

German cloud to Public Cloud migration using GeoDR solution


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Overview

Due to the upcoming deprecation of Black Forest (Germany Cloud), SQL DB needs to migrate the customers that are currently on the German cloud to Azure global cloud. And as part of the migration, the goal is to provide a mechanism allowing to migrate online databases of different sizes from BF to PC. The solution is based on an active geo-replication (Geo-Dr) working for Azure SQL DB across clouds. Currently this functionality is supported within one cloud allowing to create a secondary database(s) in a different cloud region and to failover to a secondary database that becomes a primary. Effectively a geo-replication creates an online copy of a database in another region (within a cloud).


For the BF migration the same Geo-Dr mechanism can be used across-clouds from BF to PC. An active replication means that after creating a secondary database, all operations are online, and customers can access their database as the Geo-Dr is in progress. For more details see [Creating and using active geo-replication](#) .

Prerequisites for customers


The following prerequisites must be fulfilled before that migration process can start.

- Valid Blackforest Subscription with resources to migrate to Public Cloud.
- Only one Source subscription (blackforest) allowed per service request.
- Support request should be created from Blackforest Subscription(Source).
- The target Public Cloud subscription requires at least one provisioned resource to enable whitelisting. If the subscription currently has no resources configured, customer should provision a SQL server (for

example). Note: the provision of only a resource group is not sufficient.

- Customers without support plan should be able to use deep [link](#)  to open support request to Migrate


Scope

- The scope of this request is to help customers who prefer to migrate using GeoDR mechanism. Customers will open service request with us and we raise ICM to GeoDR to help whitelisting subscription pairs.
- Alternatively for small workloads (database) customer can also migrate database using [standard methods](#)  on their own without Microsoft support.
- And Engineering will whitelist unique subscription pairs (1Source & 1Target Subscription) to enable Geo replication method of active migration. (PG Will not migrate for customers)

Allow list (Whitelist)

- Establishing geo-replication link from Azure Germany cloud to a server on Azure Global (public cloud) requires whitelisting of each target subscription. Whitelisting requests must be submitted from the Azure Germany (source) subscription. For replicating the databases to different target subscriptions customers can provide multiple targets

Requirement from CSS/ARR engineers

- Review customer Support request and ensure Source (Blackforest Subscription used for creating this support request) and Target Subscription IDs (one or more Target Subscription IDs)
- Update SR - Internal Title to uniquely identify these support requests from customers. i.e.: **[Azure Germany To Public Cloud Geo-DR migration request]**
- Use ICM Template for [German Cloud Migration requests](#) to create Escalation request with [GeoDR Product Team](#) .
- For Multiple Target Subscriptions, ensure to submit request for unique pairs to whitelist


Example (Unique pair) :

Customer migrating from a Source (Blackforest) to two Target (Public cloud) subscriptions

Whitelist 1 - XXXXXX596-75A1-1C8E-A98C-DE72BD64B1D (Source) -> XXXXXX39D-75A1-1C8E-A98C-DE72BD6eeeD (Target)

Whitelist 2 - XXXXXX596-75A1-1C8E-A98C-DE72BD64B1D (Source) -> XXXXXX5JFJ-928D-8NBH-A98C-GHJDKEIDKIF-Unique P




- Upon whitelist confirmation from Geo DR Engineering team, update and request customers to follow our public documentation for step by step instructions - [Migrate database using active Geo Replication](#) 
- Resolve Incident.

Additional Details

Migration steps for customers

After whitelisting subscription pair(s) customer follows these steps to execute and complete the database migration from blackforest to Public cloud. This information will also be available to follow thru Public doc link for customers.

1. Choose the BF user database e.g. "mybfdb"

2. Create a logical server in PC, e.g. "mypcserver". It's FQDN is mypcserve.database.windows.net .
3. Start geo-replication from BF to PC by executing this T-SQL command on bf-server in BF region

```
ALTER DATABASE [mybfdb] ADD SECONDARY ON SERVER [mypcserver.database.windows.net];
```

Note that the fully qualified dns name is used for the public server. This is to indicate that the target serv

4. When the replication is ready to move the read-write workload to PC, initiate a planned failover to PC by executing this T-SQL command on PC server.

```
ALTER DATABASE [mybfdb] FAILOVER;
```

5. Use the following T-SQL to stop geo-replication. If this command is run after the planned failover, it will terminate the geo-link with database in public cloud being the read-write copy. This will complete the migration process. However, if the command is executed before the planned failover, it will stop the migration process and the database and in BF will remain the read-write copy. This T-SQL command should be run on the current geo-primary database's logical server, e.g. on bf-server before planned failover and public-server after planned failover.

```
ALTER DATABASE [mybfdb] REMOVE SECONDARY ON SERVER [bf-server];
```

or

```
ALTER DATABASE [mybfdb] REMOVE SECONDARY ON SERVER [public-server];
```

These steps to migrate an Azure SQL databases from BF region to PC can also be followed using active geo-replication.

