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| Operations manual |
| Azure SQL service |
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| **Enclosures** |
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| **Current version** | | |  | **Supersedes** | | |  | **Issue date** | | | |
| Version no.: | | |  | Version no.: | | |  | 200x.mm.dd | | | |
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# Purpose of this document

The purpose of this document is to serve as an Manual Operation for the Microsoft SQL solutions in the cloud environment of multiple customers operated by Vestas HPMO in the Microsoft public cloud Azure.

The azure portal can be accessed via [https://portal.azure.com](https://portal.azure.com/).

# General description of the system

Every customer has different deployments in terms of Azure SQL server resources.

|  |  |
| --- | --- |
| Subscriptions | SQL in Azure VM |
| Dev ([vestas-sap-ea-westeurope-dev-01](https://portal.azure.com/)) | [3](https://portal.azure.com/#view/HubsExtension/BrowseResource/resourceType/Microsoft.SqlVirtualMachine%2FSqlVirtualMachines) |
| Test ([vestas-sap-ea-westeurope-prd-01](https://portal.azure.com/)) | [17](https://portal.azure.com/#view/HubsExtension/BrowseResource/resourceType/Microsoft.SqlVirtualMachine%2FSqlVirtualMachines) |
| Production ([vestas-sap-ea-westeurope-tst-01](https://portal.azure.com/)) | [20](https://portal.azure.com/#view/HubsExtension/BrowseResource/resourceType/Microsoft.SqlVirtualMachine%2FSqlVirtualMachines) |

# Responsibilities

## System owner, system manager

Service owner/manager is Vestas HPMO.

## Support organisation

Vestas HPMO.

## Platform administrator

Vestas HPMO. All members need to have Contributor access at the Azure level and SysAdmin for the SQL in Azure VM. Also be part of Active directory group Azure SQL Admins (Tier1-ROLE-SQL-Admins).

These accesses need to be requested with Alan Madsen.

## Application responsible

The application configuration is the customer responsibility along with Microsoft as a platform provider can be contacted in case of further support.

## Technical requirements and tools

The most common way of connection to the databases and instances is usually through SSMS (SQL Server Management Studio). You can access the SSMS inside the SQL in Azure VM.

# System contents

## Operations model - system level

| **Service Level Target** | **Details** | **24/7** |
| --- | --- | --- |
| Service Hours | The time period where the services covered are expected to be available and where incident management will be performed. | Yes |
| Change and general request Fulfillment | The time period where the services covered is subject to Request fulfilment and Change Management. Activities related to other supporting processes are also covered in this category unless otherwise stated.  For details on targets for each process please refer to the NNIT Cloud Delivery Model | Yes |

## Azure SQL overview

Current Azure SQL resources are [here](https://portal.azure.com/#blade/HubsExtension/BrowseResource/resourceType/Microsoft.Sql%2Fazuresql)

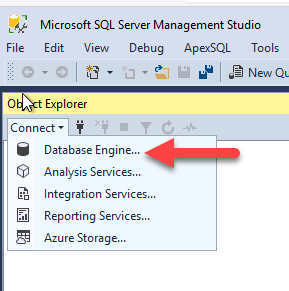
**Discovering all SQL databases on a subscription:**

[SQL virtual machines - Microsoft Azure](https://portal.azure.com/#view/HubsExtension/BrowseResource/resourceType/Microsoft.SqlVirtualMachine%2FSqlVirtualMachines)

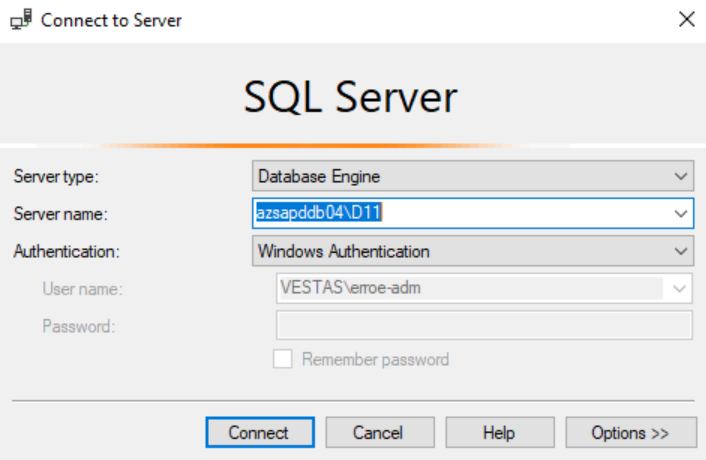
# User management

5.1. Connecting to a Azure SQL database

1. Click on Database Engine



1. Type the database you need to connect to your Windows Authentication and use your domain account:



5.2. Adding users to an SQL Azure database:

Make sure you have a Service Request assigned to Cloud Operations team in Remedy.

