

OFFICIAL MICROSOFT LEARNING PRODUCT

10979F

**Introduction to Microsoft Azure for IT
Professionals**

Companion Content

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Module 1

Getting started with Microsoft Azure

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Lesson 2

What is Azure?

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Question and Answers

Question: Which of the following items did Azure Resource Manager introduce?

- Tags
- Template-based deployment
- Resource groups
- A web-based portal
- Windows PowerShell-based management of Azure services

Answer:

- Tags
- Template-based deployment
- Resource groups
- A web-based portal
- Windows PowerShell-based management of Azure services

Feedback:

Azure Resource Manager introduced the concept of resource groups, and made it possible to tag these groups' resources. A web-based portal and Windows PowerShell-based management are available with both management models.

Resources

Overview of Azure

 **Additional Reading:** For more information on newly announced Azure geographies and regions, including planned regional datacenter deployments, refer to "Azure Regions" at: <http://aka.ms/Tzcz4g>.

Overview of Azure services

 **Additional Reading:** For a full list of services that are currently available in Azure, refer to <https://aka.ms/AA1zybh>.

Lesson 3

Managing Azure

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Question and Answers

Question: Which of the following are advantages of Azure Cloud Shell over Azure PowerShell?

- Azure Cloud Shell does not require the installation of Azure PowerShell.
- Azure Cloud Shell does not require a separate authentication mechanism.
- Azure Cloud Shell does not depend on any Azure resources.
- Azure Cloud Shell offers a graphical method to manage Azure resources.
- Azure Cloud Shell can be used to run unattended scripts.

Answer:

- Azure Cloud Shell does not require the installation of Azure PowerShell.
- Azure Cloud Shell does not require a separate authentication mechanism.
- Azure Cloud Shell does not depend on any Azure resources.
- Azure Cloud Shell offers a graphical method to manage Azure resources.
- Azure Cloud Shell can be used to run unattended scripts.

Feedback:

Azure Cloud Shell works directly within a web browser window, so it does not depend on any locally installed components, unlike Azure PowerShell or Azure CLI. It also does not require a separate authentication mechanism, relying instead on the same credentials that you used to sign in to the Azure portal. However, it requires an Azure Storage account, it does not offer a graphical interface, and you cannot use it to run unattended scripts.

Resources

Azure management tools



Additional Reading: To develop applications that target Azure in Visual Studio, install the Azure software development kit (Azure SDK) for your development platform, from “Downloads, Get the SDKs and command-line tools you need” at <http://aka.ms/ywmvxt>.

Demonstration: Navigating the Azure portals

Demonstration Steps

1. Step through the process of creating and sharing the Azure portal dashboards by following the steps on the webpage <https://aka.ms/AA1zybj>.
2. Demonstrate the Azure Account Center interface through which you would perform most common subscription management tasks (without actually carrying out these tasks), including the following:
 - Cancelling a subscription: Refer to the steps at <https://aka.ms/AA1zybk>.
 - Transferring ownership of a subscription: Refer to the steps at <https://aka.ms/AA2064u>.
 - Reactivating a subscription: Refer to the steps at <https://aka.ms/AA2064v>.
 - Changing a payment method: Refer to the steps at <https://aka.ms/AA1zybm>.
 - Changing a Subscription Administrator: Refer to the steps at <https://aka.ms/AA1zybn>.

Lesson 4

Subscription management, support, and billing

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Question and Answers

Question: You are the Service Administrator of an Azure subscription. How can you delegate the ability to manage all of your subscription's resources to another user without allowing that user to delegate resource management to other users?

- () Configure the user as the Account Administrator
- () Configure the user as the Service Administrator
- () Configure the user as a Co-administrator
- () Assign to the user the Contributor role within the subscription by using RBAC
- () Assign to the user the Owner role within the subscription by using RBAC

Answer:

- () Configure the user as the Account Administrator
- () Configure the user as the Service Administrator
- () Configure the user as a Co-administrator
- (v) Assign to the user the Contributor role within the subscription by using RBAC
- () Assign to the user the Owner role within the subscription by using RBAC

Feedback:

You should assign to the user the Contributor role within the subscription by using role-based access control (RBAC). This complies with the principle of least privilege and is the most secure solution.

Configuring the user as the Account Administrator would not have the desired outcome, because the Account Administrator does not have privileges to manage subscription services. You cannot configure the user as the Service Administrator, because there can be only one Service Administrator. While configuring the user as Co-administrator would allow that user to manage any resources in the subscription, we do not recommend this as it is a legacy approach for managing classic resources. In addition, both the Co-administrator and Owner roles would provide excessive privileges because they would allow the user to delegate resource management to other users.

Resources

Accounts, subscriptions, administrative roles, and RBAC

 **Additional Reading:** For a listing of Azure subscription limits and quotas, refer to <https://aka.ms/AA2064w>.

 **Additional Reading:** You can access the Azure Account Center from the Microsoft website at: <http://aka.ms/Cbnltm>.

Azure billing and support options

 **Additional Reading:** For more information about the Pay-As-You-Go plan, including usage quotas, refer to "Pay-As-You-Go" at: <http://aka.ms/Gote79>.

 **Additional Reading:** For more information, refer to "Get Started with Azure in Open Licensing" at: <http://aka.ms/Kem08f>.

 **Additional Reading:** For more information, refer to “Licensing Azure for the Enterprise” at: <http://aka.ms/Voag7x>.

 **Additional Reading:** For more information about Microsoft Azure Hybrid Benefit, refer to “Azure Hybrid Benefit” at <https://aka.ms/pc0s73>.

 **Additional Reading:** For more information about Azure RIs, refer to “Azure Reserved VM Instances (RIs)” at <https://aka.ms/AA1zybo>.

 **Additional Reading:** For more information about members’ benefits, refer to “Member Offers” at: <http://aka.ms/Nse6tf>.

 **Additional Reading:** For more information, refer to “Azure support plans” at <http://aka.ms/N613e7>.

Azure pricing

 **Additional Reading:** For more information, refer to “Azure pricing” at: <http://aka.ms/Svvpfj>.

Estimating and managing Azure costs

 **Additional Reading:** Azure pricing calculator is available at <https://aka.ms/lyvi3b>.

 **Additional Reading:** TCO calculator is available at <https://aka.ms/AA1zybv>.

 **Additional Reading:** For more information regarding Azure Cost Management, refer to “Azure Cost Management Documentation” at <https://aka.ms/AA20656>.

Demonstration: Viewing resource cost, billing data, and subscription usage and quotas

Demonstration Steps

1. View your subscription’s current charges in the Azure portal by following the steps on the webpage <https://aka.ms/AA1zybw>.
2. View the billing data in the Account Center by following the steps on the webpage <https://aka.ms/AA20658>.
3. View the current usage and quotas in the Azure portal by following the steps on the webpages <https://aka.ms/AA1zybx> and <https://aka.ms/AA1zyby>.

