CONTOSO

Report: Moving to Azure

STEP 0: Problem Background

Contoso is an online cloth merchandise company specializing in selling activewear. They have a rented space in a local data center. They have one system administrator who makes sure all servers are working properly 24x7. Their hardware is getting old and they must decide on whether they need to spend $22,000 for new hardware or move their business to the Azure cloud services. The following list represents their current on-premises infrastructure:

Server 1:	**Purpose:** WordPress web server **CPU:** 8 Cores and 60% average utilization **RAM:** 16 GB and 87% average utilization **HDD OS:** 500 GB capacity with 57 GB used **Web URL:** Contoso.com **IP # Public:** 200.200.100.50 **IP #:** 10.10.1.11 **Firewall:** Inbound TCP 2222-2224, 80, 443 **Usage:** This is Contoso's only web server. It runs WordPress and eCommerce services. Their on-line store is always open, and they receive orders 24x7 This server uses ports 80 and 443 for HTTP and HTTPS traffic

Server 2 & 3:	**Purpose:** Microsoft SQL 2019 **CPU:** 8 Cores and 30% average utilization x2 **RAM:** 16 GB and 87% average utilization x2 **HDD OS:** 500 GB capacity with 240 GB used x2 **HDD Data:** 2 TB SAN (Storage Area Network drive) **IP #:** 10.10.1.12 and 10.10.1.13 **SQL Cluster:** SQLCluster.Contoso.Com **IP #:** 10.10.1.14 **Firewall:** Inbound TCP 2222-2224, 1433 **Usage:** These two servers are running Microsoft SQL cluster services. SQL Always-On service is fully configured as Active-Passive nodes. The 2 servers use an external attached SAN drive for all data storage such as product descriptions, transaction logs, and clients lists. Annual data growth is negligible. These servers use the standard SQL inbound TCP port 1433
Server 4:	**Purpose:** ABC Backup and Restore server **CPU:** 8 Cores and 30% average utilization **RAM:** 16 GB and 87% average utilization **HDD OS:** 500 GB capacity with 164 GB used **HDD Backup:** 40 TB **IP #:** 10.10.1.15 **Firewall:** Inbound TCP 2222 **Usage:** The ABS backup software runs daily at 8pm. It stores the last 18 months of all the SQL data drive contents onto a local D: drive (HDD Backup) with 40 TB capacity.

Server 5:	**Purpose:** XYZ Antivirus server **CPU:** 8 Cores and 30% average utilization **RAM:** 16 GB and 87% average utilization **HDD:** 500 GB capacity with 43 GB used **IP #:** 10.10.1.16 **Firewall:** Inbound TCP 2222-2224 This server uses ports TCP 2222-2224 for the antivirus client **Usage:** The XYZ anti-virus services are essential for the security of Contoso's operations security. The server is always on and constantly running. It monitors all Contoso's servers and mitigates against viruses and hack attacks. Data grown is negligible.

STEP 1: Assessing the On-Premises Environment

Purpose: To identify the Azure services needed to ensure Contoso's business continuity in the cloud.

Current Environment Make a list of all current on-premises servers and services.	Server 1: **Purpose:** WordPress web server **CPU:** 8 Cores and 60% average utilization **RAM:** 16 GB and 87% average utilization **HDD OS:** 500 GB capacity with 57 GB used **Web URL:** Contoso.com **IP # Public:** 200.200.100.50 **IP #:** 10.10.1.11 **Firewall:** Inbound TCP 2222-2224, 80, 443 **Usage:** This is Contoso's only web server. It runs WordPress and eCommerce services. Their on-line store is always open, and they receive orders 24x7 This server uses ports 80 and 443 for HTTP and HTTPS traffic Server 2&3: **Purpose:** Microsoft SQL 2019

CPU: 8 Cores and 30% average utilization x2

RAM: 16 GB and 87% average utilization x2

HDD OS: 500 GB capacity with 240 GB used x2

HDD Data: 2 TB SAN (Storage Area Network drive)

IP #: 10.10.1.12 and 10.10.1.13

SQL Cluster: SQLCluster.Contoso.Com

IP #: 10.10.1.14

Firewall: Inbound TCP 2222-2224, 1433

Usage: These two servers are running Microsoft SQL cluster services. SQL Always-On service is fully configured as Active-Passive nodes. The 2 servers use an external attached SAN drive for all data storage such as product descriptions, transaction logs, and clients lists. Annual data growth is negligible.

These servers use the standard SQL inbound TCP port 1433

Server 4:
Purpose: ABC Backup and Restore server

CPU: 8 Cores and 30% average utilization

RAM: 16 GB and 87% average utilization

HDD OS: 500 GB capacity with 164 GB used

HDD Backup: 40 TB

IP #: 10.10.1.15

Firewall: Inbound TCP 2222

Usage: The ABS backup software runs daily at 8pm. It stores the last 18 months of all the SQL data drive contents onto a local D: drive (HDD Backup) with 40 TB capacity.

Server 5:
Purpose: XYZ Antivirus server

CPU: 8 Cores and 30% average utilization

RAM: 16 GB and 87% average utilization

HDD: 500 GB capacity with 43 GB used

IP #: 10.10.1.16

	Firewall: Inbound TCP 2222-2224 This server uses ports TCP 2222-2224 for the antivirus client **Usage:** The XYZ anti-virus services are essential for the security of Contoso's operations security. The server is always on and constantly running. It monitors all Contoso's servers and mitigates against viruses and hack attacks. Data grown is negligible.
Matching Azure Services Match the list of on-premises servers and services to the corresponding Azure ones.	**Server 1:** we will create web server with the following capabilities: Purpose: WebServer Size: DS3_V2 Firewall: 80, 443, 22 Usage: It runs WordPress and eCommerce services. Their on-line store is always open, and they receive orders 24x7 ports: 80, 443 **Server 2&3:** we will create just one SQL server with the following capabilities: purpose: SQL server Usage: it will run Microsoft SQL cluster services. ports: 1433 **Server 4:** We will create a web server with the following capabilities: Purpose: Backup and Restore Server Size: DS3_V2 Firewall: 80, 443, 22 Purpose: Backup and Restore Usage: It stores the last 18 months of all the SQL data drive contents **Sever 5:** we will create web server with the following capabilities: Purpose: Antivirus Server Size: DS3_V2 Firewall: 80, 443, 22

