Microsoft Azure Administration AZ-103 Documentation 2020

Contents

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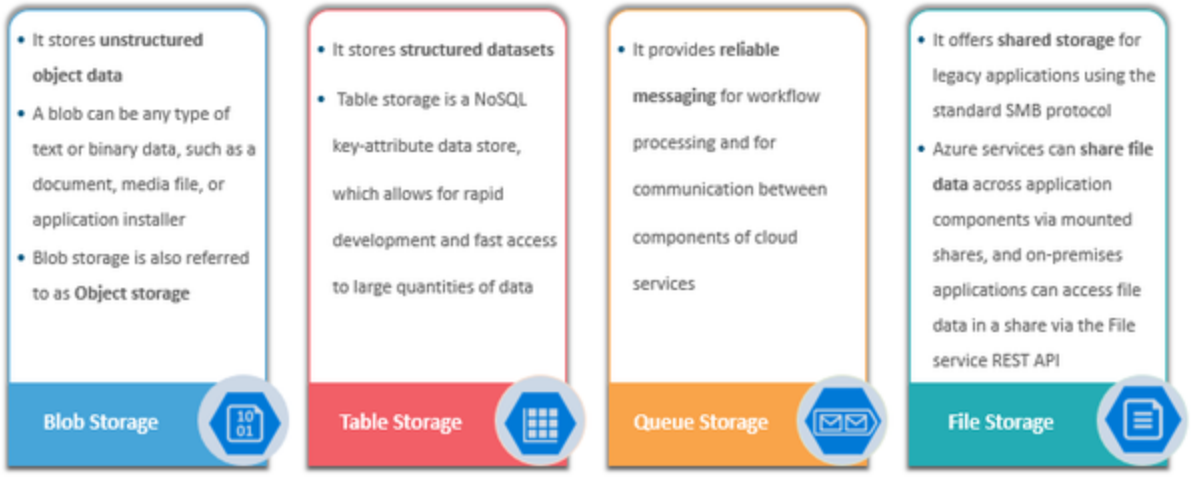
Azure Administration Az-103

Microsoft Azure Storage Account

INTRODUCTION:

IF you are planning for (**Az-103**) Microsoft Azure Administrator Exam or new update from this certification (**AZ-104**) Microsoft Azure Administrator (beta) that will be available on or around April 2, 2020, you should take in your consideration implement and manage storage this part is (10-15%) from the exam . in this post I will share some important keynote that can-do refresh for you in this part.



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WHAT ARE THE TYPES OF AZURE STORAGE ACCOUNT?

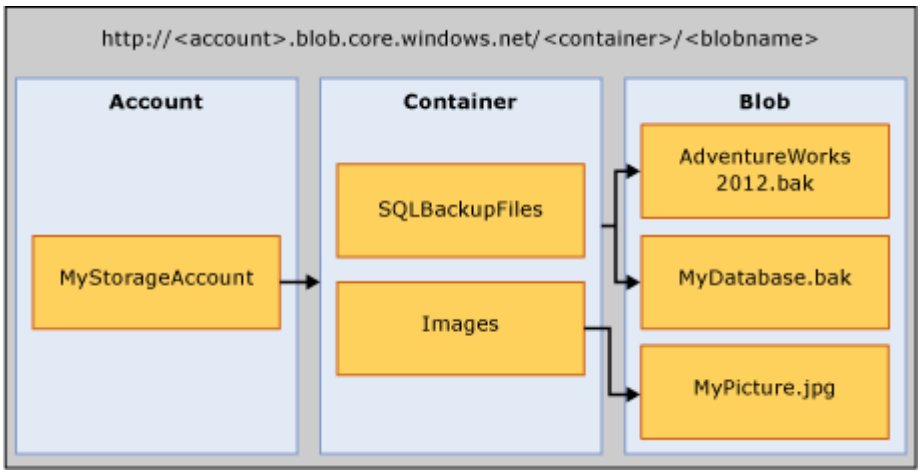
1. **Blobs** used for unstructured data
2. **Files**: Shared files in Cloud or in on-premises which allows us to create SMB files shares, hosted in Azure that you can connect to, and utilize on-premises or in the cloud.
3. **Tables** used for storing your schema list NoSQL data.
4. **Queue** used for massaging.

WHAT ARE THE AZURE STORAGE BLOB TYPES?

- **Block Blobs** Used for test and binary data and it is interested in storing SQL Server DB MDF, NDF and LDF files, as well as backup files, can be taken on Blob storage let you upload large blobs and the files are comprised of blocks, each block can be a different size based on versions, with block blob you can upload multiple blocks in parallel to decrease upload time. And it contains feature help you for managing big files over the network, you can modify the existing block blob, Most object storage scenarios Documents, images, video, etc. https://docs.microsoft.com/en-us/rest/api/storageservices/understanding-block-blobs–append-blobs–and-page-blobs#about-block-blobs,
- **Append Blobs** Used for append operation like logging data
- **Page Blobs** Used for Virtual hard disks (VHD) Files. Azure virtual machine disks backed by Microsoft Azure Blob storage page blob, page blob contain two types of disks premium and standard https://docs.microsoft.com/en-us/rest/api/storageservices/understanding-block-blobs–append-blobs–and-page-blobs#about-page-blobs

WHAT IS THE BLOB STORAGE RESOURCES?

We have 3 types of resources (Storage account, Container, Blob)https://docs.microsoft.com/en-us/sql/relational-databases/backup-restore/sql-server-backup-to-url?redirectedfrom=MSDN&view=sql-server-ver15#Blob



WHAT ARE THE AZURE STORAGE FIREWALL AND ACCESS KEY?

1. **Storage account Firewall**: by default, Firewall will accept all connection and we can restrict access by adding some IP's also we can add Exception, also we can configure network access to a storage account to allow the traffic coming from allowed VNET to access this storage account
2. **Access Key:** any storage account have an access key to be used when the application connected to the storage and Microsoft recommended to use Shared Access Signature and to regenerate this key from time to time but after the regeneration the key process you will need to update the APP and the resources by the regenerating key. You will have two Keys you can use any one of them, and you

can generate the key at any time but generating the key meaning old keys will not be longer used. Access key will give the user full access on your storage account

3. **Shared Access Signature**: it is a very helpful security role to allow access without sharing the account keys because using the account keys will allow administrative access and for this security feature, we can custom it by start and end date as an expiry date. It is the best option for Security-wise.

Azure Storage Location

When you are creating any resource in Azure Microsoft asking you about the location because not all locations have full azure features.that's why the location is the key that will determine the features you will have on the Storage account. e.g. If you selected Australia Center and selected the performance premium storage you will have two kinds of storage account only general Purpose V2 and General Purpose V1 but if you selected East US 2 you will have other choices in the storage kind like BlockblobStorage and FileStorage.

Azure Storage Performance

We have two options Stander option (HDD Disks) and Premium option (SDD Disks).

Azure Storage account Kind

We have 5 Types (V1, V2, BlobStorage, BlockBlobStorage, FileStorge)depended on your choice for azure Storage performance (Stander or Premium) and each type from the 5 types supported some azure Storage types from the 4 types (Blobs, Tables, file shares, Queues) and supported also some replication types from the 6 types. The below image will explain you all of these words.

Storage based on Performance / Kind and replication

Storage Performance	Account Kind					Replication						Access Tier	
Stander(HDD)/Premium(SDD)	General Purpose V1	General Purpose V2	BlobStorgae	BlockblobStorge	FileStorgae	LRS	ZRS	GRS	RA-GRS	GZRS	RA-GZRS	HOT	COOL
Stander HDD	☑					☑	☒	☑	☑	☒	☒	☒	☒
		☑				☑	☑	☑	☑	☑	☑	☑	☑
			☑			☑	☒	☑	☑	☒	☒	☑	☑
				☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
					☒	☒	☒	☒	☒	☒	☒	☒	☒
Permium SDD	☑					☑	☒	☒	☒	☒	☒	☒	☒
		☑				☑	☒	☒	☒	☒	☒	☒	☒
				☑		☑	☒	☒	☒	☒	☒	☒	☒
					☑	☑	☒	☒	☒	☒	☒	☒	☒
			☒			☒	☒	☒	☒	☒	☒	☒	☒

Storage account Features #1

and to know each type from the 5-account storage kind supported which storage type (Blobs, Tables, File Shares, Queues) look into below image (You can upgrade from V1 to V2 without any downtime.)

Storage Types Supported by each Storage Kind					
Storage Performance	Account Kind				
Stander(HDD)/Premium(SDD)	General Purpose V1	General Purpose V2	BlobStorgae	BlockblobStorge	FileStorgae
Stander HDD	Supported (block blob, Page Blobs, Append Blob, File Shares, Tables, Queues and the maxmuim size of the blob is 500 TB. And it is not supported Hot and cold access tier even latest features on azure Storage not supported by V1	Supported (block blob, Page Blobs, Append Blob, File Shares, Tables, Queues	Supported Block Blobs and Append Blob only.	Not supported by Stander at all	Not supported by Stander at all
Permium SDD	Supported Page Blobs only	Supported Page Blobs only as SSD	Not supported by permium at all	Supported Block Blobs and Append Blobs only. AS SSD so it is best options when you need to save data in Super high Performance storage when you have creazy read write transactions	Supported File Shares only.

Storage account Features #2

Azure Storage Replications and redundancy options

Microsoft provides 6 types of replications depended on the locations and the storage account kind

- **Locally redundant storage (LRS)**: (Data will be replicated into 3 rack power inside the local location) **LRS** is Simple low-cost replication Strategy and the data here replicated (**L**) Locally on the same data center as we know the data saved on storage unites or by another definition (**a rack power**) and inside the data center, Microsoft has multiple storage units so when you select **LRS** this means your data replicated inside the same data center on 3 storage units that's why it is low-cost replication . for more information check this **article**. Supported GPV1 and GPV2 and Blob Storage account

- **Geo-redundant storage (GRS)**: (data will be replicated into 3 Physical locations and inside each location will be replicated to 3 Rack power **without** accessing the data in the secondary locations) **GRS** It is one of the disaster recovery solutions because it is replicating the data synchronously into 3 regions (Physical locations) using the **LRS** (Locally redundant storage) this means if you host data in East US 2 location and you selected to replicate it to West US 2 location the data will be replicated inside the locations as **LRS** and it will be replicated to another location using **GRS** but add in your note you will not be able to access the data in the other location unless you do failover so you will access only the primary location. For more information check this **article**.

