

SQL SERVER 2014 AlwaysOn Implementation Guide for DBA





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Applies to: SQL Server 2014 Enterprise Edition, Windows Server 2012 R2 Data centre

Summary: This document describes SQL 2014 AlwaysOn HADR multi-subnet implementation in Texas, New Jersey Data Centre environment planning, configuration steps and troubleshooting notes.



INTRODUCTION

When companies plan to migrate SQL Server legacy technology with AlwaysOn 2014 implementation, this document has a detailed explanation of AlwaysOn implementation steps which were performed in multi-subnet environments either Secondary Servers in different regions or countries.

AlwaysOn – High Availability and Disaster Recovery Solution available from SQL Server 2012 onward.

- The application can access one read/write and rest all instances in read mode.
- AG group provides the fastest failover time compared to all other HA (and DR) solutions.

This document provides guidelines to prepare a new SQL Server AlwaysOn environment for implementation. All OS and SQL Server Installations will follow standard guidelines and documentation specific to AlwaysOn Implementations. You can refer to this as an SOP document.

This document explains complete implementation steps that will help any novice DBA to implement and maintain this solution.



ALWAYSON IMPLEMENTATION TASK LIST

Infrastructure Planning

Virtual Machine - Build Request & Configuration

Request to Build VM Instances along with Storage Request to get IP addresses SQL Service Account Witness Folder

Windows Feature Installation and Configuration

Fix Patch Update Install Failover Clustering Component on all

SQL 2014 Installation and Configuration

SQL Server Installation on all machine Adding user group with SQL Security Restore DB Backup Always On Availability Group Configuration Configure Listener

Testing of Always-On

Test Application Connection Strings

CONFIGURATION AND INSTALLATION STEPS

Infrastructure Planning

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In Infrastructure preplanning, first list down all the details listed below – Current details of Network IPs, Hardware Configuration – CPU, Disk, Memory etc. Hardware and OS details should be as per the given minimum requirement of SQL Server 2014 AlwaysOn https://docs.microsoft.com/en-us/sql/database-engine/availabilitygroups/windows/prereqs-restrictions-recommendations-always-on-availability?view=sqlserver-2014

Below is an example to visualize the high-level infrastructure details of your network, Here all the explanations belong to the domain: ImproveSQL.net

Data Center Zone	Texas	New Jersey
IP CIDR Block	20.22.30.187	20.52.30.187
VM Name	ALWSQL01	ALWSQL02
Require additional IPs	2	2
	(1 - Failover Cluster Manager, 1 - AlwaysOn Listener in this subnet)	(1 - Failover Cluster Manager, 1 - AlwaysOn Listener in this subnet)
Ports	54001, 1433	54001, 1433
VM Instance Count	1	1
VM Instance Size & RAM	2 core, 16 GB Memory	2 core, 16 GB Memory
Operating System	Windows Server 2012 Datacenter	Windows Server 2012 Datacenter
Feature	Failover Clustering	Failover Clustering
	.Net Framework 3.5	.Net Framework 3.5
OS Disk Space	80 GB	80 GB
Drives & Disk Space	Depends on your database size & Conf	iguration
Domain Controller Name	ImproveSQL.net	ImproveSQL.net
SQL Server ISO Image	SQL Server 2014 Enterprise Edition	SQL Server 2014 Enterprise Edition
SQL Service Account	ImproveSQL.net\srvAcctAlwaysOn (Nor	mal user in ImproveSQLnet domain)
Failover Cluster Name	ALWSQL01CL.ImproveSQL.net	
Failover Cluster IP	20.22.30.185	20.52.30.185
Full Back up and Log file	\\WINDC\AWLSQL_Witness	
Folder Location	(with read/write access to srvAcctAlwaysOn user)	
AlwaysOn Listener Name	ALWSQL01LSN.DEV.CDS	
AlwaysOn Listener Port	54001	
AlwaysOn Listener IP	10.22.30.186	10.52.30.186

PS: this specified table is for reference, you can change the details as per your environment and requirements.

