

## 1. AZ-300 - Azure Solution Architect Expert

### Module 1: Managing Azure Subscriptions and Resources

In this module you will explore Azure monitoring capabilities using Azure alerts, Azure activity logs, and Log Analytics. You will learn to query, analyze, and interpret the data viewed in Log Analytics.

**After completing this module, students will be able to:**

- Managing Azure Subscriptions and Resources

### Module 2: Implementing and Managing Storage

In this module you will learn about Azure storage accounts, data replication, how to use Azure Storage Explorer, and monitor storage.

**After completing this module, students will be able to:**

- Implementing and Managing Storage

### Module 3: Deploying and Managing Virtual Machines (VMs)

In this module you will learn how to do the following: Create Virtual Machines (VM)s within the Azure Portal Create Virtual Machines (VM)s using Azure PowerShell Create Virtual Machines (VM)s using ARM templates Deploy Linux Virtual Machines (VM)s Monitor Virtual Machines (VM)s Additionally, you will learn how to protect data using backups at regular intervals, whether by snapshot, Azure Backup, or Azure Site Recovery.

**After completing this module, students will be able to:**

- Deploying and Managing VMs

### Module 4: Configuring and Managing Virtual Networks

In this module you will create and implement virtual networks using the Azure Portal as well as Azure PowerShell and CLI. You will receive and overview on how to assign IP addresses to Azure resources to communicate with other Azure resources, your on-premises network, and the Internet.

#### Lessons

- Network routing using routing tables and algorithms
- Inter-site connectivity using VNet-to-VNet connections and VPNs
- Virtual network peering for regional and global considerations
- Gateway transit

**After completing this module, students will be able to:**

- Configuring and Managing Virtual Networks

### Module 5: Managing Identities

This module covers Azure Active Directory (Azure AD) for IT Admins and Developers with a focus on the Azure AD multi-tenant cloud-based directory and identity management service.

#### Lessons

- Role-Based Access Control (RBAC)
- built-in roles
- Self-Service Password Reset (SSPR)
- authentication methods for password reset

**After completing this module, students will be able to:**

- Managing Identities using Azure Active Directory

## **Module 6: Evaluating and Performing Server Migration to Azure**

This module covers migrating workloads to a new environment, whether it be another datacenter, or to a public cloud, and setting clear goals for the migration. Goals include both technology-focused and business-focused goals for migrations, and the benefits to an organization's business. Activities include components of the Azure migration process: creating a project, creating a collector, assessing readiness, and estimating costs. Additionally, you will receive an overview of Azure Site Recovery (ASR) that includes end-to-end scenarios.

**After completing this module, students will be able to:**

- Evaluating and Performing Server Migration to Azure

## **Module 7: Implementing and Managing Application Services**

This module includes the following topics: Deploying Web Apps Managing Web Apps App Service Security Serverless Computing Concepts Managing Event Grid Managing Service Bus Managing Logic App

**After completing this module, students will be able to:**

- Implementing and Managing Application Services

## **Module 8: Implementing Advanced Virtual Networking**

This module includes the following topics: Azure Load Balancer Azure Application Gateway Site-to-Site VPN Connections As well as an overview of ExpressRoute which allows companies to extend on-premises networks into the Microsoft cloud over a dedicated private connection facilitated by a connectivity provider.

**After completing this module, students will be able to:**

- Implementing Advanced Virtual Networking.

## **Module 9: Securing Identities**

This module includes the following topics with an emphasis on identity and roles: Azure AD Identity Protection Azure Domains and Tenants Azure Users and Groups Azure Roles As well as an overview of Azure AD integration options that focuses on Azure AD Connect to integrate on-premises directories with Azure Active Directory.

**After completing this module, students will be able to:**

- Securing Identities using Azure AD.

## **Module 10: Selecting Compute and Storage Solutions**

This module includes the following topics: Azure Architecture Center Cloud design patterns Competing consumers pattern Cache-aside pattern As well as sharding patterns to divide a data store into horizontal partitions, or shards. Each shard has the same schema but holds its own distinct subset of the data.