- **Zone-redundant storage(ZRS) :** (Data will be replicated into 3 zones inside the local location) **ZRS** When you select the location while creating the Storage account each location have multiplied zones in the same region and inside the zone, we have data center so **ZRS** (Zone-redundant storage) option it means replicating the data synchronously into 3 availability zones inside the primary region for your location. For more information check this **article**.

- **Read access Geo-Redundant Storage (RA-GRS)**: (data will be replicated into 3 Physical locations and inside each location will be replicated to 3 Rack power **with** accessing the data in the secondary locations as Read-only) **RA-GRS** it is a combination between **LRS** and **GRS** it is the same concept of GRS but it will give you the availability to access the data as read-only on the secondary Physical locations. For more information check this **article**.

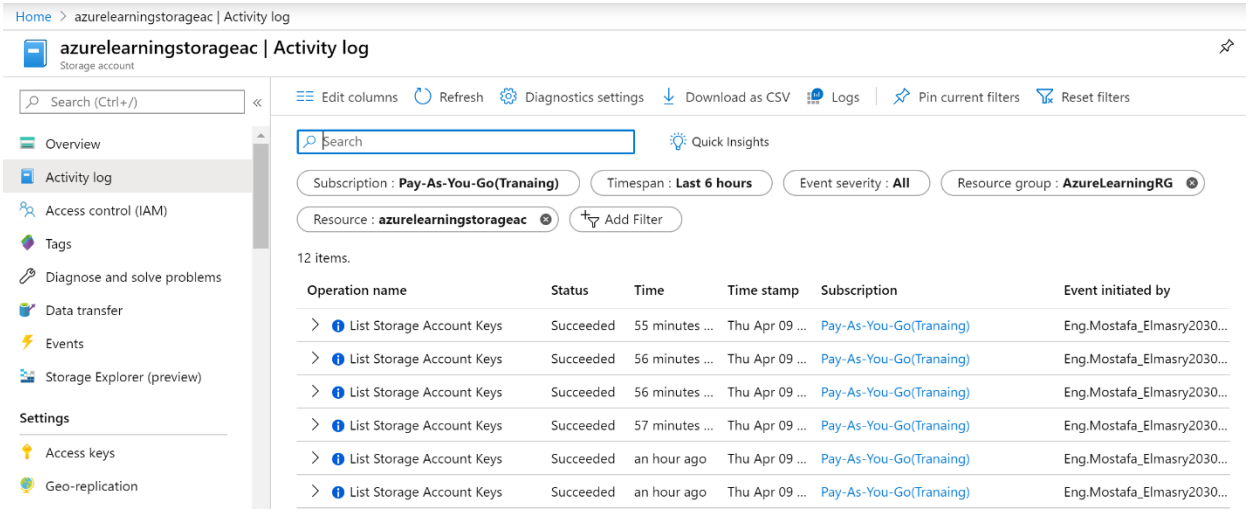
- **Geo-zone-redundant storage (GZRS):** (Data will be replicated into 3 Physical locations and inside each location will be replicated in 3 zones **without** accessing the data in the secondary locations) **GZRS** replicating the data synchronously into 3 Rejoins (Physical locations) using the **ZRS** (Zone-redundant storage) this means if you host data in East US 2 and you selected to replicate it to West US 2 the data will be replicated inside the location as **ZRS** on 3 zones in the same location and it will be replicated to the other locations using **GZRS** but add in your note you will not be able to access the data in the other location unless you do failover so you will access only the primary location. For more information check this **article**.

- **Read access Geo-zone-redundant storage (RA-GZRS):** (Data will be replicated into 3 Physical locations and inside each location will be replicated into 3 zones **with** accessing the data in the secondary locations as read-only) **RA-GZRS** it is a combination between **ZRS** and **GZRS** For more information check this **article**.

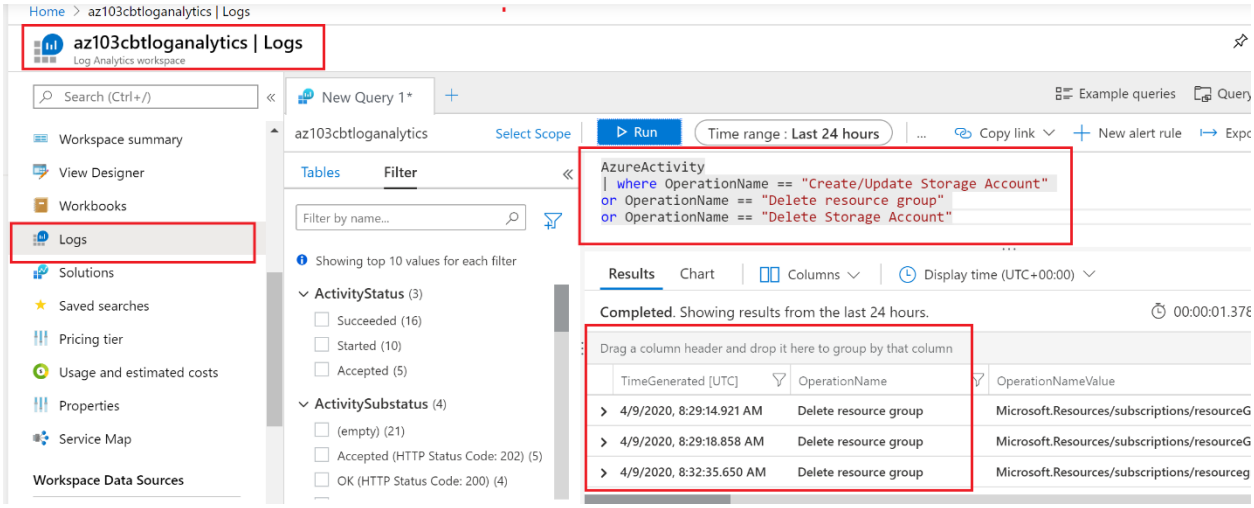
The last 4 Types of replication are the best choices for disaster recovery (GRS, RA-GRS, GZRS, RA-GZRS)

How to monitor Storage account

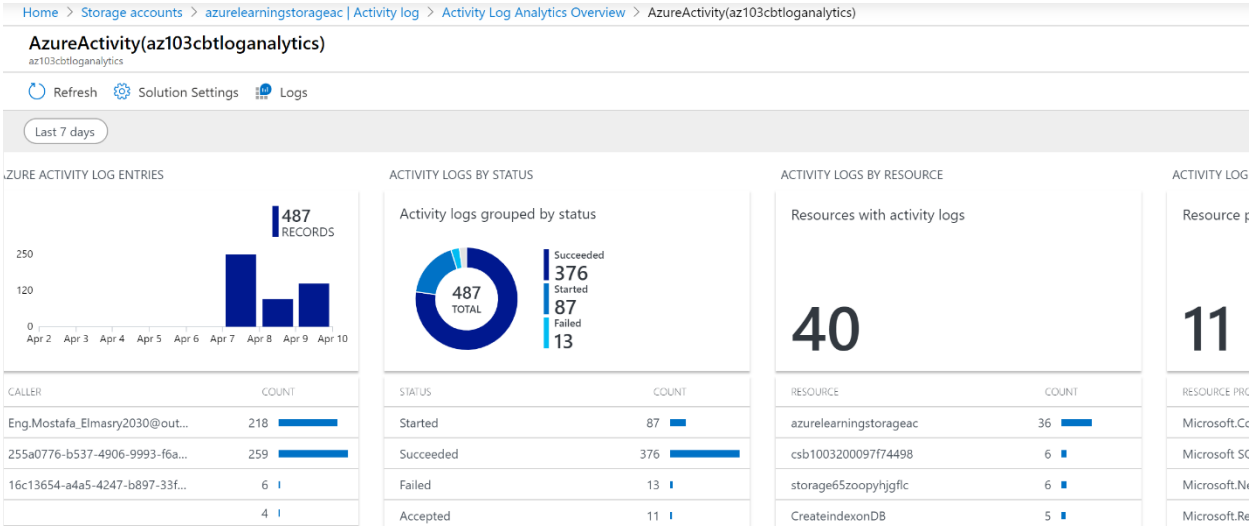
1- **Activity log**: it is like the event viewer in windows when you open the storage account you will find in the left side activity log if you open it you will find all of the activities you do it and when and who do it



2- **Log analytics**: Search about log analytics on the Azure portal search and create new workspace then on the left you will find container call "**Workspace data source**" under it you will find Azure activity log if you click on it you will find your azure subscription just only connect the subscription to the log analytics then Go for the left side again and select Log and from here you can query your activity log using KQL query



3- **Log Analytics on Activity log**: we can add Log analytics as a solution on the activity log on Azure storage account to do that (You Should Create first step 2 Log Analytics workspace > open Storage account > in the left side select activity log > on the top right side click on log > add > Select the log analytics Workspace you created it > then save > the refresh) IF you return to Log Analytics workspace in the left side select solution you will find the solution you created it.



WHAT IS THE AZURE STORAGE EXPLORER?

Azure Storage Explorer Tool: It can be used from on Premises server or your local PC to view and, upload and download files or folders on storage account it is a fantastic tool. Download it from **HERE** and it is working on an operating system (Windows, macOS, Linux). Also, you can find the same services on the portal Storage account (Storage Explorer (preview)

WHAT IS THE AZURE BLOB PRICING?

1. Azure page blob price: https://azure.microsoft.com/en-us/pricing/details/storage/blobs/
2. Azure block blob price: https://azure.microsoft.com/en-us/pricing/details/storage/page-blobs/

WHAT ARE THE SOLUTIONS FOR MOVING DATA TO MICROSOFT AZURE BLOB STORAGE?

(Blobfuse, AzCopy, Azure Storage Data Movement Library, Azure Import/Export, Azure Data Box, Azure Data Factory) for more information about the usage of each solution check this article

WHAT IS AZURE DATA BOX

Azure Data Box: one of the new features on azure that you can use it from import and export data on azure and it is containing two types offline data box and online data box for more information check this post (**Azure Data BOX**) and to start on creating Azure Data Box go **here**

Offline Data Box Contain 3 types:

1. Data Box: This ruggedized device with 100-TB
2. Data Box Disk: It comes in packs of up to five for a total of 40 TB.
3. Data Box Heavy: This ruggedized, self-contained device is designed to lift 1 PB of data to the cloud.

Online Data Box: Data Box Gateway and Azure Stake Edge (Data Box Edge)

WHAT IS AZURE CDN

Azure CDN: when you are going to import or export data to or from azure you should consider Azure CDN configuration (content delivery network on Azure) to give you Better performance and improved and Large scaling to better handle instantaneous high loads

What is CDN Product

Premium Verizon, Standard Verizon, Standard Akamai, Standard Microsoft add in your note, not all Regions supported all CDN Product and Microsoft recommended using this feature based on a feature not on location.

