Exam AZ-900: Microsoft Azure Fundamentals Study Guide

*Author note from **Jason Zandri** - the hyperlinks provided herein are directly from those as found via Microsoft's public facing Azure content. While assembled and linked by me, none of that originating work, as cross referenced via the links, is my own - the only ownership of any sort that I claim is the direct content of this posting itself.*

The **Microsoft Azure Fundamentals exam (AZ-900)** is designed for candidates looking to demonstrate foundational level knowledge of cloud services and how those services are provided with Microsoft Azure. The domains of information that make up the exam are introductory in nature and are designed for people of non-technical backgrounds and / or for those with entry level technical foundational level knowledge around cloud services. Technical IT experience is not required however some general IT knowledge or experience would be beneficial.

The AZ-900 exam can be taken as an optional first step in validating your knowledge about cloud services and how those concepts are demonstrated by Microsoft Azure. While it can be taken as a precursor to Microsoft Azure or Microsoft cloud services exams, it is not a pre-requisite before taking any other Azure-based certifications.

There are four main domains for the exam:

- **Understand cloud concepts (15 to 20% of the exam)**
- **Understand core Azure services (30 to 35% of the exam)**
- **Understand security, privacy, compliance, and trust (25 to 30% of the exam)**
- **Understand Azure pricing and support (25-30%)**

Below is a listing of all the subtopic information as it corresponds back to the four main domains. Where I have been able to, I have provided links to additional study details and resources for additional review.

Understand cloud concepts (15-20%)

-- Describe the benefits and considerations of using cloud services
-- Overview of Azure Cloud Services
-- High Availability in Azure
-- Scalability in Azure – the ability to increase workload size within the existing hardware and / or software infrastructure without impacting performance
-- Elasticity in Azure – the ability to grow or shrink infrastructure resources dynamically as needed to adapt to workload changes in an autonomic manner, maximizing the use of resources
-- Agility in Azure – the ability to react by allocating and deallocating resources quickly. The ability to offer on-demand via self-service where computing resources can be provisioned in minutes.
-- Fault Tolerance in Azure – understanding the three scenarios that can lead to virtual machine in Azure being impacted: unplanned hardware maintenance, unexpected downtime, and planned maintenance.
-- Disaster Recovery in Azure – understanding Azure regions and availability for virtual machines
-- Understand the principles of economies of scale
-- Understand the differences between Capital Expenditure (CapEx) and Operational Expenditure (OpEx)
Understand the consumption-based model
-- Describe the differences between Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS)
-- Describe Infrastructure-as-a-Service (IaaS)
-- Describe Platform-as-a-Service (PaaS)
-- Describe Software-as-a-Service (SaaS)
-- Describe the differences between Public, Private and Hybrid cloud models
-- Describe Public cloud
-- Describe Private cloud
-- Describe Hybrid cloud
-- Compare and contrast the three different cloud models

Understand core Azure services (30 to 35% of the exam)

-- Understand the core Azure architectural components
-- Describe Regions; understand products available by region
-- Describe Availability Zones – fault-isolated area within an Azure region, providing redundant power, cooling, and networking.
-- Describe Resource Groups
-- Azure Resource Manager overview
-- Describe the benefits and usage of core Azure architectural components
-- Describe some of the core products available in Azure solution architectures
-- Describe products available for Compute such as Virtual Machines, Virtual Machine Scale Sets, App Service and Functions
-- Describe products available for Networking such as Virtual Network, Load Balancer, VPN Gateway, Application Gateway and Content Delivery Network
-- Describe products available for Storage
-- Azure Blobs: A massively scalable object store for text and binary data.
-- Azure Files: Managed file shares for cloud or on-premises deployments.
-- Azure Queues: A messaging store for reliable messaging between application components.
-- Azure Tables: A NoSQL store for schemaless storage of structured data.
-- Azure Files enables you to set up highly available network file shares that can be accessed by using the standard Server Message Block (SMB) protocol
-- Locally-redundant storage (LRS): A simple, low-cost replication strategy. Data is replicated within a single storage scale unit.
-- Zone-redundant storage (ZRS): Replication for high availability and durability. Data is replicated synchronously across three availability zones.
-- Geo-redundant storage (GRS): Cross-regional replication to protect against region-wide unavailability.
-- Read-access geo-redundant storage (RA-GRS): Cross-regional replication with read access to the replica.
-- Describe products available for Databases such as CosmosDB, Azure SQL Database, Azure Database Migration service, and Azure SQL Data Warehouse
-- Describe the Azure Marketplace and its usage scenarios
-- Describe Internet of Things (IoT) and products that are available for IoT on Azure such as IoT Fundamentals, IoT Hub and IoT Central
-- Use Azure IoT Edge to create a field gateway to perform protocol translation on the edge.
-- Customize the Azure IoT protocol gateway to perform protocol translation in the cloud.
-- Describe Big Data and Analytics and products that are available for Big Data and Analytics such as SQL Data Warehouse, HDInsight and Data Lake Analytics
-- Describe Artificial Intelligence (AI) and products that are available for AI such as Azure Machine Learning Service and Studio
-- Describe Serverless computing and Azure products that are available for serverless computing such as Azure Functions, Logic Apps and App grid
-- Understand Azure management tools
-- Understand Azure tools such as Azure CLI, PowerShell, and the Azure Portal
-- Understand Azure Advisor
-- Introduction to Azure Advisor

