

SABC Cluster Servers

About	Description
Revision	4.6.5-1.0
History	
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Overview

About this manual

The Swift Newsroom system at SABC relies on 4 central servers:

- 1. **Repository Server** stores the Subversion Repository for all the Swift projects in use at SABC.
- 2. MySQL Server stores external data for use in Swift graphics
- 3. **MOS Gateway Server** creates and distributes Swift running orders received from ENPS
- 4. DataServer Server stores details of the Swift Live logins and Sessions

Because these servers are a broadcast-critical part of the infrastructure each one is implemented as a clustered pair of machines with one machine acting as the "Main" server and the other acting as the "Backup" server. Should the "Main" fail at any time the "Backup" will take over in a seamless fashion.

This manual details the setup, configuration and maintenance of each of the four "Clusters" at SABC.

Overview of the SABC Clusters

Each of the clusters is implemented as a Microsoft Active Directory-detached Cluster - Microsoft documentation can be found here:

https://learn.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-r2-and-2012/dn265970(v=ws.11)#:~:text=An%20Active%20Directory%2Ddetach ed%20cluster%20uses%20Kerberos%20authentication%20for%20intracluster,scenario %20that%20requires%20Kerberos%20authentication.

An Active Directory-detached failover cluster has no dependencies in Active Directory Domain Services (AD DS) for network names and only requires that the failover cluster nodes are joined to an Active Directory domain.

Each cluster also requires a Cluster Quorum Witness to be configured. For more details see:

https://learn.microsoft.com/en-us/azure-stack/hci/concepts/quorum

Each of the 8 cluster "nodes" has been joined to an SABC AD domain and because these are "AD-detached" clusters the clusters themselves can only be created via Windows Powershell commands.

Each of the cluster nodes is also configured to run a Powershell script every 5 seconds. This script updates a file

(C:\ProgramData\RTSoftware\RTSW\conf\isBackupServer.txt). If this file contains a "1" then the node is the "Backup" server. If this file contains a "0" then the node is the "Main" (or Active) server.

SABC have four Clusters, each one comprising a pair of HP zCentral 4R rack workstations running Windows Server 2019.

Cluster Name	Host Node DNS Name	Host Node IP Address	Cluster DNS Name	Cluster IP Address
MOS Gateway	NSR-MOS1-RND-S	10.235.71.121	NSR-MOS-RND-C 10.235.71.100	10.235.71.100
	MCR-MOS2-BAC-S	10.235.71.64		
Data Server	NSR-NRCS1-SVR	10.235.71.122	NSR-NRCS-SVR-C	10.235.71.101
	MCR-NRCS-BAC	10.235.71.65]	
Media Watcher	NSR-SM-MW1	10.235.71.123	NSR-SM-MW-C	10.235.71.102
	MCR-SM-NN-MW2	10.235.71.66		
Repository	NSR-MNG-REP1	10.235.71.124	NSR-MNG-REP-C	10.235.71.103
	MCR-MNG-REPBAC	10.235.71.62		

The following table shows the names/IP addresses for each cluster:

For Administration purposes each node supports Remote Desktop login. Applications using a service hosted on a cluster should connect to the Cluster IP address/DNS name. Connections to the cluster IP address are serviced by the active node within the cluster pair.

Creating and Configuring a Cluster

Each of the 4 clusters is created and configured in an identical fashion. In this Chapter I will be showing the Mos Gateway cluster as an example.

The example Powershell commands should be executed from a Powershell window that has been "Run As" Administrator.

Cluster Creation

The powershell command is (all typed on one line):

```
New-Cluster <cluster-name> -Node <Node-1>,<Node-2>
-StaticAddress <Cluster IP address> -NoStorage
-AdministrativeAccessPoint Dns
```

Where:

<cluster name=""></cluster>	=	the DNS name of the cluster
<node-1></node-1>	=	the DNS name of the first node in the cluster
<node-2></node-2>	=	the DNS name of the second node in the cluster
<cluster-ip></cluster-ip>	=	the IP address of the cluster

Witness Configuration

Each cluster has now been created but requires a "Witness" to be configured. There are several different types of Witness but in this case we will configure a File Share WItness. For further details please see:

https://learn.microsoft.com/en-us/windows-server/failover-clustering/file-share-witne ss

At SABC the File Share is provided by the Facilis system.