Prerequisite Checklist and Verification

- 1. DBA can use organization standard process to request OS and feature Installation, Open ports and IP requests. Specific to this Texas and New Jersey Environment, the Domain is the same as mentioned above and domain-level communication ports are open.
- 2. To start ask your System Admin to mount SQL Server 2014 Enterprise Edition ISO image to Install SQL Server.
- 3. Request to create a shared folder on the network location to store Backup and log files. i.e. \\WINDC\AWLSQL_Witness, allocate free space approx. double of database size. This folder should have Read/Write (Full) Access to the ImproveSQL.net\srvAcctAlwaysOn Service Account.
- 4. Once VMs are ready, check everything installed and configured properly.
 - Follow our standard checklist first to ensure the VM build is ready.
 - Note down allocated IP Address and requested additional IPs (for Failover Cluster and AlwaysOn Listener)
 - Check OS version and updates, Memory, CPU, and Server manager Initial Configuration like part of the domain, all VMs are reachable.
 - Check Requested Features are installed i.e. .Net Framework 3.5 and Failover Clustering. For more details on feature installation refer last section Windows Feature Installation
 - Check Drive Mapping and allocated space is correct
 - Check SQL Server Service Account is part of the Local Administrator group of newly created VMs.
 - Verify SQL Service account has read/write access to the requested new shared folder.

Windows Failover Cluster Configuration

In this section, we are configuring the Windows Failover Cluster. Windows Failover Cluster Manager Configuration requires Domain Administrator rights to create AD Objects, Preferred to Login with Domain Admin Login credentials or ask System Administrator to perform / Run Wizard.

Make sure to keep the Windows 2012 Server Operating system with the latest updates before you proceed to configure failover clustering.



To start failover clustering manager configuration – connect to anyone (preferred Planned Primary AlwaysOn Instance) through a remote desktop i.e. ALWSQL01 , start → Server Manager → Tools → Failover Cluster Manager

Once the Failover Cluster Manager MMC window opens, on right hand Actions pan choose Validate Configuration Option



 $\ensuremath{\mathsf{Next}} \to \ensuremath{\mathsf{select}}$ servers where you can specify server names

e 1	Vá	lidate a Configuration Wizard	
Select S	Servers or a Cluste	er	
Vefore You Begin lelect Servers or a Juster	To validate a set of se To test an existing clu	rvers, add the names of all the servers. ster, add the name of the cluster or one of its nodes.	
Testing Options	Enter name:	[Browse
onfirmation	Selected servers:	ALWSQL01.ImproveSQL.net	Add
Summary		ALWSQL02.ImproveSQL.net	Remove

Next \rightarrow choose Run all tests (recommended) option.

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嘲	Validate a Configuration Wizard	x
Testing	Options	
Before You Begin Select Servers or a Cluster Testing Options Confirmation Validating Summary	Choose between running all tests or running selected tests. The tests examine the Cluster Configuration, Hyper-V Configuration, Inventory, Network, Storage, and System Configuration. Microsoft supports a cluster solution only if the complete configuration (servers, network, and storage) can pass all tests in this wizard. In addition, all hardware components in the cluster solution must be "Certified for Windows Server 2012 R2." Run all tests (recommended) Run only tests I gelect More about cluster validation tests	n
	< <u>P</u> revious <u>N</u> ext > Cancel	

After a successful test, on the summary wizard, there is an option selected automatically to create the cluster now using the validated nodes. It automatically starts cluster wizard.



or you can manually as well choose to create a cluster. From Actions pan \rightarrow Create Cluster

On step Access Point for Administering the Cluster window, you need to specify Failover Cluster Name: ALWSQL01CL (Specify name without domain name) and failover cluster IPs (20.22.30.185, 20.52.30.185) defined initially into infrastructure planning section.