	Usage: It will monitor all Contoso's servers and mitigates against viruses and hack attacks. ports: 80, 443
Discussion Question #1 A - How can you verify the running programs and services on each of your on-premises servers? List the steps taken to identify the services running for each server. B - List your migration plans.	A- we can verify the running programs and services on each of on-premises servers through the following steps: 1- control panel 2- programs 3- programs and features B- ● For the migration plan we will start with the assessment stage using the azure migrate utility where we will be able to discover the resources which are within the on-premises environment and determine what can be migrated. And it can be done through the following steps: 1- select azure migrate tool. 2- under migration tool select servers. 3- select discover option 4- select yes with hyper v 5- give a name for the appliance "contosogroup1" 6- click download 7- unzip the file 8- through the hyper v manager, utilize azure migrate appliance 9- after communication and assessment completion, select assess under server assessment 10- select word press web server to be assessed. (kindly note that the same process will be executed for server 2&3 at once, and for server 4 in a separate step) 11- then we will get a report through the completed assessments which determine if the server is ready to be migrated or not or ready with conditions. For the actual migration 1- under migration tools select discover then hyper v 2- download ASR and run it 3- replicate the devices 4- test the azure environment 5- then migrate ● we have to make sure to involve the key stakeholders and then we will follow the following steps: 1- list the on-premises resources 2- assess the resources that will be migrated 3- set a timeline for migration and but an additional timeline for unexpected events 4- we can utilize ASR instead of having the resources created in azure before migration as follows ● Prepare source and target environment

	• Start replication process • Test to make sure it works • Failover from source servers to azure 5- utilize azure data migration service 6- start small with only the 4 servers 7- do not decommission to soon
Discussion Question #2 On your on-premises servers: A - How can you find the listing of all windows firewall port exceptions? B - Do these firewall port exceptions have to match the NSG firewall exceptions? Please explain.	A- we can find the listing of all windows firewall port exceptions through the following steps: 1- control panel 2- system and security 3- windows defender firewall 4- allowed apps B- yes all the firewall port exceptions have to match the NSG firewall exceptions as it allows access from all networks by default.
Optional Discussion Looking at the new Azure server farm, what will you change and why?	At the new azure server farm I will terminate server 3 (the second SQL server) as servers on the cloud are secured by Microsoft.

STEP 2: Cost Estimates

Purpose: To provide the CIO with a monthly cost estimate after the migration to Azure.

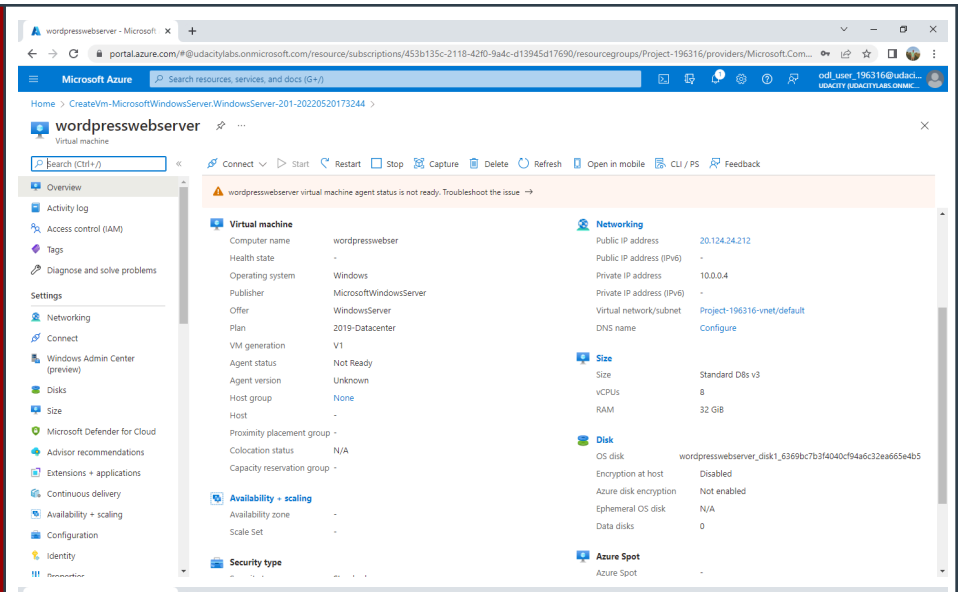
Use Azure Pricing Calculator to provide the CIO with a monthly cost estimate, including:

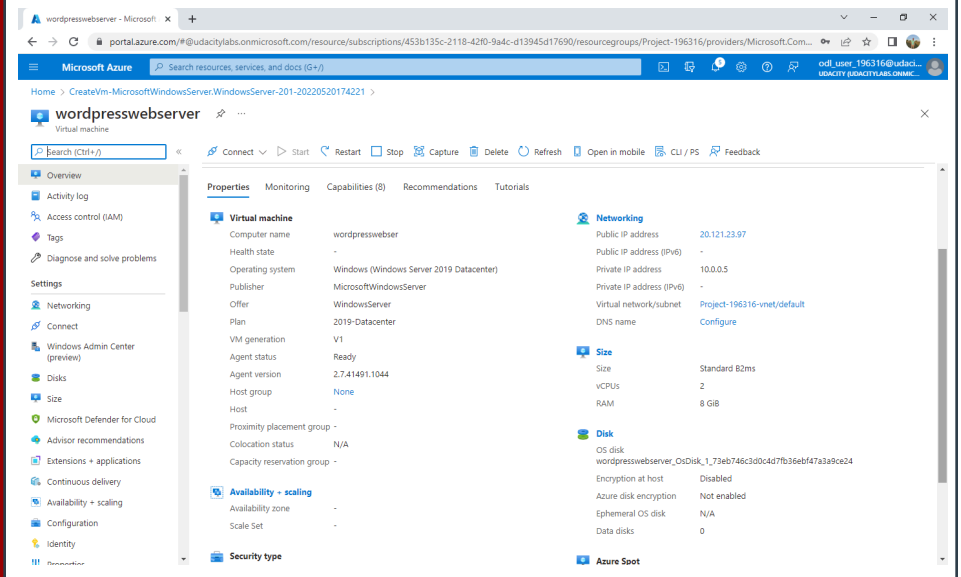
- The number of VMs needed
- The RAM and CPU needed for each VM
- The amount of storage needed
- Any Azure services such as anti-virus, back-up, database, etc.
- Build a list/table that includes VM type (you may use the template below or create your own)

Build / fill out the table providing your current server farm and its corresponding Azure farm. List the potential Azure replacement for each of the on-premises servers, the VM type and monthly cost. Assume your company has Hybrid benefits and are willing to commit to 3-year agreements. Use the East US Azure zone. Show the cost of all servers with a three year commitment after applying Azure Reservations cost reduction. Compare the VMs prices with and without Azure Reservations.