The name of the share is \\NSR-FAC-SAN\W with:

User name: facilis

Password: WIndowsRoot

When the Set-ClusterQuorum command is run it will prompt for the username and password as given above.

```
Set-ClusterQuorum -FileShareWitness \\NSR-FAC-SAN\W
-Credential (Get-Credential)
```

Check Cluster Created Successfully

If the above 2 commands have run successfully we should now be able to run up the "Failover Cluster Manager" from the tools menu on the Server Manager dashboard:



In the Failover CLuster Manager select "Connect to Cluster" then OK:

Eailover Cluster Manager File Action View Help		
Failover Cluster Manager	Failover Cluster Manager	Actions
	Create failover clusters, validate hardware for potential failover clusters, and perform configuration changes to your failover clusters.	Validate Configuration
	Overview A failover cluster is a set of independent computers that work together to increase the availability of server roles. The clustered servers (called nodes) are connected by physical cables and by software. If one of the nodes fails, another node begins to provide services. This process is known as failover.	Connect to Cluster View Refresh
	Clusters	Properties
	Name Role Status Node Status Image: Select Cluster X Image: Select Cluster X	
	Management OK Cancel Browse To begin to use failover clustering, first validate your hardware configuration, and then create a cluster. After these steps are complete, you can manage the cluster. Managing a cluster can include copying roles to it from a cluster running Windows Server 2019 or supported previous versions of Windows Server.	
	W Validate Confouration @ Create Custer @ Connect to Cluster	

Once connected to the cluster various bits of information should be shown.

In the top section "Summary of Cluster" you should see the cluster name and the number of nodes. Below that should be the full DNS name of the cluster. The current host is shown (the currently active server in the pair) and there should be no cluster events (errors) shown. Lastly the File Share Witness should be shown.

In the "Cluster Core Resources" section you should see the cluster name and its associated IP address and below that the File Share Witness share name.

🍓 Failover Cluster Manager				
File Action View Help				
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📲 Failover Cluster Manager	Cluster NSR-MOS-RND-C.sabc.co.za			Actions
NSR-MOS-RND-C.sabc.c	2			NSR-MOS-RND-C.sabc.co.za
Roles	Summary of Cluster NSR-MOS-RND-C			🦣 Configure Role
> 🛃 Storage	NSR-MOS-RIND-C has 0 clustered roles and 2 nodes.	and an Oliver Network 1		Validate Cluster
Networks	Current Host Server: NSR-MOS1-RND-S Subr	nets: 1 IPv4 and 0 IPv6		View Validation Report
Cluster Events	Recent Cluster Events: None in the last 3 hours			Add Node
	Witness: File Share Witness (\\NSR-FAC-SAN\W)			Close Connection
				Beast Recent Fuents
	 Configure 			Keset Recent Events
	Configure high availability for a specific clustered role, add one or mor Windows Server 2019 or supported previous versions of Windows Ser	e servers (nodes), or copy re	oles from a cluster running	More Actions
	Ex Configure Bole	allover cluster topics on the V	/eb	View
	W Validate Cluster			Q Refresh
	Add Node			Properties
	Copy Cluster Boles			🕐 Help
	Cluster-Aware Undation			
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				7
	Roles Nodes	Torage		
	Networks Cluster Events			
	O olivetes Orea Deserves			1
	Cluster Core Resources			
	Name	Status	Information	
	Server Name	0		
	Name: NSR-MOS-RND-C	() Online		
		(1) Online		
	File Share Witness	-		
	File Share Witness (\\NSR-FAC-SAN\W)	Online		
			>	

Please note that as we are using "AD-detached" clusters the Failover Cluster Manager can be used to query & monitor the cluster but most administration has to be done from Powershell.

Setup Powershell script

For the RTSW Newsroom server software to run correctly it needs to know if it is running on the active server or on the backup server. It does this by querying a set file:

C:\ProgramData\RTSoftware\RTSW\conf\isBackupServer.txt

If this file contained a "0" then this is the currently active server. If this file contains a "1" then this server is currently the backup server.

The file is created and updated by a Powershell script that is called every 5 seconds from a DOS script. The DOS script is run as a Windows Service. Because Windows Services cannot be script files the DOS script is run via NSSM.exe which does allow .bat files to run as a service.

