# Creating a 2 node virtual SQL Server 2008 Cluster Configuration Using Windows 2003 MSCS

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# 1 PURPOSE OF THE DOCUMENT

This document explains how to create a virtual 2 node SQL Server cluster using VMWare Server 2.0.1, Windows 2003 Enterprise 32bit and SQL Server 2008 Enterprise 32 bit (you may use 64 bit if your hardware supports it). For the purposes of this document the following apply;

Fail-Over	A Microsoft Cluster implementation method		
SSMS SQL Server Management Studio			
T-SQL	Transact_SQL (the native SQL Server command language)		
MSCS	Microsoft Cluster Services. The underlying technology for SQL		
	Server Fail-Over clustering		
NIC	Network interface card		
Virtual Server	A unique computer name in the domain. During fail-over this		
Name	computername is passed from one node to another		
Virtual IP Address	A unique IP Address in the network. During fail-over this IP		
	Address is passed from one node to another		
NOS Operating System			
Node	A host which participates in a cluster		
Quorum	The centralised repository used by MSCS		
Heartbeat	A segregated private network for communication detection between		
	nodes		
Active\Passive	A cluster configuration which involves an active node and a passive		
	node. The passive node becomes active on Fail-Over.		

#### 1.1 AUDIENCE

The document is intended to be accessible by Support representatives expressing a wish to learn more about Windows\SQL Server clustering with a view to supporting the SQL Server application under this platform. It is not expected that the reader is familiar with the Windows operating system and MSCS.

# 2 CLUSTERING BRIEF OVERVIEW

MSCS involves 2 or more computers (they don't have to be physical you can use virtual machines too) configured into a cluster relationship, however they do all have to use the same NOS (i.e. Enterprise or Datacentre). This technology requires a central, shared storage (it cannot exist on the machine itself). Clusters use Virtual Server Names and Virtual IP Addresses to create a reference for the network connection to the clustered application. For example SQL Node 1 has a computername of S-DBA-SQL-P01 and IP Address of 10.20.0.120. SQL Server instance, INST1 has a virtual network name of S-DBA-SQL-C03 and IP Address of 10.20.0.126. All network calls to the SQL Server instance 1 are made through the virtual server name and IP address, not the Nodes actual name or IP Address. During fail-over this virtual name is de registered and re registered and along with the IP address passed to the partner Node like a ticket, re directing network calls to the new Node.

## **3 CREATING THE WINDOWS CLUSTER**

To re create storage scenarios you will use FREENAS to deploy a virtual SAN. The first steps in this article, install and configure the VMWare Server hypervisor and then the FreeNAS SAN virtual machine.

#### 3.1 INSTALL & CONFIGURE VMWARE SERVER

Note: For this to be workable you must have sensible hardware available. You will need a multi socket, multi core machine and plenty of RAM and disk space.

Install VMware Server 2.0.1 and then ensure you add your Windows\domain account to the following local group on your pc

\_\_vmware\_\_

Login to the Vmware Server console supplying your Windows\domain account and password, you see the following;

🕞 🕞 👻 🙋 https:// -95918:8333/ui/#{e:"H	ostSystem ha-host",w:{t:true,i	:0}}			👻 😵 Certifica	ite Error 😽 🗲	K Google UK
Elle Edit View Favorites Iools Help							
						2	Took +
Windle thirdscoccole web Access							
VMware Infrastructure Web Access		<u> </u>					
Application Virtual Machine Administ	ration 📕 🔢 🕨 🧐	3				Help	Virtual Appliance Marketplace   Log Ou
Inventory	95918	·					
📕95918	Summary Virtual Mach	ines Tasks Events Perm	issions				
	General				-	Commands	
	Hostname	. 95918.				📑 Create Vir	rtual Machine
	Manufacturer	Dell Inc.				<ul> <li>Add Virtua</li> </ul>	al Machine to Inventory
	Model	OptiPlex 745				Add Datas Configure Or	tore ptions
	Processors	Intel(P) Pentium(P) D C	PU 3 40GHz			• Edit Host S	Settings
	- Hocessons	1 CPU	0 0.40012			Edit Virtua	I Machine Startup/Shutdown Settings
	lisane	1525	00 MH <del>7</del>			Refresh Ne	etwork List
	,-					VMware Tips	-
	Memory	1.98 GB					(Converse
	Usage	798 М	мв				Whenever technologiset and 3
	Datastores				-		
	Name 🔺	Capacity	Free Space	Location			
	standard	137.3 GB	118.12 GB	C:\Virtual Machine	ss/		Triffication
	<				>	Upgrade to VN afford	Mware Infrastructure at a price you can
	Networks					Improve serv	er utilization and get higher performance.
	Name A		VN	Mnet	Туре		
	Bridged		VI	mnetu mneti	bostoply		
	NAT		vi	mnet8	nat		
	<				>	1	
<							
Task	Target	Stat		Triggered At w	Tria	gered by	Completed At