WHAT IS THE AZURE BACKUP TYPES?

When we are talking about storage we should consider the azure backup and we have some types on azure backup and check this Microsoft post to know more information about Azure Backup check this **post**

- Azure Backup MARS Agent
- System Center DPM
- Azure Backup Server MABS Agent
- Azure Virtual Machine backup (Windows and Linux)
- Azure Files shares –Back up Azure File shares to a storage account
- **SQL Server in Azure VMs**– Back up SQL Server databases running on Azure VMs
- **SAP HANA databases in Azure VMs**– Backup SAP HANA databases running on Azure VMs

WHAT IS THE SQL SERVER BACKUP LIMITATION ON MICROSOFT AZURE BLOB STORAGE?

1. Microsoft did not support backup operation on premium storage
2. Using the Blob URL as a backup device is not supported
3. Appending to existing backup blobs is not supported, only overwrite option is available
4. Taking backup on multiple blobs for single backup is only supported on block blob type
5. FileStream data files not supported to be stored on Microsoft Azure Blob storage and this means you cannot store in-Memory OLTP data because it is depending on FileStream data

files https://docs.microsoft.com/en-us/sql/relational-databases/databases/sql-server-data-files-in-microsoft-azure?view=sql-server-2017

WHAT IS THE AZURE BACKUP MONITORING?

Configure and Manage backup reports can be done from diagnostic settings, and the first configuration you should wait 24 hours to be the data available to you in the reports and the reports compatible with Power BI

Create Storage account using PowerShell Command

- Create a Resource Group
- Show list by all resource groups
- Create a Storage account
- Show list by all Storage account
- Remove Storage account
- Remove Resource Group
  - New-AzResourceGroup -Name storageresourcegroup -location "East US 2"
  - Get-AzResourceGroup
  - New-AzStorageAccount -name elmasryteststorage1 -ResourceGroupName storageresourcegroup -SkuName Standard_LRS -location "East US 2" -kind Storagev2
  - Get-AzStorageAccount
  - Remove-AzStorageAccount -name elmasryteststorage1 -ResourceGroupName storageresourcegroup
  - Remove-AzResourceGroup -name storageresourcegroup

Create Storage account using CLI Command

- Create a Resource Group
- Show list by all resource groups
- Create a Storage account
- Show list by all Storage account
- Remove Storage account
- Remove Resource Group
  - az group create --name storageresourcegroup2 --location "East US 2"
  - az group list

- az storage account create --name elmasryteststorage2 --resource-group storageresourcegroup2 --location "East US 2" --kind storagev2 --SKU standard_LRS
- az storage account list
- az storage account delete -n elmasryteststorage2 -g storageresourcegroup2
- az group delete -n storageresourcegroup2

References

- Managing and implementing Azure storage
- Microsoft Azure Storage Kind and Architecture
- Create Storage Account Using PowerShell and CLI Command
- Microsoft Azure Log Analytics
- SQL Server Backup to URL
- Backup types and Automated backup in Azure
- How to Create an Azure Storage account
- Understanding block blobs, append blobs, and page blobs
- What disk types are available in Azure
- https://www.red-gate.com/simple-talk/cloud/cloud-data/understanding-azure-storage-options/

Azure backup Recovery Services Vault AMRS

What you can backup from Azure Services

- Azure File Share
- Azure VM
- Azure SQL Server

Can Backup the On-premises server to azure? Yes using Microsoft agent MARS
https://docs.microsoft.com/en-us/azure/backup/backup-windows-with-mars-agent &
https://docs.microsoft.com/en-us/azure/backup/backup-azure-about-mars &
https://docs.microsoft.com/en-us/azure/backup/install-mars-agent & https://azure.microsoft.com/en-us/resources/videos/download-install-and-register-the-azure-backup-agent/

Recovery Services Vault: it will be used for taking backup from Local VM to azure using Microsoft agent MARS and this configuration will require to be the resource group and the recovery services vault on the same region. And we have two types of backup and site recovery.
https://portal.azure.com/#create/Microsoft.RecoveryServices

Manage Azure Subscriptions and Resources

Manage Azure Subscriptions

Azure Roles: We have 3 types of azure roles that we can assign the user permission under them

- Classic subscription administrator roles model
  - Account Administrator: the user has full access
  - Server Administrator: user managing the services and assign Co-administrator role to the user
  - Co-Administrator: Same as services administrator but with some limitations.
- Azure Role-Based Access Control (RBAC) model Roles. https://azurecitadel.com/infra/vdc/lab5/
  - Owner Role: this meaning the user has full access to all resources and also can delegate role access for other users. It is the same as the Server administrator role in classic model roles.
  - Contributor Role: this user can create and manage resources but can't delegate access to other users like owner role
  - Reader Role: this role means the users can view azure resources only.
  - User access administrator: Special account can access and manage all Azure resources. And this account should be used by the azure admin only.
  - Built-in Roles: we have more than 70 built-in roles
  - Custom Role: The administrator can custom some roles based on his needs using RBAC Services.
- Azure Active Directory (AAD) administrator model Roles.
  - Azure AD administrator: can manage all Azure resources
  - Others azure active directory roles:
  - Services administrator: can add users inside the directory but outside the directory cannot add them.
- **Resource tag**: one of the benefits in Azure that you can Categorize your resources by adding tags and this will help for Cost analysis in the Const management and Billing for your subscription you generate const analysis report on the specific tag of for all tags
  - **Get all Azure tags:** Get-AzureRmTag -Detailed | select name, values
  - **Add New Azure tags:** New-AzureRmTag -Name IT -Value Database
  - **Remove Azure Tags:** Remove-AzureRmTag -Name Company
  - **Assign tags to resource:** Get-AzureRmResource -ResourceName "azuresqlinstanceserver/azuresqldb" -ResourceGroupName "Aznewrg2020" | Set-AzureRmResource -Tag @{IT="Database";Department="TestingServers"} -Force
- **Azure Policy**:
  - **Policy definition:** is the conditions of the policy

- **Policy assignment:** in the part, we can define which resource or services you need to apply this policy on it, add in your note that the policy assignment by default inherited so for example if you applied Policy on Subscription it will be inherited on all of the resources under this subscription
- **Policy parameters**: it will give you the availability to custom your policy

- **Azure initiative Policy**: it the like Azure policy but we can use when you need to do a group of policy in one step and it is containing the 3 parts (initiative definition, initiative assignment, initiative parameters) "**Policy Combo**"
- **Policy Location on Portal**: you can access the policy from here https://portal.azure.com/#blade/Microsoft_Azure_Policy/PolicyMenuBlade/Overview

Analyze Resource Utilization and Consumption

- Resources:
  - Creating Action Groups
- **Create groups**: this service allows you to configure a list of actions to take when the alert is triggered
  - **Action Properties**: Name, Action Type, Details
  - **Action Types:** We have 3 actions types we can use it while we are creating a group
    - ✓ Email, SMS, and Call Voice
    - ✓ Logic APP, Webhook, It Service management Function
    - ✓ Automation Runbook
- Configuring Diagnostic Settings on Resources

Analyze Resource Utilization and Consumption with Azure

- All of the activity logged into Monitor | Activity log
- Configure the Diagnostic can be done using (Portal, PowerShell, Azure CLI, and API) then sending these logs can be sent to (Event Hubs, Azure Storage, Azure Monitor)
- To Enable Diagnostic on OS/VM you should enable "**Guest level Monitoring**"

- **What is Azure Policy:** Azure Policy is a service in Azure that you use to create, assign, and manage policies. These policies enforce different rules and effects over your resources, so those resources stay compliant with your corporate standards and service level agreements. Azure Policy meets this need by evaluating your resources for non-compliance with assigned policies. All data stored by Azure Policy is encrypted at rest https://docs.microsoft.com/en-us/azure/governance/policy/overview
- **Azure Policy VS RBAC (Role-based access control):** Azure Policy focused on the resources but RBAC focused on the security and users https://docs.microsoft.com/en-us/azure/governance/policy/overview#how-is-it-different-from-rbac
- **Policy definition:** Contain Custom policies and 405 built-in policies

- **Azure classic subscription administrators**: contain 3 Roles:

https://docs.microsoft.com/en-us/azure/role-based-access-control/classic-administrators

- **Account Administrator**: one per azure account authorized to access the account center.
- **Services Administrator**: one per azure subscription authorized to access the Azure portal for all subscriptions in an account, this role have access to control all services in the subscriptions
- **Co-Administrator:** Up to 200 users per subscription, Same as the administrator of the service but can't change the association of subscriptions to the azure directory

Transfer the data to Azure Storage

Microsoft Provided us verity of options but you know the most useful option for your case you should consider 3 keys (Network Speed, Data Size, Transfer Frequency option**) azurelearningstorageac | Data transfer**

- Offline data transfer Azure Import/Export
- Offline data transfer Azure Data Box
- Offline data transfer Azure Data Box Disk
- Offline data transfer Azure Data Box Heavy (preview)
- Azure Data Box Edge
- Azure Data Box Gateway
- Azure File Sync
- AzCopy from
- Azure Storage Explorer
- Azure Storage REST API/SDK
- Azure Data Factory
- PowerShell
- CLI

Azure File Sync

https://docs.microsoft.com/en-us/azure/storage/files/storage-sync-files-deployment-guide?tabs=azure-portal

we talked before about Storage and the types of storage and how to manage the storage but today we will talk about the file share that's one of the types of azure storage but the questions now after creating the file share how I can sync my files from my V-Center VM to Azure File share, Microsoft provided us services called Azure file sync to let us how we can configure it and what is the prerequisites we should configure it on the V-Center VM

Create Azure File Share

1- Create Resource Group if you don't have you can do it from the portal or by PowerShell and CLI

```
New-AzResourceGroup -Name storageresourcegroup -location "East US 2"

az group create --name storageresourcegroup2 --location "East US 2"
```

2- Create Storage account and you can do it using (Azure Portal, PowerShell or CLI)

New-AzStorageAccount -name elmasryteststorage1 -ResourceGroupName storageresourcegroup -SkuName Standard_LRS -location "East US 2" -kind Storagev2

az storage account create --name elmasryteststorage2 --resource-group storageresourcegroup2 --location "East US 2" --kind storagev2 --SKU standard_LRS

For more information about How to Manage Storage account check this post "**Create Storage Account Using PowerShell and CLI Command**"