**After completing this module, students will be able to:**

- Design and Connectivity Patterns

## **Module 11: Hybrid Networking**

This module includes the following topics: Site-to-site connectivity Point-to-site connectivity Combining site-to-site and point-to-site connectivity Virtual network-to-virtual network connectivity As well as connecting across cloud providers for failover, backup, or even migration between providers such as AWS.

**After completing this module, students will be able to:**

- Hybrid Networking

## Module 12: Measuring Throughput and Structure of Data Access

This module includes the following topics: DTUs – Azure SQL Database RUs – Azure Cosmos DB Structured and unstructured data Using structured data stores

**After completing this module, students will be able to:**

- Address Durability of Data and Caching
- Measure Throughput and Structure of Data Access

## Module 13: Creating Web Applications using PaaS

This module provides an overview of Azure App Service Web Apps for hosting web applications, REST APIs, and a mobile back end. Topics include the following: Using shell commands to create an App Service Web App Creating Background Tasks Using Swagger to document an API As well as an explanation of how Logic Apps help to build solutions that integrate apps, data, systems, and services across enterprises or organizations by automating tasks and business processes as workflows.

**After completing this module, students will be able to:**

- Use shell commands to create an App Service Web App
- Create Background Tasks
- Use Swagger to document an API

## Module 14: Creating Apps and Services Running on Service Fabric

This module provides an overview of Azure Service Fabric as a distributed systems platform that makes it easy to package, deploy, and manage scalable and reliable microservices and containers. This module also addresses the challenges in developing and managing cloud native applications. Additional topics include: Creating a reliable service Creating a Reliable Actors app Working with Reliable collections

**After completing this module, students will be able to:**

- Create a reliable service
- Create a Reliable Actors app
- Hands-on with Reliable collections

## Module 15: Using Azure Kubernetes Service This module focuses on the Azure

Kubernetes Service (AKS) for deploying and managing a Kubernetes cluster in Azure. Topics include how to reduce operational overhead of managing Kubernetes by offloading much of that responsibility to Azure, such as health monitoring and maintenance. Additional topics include: Azure Container Registry Azure Container Instances

**After completing this module, students will be able to:**

- Understand the Azure Container Registry
- Use Azure Container instances

## Module 16: Developing Long-Running Tasks and Distributed Transactions

Topics for this module include: Implementing large-scale, parallel, and high-performance apps using batches HPC using Microsoft Azure Virtual Machines Implementing resilient apps by using queues As well as, implementing code to address application events by using webhooks. Implementing a webhook gives an external resource a URL for an application. The external resource then issues an HTTP request to that URL whenever a change is made that requires the application to take an action.

## Module 17: Configuring a Message-Based Integration Architecture

### Lessons

- Configure an app or service to send emails
- Configure an event publish and subscribe model

- Configure the Azure Relay service
- Configure apps and services with Microsoft Graph

**After completing this module, students will be able to:**

- How to configure a message-based integration architecture

## **Module 18: Developing for Asynchronous Processing**

### **Lessons**

- Implement parallelism, multithreading, and processing
- Implement Azure Functions and Azure Logic Apps
- Implement interfaces for storage or data access
- Implement appropriate asynchronous computing models
- Implement autoscaling rules and patterns

**After completing this module, students will be able to:**

- Understand how to Develop for Asynchronous Processing

## **Module 19: Developing for Autoscaling**

### **Lessons**

- Implementing autoscaling rules and patterns
- Implementing code that addresses singleton application instances
- Implementing code that addresses a transient state

**After completing this module, students will be able to:**

- Begin creating apps for Autoscaling

## **Module 20: Developing Azure Cognitive Services Solutions**

### **Lessons**

- Developing Solutions using Computer Vision
- Developing solutions using Bing Web Search
- Developing solutions using Custom Speech Service
- Developing solutions using QnA Maker