9		(Create Cluster Wiza	ird					-
Access I	Point for Admin	isterin	g the Cluster						
Before You Begin	Type the name yo	u want to	use when administering th	e cluster.					
Access Point for Administering the	Ouster Name:	ALW	SQLO1CL.ImproveS	QL.net					
Confirmation Creating New Cluster	The NetBIOS r automatically. address.	For each	nited to 15 characters. O network to be used, mai	ne or more IP ke sure the n	v4 addres etwork is s	ses could elected, a	not be nd the	r configure n type an	d
Summary			Networks	Address	R.				Π.
			20.22.30.0/24	20	22	30		185	
			20.52.30.0/24	20	52	- 30	1.1	185	
			20.52.30.0/24	20	- 52	- 30		185	

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Next \rightarrow on the confirmation window do not check the mark for Add all eligible storage to the cluster.

19 19	Create Cluster Wizard	×
Confirma	ation	
Before You Begin Access Point for Administering the	You are ready to create a cluster. The wizard will create your cluster with the following settings:	
Confirmation Confirmation Creating New Cluster Summary	Cluster: Node: Node: IP Address:	^
	Add all eligible storage to the cluster. To continue, click Next.	~
	< Previous Next > Can	cel

£		Create Cluster Wizard	
Confirma	tion		
efore You Begin ccess Point for dministering the	You are ready to create The wizard will create	e a cluster. your cluster with the following settings:	
uster	Cluster:	ALWSQL01CL	~
eating New Cluster	Node:	ALWSQL02.ImproveSQL.net ALWSQL01.ImproveSQL.net	
Jummary	IP Address:	20.22.30.185	
			~
	Add all eligible store	age to the cluster.	
	To continue, click Next	*	

At the end, summary window once you create the cluster successfully click Finish.

CONFIGURE Quorum Witness

In the Failover Cluster Manager Window−right-click on ALWSQL01.ImproveSQL.net → More Actions → Configure Cluster Quorum Settings.

ailover Cluster Manag	jer				^	Actions
ALWSQL01CL.In	Configure Role	LWSQL02 Subn	ets: 1 IPv4 and 0 I	ork 1 Pv6		ALWSQL01CL.Improv
Nodes	Validate Cluster	None in the last hour				Sconfigure Role
Storage	View Validation Report					Walidate Cluster
Disks	Add Node			- 11	View Validation Report	
	Close Connection				-	P Add Node
Cluster Event	Reset Recent Events	for a specific clustered role, add one or n 012 R2, Windows Server 2012, or Windo	ws Server 2008 R2), or copy roles from a cluster		Close Connection
	More Actions	Configure Cluster Quorum Settin	ngs	on the Web		Reset Recent Events
	View	Copy Cluster Roles				More Actions
	Refresh	Shut Down Cluster				View
	Properties	Destroy Cluster				G Refresh
	Help	Move Core Cluster Resources				Properties
		Cluster-Aware Updating				🛐 Help
	 Navigate 					Name: ALWSQL01CL
	(TR) (5.44)	THE ADDRESS	(B) 0	3		Bring Online
		C Hopes Contact			Take Offline	
		[e] Cluster overits				Information Details
	12. 					Show Critical Events
	Cluster Core	Resources				More Actions
	Name		Status	Information		🗙 Remove
	Server Name					Properties
	😑 🐏 Name: ALW:	SQL01CL	() Online			👔 Help
IP Address: 20.22.30.18		sa: 20.22.30.185	(😨 Online	Ê.		

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Configure Cluster Quorum wizard will start, Select the Quorum Witness settings \rightarrow Next to select the Quorum configuration option – choose the Quorum Witness option shown below.