Open the VMWare "Manage Virtual Networks" option from the Start menu and go straight to the "Host virtual adapters" tab as shown below.

Add a new virtual adapter for VMnet2 and VMnet3 then click "Apply"

a <sup>g</sup> Virtual Network Editor		X
Summary       Automatic Bridging       Host Virtual Network Mapping       Host         Image: Automatic Bridging       Host Virtual Network Mapping       Host Virtual Network Mapping         Image: Automatic Bridging       Host Virtual Network Mapping       Host Virtual Network Mapping         Image: Automatic Bridging       Host Virtual Network Mapping       Host Virtual Network Mapping         Image: Automatic Bridging       Host Virtual Network Mapping       Host Virtual Network Mapping         Image: Automatic Bridging       Host Virtual Network Mapping       Host Virtual Network Mapping         Image: Automatic Br	ost Virtual Adapters D ual adapters - virtual E aetwork.	HCP NAT
Network Adapter	Virtual Network	Status
WMware Network Adapter VMnet1     WMware Network Adapter VMnet8	VMnet1	Enabled
Add	Di <u>s</u> able	<u>R</u> emove
OK Cano	cel <u>Apply</u>	Help

Now go to the DHCP tab and remove any DHCP assignments (click each item and remove) the click "Apply".

<mark>a<sup>9</sup> Virtual Network</mark>	Editor			$\mathbf{X}$
Summary Automatic I	Bridging Host Virtual	Network Mapping   H	lost Virtual Adapters	DHCP NAT
Use this page	to configure the Dyna well as control the DHG	amic Host Configurati	on Protocol settings fo	r individual virtual
Virtual Network	Subnet	Netmask	Description	
VMnet1	192.168. 1. 0	255.255.255.0	vmnet1	
VMnet2	10. 10. 10. 0	255.255.255.0	vmnet2	
VMNeco	192.168.140. 0	255.255.255. U	Vmneto	
		A <u>d</u> d	Remove	Properties
DHCP service				
Service status:	Started			Start
Service request:				Stop
				R <u>e</u> start
		ОК Са	ncel <u>Apply</u>	Help

Go to the "Host virtual network mapping" option and change the subnets to be used for VMnet 1, 2 & 3. Do this by clicking the arrows (indicated) and selecting "Subnet" from the pop-up menu

😴 🖁 Virtual Netw	rork Editor 🛛 🔀	l
Summary Autor	natic Bridging Host Virtual Network Mapping Host Virtual Adapters DHCP NAT	l
Use this adapter	page to associate individual virtual networks to specific physical and virtual network s as well as change their settings.	
VMnet <u>0</u> :	Bridged to an automatically chosen adapter	l
VMnet <u>1</u> :	IN to host	
VMnet <u>2</u> :	WM Heartbeat	
VMnet <u>3</u> ;	🖤 VMware Network Adapter VMnet3	
VMnet <u>4</u> :	Not bridged	
VMnet <u>5</u> ;	Not bridged	
VMnet <u>6</u> :	Not bridged	
VMnet <u>7</u> ;	Not bridged	
VMnet <u>8</u> :	WWware Network Adapter VMnet8	
VMnet <u>9</u> :	Not bridged	l
		l
	OK Cancel <u>Apply</u> Help	l

