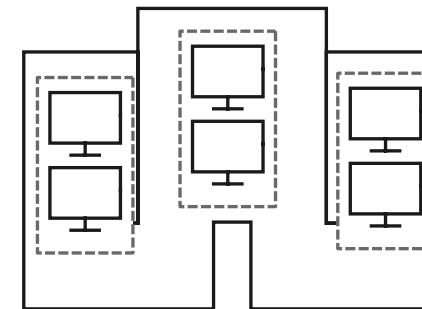
VM SLA

99.95%

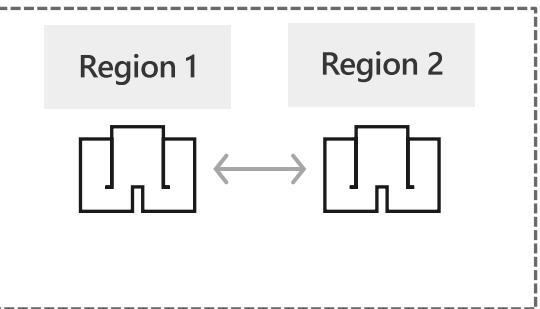


VM SLA

99.99%



MULTI-REGION DISASTER RECOVERY



SINGLE VM

Easier lift and shift

AVAILABILITY SETS

Protecting against failures within datacenters

AVAILABILITY ZONES

Protection from entire datacenter failures