Understand security, privacy, compliance, and trust (25-30%)

-- Understand [securing network connectivity in Azure](#)
-- Describe [Azure Firewall](#)
-- Describe [Azure DDoS Protection](#)
-- [Configure DDoS Protection Standard](#)
-- Describe [Network Security Group (NSG)](#)
-- Choose an appropriate [Azure security solution](#)
-- Describe core [Azure Identity services](#)
-- Understand the difference between [authentication](#) and [authorization](#)
-- [Authenticate requests across tenants](#)
-- Describe [Azure Active Directory](#)
-- Describe [How Azure Multi-Factor Authentication works](#)
-- Describe security tools and features of Azure
-- Describe [Azure Security](#)
-- Understand [Azure Security center](#) usage scenarios
-- Describe [Key Vault](#)
-- Describe [Azure Information Protection](#) (AIP)
-- Describe [Azure Advanced Threat Protection](#) (ATP)
-- Describe [Azure governance methodologies](#)
-- Describe [Azure Policies](#)
-- [Azure Policy Samples](#)
-- Describe [Initiatives](#)
-- Describe [Role-Based Access Control (RBAC)](#)
-- Describe [Locks](#)
-- [Introduction to Azure Advisor](#)
-- Describe [Azure Advisor security assistance](#)
-- Understand [monitoring and reporting options](#) in Azure
-- Describe [Azure Monitor](#)
-- Describe [Azure Service Health](#)
-- Understand the use cases and benefits of [Azure Monitor](#) and [Azure Service Health](#)
-- Understand [privacy](#), [compliance](#) and [data protection](#) standards in Azure
-- Understand industry [compliance](#) [terms](#) such as [GDPR, ISO and NIST](#)
-- More on [GDPR](#); [documentation](#) and [e-book](#)
-- Understand the [Microsoft Privacy Statement](#)
-- Describe the [Trust center](#)
-- Describe the [Service Trust Portal](#)
-- [Get started with the Microsoft Service Trust Portal](#)
-- Describe [Compliance Manager](#)
-- Understand [Azure Government](#) services
-- Understand [Azure Germany](#) services

Understand Azure pricing and support (25-30%)