Open a new query window and run

|  |
| --- |
| CREATE LOGIN "UserName" WITH password='StrongPassword';  USE YorDatabase  CREATE USER "UserName"  FOR LOGIN " UserName "WITH DEFAULT\_SCHEMA = dbo  GO  USE YorDatabase  GO  ALTER ROLE db\_datareader ADD MEMBER "UserName"  GO |

Then you can verify that the users were created with this script:

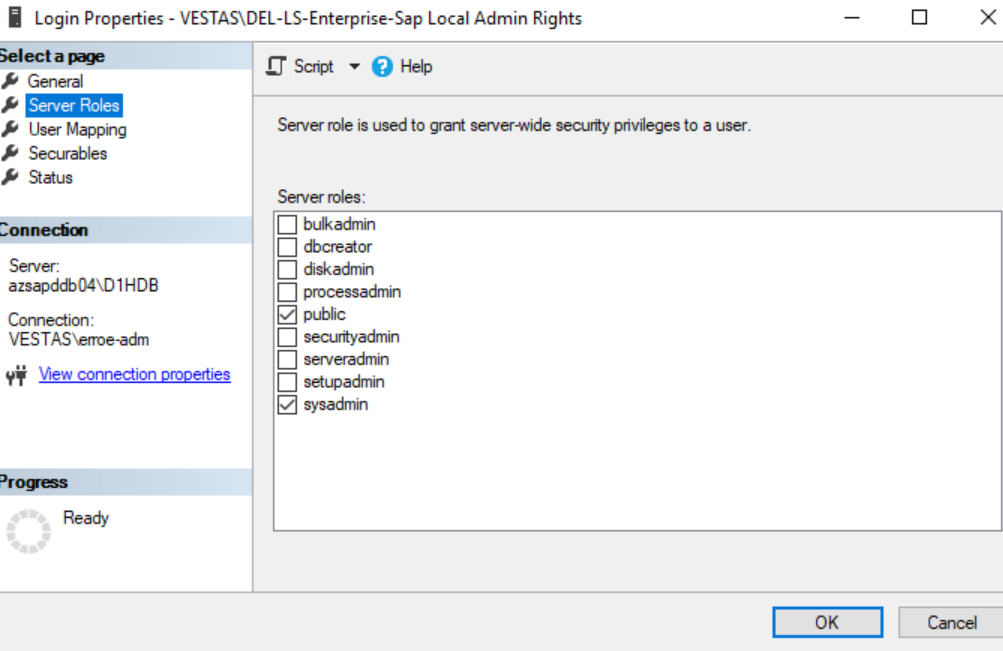
|  |
| --- |
| select name as username,  create\_date,  modify\_date,  type\_desc as type,  authentication\_type\_desc as authentication\_type  from sys.database\_principals  where type not in ('A', 'G', 'R', 'X')  and sid is not null  order by username; |

