Lab Instructions

01 - Create a virtual machine in the portal (10 min)

In this walkthrough, we will create a virtual machine in the Azure portal, connect to the virtual machine, install the web server role and test.

Note: Take time during this walk-through to click and read the Informational icons.

Task 1: Create the virtual machine

1. Sign-in to the Azure Portal at https://portal.azure.com

2. From the **All services** blade in the Portal Menu, search for and select **Virtual machines**, and then click **+Create** and choose **+Azure Virtual machine** from the drop down.

3. On the **Basics** tab, fill in the following information (leave the defaults for everything else):

Settings	Values
Subscription	**Use default supplied**
Resource group	**Create new resource group**
Virtual machine name	**myVM**
Region	**(US) East US**
Availability options	No infrastructure redundancy options required
Image	**Windows Server 2019 Datacenter - Gen2**

Settings	Values
Size	**Standard D2s v3**
Administrator account username	**azureuser**
Administrator account password (type in carefully!)	**Pa$$w0rd1234**
Inbound port rules -	**Allow select ports**
Select inbound ports	**RDP (3389)** and **HTTP (80)**

4. Switch to the Networking tab to ensure **HTTP (80) and RDP (3389)** are selected in section **Select inbound ports**.

5. Switch to the Monitoring tab and select the following setting:

Settings	Values
Boot diagnostics	**Disable**

6. Leave the remaining values on the defaults and then click the **Review + create** button at the bottom of the page.

7. Once Validation is passed click the **Create** button. It can take anywhere from five to seven minutes to deploy the virtual machine.

8. You will receive updates on the deployment page and via the **Notifications** area (the bell icon in the top menu bar).
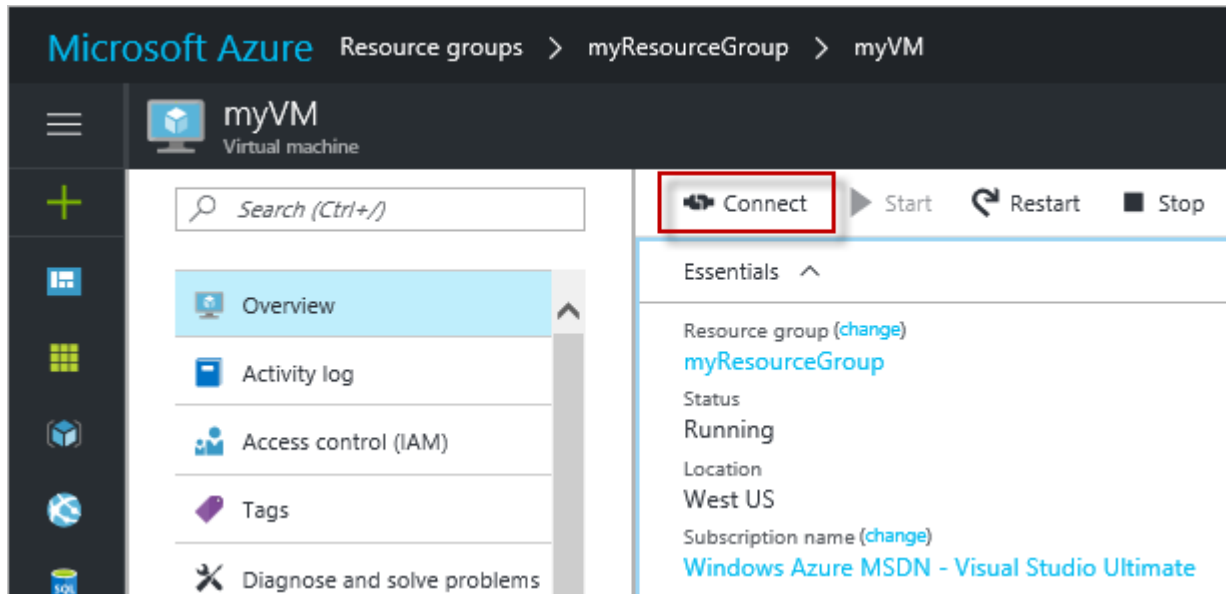
Task 2: Connect to the virtual machine

In this task, we will connect to our new virtual machine using RDP (Remote Desktop Protocol).

1. Click on bell icon from the upper blue toolbar, and select 'Go to resource' when your deployment has succeded.
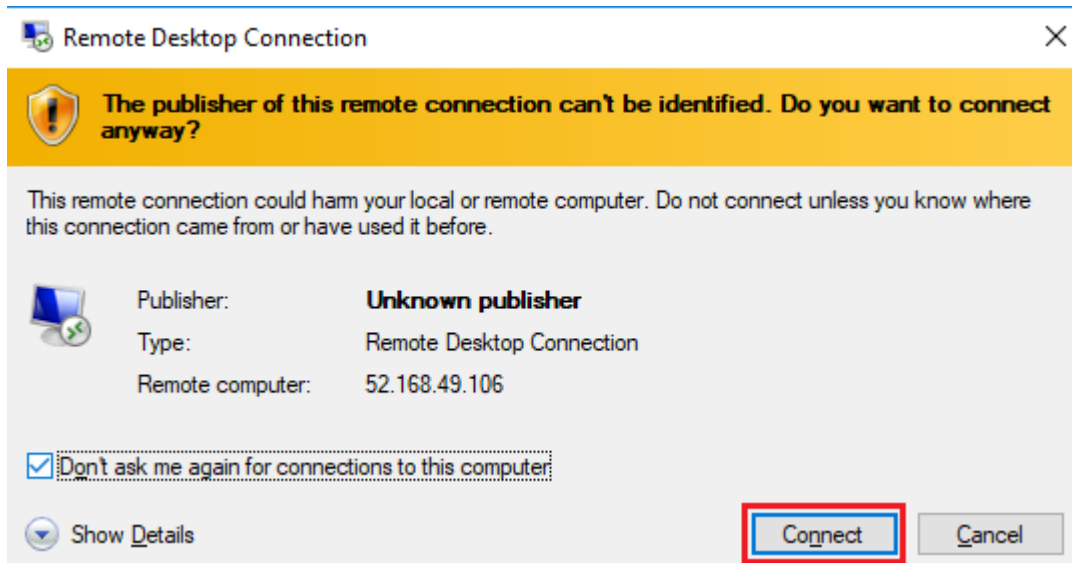
Note: You could also use the **Go to resource** link on the deployment page

2. On the virtual machine **Overview** blade, click **Connect** button and choose **RDP** from the drop down.


Note: The following directions tell you how to connect to your VM from a Windows computer. On a Mac, you need an RDP client such as this Remote Desktop Client from the Mac App Store and on a Linux computer you can use an open source RDP client.

3. On the **Connect to virtual machine** page, keep the default options to connect with the public IP address over port 3389 and click **Download RDP File**. A file will download on the bottom left of your screen.

4. **Open** the downloaded RDP file (located on the bottom left of your lab machine) and click **Connect** when prompted.

5. In the **Windows Security** window, sign in using the Admin Credentials you used when creating your VM **azureuser** and the password **Pa$$w0rd1234**.

