



Configuration of Alwayson Cluster and Windows Cluster

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Windows Operating System : Windows Server 2012

SQL Server Software : C:\Kamran\Software\sql2016ent\Microsoft SQL Server 2016 Enterprise SP1 X64

Database Node 1 : SQLN1 - 192.168.100.148

Database Node 2 : SQLN2 - 192.168.100.151

Windows Domain : HST - 192.168.100.157

Windows Cluster : WCLSQL - 192.168.100.161

SQL Server Availability Group : SCLSQL

SQL Server Listener : LCLSQL - 192.168.100.162

Sharing Folder : <\\kkdomain\CLQuorum>

High Level Steps

S. No.	Task	
1	Create VM of Both Database Machines	Pre-Reqs
2	Install Operating System on Both Database Machines	Pre-Reqs
3	Enable Networks and Assign IP Address on both Machines	Pre-Reqs
4	Disable Firewall on both Machines	Pre-Reqs
5	Join Domain with Both Database Machines	Pre-Reqs
6	Create User "dba" for windows Login on Domain Controller	Pre-Reqs
7	Mount SQL Server CD on both Database Machines	
8	Verify Names of Both Database Machines	
9	Create Folders for Database Files if Possible each Create on Separate Drives.	
10	Install SQL Server on both Database Machines	
11	Copy SSMS (Management Studio) Software on Both Database Nodes.	
12	Install SSMS (Management Studio) Software on Both Database Nodes.	
13	Install Failover Cluster on both Database Nodes from Admin users.	
14	Create Windows Cluster on both Database Nodes from Admin users.	
15	Create Shared Folder for Quorum Disk.	
16	Configure Quorum Disk on Windows Cluster.	
17	Enable Alwayson Availability group options in SQL Server Service on both Databases nodes.	
18	Create New Empty Database on SQL Server	
19	Take Database backup of New Empty Database	
20	Create SQL Server Availability group from Database Node	

Configuration of Alwayson Cluster and Windows Cluster

Pre-Requisites

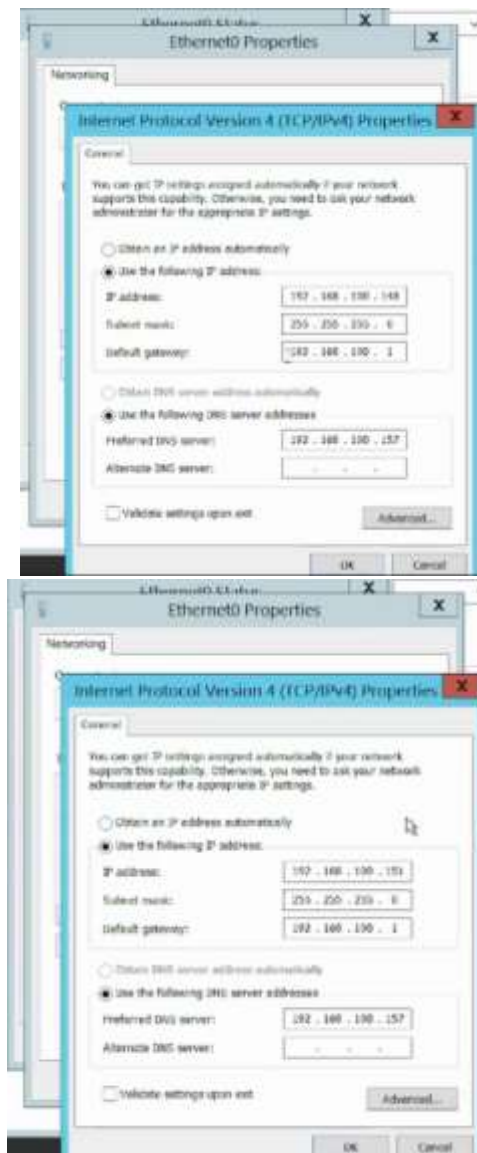
Windows Machine Configuration

1. Install OS on Two Database Machines



2. Enable Network and Provide IP Address on Both Machines

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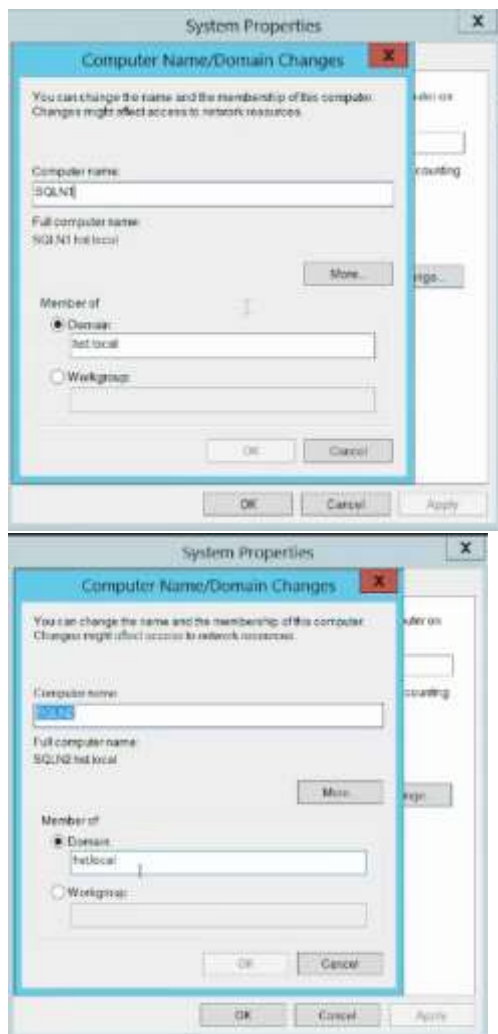


3. Disable Firewall on Both Machines.

Configuration of AlwaysOn Cluster and Windows Cluster



4. Join Both Machines on Windows Domain e.g. "HST"



Configuration of AlwaysOn Cluster and Windows Cluster

Windows User Privileges of Windows Domain.

1. Create Windows User "DBA" on Domain Controller and Grant Required Privileges.

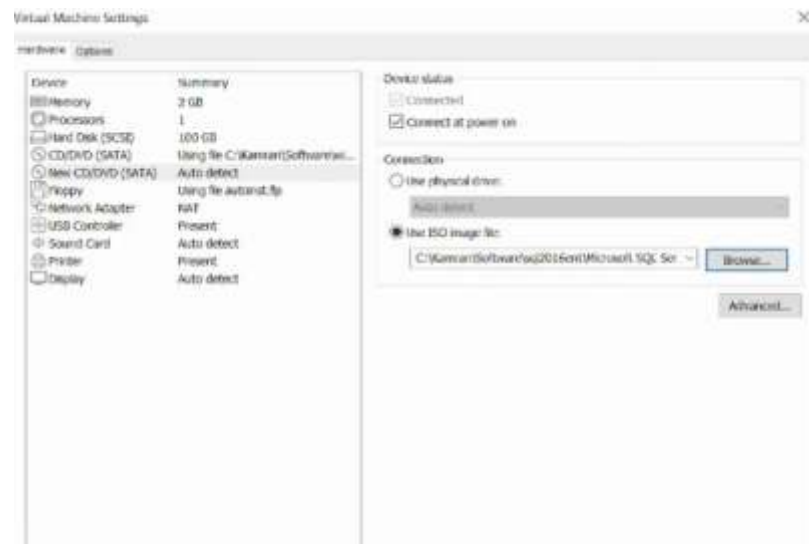


2. Enable Machine for Remote Desktop on user "DBA".
3. Allow "DBA" User Local Admin of Computer add in Local "Administrators" Group.

SQL Server Always on Configuration

1. Login with DBA User on Both Machines
2. Mount SQL Server ISO on Both Machine

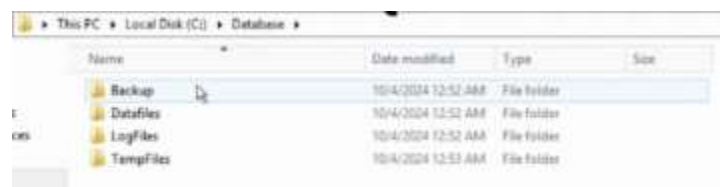
Configuration of AlwaysOn Cluster and Windows Cluster



3. Verify Name of Both Database Machine
4. Create Folders on both Databases Machines if Possible create Folder on Separate Drives.

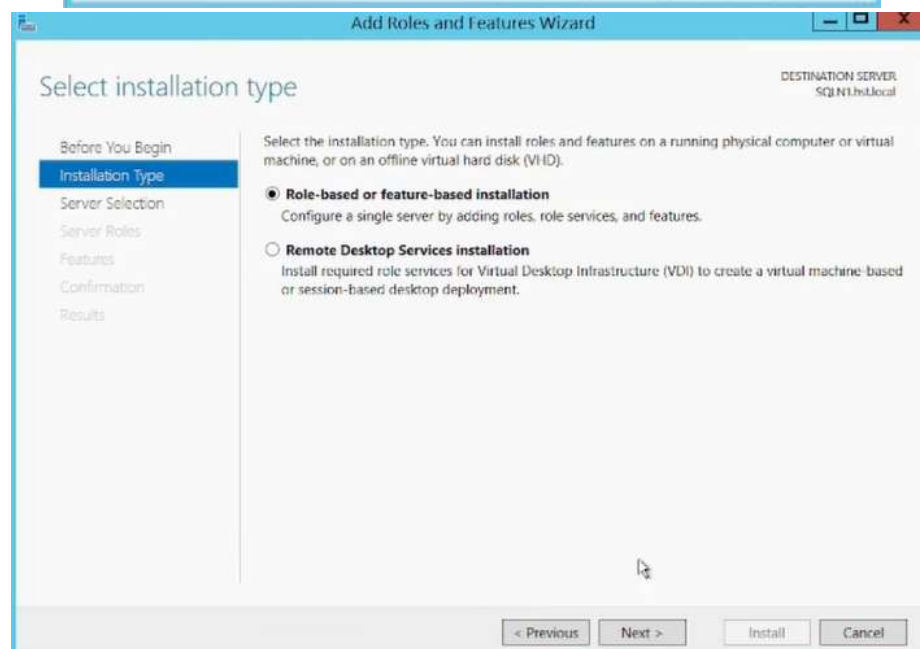
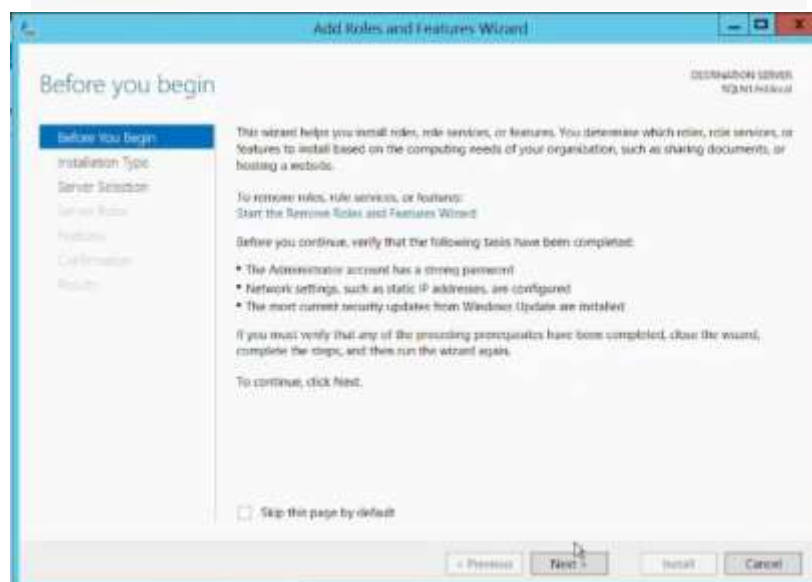
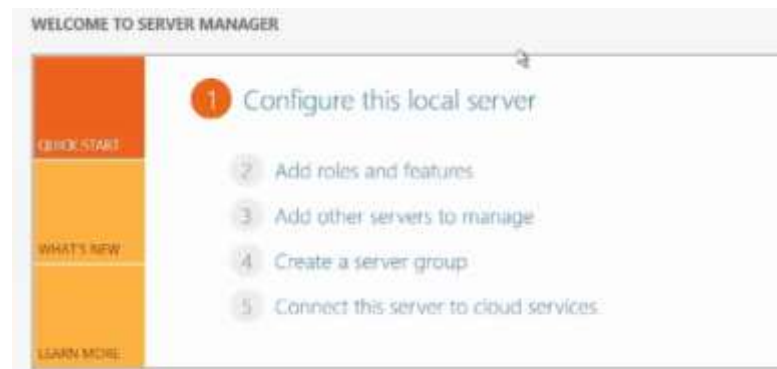
Create Folders