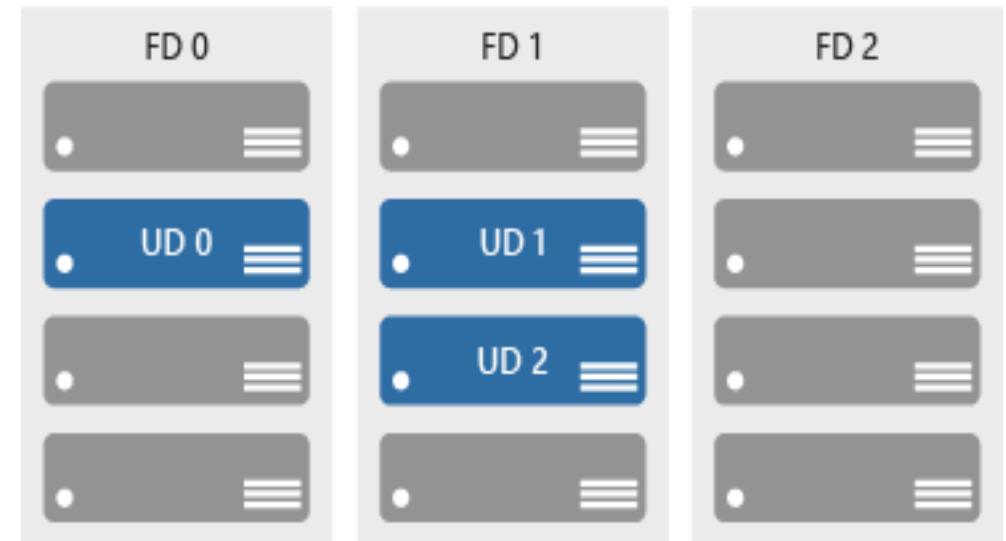
REGION PAIRS

Regional protection within Data Residency Boundaries

Availability sets

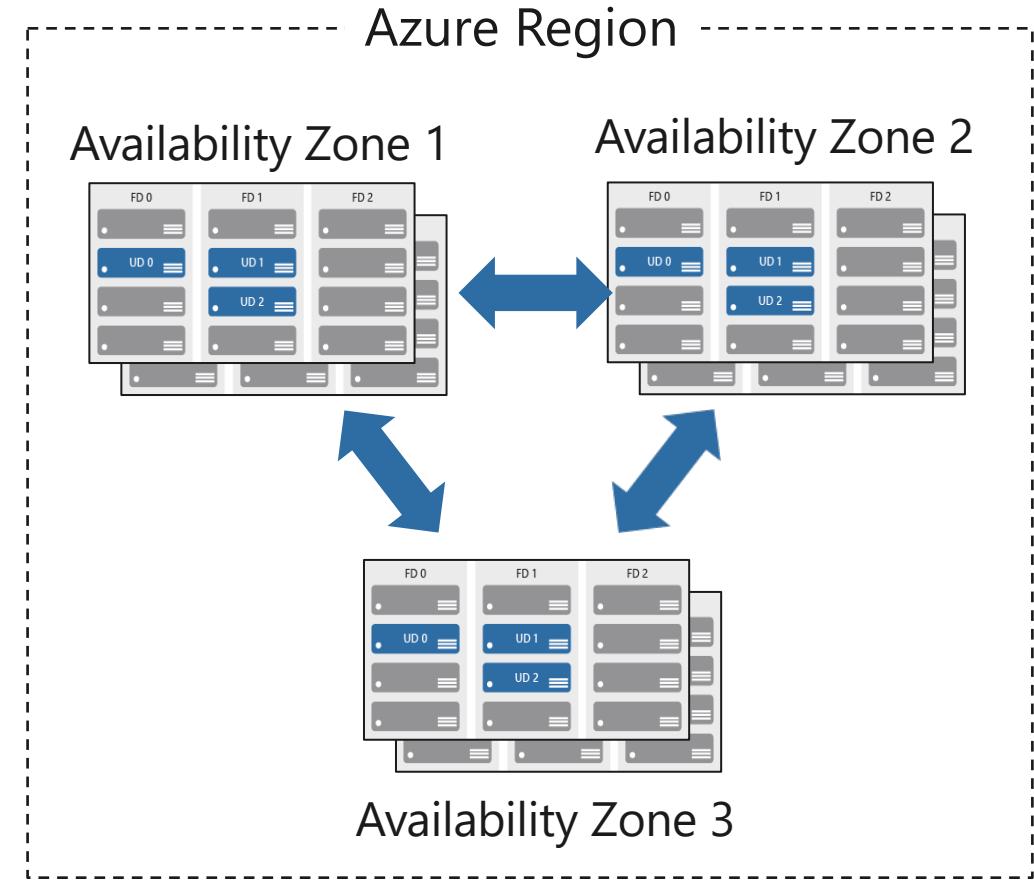
Keep applications online during maintenance or hardware failure.

- 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 datacenter.