6. You may receive a warning certificate during the sign-in process. Click **Yes** or to create the connection and connect to your deployed VM. You should connect successfully.
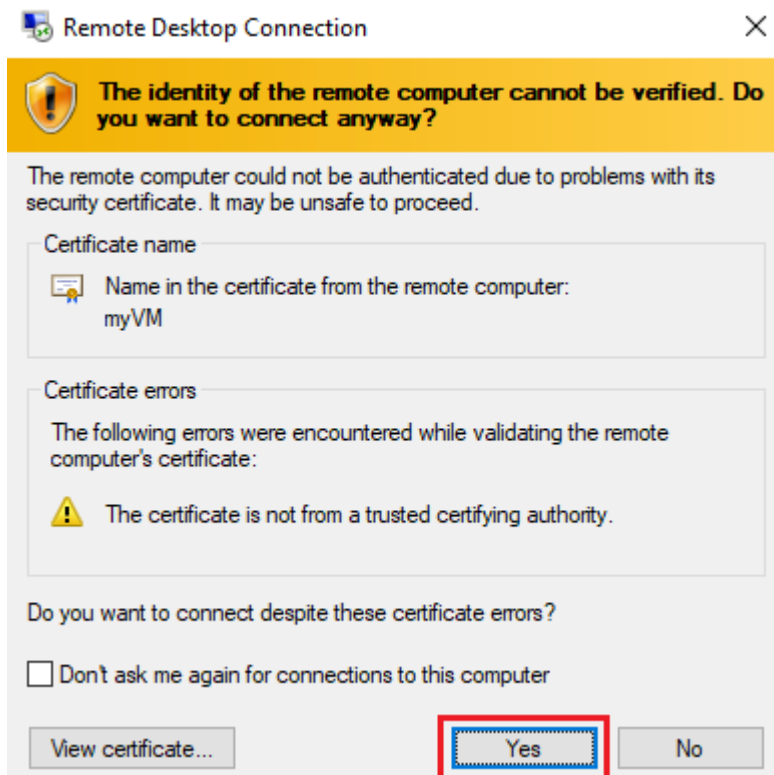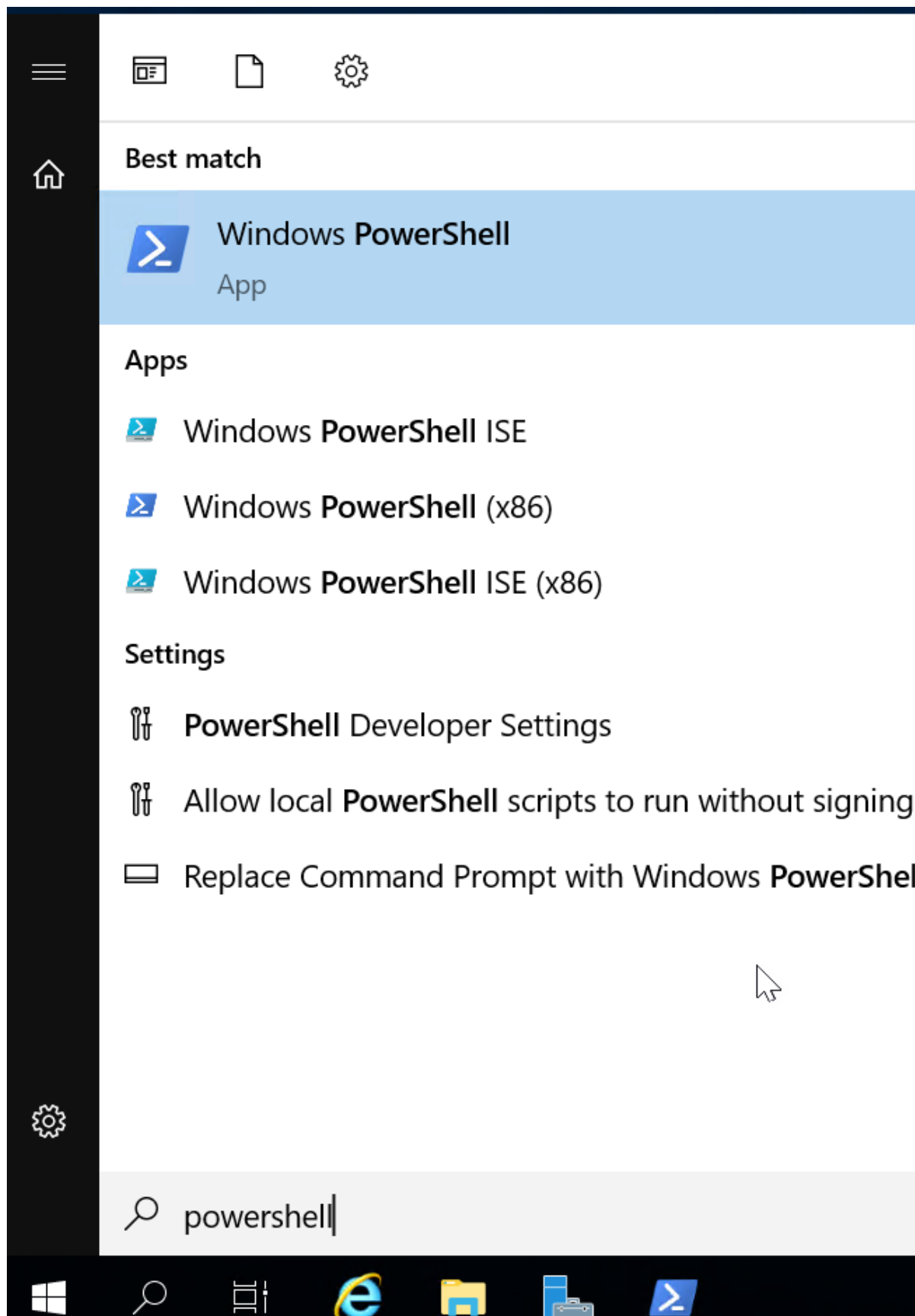
A new Virtual Machine (myVM) will launch inside your Lab. Close the Server Manager and dashboard windows that pop up (click "x" at top right). You should see the blue background of your virtual machine. **Congratulations!** You have deployed and connected to a Virtual Machine running Windows Server.

Task 3: Install the web server role and test

In this task, install the Web Server role on the server on the Virtual Machine you just created and ensure the default IIS welcome page will be displayed.

1. In the newly opened virtual machine, launch PowerShell by searching **PowerShell** in the search bar, when found right click **Windows PowerShell** to **Run as administrator**.

Best match

Windows **PowerShell**
App

Apps

Windows **PowerShell** ISE

Windows **PowerShell** (x86)

Windows **PowerShell** ISE (x86)

Settings

PowerShell Developer Settings

Allow local **PowerShell** scripts to run without signing

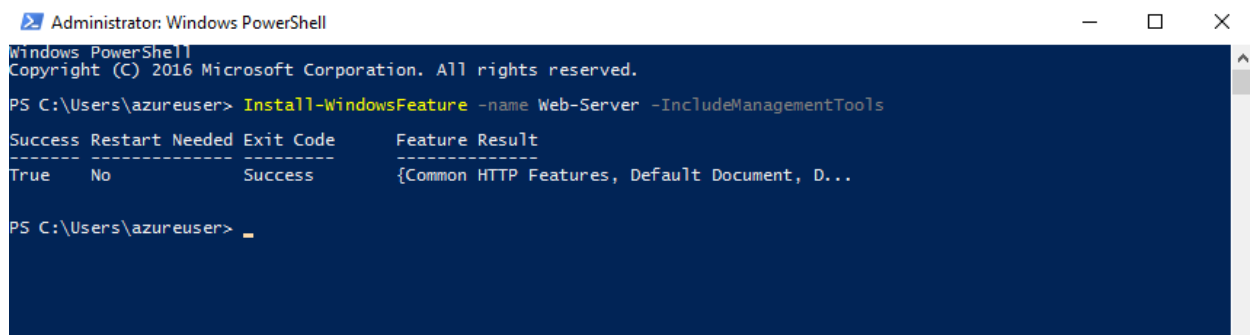Replace Command Prompt with Windows **PowerShel**

powershell

2. In PowerShell, install the **Web-Server** feature on the virtual machine by running the following command. (Paste in the command and hit ENTER for the installment to begin).

PowerShell

Install-WindowsFeature -name Web-Server -IncludeManagementTools

3. When completed, a prompt will state **Success** with a value **True**. You do not need to restart the virtual machine to complete the installation. Close the RDP connection to the VM by clicking the **x** on the blue bar at the top center of your virtual machine. You can also minimize it by clicking the **-** on the blue bar at the top center.