Server Name	CPU Cores	RAM/HD	VM Type	Monthly Cost	Monthly cost for one year reservation
Server 1 WPwebserver	16	64GB	Web server	248.19usd	388.05usd
Server 2 SQLserver	16	64GB	SQL server	248.19usd	388.05usd
Server 3 Backup and Restore server	16	64GB	Web server	248.19usd	388.05usd
Server 4 Antivirus server	16	64GB	Web server	248.19usd	388.05usd

Discussion Question #1 Will these 4 Azure servers provide HA/DR for Contoso? Will their site be available 24x7, 365 days?	System has no high availability as there is a single point of failure. There is only one server for each task in the current setup which creates a single point of failure. For example if we need to update the wordpress server, the site will be down, and Azure policies provide SLA that's guarantees that the server will be available 99.99% of the time, but it has nothing to do with the software updates which need to be done from time to time.
Discussion Question #2 Can you change the VM type (upgrade or downgrade the configurations based on needs)? Try to downgrade one of the Azure VMs to B2ms. Also, please provide a screenshot of the VM Overview settings, including VM name and size.	Sure we can upgrade or downgrade the configuration based on needs.





Optional Discussion

Is Contoso better off with a SQL Managed Instance? Check Azure Pricing.

Sure it's better as it is just paying for what it utilizes.
250GB usable storage volume … the cost is 25.76usd per month

STEP 3 (OPTIONAL): Creating a VPN

Purpose: Build and set up a point-to-point (site to site) VPN connection between Contoso's on-premises and Contoso's Azure environments.

Note:*This step is entirely optional, and may take a considerable amount of time to implement. Therefore, it is suggested that you only attempt this step on your own after having satisfactorily completed all other project steps. You may find [this site] helpful in completing this optional step.*

STEP 4: An Additional Server

Purpose: Use Azure Resource Manager (ARM) to deploy one additional WordPress web server. This additional web server should provide web services redundancy and improve the web site's response time.

Create a replica of the WordPress server configuration.

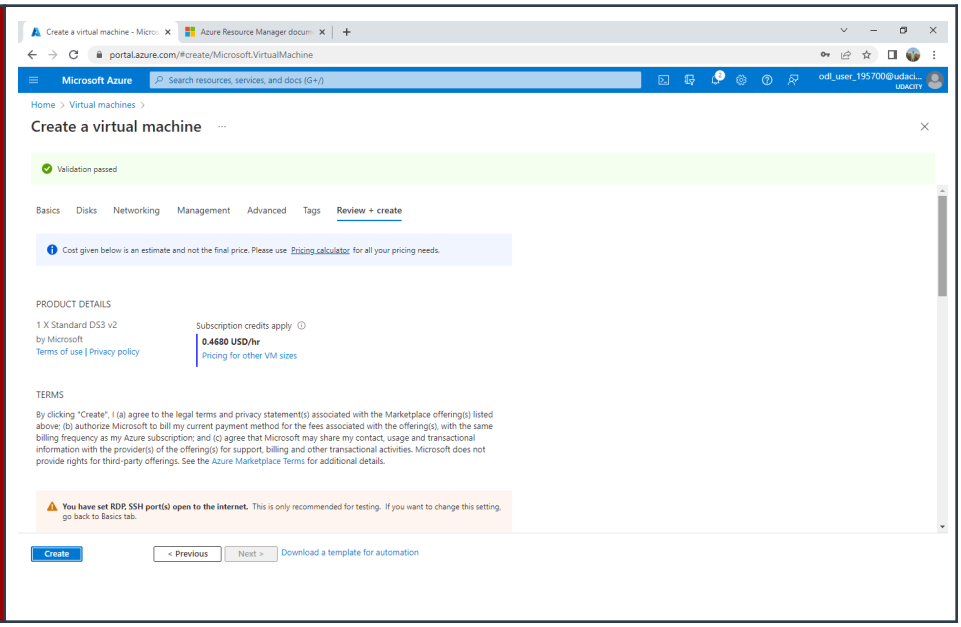
The process is summarized as:

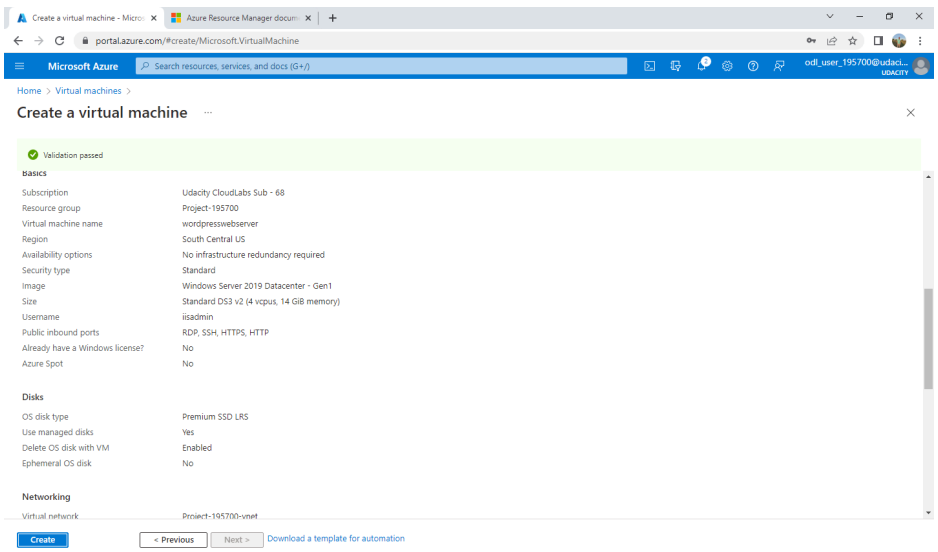
- The current WP server settings were saved as a template during the creation process. If not, you will need to add it to your Template store.
- Deploy a new VM from a template. In the Azure portal search for TEMPLATES and run that service.
- The WP server template should be listed there. Select it.
- Make sure you load and edit the parameters file and change the values for the new VM as needed. Values such as Name, Password, etc. should be unique. Use the Azure Template Services.

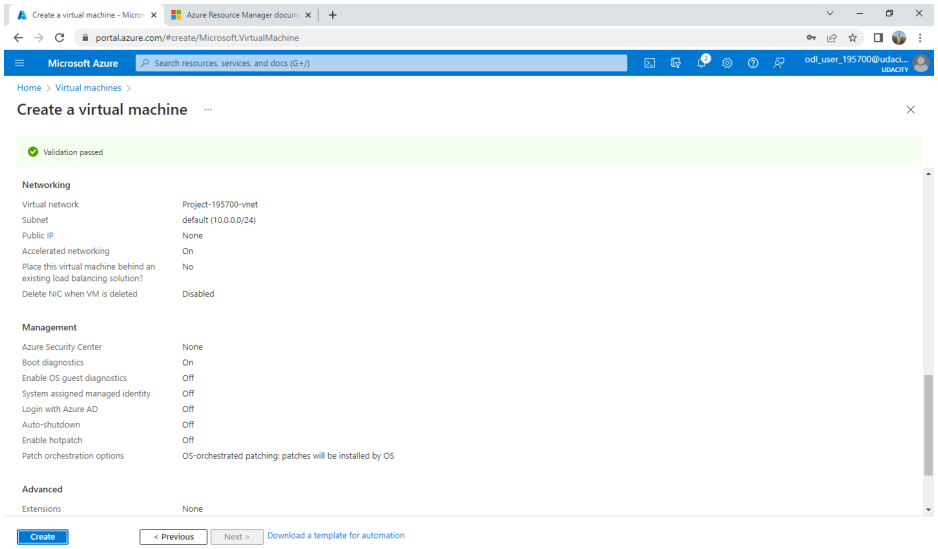
Make sure you already have a resource group to place the VM in. You may need to create a Servers-RG resource group if one does not exist.