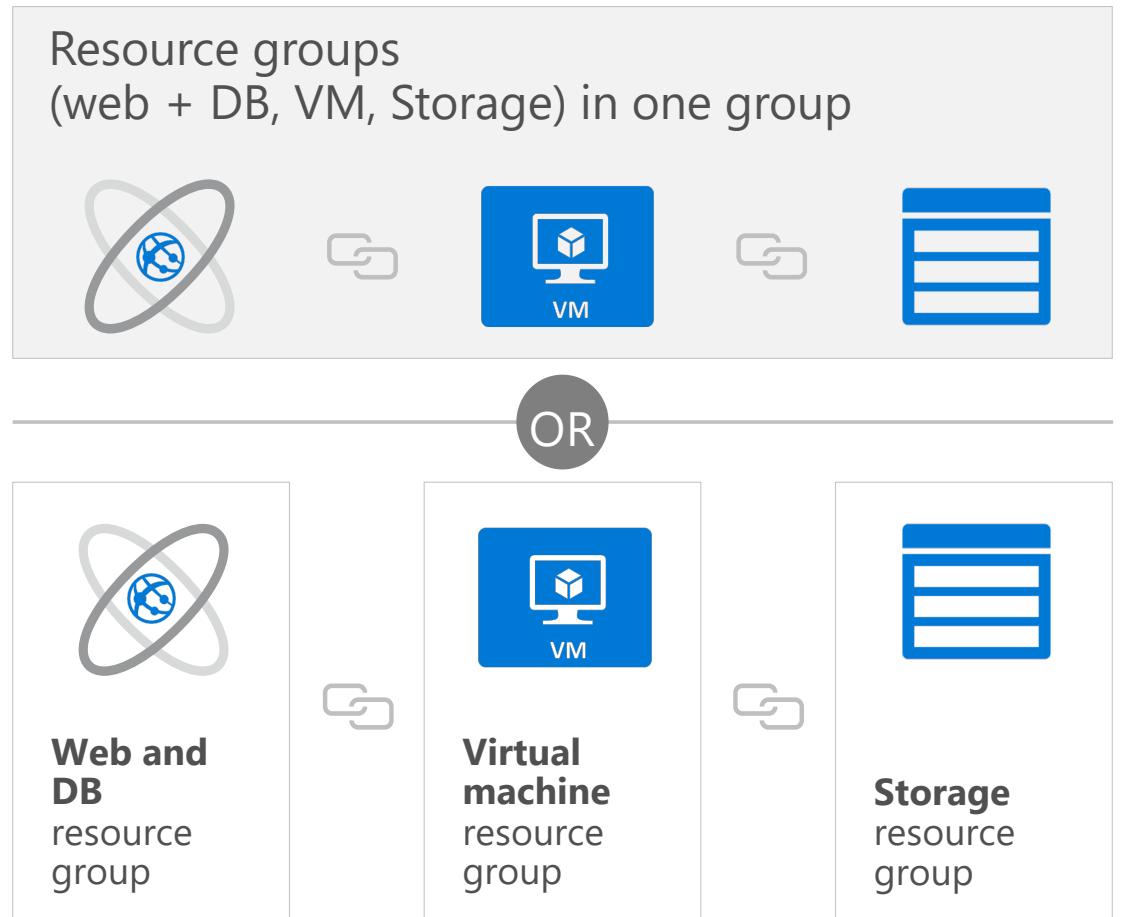
Availability zones

- Physically separate locations within an Azure region.
- Takes availability sets to the next level
- Includes one or more datacenters, equipped with independent power, cooling, and networking.
- Acts as an isolation boundary.
- If one availability zone goes down, the other continues working.