4. Back in the portal, navigate back to the **Overview** blade of myVM and, use the **Click to clipboard** button to copy the public IP address of myVM, then open a new browser tab, paste the public IP address into the URL text box, and press the **Enter** key to browse to it.
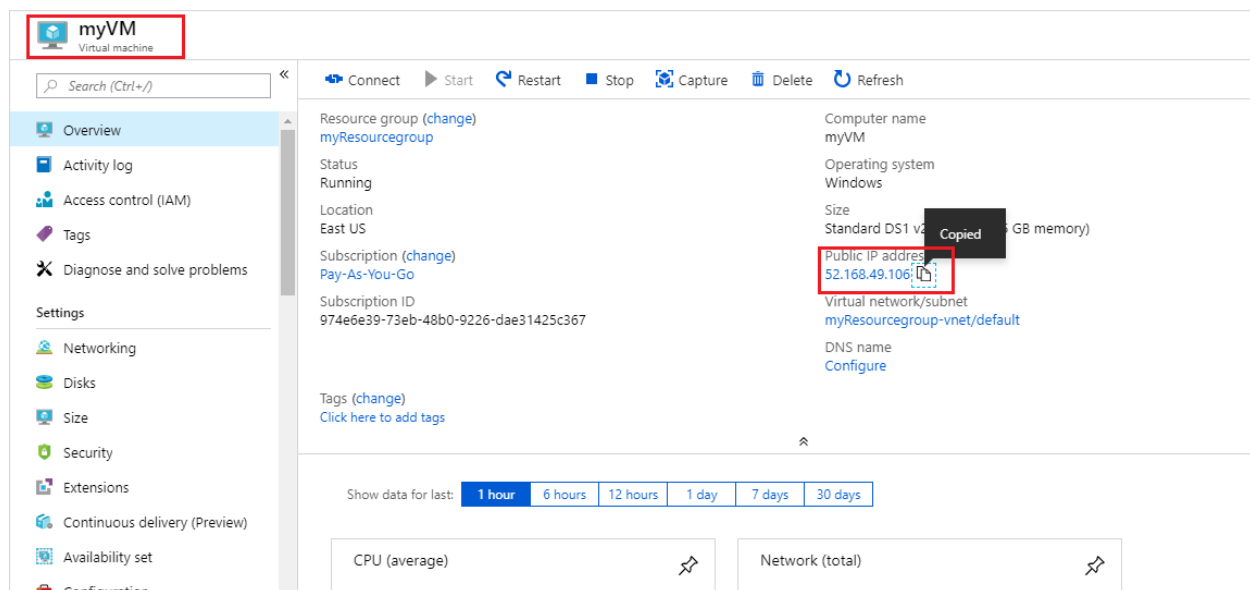
5. The default IIS Web Server welcome page will be displayed.
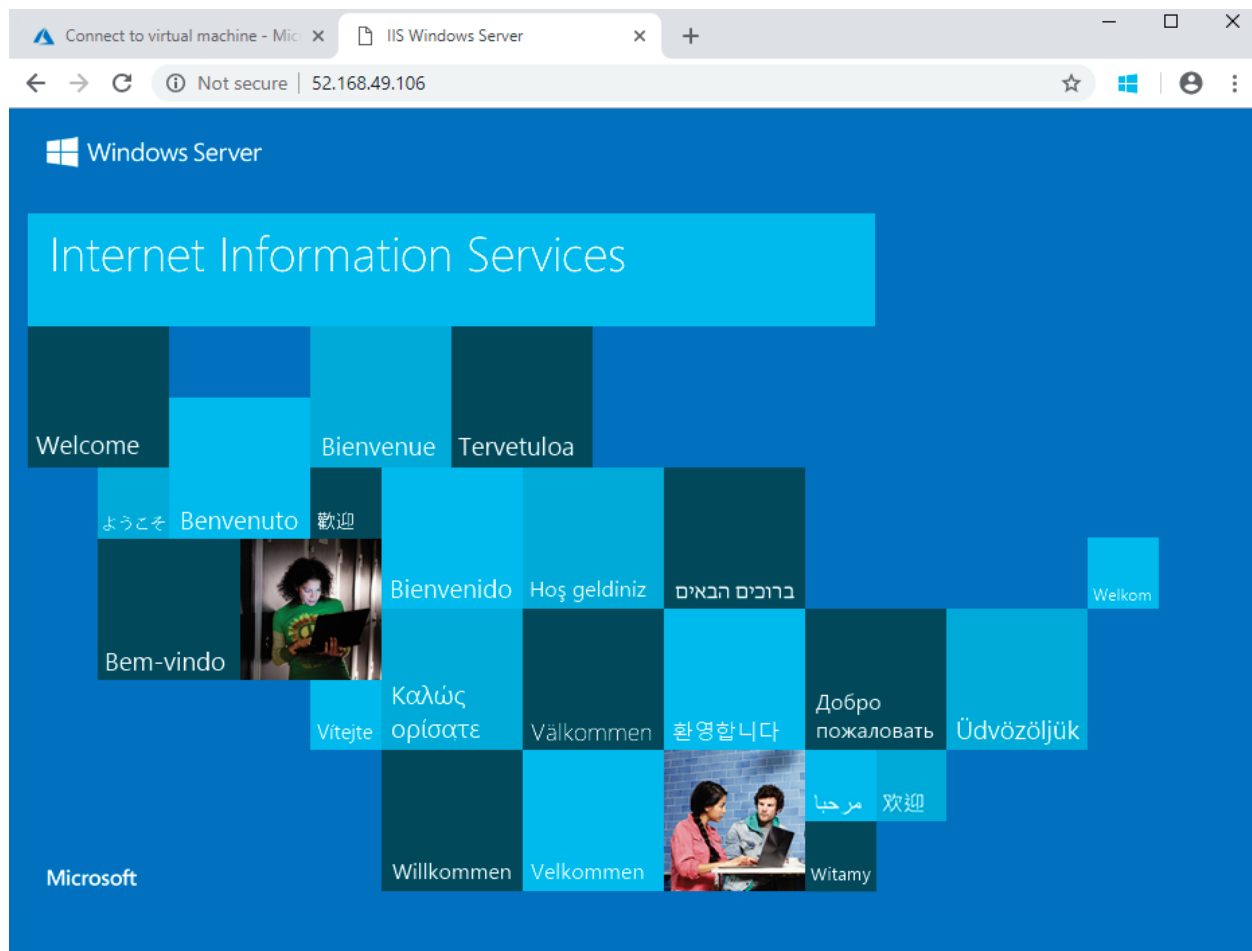
Congratulations! You have created a new VM running a web server that is accessible via its public IP address. If you had a web application to host, you could deploy application files to the virtual machine and host them for public access on the deployed virtual machine.

Note: To avoid additional costs, you can optionally remove this resource group. Search for resource groups, click your resource group, and then click **Delete resource group**. Verify the name of the resource group and then click **Delete**. Monitor the **Notifications** to see verify that the deletion completed successfully.

Congratulations!

Click **Next** to proceed to the **Review Questions**

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03 - Deploy Azure Container Instances (10 min)

In this walkthrough we create, configure, and deploy a container by using Azure Container Instances (ACI) in the Azure Portal. The container is a Welcome to ACI web application that displays a static HTML page.

Task 1: Create a container instance

In this task, we will create a new container instance for the web application.

1. Sign in to the Azure Portal at https://portal.azure.com

2. From the **All services** blade, search for and select **Container instances** and then click **+ Add, + Create, + New**.

3. Provide the following Basic details for the new container instance (leave the defaults for everything else)):

Setting	Value
Subscription	*Use default supplied*
Resource group	**Create new resource group**
Container name	**mycontainer**
Region	**(US) East US**
Image source	**Docker Hub or other registry**
Image type	**Public**
Image	**mcr.microsoft.com/azuredocs/aci-helloworld**
OS type	**Linux**

Setting	Value
Size	***Leave at the default***

4. Configure the Networking tab (replace **xxxxx** with letters and digits such that the name is globally unique). Leave all other settings at their default values.

Setting	Value
DNS name label	**mycontainerdnsxxxxx**

5. **Note**: Your container will be publicly reachable at dns-name-label.region.azurecontainer.io. If you receive a **DNS name label not available** error message following the deployment, specify a different DNS name label (replacing the xxxxx) and re-deploy.

6. On the Monitoring tab, uncheck the **Enable container instance logs** option.

7. Click **Review and Create** to start the automatic validation process.

8. Click **Create** to create the container instance.

9. Monitor the deployment page and the **Notifications** page.

Task 2: Verify deployment of the container instance

In this task, we verify that the container instance is running by ensuring that the welcome page displays.

1. After the deployment is complete, click the **Go to resource** link the deployment blade or the link to the resource in the Notification area.

2. On the **Overview** blade of **mycontainer**, ensure your container **Status** is **Running**.

3. Locate the Fully Qualified Domain Name (FQDN).

▶ Start   ↻ Restart   ■ Stop   🗑 Delete   ↻ Refresh

Resource group (change) : myResourceGroup	OS type : Linux
Status : Running	IP address : 52.255.223.57
Location : East US	FQDN : mycontainerces.eastus.azurecontainer.io
Subscription (change) : Visual Studio Enterprise	Container count : 1
Subscription ID : aa509d92-2cc7-4eb9-9ae9-db02c24e057d	
Tags (change) : Click here to add tags	

4. Copy the container's FQDN into a new web browser tab and press **Enter**. The Welcome page should display.

Congratulations! You have used Azure Portal to successfully deploy an application to a container in Azure Container Instances.

Note: To avoid additional costs, you can optionally remove this resource group. Search for resource groups, click your resource group, and then click **Delete resource group**. Verify the name of the resource group and then click **Delete**. Monitor the **Notifications** to see how the delete is proceeding.

Congratulations!

Click **Next** to proceed to the **Review Questions**

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05 - Create blob storage (5 min)

In this walkthrough, we will create a storage account, then work with blob storage files.

Task 1: Create a storage account

In this task, we will create a new storage account.

1. Sign in to the Azure Portal at https://portal.azure.com

2. From the **All services** blade, search for and select **Storage accounts**, and then click **+ Add, + Create, + New**.

3. On the **Basics** tab of the **Create storage account** blade, fill in the following information (replace **xxxx** in the name of the storage account with letters and digits such that the name is globally unique). Leave the defaults for everything else.

Setting	Value
Subscription	**Leave provided default**
Resource group	**Create new resource group**
Storage account name	**storageaccountxxxxx**
Location	**(US) East US**
Performance	**Standard**
Redundancy	**Locally redundant storage (LRS)**

4. **Note** - Remember to change the **xxxxx** so that it makes a unique **Storage account name**

5. Click **Review + Create** to review your storage account settings and allow Azure to validate the configuration.

6. Once validated, click **Create**. Wait for the notification that the account was successfully created.

7. From the Home page, search for and select **Storage accounts** and ensure your new storage account is listed.

Storage accounts
Default Directory

+ Add ≣≣ Edit columns ↻ Refresh ↓ Export to CSV | ⊘ Assign tags 🗑 Delete | ♡ Feedback ⇄ Leave preview

| Filter by name... | Subscription == **all** | Resource group == **all** ⊗ | Location == **all** ⊗ | ⁺ᵧ Add filter |

Showing 1 to 2 of 2 records.