Module Review and Takeaways

Review Question

Question: What are the three categories of cloud services?

Answer: Cloud services generally fall into one of the following three categories:

- Software as a service (SaaS)
- Platform as a service (PaaS)
- Infrastructure as a service (IaaS)

Lab Review Questions and Answers

Lab: Using the Azure portals

Question and Answers

Question: The lab showed you how you use different methods to view charges of services and resources in your subscription. Which methods allow you to download billing invoice and daily usage data?

Answer: You can use the Azure portal and the Account Center to download billing invoice and daily usage data. For more information, refer to <https://aka.ms/AA2065e>.

Module 2

Microsoft Azure management tools

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Lesson 1

What is Azure PowerShell?

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Question and Answers

Question: Which cmdlet should you use if you want to authenticate to your subscription and manage Azure Resource Manager resources?

- Select-AzureRmSubscription**
- Add-AzureAccount**
- Connect-AzureRmAccount**
- Select-AzureSubscription**
- Get-AzureRmContext**

Answer:

- Select-AzureRmSubscription**
- Add-AzureAccount**
- Connect-AzureRmAccount**
- Select-AzureSubscription**
- Get-AzureRmContext**

Feedback:

The **Connect-AzureRmAccount** cmdlet prompts you for credentials to authenticate to your Azure subscription, providing you with the ability to manage its Azure Resource Manager resources. The **Add-AzureAccount** cmdlet behaves in a similar manner but provides access to Service Management services. You can use the **Select-AzureRmSubscription** and **Select-AzureSubscription** cmdlets to select the target subscription you want to manage after you authenticate. You can use the **Get-AzureRmContext** cmdlet to identify your current context but not to trigger authentication.

Resources

Introduction to PowerShell

 **Additional Reading:** For more information about Visual Studio Code and PowerShell, refer to “Using Visual Studio Code for PowerShell Development” at <https://aka.ms/AA20603>.

 **Additional Reading:** For more information about PowerShell and Visual Studio 2017, refer to “PowerShell Tools for Visual Studio 2017” at <https://aka.ms/iz4i9p>.

 **Additional Reading:** For more information about Visual Studio Code, refer to “Visual Studio Code” at <http://aka.ms/Frdda1>.

Introduction to Azure PowerShell

 **Additional Reading:** For more information, refer to “Downloads” at <https://aka.ms/wiu6qp>.

 **Additional Reading:** For more information regarding Windows Management Framework 5.1, refer to <https://aka.ms/n4hlto>.

 **Additional Reading:** For more information regarding PackageManagement PowerShell Modules, refer to <http://aka.ms/Onym5y>.

 **Additional Reading:** For more information, refer to “Azure/azure-powershell” at <http://aka.ms/Vep7fj>.

Managing Azure subscriptions by using Azure PowerShell



Additional Reading: The expiration time for an Azure AD authentication token depends on several factors. For more information, refer to “Configurable token lifetimes in Azure Active Directory (Public Preview)” at <https://aka.ms/k2mtil>.



Additional Reading: For more information regarding this functionality, refer to “Persist files in Azure Cloud Shell” at <https://aka.ms/AA1zyar>.

Demonstration: Installing and using Azure PowerShell

Demonstration Steps

Start by demonstrating the use of **PowerShellGet** to install an additional version of the Azure PowerShell module. For more information, refer to the **Use multiple versions of Azure PowerShell** section of <https://aka.ms/hucfwv>.

Demonstrate signing in to an Azure subscription from a local Azure PowerShell session by following the instructions available at <https://aka.ms/AA2064e>.

Demonstrate using locally installed Azure CLI 2.0 to deploy an Azure virtual machine (VM) by following the instructions available at <https://aka.ms/AA2064f>.

Demonstrate the use of Azure CLI 2.0 and a clouddrive share in Cloud Shell by following the instructions available at <https://aka.ms/AA1zyar>.

Lesson 2

Visual Studio Tools for Azure and Azure CLI

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Question and Answers

Question: In your Azure CLI 2.0 sessions, you have successfully authenticated to Azure AD by using your Microsoft account. You need to specify the Azure subscription that you want to use. Which Azure CLI command should you run?

- () **azure config mode arm**
- () **az login**
- () **azure login**
- () **az account set**
- () **azure account set**

Answer:

- () **azure config mode arm**
- () **az login**
- () **azure login**
- (√) **az account set**
- () **azure account set**

Feedback:

You should use the **az account set** command to designate the target Azure subscription. None of the **azure** commands are relevant in this case because they require Azure CLI 1.0. You would use the **az login** command to authenticate, but our scenario does not require this.

Resources

What are Visual Studio Tools for Azure?

 **Additional Reading:** For Azure .NET Core development on Linux, you can use Visual Studio Code with .NET Core SDK. For more information, refer to “Tools for .NET Azure developers” at <https://aka.ms/AA2064h>. If you are using macOS, you can download and install Visual Studio for Mac from <https://aka.ms/AA1zyau>.

 **Additional Reading:** If you are using Visual Studio 2015, you can download Azure SDK for .NET from <https://aka.ms/AA1zyav>.

 **Additional Reading:** For more information, refer to “Visual Studio Tools for Azure” at <https://aka.ms/AA2064j>.

Introduction to the Azure CLI

 **Additional Reading:** For more information about installing Azure CLI 1.0, refer to “Microsoft Azure Xplat-CLI for Windows, Mac and Linux” at <https://aka.ms/q3asut>

 **Additional Reading:** For more information about installing Azure CLI 2.0, refer to “Install Azure CLI 2.0” at <https://aka.ms/ultvco>.

 **Additional Reading:** For more information regarding this functionality, refer to “Persist files in Azure Cloud Shell” at <https://aka.ms/AA2064k>.

Demonstration: Installing and using the Azure CLI

Demonstration Steps

Install Azure CLI 2.0 by following the instructions available at <https://aka.ms/ultvco>.

Demonstrate signing in to an Azure subscription from a local Azure CLI 2.0 session by following the instructions available at <https://aka.ms/AA2064l>.

Demonstrate using locally installed Azure CLI 2.0 to deploy an Azure VM by following the instructions available at <https://aka.ms/AA2064m> (run it from the local installation of Azure CLI 2.0).

Demonstrate using Azure CLI 2.0 and a clouddrive share in Cloud Shell by following the instructions available at <https://aka.ms/AA1zyb0>.

Module Review and Takeaways

Question: Which method would you choose to automate the management of your Azure environment?

Answer: The most common answers will likely include Azure PowerShell or the Azure CLI. The answers depend on the students' level of familiarity with PowerShell and Linux shell scripting.

Lab Review Questions and Answers

Lab: Using Microsoft Azure management tools

Question and Answers

Question: You want to use the Azure CLI to manage classic resources. What must you do?