5.3 Adding users to a SQL Instance (Azure SQL on VM and Azure SQL Managed Instance)

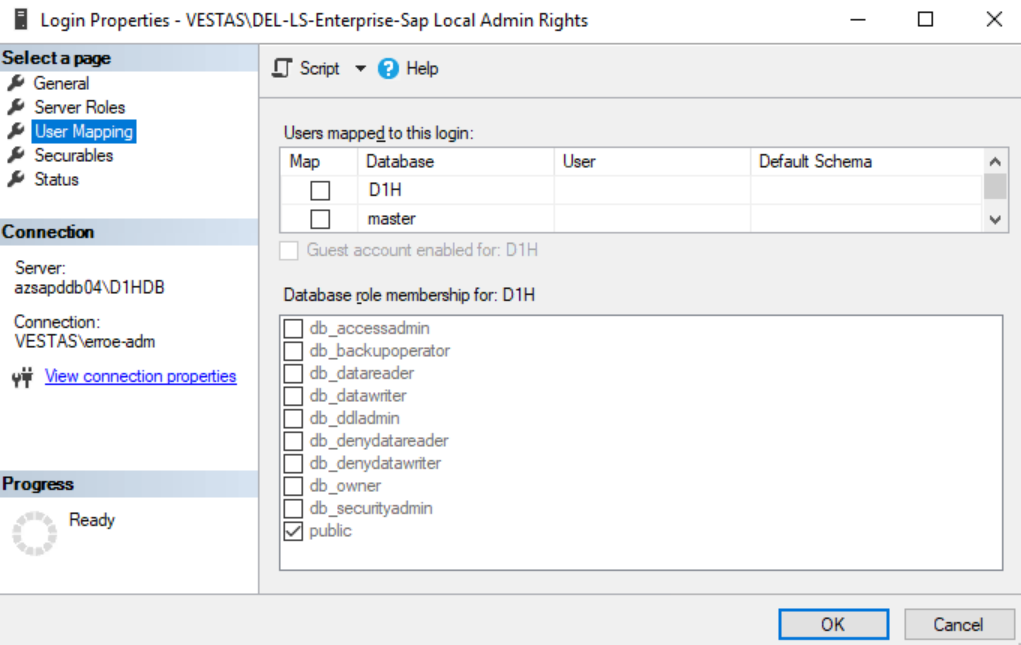
When adding domain users accounts is preferable to add users to a Active directory group, for example VESTAS\DEL-LS-Enterprise-Sap Local Admin Rights and then add the group into the instance. This is the best practice but if customer requires to add a particular user, then please follow the same procedure as below:

1. Make sure you have a ticket in Remedy and the username
2. Right click on Logins and select New login:
3. Insert the AD group
4. Click on Server Roles

By default, we do not provide sysadmin rights on an instance:



1. Click on User Mapping



1. Click OK.

Detailed information related Azure SQL databases and FW rules can be found [here](https://docs.microsoft.com/en-us/azure/azure-sql/database/firewall-configure#permissions).

# Deploying a database

In order to deploy a new database a new Request for Change in Remedy must be raised and assigned to Cloud Operations team. The Remedy template used is “New PaaS SQL Instance” The following requirements must be provided from the customer

|  |  |  |
| --- | --- | --- |
| Question/ requester input | Mandatory | Selection Values  (Default value first, delete values not required) |
| What would be the preferred name for a SQL Database? | Yes |  |
| What application name is the DB used by? | Yes | Application name |
| Environment for DB | Yes | Example: Development |
| Existing SQL PaaS Instance to place the database in. (if 'new SQL PaaS instance', please request this via a demand) | No |  |
| Refer if any existing SQL PaaS server name | No |  |
| DB Owner Name and contact | Yes |  |
| How the application using the DB will be published | Yes |  |
| What kind of application will be using this DB *(Web application any warehouse kind of requirement etc. Please brief on the project/ application usage.)* | Yes |  |
| Please provide approximate count of users to whom this application will be published. | Yes |  |
| Criticality of the Application | No |  |
| DB Read/Write permission will be provided by Default: (Please mention if any users with special permissions need to be created) | No |  |
| Please specify the SQL elastic pool if the database must be placed in one? | Yes |  |
| Tags to be added to this resource | No |  |
| Server admin login | Yes |  |
| Resource group | Yes |  |
| Subscription name | Yes |  |
| Collation | Yes | Default is SQL\_Latin1\_General\_CP1\_CI\_AS |
| Purchase model | Yes | vCore or DTU specify according Microsoft [here](https://azure.microsoft.com/en-us/pricing/details/azure-sql-database/single/) |
| High Availability | Yes |  |
| Backup requirement (Standard or LTR) | Yes |  |

# Deleting (decommissioning) a database

Please refer to this link:

[Decomission process - Overview (visualstudio.com)](https://vestas.visualstudio.com/Data%20Center%20Hybrid/_wiki/wikis/Hybrid%20Operations/4814/Decomission-process)

# Checking database consistency in multiple databases in the same instance

Connect to the instance via Management Studio (SSMS).