☐ Name ↑↓	Type ↑↓	Kind ↑↓	Resource group ↑↓	Location ↑↓
☐ 📊 storageaccount124342	Storage account	StorageV2	myRGStorage	East US

Task 2: Work with blob storage

In this task, we will create a Blob container and upload a blob file.

1. Click the name of the new storage account, scroll to the **Data storage** section in the left menu, and then click **Containers**.

2. Click **+ Container** and complete the information. Use the Information icons to learn more. When done click **Create**.

Setting	Value
Name	**container1**
Public access level	**Private (no anonymous access)**

| + Container | 🔒 Change access level | ↻ Refresh | 🗑 Delete |

🔍 Search containers by prefix

Name	Last modified	Public access level	Lease state
☐ container1	1/7/2020, 9:21:42 AM	Private	Available

3.

4. Open a new browser window and search **Bing** for an image of a flower. Right click on the image and save it to your VM.

5. Back in the Portal, click on **container1** , and then select **Upload**.

6. Browse for the image file you just saved on your local computer. Select it and then select upload.

7. Click the **Advanced** arrow, leave the default values but review the available options, and then click **Upload**.

Note: You can upload as many blobs as you like in this way. New blobs will be listed within the container.

8. Once the file is uploaded, right-click on the file and notice the options including View/edit, Download, Properties, and Delete.

9. If you have time review the options for Files, Tables, and Queues.

Task 3: Monitor the storage account

1. Return to the storage account blade and click **Diagnose and solve problems**.

2. Explore some of the most common storage problems. Notice there are multiple troubleshooters here.

3. On the storage account blade, scroll down to the **Monitoring** section and click **Insights**. Notice there is information on Failures, Performance, Availability, and Capacity. Your information will be different.

Insights
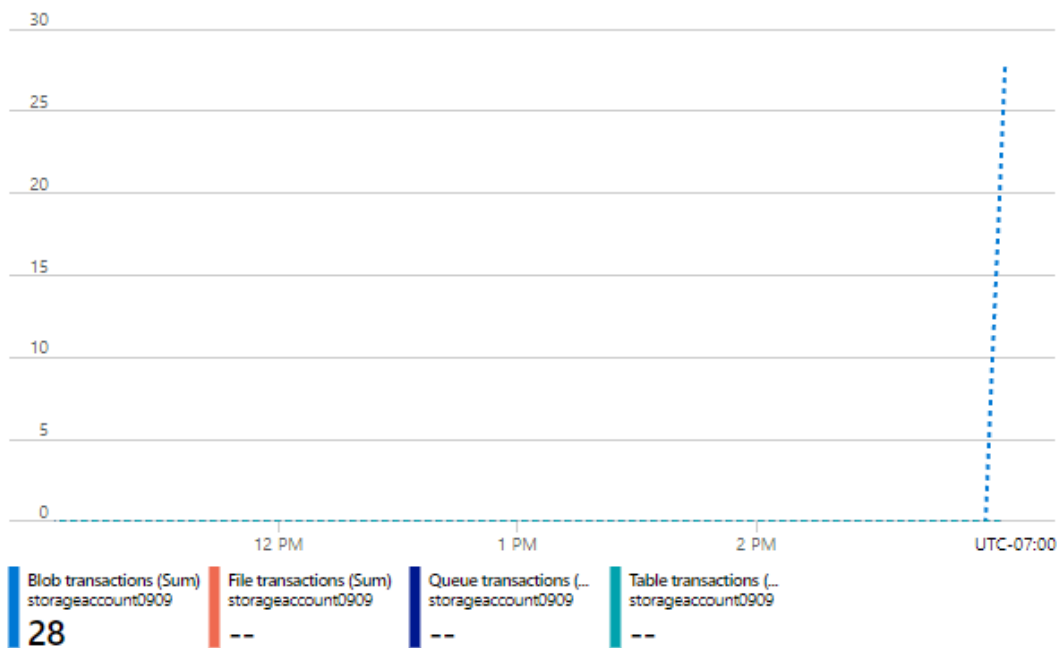
Congratulations! You have created a storage account, then worked with storage blobs.

Note: To avoid additional costs, you can optionally remove this resource group. Search for resource groups, click your resource group, and then click **Delete resource group**. Verify the name of the resource group and then click **Delete**. Monitor the **Notifications** to see how the delete is proceeding.

Congratulations!

Click **Next** to proceed to the **Review Questions**

06 - Create a SQL database (5 min)

In this walkthrough, we will create a SQL database in Azure and then query the data in that database.

Task 1: Create the database

In this task, we will create a SQL database based on the AdventureWorksLT sample database.

1. Sign in to the Azure Portal at https://portal.azure.com

2. From the **All services** blade, search for and select **SQL databases**, and then click **+ Add, + Create, + New**.

3. On the **Basics** tab, fill in this information.

Setting	Value
Subscription	**Use default supplied**
Resource group	**Create new resource group**
Database name	**db1**
Server	Select **Create new** (A new sidebar will open on the right)
Server name	**sqlserverxxxx** (must be unique)
Location	**(US) East US**

Setting	Value
Authentication method	**Use SQL authentication**
Server admin login	**sqluser**
Password	**Pa$$w0rd1234**
Click	**OK**

4.

5. On the **Networking** tab and configure the following settings (leave others with their defaults)

Setting	Value
Connectivity method	**Public endpoint**
Allow Azure services and resources to access this server	**Yes**
Add current client IP address	**No**

6.

7. On the **Security** tab.

Setting	Value
Microsoft Defender for SQL	**Not now**

8. Move to the **Additional settings** tab. We will be using the AdventureWorksLT sample database.

Setting	Value
Use existing data	**Sample**

Create SQL Database ···

Microsoft

| Basics | Networking | **Additional settings** | Tags | Review + create |

Customize additional configuration parameters including collation & sample data.

Data source

Start with a blank database, restore from a backup or select sample data to populate your new database.

Use existing data *   None   Backup   **Sample**

AdventureWorksLT will be created as the sample database.

Database collation

Database collation defines the rules that sort and compare data, and cannot be changed after database creation. The default database collation is SQL_Latin1_General_CP1_CI_AS. Learn more ↗

Collation ⓘ   SQL_Latin1_General_CP1_CI_AS

Azure Defender for SQL

Protect your data using Azure Defender for SQL, a unified security package including vulnerability assessment and advanced threat protection for your server. Learn more ↗

Get started with a 30 day free trial period, and then 19.2 CAD/server/month.

Enable Azure Defender for SQL * ⓘ   Start free trial   **Not now**

Review + create   < Previous   Next : Tags >

9.

10. Click **Review + create** and then click **Create** to deploy and provision the resource group, server, and database. It can take approx. 2 to 5 minutes to deploy.

Task 2: Test the database.

In this task, we will configure the SQL server and run a SQL query.

1. When the deployment has completed, click Go to resource from the deployment blade. Alternatively, from the **All Resources** blade, search and select **Databases**, then **SQL databases** ensure your new database was created. You may need to **Refresh** the page.

SQL databases
Microsoft

➕ Add **🕐 Reservations** **⊞⊞ Edit columns** **🔄 Refresh** | **🏷 Assign tags** **🗑 Delete**

1 items

☐ Name ↑↓	Status	Replication role	Server	Pricing tier	Location ↑↓	Subscription ↑↓
☐ 🗄 db1	Online	None	mysqlserverces	General Purpose: Gen5, 2 vCores	East US	**Visual Studio Enterprise**

2. Click the **db1** entry representing the SQL database you created. On the db1 blade click **Query editor (preview)**.

3. Login as **sqluser** with the password **Pa$$w0rd1234**.

4. You will not be able to login. Read the error closely and make note of the IP address that needs to be allowed through the firewall.

