

Task: To Upgrade SQL Server is installed on Windows Cluster (WSFC) – 3 Nodes(SQL FCI) with 3 Replicas in DR - SQL 2017 to SQL 2019

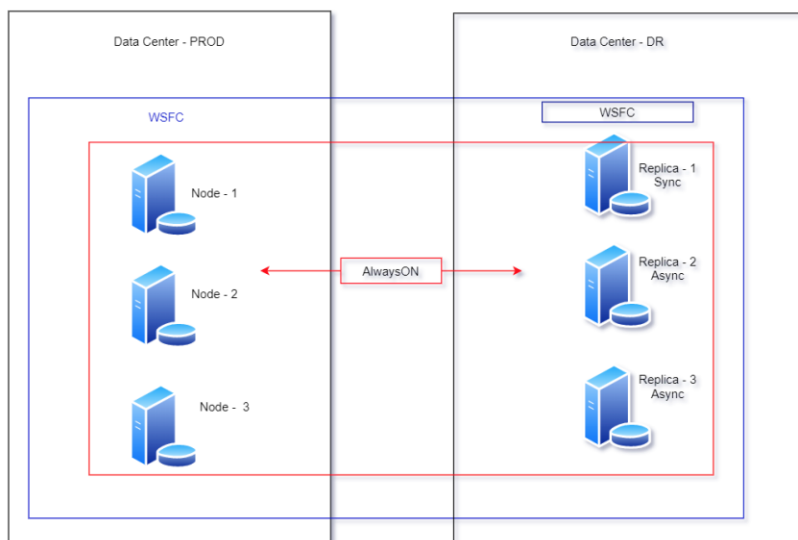
Server names in WSFC: \$FCICluster - \$FCInode1, \$FCInode2, \$FCInode3, \$DRNode1, \$DRNode2, \$DRNode3. In total 6 nodes

Databases also have Transaction Replication configured with Remote Distributor and Subscriber

Note:

1. I assume the service accounts of all the 6 nodes and Remote distributor and subscriber are same.
2. I assume read routing enabled for all the 3 replicas in the order (DRNode1, DRNode2), (DRNode2, DRNode3), (DRNode3, DRNode1) – At any given point of time one replica is in SYNC to accept the read load.

High-Level Architecture:



CHECK LIST:

1. Run the upgrade advisor / Assessment on Data migration assistant (DMA) make sure everything is fixed before starting migration.

Before starting the rolling upgrade,

2. Run DBCC CHECKDB on every availability database on all replicas
3. Backup all databases, including system databases, and those participating in the availability group, replication.
4. Before upgrading from one Version of SQL Server 2019 (15.x) to another, verify that the functionality you are currently using is supported in the edition to which you are moving.

5. Verify supported hardware and software.
6. Before upgrading SQL Server, enable Windows Authentication for SQL Server Agent and verify the default configuration: that the SQL Server Agent service account is a member of the SQL Server sysadmin group.
7. To upgrade to SQL Server 2019 (15.x), you must be running a supported operating system. For more information, see Hardware and Software Requirements for Installing SQL Server.
8. Upgrade will be blocked if there is a pending restart.
9. Upgrade will be blocked if the Windows Installer service is not running.

RISK FACTORS:

1. During a version upgrade, no replicas are readable or available for backups.
2. During a version upgrade, readable secondaries cannot be read after an upgrade of the readable secondary and before either the primary replica is failed over to an upgraded secondary or the primary replica is upgraded.
3. No automatic failover from SQL FCI to DR replicas.
4. If storage goes down on SQL FCI, till we manually failover to DR site the DB/application is down
5. Without upgrading Remote Distributor, if we proceed with upgrading publisher node that will halt the data transfer with below error.

The SQL Server version of the Publisher server needs to be upgraded to 'Microsoft SQL Server 2012'. (Source: MSSQL_REPL, Error number: MSSQL_REPL-2147200956)
Get help: http://help/MSSQL_REPL-2147200956

6. In in-place upgrade the backout is time consuming effort, because there is no version downgrade option in default. The SQL 2019 version need to uninstall and reinstall with SQL 2017, Post DB configuration, database restores.

IMPLEMENTATION PLAN & POWERSHELL EXECUTION SEQUENCE:

Step 1: /*To upgrade Remote Distributor and Subscriber to SQL 2019 - Prerequisite /

- a) Make sure that the Log Reader Agent is running for the database > Stop user activity on published tables > Allow time for the Log Reader Agent to copy transactions to the distribution database, and then stop the agent.
- b) Execute sp_replcmds to verify that all transactions have been processed. The result set from this procedure should be empty.
- c) Execute sp_replflush to close the connection from sp_replcmds.
- d) I have created a upgrade function that will take care of the upgrade

Script will call the DB backup full backup job, makes sure all the system/user dbs are backed up.

Note: Created function to copy binaries 'COPY_SQL_BINARIES' to all the 6 nodes, and function to do in-place upgrade 'SQL_SERVER_UPGRADE'. (Code optimization)

Step 2: Parse the input parameters, Listener name, distributor and subscriber server name, service account credentials (sysadmin access).