Answer: To manage classic resources, you must install Azure CLI 1.0. Azure CLI 2.0 only supports the Azure Resource Manager deployment model.

Module 3

Virtual machines in Microsoft Azure

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Lesson 1

Creating and configuring Azure VMs

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Demonstration: Creating a VM from an Azure Resource Manager template	4
Demonstration: Deploying VMs into an availability set and an availability zone by using the Azure portal	4
Demonstration: Connecting to a VM	5

Question and Answers

Question: What is the number of fault domains in an Azure VM scale set consisting of 100 VMs?

- 2
- 3
- 5
- 20
- 50

Answer:

- 2
- 3
- 5
- 20
- 50

Feedback:

To facilitate resiliency, Azure VM scale sets use placement groups, which are functionally equivalent to availability sets. Each placement group can contain up to 100 VMs, automatically distributed across five fault domains and five update domains. A single VM scale set can contain up to 1,000 VMs.

Resources

What are Azure VMs?

 **Additional Reading:** For more information, refer to “Sizes for Windows virtual machines in Azure” at: <http://aka.ms/lyrbvv> and “Sizes for Linux virtual machines in Azure” at: <https://aka.ms/AA2064n>

 **Additional Reading:** For more information, refer to “Previous generations of virtual machine sizes” at: <https://aka.ms/AA1zyb1>

Creating a VM from an Azure Resource Manager template

 **Additional Reading:** For more information, refer to “Azure Quickstart Templates” at: <http://aka.ms/Qgh9jn>

 **Additional Reading:** For more information, refer to “Create a Windows virtual machine with a Resource Manager template” at: <http://aka.ms/Bt1gf6>

Configuring VM availability

 **Additional Reading:** For more information, refer to “What are Availability Zones in Azure?” at <https://aka.ms/AA1zyb2>.

Configuring an operating system by using VM extensions

 **Additional Reading:** For more information, refer to “Virtual machine extensions and features for Windows” at: <http://aka.ms/B8t3pl> and “Virtual machine extensions and features for Linux” at: <https://aka.ms/qb84ta>.

Connecting to a VM

 **Additional Reading:** For more information, refer to “Setting up WinRM access for Virtual Machines in Azure Resource Manager” at: <https://aka.ms/ljezi1>

 **Additional Reading:** For more information, refer to “Using Remote Desktop to connect to a Microsoft Azure Linux VM” at: <https://aka.ms/i32wgz>.

Demonstration: Create a VM from the Azure portal by using an Azure Marketplace image

Demonstration Steps

1. Deploy a new Windows VM named **10979F03DemoVM1** into a new resource group named **10979F03-DemoRG01** by following the steps listed at <https://aka.ms/foups0>.
2. Deploy a Linux VM named **10979F03DemoVM2** into a new resource group named **10979F03-DemoRG02** by following the steps listed at <https://aka.ms/xdj3kq>.
3. Do not wait for the deployment to complete. Continue with the next topic.

Demonstration: Creating a VM from an Azure Resource Manager template

Demonstration Steps

1. From the classroom VM, start Microsoft Edge and browse to <https://github.com/Azure/azure-quickstart-templates/tree/master/101-vm-simple-windows>.
2. On the **Very simple deployment of a Windows VM** page, click **Deploy to Azure**.
3. On the **Custom deployment** blade, deploy a Windows Azure VM into a new resource group named **10979F03-DemoRG03**.
4. Do not wait for the deployment to complete. Continue with the next topic.

Demonstration: Deploying VMs into an availability set and an availability zone by using the Azure portal

Demonstration Steps

1. Create an availability set in a new resource group named **10979F03-DemoRG04** by following the steps listed at <https://aka.ms/rnxtqx>.
2. Deploy a new Windows VM named **10979F03DemoVM4** into the newly created availability set and the same resource group.
3. Explain that you could also create a new availability set during VM deployment when using the Azure portal.
4. Do not wait for the deployment to complete. Continue with the demonstration.

5. Step through deployment of a Windows VM into an availability zone by following <https://aka.ms/AA2064p>. Name the VM **10979F03DemoVM5** and deploy it into the resource group **10979F03-DemoRG05**. Choose any Azure region available in your subscription that supports availability zones. For their listing, refer to <https://aka.ms/AA1zyb7>
6. Wait for the deployment to complete and then continue with the next topic.

Demonstration: Connecting to a VM

Demonstration Steps

1. Prior to the demonstration, ensure that the deployment of **10979F03DemoVM1** into a new resource group named **10979F03-DemoRG01**, which you started in the first demonstration, completed successfully.
2. Connect to the Azure VM **10979F03DemoVM1** via RDP by following the steps listed at <https://aka.ms/ivfcgg>.
3. When you have connected, in the Remote Desktop session, examine the Windows Defender Firewall settings.
4. Minimize the Remote Desktop session window but leave it open, as you will use it in the next demonstration.

Lesson 2

Configuring Azure VM storage

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Demonstration: Configuring disks	7

Question and Answers

Question: You have a Microsoft Azure VM that runs Windows Server 2016 with a single data disk with a size of 4 TB. You need to create a 7-TB data volume. What should you do?

- Attach one disk. Create a Storage Spaces–based volume with the simple layout.
- Increase the size of the data disk.
- Attach one disk. Convert data disks to dynamic disks and create a stripe.
- Attach one disk. Create a Storage Spaces–based volume with the parity layout.
- Convert the data disk to Premium Storage and increase the size of the disk.

Answer:

- Attach one disk. Create a Storage Spaces–based volume with the simple layout.
- Increase the size of the data disk.
- Attach one disk. Convert data disks to dynamic disks and create a stripe.
- Attach one disk. Create a Storage Spaces–based volume with the parity layout.
- Convert the data disk to Premium Storage and increase the size of the disk.

Feedback:

To accomplish this objective, you should create a two-disk Storage Spaces–based volume with the simple layout. This will yield usable space of 8 TB. 4 TB is the maximum size of page blobs, so you cannot increase the disk size. Striping by using dynamic disks was deprecated in Windows Server 2012. Parity layout requires at least three disks. Premium Storage is subject to the same size limitations as standard storage, so the maximum size of the disk is 4 TB.

Resources

Azure VMs disk mobility

 **Additional Reading:** For more information, refer to “What is Azure Import/Export service?” at: <https://aka.ms/AA2064q>

Configuring storage in Windows and Linux VMs

 **Additional Reading:** For more information, refer to “Configure LVM on a Linux VM in Azure” at: <https://aka.ms/d44xh4> and regarding mdadm, refer to “Configure Software RAID on Linux” at: <https://aka.ms/n8yavz>.