- Database
 - Backups
 - DataFiles
 - LogFiles
 - TempFiles

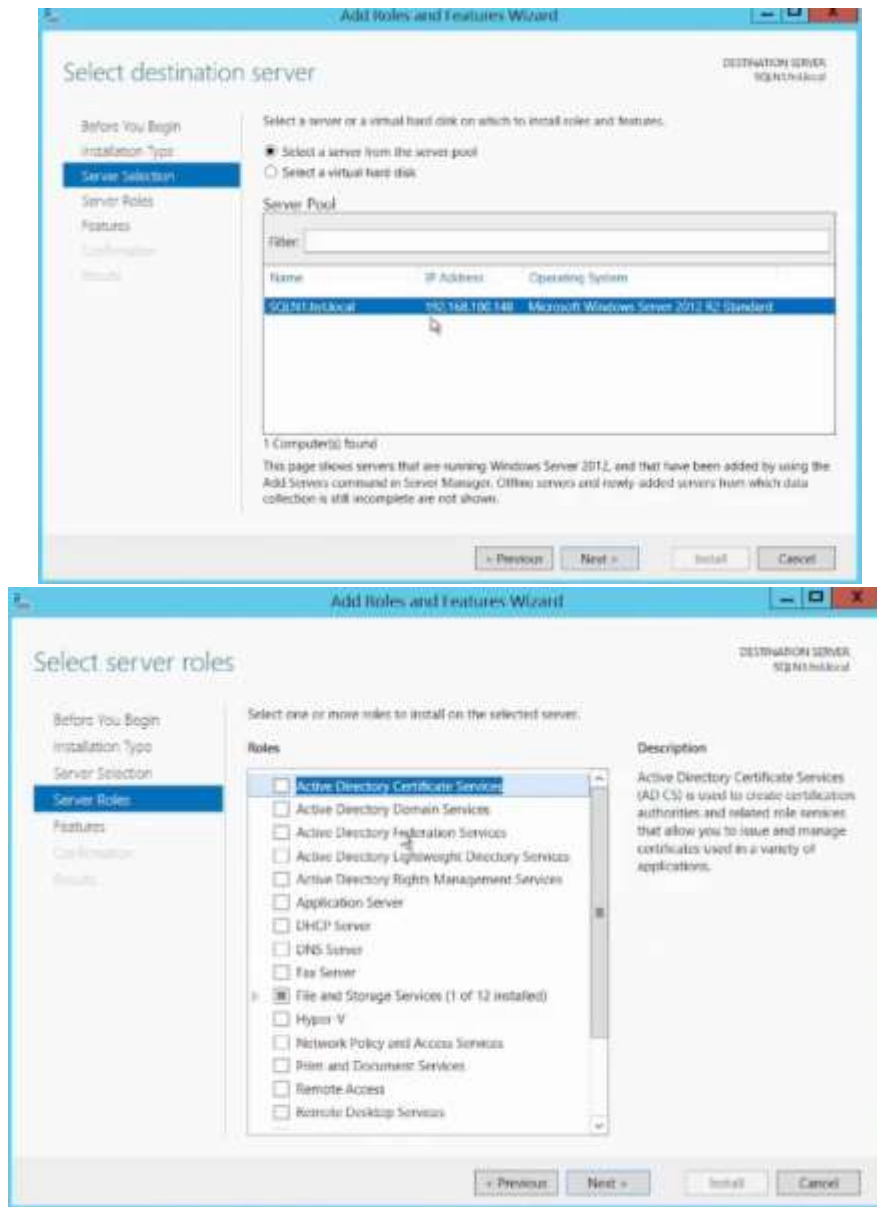


5. Install SQL Server on Both Machines.
6. Copy SSMS Software on Both Machines C:\software\SSMS-Setup-ENU
7. Install SSMS Software on Both Machines
8. Login with Admin User on both Machines
9. Install Failover Cluster on Both Databases Machine > Server Manager > add Roles and Features > "Failover Clustering"

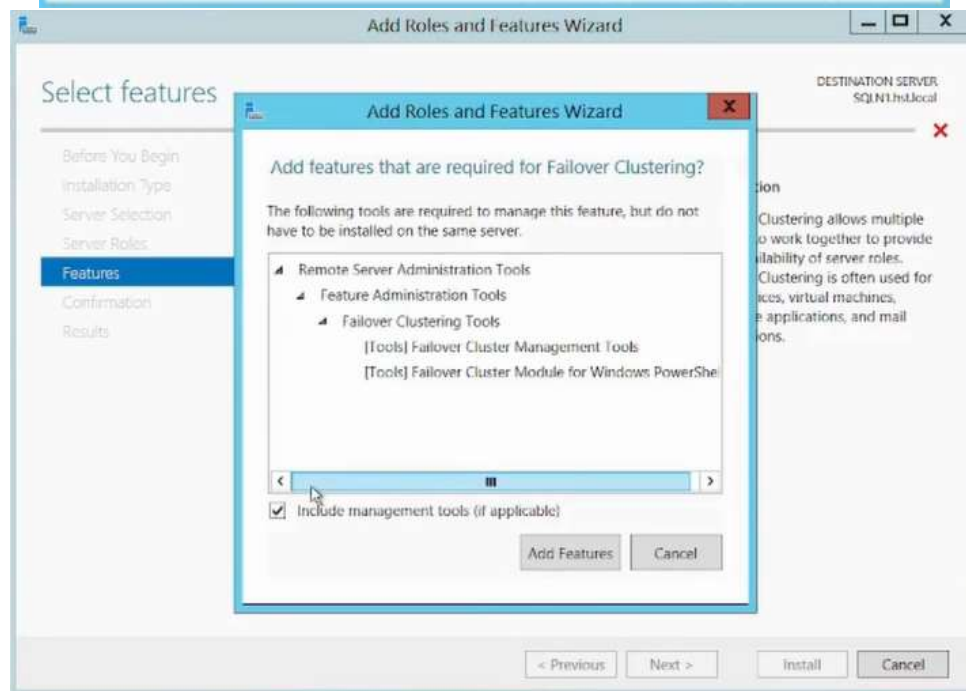
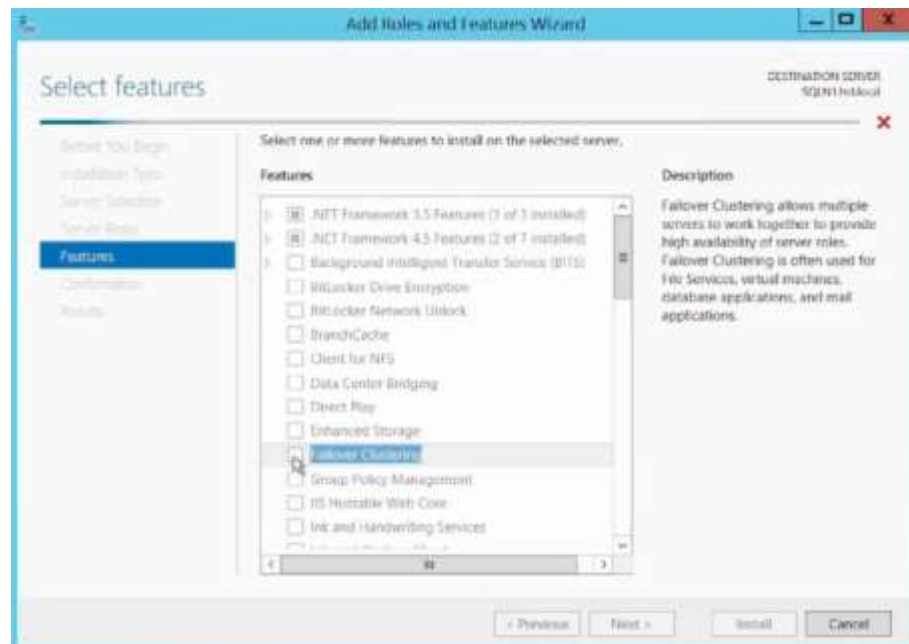
Configuration of AlwaysOn Cluster and Windows Cluster