3- Create File Share using Portal it will need only name and Quota and for your note the maximum quota it 5 TB once you created the storage account click on it and you find the 4 types of the storage click on a File share and write the name and the quota

Assess your file on V-Center VM

Now we need to assess the files that we need to sync it with azure file share and this we will do it use PowerShell scripting command

Install-Module -Name packagemanagement -Repository PSGallery -Force

Install-Module -Name PowerShellGet -Repository PSGallery -Force

Install-Module -Name Az.StorageSync -AllowPrerelease -AllowClobber -force

Invoke-AzStorageSyncCompatibilityCheck -Path D:\Work\Azurefilesyncfolder

Maybe you can find an issue on the last command and if it shows to you error like below image you can add (-SkipSystemChecks) to the command and It will work fine

Invoke-AzStorageSyncCompatibilityCheck -Path D:\Work\Azurefilesyncfolder -SkipSystemChecks

After Executing the command with (-SkipSystemChecks) or without the results should be something like this

```
PS C:\Users\EngMo> Invoke-AzStorageSyncCompatibilitycheck -Path D:\Work\Azurefilesyncfolder -SkipSystemChecks


Namespace validation results:

Path: D:\Work\Azurefilesyncfolder
Number of files scanned: 2
Number of directories scanned: 1

There were no compatibility issues found with your files.



PS C:\Users\EngMo>
```

Install Azure File Sync on Azure

Now we need to install Azure File Sync on Azure portal and you can do Search on Azure Portal services by the name "Deploy Azure File Sync" or click on this **link** it will direct you to the correct page that you can create from it Azure file sync in this page we need below information

1- Resource Group name we created it
2- Name for Storage sync Services
3- Regain

Install Azure File Sync on local V-Center VM

To be able to sync the data from your local VM to azure we have some steps we need to do it on local VM to registered this VM with Storage sync Services we created it on Azure in the last step.

1- Turn off **IE Enhanced Security Configuration** from server Manger
2- Install the latest AzureRM module as it is required by the Azure file sync agent and this step you can do it by below PowerShell Code and I highly recommend you to look at this post (**How to manage Azure using Windows PowerShell**) you learn how to add most of the used azure modules on your PowerShell.

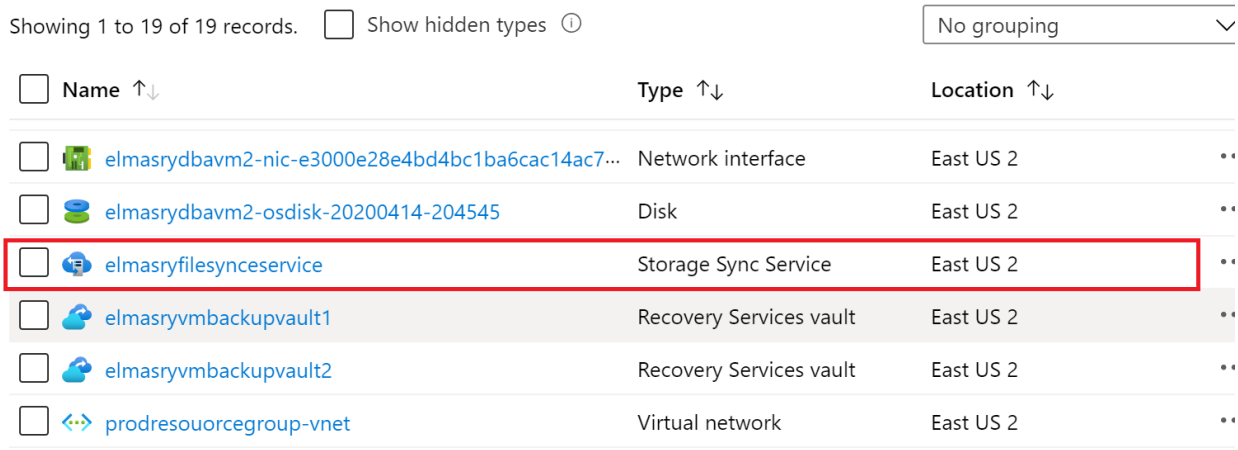
```
Install-Module -Name AzureRM -AllowClobber
```

1- Install agent "Azure File Sync Agent" you can download it from **here**, after installation you should
2- Now after installation, it is time to sign in to Azure using Azure file sync agent to register your VM With Azure Storage sync services. Once you click on the sign-in, it will open for you a dialog box to add your Azure account and Password, and this the reason for disabling the **IE Enhanced Security Configuration** to be able to see the dialog box.

Registration Verification

Now we need to check if our VM registered with Storage sync Services on Azure to do this

1- Open Azure Storage Sync Services we created it on azure if you open your Azure resource group, we created it in the first step you will find this service under it
2- Click on it then on the left side you will find Registered servers if you click on it you will find your local VM information



Create Azure Sync endpoint and server endpoint

1- Open Azure Storage Sync Services we created it on azure if you open your Azure resource group, we created it in the first step you will find this service under it
2- Click on it and from the top select (Sync Group) and it will be required from you (Name, Storage account we created it, Azure File Share we created it under the storage account)
3- Now we created the endpoint and we need to create the server endpoint
4- Click on the Azure Sync group we created it in the top, select server endpoint to create it.
5- To create Server endpoint, we will need to select the registered servers that we installed on it the Azure Sync file Agent and we validated it in the registered servers in Storage Sync Services.
6- Also, we need to add the path we need to sync the data from the local VM. Example **D:\Work\Azurefilesyncfolder**

After creating the Server endpoint azure file sync services will start to sync your local files to an Azure file share to check it open the storage account then file share and you will find all of your files.

Microsoft Announced Azure File shares snapshot management by Azure Backup is now generally available For more information about the benefits from this feature check this post → https://lnkd.in/eyiZRQf and for How to create Backup on Azure File Share using Recovery Service

Vault check this Post → **https://lnkd.in/eCfH9tY** And to learn more about how to sync your files between Azure and On-premises using Azure File Sync Check this Post → **https://lnkd.in/e9RcpVa** and IF you need to Copy your Files from or to Azure using AzCopy Command line Check this Post → **https://lnkd.in/eAWzZhe**

Azure Virtual Machines

1- ACU is an Azure compute unit, and it's the equivalent of a DTU in Azure SQL database https://docs.microsoft.com/en-us/azure/virtual-machines/windows/acu
2- VM Scale Set and Scale down

Azure Virtual Machine series:

(https://azure.microsoft.com/en-us/pricing/details/virtual-machines/series/**)**

1. **A-Series: Entry-level economical VMs for dev/test**
2. **Bs-Series: Economical burstable VMs**
3. **D-Series: General purpose compute**
4. **DC-series: Protect data in use**
5. **E-Series: Optimized for in-memory hyper-threaded applications**
6. **F-Series: Compute-optimized virtual machines**
7. **G-Series: Memory and storage optimized virtual machines**
8. **H-Series: High Performance Computing virtual machines**
9. **Ls-Series: Storage optimized virtual machines**
10. **M-Series: Memory-optimized virtual machines**
11. **Mv2-Series: Largest memory-optimized virtual machines**
12. **N-Series: GPU enabled virtual machines**

Virtual Machine Pricing:

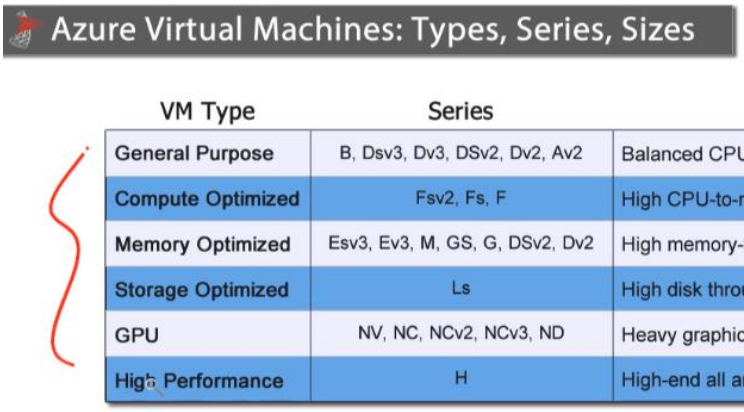
Based on this wide range of VM types and size we have a lot of pricing that is the estimation of it depend on the VM specification, workload, and region You can check the Pricing from **here** and you can Configure and estimate the costs for Azure products using **Microsoft Pricing calculator**

Learn more about Azure VMs:

- Microsoft Azure – Virtual Machine Types
- How to choose an Azure Virtual Machine
- Azure Academy: Infrastructure and Networking
- Implementing Microsoft Azure Infrastructure Solutions
- Managing and implementing Azure storage

Azure Virtual Machine Types or Sizes

Azure Virtual Machine Types or Sizes (https://docs.microsoft.com/en-us/azure/virtual-machines/windows/sizes)



VM Type	Series	Description
General Purpose	B, Dsv3, Dv3, DSv2, Dv2, Av2	Balanced CPU-to-memory ratio.
Compute Optimized	Fsv2, Fs, F	High CPU-to-memory ratio.
Memory Optimized	Esv3, Ev3, M, GS, G, DSv2, Dv2	High memory-to-CPU ratio.
Storage Optimized	Ls	High disk throughput and IO.
GPU	NV, NC, NCv2, NCv3, ND	Heavy graphic rendering and video editing.
High Performance	H	High-end all around, for the most epic workloads!

1. **General Purpose** is a popular one, because we have a balanced CPU-to-memory ratio, and it's good for things like testing and development, small to medium-sized databases, and low to medium traffic web servers. We have six series within the General-Purpose category. Microsoft's best practice and recommendation are to run most of your SQL Server workloads undersize in the DSv2 series. And that's because it supports both premium storage and premium storage caching-- which, by the way, is SSDs. And it is recommended DS2 V2 for SQL Server stander edition and DS3 V3 for Enterprise edition
2. **Compute Optimized**, which contains VMs that have a high CPU-to-memory ratio. And you'll only use this in the SQL Server world if you need a dedicated machine for batch processing. It's also good for web servers with a lot of traffic, as well as your application servers. And, if you're going to need one in here, I would go with the Fsv2 because, again, it supports premium storage, premium storage caching, and it also has hyperthreaded CPU configurations
3. **Memory-Optimized**. And this is the exact opposite of Compute Optimized, where we have a high memory-to-CPU ratio. So this is also very good for hosting our SQL Server databases as well as data warehousing and in-memory analytics. The series you'll want to keep an eye out for, here, is going to be Esv3, M, and GS, as they all support premium storage.
4. **Storage Optimized**, which gives us high disk throughput and IO, which is a perfect match for big data and NoSQL-style databases.
5. **GPU Optimized** well for those graphic-intensive workloads-- not applicable, here, to SQL Server
6. **High performance computing** is the ultimate VM category. This is good for your scientific calculations and molecular modeling and that stuff that needs crazy amounts of horsepower

Azure Fault Domain and updated domain

Fault Domain

- Fault domains define the group of virtual machines that share a common power source and network switch.
- Every fault domain contains some racks and each rack contains a virtual machine.
- Each of these Fault domain shares a power supply and a network switch.
- If there is a failure in the fault domain then all the resources in the fault domain become unavailable.
- You should place your VMS in such a way that each fault domain gets one web server, one database server, and like that.