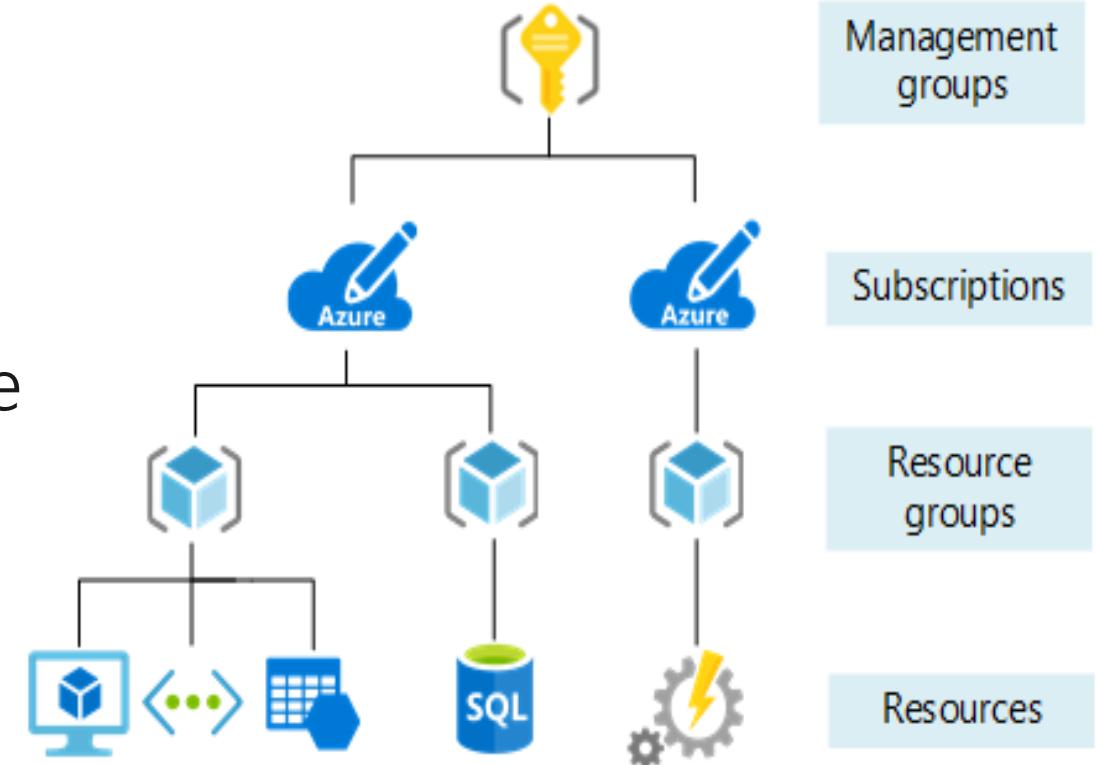
Resource groups

- Containers for multiple resources that share the same life cycle.
- Aggregates resources into a single manageable unit.
- Every Azure resource must exist in one (and only one) resource group.
- Secure at the resource group (or resource) level - using role-based access control (RBAC).

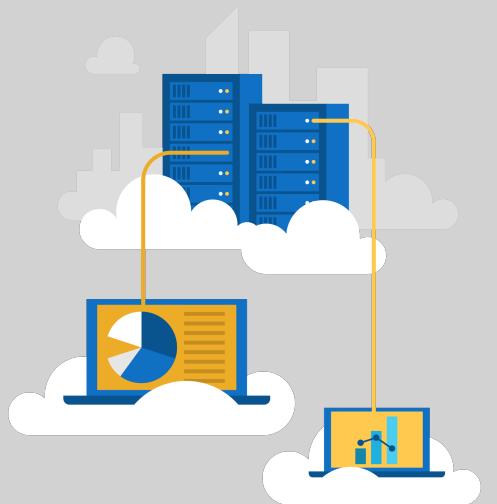


Azure Resource Manager

- Provide a management layer that enables you to create, update, and delete resources in your Azure subscription.
- Create, configure, manage and delete resources and resource groups.
- Organize resources.
- Control access and resources.
- Automate using different tools and SDKs.