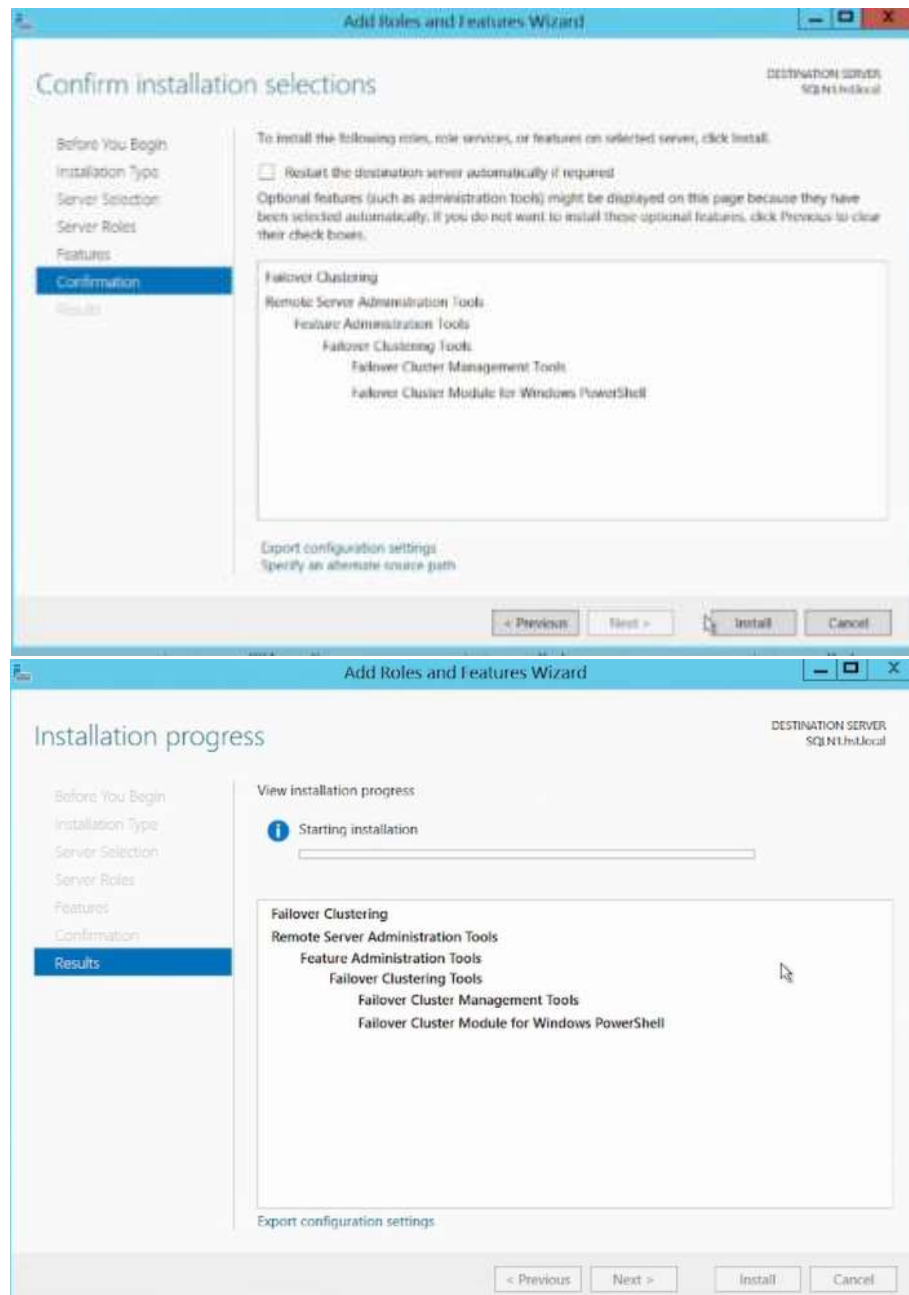
Configuration of AlwaysOn Cluster and Windows Cluster



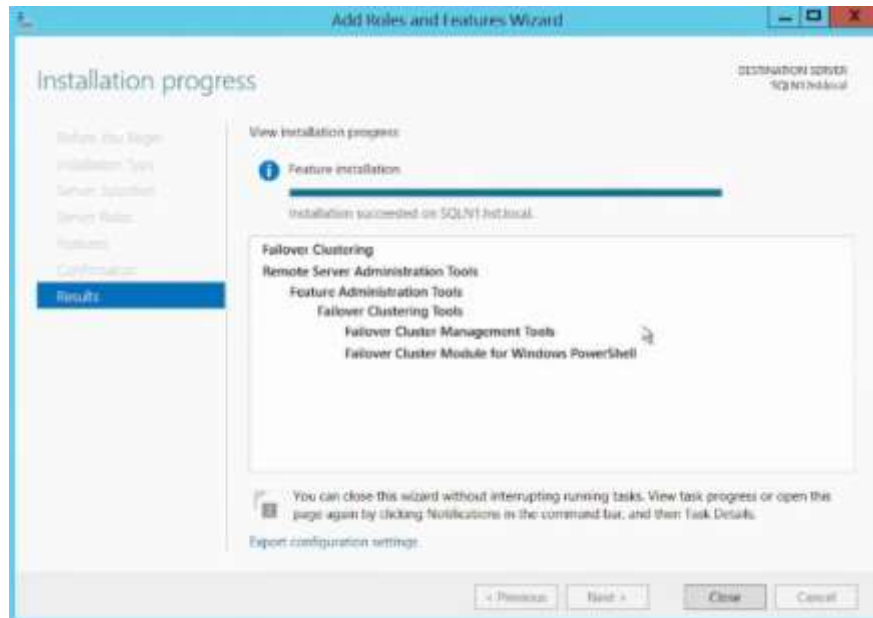
Configuration of AlwaysOn Cluster and Windows Cluster



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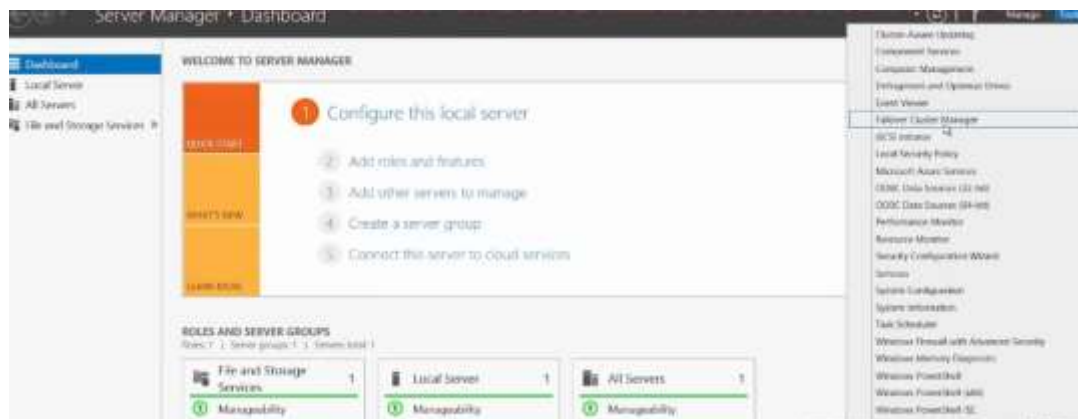
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10. Login Database Node 1 Machine as Admin User.

11. Create Windows Cluster: Server Manager > Tools > Fail Over Cluster Manager > Create Cluster

Note: Uncheck "All add Eligible storage to the cluster"