For VMnet1 set the IP address to 192.168.1.0

Subnet	
IP <u>A</u> ddress:	192 . 168 . 1 . 0
<u>S</u> ubnet Mask:	255 . 255 . 255 . 0
	OK Cancel

For VMnet2 set the IP address to 10.10.10.0

Subnet	X
IP <u>A</u> ddress:	10 . 10 . 10 . 0
<u>S</u> ubnet Mask:	255 . 255 . 255 . 0
	OK Cancel

For VMnet3 set the IP address range to 192.168.93.0

Subnet		
IP <u>A</u> ddress:	192 . 168 . 93 . 0	
<u>S</u> ubnet Mask:	255 . 255 . 255 . 0	
	OK Cancel	

Click "OK" to exit the virtual network editor

It's a good idea to open your host machine network connections and rename the virtual LAN adapters to something a little more meaningful, as shown below;

S Network Connections				
<u>File E</u> dit <u>V</u> iew <u>T</u> ools Adva <u>n</u> ced	i <u>H</u> elp			A.
🕞 Back - 🌍 - 🏂 🔎	Search 😥 Folders 🕼	35 🗙 🍤	•	
Address 🔇 Network Connections				💌 🄁 Go
Name	Туре	Status	Device Name	Phone # or Host Addre 🔨
LAN or High-Speed Internet				
Local Area Connection	LAN or High-Speed Internet LAN or High-Speed Internet LAN or High-Speed Internet LAN or High-Speed Internet LAN or High-Speed Internet	Connected Connected Connected Connected Connected	VMware Virtual Ethernet Adapter for VMnet8 VMware Virtual Ethernet Adapter for VMnet1 VMware Virtual Ethernet Adapter for VMnet3 VMware Virtual Ethernet Adapter for VMnet2 Broadcom NetXtreme S7xx Gigabit Controller	
<				>
6 objects				

Click the "refresh networks list option" within the VMWare Server console to refresh the virtual networks.

With the VMware Server console installed and configured and the virtual networks created, it's now time to create a datastore to hold all the ISO images we wish to install from.

Select the host node in the server console as shown below and under "Commands" click "Add datastore";

n III E	es Tasks Events Permissio	ons				Help   Virtual Appliance Marketplace   Log Out Commands
ummary Virtual Machin General Hostname Manufacturer Model	es Tasks Events Permissio	ons				Commands
General Hostname Manufacturer Model	·95918.					Commands 📃
Hostname Manufacturer Model	-95918.					
Manufacturer Model						Constant Mathematica Standards
Model						Add Victual Machine to Inventory
Model						Add Datastore
						Configure Options
Processors	Intel(P) Pentium(P) D CPU	3 40 GHz				Edit Host Settings
In rocessors	A CDU	5.400112				Edit Virtual Machine Startup/Shutdown Settings
	I CPU					Refresh Network List
Usage	678.00 M	IHz				VMware Ting
Mamony	1.98.CB					
	1.90 00					Statement and a
Usage	/1/ MB					
atastores					Ξ	
lame 🔺	Capacity F	free Space	Location			
standard	137.3 GB	105.12 GB	C:\Virtual Machin	es\		Burdin 22m
					>	Upgrade to VMware Infrastructure at a price you can
letworks						attord!
lame 🔺		V	/Mnet	Туре		Improve server utilization and get nigher performance.
Bridged			vmnet0	bridged		
HostOnly			vmnet1	hostonly		
NAT			vmnet8	nat		
( )					>	
Target	Status		Triggered At v	Т	Frigge	ered by Completed At
	Usage Memory Usage atastores ame A tandard etworks ame A bridged toatOnly tAT	Usage 673.00 M Memory 1.98 GB Usage 717 MB atastores ame ≜ bridged tototonly tAT Target Status	Usage 673.00 MHz Memory 1.98 GB Usage 717 MB atastores anne A Capacity Free Space tandard 137.3 GB 105.12 GB etworks 4000 tridged totochniy tAT 1000000000000000000000000000000000000	Usage 673.00 MHz  Memory 1.98 GB Usage 717 MB  atastores anne ▲ Capacity Free Space Location tandard 137.3 GB 105.12 GB Ct/Virtual Machin  etworks anne ▲ VMnet bridged vmnet0 totOhly vmnet1 totOhly vmnet1 totOhly vmnet1 totOhly vmnet2	Usage 673.00 MHz Memory 1.98 GB Usage 7.17 MB atastores anne A Cepacity Free Space Location tandard 137.3 GB 105.12 GB C:\Virtual Machines\ etworks C anne A VMnet Type tridged vmnet0 bridged totoohy vmnet1 hostonly (AT vmnet8 nat 100 bridged 100 b	Usage 678.00 MHz Memory 1.98 GB Usage 717 MB atastores ane A Cepacity Free Space Location tandard 137.3 GB 105.12 GB C:\Virtual Machines\ tridged control bridged ownet0 bridged ownet0 bridged ownet0 bridged tridged control bridged Target Status Triggered At ★ Triggered At K Triggered At ★ Triggered At K Triggered At K Trig