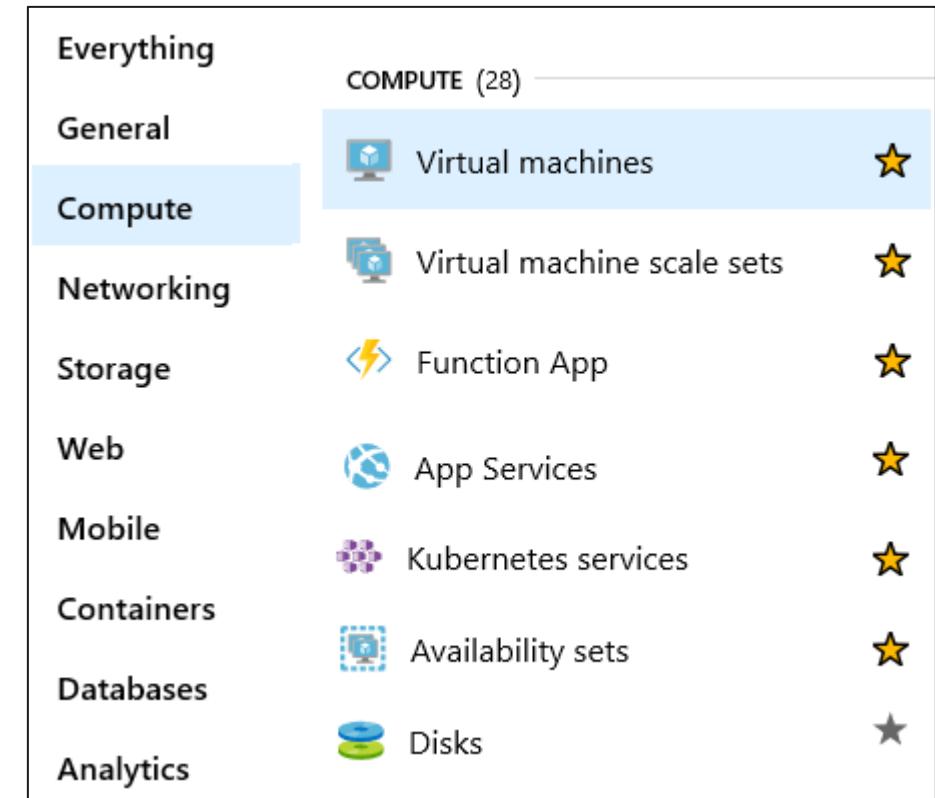


Lesson 03: Core Azure services and products



Azure compute

- On-demand computing service for running cloud-based applications.
- Provides computing resources such as disks, processors, memory, networking, and operating systems.
- Makes resources available in minutes or seconds.
- Lots of on-demand services.
- Pay-per-use.



Azure compute services



- Azure VMs use Infrastructure as a Service (IaaS) to provide computing power in the cloud.
- VM scale sets are designed for automatic scaling of identical VMs.
- App services is a Platform as a Service (PaaS) offering to build, deploy, and scale enterprise-grade web, mobile, and API apps.
- Functions perform compute actions based on an event.



Walkthrough - Create a virtual machine

Create a virtual machine in the Azure Portal, connect to the virtual machine, install the web server role and test.

1. Create the virtual machine.
2. Connect to the virtual machine.
3. Install the web server role and test.

Container services

Containers are a virtualization environment. However, unlike virtual machines, you do not manage an operating system. Containers are meant to be lightweight, and are designed to be created, scaled out, and stopped dynamically.



- **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.

Walkthrough - Deploy Azure Container Instances

Using the Azure Portal create, configure, and deploy a Docker container to an Azure Container Instance. The container will deploy a Hello HTML page.

1. Create a container instance.
2. Deploy the container and test.

Azure network services

-  • Azure Virtual Network provides secure communication between Azure resources.
-  • Azure Load Balancer automatically scales to create highly-available access to applications or resources.
-  • VPN Gateway is a platform managed scalable and highly available application delivery controller.
-  • Azure Application Gateway provides for the management of traffic to web applications.
-  • Content Delivery Network provides a distributed network of servers that efficiently deliver web content in their local region.

Walkthrough - Create a virtual network

Create a virtual network with two virtual machines and then test connection between the machines.

1. Create a virtual network.
2. Create two virtual machines.
3. Test the connection.

Azure data categories

	Schema	Data relationships	Examples
Structured data	Adheres to a schema, with the same data fields or properties.	Storable in relational database tables, with rows and columns.	Sensor data and financial data.
Semi-structured data	Has an ad hoc schema with less organized fields and properties.	Non-relational or NoSQL data, not storable in tables, rows and column.	Books, blogs, JSON, HTML documents.
Unstructured data	Has no designated schema or data structure.	Non-relational or blob data, with no restrictions on the kinds of data blobs contain.	PDFs, JPGs, videos.

Azure storage services

IaaS

Disks

- Persistent disks for Azure IaaS VMs.
- Premium Storage.
- Disks option: SSD based, high IOPS, low latency.
- Lift and shift operations.

Files

- SMB and REST access.
- Access from anywhere.
- Secure access.

PaaS

Containers

- Unstructured data – text or binary.
- Block Blobs.
- Page Blobs.
- Append Blobs.

Tables

- NoSQL data store - structured data.
- Dynamic scaling based on load.
- Scales to petabytes of data.
- Fast key/value lookups.