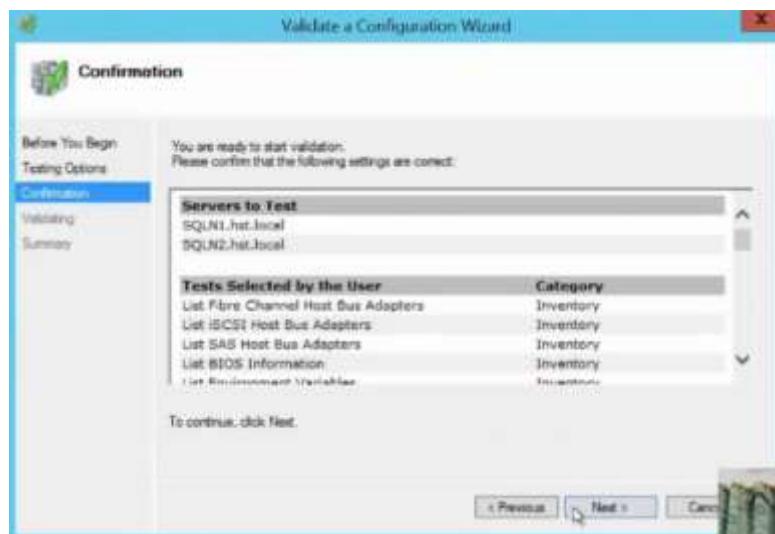
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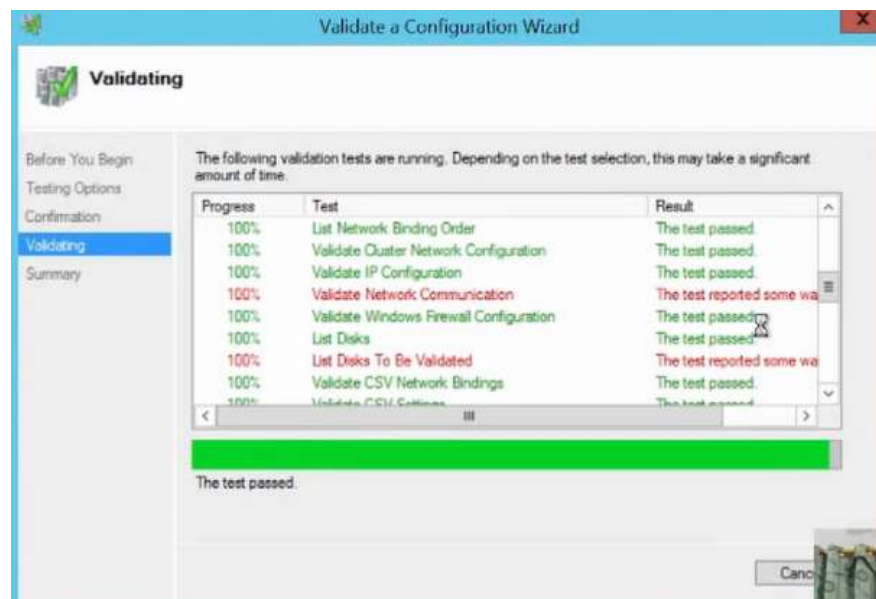
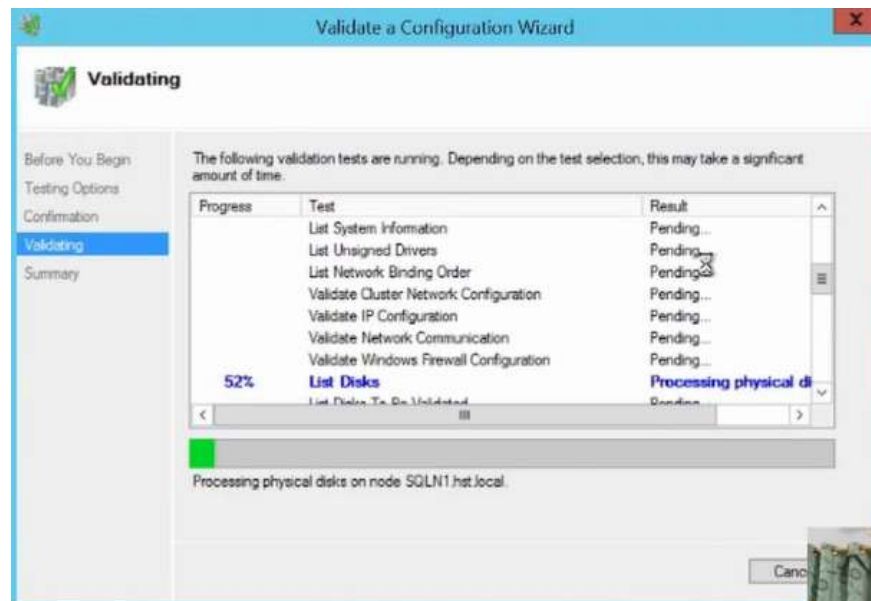
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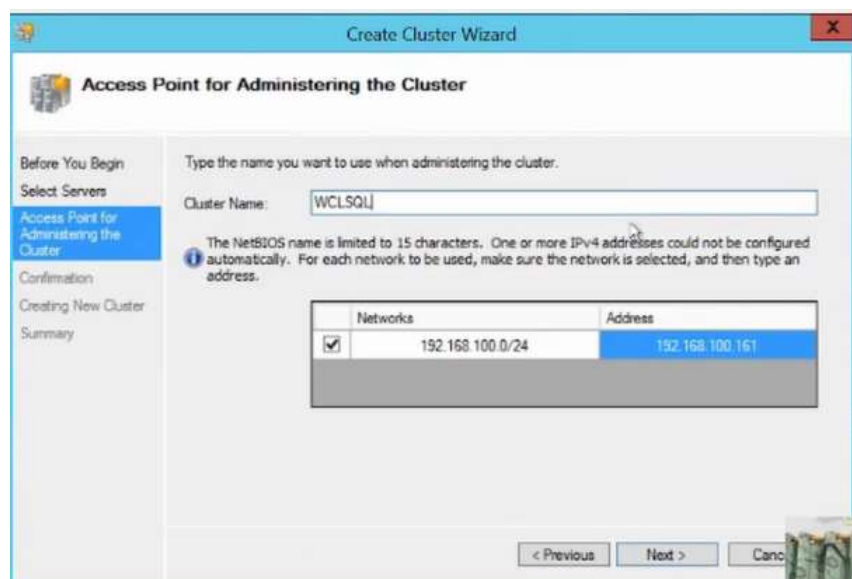
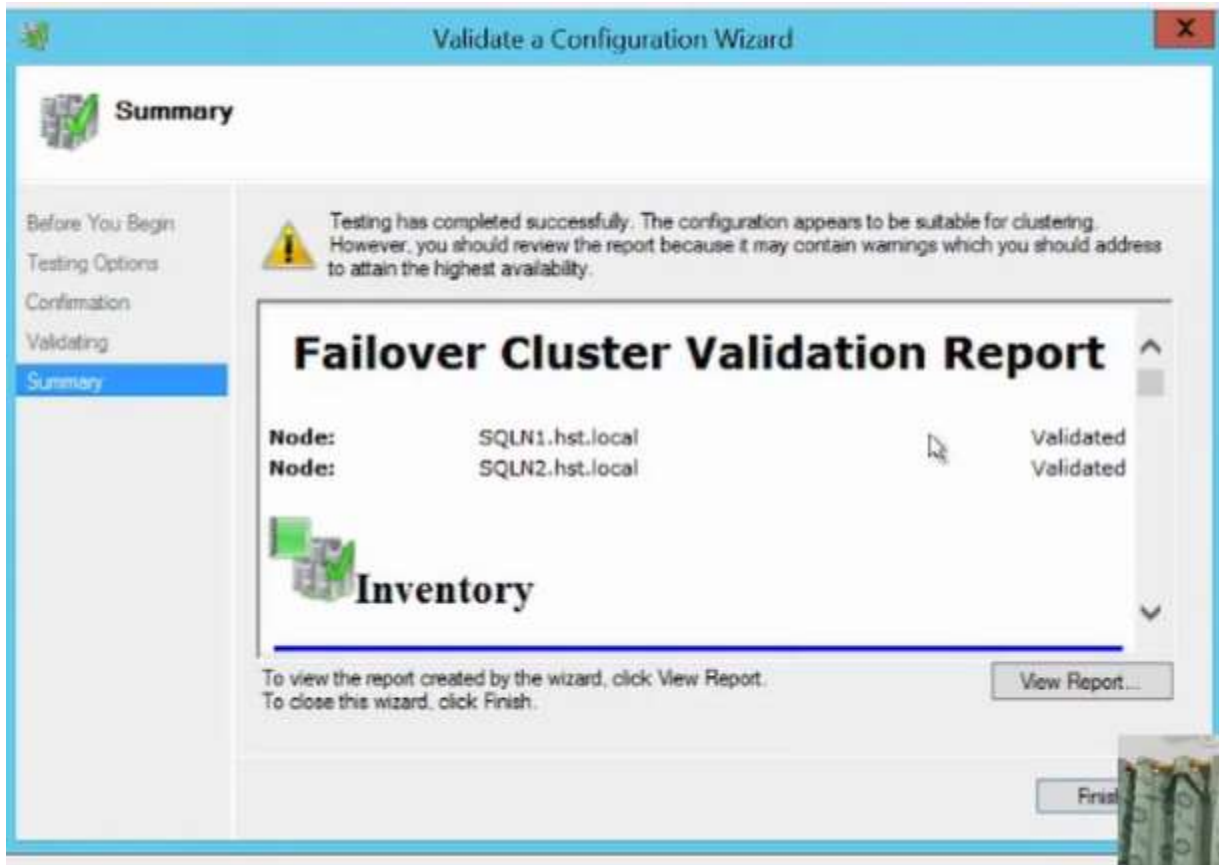
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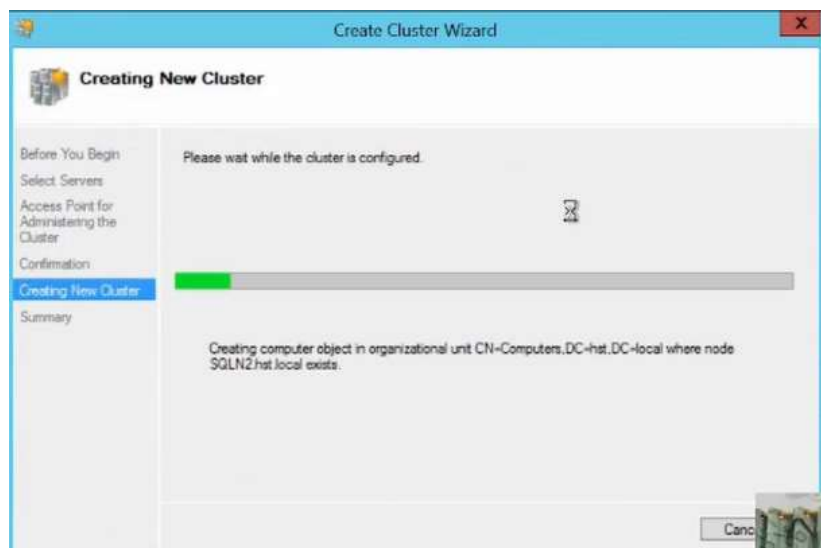
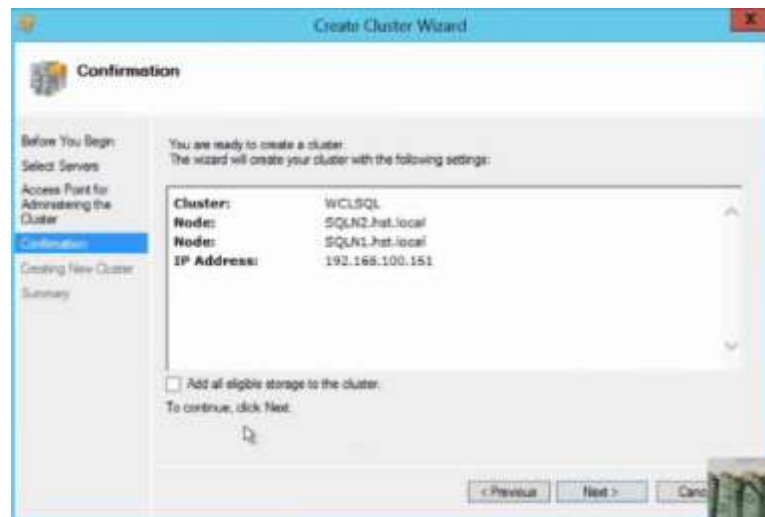
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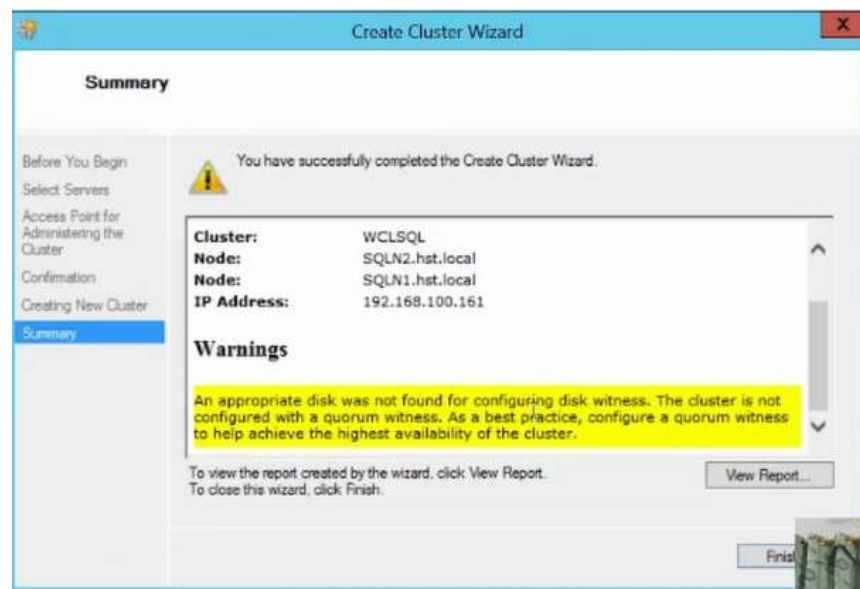
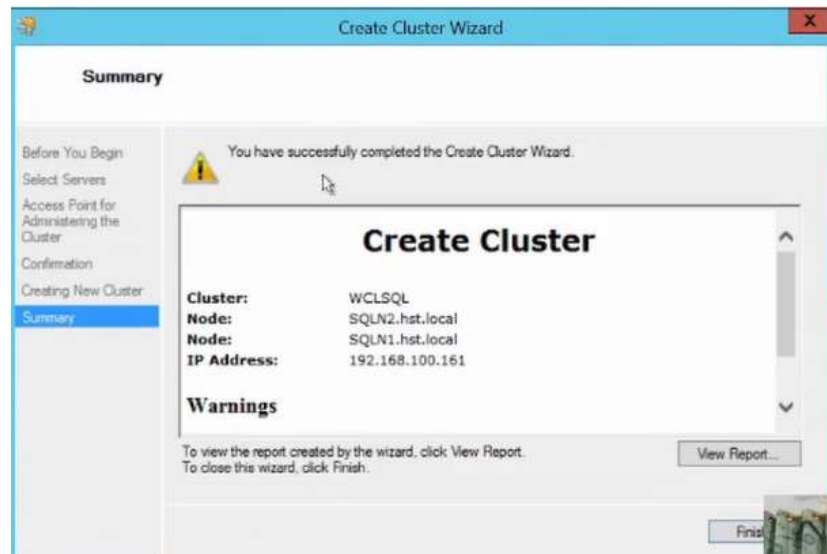
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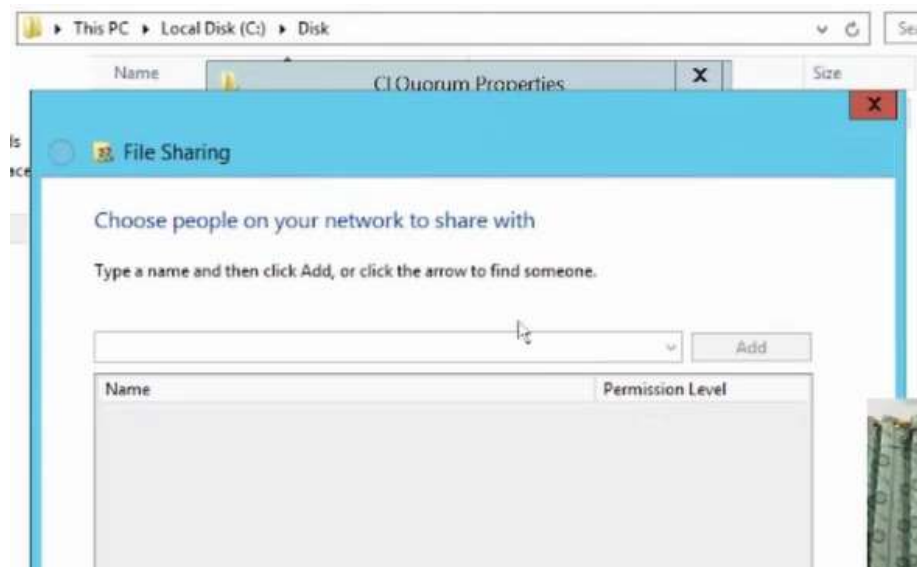
12. Create Shared Folder for Quorum Disk