At the dialog supply a datastore name (ISOs) and a local path (C:\ISOs) then click "OK";

🖶 Add Datas	tore	×
Name:		1
O Local D	atastore	
Map a direct	ory on the host system as a	
Directory P	ath:	
		4
○ CIFS		
Use a shared connection a	l folder over a network s a VMware datastore.	
Properties:		
Server:		
	Examples: SERVER, nas.example.com, 192.168.0.1	
Folder:		
	Examples: \common\ISO- images, d\$	, 
Authorizati	on:	
Username:		]
	Examples: MYDOMAIN\user, SERVER\user	
Password:		
Help	ОК	Cancel

#### 3.2 CREATE & CONFIGURE THE SAN\NAS VM

The first VM we need to create is the NAS server. Create a new VM with the following properties (select either 32 bit or 64 bit as your host system supports);

🖶 Create Virtual Machine 🛛 🗙 🗙			
Pages		Guest Operating System	
Name and Location	^		
Guest Operating System Memory and Processors		Select the operating system you plan to install in your virtual machine. Your selection will be used to recommend settings and optimize performance.	
Hard Disk Properties		Once the virtual machine has been created, you will need to install this operating system from your own installation disc.	
Network Adapter Properties	Ш	Operating System: O Windows operating system Novell Netware Solaris operating system	
CD/DVD Drive Properties		Clinux operating system     Other operating systems      Version:     DOS	
Floppy Drive Properties		▶ Product Compat OS/2 (experimental) FreeBSD (32-bit) FreeBSD (64-bit)	
USB Controller	•	SCO OpenServer 5 (Experimental) SCO UnixWare 7 (experimental) Other (32-bit) Other (64-bit)	
Help		Back Next Cancel	

Add a 2GB virtual hard disk and a network adapter. Bind the virtual NIC to whichever virtual switch you want to use for the Public network (VMNET1 in my case). Add a virtual CD\DVD drive and bind to the FreeNAS ISO image. Do not add a USB controller or a Floppy disk drive. The VM will need 400MB of RAM.

Boot the ISO image accepting all defaults. Once the NOS has booted (shown below), select option 9 from the menu.



You want to install the Full OS using the 3rd option.