For more information the following tables below indicates T-SQL commands managing failover. The commands indicated below are supported for cross-cloud Geo-Dr between BF (black forest cloud) and PC (public cloud)

Command	Description
ALTER DATABASE	Use ADD SECONDARY ON SERVER argument to create a secondary database for an existing database and starts data replication
ALTER DATABASE	Use FAILOVER or FORCE_FAILOVER_ALLOW_DATA_LOSS to switch a secondary database to be primary to initiate failover
ALTER DATABASE	Use REMOVE SECONDARY ON SERVER to terminate a data replication between a SQL Database and the specified secondary database. <i>-sys.geo_replication_links Returns information about all existing replication links for each database on the Azure SQL Database server.</i>

Geo-Dr system views - for Monitoring

- **sys.geo_replication_links**

Returns information about all existing replication links for each database on the Azure SQL Database server.

- **sys.dm_geo_replication_link_status**

Gets the last replication time, last replication lag, and other information about the replication link for a given SQL database.

- **sys.dm_operation_status**

Shows the status for all database operations including the status of the replication links.

- **sp_wait_for_database_copy_sync**

Causes the application to wait until all committed transactions are replicated and acknowledged by the active secondary database.

Functional description

Below is the functional description for this feature. Please note that the Geo-Dr is supported today within the same cloud and its new functional feature extension contain a cross-cloud support.

The following T-SQL syntax is supported allowing to specify a target server in PC by using its fully qualified dns server name on the target side:

```
Alter database [sourcedb] add secondary on server [public-server.database.windows.net]
where: sourcedb -represents the database name in an Azure SQL server in BF.
```

[public-server.database.windows.net](#) ☐ –represents the Azure SQL server name that exists in the PC, where the database should be migrated. The namespace “[database.windows.net](#) ☐” is hardcoded, meaning, the public-server name must exist within this namespace. No other namespace can be chosen.

Note - *This T-SQL syntax exists today except that in the cross-cloud replication the address for the target server is extended to represent another Azure cloud in this case PC.*

- The above T-SQL command is an extension of existing T-SQL command that starts the Geo-Dr process. Alter database [sourcedb] add secondary on a server [target-server], where target-server is an existing server in the cloud environment that is hosting the sourcedb. For more information see [ALTER DATABASE \(Transact-SQL\)](#) ☐
- The command is executed on the master database on the server hosting the local database that becomes the primary.
- The T-SQL start-copy API authenticates the logged-in user in the public cloud server by finding a user with the same SQL login/user name in master database of that server. This approach is cloud-agnostic; thus, the T-SQL API is used to start cross-cloud copies. For permissions and more information on this topic see [Creating and using active geo-replication and ALTER DATABASE \(Transact-SQL\)](#)
- Except for the initial T-SQL command extension indicating an Azure SQL logical server in PC, the rest of Geo-Dr process is identical to the existing execution in the local cloud. The steps to create active Geo-Dr are described here see [Creating and using active geo-replication](#) ☐ with an exception the a secondary database is created in the secondary logical server created in PC

- Once the secondary database exists in PC (as its online copy of the BF database), customer can initiate a database failover from BF to PC for this database using T-SQL command (see the table below and the steps present in the appendix)
- After the failover, once the secondary becomes a primary database in PC, customer can stop the geo-replication and remove the secondary database on the BF side at any time (see the table below and the steps present in the appendix diagram)

Note that SQL ALTER DATABASE command indicated above is the only user interface available to setup Geo-Dr to migrate a BF database to PC. No Azure portal support nor ARM, PowerShell and CLI for the Geo-DR is available for this migration.

Limitations

- Only One Source Subscription per Service request. (Multiple targets allowed)
- Failover Groups are not supported. *This means that customers migrating BF database(s) will need to manage connection strings themselves during failover.*
- No support for Azure portal, ARM APIs, PowerShell or CLI This means that customer's BF migration will need to manage Geo-Dr setup and failover through T-SQL.
- Customers cannot create multiple geo-secondaries in public cloud for databases in BF.
- Creation of a geo secondary must be initiated from the BF region.
- Geo-replication is not support for SQL DW, SQL Managed Instance (MI) and Cosmos-DB
- Customers can migrate databases out to BF cloud only to PC. Currently no other cross-cloud migration is supported.
- Azure AD users in the BF user database are migrated but are not available in the new Azure AD tenant where the migrated database resides. To enable such users, they must be manually dropped and recreated using the current Azure AD users available in the new Azure AD tenant where the newly migrated database resides.
- Please note that this feature is only supported for Azure SQL single database(s) and elastic pools and is not supported for Azure Synapse Analytics (former DW), Managed Instance and Cosmos DB.

SAP and Root Cause Classification

Cases resolved by this TSG should be coded to the following SAP and root cause paths:

<SAP path> SAP: Azure/Subscription management/Migration and Move/Migration from Microsoft Cloud Germany to global Azure (Azure SQL Database)

<Root cause path>: /Root Cause - Azure Sub Mgmt V1/Subscription Requests/Data Migration/Request to move a subset of resources

Terms for reference

- BF - Black Forest
- PC - Public Cloud
- GC = German Cloud
- German Cloud = Blackforest

Feedback

How good have you found this content?