IP: 192.168.100.157 C:\Disks\SCLSQL-Quorum

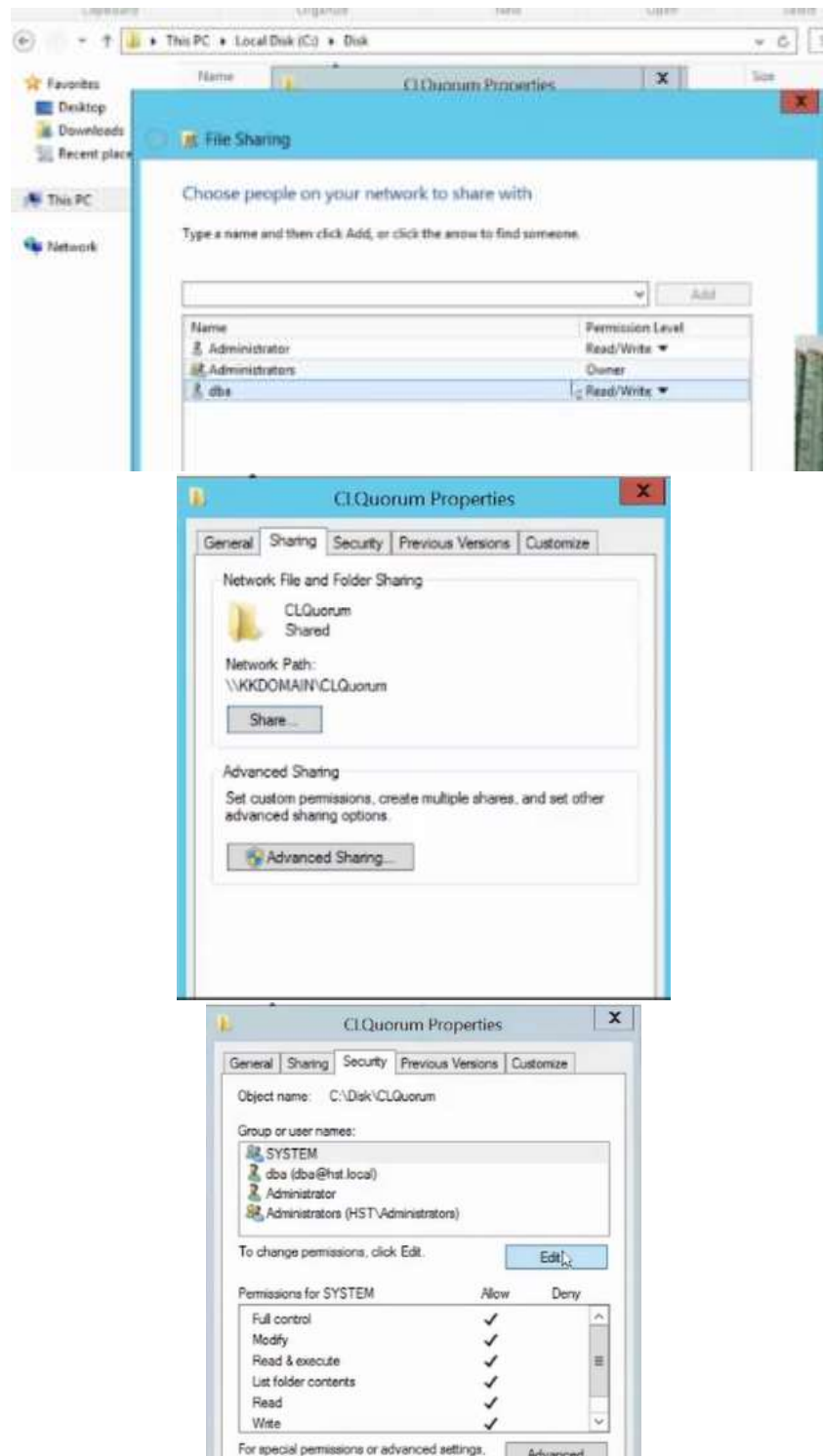
Folder Name = CLQuorum

Permission: Read / Write and Add Security for "WCLCluster\$" All Privilege

Sharing Folder: <\\kkdomain\CLQuorum>



Configuration of AlwaysOn Cluster and Windows Cluster



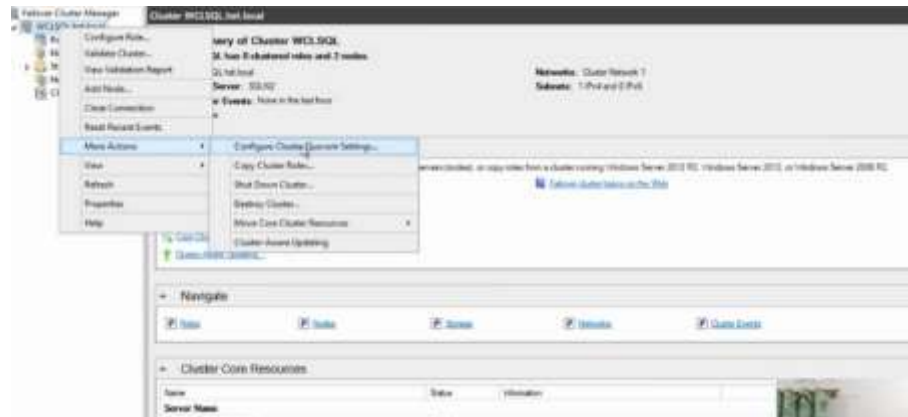
13. Login Database Node 1 Machine as Admin User.

14. Configure Server Manager > Tools > Fail Over Cluster Manager > More Action > Configure Cluster Quorum Settings

Configuration of AlwaysOn Cluster and Windows Cluster

Select Quorum Witness > Configure File Sharing Witness

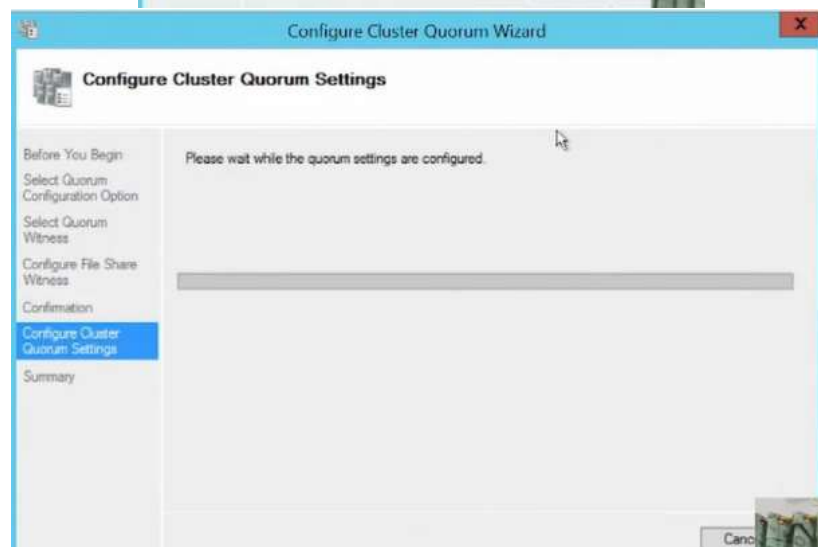
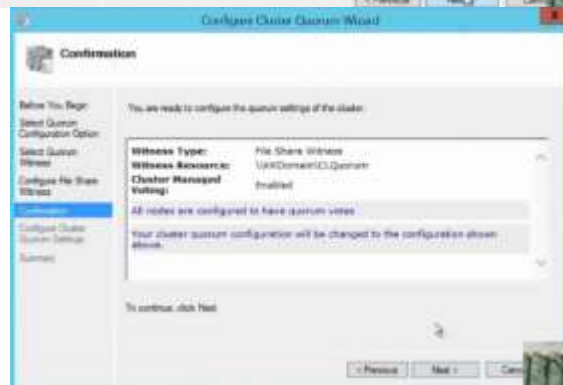
Sharing Folder: [\\kkdomain\CLQuorum](#)