Open a new query window and paste the following script:

|  |
| --- |
| IF OBJECT\_ID('tempdb..#DBInfo') IS NOT NULL  Drop TABLE #DBInfo  IF OBJECT\_ID('tempdb..#Value') IS NOT NULL  Drop TABLE #Value  CREATE TABLE #DBInfo (ParentObject VARCHAR(255), [Object] VARCHAR(255), Field VARCHAR(255), [Value] VARCHAR(255))  CREATE TABLE #Value (DatabaseName VARCHAR(255), LastDBCCCheckDB DATETIME)  EXECUTE sp\_MSforeachdb '  INSERT INTO #DBInfo EXECUTE ("DBCC DBINFO ( ""?"" ) WITH TABLERESULTS");  INSERT INTO #Value (DatabaseName, LastDBCCCheckDB) (SELECT "?", [Value] FROM #DBInfo WHERE Field = "dbi\_dbccLastKnownGood");  TRUNCATE TABLE #DBInfo;  '  SELECT \* FROM #Value  WHERE DatabaseName NOT IN ('tempdb')  IF OBJECT\_ID('tempdb..#DBInfo') IS NOT NULL  Drop TABLE #DBInfo  IF OBJECT\_ID('tempdb..#Value') IS NOT NULL  Drop TABLE #Value |

# Backup and Restore

**SQL Standalone Backup:**

All backups are stored and managed in a Recovery Services vault. Database Backup is performed on the Instance level and not on the individual DB. Once the SQL Instance are backed up, the DBs inside is now part of the backup setup.

The HPMO team is monitoring all the SQL Instance backup created in the Recovery Services Vault that are being run through the created Core-SQL-Policy. If the backup fails, an internal investigation will be started immediately.

**SQL AG Instances Backup:**

In the Availability Group setup, the unique name changes to AGName\DBName. The database must be configured for protection from under the AG. Make sure that all the nodes that are part of the AG instance are registered in the Recovery Services Vault.

You can refer to the below document for more details on this limitation:

Back up SQL Server always on availability groups - Azure Backup | Microsoft Docs

**Note:**

To avoid missing Log Backup for some SQL DBs, this validation must be done:

o There are 3 different types of recovery model: Simple, Full and Bulk logged.

o If the database is in the simple recovery model, the log backup schedule for that database will be paused and so no log backups will be triggered.

o If the recovery model of the database changes from Full to Simple, log backups will be paused within 24 hours of the change in the recovery model. Similarly, if the recovery model changes from Simple, implying log backups can now be supported for the database, the log backups schedules will be enabled within 24 hours of the change in recovery model.

In order to enable log backups in Azure SQL Backup, the DB’s recovery model must be changed to Full or Bulk Logged.

o The recovery models of a DB cannot be modified from the Azure portal and must be changed from within the SQL Server The steps of changing the recovery model are quite straightforward as explained in: Set database recovery model - SQL Server | Microsoft Docs. After changing the recovery model to Full, we need to wait for 24 hours for the log backups to be reflected.

**SQL Restore**

There are 3 options to restore an SQL DB from Azure as per: Restore SQL Server databases on an Azure VM - Azure Backup | Microsoft Docs. Below is the summary for them:

 Alternate Location: Restore the database to an alternate location and keep the original source database. This option is helpful if you have concerns about losing the latest data in the source database or if you are copying the database to another path.

 Overwrite DB: Restore the data to the same SQL Server instance as the original source. This option overwrites the original database.

Note:

If the selected database belongs to an Always On availability group, SQL Server doesn't allow the database to be overwritten. Only Alternate Location is available. You need to restore such database to a standalone SQL instance and then join it to the AG.

 Restore as files: Instead of restoring as a database, restore the backup files that can be recovered as a database later any machine where the files are present using SQL Server Management Studio. Since all 3 restore options require you to restore to an SQL instance registered to Azure Backup, the “restore as files option” allows you to copy the files to computers not managed by Azure Backup for other uses. Refresh the SQL server on the Management Studio and check if the new database is restoring.