The DOS .bat script is:

To be added

The Powershell script that it calls every 5 seconds is:

To be added

Both of these scripts and the NSSM executable are saved in:

C:\ProgramData\RTSoftware\RTSW\bin

Cluster Deletion

If it ever becomes necessary to delete and reinstate a cluster it has to be done from the Powershell. From a node on the cluster execute Powershell command:

bladwdwdw

which will delete the cluster. After cluster deletion the server should be rebooted.

Individual Cluster Details

The MOS Gateway Cluster

Cluster Name	Host Node DNS Name	Host Node IP Address	Cluster DNS Name	Cluster IP Address
MOS Gateway	NSR-MOS1-RND-S	10.235.71.121	NSR-MOS-RND-C	10.235.71.100
	MCR-MOS2-BAC-S	10.235.71.64		

Overview

Both nodes in this cluster run the RTSW Mos Gateway application that allows ENPS (via an ActiveX plugin) to push Running Orders to this cluster. ENPS pushes the Running Order to both nodes in the cluster and the currently active node will push that running order through to both of the nodes in the Data Server cluster.

MOS Gateway Application Configuration

To be completed

Running Order Distribution

To be completed

The Data Server Cluster

Cluster Name	Host Node DNS Name	Host Node IP Address	Cluster DNS Name	Cluster IP Address
Data Server	NSR-NRCS1-SVR	10.235.71.122	NSR-NRCS-SVR-C	10.235.71.101
	MCR-NRCS-BAC	10.235.71.65		

Overview

This cluster runs the RTSW DataServer application that is accessed by the RTSW Swift Live playout system.

Both nodes run the DataServer application and the active node pushes changes to the backup node to keep the 2 nodes synchronized.

Swift Live is configured to query the Cluster name/IP address and the query will be answered by the currently active node.

DataServer Application Configuration

To be completed

Cluster Node Synchronisation

To be completed

The MediaWatcher Cluster

Cluster Name	Host Node DNS Name	Host Node IP Address	Cluster DNS Name	Cluster IP Address
Media Watcher	NSR-SM-MW1	10.235.71.123	NSR-SM-MW-C	10.235.71.102
	MCR-SM-NN-MW2	10.235.71.66		

Overview

This cluster runs the RTSW MediaWatcher application that is accessed by the RTSW Swift Live playout system. Both nodes also run a MariaDB Database to store the incoming data. On both nodes MariaDB is configured in a master-master configuration which means that changes to the database on one node will be replicated on the other node to keep both databases synchronised.

Both nodes run the MediaWatcher application and process any incoming data. The active node in the cluster will update its local database and these updates will get replicated on the backup node.

Database queries are configured to use the Cluster name/IP address and the query will be answered by the currently active node.

MediaWatcher Application Configuration

To be completed

Cluster Node Synchronisation

To be completed

The Repository Cluster

Cluster Name	Host Node DNS Name	Host Node IP Address	Cluster DNS Name	Cluster IP Address
Repository	NSR-MNG-REP1	10.235.71.124	NSR-MNG-REP-C	10.235.71.103
	MCR-MNG-REPBAC	10.235.71.62		

Overview

This cluster acts as the repository for the RTSW Repository application.

Both nodes run the VisualSVN Subversion server application which is configured in a master-slave configuration. If both nodes are available both the master and slave repositories are available for read and write. If the master repository becomes unavailable then the slave becomes read-only and must be re-configured as a "temporary master" for normal operation to be resumed.

Clients accessing the Subversion repository use the cluster IP address/name and any Subversion query made on the cluster IP address will be served by the currently active node in the cluster.

In normal operation the "master" repository is on the master node in the cluster, the "master" cluster node is the "active" node and any VisualSVN updates will be automatically replicated onto the repository on the backup node. On failover the backup node will become the active node and the repository will become read-only until VisualSVN is reconfigured to become the new "master".

When the failed node becomes available again VisualSVN should be configured as a slave to the new master at which time it will synchronise with the new master.

VisualSVN Configuration

For VisualSVN installation and configuration please see the Repository manual:

https://rtsw.co.uk/document/repository-user-guide-installation-and-configuration3-1/

VisualSVN Failover and Recovery Procedure

As initially setup the Cluster "master" node is the "active" node and is also the VisualSVN "master" repository.