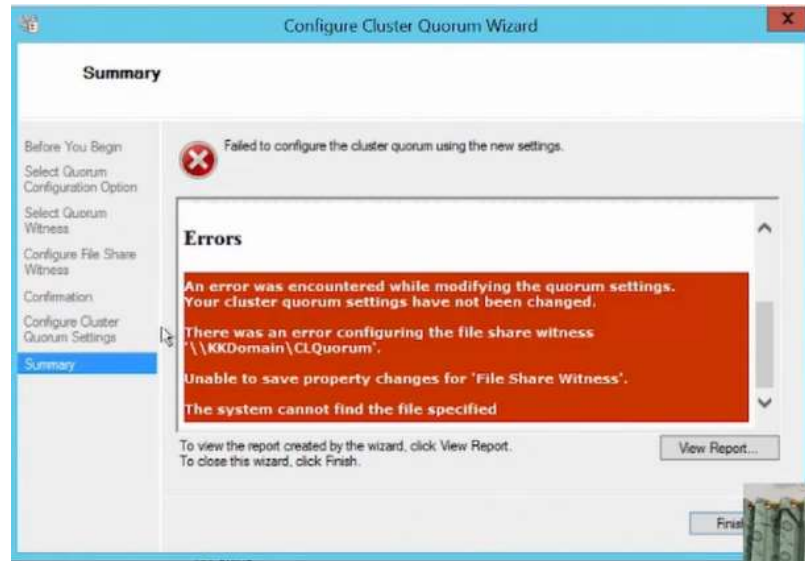
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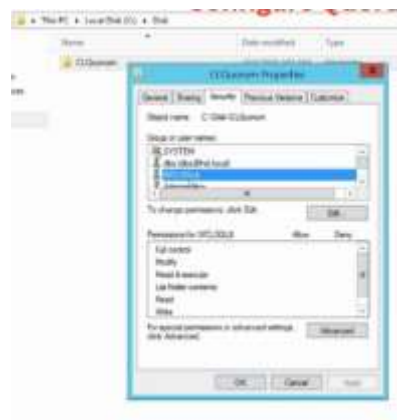
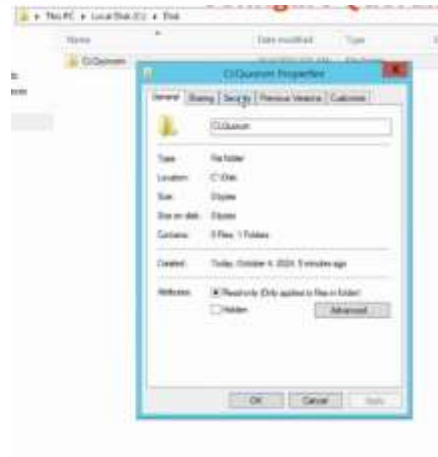
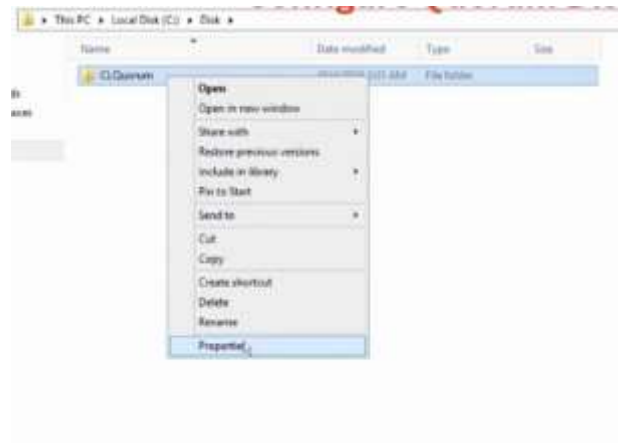


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Change Permission of Share Folder

Configuration of AlwaysOn Cluster and Windows Cluster



Configuration of AlwaysOn Cluster and Windows Cluster



Re-Execute Above Steps Again for Quorum Disk Creation



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15. Login Database Node 1 Machine as "dba" User.
16. Enable AlwaysOn Availability Groups Feature on SQL Server Services on Both Databases nodes

SQL Server 2016 Configuration Manager> Run as Administrator> enter DbA User / Password > SQL Server Service > SQL SERVER (MSSQLSERVER) > Properties > Always on High Availability > Enable Alwayson Availability Groups > Apply > Ok > Ok

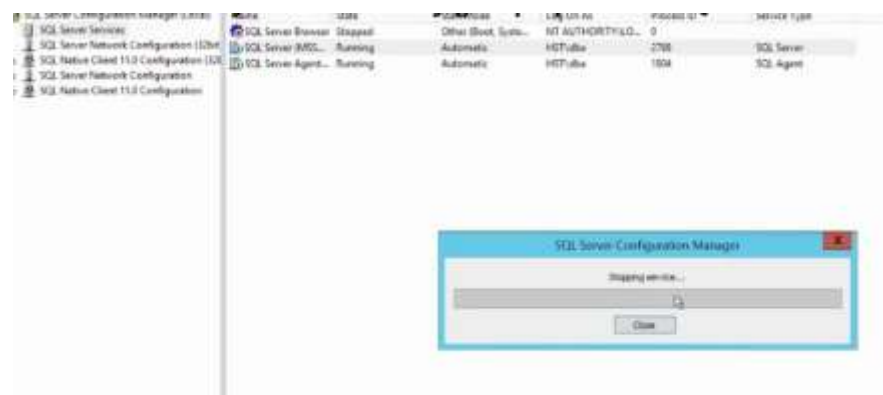
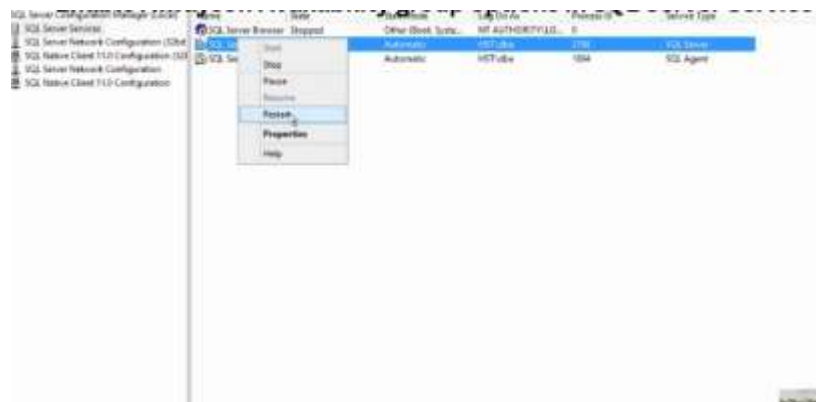


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17. Restart SQL Server Services

SQL Server 2016 Configuration Manager > Run as Administrator > enter Dba User / Password > SQL Server Service > SQL SERVER (MSSQLSERVER) > Right Click > Restart



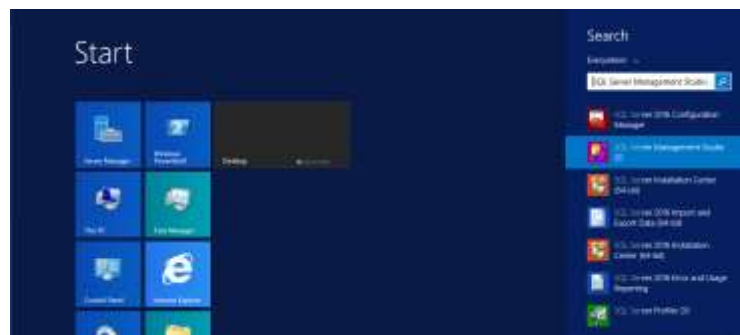
Configuration of AlwaysOn Cluster and Windows Cluster



18. Login as "DBA" User on DB Node 1

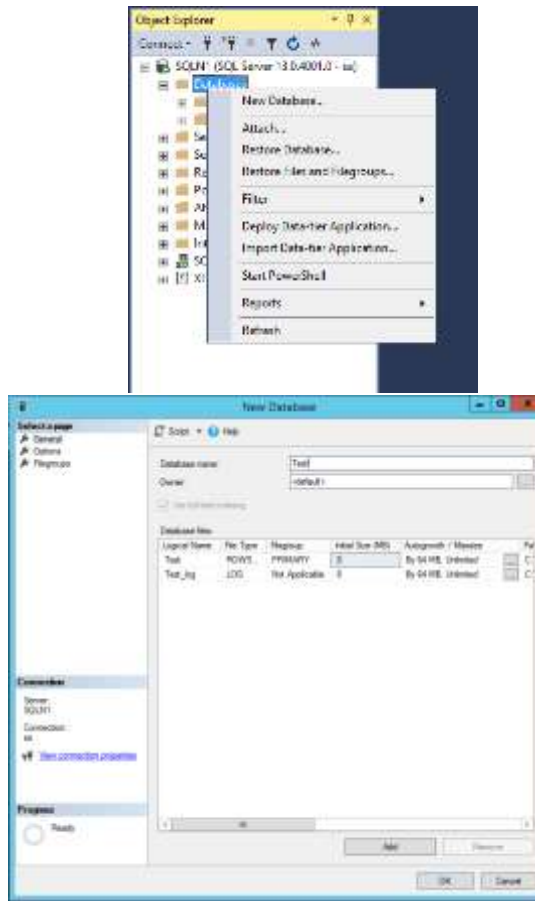
19. Login on SQL Server Management Studio

- Open "SQL Server Management Studio" > Authentication > SQL Server Authentication > Login "sa" and enter Password > Connect.

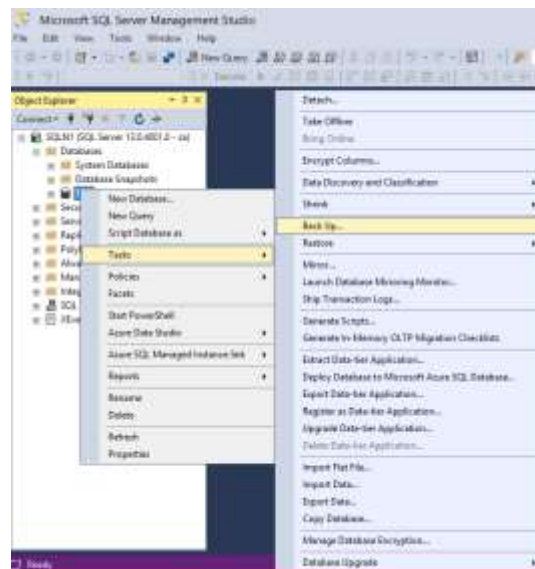


20. Create New Empty Database > Databases > New Databases > Enter Name of Database > Ok

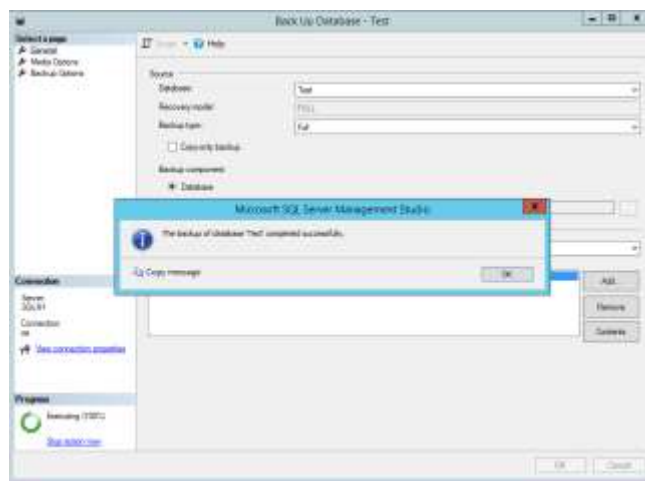
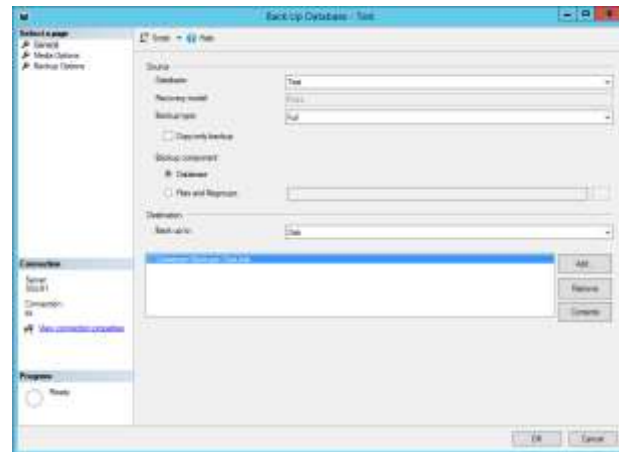
Configuration of Alwayson Cluster and Windows Cluster