-- Understand [Azure subscriptions](#)
-- [Azure subscription and service limits, quotas, and constraints](#)
-- Understand the uses and options with Azure subscriptions
        -- [Pay as you go](#)
        -- [Azure in Open](#)
        -- [Pay-As-You-Go Dev/Test](#)
        -- [Visual Studio Professional](#)
        -- [Visual Studio Test Professional](#)
        -- [MSDN Platforms](#)
        -- [Visual Studio Enterprise](#)
        -- [Visual Studio Enterprise (Bizspark)](#)
        -- [Azure Pay-As-You-Go Subscription Migration to CSP](#)
        -- [Cloud Solution Provider](#) (CSP)
        -- [Enterprise Agreement](#) (EA)
-- Understand [planning and management of costs](#)
-- Understand [options for purchasing Azure products and services](#)
-- Understand options around [Azure Free account](#)
-- Understand the [factors affecting costs](#) such as resource types, [services, locations](#), [ingress and egress](#) traffic
-- Understand [Zones for billing purposes](#)
-- Understand [Reservations](#) and [Reserve Instances](#)
-- Understand the [Pricing calculator](#)
-- Understand the [Total Cost of Ownership (TCO) calculator](#)
-- Understand best practices for minimizing Azure costs such as [performing cost analysis](#), [creating spending limits and quotas](#), and using [tags to identify cost owners](#); use Azure reservations; use [Azure Advisor recommendations](#)
-- Describe [Azure Cost Management](#)
-- Understand the [support options available with Azure](#)v
-- [Understand support plans](#) that are available such as [Dev, Standard, Professional Direct and Premier](#)
-- Understand [how to open a support ticket](#)
-- [Understand available support channels](#) outside of support plan channels
-- Describe the [Knowledge Center](#)
-- Describe [Azure Service Level Agreements](#) (SLAs)
-- [Determine SLA for a particular Azure product or service](#)
-- Understand [service lifecycle in Azure](#)
-- Understand [Public and Private Preview features](#)
-- Understand how to [access Preview features](#)
-- [Monitor feature updates](#)

The detailed information provided below is presented in general reference to the domain topics listed prior for AZ-900, but this additional information via the linked articles goes beyond the full scope of information that you might need specifically for the exam. It is offered as additional reference and for the benefit of extended knowledge and review.

-- Microsoft Azure – All Products
-- What are virtual machine scale sets
-- Overview of autoscale with Azure virtual machine scale sets
-- Overview of autoscale in Microsoft Azure Virtual Machines, Cloud Services, and Web Apps
-- Automatically scale a virtual machine scale set in the Azure portal
-- Advanced autoscale configuration using Resource Manager templates for VM Scale Sets
-- How to configure auto scaling for a Cloud Service in the portal
-- Configure multiple virtual machines in an availability set for redundancy
-- Use managed disks for VMs in an availability set
-- Use scheduled events to proactively response to VM impacting events
-- Configure each application tier into separate availability sets
-- Combine a Load Balancer with availability sets
-- Use availability zones to protect from datacenter level failures
-- Create a virtual machine
-- Create a Windows virtual machine in the Azure portal
-- Create a Windows virtual machine in Azure with PowerShell
-- Create a Windows virtual machine with the Azure CLI
-- Create a custom image of an Azure VM with Azure PowerShell
-- Create and deploy highly available virtual machines with Azure PowerShell
-- Create a virtual machine scale set and deploy a highly available app on Windows with Azure PowerShell
-- Load balance Windows virtual machines in Azure to create a highly available application with Azure PowerShell
-- Create and Manage Windows VMs with Azure PowerShell
-- Manage Azure disks with Azure PowerShell
-- Deploy applications to a Windows virtual machine in Azure with the Custom Script Extension
-- Create and manage Azure virtual networks for Windows virtual machines with Azure PowerShell
-- Back up and restore files for Windows virtual machines in Azure
-- Monitor and update a Windows virtual machine in Azure
-- Use Azure Security Center to monitor Windows virtual machines
-- Maintenance for virtual machines in Azure
-- Add a Managed Disk using PowerShell
-- Create a zone redundant virtual machine scale set
-- Load balance VMs across zones using a Standard Load Balancer with a zone-redundant frontend
-- Load balance VMs within a zone using a Standard Load Balancer with a zonal frontend
-- Zone-redundant storage
-- SQL Database
-- Event Hubs geo-disaster recovery
-- Service Bus geo-disaster recovery
-- Create a zone-redundant virtual network gateway
-- VMware to Azure disaster recovery architecture
-- SLA for Virtual Machines
-- Load balance internet traffic to VMs
-- Load balance internal traffic to VMs
-- Load balance VMs across availability zones
-- Load balance VMs within a specific availability zone
-- Configure port forwarding in Load Balancer
-- Manage web traffic with an application gateway.
-- Restrict web traffic with a web application firewall on an application gateway.
-- Enable SSL termination on an application gateway.