A fault on the cluster master node may cause the cluster to failover. The immediate effect of this will probably be errors when using the Repository application to check-in a new project or changes to an existing project.

If the Repository application cannot update the VisualSVN repository it's very likely that the cluster has failed-over. The failover means the active node will now be the "backup" node in the cluster and it will be running the "slave" VisualSVN repository which will have become read-only when the "master" node on the cluster became unavailable causing the failover. The first step is to verify which cluster node is "active" and whether the VisualSVN Repository is a "master" or a "slave" on the active node.

If the "active" node has a "slave" repository the next step is to use the VisualSVN Server Manager to check if the repository is writable.

If the repository is not writable then a manual intervention is required to make the "slave" VisualSVN repository a "master" and therefore enable reads and writes on the repository. Once this has been done the Repository application should work as normal.

The final step is to restore the failed cluster node (it will now be the passive, non-active node) and create a VisualSVN repository that is a "slave" to the new "master" and on the now active node.

In summary the steps required are:

- 1. Identify active node and the status of the repository on that node
- 2. If the repository is a slave check to see if its writable
- 3. If the repository is not writable make it the new "master"
- 4. Restore failed node and recreate the repository as a slave to the new master

The following sections detail each step:

Identify active node and repository status

RDP into one of the nodes on the cluster and start the Failover Cluster Manager from the Server Manager menu:



In the Failover Cluster Manager connect to the cluster:

Hailover Cluster Manager		
File Action View Help		
📲 Failover Cluster Manager	Failover Cluster Manager	Actions
	Create failover clusters, validate hardware for potential failover clusters, and	Failover Cluster Manager
	perform configuration changes to your failover clusters.	Validate Configuration
		Create Cluster
	Overview	📲 Connect to Cluster
	A failover cluster is a set of independent computers that work together to increase the availability of server roles. The clustered servers (called nodes) are connected by	View
	physical cables and by software. If one of the nodes fails, another node begins to provide services. This process is known as failover.	Refresh
		Properties
	Clusters	Help
	Name Role Status	
	No items found.	
	Management	
	To begin to use failover clustering, first validate your hardware configuration, and then create a cluster. After these steps are complete, you can manage the cluster. Managing a cluster can include copying roles to it from a cluster running Windows Server 2019 or supported previous versions of Windows Server.	
	Walidate Configuration	
	Treate Cluster	
	Connect to Cluster	

The currently active node is shown at the top of the subsequent menu:



In this example the currently active node in the cluster is server MCR-MNG-REPBAC which is considered to be the "backup" node in the cluster.

Now login to the active cluster node (in this case NSR-MNG-REPBAC) and check the status of the VisualSVN server.

This is done via the VisualSVN Server Manager which is started from the Windows Start icon:



In the VisualSVN Server manager click on the Repositories entry and the status of the "project" repository can be seen on the right of the screen:

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File Action View Help			
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VisualSVN Server (Local)	Repositories		
> 🚺 Repositories	Name	Revisions	Туре
Groups	🐌 projects	723	VDFS(slave)
Jobs			
	1		

So, in this example we know that the currently active cluster node is the "backup" node and its VisualSVN repository is the "slave" repository.

This is what we would expect to see if the "main" node in the cluster had failed and the cluster had failed-over to the "backup" node.

Check if "slave" repository is writable

Using the VisualSVN Repository Manager try and create a new folder in the projects repository. Right-click on the repository name to create a new folder.

6 VisualSVN Server
File Action View Help
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VisualSVN Server (Local) projects (http://MCR-MNG-REPBAC.sabc.co.za/svn/projects/)
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> FOKI Export List
> FOKI Help
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If the folder gets created successfully then the "slave" is writable. Delete the new folder immediately. In this example I created a new folder called "ANewFolder":



If the folder did not get created then this repository is read-only and the next step is to convert it to a "master" repository to make it read/write.

Convert the "slave" VisualSVN repository to a "master"

Start up the VisualSVN



In the PowerShell window type in the following commands:

Suspend-SvnRepository projects

Switch-SvnRepository -Name projects -Role Master Set-SvnRepository projects -ReplicationEnabled \$true Resume-SvnRepository -Name Projects

After running these commands the VisualSVN repository is now a "master" and therefore read/write and the Repository application should now work fine.