21. Create Backup on New Test Database > Add Backup Device > Ok



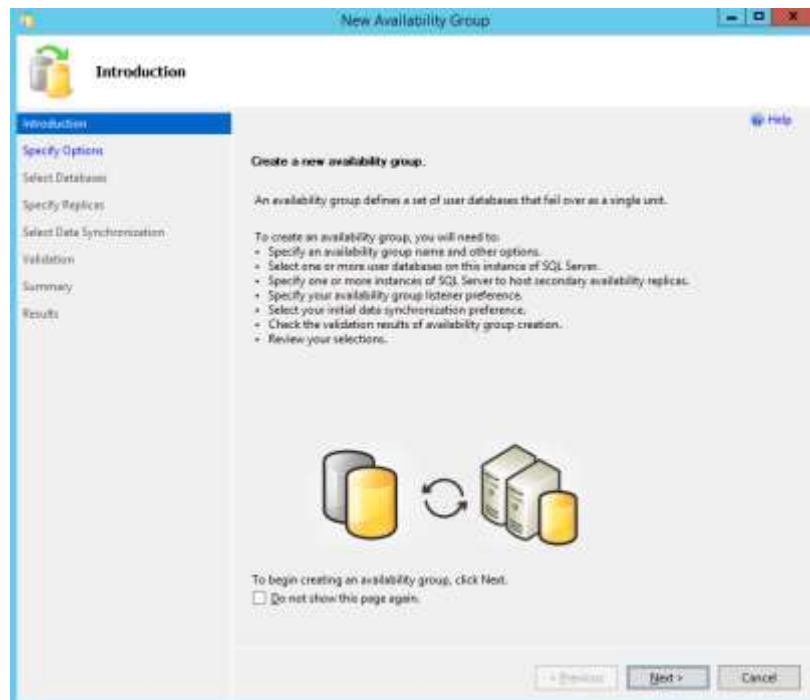
Configuration of Alwayson Cluster and Windows Cluster



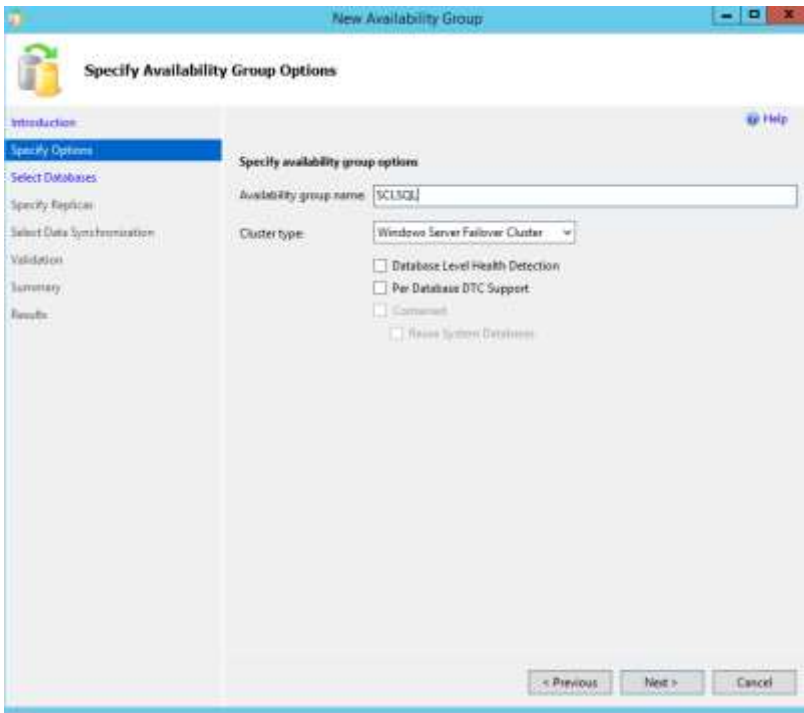
Configuration of Alwayson Cluster and Windows Cluster

22. Create Alwayson High Availability Group

Expand SQLN1 > Always on High Availability > Right Click > New Availability Group Wizard



Configuration of Alwayson Cluster and Windows Cluster



Specify Availability Group Options

Introduction
Specify Options
 Select Databases
 Specify Replicas
 Select Data Synchronization
 Validation
 Summary
 Results

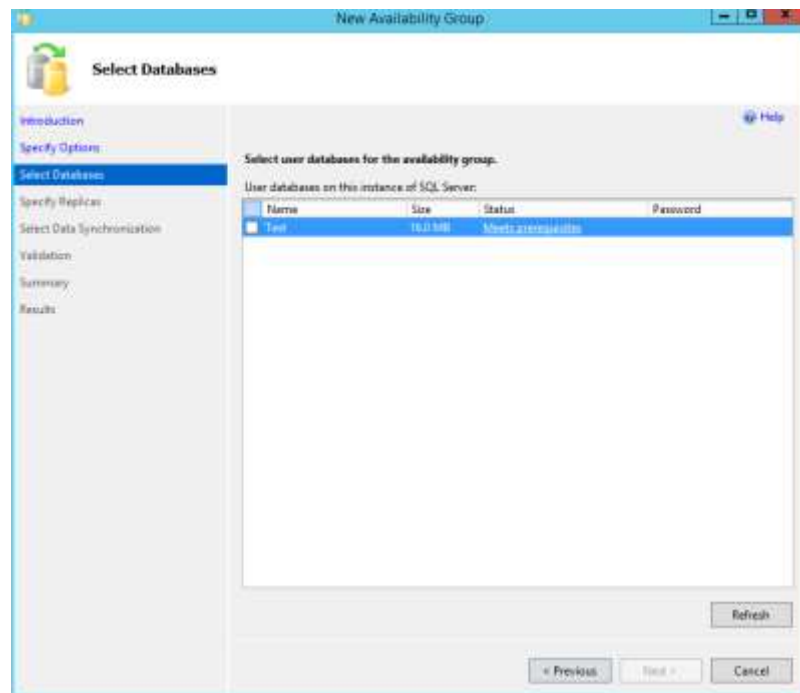
Specify availability group options

Availability group name:

Cluster type:

☐ Database Level Health Detection
☐ Per Database DTC Support
☐ Compressed
☐ Reuse System Databases

< Previous Next > Cancel



Select Databases

Introduction
Select Options
Select Databases
 Specify Replicas
 Select Data Synchronization
 Validation
 Summary
 Results

Select user databases for the availability group.

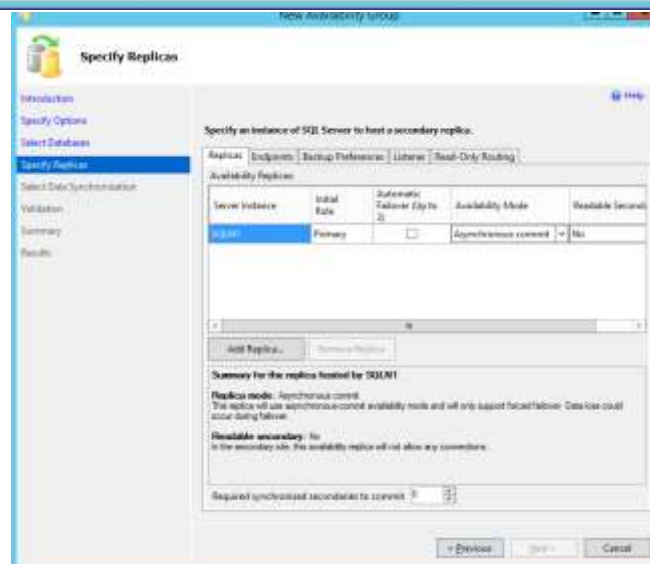
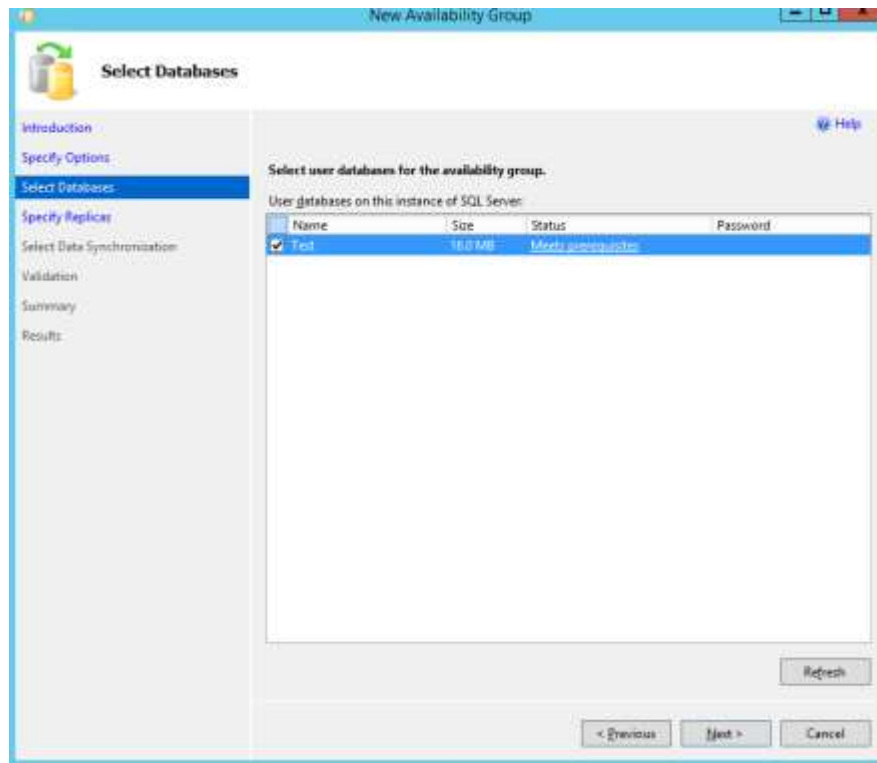
User databases on this instance of SQL Server:

Name	Size	Status	Password
Test	16.0 MB	Normal, read-only	

Refresh

< Previous Next > Cancel

Configuration of Alwayson Cluster and Windows Cluster



Configuration of AlwaysOn Cluster and Windows Cluster

New Availability Group

Specify Replicas

Introduction | Specify Options | Select Database | **Specify Replicas** | Select Data Synchronization | Validation | Summary | Ready

Specify an instance of SQL Server to host a secondary replica.