**After completing this module, students will be able to:**

- Understand Azure Cognitive Services Solutions

## **Module 21: Develop for Azure Storage**

### **Lessons**

- Develop Solutions that use Azure Cosmos DB Storage
- Develop Solutions that use a Relational Database
- Modeling a Database by using Entity Framework Core
- Develop Solutions that use Microsoft Azure Blob Storage
- Manipulating Blob Container Properties in .NET

**After completing this module, students will be able to:**

- Understand Azure Storage services such as blobs and Cosmos DB

## 2. AZ-301 - Microsoft Azure Architect Design

### Module 1: Managing Security & Identity for Azure Solutions

This module discusses both security and identity within the context of Azure. For security, this module reviews the various options for monitoring security, the options available for securing data and the options for securing application secrets. For identity, this module focuses specifically on Azure Active Directory (Azure AD) and the various features available such as Multi-Factor Authentication (MFA), Managed Service Identity, Azure AD Connect, ADFS and Azure AD B2B/B2C.

#### Lab : Securing Secrets in Azure

After completing this module, students will be able to:

- Integrate their existing solutions with external identity providers using Azure AD B2B or B2C.
- Design a hybrid identity solution.
- Determine when to use advanced features of Azure AD such as Managed Service Identity, MFA and Privileged Identity Management.
- Secure application secrets using Key Vault.
- Secure application data using SQL Database and Azure Storage features.

### Module 2: Integrating SaaS Services Available on the Azure Platform

This module introduces multiple SaaS services available in Azure that are available for integration into existing Azure solutions. These services include Cognitive Services, Bot Service, Machine Learning and Media Services.

#### Lab : Deploying Service Instances as Components of Overall Azure Solutions

After completing this module, students will be able to:

- Detail the various APIs available in Cognitive Services.
- Identify when to use the Face API, Speech API or Language Understanding (LUIS) service.

### Module 3: Backing Azure Solutions with Azure Storage

This module describes how many Azure services use the Azure Storage service as a backing store for other application solution in Azure. The module dives into critical considerations when using Azure Storage as a supplemental service for an all-up Azure solution.

After completing this module, students will be able to:

- Determine the ideal pricing option for Azure Storage based on a solution's requirements.
- Identify performance thresholds for the Azure Storage service.
- Determine the type of Storage blobs to use for specific solution components.
- Use the Azure Files service for SMB operations.
- Identify solutions that could benefit from the use of StorSimple physical or virtual devices.

### Module 4: Comparing Database Options in Azure

This module compares the various relational and non-relational data storage options available in Azure. Options are explored as groups such as relational databases (Azure SQL Database, MySQL, and PostgreSQL on Azure), non-relational (Azure Cosmos DB, Storage Tables), streaming (Stream Analytics) and storage (Data Factory, Data Warehouse, Data Lake).

#### Lab : Deploying Database Instances in Azure

After completing this module, students will be able to:

- Compare and contrast monitoring services for applications, the Azure platform, and networking.
- Identify data streaming options for large-scale data ingest.
- Identify longer-term data storage options.

## Module 5: Monitoring & Automating Azure Solutions

This module covers the monitoring and automation solutions available after an Azure solution has been architected, designed and possibly deployed. The module reviews services that are used to monitor individual applications, the Azure platform, and networked components. This module also covers automation and backup options to enable business-continuity scenarios for solutions hosted in Azure.

Lab : Deploying Configuration Management Solutions to Azure

**After completing this module, students will be able to:**

- Compare and contrast monitoring services for applications, the Azure platform, and networking.
- Design an alert scheme for a solution hosted in Azure.
- Select the appropriate backup option for infrastructure and data hosted in Azure.
- Automate the deployment of future resources for backup recovery or scaling purposes.

## Module 6: Deploying Resources with Azure Resource Manager

This module establishes a basic understanding of Azure Resource Manager and the core concepts of deployments, resources, templates, resource groups, and tags. The module will dive deeply into the automated deployment of resources using ARM templates.