-- [Host multiple web sites using an application gateway.](#)
-- [Route traffic based on the URL in an application gateway.](#)
-- [Redirect traffic to specific servers in an application gateway pool.](#)
-- Create an application using [.NET with Azure SQL DB](#) or [Node.js with MongoDB](#)
-- [Map an existing custom domain to your application](#)
-- [Bind an existing SSL certificate to your application](#)
-- [Add a CDN to your application](#)
-- Create and manage a scale set with the [Azure CLI](#) or [Azure Powershell](#)
-- Use data disks with the [Azure CLI](#) or [Azure Powershell](#)
-- Use a custom VM image with the [Azure CLI](#) or [Azure Powershell](#)
-- Deploy apps to a scale set with the [Azure CLI](#) or [Azure Powershell](#)
-- Autoscale a scale set with the [Azure CLI](#) or [Azure Powershell](#)
-- [Azure Application Architecture Guide](#)
-- [Create a function that integrates with Azure Logic Apps](#)
-- [Create a serverless API using Azure Functions](#)
-- [Create an OpenAPI definition for a function](#)
-- [Automate resizing uploaded images using Event Grid](#)
-- [Create a serverless web app to store pictures with metadata](#)
-- [Filter network traffic](#)
-- [Route network traffic](#)
-- [Restrict network access to resources](#)
-- [Connect virtual networks](#)
-- [Deploy your site to Azure](#)
-- [Scale with Azure Load Balancer](#)
-- [Reduce latency with Azure Traffic Manager](#)
-- [Azure Service Health Dashboard](#)
-- [Designing resilient applications for Azure](#): An overview of the key concepts for architecting highly available applications in Azure.
-- [Availability checklist](#): A checklist for verifying that your application implements the best design practices for high availability.
-- [Designing highly available applications using RA-GRS](#): Design guidance for building applications to take advantage of RA-GRS.
-- [Tutorial: Build a highly available application with Blob storage:](#) A tutorial that shows how to build a highly available application that automatically switches between endpoints as failures and recoveries are simulated.
-- Disks: Use [Azure Backup](#) to back up the VM disks used by your Azure virtual machines. Also consider using [Azure Site Recovery](#)to protect your VMs in the event of a regional disaster.
-- Block blobs: Turn on [soft delete](#) to protect against object-level deletions and overwrites, or copy block blobs to another storage account in a different region using [AzCopy](#), [Azure PowerShell](#), or the [Azure Data Movement library](#).
-- Files: Use [AzCopy](#) or [Azure PowerShell](#) to copy your files to another storage account in a different region.
-- Tables: use [AzCopy](#) to export table data to another storage account in a different region.
-- What is [VPN Gateway](#)
-- About [VPN Gateway configuration settings](#)
-- [Virtual Network Gateways for ExpressRoute](#).
-- [About zone-redundant gateways](#).
-- [About Virtual WAN](#)
-- [VPN Gateway FAQ](#)
-- Azure Content Delivery Network - [Dynamic site acceleration](#)
-- Azure Content Delivery Network - [CDN caching rules](#)
-- Azure Content Delivery Network - [HTTPS custom domain support](#)
-- Azure Content Delivery Network - [Azure diagnostics logs](#)
-- Azure Content Delivery Network - [File compression](#)
-- Azure Content Delivery Network - [Geo-filtering](#)
-- [Compare Azure CDN product features](#)