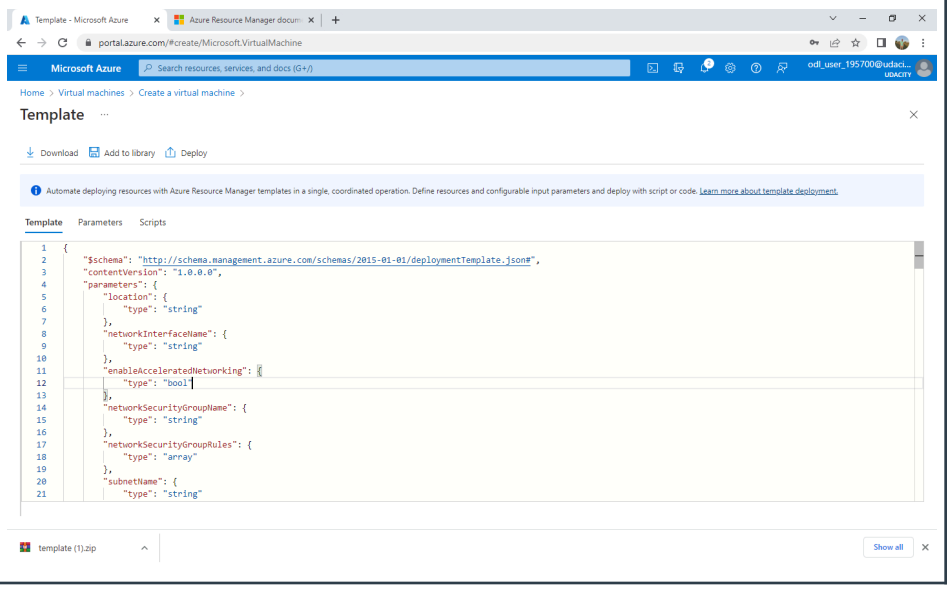
Configuration Process

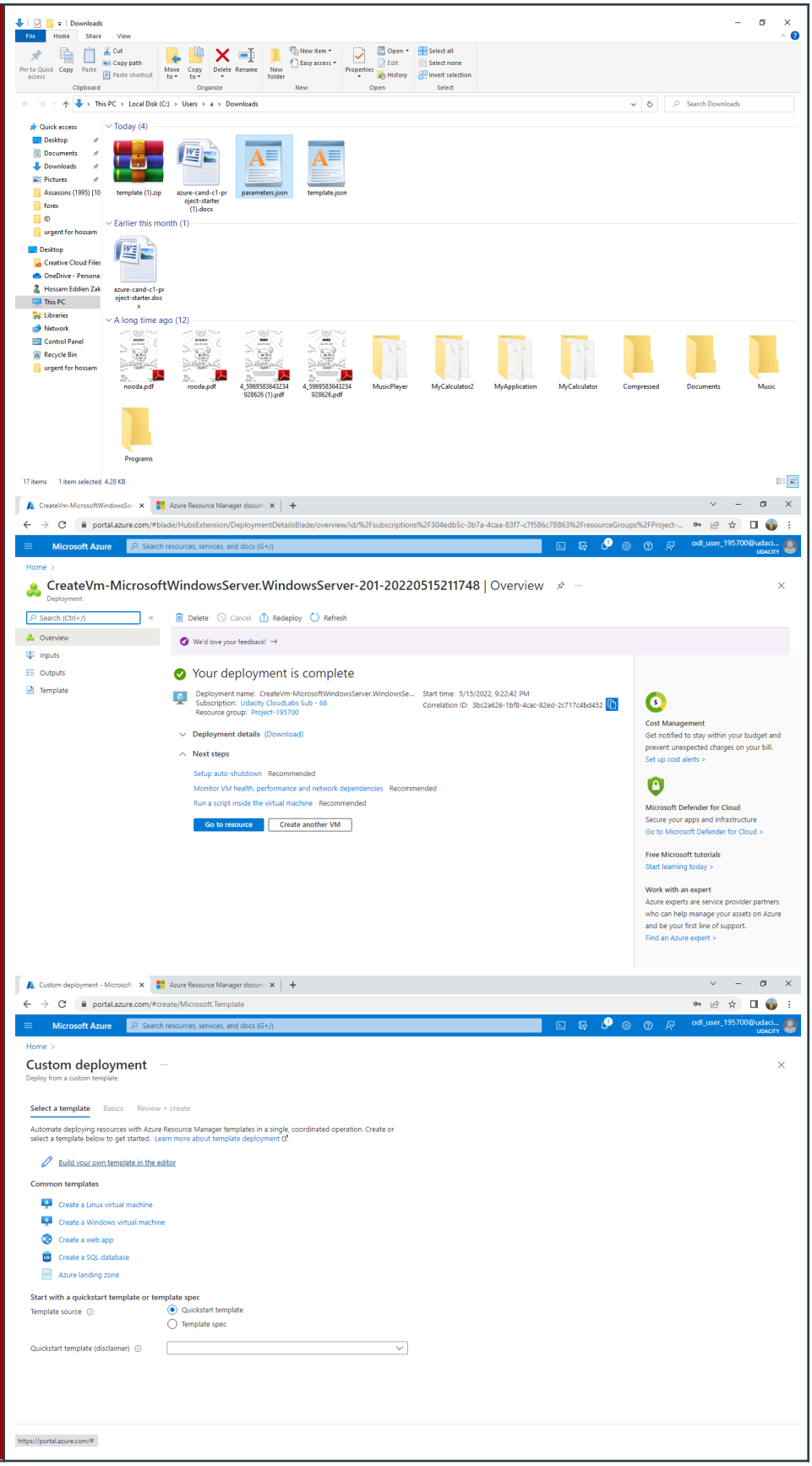
Provide a screenshot of the template configuration process.