7	NASTest VMware Remote Console - Devices -	- 🗆 ×
	Install & Upgrade	1
	<ol> <li>Install 'embedded' OS on HDD/Flash/USB</li> <li>Install 'embedded' OS on HDD/Flash/USB + DATA + SWAP partition</li> <li>Install 'full' OS on HDD + DATA + SWAP partition</li> <li>Upgrade 'embedded' OS from CDROM</li> <li>Upgrade 'full' OS from CDROM</li> <li>Upgrade and convert 'full' OS to 'embedded'</li> </ol>	
	COR CRATC	-
To	direct input to this virtual machine, press Ctrl+G. 🛛 🛁 🚱 🗐 🗐 🖛	vare <sup>.</sup>

## Answer "OK" to continue

1	NASTest VMware Remote Console	- 🗆 ×
	FreeNAS installation-	
	FreeNAS 'full' installer for HDD.	
	<ul> <li>Create MBR partition 1, using UFS, customizable size for OS</li> <li>Create MBR partition 2, using UFS, for DATA</li> <li>Create MBR partition 3, as SWAP</li> <li>Easy to customize (e.g. install additional FreeBSD packages)</li> <li>WARNING: There will be some limitations:</li> <li>This will erase ALL partitions and data on the destination disk</li> </ul>	
	Cancel>	
Τo	o direct input to this virtual machine, press Ctrl+G.	ware <sup>.</sup>

Select "OK" for the CD drive,

🛃 NASTest	VMware Remote Console 👻 Devices 👻	_ 🗆 ×
	Choose installation media	
	Cancel>	
To direct input to	this virtual machine, press Ctrl+G. 📃 🔒 🗐 🗤	ware'

Select "OK" for the virtual disk,

NASTest VMware Remote Console - Devices -	- 🗆 ×
Choose destination media	
Select media where FreeNAS OS should be installed.	
la0 2048MB «UMware, UMware Virtual S 1.0»	
Cancel>	
To direct input to this virtual machine, press Ctrl+G.	<b>vm</b> ware <sup>.</sup>

Supply the OS partition size of 512MB,

🛃 NASTest	VMware Remote Console 👻 Devices 👻	- 🗆 ×
	Enter the size for US partition in MB (Min 128MB):	
	512	
	<pre>Cancel&gt;</pre>	
To direct input to	this virtual machine, press Ctrl+G. 📃 😭 🗐 🖛	nware <sup>.</sup>

Select "yes" to add a swap partition,

🛃 NASTest 🛛 VMware Remote	Console - Devices -	- 🗆 ×
	Do you want to add a swap partition?	
To direct input to this virtual machin	e, press Ctrl+G. 🔤 🔂 🖬 🗐 🗤	ware

Supply the swap partition size of 1024MB,

🔀 NASTest VMware	Remote Console 👻 Devices 👻	_ 🗆 ×
	Enter the size of the swap partition in MB. 1024 COX > <cancel></cancel>	
To direct input to this virtual	machine, press Ctrl+G.	<b>n</b> ware'

Installation completed, press "Enter" to continue.



Now select "Exit" to finish.

NASTest VMware Remote Console - Devices -	_ 🗆 ×
-Install & Upgrade I Install 'embedded' OS on HDD/Flash/USB 2 Install 'embedded' OS on HDD/Flash/USB	ition
<ul> <li>2 Install embedded US ON HDD/Flash/DSB + DHIH + SWAP part</li> <li>3 Install 'full' OS on HDD + DATA + SWAP partition</li> <li>4 Upgrade 'embedded' OS from CDROM</li> <li>5 Upgrade 'full' OS from CDROM</li> <li>6 Upgrade and convert 'full' OS to 'embedded'</li> </ul>	
To direct input to this virtual machine, press Ctrl+G. 😽 🕞 🗐	🗇 <b>vm</b> ware'

Now select option 7 and reboot the SAN! Once this has been done we need to set the LAN IP address. Select option 2 from the menu

🗾 testsan VMware Remote Console 🔹 Devices 👻	- 🗆 × 🛛
*** This is FreeNAS, version 0.7.1 (revision 5127) built on Sun Apr 11 00:21:36 JST 2010 for i386-full Copyright (C) 2005-2010 by Olivier Cochard-Labbe. All rights reserved. Visit http://www.freenas.org for updates.	
LAN IPv4 address: 192.168.1.250	
Port configuration:	
LAN -> le0	
Console setup	
1) Assign interfaces 2) Set LAN IP address 3) Reset WebGUI password 4) Reset to factory defaults 5) Ping host 6) Shell 7) Reboot system 8) Shutdowm system	
Enter a number: To direct input to this virtual machine, press Ctrl+G.	are:
To direct input to this virtual machine, press Ltil+G.	ure