Queues

- Store and retrieve messages.
- Highly scalable.
- Messages can be processed asynchronously.

Built on an unified distributed storage system

Durability, Encryption at rest, Strongly consistent replication, fault tolerance, auto load-balancing

Walkthrough - Create Blob storage

Create a storage account with a blob storage container. Work with blob files.

1. Create a storage account.
2. Work with blob storage.
3. Monitor the storage account.

Azure database services



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

These are just a few of our database offerings.

Walkthrough-Create a SQL database

Create a SQL database in Azure and then query the data in that database.

1. Create the database.
2. Query the database.

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



- Azure IoT Central is a fully-managed global IoT SaaS solution that makes it easy to connect, monitor, and manage your IoT assets at scale.
- Azure IoT Hub is 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.



These are just two of our IoT offerings. Use the IoT Product Selector to determine which product is best for your situation.

Walkthrough - Implement the Azure IoT Hub

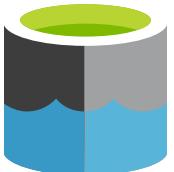
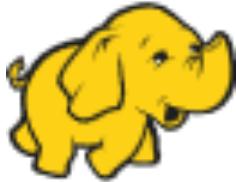
Create an Azure IoT Hub in Azure Portal and configure the hub to authenticate a connection to an IoT device using the Raspberry Pi device simulator.

1. Create an IoT Hub.
2. Add an IoT device.
3. Test the device using the Raspberry Pi Simulator.

Big data and analytics



- Azure SQL Data Warehouse is a cloud-based Enterprise Data Warehouse that leverages massively parallel processing to run complex queries quickly across petabytes of data.
- Azure HDInsight is 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 is 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.

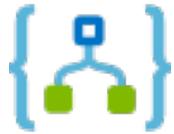


Artificial Intelligence



- 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 is a collaborative, drag-and-drop visual workspace where you can build, test, and deploy machine learning solutions without needing to write code.

Serverless computing



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

Walkthrough - Implement Azure Functions

Create a Function app with a Webhook to provide a Hello message with your name.

1. Create a Function app.
2. Create a HTTP triggered event function and test.

DevOps



- 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.



Azure App Service

Quickly and easily build web and mobile apps for any platform or device.

- Multiple languages and frameworks.
- DevOps optimization.
- Global scale with high availability.
- Connections to SaaS platforms and on-premises data.
- Security and compliance.
- Application templates.
- Visual Studio integration.
- API and mobile features.
- Serverless code.

Walkthrough – Create a Web App

Create a new web app by using a Docker image stored in Azure Container Registry.

1. Create a Web App using a Docker image.
2. Test the Web App.

Lesson 05: Azure management tools



Azure management tools



- Azure portal



- Azure PowerShell and Azure Command-Line Interface (CLI)



- Azure Cloud Shell



- Azure mobile app



- Azure REST API

Azure Advisor



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

Walkthrough – Create a VM with an ARM Template

Use the Azure QuickStart gallery to deploy a template that creates a virtual machine.

1. Explore the gallery and deploy a template.
2. Verify your virtual machine deployment.

Walkthrough - Create a VM with PowerShell

Install PowerShell locally, create a resource group and virtual machine, access and use the Cloud Shell, and review Azure Advisor recommendations.

1. Configure PowerShell locally.
2. Use PowerShell to create a resource group and virtual machine.
3. Execute PowerShell commands in the Cloud Shell.
4. Review Azure Advisor Recommendations.

Walkthrough - Create a VM with the Azure CLI

Install the Azure CLI locally, create a resource group and virtual machine, use the Cloud Shell, and review Azure Advisor recommendations.

1. Install the CLI locally.
2. Use the CLI to create a resource group and virtual machine.
3. Execute commands in the Cloud Shell.
4. Review Azure Advisor Recommendations.

Lesson 06: Module review questions