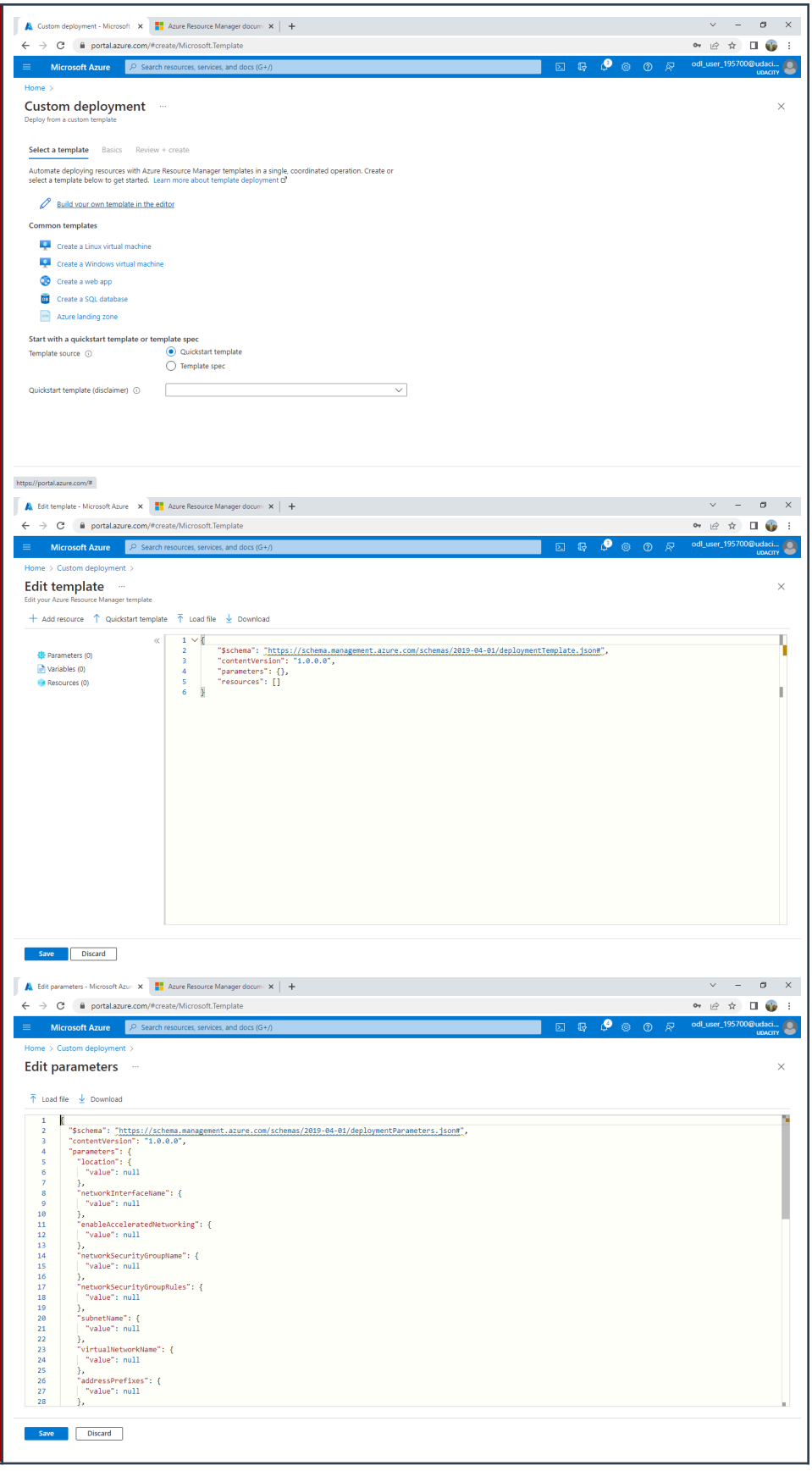



Create a virtual machine - Micro
Azure Resource Manager docum
portal.azure.com/#create/Microsoft.VirtualMachine
Microsoft Azure
Search resources, services, and docs (G+/)
odl_user_195700@udaci...
UDACITY
Home > Virtual machines >
Create a virtual machine
Validation passed
Basics
Subscription Udacity CloudLabs Sub - 68
Resource group Project-195700
Virtual machine name wordpresswebserver
Region South Central US
Availability options No infrastructure redundancy required
Security type Standard
Image Windows Server 2019 Datacenter - Gen1
Size Standard DS3 v2 (4 vcpus, 14 GiB memory)
Username iisadmin
Public inbound ports RDP, SSH, HTTPS, HTTP
Already have a Windows license? No
Azure Spot No
Disks
OS disk type Premium SSD LRS
Use managed disks Yes
Delete OS disk with VM Enabled
Ephemeral OS disk No
Networking
Virtual network Project-195700-vnet
Create
< Previous
Next >
Download a template for automation


Create a virtual machine - Micro
Azure Resource Manager docum
portal.azure.com/#create/Microsoft.VirtualMachine
Microsoft Azure
Search resources, services, and docs (G+/)
odl_user_195700@udaci...
UDACITY
Home > Virtual machines >
Create a virtual machine
Validation passed
Networking
Virtual network Project-195700-vnet
Subnet default (10.0.0.0/24)
Public IP None
Accelerated networking On
Place this virtual machine behind an existing load balancing solution? No
Delete NIC when VM is deleted Disabled
Management
Azure Security Center None
Boot diagnostics On
Enable OS guest diagnostics Off
System assigned managed identity Off
Login with Azure AD Off
Auto-shutdown Off
Enable hotpatch Off
Patch orchestration options OS-orchestrated patching: patches will be installed by OS
Advanced
Extensions None
Create
< Previous
Next >
Download a template for automation


Template - Microsoft Azure
Azure Resource Manager docum
portal.azure.com/#create/Microsoft.VirtualMachine
Microsoft Azure
Search resources, services, and docs (G+/)
odl_user_195700@udaci...
UDACITY
Home > Virtual machines > Create a virtual machine >
Template
Download
Add to library
Deploy
Automate deploying resources with Azure Resource Manager templates in a single, coordinated operation. Define resources and configurable input parameters and deploy with script or code. Learn more about template deployment.
Template
Parameters
Scripts
{
"$schema": "http://schema.management.azure.com/schemas/2015-01-01/deploymentTemplate.json#",
"contentVersion": "1.0.0.0",
"parameters": {
"location": {
"type": "string"
},
"networkInterfaceName": {
"type": "string"
},
"enableAcceleratedNetworking": {
"type": "bool"
},
"networkSecurityGroupName": {
"type": "string"
},
"networkSecurityGroupRules": {
"type": "array"
},
"subnetName": {
"type": "string"
template (1).zip
Show all