離	Configure Cluster Quorum Wizard
Select Q	uorum Configuration Option
Before You Begin	Select a quorum configuration for your cluster.
Select Quorum Configuration Option	O Use default quorum configuration
Select Quorum Witness	The cluster determines quorum management options, including the quorum witness.
Configure File Share	<u>Select the quorum witness</u>
Witness	You can add or change the quorum witness. The cluster determines the other quorum management
Confirmation	Advanced auorum configuration
Quorum Settings	You determine the quorum management options, including the quorum witness.
Summary	
	Failover Cluster Quorum and Witness Configuration Options
	< <u>P</u> revious <u>N</u> ext > Cancel



then click next to select the quorum witness window and choose configure a file share witness,

巃	Configure Cluster Quorum Wizard
Select Q	uorum Witness
Before You Begin Select Quorum Configuration Option	Select a quorum witness option to add or change the quorum witness for your cluster configuration. As a best practice, configure a quorum witness to help achieve the highest availability of the cluster.
Select Quorum Witness	 Configure a disk witness Adds a quorum vote of the disk witness
Configure File Share Witness Configure Cluster Quorum Settings Summary	 Configure a file share witness Adds a quorum vote of the file share witness Do not <u>c</u>onfigure a quorum witness
	Failover Cluster Quorum and Witness Configuration Options
	< Previous Next > Cancel

and specify network shared folder

離	Configure Cluster Quorum Wizard
Configure	e File Share Witness
Before You Begin Select Quorum Configuration Option	Please select a file share that will be used by the file share witness resource. This file share must not be hosted by this cluster. It can be made more available by hosting it on another cluster.
Select Quorum Witness	File <u>S</u> hare Path:
Configure File Share Witness	\\WINDC\ALWSQL_Witness Browse
Confirmation	
Configure Cluster Quorum Settings	
Summary	
	< <u>P</u> revious <u>N</u> ext > Cancel



Click Next to Configure, after completion, it will display a confirmation window

離	Configur	re Cluster Quorum Wizard	×
Confirma	tion		
Before You Begin Select Quorum Configuration Option	You are ready to configure the	e quorum settings of the cluster.	
Select Quorum Witness	Witness Type: Witness Resource:	File Share Witness	^
Configure File Share Witness	Cluster Managed Voting:	Enabled	
Confirmation	All nodes are configured	to have quorum votes	
Configure Cluster Quorum Settings	Your cluster quorum cor above.	figuration will be changed to the configuration shown	
Summary			~
	To continue, click Next.		
		< Previous Next > Can	cel

Click Next to configure Cluster Quorum Settings

SQL 2014 Installation and Configuration

Please refer to our standard SQL Server Installation guide. In addition, there are a few steps that are explained here to configure AlwaysOn.

Start Installation using the Service Account specified in the initial infrastructure planning section.

- 1. Start SQL Server 2014 Installation Setup choose to Install SQL Server Standalone instances
- The rest of the steps remained the same as per our standard SQL server installation guide. available on network location M:\Collaboration\Sharing\Operations\ApplicationsAndDatabases\DatabaseDocuments\

 Choose the default Instance, and with the Server Configuration step – specify the service account and password for the server configuration step and set the Startup Type of SQL Agent service to Automatic as it is by default 'Manual'.

5	SQL Ser	ver 2014 Setup			×		
Server Configuration Specify the service accounts and	d collation configuration.						
Setup Support Rules Setup Role Feature Selection	Service Accounts Collation Microsoft recommends that you use a seg	wrate account for each SQL Server service.					
Installation Rules	Service	Account Name	Password	Startup Type			
Instance Configuration	SQL Server Agent	locSearch\SQLSERVERAGENT		Automatic	¥		
Disk Space Requirements	SQL Server Database Engine	IocSearch/JMSSQLSERVER	******	Automatic	w.		
Server Configuration	SQL Server Analysis Services	locSearch1MSSQLOLAPService		Automatic	¥		
Database Engine Configuration	SQL Server Reporting Services	locSearch\ReportServer	**********	Automatic	v		
Analysis Services Configuration	SQL Server Integration Services 11.0	locSearch\MsDtsServer110	••••••	Automatic	v		
Reporting Services Configuration	SQL Server Distributed Replay Client	NT Service'/SQL Server Distributed Replay Cli		Manual	¥		
Distributed Replay Controller	SQL Server Distributed Replay Controller	NT Service\SQL Server Distributed Replay C		Manual	×		
Distributed Replay Client	SQL Full-text Filter Daemon Launcher	NT Service\MSSQLFDLauncher	ncher Manu				
Error Reporting	SQL Server Browser	NT AUTHORITY/LOCAL SERVICE		Automatic	¥		
Installation Configuration Rules Ready to Install Installation Progress Complete					_		
		< Back New	t > Cance	E He	lp		