Welcome to SQL Database Query Editor

SQL server authentication

Login *

sqluser

Password *

•••••••••••• ✓

❌ Cannot open server 'sqlserverxxx1' requested by the login. Client with IP address ▮▮▮▮▮▮▮ is not allowed to access the server. To enable access, use the Windows Azure Management Portal or run sp_set_firewall_rule on the master database to create a firewall rule for this IP address or address range. It may take up to five minutes for this change to take effect.
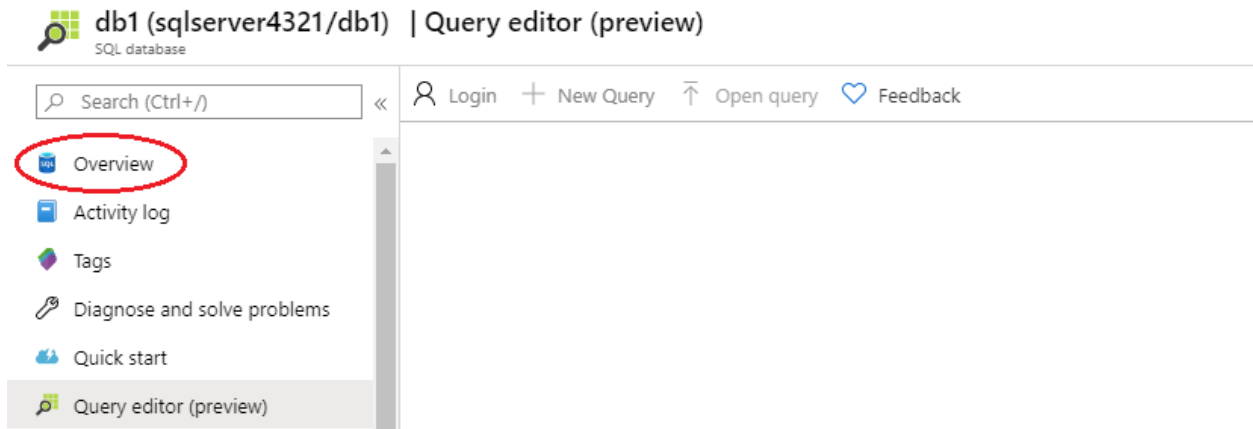
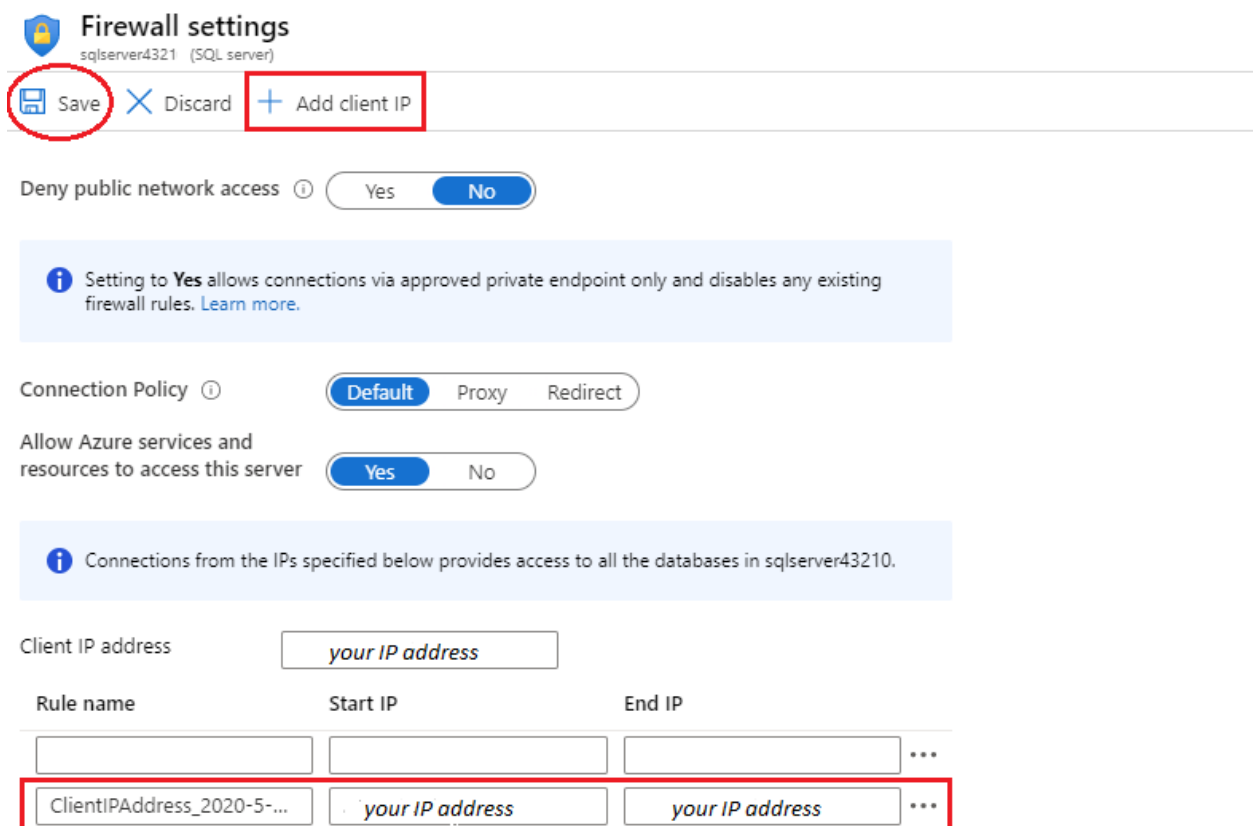Set server firewall (sqlserverxxx1)

OR

Active Directory authentication

Continue as ▮▮▮▮▮▮▮▮▮▮

5. Back on the **db1** blade, click **Overview**.

db1 (sqlserver4321/db1) | Query editor (preview)
SQL database

🔍 Search (Ctrl+/)   «   👤 Login   + New Query   ⬆ Open query   ♡ Feedback

- **Overview**
- Activity log
- Tags
- Diagnose and solve problems
- Quick start
- Query editor (preview)

6. From the db1 **Overview** blade, click **Set server firewall** Located on the top center of the overview screen.

7. Click **+ Add client IP** (top menu bar) to add the IP address referenced in the error. (it may have autofilled for you - if not paste it into the IP address fields). Be sure to **Save** your changes.

🛡 **Firewall settings**
sqlserver4321 (SQL server)

💾 Save   ✕ Discard   + Add client IP

Deny public network access ⓘ   (Yes   **No**)

ℹ Setting to **Yes** allows connections via approved private endpoint only and disables any existing firewall rules. Learn more.

Connection Policy ⓘ   (**Default**   Proxy   Redirect)

Allow Azure services and resources to access this server   (**Yes**   No)

ℹ Connections from the IPs specified below provides access to all the databases in sqlserver43210.

Client IP address | your IP address |

Rule name	Start IP	End IP	
			...
ClientIPAddress_2020-5-...	your IP address	your IP address	...

8. Return to your SQL database (slide the bottom toggle bar to the left) and click on **Query Editor (Preview)**. Try to login again as **sqluser** with the

password **Pa$$w0rd1234**. This time you should succeed. Note that it may take a couple of minutes for the new firewall rule to be deployed.

9.   Once you log in successfully, the query pane appears. Enter the following query into the editor pane.
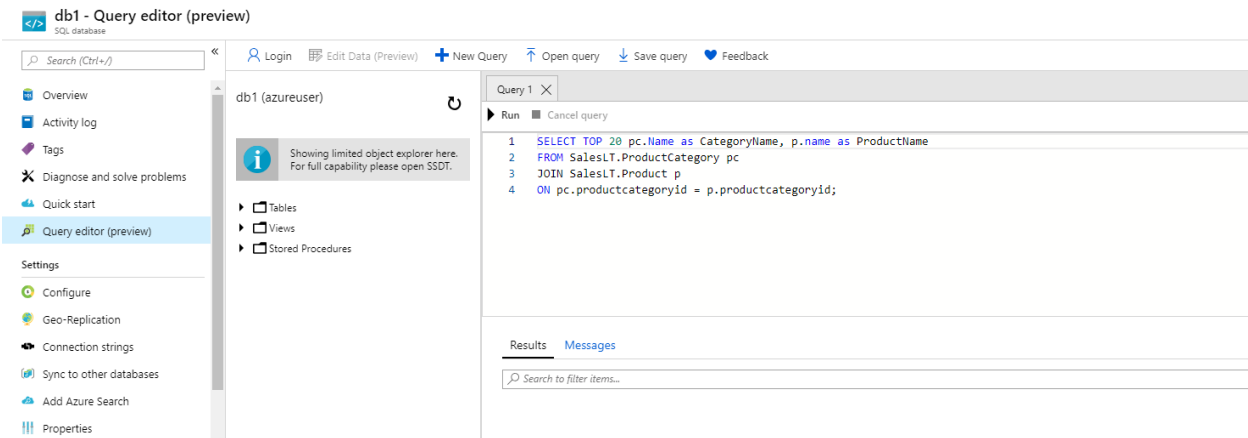
SQL

SELECT TOP 20 pc.Name as CategoryName, p.name as ProductName

FROM SalesLT.ProductCategory pc

JOIN SalesLT.Product p

ON pc.productcategoryid = p.productcategoryid;

10. Click **Run**, and then review the query results in the **Results** pane. The query should run successfully.

Congratulations! You have created a SQL database in Azure and successfully queried the data in that database.

Note: To avoid additional costs, you can optionally remove this resource group. Search for resource groups, click your resource group, and then click **Delete resource group**. Verify the name of the resource group and then click **Delete**. Monitor the **Notifications** to see how the delete is proceeding.

Congratulations!

Click **Next** to proceed to the **Review Questions**

Click **here** to return to the **Table of Contents**.