Downloads
File
Home
Share
View
Pin to Quick access
Copy
Paste
Cut
Copy path
Paste shortcut
Clipboard
Move to
Copy to
Delete
Rename
Organize
New folder
New item
Easy access
New
Properties
Open
Edit
History
Open
Select all
Select none
Invert selection
Select
This PC › Local Disk (C:) › Users › a › Downloads
Search Downloads
Quick access
Desktop
Documents
Downloads
Pictures
Assassins (1995) [10
forex
ID
urgent for hossam
Desktop
Creative Cloud Files
OneDrive - Persona
Hossam Eddien Zak
This PC
Libraries
Network
Control Panel
Recycle Bin
urgent for hossam
Today (4)
template (1).zip
azure-cand-c1-project-starter (1).docx
parameters.json
template.json
Earlier this month (1)
azure-cand-c1-project-starter.docx
A long time ago (12)
nooda.pdf
nooda.pdf
4_5969583643234928826 (1).pdf
4_5969583643234928826.pdf
MusicPlayer
MyCalculator2
MyApplication
MyCalculator
Compressed
Documents
Music
Programs
17 items
1 item selected 4.28 KB
CreateVm-MicrosoftWindowsSe
Azure Resource Manager docum
portal.azure.com/#blade/HubsExtension/DeploymentDetailsBlade/overview/id/%2Fsubscriptions%2F304edb5c-3b7a-4caa-83f7-c7f586c78863%2FresourceGroups%2FProject-...
Microsoft Azure
Search resources, services, and docs (G+/)
odl_user_195700@udaci...
UDACITY
Home
CreateVm-MicrosoftWindowsServer.WindowsServer-201-20220515211748 | Overview
Deployment
Search (Ctrl+/)
Overview
Inputs
Outputs
Template
Delete
Cancel
Redeploy
Refresh
We'd love your feedback!
Your deployment is complete
Deployment name: CreateVm-MicrosoftWindowsServer.WindowsSe...
Subscription: Udacity CloudLabs Sub - 68
Resource group: Project-195700
Start time: 5/15/2022, 9:22:42 PM
Correlation ID: 3bc2a626-1bf8-4cac-82ed-2c717c4bd452
Deployment details (Download)
Next steps
Setup auto-shutdown Recommended
Monitor VM health, performance and network dependencies Recommended
Run a script inside the virtual machine Recommended
Go to resource
Create another VM
Cost Management
Get notified to stay within your budget and prevent unexpected charges on your bill.
Set up cost alerts >
Microsoft Defender for Cloud
Secure your apps and infrastructure
Go to Microsoft Defender for Cloud >
Free Microsoft tutorials
Start learning today >
Work with an expert
Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.
Find an Azure expert >
Custom deployment - Microsoft
Azure Resource Manager docum
portal.azure.com/#create/Microsoft.Template
Microsoft Azure
Search resources, services, and docs (G+/)
odl_user_195700@udaci...
UDACITY
Home
Custom deployment
Deploy from a custom template
Select a template
Basics
Review + create
Automate deploying resources with Azure Resource Manager templates in a single, coordinated operation. Create or select a template below to get started. Learn more about template deployment
Build your own template in the editor
Common templates
Create a Linux virtual machine
Create a Windows virtual machine
Create a web app
Create a SQL database
Azure landing zone
Start with a quickstart template or template spec
Template source
Quickstart template
Template spec
Quickstart template (disclaimer)
https://portal.azure.com/#


Custom deployment - Microsoft
Azure Resource Manager docum
portal.azure.com/#create/Microsoft.Template
Microsoft Azure
Search resources, services, and docs (G+/)
odl_user_195700@udaci...
UDACITY
Home
Custom deployment
Deploy from a custom template
Select a template
Basics
Review + create
Automate deploying resources with Azure Resource Manager templates in a single, coordinated operation. Create or select a template below to get started. Learn more about template deployment
Build your own template in the editor
Common templates
Create a Linux virtual machine
Create a Windows virtual machine
Create a web app
Create a SQL database
Azure landing zone
Start with a quickstart template or template spec
Template source
Quickstart template
Template spec
Quickstart template (disclaimer)
https://portal.azure.com/#
Edit template - Microsoft Azure
Home > Custom deployment
Edit template
Edit your Azure Resource Manager template
Add resource
Quickstart template
Load file
Download
Parameters (0)
Variables (0)
Resources (0)
{
"$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
"contentVersion": "1.0.0.0",
"parameters": {},
"resources": []
}
Save
Discard
Edit parameters - Microsoft Azu
Edit parameters
Load file
Download
{
"$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentParameters.json#",
"contentVersion": "1.0.0.0",
"parameters": {
"location": {
"value": null
},
"networkInterfaceName": {
"value": null
},
"enableAcceleratedNetworking": {
"value": null
},
"networkSecurityGroupName": {
"value": null
},
"networkSecurityGroupRules": {
"value": null
},
"subnetName": {
"value": null
},
"virtualNetworkName": {
"value": null
},
"addressPrefixes": {
"value": null
},
Save
Discard

Discussion Question #1 List the benefits (at least three) of using ARM templates. Think of when, why and how you can benefit from this Azure service.	• Consistency within deployments • Complex deployments are made easy • There is a reduction of errors • Easily reused • Speed
Discussion Question #2 What is the difference between an ARM template and a server image? When will you use each and for what purpose? Make sure you consider each of the two.	ARM template is a JavaScript Object Notation (JSON) file that defines the infrastructure and configuration for your project. The template uses declarative syntax, which lets you state what you intend to deploy without having to write the sequence of programming commands to create it. In the template you just specify the resources to deploy and the properties for those resources. A server image is a full, read-only copy of a virtual machine. You can use a server image as a point-in-time backup, or to help troubleshoot virtual machine issues. Once you have a virtual machine set up and configured as you want, you can capture the instance as a VM image. During the capture process, all relevant properties of the virtual machine and disks are stored. We actually use ARM template to automate the process of deploying VMs, and ARM template is useful as it has some advantages which includes consistency, simplicity, reduction of errors, reusability, and speed. And for a server image we mainly use it as a point-in-time backup, or to help troubleshoot virtual machine issues.
Optional Discussion Visit GitHub (https://github.com/azure/azure-quickstart-templates) and look at all available templates. Can you find a template that deploys 2 web servers, a load balancer, and a Resource Group? Send the link to the template or a screenshot clearly highlighting the one you will select.	