- 4. With Database Engine Configuration add SQL Server Administration user group DALLAS\Cardtronics_DBA or
- 5. After completion of SQL server installation, and server restart, start SQL Server Management Studio and log in.
- In SQL Server Object Explorer, expand Instance node → Security → Login, then add a new login "DALLAS\Cardtronics_DBA" with sysadmin server roles.

ime	Create Date	Policy Health State				
##MS_PolicyEventProcessi ##MS_PolicyTsglExecutio DEV\ALWSQL01_SQL	12/12/2017 3:20 AM 2/20/2014 8:49 PM 12/12/2017 3:20 AM	3	Login -	New		
A NT AUTHORITY\SYSTEM	12/12/2017 3:20 AM 12/12/2017 3:20 AM	Select Us	er, Service Account, or Grou	ip 🚺		
A NT SERVICE\ReportServer	12/12/2017 3:20 AM	Select this object type:				
A NT SERVICE\SQLSERVERA	12/12/2017 3:20 AM	User, Group, or Built in security p	vincipal	Object Types		Search
NT SERVICE\SQLWriter	12/12/2017 3:20 AM	From this location:				
sa	4/8/2003 9:10 AM	dallas cds		Locations		_
		Enter the object name to select (examples):			=
		cardtronics_DBA		Check Names		_
			User must charge para Mapped to certificate Mapped to asymmetric key	word at rest login	4	~
		Connection	Map to Credential			V Add
		Server: KCDEVALWSQL01 Connection: DEV-ALWSQL01_SQL	Mapped Credentials	Credential	Provider	
		Progress				Flemoy
		Progress Ready	Default database:	master		■ Remov

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 Start SQL Server 2014 Configuration Manager → SQL server services → SQL Server (MSSQLSERVER) Properties



8. Select SQL server service – in properties – enable AlwaysOn High Availability groups and restart the server



SQL Serv	er (MSSQLSERVE	R) Propert	ies ? X
Log On	Service	FIL	ESTREAM
AlwaysOn High Availab	ility Startup Pa	arameters	Advanced
Windows failover duster ALWSQL01CL ✓ Enable AlwaysOn Av Allow this instance of availability and disast	name: ailability Groups SQL Server to use ava er recovery.	ilability groups	for high
ОК	Cancel	Apply	Help

- 9. You can repeat the above installation and configuration steps for the rest of AlwaysOn Instances.
- 10. Start SQL Server Management Studio and log in.
- 11. Right-click on Databases \rightarrow restore the database.
- 12. Make sure that the database recovery mode is full and the compatibility level is SQL Server 2012 (110) / SQL Server 2014 (120).
- 13. Take full backup on network shared folder location \\DALDEVAPPSQL01\AWLSQL01_Witness
- 14. Now will start to configure the Always on Availability group wizard.



- 15. Click on the new availability group wizard, and specify the below details within the wizard
 - Availability group Name: ALWSQL01AG

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- Specify Replica: DALDEVALWSQL01, KCDEVALWSQL01
- 16. In the Select Databases page, select the checkbox beside the database that you want to include in the Availability Group. The databases have to be in a Full recovery model before joining them in the Availability group. Click Next.
- 17. In Specify Replica, you can add a replicas button and connect to the SQL instances that you joined as nodes in your WSFC
 - Specify Replica: DALDEVALWSQL01, KCDEVALWSQL01
- Set to automatic failover and synchronous commit instance, and readable secondary Yes.