Update Domains

- Virtual machines get update domains automatically once they are put inside the availability set.
- All virtual machines within that update domain will reboot together.
- Update domains are used for patching of the virtual machines.
- Only one update domain would be updated at the time

How many Fault Domains and How many Update Domains we can have?

- In the Azure Service Management (ASM) portal, we have two Fault domains and 5 update domains.
- In the Azure Resource Manager (ARM) portal, we have three Fault domains and 5 update domains but we can upgrade our update domains from 5 to 20.
- VMs are assigned sequentially in the update domains and fault domains.
- Consider the below-mentioned table to understand how virtual machines would be placed within Fault Domains and Update Domains inside an availability set.

Azure High Availability

Availability can be configured only when you are created new VM but you can configure it on VM already published

1. Availability Set

Fault Domain It is the type of Availability that will secure your VM from the outage of the network or outage of the Power by balancing the VM's on multiple Sets. and the maximum is 3 (Fault domains define the group of virtual machines that share a common power source and network switch.)

Updated Domain: Secure your VM's the update process instead of doing an update for all of VM's in one time, we can balance it into 5 domains

2. Availability Zone

We can balance our VM's on 3 zones on the same rejoin and we have the choice to select which zone you need it not like Fault domain and updated domain it is selected by Microsoft

Virtual Machine (VM) Backup and Restore (Vault).

Introduction

It is azure built-in services doesn't require any infrastructure preparation and it is supported multiple types of backup (VM, File, Disk and SQL Database) it is one of the built options in the VM, so easy when you open Azure virtual machines and select your VM you will find in the left side Backup from this point and this place you can start to manage your backup and restore process as well you can keep monitoring your backup jobs and restore jobs let us go for demo and how to do VM backup and restore it and what is the restore types supported.

Azure Backup Process:

How the backup process will start and what is the sequences that running behind the seances when I asked azure backup services to take a backup from my MV

1- You need to install Azure backup recovery vault Services
2- Define backup policy then the backup extension will be installed.

3- After this, the backup services will start to discover and analyze your VM disks, files, data, and size.
4- Then It will start to create a Snapshot of your data. That's why the backup process sometimes takes time but this time will not be more than 24 hours.
5- After the snapshot completed the Azure backup extension will transfer the snapshot to azure backup recovery vault.

Azure backup hints

1- One backup per day is the maximum
2- To handle the backup, you will need to install the backup extension and it is supported by Windows and Linux. And it will be created automatically while creating azure vault service
3- During the process of moving the snapshot to azure backup vault you should not wait for the move process to do your restore no you can do fast restore from the snapshot that is saved locally and by default, the snapshot saved the local storage "Account storage" for two days and you can edit this number but this meaning more size on your storage "**This configuration can be done from backup policy**"
4- After this, the backup snapshot by default will be available on Azure backup vault for 180 days for daily backup and 12 weeks for weekly backup and you have also retention period for monthly and yearly **"This configuration can be done from backup policy**"
5- By default, recovery vault is Geo-redundant Storage (**GRS**) meaning one vault in your region and another vault in another region and you can change this configuration, for example, you can do it **LRS** (Local redundant Storage).
6- Azure Backup Vault Services on Windows VM working with (VSS) Services Windows Volume Shadow Copy Service to take an app-consistent snapshot of the VM. And once your backup is done you will find in azure backup page (APPLICATION CONSISTENT) as information.
7- Azure Backup Vault Services on Linux VM working with takes a file-consistent backup and if you need to implement (VSS) Volume Shadow copy Service you need to di it manual with a custom script
8- You cannot run more than one backup job for the same VM at the same time." **Failed**"

How to start to take a backup from VM

1- Open Microsoft Azure portal >> in the search write Virtual machines >> Select your VM >> in the left side click on Backup
2- IF you already have services recovery vault crated you can select it or you can create a new one
3- To create a new Vault, you need (Name, Resource Group, Policy) and you can create a new resource group and new policy from the same page.
4- Backup Policy it can be (Daily, Weekly, monthly, yearly) each option you can configure the retention period for it and the (Retain instant recovery snapshot(s)) How many days you need to keep your snapshot in your storage to do fast restore from it (More days = More Storage)

5- Now your backup enables and you ready to take your first backup

6- Backup Jobs you can track your job progress and restore also from it and you can find it when you select VM > Backup > in the left side you will find a backup job or you can find it on the recovery service vault

Azure Recovery Services vault

1- You can open it by searching the portal by "**Recovery Services vault**" or from VM Select backup from the left side and on the top right you will find your "Recovery services vault" name if you click on the name it will direct you to the services.
2- From Recovery services vault you can know backup in Progress or fail, what is the services covered by this vault-like How many VM's, you can know the type of your backup storage is it LRS (Local redundant Storage) or GRS (Geo-redundant Storage)
3- On the left side you can find Backup Jobs from it you can know all of the backup jobs executed if you click on the failed job you will know why it is failed for example "**Unable to initiate backup as another backup operation is currently in progress.**

Azure Restore

Azure provides us multiple options for restore

1- Restore Backup of the VM as new VM
2- Restore the backup of the VM as replace current VM
3- Restore Disk from the backup
4- Restore file by browsing the snapshot and select which files you need to restore it

Restore Hints

- If you restored a VM to the same resource group with the same name as the originally backed-up VM, backup continues on the VM after restoration.
- If you restored the VM to a different resource group or you specified a different name for the restored VM, you need to set up a backup for the restored VM
- IF the VM used Static IP and you do restore for the VM it will be converted to Dynamic IP at this time you should change the configure of the IP again.

How to do a restore

1- Open VM > backup option > at the end of the page you will find a list by backups with recovery types (**Snapshot**: Meaning the Snapshot taken but still not transferred to Vault, **Snapshot, and Vault:** Meaning the Snapshot taken and transferred to the vault
2- Select the backup you need it and right-click on it and select from restoring VM or file recovery
3- If you Selected Restore VM you will have two option replace current one or create a new one

4- IF you selected the File recovery Azure will generate PowerShell script it will be download as EXE for Example "IaaSVMILRExeForWindows.exe" Run it as administrator and the script will mount all of the disks on your machine to recovery your files, to unmount the disks on the same page you can click on Unmount Disks. Just only.

Notes

- **When you are planning to take a backup** from your Azure VM the recovery service Vault should be in the same region of the VM and if you will replicate this backup to another region each region should have dedicated Recovery services vault
- **Redeploy** VM when you do it you will lose the temp disk and dynamic IP (Set-Azurermvm -Redeploy -ResourceGroupname "-Name ""
- Moving resources to another resource group or subscription will be created with new resource id
- When you deploy disk on VM you need to log in as RDP to the VM to format and manage the disk, but you can still do this thing from Azure PowerShell when you add an extension to mount the disks
- **PowerShell DSC (Desired State Configuration)** when you create Automation services it will create automatically extension with PowerShell DSC and this can be used in case you need to validate the C: Drive is it exists in the VM by creating a text file on it and anyone deleted this file the automation services will create it again automatically https://docs.microsoft.com/en-us/azure/virtual-machines/extensions/dsc-overview
- Adding a New NIC Network card on VM it will be required to deallocate the VM server.
- for most SQL Server workloads, OLTP, and OLAP, you'll be choosing a series and size in the General Purpose or Memory Optimized categories
- For SQL Server data in a storage pool, which storage layout should be chosen (Simple)
- Storage pool types (Simple, mirror, parity) https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/deploy-standalone-storage-spaces
- Performance guidelines for SQL Server in Azure Virtual Machines: https://docs.microsoft.com/en-us/azure/virtual-machines/windows/sql/virtual-machines-windows-sql-performance & https://docs.microsoft.com/en-us/azure-stack/user/azure-stack-sql-server-vm-considerations?view=azs-1910
- VM Size use DS3 V2 for Enterprise edition or DS2 V2 for Stander edition in the General Purpose VM Type
- Use the Premium Storage with SSD
- Use minimum 2 disks one for log (LDF) and another one for data (MDF)
- Keep the storage account in the same VM in the same region
- Avoid using read-write caching on the disk of data (MDF) to not lose data
- Avoid using any caching type on the disk of log files (LDF)
- Enable instant file initialization for data files.

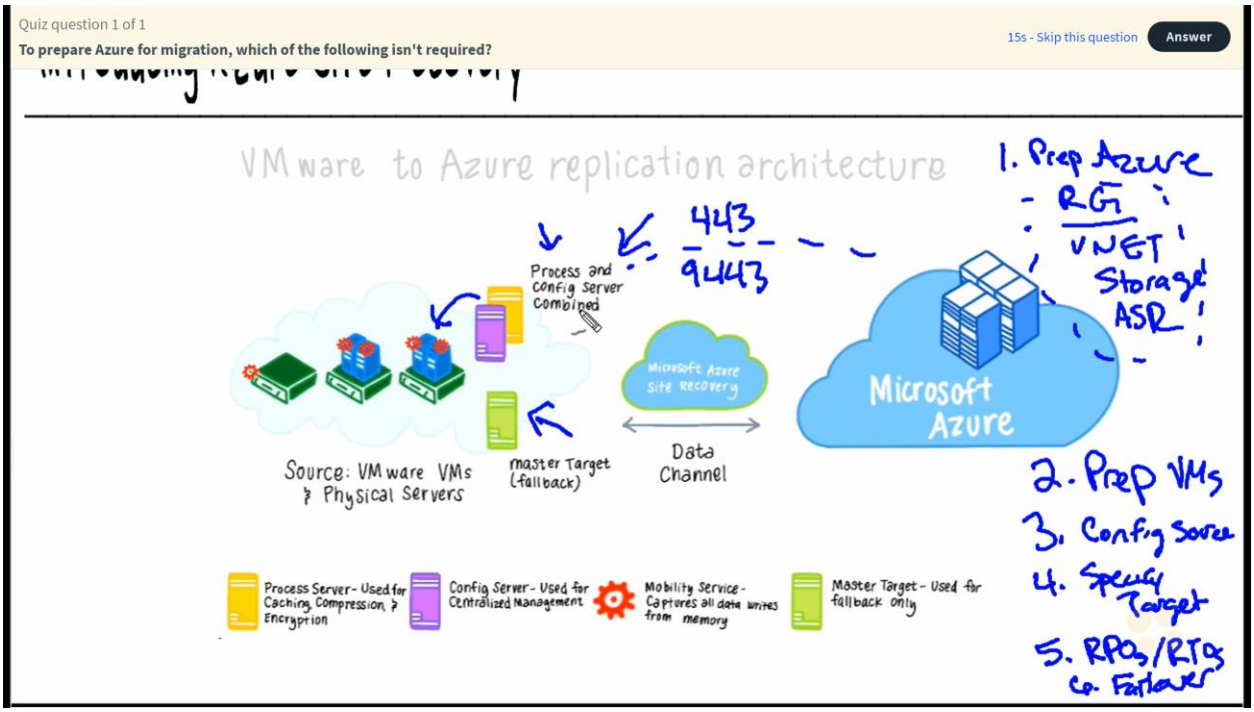
- Don't use the default port 1433
- Back up directly to blob storage