The LAN configuration starts as follows. Select whether to use DHCP (no for our scenario)



#### Enter the new LAN IP address

🎽 testsan VMware Remote Con	sole • Devices •		_ 🗆 ×
	Enter new LAN IPv4 address. 192.168.1.5 COK > <cancel></cancel>		
To direct input to this virtual machine, pr	ess Ctrl+G.	🕞 🚱 🗊 📁	🗇 <b>vm</b> ware

Supply the Network mask (using CIDR notation),

NASTest VMware Remote Console - Devices -	_ 🗆 ×
Enter new LAN subnet mask. Subnet masks are entered as bit counts (as in CIDR notation).	
e.g. 255.255.255.0 = 24 255.255.0.0 = 16 255.0.0.0 = 8	
24	
Cancel>	
To direct input to this virtual machine, press Ctrl+G.	vare' 📑

Select "no" for the IPv6 configuration,

📝 NASTest	VMware Remote Console Devices	- 🗆 ×
	Do you want to configuration IPv6 for this interface?	
To direct input to the	nis virtual machine, press Ctrl+G. 📃 😭 🗐 👘 🖛	ware <sup>.</sup>

Press "Enter" to continue,

🗾 testsan VMware Remote Console – Devices –	- 🗆 ×
Initializing interface. Disass unit	
Initializing Interlace. Please Walt	
The LAN IP address has been set to: IPv4: 192.168.1.5/24	
You can access the WebGUI using the following URL: http://192.168.1.5:80	
Press ENTER to continue.	
To direct input to this virtual machine, press Ctrl+G. 🚑 😪 🗐 👜 🗤	<b>n</b> ware <sup>.</sup>

Shutdown the server using option 8 from the menu as we now have to create\attach the virtual hard disk to the NAS VM that will hold our iSCSI LUNs. Click the "Add hardware" option and add a new disk 11GB in size, pre allocating all disk space (shown below).

🖶 Add Hardware Wizard	X
Add Hardware Wizard          Pages         Hardware Type         Hard Disk         Properties         Ready to Complete	Properties         How much software and data should this hard disk be able to store?         Capacity:       11         GB         Location:       [standard] NASTest/NASTest_2.vmdk         Browse         31.78 GB available         ▼ File Options
	<ul> <li>✓ Allocate all disk space now</li> <li>Split disk into 2 GB files</li> <li>▶ Disk Mode</li> <li>▶ Virtual Device Node</li> <li>▶ Policies</li> </ul>
Help	Back Next Cancel

At this point, you now need to complete the configuration for the networks the SAN will be using. Shutdown the SAN VM and add a second vNIC binding to the virtual switch you will use for iSCSI traffic (VMNET2 in my case). Start the VM and login to the console, from the main menu select 'Network' > 'Interface management'. You will only see the 1 vNIC. Click the 'Add Interface' icon shown below;

etwork	Interface Management
Management	VLAN LAGG
Interface	Network port
LAN	le0 (00:0c:29:30:7d:bd) 💌
Save Warning: After you dick following steps • change • access	'Save", you must reboot FreeNAS to make the changes take effect. You may also have to do one or more of the before you can access your NAS again: the IP address of your computer the webGUI with the new IP address

Select the second vNIC to bind to the iSCSI network (OPT1 interface), as shown below;



Click 'save' and then reboot the system! This will create a new network interface named 'OPT1'. Once you have saved and rebooted, login to the console and go to 'Network' > 'OPT1'. Configure the iSCSI network information as shown below, (this IP address will later become the iSCSI portal address). Save and reboot again!

terfaces   O	otional 1 (OPT1)	
IPv4 Configuration		🗹 Activate
Туре	Static 🗸	
Description	OPT 1 You may enter a description here for your reference.	
IP address	10.10.5	

Once the disk has been added and the OPT1 interface configured, boot the NAS VM and login to the NAS web management page using the username "admin" and password "FreeNAS" (without quotes). You may have to bypass the proxy for local addresses in your IE settings!