Demonstration: Configuring disks

Demonstration Steps

1. From the classroom VM, start Microsoft Edge and browse to the Azure portal. If prompted, sign in by using the Microsoft account that is the Service Administrator of your Azure subscription.
2. Navigate to the **10979F03DemoVM1** blade.
3. Add two standard storage managed disks, each with a size of 128 GB.
4. Switch back to back the Remote Desktop session to **10979F03DemoVM1**.

5. On **10979F03DemoVM1**, create a new Storage Spaces–based simple layout volume by using both disks with default settings.
6. Wait until the volume is fully formatted.
7. Close the RDP connection.
8. Delete all resource groups that you created in this module.
9. Close all open windows on the classroom VM.

Module Review and Takeaways

Question: What factors should you consider when migrating your on-premises VMs to Azure VMs?

Answer: Answers might vary, but they will likely include such factors as compatibility and the migration methodology.

For example, Azure VMs do not support Generation 2 Hyper-V VMs or dynamically expanding .vhdx disk files. However, it is possible to use Azure Site Recovery to migrate Generation 2 VMs to Azure VMs. Additionally, Azure Site Recovery supports migrating VMware VMs and physical servers to Azure VMs.

Question: Based on what you learned in this module, for what purpose would you choose Azure VM deployment?

Answer: Answers might vary, but will likely include implementations that must accommodate dynamically changing demand (such as websites that must adjust to fluctuations in their workload) or that involve temporary setup (frequently required to accommodate proof-of-concept or development needs).

Lab Review Questions and Answers

Lab B: Creating a VM in Azure

Question and Answers

Question: What type of connectivity can you use to manage Azure VMs?

Answer: You can manage Azure VMs that run Windows by using RDP and WinRM connections. For Linux VMs, you can use Secure Shell (SSH) or RDP for Linux.

Module 4

Azure Web Apps

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Lesson 1

Creating and configuring Azure web apps

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Demonstration: Creating and scaling a web app	3

Question and Answers

Question: You work as a developer for your organization, and your manager wants you to list the major benefits of using Azure App Service. What would you tell him?

Answer: Some of the most important benefits of Azure App Service include:

1. Rapid deployment of web and mobile apps.
2. Native support for staged deployments.
3. Support for most common development platforms.

Resources

Comparing Web Apps with other Azure services providing web app-hosting functionality

 **Additional Reading:** For more information regarding Azure Web App sandbox, refer to “Azure Web App sandbox” at <https://github.com/projectkudu/kudu/wiki/Azure-Web-App-sandbox>.

Creating and maintaining web apps

 **Additional Reading:** For App Service Plan Pricing Details, refer to “App Service pricing” at <http://aka.ms/Nmhpka>.

 **Additional Reading:** The Free and Shared pricing tiers impose time-based quotas on resources, such as central processing unit (CPU), memory, and outbound bandwidth available to Azure web apps. For more information regarding these quotas, refer to the “Quotas and alerts” section in the “How to: Monitor Apps in Azure App Service” webpage at <https://aka.ms/AA2065s>.

Configuring and scaling web apps

 **Additional Reading:** For more information about scaling web apps, refer to “Scale up an app in Azure” at <http://aka.ms/Peyuez>

Demonstration: Creating and scaling a web app

Demonstration Steps

1. Use the Azure portal to create a Azure web app with an App Service plan based on the Free pricing tier in a resource group named 10979F04-DemoRG01t.
2. Scale up the App Service plan of the newly created Azure web app to the Standard pricing tier by following the instructions at <https://aka.ms/AA2065w>.
3. Scale out the App Service plan of the newly created Azure web app by following the instructions at <https://aka.ms/AA2065x>.
4. At the end of the demonstration, scale in the App Service plan and scale it down to the Free pricing tier to avoid extra charges.

Lesson 2

Deploying and monitoring Azure web apps

Contents:

Question and Answers	5
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Demonstration: Monitoring Azure web apps by using the Azure portal	5

Question and Answers

Question: What are the benefits of deployment slots, and how can you move your web app between slots?

Answer: You can create deployment slots for production and development. You can validate the status of your web app in the staging deployment slot and swap it into production after the validation is complete. Furthermore, if it turns out that the newly deployed version of the web app is not functioning properly, you have the flexibility to perform an instant rollback.

Resources

Options for building, publishing, and deploying Azure web apps

 **Additional Reading:** To download the MSDeploy.exe tool, refer to “Web Deploy 3.6” at <http://aka.ms/D8g047>.

Publishing a web app from Visual Studio

 **Additional Reading:** For information on how to use Visual Studio to create an ASP.NET Core web app in Azure, refer to “Create an ASP.NET Core web app in Azure” at <http://aka.ms/C4mv1m>.

Performing staged deployments

 **Additional Reading:** For more information regarding this topic, refer to “Continuous Deployment to Azure App Services” at <https://aka.ms/AA2065z>.

Monitoring Azure web apps

 **Additional Reading:** For more information about using Azure Monitor for monitoring, diagnostics, and alerting, refer to <https://aka.ms/AA20664> and <https://aka.ms/AA1zyco>.

Demonstration: Monitoring Azure web apps by using the Azure portal

Demonstration Steps

1. Configure Azure web app monitoring by following the instructions at <https://aka.ms/AA20665>.
2. Configure Azure web app diagnostics by following the instructions at <https://aka.ms/AA1zyco>.
3. Configure Azure web app alerts by following the instructions at <https://aka.ms/AA1zyct> (note that this content references alerting for an Azure VM, but the process of configuring classic alerts for an Azure web app is largely the same).
4. Configure Azure web app Application Insights by following the instructions at <https://aka.ms/AA1zycu>.
5. Delete all the resource groups that you created in this module.
6. Close all open windows on the classroom VM.

Module Review and Takeaways

Best Practices

The Web Apps feature of Azure App Service is the primary choice for most web apps for several reasons:

- The Azure platform provides built-in support for deployment and web app management.
- You can scale your sites rapidly to handle high-volume traffic.
- Web apps have built-in support for load balancing.
- You can move your existing web apps to Azure quickly and easily with an online migration tool.
- You can use an open-source app from the Azure Marketplace or create a new site by using the framework and tools of your choice.

Note that, in some situations, you might need a higher level of control over your web apps. For example, you might require the ability to connect remotely to your server or to configure server startup tasks. In such cases, Azure VMs or Azure VM scale sets might provide a viable alternative. You could also consider other options, such as containers or Azure Service Fabric.

Review Question

Question: From a management standpoint, what is the key difference between using an Azure web app and using an Azure VM with the IIS server role installed to host your web apps?

Answer: Azure web apps provide a fully managed Platform as a Service (PaaS), whereas the Azure virtual machine does not.

Lab Review Questions and Answers

Lab: Creating and managing Azure web apps

Question and Answers

Question: In the lab, you used an Azure web app to host your website. What do you think are the most important benefits of Azure web apps when compared with running web apps in Azure VMs?