Lab : Deploying Resources with Azure Resource Manager

**After completing this module, students will be able to:**

- Create a resource group.
- Add resources to a resource group.
- Deploy an ARM template to a resource group.
- Filter resources using tags.
- Author a complex deployment using the Azure Building Blocks tools.

## Module 7: Creating Managed Server Applications in Azure

This module describes how solutions can leverage serverless application hosting services in Azure to host web applications, REST APIs, integration workflows and HPC workloads without the requirement to manage specific server resources. The module focuses on App Services-related components such as Web Apps, API Apps, Mobile Apps, Logic Apps, and Functions.

Lab : Deploying Managed Containerized Workloads to Azure

**After completing this module, students will be able to:**

- Select between hosting application code or containers in an App Service instance.
- Describe the differences between API, Mobile, and Web Apps.
- Integrate an API or Logic App with the API Management service.
- Design an App Service Plan or multi-region deployment for high performance and scale.

## Module 8: Authoring Serverless Applications in Azure

This module describes how solutions can leverage serverless application hosting services in Azure to host web applications, REST APIs, integration workflows and HPC workloads without the requirement to manage specific server resources. The module focuses on App Services-related components such as Web Apps, API Apps, Mobile Apps, Logic Apps, and Functions.

Lab : Deploying Serverless Workloads to Azure

**After completing this module, students will be able to:**

- Select between hosting application code or containers in an App Service instance.
- Describe the differences between API, Mobile, and Web Apps.
- Integrate an API or Logic App with the API Management service.

- Design an App Service Plan or multi-region deployment for high performance and scale.

## Module 9: Application Architecture Patterns in Azure

This module introduces, and reviews common Azure patterns and architectures as prescribed by the Microsoft Patterns & Practices team. Each pattern is grouped into performance, resiliency, and scalability categories and described in the context of similar patterns within the category.

**After completing this module, students will be able to:**

- Locate and reference the Cloud Design Patterns documentation.
- Locate and reference the Azure Architecture Center.
- Describe various patterns pulled from the Cloud Design Patterns.

## Module 10: Building Azure IaaS-Based Server Applications (ADSK)

This module identifies workloads that are ideally deployed using Infrastructure-as-a-Service services in Azure. The module focuses on the VM Scale Sets and Virtual Machine services in Azure and how to best deploy workloads to these services using best practices and features such as Availability Sets.

**Lab : Building Azure IaaS-Based Server Applications.**

**After completing this module, students will be able to:**

- Design an availability set for one or more virtual machines.
- Describe the differences between fault and update domains.
- Author a VM Scale Set ARM template.
- Join a virtualized machine to a domain either in Azure or on a hybrid network.

## Module 11: Networking Azure Application Components

This module describes the various networking and connectivity options available for solutions deployed on Azure. The module explores connectivity options ranging from ad-hoc connections to long-term hybrid connectivity scenarios. The module also discusses some of the performance and security concerns related to balancing workloads across multiple compute instances, connecting on-premise infrastructure to the cloud and creating gateways for on-premise data.

**Lab : Deploying Network Infrastructure for Use in Azure Solutions**

**After completing this module, students will be able to:**

- Describe DNS and IP strategies for VNets in Azure.
- Compare connectivity options for ad-hoc and hybrid connectivity.
- Distribute network traffic across multiple loads using load balancers.
- Design a hybrid connectivity scenario between cloud and on-premise.

## Module 12: Integrating Azure Solution Components Using Messaging Services

This module describes and compares the integration and messaging services available for solutions hosted on the Azure platform. Messaging services described include Azure Storage Queues, Service Bus Queues, Service Bus Relay, IoT Hubs, Event Hubs, and Notification Hubs. Integration services include Azure Functions and Logic Apps.

**Lab : Integrating Azure Solution Components using Messaging Services**

**After completing this module, students will be able to:**

- Compare Storage Queues to Service Bus Queues.
- Identify when to use Azure Functions or Logic Apps for integration components in a solution.
- Describe the differences between IoT Hubs, Event Hubs and Time Series Insights.