Go to "Disks" > "Management". Click the + sign as indicated,

C freena	is.local	- Disks   i	Manage	ement - '	Windows	Inter	net Ex	kplore	er.																				
$\Theta$	- 🖭	http://10.	10.10.2/	disks_man	age.php														~	<b>*</b>	×G	ogle U	IK.				<b>^</b>	•	
Eile Edit	⊻iew	Favorites	s <u>I</u> ools	s <u>H</u> elp																									
* *	😤 free	nas,local -	Disks   Ma	anagemen																	<u>۰</u>	<u>.</u>		• 🗗	Page	• 💮 T	r <u>o</u> ols ¬	• »	
Fi	ree netwo	VAS ork attache	d storage					Etra			) in an			Adu			d		)	•		k	-		free	enas.loc	cal		
Sys	Disks	Man	agen	ient	ervices	AC	Cess	514	atus		nagino	osuc	2	Auva	anceo		eiþ												
	Manage	ement	5.M.A.	R.T. i9	CSI Initia	tor																							
	Disk	Size	Desc	ription									Ser nur	ial nber		Stan time	dby	Fi	le syst	em	Statu	5							
	_		_																				1	-	-				
	Res	scan disk	s																										
							_																						<u> </u>
							Freel	NAS © :	2005-2	-2010 t	by Oliv	ivier Ci	ochari	d-Labb	e. All ri	ights re	served.												
																												~	
					_		_	_		_	_	_	_		_							otorno			1	A 100	- 		

Select the new 11GB disk and use ZFS pre formatted file system, then click "add". After adding the disk you must click the "Apply changes" button.

tem Network Disks	ervices Access Status Diagnostics Advanced Help
) isks   Management	Disk   Add
Management SMART i	SCST Initiator
Thendycinche Sinishari	
Disk	da 1:11264MB (VMware, VMware Virtual S 1.0)
Description	dai: 1048WB (Whware, VMware Virtual S 1.0) dai: 1164MB (Whware, VMware Virtual S 1.0) lacdo: NA (VMware Virtual DE CDROM Drive(00000001) voo nay erker a desprotentiere tor voor terteretee.
Transfer mode	Auto
Hard disk standby time	Always on v Puts the hard disk into standby mode when the selected amount of time after the last hard disk access has been elapsed.
Advanced Power Management	Disabled  This allows you to lower the power consumption of the drive, at the expense of performance.
Acoustic level	Disabled This allows you to set how loud the drive is while it's operating.
S.M.A.R.T.	Activate S.M.A.R.T. monitoring for this device.
S.M.A.R.T. extra options	Extra options (usually empty). Please check the documentation.
Preformatted file system	ZFS storage pool device  This allows you to set the file system for preformatted hard disks containing data. Leave 'Unformated' for unformated disks and format them using format menu.
Add Cancel	

After adding the disk, click "Disks" > "ZFS". Select "Pools" > "Virtual device". Click the + sign

System	Network	C Disks	Services	Access	Status	Diagnostics	Advanced	Help	1
Dis	ks   ZFS	Pools   Vi	rtual de	evice				$\sim$	
Poo	ls Dataset	ts Configu	ration					$\sim$	
Virt	ual device	Managemen	t Tools	Information	I/O sta	tistics			
N	ame		Туре		Descripti	on			
								+	

Supply a device name and select the disk then click "Add", you must click the "Apply changes" button afterwards.

Disks   ZFS   Pools   Virtua	al device   Add
Pools Datasets Configuration	
Virtual device Management T	Tools Information I/O statistics
Name	Data_Vol
Туре	Stripe 🗸
Devices	da1 (11264MB, VMware, VMware Virtual S 1.0)
Description	You may enter a description here for your reference.
Add Cancel	

Now click "Management" as shown below and then click the + sign

KS   ZFS   POOIS   Mai ols Datasets Configurat tual device Management	ion Tools Info	i ormation I/O	statistics				
lame	Size	Used	Free	Capacity	Health	AltRoot	
		FreeNAS © 200	5-2010 by Olivier (	Cochard-Labbe. All	rights reserved.		