Answer: Similar to Azure VMs, you can scale a web app vertically by changing its pricing tier. However, unlike Azure VMs, which require a reboot, this change takes effect almost instantaneously in an Azure web app. Changing a pricing tier increases or decreases the computing resources allocated to instances of that web app. Alternatively, you can scale web apps horizontally, either manually or dynamically, which automatically accommodates changes in their utilization. Doing so increases or decreases the number of web app instances and relies on built-in Azure load balancing to distribute incoming requests among them.

On the other hand, while web apps provide excellent agility and scalability, their capabilities are limited if you need to distribute your web app into multiple components, each running within its own process space. In addition, they operate within a sandbox. Thus, they do not support such customization tasks as direct connectivity through Remote Desktop or Secure Shell (SSH), writing to the system drive, or outbound connectivity to a range of Remote Procedure Call (RPC) ports and Server Message Block (SMB) ports. Additionally, Windows-based web apps do not support tasks such as modifying the registry and accessing Windows Management Instrumentation (WMI) or out-of-process Component Object Model (COM) servers.

Module 5

Introduction to Azure networking

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Lesson 1

Getting started with Azure networking

Contents:

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Demonstration: Creating a virtual network	4

Question and Answers

Question: Which of the following Azure services support direct connectivity to an Azure virtual network?

- Azure Traffic Manager
- Azure AD
- Azure Virtual Machines
- Azure SQL Database
- Azure Web Apps

Answer:

- Azure Traffic Manager
- Azure AD
- Azure Virtual Machines
- Azure SQL Database
- Azure Web Apps

Feedback:

Azure virtual machines are automatically placed on a virtual network during their deployment. You can also use service endpoints to connect Azure SQL Database directly to a virtual network. In the case of Azure Web Apps, you can connect them via a point-to-site VPN. Azure AD and Azure Traffic Manager do not support direct connectivity to Azure virtual networks.

Question: What is the smallest subnet that you can implement in an Azure virtual network?

- /24
- /26
- /29
- /30
- /31

Answer:

- /24
- /26
- /29
- /30
- /31

Feedback:

There are five IP addresses on each subnet that Azure platform reserves for its internal use. The smallest subnet you can implement is /29.

Resources

Determining the need for Azure virtual networks

 **Additional Reading:** For a complete listing of services that you can deploy into a virtual network, refer to “Virtual network integration for Azure Services” at <https://aka.ms/AA1zyd0>.

 **Additional Reading:** For an up-to-date listing of services that support service endpoints, refer to “Virtual Network Service Endpoints” at <https://aka.ms/AA20668>.

Azure networking capabilities

 **Additional Reading:** For more information regarding private DNS zones, refer to “Use Azure DNS for private domains” at <https://aka.ms/AA1zyd3>.

Demonstration: Creating a virtual network

Demonstration Steps

1. Follow the steps described at <https://aka.ms/AA2066c> to create a virtual network. Create the virtual network in a new resource group named **10979F03-DemoRG01**.
2. Follow the steps described at <https://aka.ms/AA1zyd6> to add a subnet to the virtual network that you created in the previous step.
3. Follow the steps described at <https://aka.ms/AA2066f> to deploy an Azure virtual machine (VM) into the first subnet of the newly created virtual network. Deploy the Azure VM into the resource group that you created in the first step.
4. Follow the steps described at <https://aka.ms/AA2066g> to move the network interface from the first subnet to the second subnet of the virtual network.

Lesson 2

Getting started with Azure Load Balancer

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Question and Answers

Question: Which SKU of the Azure load balancer would you consider using in your Azure deployments?

Answer: Answers might vary. Azure Load Balancer is available in Basic and Standard SKU. Standard Load Balancer offers a number of advantages, but its use incurs extra cost. Charges depend on the number of load balancing rules in place and the amount of processed data.

The advantages of Azure Standard Load Balancer include:

- Increased scalability for up to 1,000 Azure VMs.
- Enhanced resiliency in multizone configurations.
- Support for high-availability ports, which facilitates implementations of active/active load balancing across network virtual appliances.
- Enhanced diagnostics.
- Increased security, due to requirement for NSGs for all virtual machines in the backend pool.

Resources

Overview of Azure Load Balancer

 **Additional Reading:** For details regarding functionality and implementation of Azure Standard Load Balancer, refer to “Azure Load Balancer Standard overview” at <https://aka.ms/AA1zyd7>.

Creating an Azure load balancer

 **Additional Reading:** For more information about Azure support for IPv6 in its public Azure load balancer, refer to “Overview of IPv6 for Azure Load Balancer” at <https://aka.ms/p75q4e>.

Demonstration: Creating an Azure load balancer

Demonstration Steps

1. Follow the steps provided at <http://aka.ms/R5k97r> when performing this demonstration. Use the VM that you created in the previous demonstration as the backend pool. Provision the load balancer into the existing resource group **10979F03-DemoRG01**.
2. To avoid unnecessary charges, after you complete the demonstration, delete the resource groups and their resources that you created in this module’s demonstrations.

Module Review and Takeaways

Review Question

Question: If you decide to implement different types of services on the Azure platform, would you need to create Azure virtual networks?

Answer: The answers might vary, but in general:

- You must create virtual networks or use existing ones when deploying Azure VMs.
- Several Platform as a Service (PaaS) services support direct virtual network connectivity but do not require it. As a result, you can deploy them without creating a new virtual network or using an existing one. For example, the Web Apps feature of Azure App Service supports integration with Azure virtual networks to facilitate direct connectivity to Azure VMs.
- A growing number of Azure PaaS services integrate with Azure virtual networks by using service endpoints. Unlike point-to-site virtual private network (VPN), service endpoints do not require VPN gateways. They also do not incur performance and latency penalties that are inherent to VPN-based technologies.
- Some PaaS services do not depend on or integrate with Azure virtual networks. These services include, for example, Azure Active Directory (Azure AD), Azure Traffic Manager, Azure Data Lake Storage, Azure Content Delivery Network, Azure Media Services, and Azure Container Registry.

Lab Review Questions and Answers

Lab: Creating and configuring virtual networks

Question and Answers

Question: Can you move virtual machines that you created in the lab to a different virtual network?

Answer: No. You would have to redeploy these virtual machines.

You can easily move Azure virtual machines between subnets on the same virtual network. You cannot move virtual machines between virtual networks. Doing so requires redeployment.

Question: By default, can you successfully ping a Windows Server 2016 virtual machine on a virtual network?

Answer: No, which is the reason that in the lab, the test involved using the Remote Desktop Protocol.

Ping functionality relies on the Internet Control Message protocol (ICMP), which by default is blocked by Windows Firewall on each of the two Azure virtual machines.

Module 6

Introduction to Azure Storage and Data Services

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Lesson 1

Understanding Azure Storage options

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Question and Answers

Question: What type of Azure Storage could you use for storing virtual disk files for Azure virtual machines (VMs)?