Step 3: SQL Query is query is written to find the replica names , FCI node names, with Primary and Secondary tag information.

Step 4: call function 'SQL_SERVER_UPGRADE' to upgrade \$DRNode3

Step 5: Change to synchronous to node \$DRNode2 ie) this will make sure a sync read is available when we upgrade \$DRNode1.

Step 6: call function 'SQL_SERVER_UPGRADE' to upgrade \$DRNode2

Step 7: call function 'SQL_SERVER_UPGRADE' to upgrade \$DRNode1

Step 8 & 9: call function 'SQL_SERVER_UPGRADE' to upgrade \$FCInode1(Passive)

Step 10 & 11: call function 'SQL_SERVER_UPGRADE' to upgrade \$FCInode2(Passive)

Step 12 & 13: Move the cluster resource node \$FCInode1 (Active) to \$FCInode2(Passive)

Step 14: Execute the SP EXECUTE [master].[sys].[sp_vupgrade_replication] against the new Active node \$FCInode2(Active)

Step 15: call function 'SQL_SERVER_UPGRADE' to upgrade \$FCInode1(Passive)

Step 16: Written a script to check the synchronization between all the 6 nodes.

Post upgrade of all the nodes Run update stats, and run integrity check with data purity option

```
USE <dbname>
GO
EXEC sp_updatestats
DBCC UPDATEUSAGE (0);

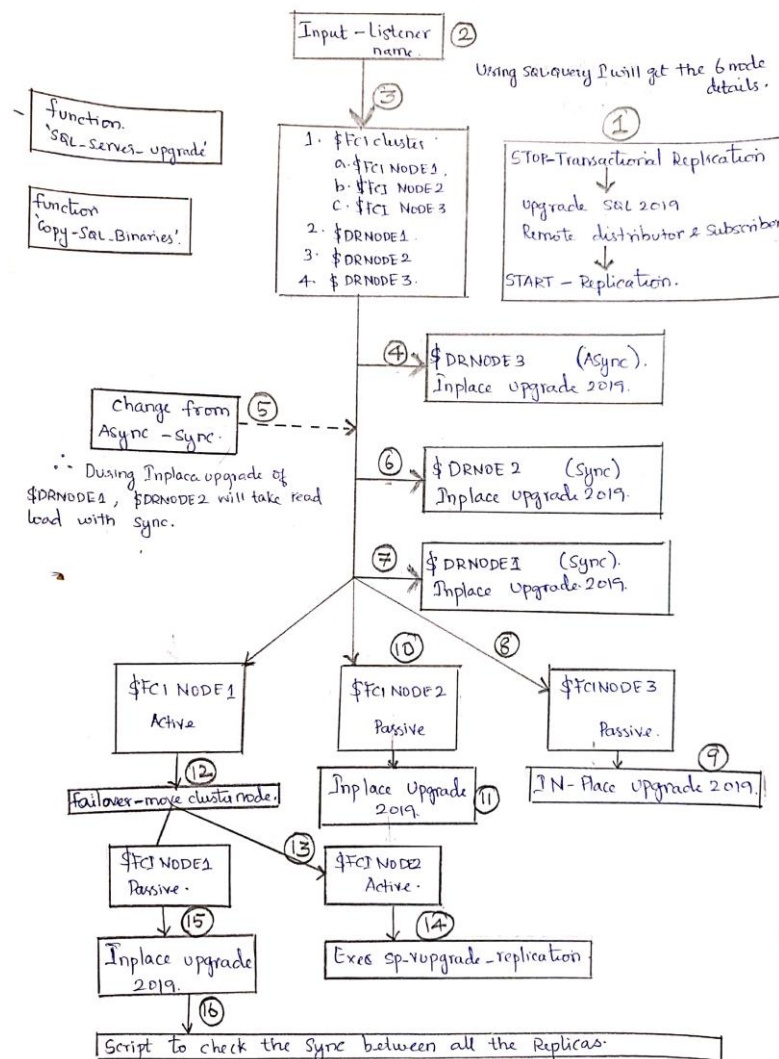
DBCC CHECKDB (<dbname>) WITH DATA_PURITY
```

Note: step X instead of Y.

- a) We can do a manual failover after "Step 7" to DR Replicas then we can upgrade the SQL FCI 3 nodes. But I didn't prefer this approach because
 1. Till that time application will face latency in case application servers are not placed in DR data centre

2. Need to work on Transactional replication part, that is tedious on this upgrade
3. Again, we need to failback to SQL FCI from DR replicas (so in total two failover) but in proposed approach I do only one failover from \$FCInode1 to \$FCInode2

FLOW CHART:



VALIDATION:

1. Make sure the Remote distributor server is upgraded to SQL 2019
2. Make sure the SQL server is upgraded to SQL 2019, select @@version.

3. Node 3 is current Primary server, once validation is done then proceed with the Upgrade of other two nodes (Node1, Node2)

BACKOUT:

1. Back out is time consuming task in In-place upgrade, Uninstalling SQL 2019 and Re-install 2017 on the nodes.
2. It's always recommended to run this in the lower environment before Prod migration.