STEP 5: Backup and Recovery

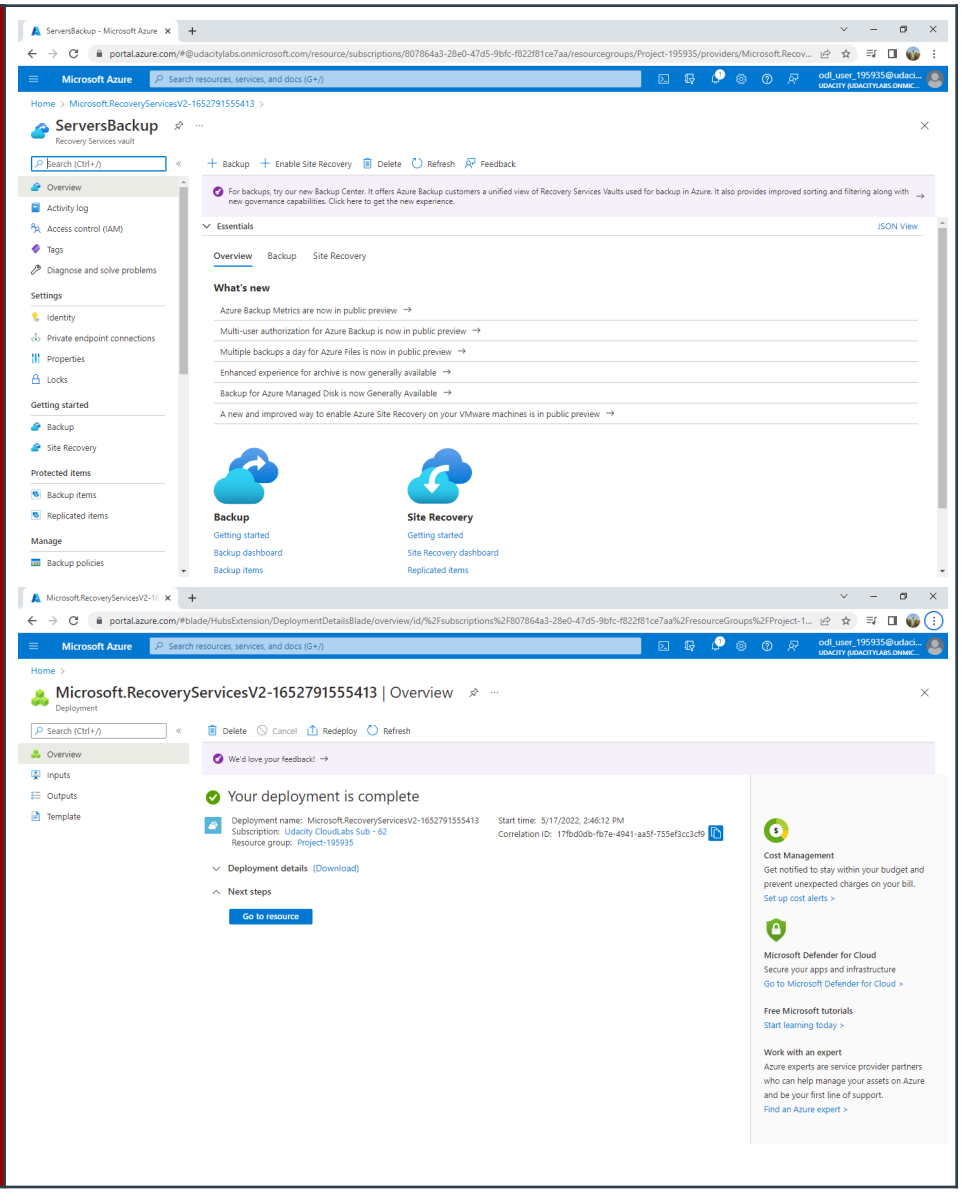
Purpose: Use the Azure backup services to setup recurring full daily backup jobs of your products and client's data. Test the backup process. No back is fully verified until you perform a successful restore.

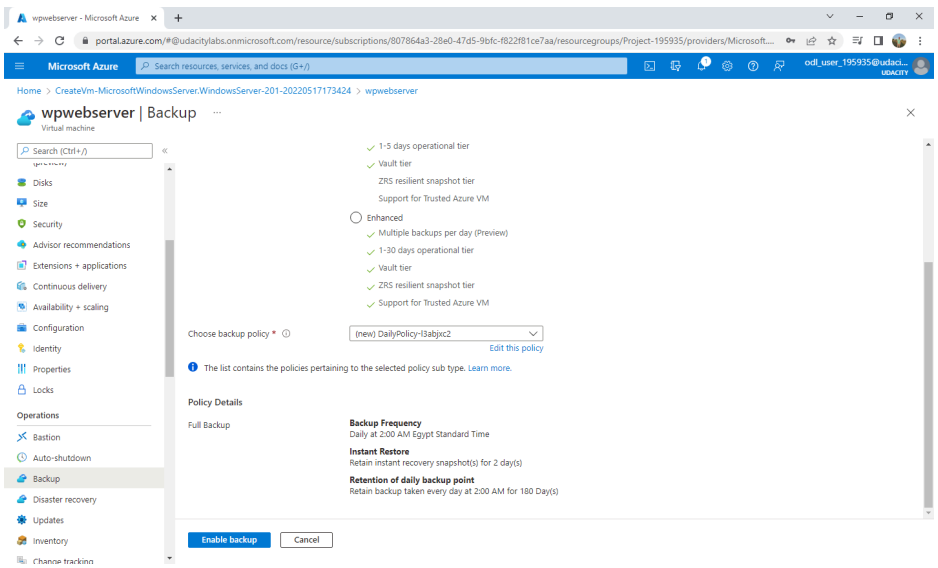
You want to ensure your VMs are all backed up. You want to ensure a working replica of each of them is saved somewhere safe. The steps are:

1. Create a backup vault. Call it “ServersBackup”.
2. Install Azure Backup Extension on the target VM.
3. Create a backup policy in the vault. Set retention policy and daily backup points.
4. Now it is time to link the target VM to the backup policy. Click on the target VM, select Backup from the Operations tab. Then select the newly created backup policy.
5. Alternatively, you can select Recovery Services Vault from the left navigation bar. Select all the VMs you want to add to the backup.

Backups

Provide screenshots of 1) the backup vault and 2) the backup policy.





Discussion Question #1

What is the difference between Azure backup and site recovery? When would you use each service and for what reason?

With the azure backup service you will have the ability to have your backups for both your on-premises resources and your cloud resources in one central location, but it does not actually provide failover and failback service in order to minimize the loss in the event of a natural disaster.
About azure site recovery, it replicates the physical and virtual machine workloads from the on-premises environment into a secondary location, so if there is natural disaster in the primary site the system will failover to the secondary location, and once the primary location is back, then we can failback to the primary location.

So we actually use azure backup for the first step which is backing up, and use azure site recovery for the second step which is replicating and failing over and failing back.

Discussion Question #2

Restore Time Objective (RTO) and Restore Point Objective (RPO) have similarities and differences.
A - How are they different? Make sure you consider each of the two.

B - Which backup strategy consumes more disc space?

A-
RTO is the maximum acceptable time that an application can be unavailable after an incident,
While RPO is the maximum duration of data loss that's acceptable during a disaster which means how many days of backups do you carry?

B-
RTO strategy consumes more disc space.