-- [Azure Event Grid](#) to enable your business to react quickly to critical events in a reliable, scalable, and secure manner.
-- [Azure Logic Apps](#) to automate business processes.
-- [Azure Machine Learning](#) to add machine learning and AI models to your solution.
-- [Azure Stream Analytics](#) to run real-time analytic computations on the data streaming from your devices.
-- [Azure Functions Premium plan](#) for enterprise serverless workloads
-- Azure Functions - [Create a function that integrates with Azure Logic Apps](#)
-- Azure Functions - [Create a serverless API using Azure Functions](#)
-- Azure Functions - [Create an OpenAPI definition for a function](#)
-- Azure Functions - [Automate resizing uploaded images using Event Grid](#)
-- Azure Functions - [Create a serverless web app to store pictures with metadata](#)
-- [Optimize the performance and reliability of Azure Functions](#)
-- [Check traffic with a schedule-based logic app](#)
-- [Manage mailing list requests with a logic app](#)
-- [Process emails and attachments with a logic app](#)
-- [Monitor changes to VMs with logic apps](#)
-- [Resize uploaded images](#)
-- [Integrating Azure Automation with Event Grid](#)
-- Azure Advisor - [Get started with Advisor](#)
-- Azure Advisor - [High Availability recommendations](#)
-- Azure Advisor - [Security recommendations](#)
-- Azure Advisor - [Performance recommendations](#)
-- Azure Advisor - [Cost recommendations](#)
-- [Tutorial: Deploy and configure Azure Firewall using the Azure portal](#)
-- [Deploy Azure Firewall using a template](#)
-- [Create an Azure Firewall test environment](#)
-- [Azure boundary security best practices](#)
-- [Azure database security best practices](#)
-- [Azure data security and encryption best practices](#)
-- [Azure identity management and access control security best practices](#)
-- [Azure network security best practices](#)
-- [Azure operational security best practices](#)
-- [Azure PaaS Best Practices](#)
-- [Azure Service Fabric security best practices](#)
-- [Best practices for Azure VM security](#)
-- [Implementing a secure hybrid network architecture in Azure](#)
-- [Internet of Things security best practices](#)
-- [Securing PaaS databases in Azure](#)
-- [Securing PaaS web and mobile applications using Azure App Service](#)
-- [Securing PaaS web and mobile applications using Azure Storage](#)
-- [Security best practices for IaaS workloads in Azure](#)
-- [Security groups](#)
-- [Azure network security overview](#)
-- [Azure identity management security overview](#)
-- [Azure Active Directory Premium](#)
-- [Security principals](#)
-- [Overview of single sign-on](#)
-- [What is application access and single sign-on with Azure Active Directory?](#)
-- [Integrate Azure Active Directory single sign-on with SaaS apps](#)
-- [Enabling Azure AD Application Proxy](#)
-- [Publish applications using Azure AD Application Proxy](#)
-- [Single sign-on with Application Proxy](#)
-- [Working with conditional access](#)
-- [Multi-Factor Authentication](#)
-- [What is Azure Multi-Factor Authentication?](#)
-- [Built-in roles for Azure resources](#)

-- [View your access and usage reports](#)
-- [Get started with Azure Active Directory reporting](#)
-- [Azure Active Directory reporting guide](#)
-- [What is Azure Active Directory B2C?](#)
-- [Azure Active Directory B2C preview: Sign up and sign in consumers in your applications](#)
-- [Azure Active Directory B2C Preview: Types of applications](#)
-- [Get started with Azure AD device registration](#)
-- [Automatic device registration with Azure AD for Windows domain-joined devices](#)
-- [Set up automatic registration of Windows domain-joined devices with Azure AD](#)
-- [What is Azure AD Privileged Identity Management?](#)
-- [Assign Azure AD directory roles in PIM](#)
-- [Azure AD Identity Protection](#)
-- [Channel 9: Azure AD and Identity Show: Identity Protection Preview](#)
-- [Hybrid identity white paper](#)
-- [Azure AD team blog](#)
-- [Azure AD access reviews](#)
-- [Manage user access with Azure AD access reviews](#)
-- [Tutorial: Authenticate and authorize users end-to-end in Azure App Service (Windows)](#)
-- [Tutorial: Authenticate and authorize users end-to-end in Azure App Service for Linux](#)
-- [How to configure your app to use Azure Active Directory login](#)
-- [How to configure your app to use Facebook login](#)
-- [How to configure your app to use Google login](#)
-- [How to configure your app to use Microsoft Account login](#)
-- [How to configure your app to use Twitter login](#)
-- What is [Azure Active Directory](#)
-- [Edit the Azure Information Protection policy and create a new label](#)
-- [Configure Azure Information Protection policy settings that work together](#)
-- [Azure ATP frequently asked questions](#)
-- [Working with security alerts](#)
-- [Azure ATP Architecture](#)
-- [Azure ATP prerequisites](#)
-- [Azure ATP sizing tool](#)
-- [Azure ATP capacity planning](#)
-- [Configure event forwarding](#)
-- [Configuring Windows event forwarding](#)
-- [Install Azure ATP](#)
-- [Azure ATP Prerequisites](#)
-- [What's new in Azure ATP](#)
-- [Plan capacity for Azure ATP](#)
-- Azure ATP [Reconnaissance alerts](#)
-- [What are Azure Reservations](#)

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