In order to see the status of the restore job, open a new query in SSMS and execute the following scripts:

SELECT r.session\_id,r.command,CONVERT(NUMERIC(6,2),r.percent\_complete)

AS [PERCENT Complete],CONVERT(VARCHAR(20),DATEADD(ms,r.estimated\_completion\_time,GETDATE()),20) AS [ETA COMPLETION TIME],

CONVERT(NUMERIC(6,2),r.total\_elapsed\_time/1000.0/60.0) AS [Elapsed MIN],

CONVERT(NUMERIC(6,2),r.estimated\_completion\_time/1000.0/60.0) AS [ETA MIN],

CONVERT(NUMERIC(6,2),r.estimated\_completion\_time/1000.0/60.0/60.0) AS [ETA Hours],

CONVERT(VARCHAR(100),(SELECT SUBSTRING(TEXT,r.statement\_start\_offset/2,

CASE WHEN r.statement\_end\_offset = -1 THEN 1000 ELSE (r.statement\_end\_offset-r.statement\_start\_offset)/2 END)

FROM sys.dm\_exec\_sql\_text(sql\_handle)))

FROM sys.dm\_exec\_requests r WHERE command IN ('RESTORE DATABASE','BACKUP DATABASE')

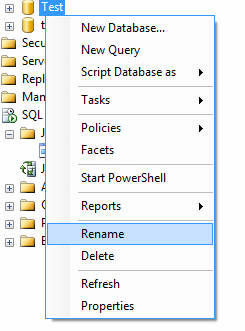
SELECT \* FROM sys.dm\_exec\_requests

To see the ETA remaining you need to run the following command because the ETA is not visible on the portal:

SELECT \* FROM sys.dm\_operation\_status

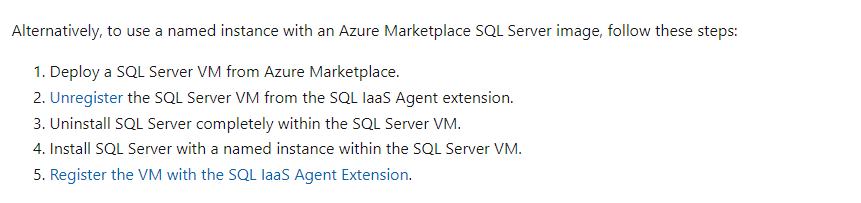
**Renaming the database**

If the request is to restore one database to the same server, then after restoring with a different name you have to rename it via SSMS.



Or via TSQL: ALTER DATABASE [Test] MODIFY NAME = [Test2]

As discussed with an MS Support, they have suggested the same process I have told you and the following process on renaming the Named SQL Instance should be our guide:

**

*refer to:*[*https://docs.microsoft.com/en-us/azure/azure-sql/virtual-machines/windows/sql-server-iaas-agent-extension-automate-management?view=azuresql&tabs=azure-powershell#named-instance-support*](https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.microsoft.com%2Fen-us%2Fazure%2Fazure-sql%2Fvirtual-machines%2Fwindows%2Fsql-server-iaas-agent-extension-automate-management%3Fview%3Dazuresql%26tabs%3Dazure-powershell%23named-instance-support&data=05%7C01%7Cerroe%40vestas.com%7C79f98bca70204d7782bd08da946c10db%7Cc07019407b3f4116a59f159078bc3c63%7C0%7C0%7C637985489126424437%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=96qE40Ss4msTIvXJPsqEO9QhuXb7dTDqEmvQ4pgZBWM%3D&reserved=0)