Replicas | **Endpoints** | Backup Preferences | Listener | Read-Only Routing

Server Instance	Initial Role	Automatic Failover (up to 3)	Availability Mode	Readable Secondary
SQL01	Primary	☐	Asynchronous commit	No

1 2 3

Add Replica... Remove Replica

Summary for the replica hosted by SQL01

Replica mode: Asynchronous commit
The replica will use asynchronous commit availability mode and will only support forced failover. Data loss could occur during failover.

Readable secondary: No
In the secondary role the availability replica will not allow any connections.

Required synchronized secondaries to commit: 2

OK Cancel

Connect to Server

SQL Server

Login | **Connection Properties** | Always Encrypted | Additional Connection Parameters

Server

Server type: Database Engine

Server name: SQL02

Authentication: SQL Server Authentication

Login: sa

Password:

☐ Remember password

Connection Security

Encryption: Optional

☐ Trust server certificate

Host name in certificate:

Connect Cancel Help Options <<

Configuration of AlwaysOn Cluster and Windows Cluster

New Availability Group - Specify Replicas

Introduction | Specify Options | Select Database | **Specify Replicas** | Select Data Synchronization | Validation | Summary | Results

Specify an instance of SQL Server to host a secondary replica.

Replicas | Backup Preferences | Listener | Read-Only Routing

Server Instance	Initial Role	Automatic Failover (Up to 5)	Availability Mode	Readable Secondary
SQL01	Primary	☐	Asynchronous commit	No
SQL02	Secondary	☐	Asynchronous commit	No

Add Replica... Remove Replica

Summary for the replica hosted by SQL02

Replica mode: Asynchronous commit
This replica will use asynchronous-commit availability mode and will only support forced logover. Data loss could occur during failover.

Readable secondary: No
In the secondary role, the availability replica will not allow any connections.

Required synchronized secondaries to commit: 0/2

Previous Next Cancel

New Availability Group - Specify Replicas

Introduction | Specify Options | Select Database | **Specify Replicas** | Select Data Synchronization | Validation | Summary | Results

Specify an instance of MS SQL Server to host a secondary replica.

Replicas | Backup Preferences | Listener | Read-Only Routing

Server Instance	Initial Role	Automatic Failover (Up to 5)	Availability Mode	Readable Secondary
SQL01	Primary	☒	Synchronous commit	No
SQL02	Secondary	☒	Synchronous commit	No

Add Replica... Remove Replica

Summary for the replica hosted by SQL02

Replica mode: Synchronous commit with automatic failover
This replica will use synchronous-commit availability mode and will support both automatic failover and manual failover.

Readable secondary: No
In the secondary role, the availability replica will not allow any connections.

Required synchronized secondaries to commit: 0/2

Previous Next Cancel

Configuration of AlwaysOn Cluster and Windows Cluster

Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replicas | Endpoints | Backup Preferences | Listener | Read-Only Routing

Where should backups occur?

☒ **Prefer secondary**
Automated backups for this availability group should occur on a secondary replica, if there is no secondary replica available, backups will be performed on the primary replica.

☐ **Secondary only**
All automated backups for this availability group must occur on a secondary replica.

☐ **Primary**
All automated backups for this availability group must occur on the current primary replica.

☐ **Any Replica**
Backups can occur on any replica in the availability group.

Replica backup priorities

Server Instance	Backup Priority	Exclude Replica
SQL01	Secondary 1, Highspeed 100	☐
SQL02	Secondary 2	☐

Previous Next Cancel

Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replicas | Endpoints | Backup Preferences | Listener | Read-Only Routing

Specify your preference for an availability group listener that will provide a client connection point.

☐ **Do not create an availability group listener now**
You can create the listener later using the AGT Availability Group Listener dialog.

☒ **Create an availability group listener**
Specify your listener preferences for this availability group.

Listener DNS Name:

Port:

Network Subnets: More IP...

Subnet: IP Address:

Add... Remove

Previous Next Cancel

Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replicas | Endpoints | Backup Preferences | Listener | Read-Only Routing

Add IP Address

Subnet:

Address:

IP Address:

Subnet Mask:

IP Address:

OK Cancel Help

Previous Next Cancel

Configuration of AlwaysOn Cluster and Windows Cluster

Specify Replicas

Specify an instance of SQL Server to host a secondary replica.

Replica | Endpoints | Backup Preferences | Listener | Read-Only Routing

Specify your preference for an availability group listener that will provide a client connection point.

☐ Do not create an availability group listener now
You can create the listener later using the Add Availability Group Listener dialog.

☒ Create an availability group listener
Specify your listener preferences for this availability group.

Listener (URL Name):

Port:

Network Mode:

Static IP Address:

Select Initial Data Synchronization

Select your data synchronization preferences.

☒ Automatic seeding
SQL Server automatically creates databases for every selected secondary replica. Automatic seeding requires that the data and log file paths are the same on every SQL Server instance participating in the availability group.

☐ Full database and log backup
Specify data synchronization by performing full database and log backups for each selected database. These databases are restored to each secondary and joined to the availability group. (Data can be the same or available for all replicas and is accounted for the same directory on all 3 new replicas.)

Specify the file share path in Windows format:

Specify the file share location in Linux format:

☐ Add-only
Starts data synchronization when you have already restored database and log backups to each secondary server. The selected databases are joined to the availability group on each secondary.

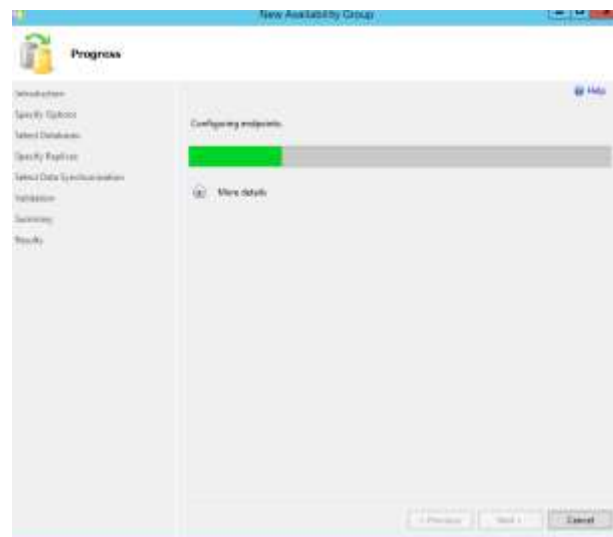
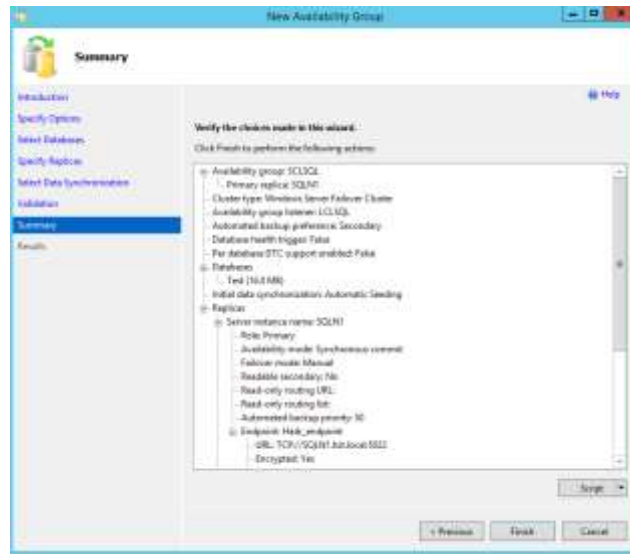
☐ Skip initial data synchronization
Choose this option if you want to perform your own database and log backups of each primary database.

Validation

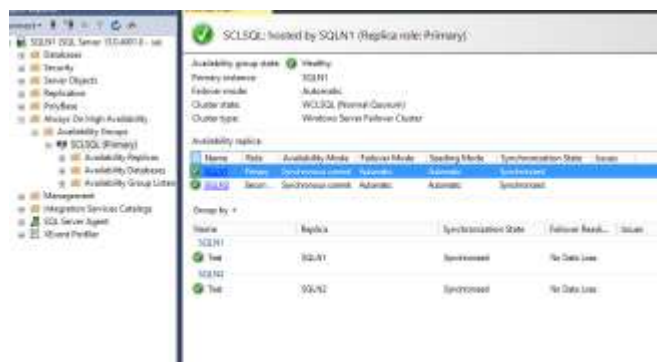
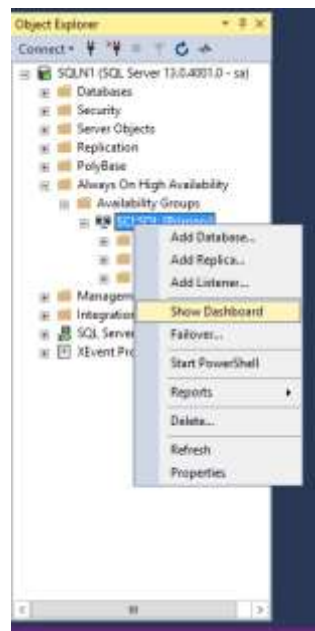
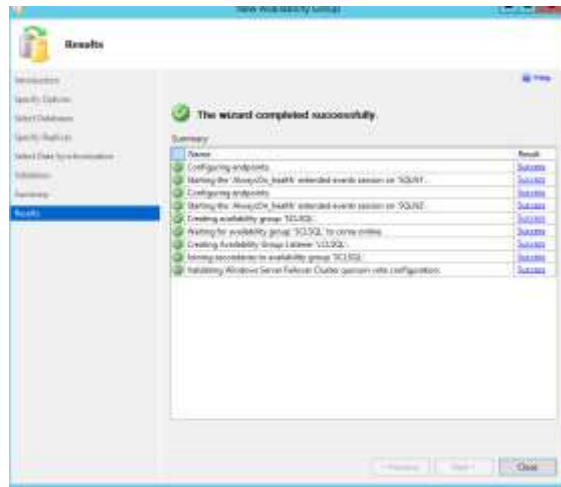
Results of availability group validation:

Name	Result
Checking for free disk space on the server instance that hosts secondary replica CUS302	Success
Checking if the selected databases already exist on the server instance that hosts secondary...	Success
Checking for the existence of the database files on the server instance that hosts secondary...	Success
Checking for compatibility of the database file locations on the server instance that hosts...	Success
Checking whether the endpoint is encrypted using a compatible algorithm	Success
Checking replica availability mode	Success
Checking the listener configuration	Success

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