10 - Create a VM with PowerShell (10 min)

In this walk-through, we will configure the Cloud Shell, use Azure PowerShell module to create a resource group and virtual machine, and review Azure Advisor recommendations.

Task 1: Configure the Cloud Shell

In this task, we will configure Cloud Shell.

1. Sign in to the Azure Portal at https://portal.azure.com **

2. From the Azure portal, open the **Azure Cloud Shell** by clicking on the icon in the top right of the Azure Portal.

3. When prompted to select either **Bash** or **PowerShell**, select **PowerShell**.

4. On the **You have no storage mounted** screen select **Show advanced settings** then fill in the information below

Settings	Values
Resource Group	**Create new resource group**
Storage account (Create a new account a use a globally unique name (ex: cloudshellstoragemystorage))	**cloudshellxxxxxxx**
File share (create new)	**shellstorage**

5. Select **Create Storage**

Task 2: Create a resource group and virtual machine

In this task, we will use PowerShell to create a resource group and a virtual machine.

1. Ensure **PowerShell** is selected in the upper-left drop-down menu of the Cloud Shell pane.

2. Verify your new resource group by running the following command in the Powershell window. Press **Enter** to run the command.

PowerShell

Get-AzResourceGroup | Format-Table

3. Create a virtual machine by pasting the following command into the terminal window.

PowerShell

New-AzVm `

-ResourceGroupName "myRGPS" `

-Name "myVMPS" `

-Location "East US" `

-VirtualNetworkName "myVnetPS" `

-SubnetName "mySubnetPS" `

-SecurityGroupName "myNSGPS" `

-PublicIpAddressName "myPublicIpPS" `

-SecurityType "Standard"

4. When prompted provide the username (**azureuser**) and the password (**Pa$$w0rd1234**) that will be configured as the local Administrator account on that virtual machines.azureadmin

5. Once VM is created, close the PowerShell session Cloud Shell pane.

6. In the Azure portal, search for **Virtual machines** and verify the **myVMPS** is running. This may take a few minutes.

Virtual machines
Microsoft

+ Add	⏱ Reservations	☰☰ Edit columns	↻ Refresh		⬤ Assign tags	▶ Start	↻ Restart	■ Stop	🗑 Delete

	Name ↑↓	Type ↑↓	Private IP address	Resource group ↑↓	Location ↑↓	Status
☐	🖥 myVMPS	Virtual machine	192.1	myRGPS	East US	Running

7. Access the new virtual machine and review the Overview and Networking settings to verify your information was correctly deployed.

Task 3: Execute commands in the Cloud Shell

In this task, we will practice executing PowerShell commands from the Cloud Shell.

1. From the Azure portal, open the **Azure Cloud Shell** by clicking on the icon in the top right of the Azure Portal.

2. Ensure **PowerShell** is selected in the upper-left drop-down menu of the Cloud Shell pane.

3. Retrieve information about your virtual machine including name, resource group, location, and status. Notice the PowerState is **running**.

PowerShell

Get-AzVM -name myVMPS -status | Format-Table -autosize

4. Stop the virtual machine using the following command.

PowerShell

Stop-AzVM -ResourceGroupName myRGPS -Name myVMPS

5. When prompted confirm (Yes) to the action. Wait for **Succeeded** status.

6. Verify your virtual machine state. The PowerState should now be **deallocated**. You can also verify the virtual machine status in the portal. Close Cloudshell.

PowerShell

Get-AzVM -name myVMPS -status | Format-Table -autosize

Task 4: Review Azure Advisor Recommendations

Note: This same task is in the Create a VM with Azure CLI lab.

In this task, we will review Azure Advisor recommendations for our virtual machine.

1. From the **All services** blade, search for and select **Advisor**.

2. On the **Advisor** blade, select **Overview**. Notice recommendations are grouped by Reliability, Security, Performance, and Cost.
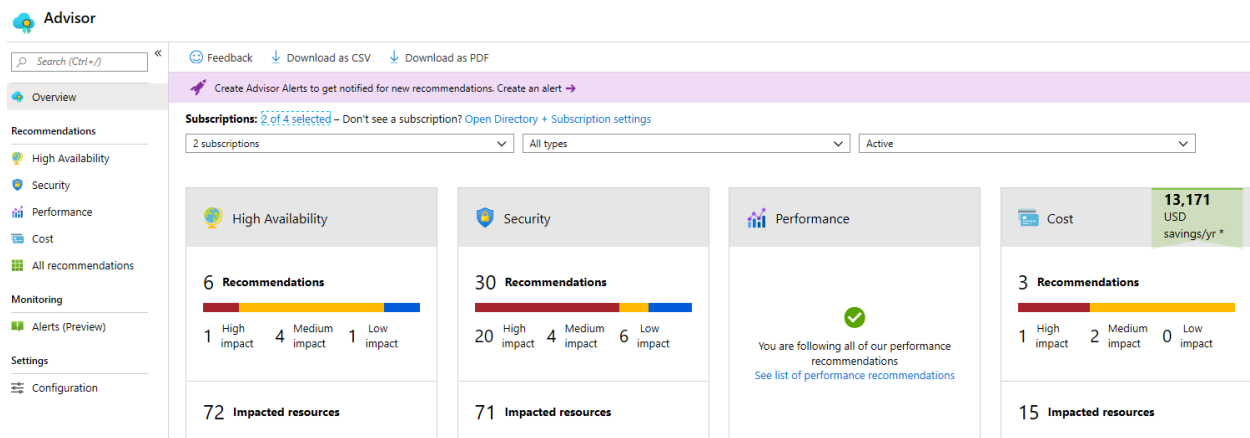
3. Select **All recommendations** and take time to view each recommendation and suggested actions.

Note: Depending on your resources, your recommendations will be different.
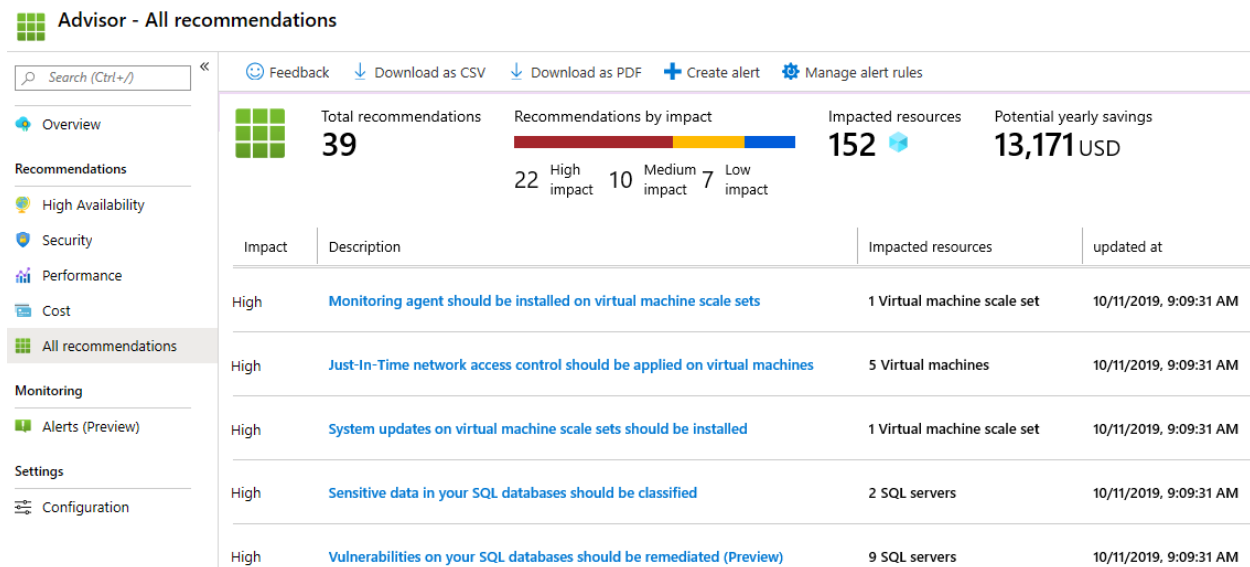
4. Notice that you can download the recommendations as a CSV or PDF file.

5. Notice that you can create alerts.

6. If you have time, continue to experiment with Azure PowerShell.

Congratulations! You have configured Cloud Shell, created a virtual machine using PowerShell, practiced with PowerShell commands, and viewed Advisor recommendations.

Note: To avoid additional costs, you can optionally remove this resource group. Search for resource groups, click your resource group, and then click **Delete resource group**. Verify the name of the resource group and then click **Delete**. Monitor the **Notifications** to see how the delete is proceeding.

Congratulations!

Click **Next** to proceed to the **Review Questions**

Click **here** to return to the **Table of Contents**.