0		Av	ailability Group Pr	op	erties - ALWS	Q	L01AG				1	-		×
Select a page	🖾 Script 💌 🚺 Help													
Permission	Availability group name Availability Databases	ALWSGL	J1AG			_		_		_				
	Database Name TestDB					_				_				
	Test Settlement_SQL													
Connection	Availability Reglicas -									9	Add	E	Remove	
Server: DALDEVALWSQL01	Server Instance	Role	Availability Mode		Fallover Mode		Connections in Primary Role		Readable Secondary		Session Timeout (seconds)		Endpo	int l
Connection:	DALDEVALWSQL01	Primary	Synchronous commit	~	Automatic	-	Allow all connections	Y	Yes 🗸	1	10	\$	TCP://	DA
Wew connection properties	KCDEVALWSQL01	Secondary	Synchronous commit	~	Automatic	*	Allow all connections	Y	Yes	1	0	<>	TCP://	KCE
Progress														
O Ready	<			.111							Add	F	Remove	>
										C	ж	C	Cancel	

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19. Make sure that you do not choose to specify a listener as shown below, we need to create a listener separately

Specify an	n instance of	f SQL Server to host	a seconda	replica.
Replicas	Endpoints	Backup Preferences	Listener	
Specify y Do no You ca	our preferen ot create an an create the	ce for an availability g availability group list listener later using th	proup lister ener now e Add Ava	r that will provide a client connection point: ability Group Listener dialog.

20. And set network location for data synchronization. Here is the specified folder name which is planned for Backup and log file purposes - \\DALDEVAPPSQL01\AWLSQL01_Witness



Se	elect your data synchronization preference.
۲	Full
	Starts 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.
	Specify a shared network location accessible by all replicas:
	\\DALDEVAPPSQL01\AWLSQL01_Witness Browse.
0	Join only
	Starts data synchronization where you have already restored database and log backups to each secondary server. The selected databases are joined to the availability group on each secondary.
0	Skip initial data synchronization
	Choose this option if you want to perform your own database and log backups of each primary database.

21. This process will take a few minutes to complete, it depends on database size. Once it's completed successfully, you will see the AlwaysOn dashboard of the primary instance as shown below

Availability group state:	🕑 Healthy	1				
Primary instance:	DALDE	VALWSQL01				
Failover mode:	Autom	atic				
Cluster state:	ALWSC	L01CL (Normal Q	uorum)			
Availability replica:						
Name	Role	Failover Mode	Synchronization State	lssues		
DALDEVALWSQL01	Primary	Automatic	Synchronized			
KCDEVALWSQL01	Secon	Automatic	Synchronized			
Group by -						
Name	Replica		Synchronizatio	n State	Failover Readi	Issues
DALDEVALWSQL01						
V TestDB	DALDE	ALWSQL01	Synchronized		No Data Loss	
TestSettlement_SQL	DALDE	ALWSQL01	Synchronized		No Data Loss	
KCDEVALWSQL01						
TestDB	KCDEV/	ALWSQL01	Synchronized		No Data Loss	
Tast Sattlament SOI	KCDEV/	ALWSQL01	Synchronized		No Data Loss	

22. Before starting to create a listener, make sure you contact to CDS Administrator to set security access from this URL <u>https://blogs.msdn.microsoft.com/alwaysonpro/2014/03/25/create-listener-fails-with-</u> <u>message-the-wsfc-cluster-could-not-bring-the-network-name-resource-online/</u> For the CDS environment - Domain Administrator/Jeremy Hoch need to perform all these

steps. This listener creation step creates internal AD objects in the Active Directory.

If you skip this step there is the possibility that you will get the below error.