Azure Migration Service

1- Crate Migration Project
2- Strat discover and assess and this step you deploy Template as **OVA File** on your V-Center to discover and assess your VM (Size, versions, features, everything)
3- After Collecting the data, it will be Uploaded into Azure migration project on the Azure portal
4- Now it is the time of creating an assessment to assess the information you collected from your V-Center.
5- From the assessment, you know how many VM can be migrated and how many other VM need some requirement to be configured or installed before migration also you can know the total cost in detail, and this assessment report can be exported as a report for management decision.

Azure Site Recovery

1- **Prepare Azure:** (Create Resource Group, Vnet, Storage account, ASR Azure Site Recovery from Azure Recovery services vault) all for this should be in the same location you will migrate your VM to it.
2- **Prepare V-Center:** open Port 443 and 9443
3- **Prepare V-Center** You Should Enable the RDP access on Local V-Center to be able to do the migration
4- **Prepare V-Center** Set Registry value for non-domain access using Regedit
5- **Prepare V-Center** Set the Current time zone



Azure VM Migration

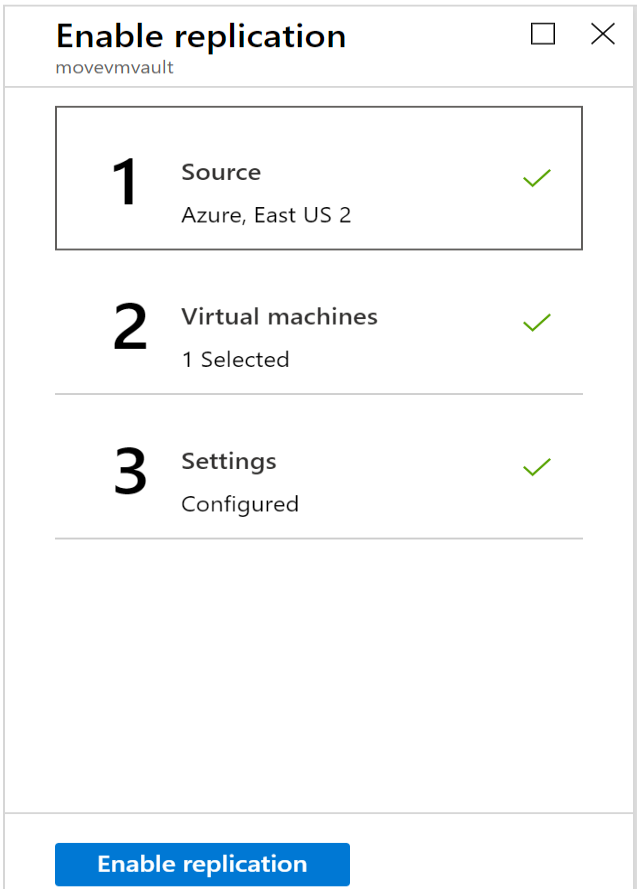
As I explained before on my last article [] that we can use the Azure recovery services vault for taking backup and doing a restore from azure VM using recovery services vault also the same services can be used to migrate your local VM from V-center to Azure using (Recovery services vault site recovery) and in this post, we will explain how to use this services recovery vault to build replication on VM between two rejoin and to do failover easily for the VM. Let's go for technical steps

1- How to build replication on VM
2- How to do Test Failover
3- How to do Real Failover

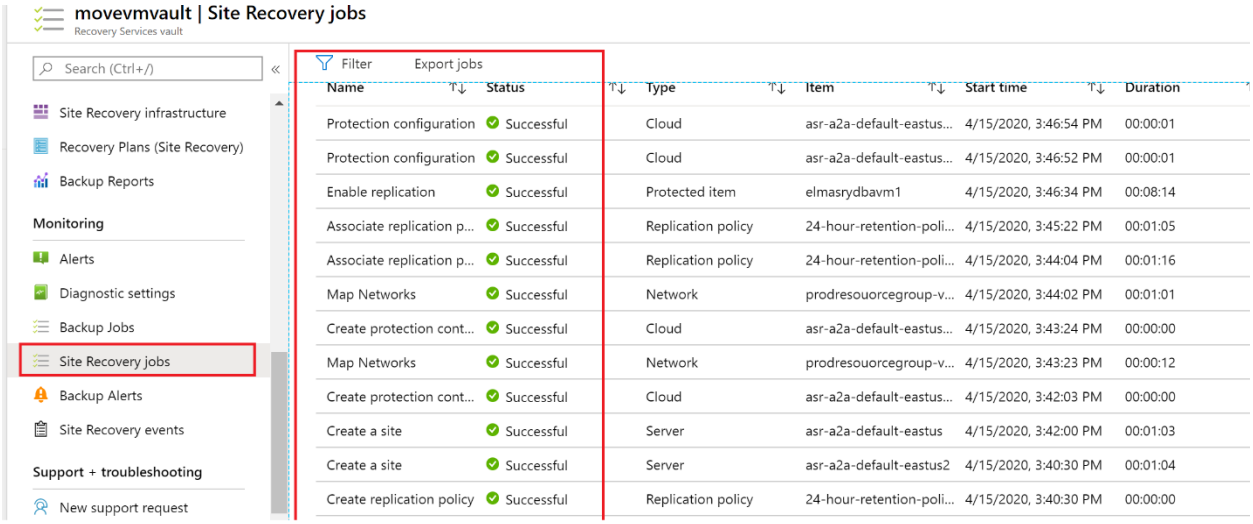
How to Build VM Replication Using Recovery Service Vault

1- You need to create New Recovery services vault and it recommended to create it on the location of the destination location you will replicate your VM on it
2- After creating the vault services, you will find on the top replication icon click on it to enable the replication by selecting the source information and distention information and the VM you need to replicate it

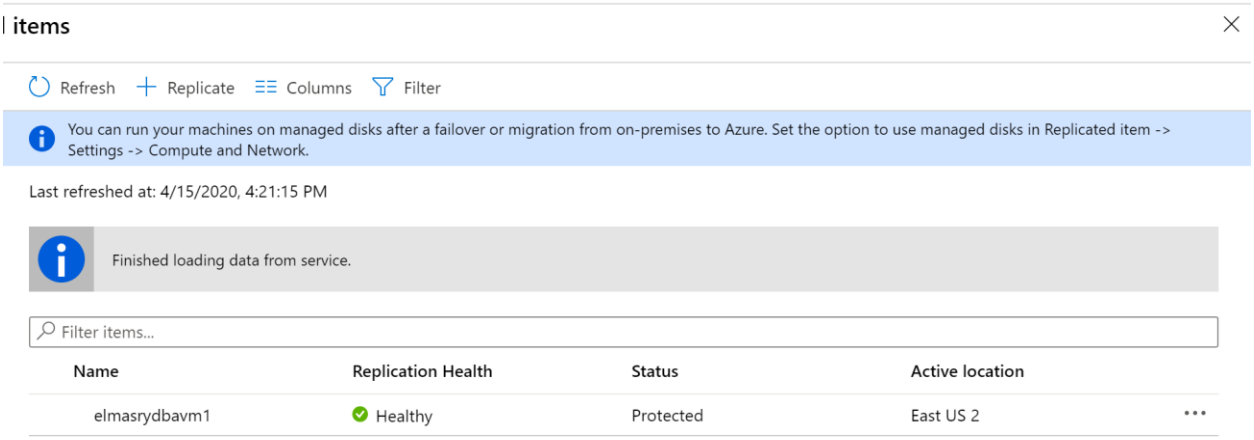
3- After this click on enable replication



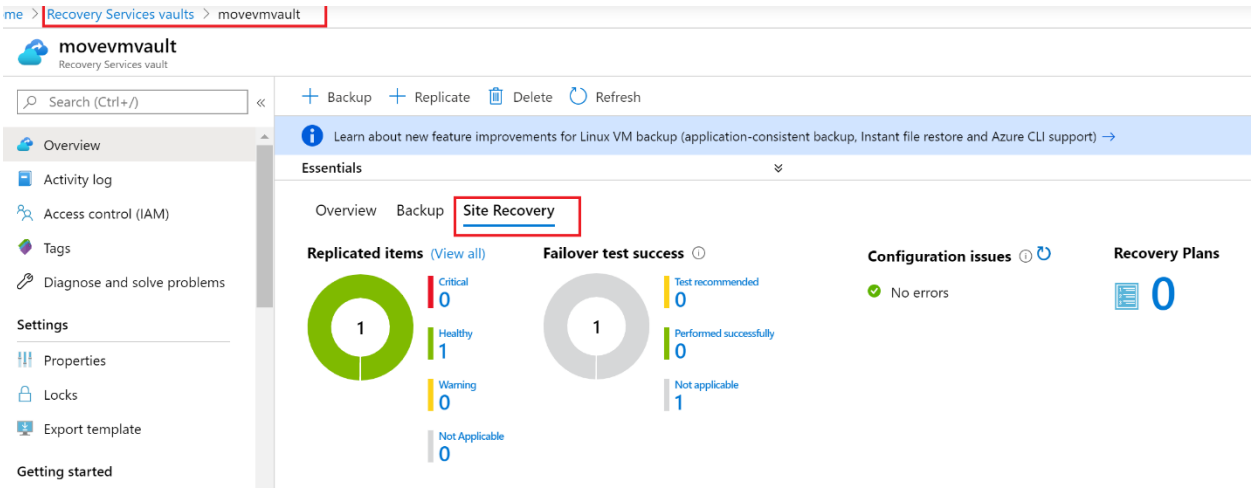
4- During the process you can keep monitoring the activities from the left you will find Site Recovery Jobs from this place you can check all of the activities running