14 - Manage access with RBAC (5 min)

In this walkthrough, we will assign permission roles to resources and view logs.
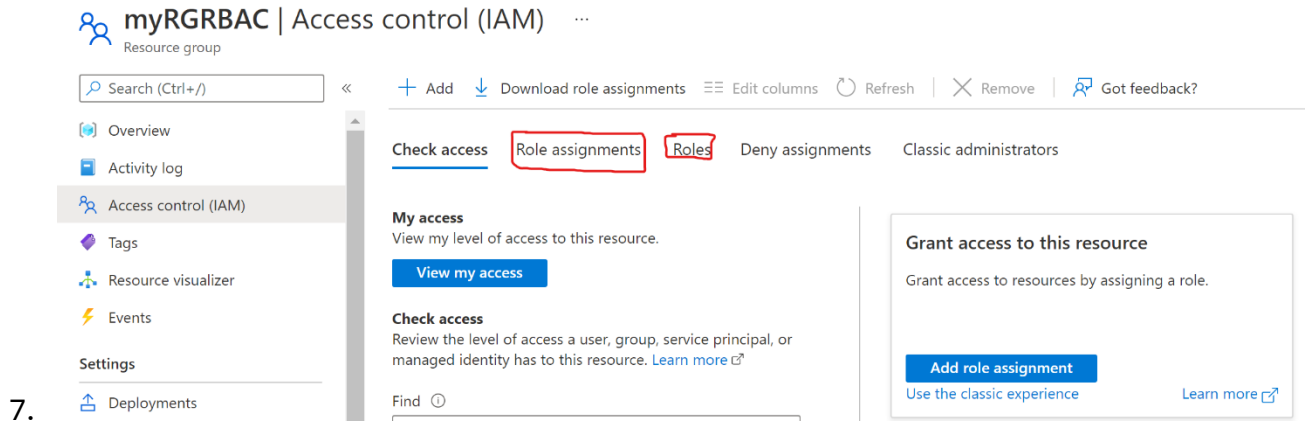
Task 1: View and assign roles

In this task, we will assign the Virtual machine contributor role.
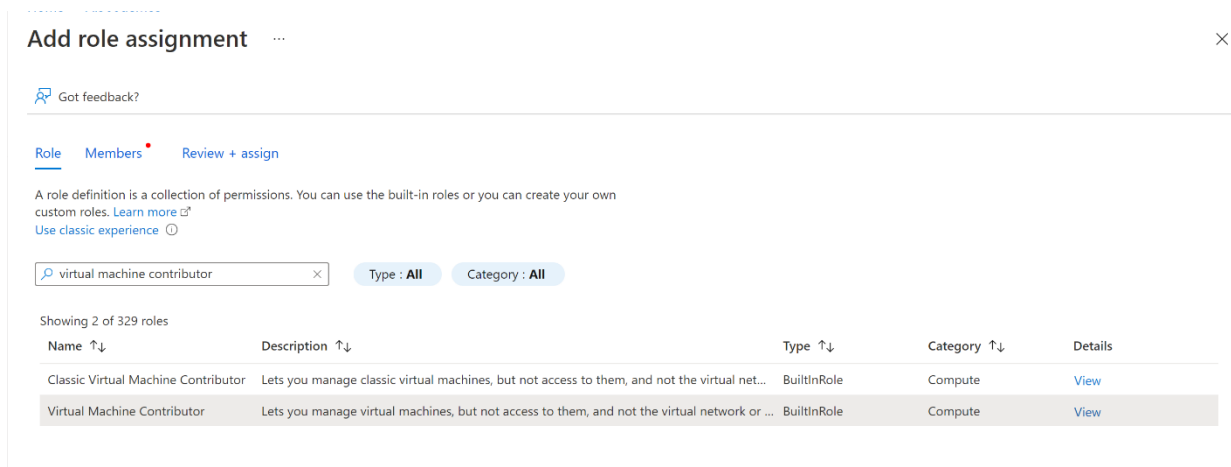
1. Sign in to the Azure Portal at https://portal.azure.com

2. From the **All services** blade, search for and select **Resource groups**, then click **+Add +New +Create**.

3. Create a new resource group. Click **Create** when you are finished.

Setting	Value
Subscription	**Use default provided**
Resource group	**myRGRBAC**
Region	**(US) East US**

4. Create **Review + create** and then click **Create**.

5. **Refresh** the resource group page and click the entry representing the newly created resource group.

6. Click on the **Access control (IAM)** blade, and then switch to the **Roles** tab. Scroll through the large number of roles definitions that are available. Use the Informational icons to get an idea of each role's permissions. Notice there is also information on the number of users and groups that are assigned to each role.

7.

8. Switch to the **Role assignments** tab of the **myRGRBAC - Access control (IAM)** blade, click **+ Add** and then click **Add role assignment**. Search for the Virtual Machine Contributor role and select. Switch to the "Members" tab and Assign access to: User, group, or service principal. Then click + Select members and type in your name to the popup search function and hit 'select.' Then hit 'Review and Assign'

Note: The Virtual machine contributor role lets you manage virtual machines, but not access their operating system or manage the virtual network and storage account they are connected to.

9. **Refresh** the Role assignments page and ensure you are now listed as a Virtual machine contributor.

Note: This assignment does not actually grant you any additional provileges, since your account has already the Owner role, which includes all privilges associated with the Contributor role.

Task 2: Monitor role assignments and remove a role

In this task, we will view the activity log to verify the role assignment, and then remove the role.

1. On the myRGRBAC resource group blade, click **Activity log**.

2. Click **Add filter**, select **Operation**, and then **Create role assignment**.

Activity log

▦ Edit columns	↻ Refresh	⬆ Export to Event Hub	↓ Download as CSV	🐘 Logs	⚲ Pin current filters	⊽ Reset filters	

🔍 Search ╳   💡 Quick Insights

Management Group : **None**   Event severity : All   Operation ⌄ : 0 selected ⌃ ⊗   +⊽ Add Filter

create role

☐ Create role assignment (Microsoft.Authorization/roleAssignments/write)
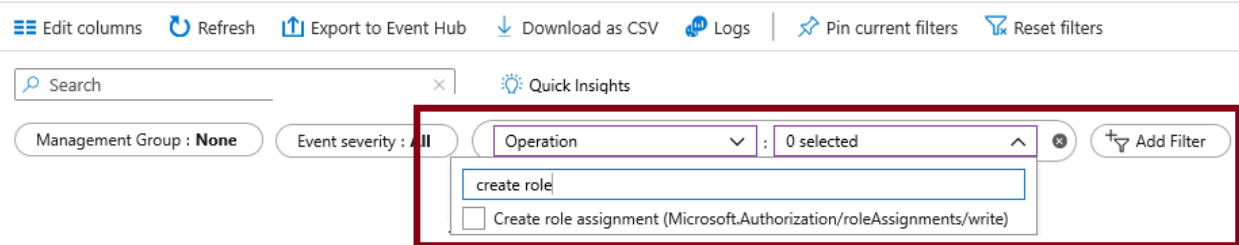
3. Verify the Activity log shows your role assignment.

Note: Can you figure out how to remove your role assignment?

Congratulations! You created a resource group, assigned an access role to it and viewed activity logs.

Note: To avoid additional costs, you can optionally remove this resource group. Search for resource groups, click your resource group, and then click **Delete resource group**. Verify the name of the resource group and then click **Delete**. Monitor the **Notifications** to see how the delete is proceeding.

Congratulations!

Click **Next** to proceed to the **Review Questions**

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19 - Use the Pricing Calculator (10 min)

In this walkthrough, we will use the Azure Pricing Calculator to generate a cost estimate for an Azure virtual machine and related network resources.

Task 1: Configure the pricing calculator

In this task, we will estimate cost of a sample infrastructure by using the Azure Pricing Calculator.

Note: To create an Azure Pricing Calculator estimate, this walkthrough provides example configurations for the VM and related resources. Use this example configurations or provide the Azure Pricing Calculator with details of your *actual* resource requirements instead.

1. In a browser, navigate to the [Azure Pricing Calculator](#) webpage.

2. To add details of your VM configuration, click **Virtual Machines** on the **Products** tab. Scroll down to view the virtual machine details.