	Microsoft SQL Server Management Studio
	Create rated for whatebond should be better a chroger toxin, the open to does not solve the same
-	An exception occurred while executing a Transact-SQL statement or batch. (Microsoft.Sg/Server.Connection@rfv)
	1. The WSPC duster couldinot bring the Network Name resource with DNS name 'ALVISQLO LSN' online. The DRS name may have been taken or have a conflict with existing name vervices, or the WSPC duster service may not be running or may be inaccessible. Use a different DNS name to resolve name conflicts, or check the WSPC duster log for more information. The attempt to create the network name and IP address for the latener failed. The WSPC service may not be numing or may be incoresible in its current state, or the values provided for the network name and IP address may be incorect. Check the state of the WSPC duster and validate the network name and IP address with the network administrator. (Microsoft SQL Server, Error: 19471)
1	<u>ه</u>

- 23. In SQL server SSMS → AlwaysOn High Availability → Availability Group → ALWSQL01AG (AG group) → Availability group Listeners → Add Listener
 - Listener Name: ALWSQL01LSN

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- Listener Port: 54001
- Listener IP: 10.22.30.186, 10.52.30.186 to their appropriate subnet as shown below

	C Seriet - 174 Halp		
🚰 General			
	Listener DNS Name: ALWSQ	LOILSN	
	Daterier DNS Malife.	No. 1 March 1	
	Port:		
	Network Mode: Static It		~
	Subnet	IP Address	
	10.22.30.0/24	10.22.30.186	
	10.52.30.0/24	10.52.30.186	
Connection			
Server: DALDEVALWSQL01			
Connection: DEV/ALWSQL01_SQL			
View connection properties			
-			
Progress			
Progress Ready			

Testing of AlwaysOn Feature

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The test application is developed in .net keep in mind that to simplify developers' lives to understand connection strings and the rest of all scenarios

1. Run the Test application and change the connection string accordingly.



vectio	in String	Server-ALWSQL01LSN.DEV.CDS:Integrated Security-SSPI:Pooling-False:MultiSubnetFailover-Yes:									
у		Select top 10 *from Run	TestSettlement_SQ	L.dbo.cds_dci_deposit_k Server Name is > KCD8	EVALWSQL01						
_	ods doi deposit k	x business date	teminal_id	terminal sequence	system trace audit	pan	~				
•	1	1/28/2015	10230027	4906	937675	420002					
	2	1/28/2015	10230026	9487	879021	420002*****					
	3	1/28/2015	12150001	5475	299379	551392****	_				
	4	1/28/2015	10230022	5717	884506	420002	=				
	E	1/28/2015	10230026	9492	885813	420002					
	5		10220022	5723	887511	420002					
	6	1/28/2015	10630022		a trained and a second s						
	6 7	1/28/2015 1/28/2015	12420001	467	885479	523860					
	6 7 8	1/28/2015 1/28/2015 1/28/2015	12420001	467 1809	885479 889461	403101					

- 2. Perform failover manually and again test this application, refer to Planned manual failover steps in Appendix
- 3. The sample connection string for the Read/write operation will be

Primary Instance Connectivity Connection Strings

Server=ALWSQL01LSN.DEV.CDS;Database=TestDB;Integrated Security=SSPI; Pooling=False; MultiSubnetFailover=Yes;

If multiple database access is required then in that case do not specify the database name in the connection string

Server=ALWSQL01LSN.DEV.CDS;Integrated

Security=SSPI;Pooling=False;MultiSubnetFailover=Yes;

And such scenarios make sure to use full (FQDN format) in queries

select top 10 * from [TestDB].[dbo].[cds_alert_message]

Read only Reporting Connection

Server=ALWSQL01LSN.DEV.CDS;Integrated Security=SSPI;Pooling=False; MultiSubnetFailover=Yes;ApplicationIntent=ReadOnly



APPENDIX

Acronyms

Acronyms	Description
AG	Availability Group
FCM	Failover Cluster Manager
HADR	High availability and Disaster Recovery
SSMS	SQL Server Management Studio
WSFC	Windows Server Failover Cluster



WINDOWS FEATURES INSTALLATION

Windows Failover Cluster Manager Installation

- 1. To start the failover clustering manager installation connect through a remote desktop using the service account (ImproveSQL.net\srvAcctAlwaysOn) / DBA regular login which has local Administration rights.
- 2. GUI Steps: Server Manager \rightarrow Dashboard \rightarrow Add Roles and Features