- Page blobs
- Block blobs
- Table storage
- Append blobs
- File storage

Answer:

- Page blobs
- Block blobs
- Table storage
- Append blobs
- File storage

Feedback:

The only possibility for virtual disk file storage of Azure VMs is page blobs. This type of storage is optimized for random access.

Resources

Overview of Azure Storage

 **Additional Reading:** The Azure platform determines the location of the secondary region automatically, based on the concept of Azure region pairing. For a list of secondary regions for each of the Azure regions, refer to "Azure Storage replication" at <https://aka.ms/r3h0wc>.

 **Additional Reading:** For more information about shared access signatures and stored access policies, refer to "Using shared access signatures (SAS)" at <https://aka.ms/AA1zyd8>.

 **Additional Reading:** For more information, refer to "Azure subscription and service limits, quotas, and constraints" at <http://aka.ms/O5vvr>.

Lesson 2

Creating and managing storage

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Question and Answers

Question: You need to create a Premium Storage account. Which of the following storage options can you use?

- Locally redundant storage
- Zone-redundant storage
- Geo-redundant storage
- Read-access geo-redundant storage
- Blob storage account type

Answer:

- Locally redundant storage
- Zone-redundant storage
- Geo-redundant storage
- Read-access geo-redundant storage
- Blob storage account type

Feedback:

Locally redundant storage is the only replication type supported by Microsoft Azure Premium Storage accounts. In addition, Premium Storage must use the general-purpose storage account, because the Blob storage account supports only block and append blobs.

Resources

Creating and managing Azure Storage non-programmatically

 **Reference Links:** For more information, refer to sebagomez/azurestorageexplorer: <https://aka.ms/AA23tb9>

 **Additional Reading:** For more information, refer to Azure Storage Client Tools at <http://aka.ms/R3aaz8>.

 **Reference Links:** For more information, refer to Use the Microsoft Azure Import/Export Service to Transfer Data to Blob Storage at <http://aka.ms/Fskpq4>.

Creating and managing storage programmatically

 **Additional Reading:** For more information, refer to "Get started with Azure Blob storage and Visual Studio connected services (ASP.NET)" at <https://aka.ms/AA1zyd9>.

Creating and managing tables programmatically

 **Additional Reading:** For more information, refer to "Get started with Azure Table storage and the Azure Cosmos DB Table API using .NET" at <http://aka.ms/Gcjemy>.

Demonstration: Creating a storage account and uploading a blob

Demonstration Steps

1. Create a storage account by following the instructions provided at <https://aka.ms/AA1zydb>.
2. Create a container in the storage account by following the instructions provided at <https://aka.ms/AA1zydb>.
3. Upload a blob to the container by following the instructions provided at <https://aka.ms/AA1zydb>.
4. Create another container and upload a blob by using Azure Storage Explorer. Follow the steps provided at <https://aka.ms/AA1zydc>.
5. Delete all resource groups and their resources that you created in this demonstration.

Lesson 3

Understanding options for relational database deployments

Contents:

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Question and Answers

Question: Which of the following features increase resiliency of an Azure SQL database?

- Point In Time Restore
- Sharding
- Elastic Database pools
- Geo-replication
- Geo-Restore

Answer:

- Point In Time Restore
- Sharding
- Elastic Database pools
- Geo-replication
- Geo-Restore

Resources

Comparing Azure SQL Database with SQL Server in an Azure VM

 **Additional Reading:** For a comprehensive list of features that Azure SQL Database supports, refer to “Feature comparison: Azure SQL Database versus SQL Server” at <https://aka.ms/AA2066p>.

 **Additional Reading:** For a comprehensive list of differences of Transact-SQL related functionality between SQL Server and Azure SQL Database, refer to Azure SQL Database Transact-SQL differences at <http://aka.ms/Ps3svp>.

 **Additional Reading:** For more information about Azure SQL Database Managed Instance, refer to “What is a Managed Instance (preview)?” at <https://aka.ms/AA1zydd>.

SQL database resiliency and scalability

 **Additional Reading:** By implementing Azure SQL Database failover groups, you can implement automatic failover and eliminate the need to modify connection strings following a failover. For more information about Azure SQL Database failover groups, refer to “Overview: Failover groups and active geo-replication” at <https://aka.ms/AA1zydj>.

 **Additional Reading:** You can also place replicas of Azure SQL Database across multiple zones in the same region to increase the resiliency of the service. At the time of authoring this content, this functionality is in preview. For more information about Azure SQL Database zone-redundant configuration, refer to “High-availability and Azure SQL Database” at <https://aka.ms/AA20671>.

Lesson 4

Creating and connecting to Azure SQL databases

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Question and Answers

Question: How will your organization use Azure SQL Database?

Answer: Answers will vary but might include:

- To store data for Azure web apps, PaaS cloud services, and applications running in Azure IaaS virtual machines.
- To store data for Azure mobile apps.
- To migrate databases from a SQL Server instance hosted in an Azure virtual machine.
- To migrate data from SQL Server on-premises.

Demonstration: Creating an Azure SQL database by using the Azure portal

Demonstration Steps

1. To create an Azure SQL database, follow the steps listed at <https://aka.ms/AA1zydk>.
2. In the Azure portal, examine database properties such as pricing tier, status, and server name.
3. Display database connection strings that you can use to connect to the SQL database.
4. In the Azure portal, examine the properties of the logical server hosting the newly created database, including the server location, server admin name, and the resource group name.
5. Examine the default firewall rules in SQL Server in Azure.

Demonstration: Configuring geo-replication settings of an Azure SQL database by using the Azure portal

Demonstration Steps

1. Configure geo-replication of the Azure SQL database that you created in the previous demonstration by following the instructions provided at <https://aka.ms/AA20674>.
2. View the graphical representation of the geo-replication in the Azure portal.
3. Perform a failover by following the instructions listed at <https://aka.ms/AA20674>.

Demonstration: Connecting to an Azure SQL database by using SQL Server Management Studio

Demonstration Steps

1. Modify the firewall of the Azure SQL database that you created in the first demonstration of this lesson to allow connectivity from your demonstration computer by following the instructions provided at <https://aka.ms/AA1zydk>.
2. Connect to the Azure SQL database from SQL Server Management Studio on your demonstration computer by following the instructions provided at <https://aka.ms/AA20675>.
3. Run a sample query `SELECT @@VERSION` from SQL Server Management Studio on your demonstration computer.
4. Delete all resource groups and their resources that you created in the demonstrations in this lesson.