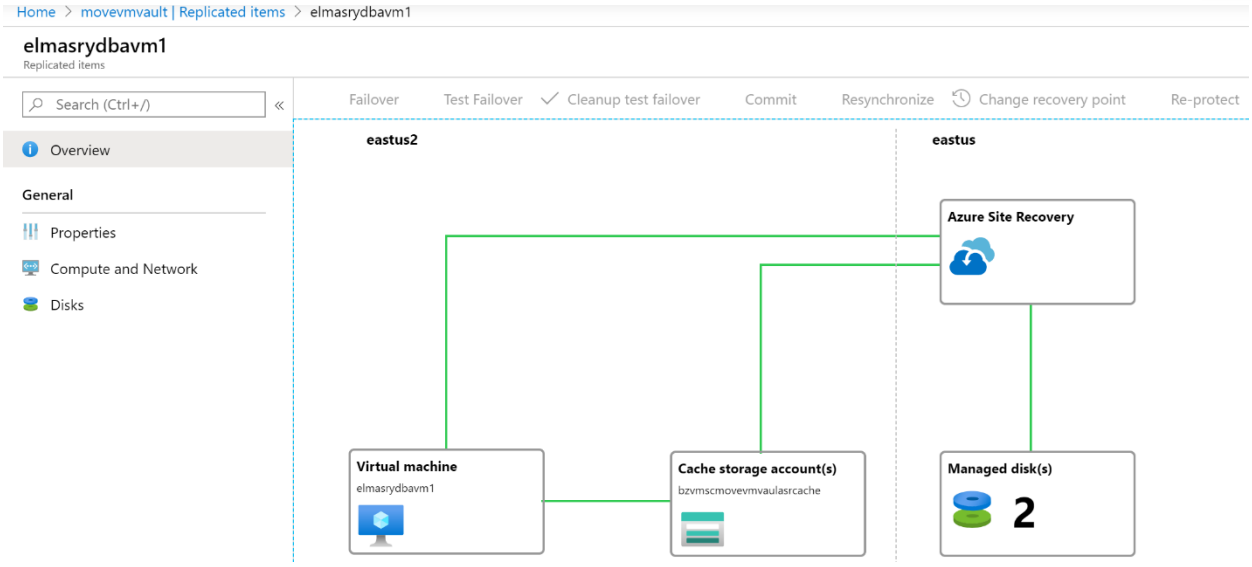
5- After this you can select from the left **Replicated Items** to check the synchronization status percentage % between source and destination once the status is converted to **PROTECTED** you can do your **test failover** then **real failover** from Source to destination.



6- The same information of the replication status you can get it by another way when you open your **services recovery vaul**t on the top you will find **Site recovery** this page will go you heath check status chart



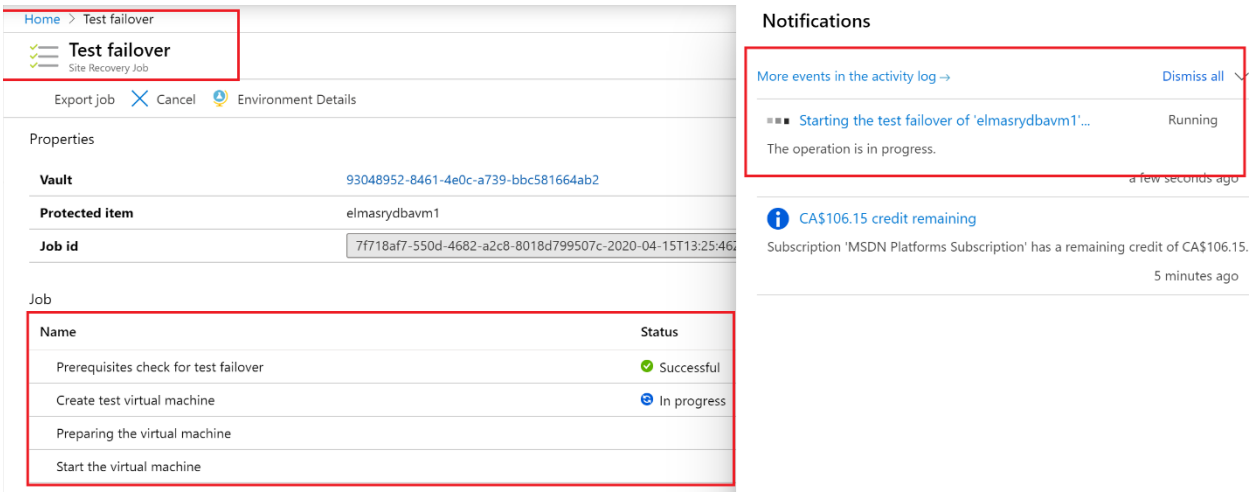
7- If you click on the status row in the page of **Replicated Items** you can discover the Infrastructure Replication and more other information about the replication status



How to do Test Failover

In Azure VM Replication we have two options **test Failover** and **Failover**

1- Open recovery service vault and select from the left replicated item right-click on the replication you build it and select **Test Failover**
2- From the notification on the top, you can click on the test failover notification to keep monitoring the test failover process.
3- Test Failover will support you to validate the failover process before going for Production failover "**Very helpful feature**"

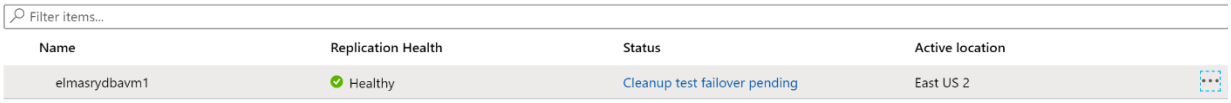


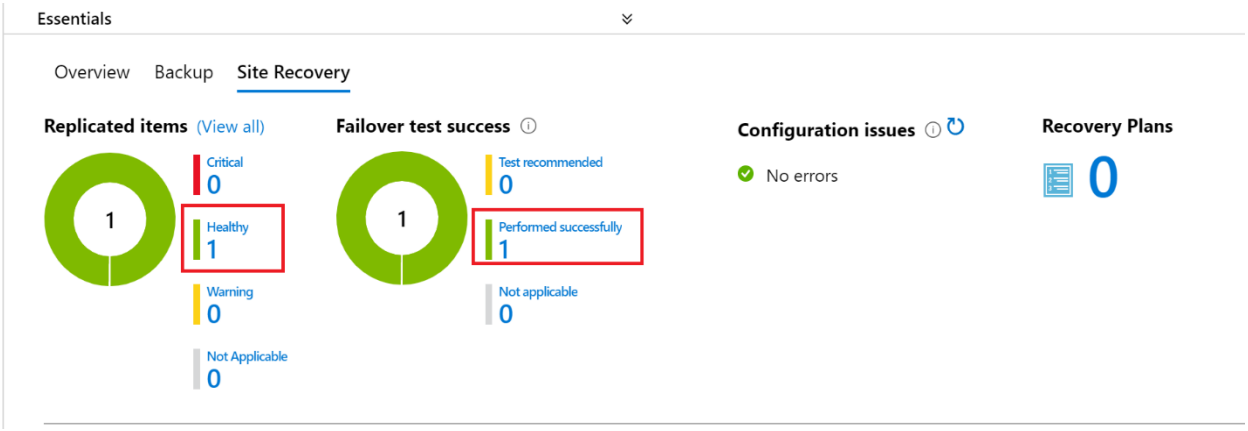
Test Failover will not affect your source VM at all it is a test scenario only but in real test, your Source VM will be **shutdown** Once it is succeeded you can do your real failover without any issue.

elmasrydbavm1	Virtual machine	Running	prodresouorcegroup	East US 2
elmasrydbavm1-test	Virtual machine	Running	prodresouorcegroup-asr	East US

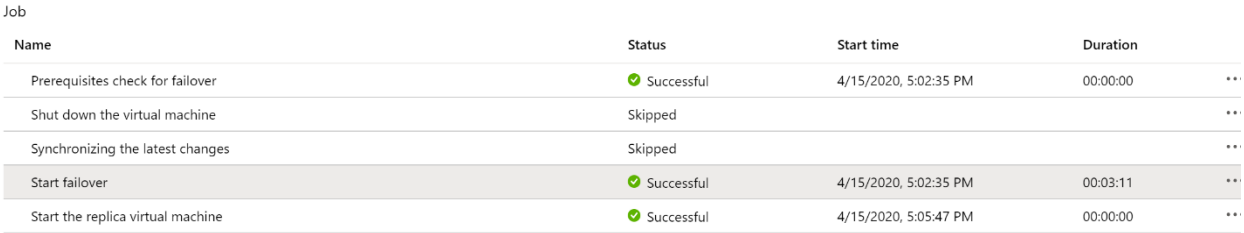
How to do real failover

1- Open recovery service vault and select from the left replicated item right-click on the replication you build and select Cleanup test Failover to do be able to do the real failover





2- From the notification on the top, you can click on the failover notification to keep monitoring the failover process.