B	Add Roles and Features Wizard	o x
Before you begin	DESTINATION DALDBAJUMP01.d;	SERVER allas.cds
Before You Begin Installation Type Server Selection Server Roles Features	This wizard helps you install roles, role services, or features. You determine which roles, role serv features to install based on the computing needs of your organization, such as sharing documer hosting a website. To remove roles, role services, or features: Start the Remove Roles and Features Wizard Refere you continue weify that the following tacks have been completed:	iices, or hts, or
Confirmation Results	 The Administrator account has a strong password Network settings, such as static IP addresses, are configured The most current security updates from Windows Update are installed If you must verify that any of the preceding prerequisites have been completed, close the wizard complete the steps, and then run the wizard again. To continue, click Next. 	4
	Skip this page by default	
	< Previous Next > Install Ca	ancel

Next \rightarrow choose Role-based or feature-based installation, Next \rightarrow select server, Next \rightarrow It will display the Server Roles window (do not select anything here), Next \rightarrow Features List, select Failover Clustering and Next \rightarrow Finish.

elect features	Add Roles and Features Wizard	DESTINATION SERV ALWSQL01.ImproveSQLr
Before You Begin Installation Type Server Selection Server Roles Features Confirmation Results	Select one or more features to install on the selected server. Features I .NET Framework 3.5 Features I .NET Framework 4.5 Features (2 of 7 installed) B Background Intelligent Transfer Service (BITS) BitLocker Drive Encryption BitLocker Network Unlock BitLocker Network Unlock BranchCache Client for NFS Data Center Bridging Direct Play Enhanced Storage Failover Clustering Group Balicy Magazement	Description Failover Clustering allows multiple servers to work together to provid high availability of server roles. Failover Clustering is often used fo File Services, virtual machines, database applications, and mail applications.
	IIS Hostable Web Core Ink and Handwriting Services	

- 3. Or you can use Powershell Steps: Run Powershell command prompt as Administrator and execute the below script to install the active directory
 - PS C:\> Set-ExecutionPolicy Unrestricted
 - PS C:\> Import-Module ServerManager
 - PS C: \> Get-WindowsFeature Failover-Clustering | Install-WindowsFeature

Note: You need to repeat the same installation steps 1 to 3 on other VM machines.

.Net Framework 3.5 Feature Installation

verExpanse

- 1. To start .Net Framework 3.5 features installation connect through remote desktop using service account / DBA regular login which has local Administration rights.
- 2. GUI Steps : Server Manager \rightarrow Dashboard \rightarrow Add Roles and Features



EverExpanse

Next → choose Role-based or feature based installation, Next → select server, Next → It will display Server Roles window (do not select anything here), Next → Features List, select .Ne Framework 3.5 Features and Next → Do not forget to specify alternate path of OS Installation (i.e. C:\IT_LIBRARY\Win2012R2DC\sources) → Finish.



- 4. Or you can use Powershell Steps : Run Powershell command prompt as Administrator and execute below script to install active directory
 - PS C: \> Set-ExecutionPolicy Unrestricted
 - PS C: \> Import-Module ServerManager

PS C: \> Get-WindowsFeature NET-Framework-Features | Install-WindowsFeature

Note: You need to repeat same installation steps 1 to 3 on all other VM machines.

Planned Manual Failover Steps

Using SSMS

- 1. Connect to SSMS object explorer Expand the AlwaysOn High Availability node and the Availability Group node
- 2. Right-click on availability group ALWSQL01AG to be failed over, and select Failover
- 3. The Failover Availability Group wizard starts before you choose the secondary replica that will become the new primary replica whose Failover Readiness value is "No data loss"
- On the Connect to Replica page, Next → to see the summary and affected databases & click Finish.
- Using Transact-SQL
- 1. Connect to the server instance that hosts the target secondary replica
- 2. Use below script

ALTER AVAILABILITY GROUP alwsql01ag FAILOVER