3. Replace **Your Estimate** and **Virtual Machines** text with more descriptive names for your Azure Pricing Calculator estimate and your VM configuration. This walkthrough example uses **My Pricing Calculator Estimate** for the estimate, and **Windows VM** for the VM configuration.
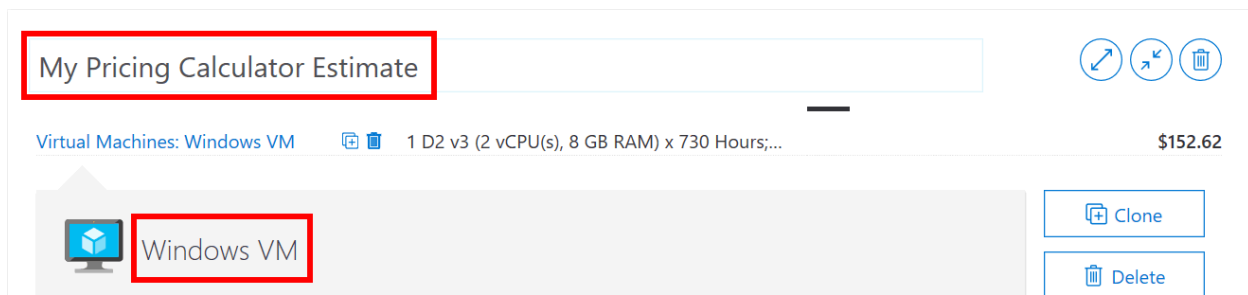
4. Modify the default VM configuration.
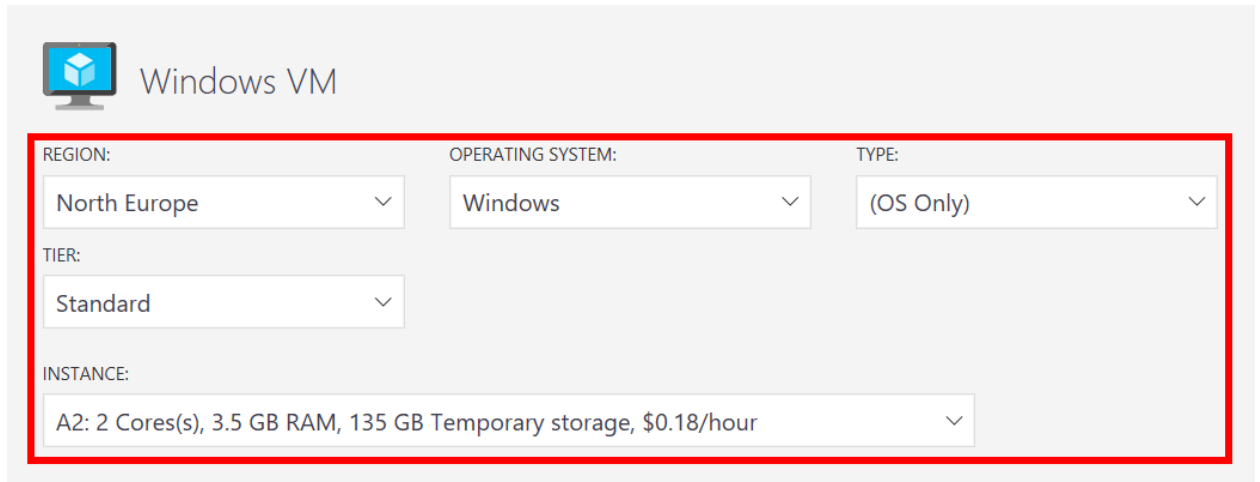
Settings	Value
Region	**North Europe**
Operating System	**Windows**
Type	**(OS only)**
Tier	**Standard**

Settings	Value
Instance	**A2: 2 Core(s), 3.5 GB RAM, 135 GB Temporary storage**

5.

6. **Note**: The VM instance specifications and pricing may differ from those in this example. Follow this walkthrough by choosing an instance that matches the example as closely as possible. To view details about the different VM product options, choose **Product details** from the **More info** menu on the right.

7. Set the **Billing Option** to **Pay as you go**.

8. In Azure, a month is defined as 730 hours. If your VM needs to be available 100 percent of the time each month, you set the hours-per-month value to 730. This

walkthrough example requires one VM to be available 50 percent of the time each month.

Leave the number of VMs set at 1, and change the hours-per-month value to 365.

Billing Option

1 year reserved option is not available for your instance selection.

3 year reserved option is not available for your instance selection.

◉ Pay as you go

○ 1 year reserved

○ 3 year reserved

Save up to 40% with Windows Server Licenses you already own. Learn more about Azure Hybrid Benefit to save compute costs.

1	×	365		=	**$65.70**
Virtual machines		Hours			Per month

9. In the **Managed OS Disks** pane, modify the default VM storage configuration.

Tier	Disk size	Number of disks	Snapshot	Storage transactions
Standard HDD	S30: 1024 GiB	1	Off	10,000

10.

11. To add networking bandwidth to your estimate, go to the top of the Azure Pricing Calculator webpage. Click **Networking** in the product menu on the left, then click the **Bandwidth** tile. In the **Bandwidth added** message dialog, click **View**.

12. Add a name for your VM bandwidth configuration. This walkthrough example uses the name **Bandwidth: Windows VM**. Modify the default bandwidth configuration by adding the following details.

Region	Zone 1 Outbound Data Transfer Amount
North Europe	50 GB

13.

14. To add an Application Gateway, return to the top of the Azure Pricing Calculator webpage. In the **Networking** product menu, click the **Application Gateway** tile. In the **Application Gateway** message dialog, click **View**.

15. Add a name for your Application Gateway configuration. This walkthrough uses the name **App Gateway: Windows VM**. Modify the default Application Gateway configuration by adding the following details.

Settings	Value
Region	**North Europe**
Tier	**Basic**
Size	**Small**
Instances	**1**
Hours	**365**
Data processed	**50 GB**
Zone 1: North America, Europe	**50 GB**

16.

Task 2: Review the pricing estimate

In this task, we will review the results of the Azure Pricing Calculator.

1. Scroll to the bottom of the Azure Pricing Calculator webpage to view total **Estimated monthly cost**.

Note: Explore the various options available within the Azure Pricing Calculator. For example, this walkthrough requires you to update the currency to Euro.

2. Change the currency to Euro, then select **Export** to download a copy of the estimate for offline viewing in Microsoft Excel (.xlsx) format.

Service type	Custom name	Region	Description	Estimated Cost
Virtual Machines	Windows VM	North Europe	1 A2 (2 vCPU(s), 3.5 GB RAM) x 365 Hours; Windows – (OS Only); P	€94.16
Bandwidth	Bandwidth: Windows VM	North Europe	Zone 1: North America, Europe, 50 GB	€3.30
Application Gateway	App Gateway: Windows VM	North Europe	Basic tier, Small Instance size: 1 Gateway hours instance(s) x 365 H	€12.26
Support			Support	€0.00
			Licensing Program	Microsoft Online S
			Monthly Total	€109.72
			Annual Total	€1,316.66

Disclaimer

All prices shown are in Euro (€). This is a summary estimate, not a quote. For up to date pricing information please visit
This estimate was created at 3/30/2019 10:01:38 PM UTC.

Congratulations! You downloaded an estimate from the Azure Pricing Calculator.

Congratulations!

Click **Next** to proceed to the **Review Questions**

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20 - Use the Azure TCO Calculator (10 min)

In this walkthrough, you will use the Total Cost of Ownership (TCO) Calculator to generate cost comparison report for an on-premises environment.

Note: This walkthrough provides example definitions of on-premises infrastructure and workloads for a typical datacenter. To create a TCO Calculator report, use the example definitions or provide details of your *actual* on-premises infrastructure and workloads.

Task 1: Configure the TCO calculator

In this task, we will add infrastructure information to the calculator.

1. In a browser, navigate to the [Total Cost of Ownership (TCO) Calculator](#) page.

2. To add details of your on-premises server infrastructure, click **+ Add server workload** in the **Define your workloads** pane.

Settings	Value
Name	**Servers: Windows VMs**
Workload	**Windows/Linux server**
Environment	**Virtual Machines**
Operating system	**Windows**
VMs	**50**
Virtualization	**Hyper-V**
Core(s)	**8**
RAM (GB)	**16**
Optimize by	**CPU**
Windows Server 2008/2008 R2	**Off**

3. Select **+ Add server workload** to make a row for a new server workloads definition.

Settings	Value
Name	**Servers: Linux VMs**

Settings	Value
Workload	**Windows/Linux server**
Environment	**Virtual Machines**
Operating system	**Linux**
VMs	**50**
Virtualization	**VMware**
Core(s)	**8**
RAM (GB)	**16**
Optimize by	**CPU**
Windows Server 2008/2008 R2	**Off**

4. In the **Storage** pane, click **Add storage**.

Settings	Value
Name	**Server Storage**
Storage type	**Local Disk/SAN**
Disk type	**HDD**

Settings	Value
Capacity	**60 TB**
Backup	**120 TB**
Archive	**0 TB**

5. In the **Networking** pane, add bandwidth.

Settings	Value
Outbound bandwidth	15 TB

6. Click **Next**.

7. Explore the options and make any adjustments that you require.

Settings	Value
Currency	**Euro**

8. Click **Next**.

Task 2: Review the results and save a copy

In this task, we will review cost saving recommendations and download a report.

1. Review the Azure cost saving recommendations and visualizations.

Settings	Value
Timeframe	**3 years**
Region	**North Europe**

2. To modify the information you provided, go to the bottom of the page, and click **Back**.

3. To save or print a PDF copy of the report, click **Download**.

Congratulations! You have used the TCO Calculator to generate a cost comparison report for an on-premises environment.

Congratulations!

Click **Next** to proceed to the **Review Questions**