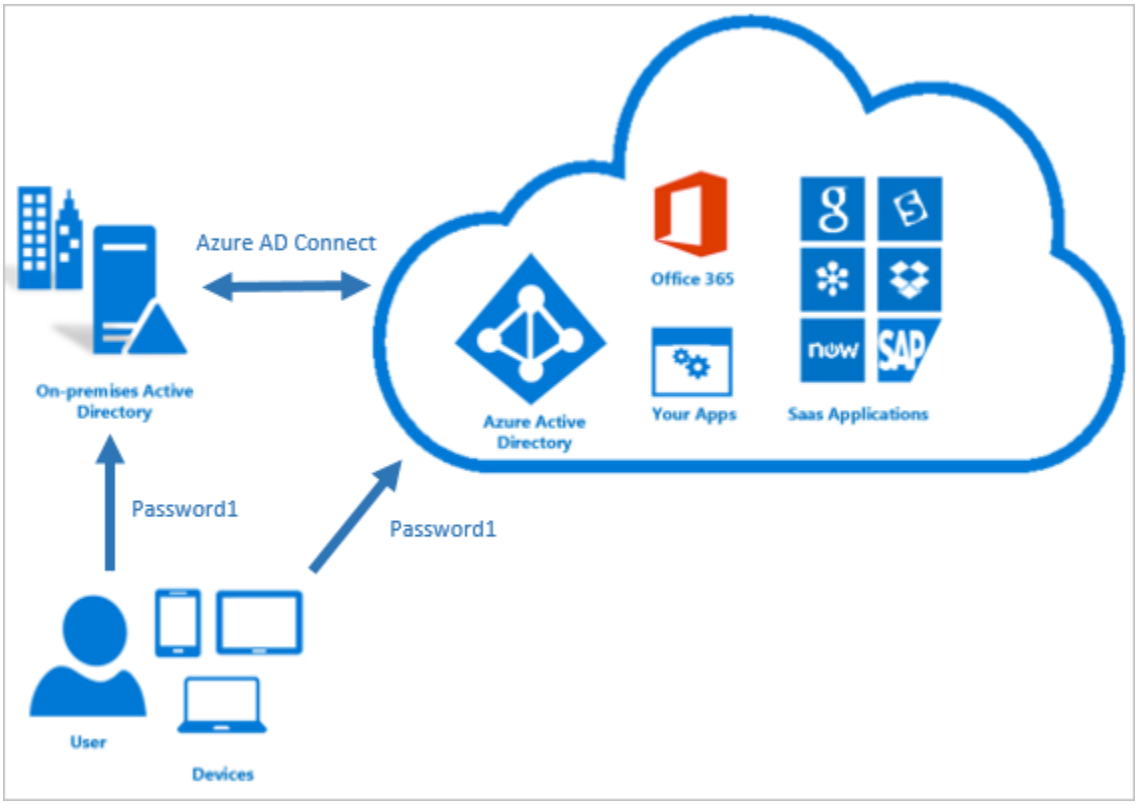
Azure Active Directory

- Azure Ad Basic VS Azure Ad Premium https://www.agileit.com/news/understanding-azure-active-directory-licensing-free-basic-p1-p2/
- Azure ID identity protection account Support by Azure AD premium account only not supported by the Azure Ad Basic.
- **Self-Password Reset**: it is allowed the users to reset the password but this services can be applied on User Group only not on users itself to implement it you should create user Group and assign to this group the users you need to be them under this group
- Load balancer VS Application Getaway in Azure
- **In Azure Active Directory:** We can implement {MFA, Self-Services password Rest, Self-Services Group Management, Device Registration, RBAC, Application Usage Monitoring, Auditing, Alert, Security Monitoring, Privileged account manager}
- Azure active direction edition (free, Basic, P1, P2) https://azure.microsoft.com/en-us/pricing/details/active-directory/

Azure AD Connect

https://mostafaelmasry.com/2020/03/30/what-is-azure-ad-connect-sync-engine/

When you are planning for Hyper model and you need to sync the identity between your local active directly on-premises to the azure active directory at this time you will need to know what is Azure AD connect



Azure AD Connect is a Microsoft tool designed for syncing the identity from on-premises active directory to azure active directory and it is containing two types of installation and it is depending on SQL Server. and by default, the engine sync's the identity every 3 minutes

- **Express installation option** for Single Forest
- **Custom installation option** for Multiple Forests or different sign-on option
- **Download Azure AD Connect** tool from **HERE**

And for more information about the how to use and how to install Azure AD Connect tool check Microsoft article

Azure AD Connect installation tips

- Azure AD Connect cannot be installed on Windows Server Essentially
- Server Core not support
- The server must be at least Windows Server 2008
- If you installed Azure AD Connect on Windows Server 2008 R2 SP1 or later password Synchronization are required.

- SQL Server is required and when you installed the Azure AD Connect it will install by default SQL Server express 2012 but you can configure it on your SQL Server.

Resources and notes

- Azure AD Connect Health for monitoring on Premises infrastructure, Alerts, View the Performance, Dashboard and it is available only on Azure Ad premium

https://www.youtube.com/watch?v=F0ldcCfCWNw

Azure Hints

- **Azure Reservation** it is new services from #Microsoft give you the benefits to reduce the cost by at least 70% compared by the normal price of Pay-As-You-Go, Azure Reservation it will help you save money by committing to one-year or three-year plans for multiple products This feature can be implemented on many Azure services such as #VM, #AzureSQL, #AzureCosmos DB, #blobstorage and so many other services to check it Go to this link 👉 https://portal.azure.com/#blade/Microsoft_Azure_Reservations/CreateBlade/referrer/Browse_AddCom mand to Purchase reservations, and for more information about the benefits and the cost check below articles ➡ https://www.appliedi.net/blog/what-are-azure-reserved-instances-and-benefits/ & https://docs.microsoft.com/en-us/azure/cost-management-billing/reservations/save-compute-costs-reservations
- Azure Free Account: https://azure.microsoft.com/en-us/free/free-account-faq/
- Azure Code Samples https://azure.microsoft.com/en-us/resources/samples/?sort=0
- Official Azure Documentation: https://docs.microsoft.com/en-us/azure/
- Official Microsoft Developer YouTube Channel https://www.youtube.com/channel/UCsMica-v34Irf9KVTh6xx-g
- Download the Azure SDK's for PowerShell and CLI https://azure.microsoft.com/en-us/downloads/
- Official Github Repository for PowerShell Scripts https://github.com/Azure/azure-powershell
- Azure REST API Browser https://docs.microsoft.com/en-us/rest/api/?view=Azure
-

Azure PowerShell

1- Check PowerShell Version ($PSVersionTable)
2- Check PowerShell Module installed on your PC: Get-Module
3- Install Windows Update module (Install-Module -Name PSWindowsUpdate -force -Verbos)

References

- Remote Server Administration Tools for Windows 10 : https://www.microsoft.com/en-au/download/details.aspx?id=45520
- Take Control of the Cloud with the Windows Azure PowerShell Cmdlets , it is onw hour demo for how to manage azure using PowerShell https://channel9.msdn.com/Events/TechEd/NorthAmerica/2013/WAD-B305#fbid=

How to manage Azure using Windows PowerShell

Requirements and Downloads

1- Azure Subscription https://portal.azure.com/
2- Check Azure account https://account.azure.com/Profile
3- .Net Framework 4.7 https://docs.microsoft.com/en-us/dotnet/framework/install/
4- PowerShell version 7 or higher https://www.thomasmaurer.ch/2019/03/how-to-install-and-update-powershell-6/
5- Azure Studio https://docs.microsoft.com/en-us/sql/azure-data-studio/what-is?view=sql-server-ver15
6- SQL Server Management Studio https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms?view=sql-server-ver15
7- Install Azure CLI https://docs.microsoft.com/en-us/cli/azure/install-azure-cli-windows?view=azure-cli-latest
8- Install Azure PowerShell Module https://docs.microsoft.com/en-us/powershell/azure/install-az-ps?view=azps-3.6.1&viewFallbackFrom=azps-1.2.0#install-the-azure-powershell-module
9- Install AzCopy Command-Line Tool for Azure Storage https://aka.ms/downloadazcopy for more information About AZcopy (https://docs.microsoft.com/en-us/azure/storage/common/storage-use-azcopy-v10) AzCopy is a command-line utility that you can use to copy blobs or files to or from a storage account. This article helps you download AzCopy, connect to your storage account, and then transfer files.
10- Install Azure Storage Emulator https://go.microsoft.com/fwlink/?LinkId=717179&clcid=0x409
11- Install PowerShell Module Manger 2020 https://www.sapien.com/software/powershell_modulemanager
12- Azure Storage Explore Free tool to easily manage your Azure cloud storage resources anywhere, from Windows, macOS, or Linux: https://azure.microsoft.com/en-us/features/storage-explorer/

Enable Azure Shell on Azure Portal

1- Login to Azure Portal https://portal.azure.com/
2- From the top banal on the right select Cloud Shell
3- Select PowerShell
4- Create Storage

Enable Azure AZ module

1- Open Windows PowerShell
2- Install Az module using this command (Install-Module -Name Az -AllowClobber -Force -Verbose)
3- Check the module installed (Get-Module -ListAvailable *Az*) or (Get-InstalledModule -Name Az -AllVersions | select Name,Version)
4- Connect to Azure using this command (Connect-AzAccount)
5- Check the Subscription for validation that you connected to azure (Get-AzSubscription)

References:

- Introducing the new Azure PowerShell Az module https://docs.microsoft.com/en-us/powershell/azure/new-azureps-module-az?view=azps-3.6.1
- Install Azure PowerShell: https://docs.microsoft.com/en-us/powershell/azure/install-az-ps?view=azps-3.6.1

Enable Azure CLI on Windows PowerShell

1- After the installation of Azure CLI https://docs.microsoft.com/en-us/cli/azure/install-azure-cli-windows?view=azure-cli-latest
2- Open Windows PowerShell As Administrator
3- Then write (**az**)
4- Check az version using this command (az --version)
5- Then install AzureRM module using this command (Install-Module AzureRM -AllowClobber -force -Verbose)
6- Check AzureRm module installed (Get-Module -ListAvailable *Azure*)

Enable Azure CLI interactive Mode

1- Open Windows PowerShell
2- Connect to Azure using this command (Connect-AzAccount)
3- Enable Az interactive using this command (AZ interactive)

References

1- https://www.red-gate.com/simple-talk/sysadmin/powershell/azure-windows-powershell-basics/
2- https://docs.microsoft.com/en-us/cli/azure/install-azure-cli-windows?view=azure-cli-latest
3- Get started with Azure CLI : https://docs.microsoft.com/en-us/cli/azure/get-started-with-azure-cli?view=azure-cli-latest
4- Azure CLI Interactive Mode https://docs.microsoft.com/en-us/cli/azure/interactive-azure-cli?view=azure-cli-latest

Enable Azure Module

1- Open PowerShell as admin
2- Execute this command (Install-Module Azure -AllowClobber -Force -Verbose)
3- Then Execute this command (Import-Module Azure -Force -Verbose)

Check Azure Module Versions

1- Get-InstalledModule Azure -AllVersions | Select-Object Name,Version,Path
2- Get-InstalledModule AzureRM -AllVersions | Select-Object Name,Version,Path
3- Get-InstalledModule Az -AllVersions | Select-Object Name,Version,Path

```
PS C:\Users\EngMo> Get-InstalledModule Azure -AllVersions | Select-Object Name,Version,Path

Name  Version Path
----  ------- ----
Azure 5.3.0

PS C:\Users\EngMo> Get-InstalledModule AzureRM -AllVersions | Select-Object Name,Version,Path

Name    Version Path
----    ------- ----
AzureRM 6.13.1

PS C:\Users\EngMo> Get-InstalledModule Az -AllVersions | Select-Object Name,Version,Path

Name Version Path
---- ------- ----
Az   3.6.1
```