At this stage the Repository cluster is being served by the formerly "backup" cluster node and the VisualSVN repository is a read-write "master" repository.

To re-enable the cluster functionality the failed "main" machine in the cluster needs to be repaired and brought back on-line. The VisualSVN repository on the "repaired master" will now need to be made a slave to the new "master" running on the "backup" node in the cluster.

Restore the failed node and re-create the VisualSVN repository as a "slave" to the new "master"

Once the failed "master" node in the cluster is back on-line we need to sync the VisualSVN repository to the new "master" repository.

The first step is to delete or rename the "projects" repository. The second step is to create a new "slave" repository and let it re-sync.

Both of these steps are done via the VisualSVN Server Manager.

To delete or rename the repository called projects right-click on it and select Delete or Rename:



The next step is to create a new repository called projects and make it a "slave" to the new "master" repository.

Right-click on "Repositories" and select "New,"

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File Action View	Help					
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O VisualSVN Server (Lo	cal) Repositories					
🗸 间 Repositories				Paulicione	Turne	
Users	Create New Repository			Revisions	type	
Groups	Import Existing Repository		There are no items to show in this view			
📄 Jobs	Open in Web Interface					
	Restore Repository					
	New	>	ר			
	All Tasks	>				
	View	>				
	Refresh					
	Export List					
	Help					
			_			

Select it to be a "Distributed VDFS repository":



Select it as a "slave" repository:



Enter the full name of the active node hosting the new "master" repository and the name of the repository on that node and under "Authentication method" select "Use certificate-based authentication and tick the "Enable mutual authentication" check-box:

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File Action View Help							
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Repositories	Name Re	evisions	Туре				
Groups Jobs	There are no items to show in this view.						
	Create New Repository			×			
	Master Repository Connection Deta Specify the connection details to the r	nils master repository					
	Master server name: MCR-MNG-REPBAC.sabc.co.za Master repository name:		~ B	rowse			
	Authentication method Active Directory)					
	Learn how to get started with VDFS repos	<u>sitories</u>					
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VisualSVN Server (Local)	Repositories						
Gepositories Users	Name	Revisions	Туре				
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	Create New Repository			×			
	Master Repository Connection D Specify the connection details to t	etails the master reposito	ry.				
	Master Repository Authenti Maste	cation Method		×			
	Maste proje	entication	·	2			
	Authe If this option is enabled master server will be vi	d, the replication ce alidated by the slav	ertificate configured on the /e.				
			OK Cancel				
	Learn how to get started with VDFS re	epositories					

Name the new repository "projects":

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File Action View Help							
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Server (Local)	Repositories						
✓ j Repositories	Name	Revisions	Туре				
Groups Jobs	There are no items to show in this view.						
	Create New Repository			×			
	Repository Name Specify the name for the VDFS SI	ave repository.		Ī			
	Repository name:						
		< Bac	k Next >	Cancel			



Check "Allow search indexing of this repository" and click "Create":

A progress window will now come up. Wait until completion before clicking on "Finish".

< Back

Create

Cancel

Search indexing is disabled in the server properties. Learn more...



We now need to assign a user permission to access the new repository. Right-click on the repository name and select "Properties...":



Under the "Security" tab click on "Add...":

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curity Hooks S	earch D	elegation	Replication	Details			
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Name				Permis	sions		
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earn more about r	permission	s for distri	buted repos	tories			

Select user "admin and click "OK":

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Propertie	s for proj	jects					×	
Security	Hooks	Search	Delegation	Replication	Details			
Group o	r user na	me:						co.za/svn
Name					Permis	sions		
C	hoose U	ser or Gr	oup			>	<	
	Specia	I ——						
	Everyon	e						
	Users							
	admin							
Pe								
	Create	user]	ОК		Cancel]	
For the	advance	d security	settings, clic	k Advanced.		Advan	ced	
<u>Learn m</u>	iore abou	t permiss	ions for distri	buted reposit	ories			
				ОК	Cance	1	Apply	
			11	поторіса				

A further click on OK and the procedure is finished.

We can now make sure we can access the newly created repository from a cmd window. The user name is "admin" with password "admin":