Module Review and Takeaways

Best Practices

By following the best practices for using Azure Storage, you can minimize its cost. The four factors that will influence your costs are:

- Amount of storage used (with standard storage) or provisioned (with Premium Storage).
- Replication options. Geo-redundant storage accounts are more expensive than locally redundant storage. To reduce costs, consider creating multiple storage accounts with replication settings configured individually according to the resiliency requirements of their content.
- Number of storage transactions. Transactions are defined as operations (such as create, read, or write) across all Azure Storage types including blobs, tables, queues, and files. Transaction-related charges do not apply to premium Azure Storage accounts.
- Egress data from the Azure region hosting the storage account. To minimize these charges, consider grouping interdependent services together in the same region.

Note: For more information, refer to “Azure Storage Overview Pricing” at <http://aka.ms/Lfqijq>.

Review Questions

Question: Which storage type should you choose if you want to store image files that multiple Azure VMs will access via the SMB protocol?

Answer: You should choose Azure File storage. Only Azure File storage supports shared access via the Server Message Block (SMB) protocol. You could implement an Azure VM to function as a file server, but this approach would result in additional compute charges.

Question: What should you consider when choosing between on-premises SQL Server, SQL Server on an Azure VM, and Azure SQL Database?

Answer: You should consider the following factors:

1. Data storage policy compliance. Some organizations, geopolitical regions, and industries have strict requirements for data storage, which might determine where and how data can be stored.
2. Required functionality. SQL Server supports some functionality that is not available in Azure SQL Database.
3. Additional relational database–related services. SQL Server includes not only the database engine but also additional services such as the SQL Server Agent, SQL Server Integration Services, SQL Server Reporting Services, SQL Server Analysis Services, and SQL Server Master Data Services. If you require the capabilities of these services, SQL Server might be a better choice.
4. Maintenance and manageability. In general, Azure SQL Database requires considerably less maintenance overhead than a SQL Server instance (on-premises or in an Azure VM).

 **Note:** Azure SQL Database Managed Instance promises to eliminate most compatibility and functionality limitations of Azure SQL Database. However, before considering its implementation, you should verify whether Azure SQL Database Managed Instance has reached general availability.

 **Additional Reading:** For more information regarding data storage policy compliance, refer to the Azure Trust Center: <http://aka.ms/Rhwnfd>.

Lab Review Questions and Answers

Lab A: Configuring Azure Storage

Question and Answers

Question: Can you change performance of an Azure Storage account from standard to premium?

Answer: No, this is not possible.

As a workaround, you could create a premium Azure Storage account and copy content of the standard Azure Storage account into it.

Question: Is it possible to upload a file to an Azure Storage blob by using the Azure portal?

Answer: Yes, you can upload files to an Azure storage blobs by using the Azure portal.

You can also use one of several Azure Storage tools, such as Azure Web Storage Explorer, for this purpose.

Lab B: Creating a SQL Database in Azure

Question and Answers

Question: In the lab, you connected to an Azure SQL database by using SQL Server Management Studio. What configuration change must you make first in the Azure portal before successfully establishing the connection?

Answer: You must configure a SQL Server firewall rule to allow incoming connections from the IP address range containing the public IP address of your lab computer.

Question: What authentication method do you have to use when connecting to Azure SQL Database?

Answer: You must use SQL Server authentication or Azure Active Directory–based authentication. Windows authentication is not supported when connecting to Azure SQL Database.

Module 7

Introduction to containers and serverless computing in Azure

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Lesson 1

Implementing Windows and Linux containers in Azure

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Question and Answers

Question: What authentication and authorization method do you intend to use when implementing Azure Container Registry?

Answer: You can use the admin user account, but only in single-user scenarios. Otherwise, multiple users will be authenticating with the same set of credentials, making it practically impossible to determine who carried out a particular action. In multiuser scenarios, we recommend creating one or more service principals in the Azure Active Directory (Azure AD) instance associated with your Azure subscription, and then assigning them to Azure Container Registry. At that point, individual users will be able to authenticate when accessing the registry by using a designated service principal name and a password. In addition, this approach allows you to implement role-based access control (RBAC). You can grant the Reader, Contributor, or Owner role to each service principal, based on the types of tasks they need to perform.

Resources

Introduction to containers

 **Additional Reading:** For more information regarding Windows containers, refer to “Windows Containers” at <https://aka.ms/AA20679>.

Implementing Docker hosts in Azure

 **Additional Reading:** For more information about installing the Docker VM extension, refer to “Create a Docker environment in Azure using the Docker VM extension” at <https://aka.ms/ead7wx>.

Deploying and managing containers on Azure VMs

 **Additional Reading:** For information about connecting to Azure VMs by using RDP and SSH, refer to Module 3, “Managing Azure virtual machines.” For information about connecting to an Azure VM by using a Docker Machine session, refer to “Create a Docker environment in Azure using the Docker VM extension” at <https://aka.ms/AA2067b>.

 **Additional Reading:** For the full syntax of the **docker run** command, refer to “docker run” at <https://aka.ms/rnaxx2>.

 **Additional Reading:** For information about the **Dockerfile** syntax, refer to “Dockerfile reference” at <http://aka.ms/wrccuy>.

 **Additional Reading:** For more information about **docker build**, including a list of all build options, refer to “docker build” at <http://aka.ms/u29exr>.

Creating multicontainer applications with Docker Compose

 **Additional Reading:** For mapping between the Compose file version number and the Docker Engine releases, refer to “Compose file version 3 reference” at <https://aka.ms/AA2067g>.

 **Additional Reading:** For details about the Docker Compose syntax, refer to “Compose file version 3 reference” at <https://aka.ms/k44zyt>.



Additional Reading: For more information about Docker Compose, refer to “Get started with Docker and Compose to define and run a multicontainer application in Azure” at <https://aka.ms/dhn0yb>.

Demonstration: Installing a Docker host and containers on an Azure VM

Demonstration Steps

1. Follow the instructions provided at <https://aka.ms/AA2067b> to deploy an Azure VM running Ubuntu with Docker.
2. Follow the instructions provided at <https://aka.ms/AA2067b> to deploy an nginx container into the newly provisioned Azure VM and to verify that the deployment was successful.

Lesson 2

Introduction to Azure serverless computing

Contents:

Question and Answers

6

Question and Answers

Question: Which service would you use to implement direct connectivity between an Azure App Service web app and on-premises SQL Server without opening any inbound firewall ports?

- Service Bus queue
- Azure Relay
- Service Bus topic
- Event Grid
- Event Hub

Answer:

- Service Bus queue
- Azure Relay
- Service Bus topic
- Event Grid
- Event Hub

Feedback:

Azure Relay provides a bidirectional proxy by using either open standard web sockets or the Windows Communication Foundation (WCF) service. Client applications can bind directly to the relay endpoint and the relay infrastructure handles routing messages to the appropriate service endpoint. Relay supports Azure App Service Hybrid Connections. This implements cross-premises connectivity for Azure App Service web apps and mobile apps. Azure App Service Hybrid Connections leverages the software component called Hybrid Connection Manager (HCM). You must download HCM from the Azure portal and install it on one of your on-premises servers running Windows Server 2012 or Windows Server 2016. HCM is responsible for initiating communication to the Service Bus Relay–hosted hybrid connection service in Azure. This requires only outbound connectivity to Azure on TCP port 80 and 443. An App Service web app or mobile app establishes another outbound connection to the same hybrid connection service instance.