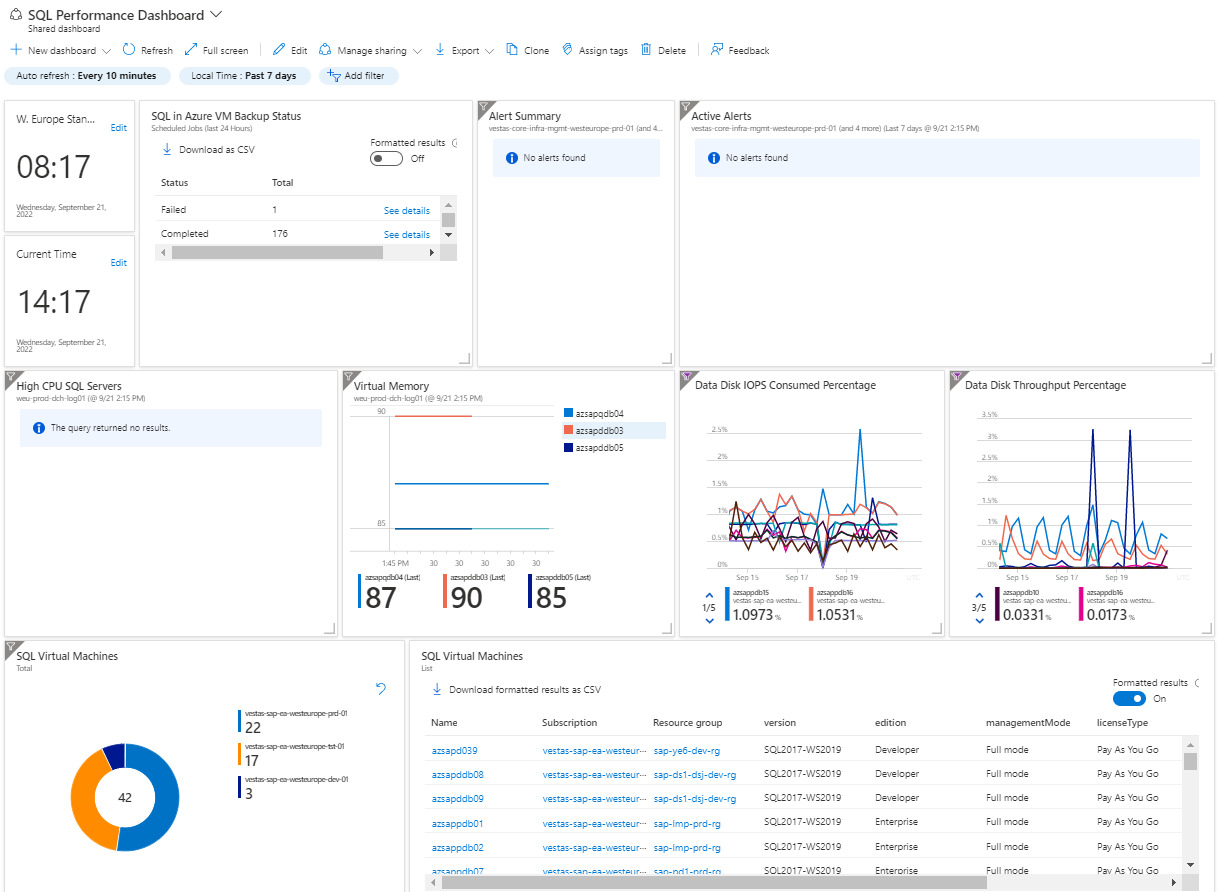
# Monitoring

SQL Performance Dashboard provide a summary view of all monitored SQL in Azure VM. It displays a matrix of tiles, arranged into defined groups, with each one representing availability, health and performance statistics.

The single pane of glass watches the status and key metrics of estate in one place. Continuously monitors the availability, health and performance statistics of all of these SQL in Azure VM, collecting and assessing a range of machine- and SQL Server- metrics, and associated alert data and then presenting it in a single graphical web interface for review and analysis.

By collecting and analyzing metrics over time, SQL Performance Dashboard makes it easier to spot and fix concerns before they become a problem that impacts the running of the SQL Servers. It reveals disconcerting trends, such as rapid database growth, disk usage statistics, backup status, alerts and uses baselines to compare the current server behavior to historical behavior over similar periods, to help understand when performance patterns are abnormal, and why.

The top band of the tile shows the backup status and alerts, with overviews to represent different categories of SQL servers (Consolidated backups, Alerts, and Summary). The middle band shows the server statistics, tiles with different measuring counters, CPU consumption, Virtual Memory and disk I/O (reads and writes) making it easy to see which instances require immediate attention. The lowest band of the tile shows the list of all SQL in Azure VM.



# AlwaysOn Availability Groups

Always On availability groups on Azure Virtual Machines are similar to Always On availability groups on-premises and rely on the underlying Windows Server Failover Cluster.

To check the Always on Availability status of the replicas you need to right click on “Availability groups”.

All databases participating on AG must be in state “Synchronizing”:

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(Secondary) 
Availability Replicas 
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DAFSQLDK026\105 
DAFSQLDK035\105 (Secondary) 
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# Change log

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| **Date** | **Version** | **Description of changes** | **Initials** |
| **09/19/2022** | **1.0** | Initial Creation | ERROE |
| **09/21/2022** | **2.0** | Monitoring Section Added | REABA |