Optional Discussion

Create more that one backup policy for each type of data. For example, you may want to create a policy that backs up certain files and folders

and not the entire VM's hard drive. Try a policy that has folder exclusion and inclusion.	

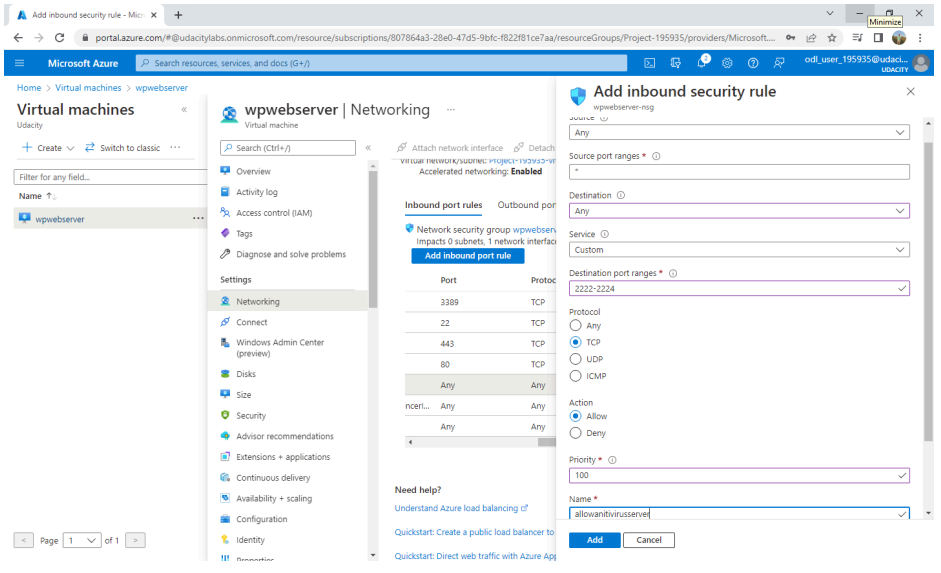
STEP 6: Antivirus Communication

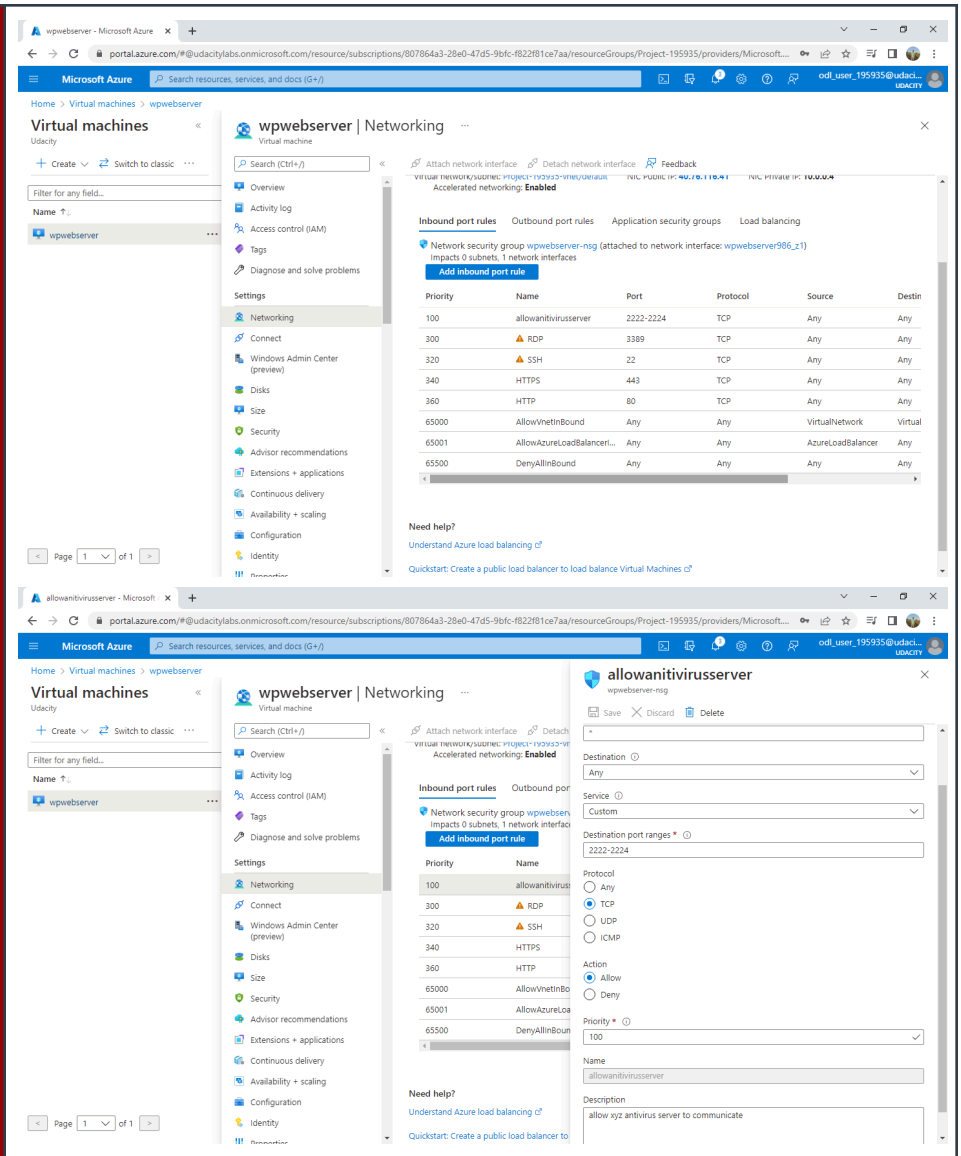
Purpose: Enable the antivirus server to communicate with client VMs.

The XYZ antivirus server requires TCP ports 2222-2224 to communicate with the target client VMs. A firewall exception on the target VM is necessary to allow the XYZ server to scan and update the clients. Assuming Contoso will want to continue using their XYZ antivirus server, how will you alter the NSG (network security group) to allow all Contoso's Azure servers port: TCP 2222-2224 in from the antivirus server?

Each of the Azure servers you created have a unique internal (not public) IP address. Each one of these VMs has its own Network Security Group (nsg) associated with it as well. **Your task is to adjust the nsg of each server to allow for traffic coming from the antivirus server**. The steps are:

1. Make a list of each server and it's internal IP.
2. For each server's nsg, modify the settings to allow for TCP 2222-2224 from the antivirus server's IP number.
3. Test your work by trying to deploy the antivirus agent on one of the target servers.

Inbound Rules Provide a screenshot of the modified nsg firewall inbound rules.	

	
Discussion Question #1 Will you need to create an inbound port exception on your Windows OS?	Yes I need to.

Note: Once you have completed your report, feel free to shut down your Azure resources to avoid charges!