An Azure App Service hybrid connection facilitates connectivity to a specific on-premises resource, based on the combination of the IP address and static TCP port, which represents a service running on the target resource. The resource can reside on any operating system platform. Examples of these on-premises resources include web services or databases servers, such as Microsoft SQL Server, MySQL, or Oracle.

Module Review and Takeaways

Question: What do you think is the most significant benefit of serverless computing?

Answer: Answers might vary, but will likely include simplified design, development, and implementation, and an extra layer of abstraction, which fully hides implementation details. Answers might also include on-demand execution and per-second billing, both of which minimize operational cost.

Lab Review Questions and Answers

Lab: Implementing containers on Azure VMs

Question and Answers

Question: Which method would you use when deploying Docker hosts on Azure VMs?

Answer: The answers might vary, but they will likely include:

- Using an Azure VM extension.
- Using the Docker images available from Azure Marketplace.
- Using the Docker Machine Azure driver.

Module 8

Configuring and managing Azure AD

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Lesson 1

Overview of Azure AD

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Question and Answers

Question: Which of the following are characteristics of Azure AD?

- Multitenant
- Contains organizational units
- Uses LDAP for directory lookups
- Supports Group Policy Objects
- Offers native support for Multi-Factor Authentication

Answer:

- Multitenant
- Contains organizational units
- Uses LDAP for directory lookups
- Supports Group Policy Objects
- Offers native support for Multi-Factor Authentication

Feedback:

Unlike AD DS, Azure AD is multitenant by design. It does not support organizational units. It relies on Internet-friendly protocols for directory lookups (Graph API over HTTPS) rather than Lightweight Directory Access Protocols (LDAP). It does not support Group Policy Objects. For management of its domain-joined devices, you can use an MDM solution, such as Microsoft Intune. It offers native support for multi-factor authentication.

Resources



Additional Reading: For more information regarding this topic, refer to “Administrative units management in Azure AD - public preview” at <https://aka.ms/AA1zyc1>.



Additional Reading: For more information regarding this topic, refer to “Configure your App Service app to use Azure Active Directory login” at <http://aka.ms/L27lid>.

Active Directory synchronization and Azure AD



Additional Reading: For more information, refer to “Azure AD Seamless Single Sign-On” at <https://aka.ms/wz4wvq>.



Additional Reading: For more information about pass-through authentication, refer to “User sign-in with Azure Active Directory Pass-through Authentication” at <https://aka.ms/e6w1t5>.

Demonstration: Creating and managing an Azure AD tenant

Demonstration Steps

1. Create an Azure AD tenant by following the steps on the following webpage: <https://aka.ms/AA2065i>.
2. Create a custom DNS domain and view the verification DNS records by following the steps on the following webpage: <https://aka.ms/AA1zyc3>.
3. Associate an Azure AD tenant with an Azure subscription by following the steps on the following webpage: <https://aka.ms/AA2065j>.

4. Create an Azure AD user account by following the steps on the following webpage:
<https://aka.ms/AA1zyc4>.
5. Grant an Azure AD user administrative access to an Azure subscription by assigning the owner role on the subscription level. To achieve this, follow the steps on the following webpage:
<https://aka.ms/AA1zyc7>.

Lesson 2

Managing Azure AD authentication and authorization

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Demonstration: Configuring password-based Azure AD SSO	7

Question and Answers

Question: How will your organization use Azure AD?

Answer: Answers will vary, but might include:

- To secure access to Azure-based services.
- To delegate management of Azure-based resources.
- To enhance security by taking advantage of Multi-Factor Authentication.
- To provide SSO functionality for access to SaaS applications.

As an identity and access management solution, Azure AD provides a range of features that integrate with other cloud and on-premises services. For example, you can use Azure AD to authenticate access to Azure web apps or Azure SQL databases. Similarly, you can delegate management of Azure resources by using role-based access control (RBAC).

Azure AD offers several authentication enhancements, including multi-factor authentication and SSO for access to SaaS applications or cloud-based web applications, including the Azure portal. Support for directory synchronization with AD DS makes it possible to implement SSO when using on-premises credentials.

Resources



Additional Reading: For a comprehensive listing of features available in different Azure AD editions, refer to “Azure Active Directory pricing” at <https://aka.ms/AA2065n>.

Azure AD Multi-Factor Authentication



Additional Reading: For more information regarding modern authentication, refer to “Office 2013 modern authentication public preview announced” at <https://aka.ms/m37pjz>.



Additional Reading: For more information about Azure Multi-Factor Authentication, refer to “What is Azure Multi-Factor Authentication?” at: <http://aka.ms/Ddsfo9>.

Azure AD conditional access, Privileged Identity Management, and Identity Protection



Additional Reading: For more information regarding Azure AD Privileged Identity Management and Identity Protection, refer to <https://aka.ms/Is724e>.

Demonstration: Configuring and using Multi-Factor Authentication

Demonstration Steps

1. To enable Multi-Factor Authentication for an Azure AD user, follow the steps on the following webpage: <https://aka.ms/AA2065p>.
2. Sign in to the Azure portal by using the newly configured Azure AD user and go through the steps to set up the second factor of authentication.

Demonstration: Configuring password-based Azure AD SSO

Demonstration Steps

1. Add a gallery application to an Azure AD tenant and configure it for SSO by following the steps on the following webpage: <https://aka.ms/AA2065r>. Choose an application to which you have access so as to demonstrate successful authentication.
2. Assign the newly added application to an Azure AD user by following the steps on the following webpage: <https://aka.ms/AA2065r>.
3. Sign in to the Access Panel as the Azure AD user to which you assigned the gallery application and launch that application to verify that your setup is correct.

Module Review and Takeaways

Question: What are some benefits of using Azure AD as an identity provider?

Answer: The benefits include:

- Full managed scalability and availability, without investments in infrastructure.
- Centralized identity management.
- Single sign-on to SaaS applications.
- Increased security of the authentication process by using Multi-Factor Authentication.
- Integration with Microsoft Office 365 and Microsoft Intune.

Tools

Azure AD Connect is the primary tool for performing directory synchronization.

Lab Review Questions and Answers

Lab: Creating and managing Azure Active Directory

Question and Answers

Question: What role should you assign to a user account in an Azure AD tenant to enable the user to fully manage all of its objects?

Answer: You should assign the Global Administrator role to the user account.

The Global Administrator role grants full control of the Azure AD tenant in which this role exists. Note that this role does not automatically provide administrative privileges to the Azure subscription that is associated with that Azure AD tenant.