Supply a name and select the virtual device then click "Add", you must click the "Apply changes" button afterwards.

rtual device Managem	nent Tools Information I/O statistics
Name	Data_Vol
Virtual devices	Data_Vol (stripe)
Root	Creates the pool with an alternate root.
Mount point	Sets an alternate mount point for the root dataset. Default is /mnt.
Description	You may enter a description here for your reference

Once this is done you may then go to "Services" > "iSCSI target". The first task is to enable the iSCSI Target by checking the box indicated and then clicking "Save and restart".

rvices   iSCSI Target	t i i i i i i i i i i i i i i i i i i i
ttings Targets Portals	Initiators Auths Media
SCSI Target	Enable
Base Name	ign. 2007-09.jp.ne.peach.istgt The base name (e.g. ign.2007-09.jp.ne.peach.istgt) will append the target name that is not starting with 'ign.'.
Discovery Auth Method	Auto  The method can be accepted in discovery session. Auto means both none and authentication.
Discovery Auth Group	None The initiator can discover the targets with correct user and secret in specific Auth Group.
Advanced settings	
I/O Timeout	30 I/O timeout in seconds (30 by default).
NOPIN Interval	20 NOPIN sending interval in seconds (20 by default).
Max. sessions	32 Maximum number of sessions holding at same time (32 by default).
Max. connections	8 Maximum number of connections in each session (8 by default).
FirstBurstLength	65536 ISCSI initial parameter (65536 by default).
MaxBurstLength	262144 ISCSI initial parameter (262144 by default).
MaxRecvDataSegmentLength	262144 ISCSI initial parameter (262144 by default).
iSCSI Target Logical Unit Contr	oller Fnahle
Save and Restart	

Go to the "Initiators" section and click the + sign.

ices iSCSI Ta	rget Initiator Group		
ngs Targets Por	tals Initiators Auths Media		
iator Groups			
ator Group	Tag Initiators	Networks	
	A Initiator Group contains authorised initiator name	s and networks to access the target.	+

If you want all initiators to connect click "Add" and specify "ALL" (you could lock down which machines connect by specifying their Initiator IDs here), you must click the "Apply changes" button afterwards.

ervices iSCSI Targ	get   Initiator Group   Add
Settings Targets Porta	ls Initiators Auths Media
Tag number	1 Numeric identifier of the group.
Initiators	ALL
Authorised network	10. 10. 10. 0/24
Comment	You may enter a description here for your reference.
Add Cancel	You may enter a description here for your reference.

Click "Portal group" and then click the + sign

Services   iSCSI Targe	t   Portal (	Group		
Settings Targets Portals	Initiators	Auths Media		
Portal Groups	_			
Portal Group	Tag	Portals		
	A Portal Grou	p contains IP addresses and listening TCP ports to connect the target from the initiator.	+	<u> </u>

Specify the portal (accept the default in our case) then click "Add". You must click the "Apply changes" button afterwards.

Services LiSCST Tar	rget   Portal Group   Add
Settings Targets Port	tals Initiators Auths Media
Tag number	1 Numeric identifier of the group.
Portals	10.10.10.2:3260
Comment	You may enter a description here for your reference.
Add Cancel	

Now click "Targets". You may now set up the LUNs you wish to present to the cluster nodes. Click the + sign to add an extent.

ixtent	Name	Path				Size			1
	Extents must be det	fined before they can be use	ed, and ext	ents cannot be used mo	ore than once.				+
arget	Name		Flags	LUNs		PG	IG	AG	
	At the highest level, a target is what is presented to the initiator, and is made up of one or more extents.						+		

Supply the extent name, type, path and size. Remember to click "Apply changes" button when prompted.

ervices iSCSI Targ	et   Extent   Add
Settings Targets Portals	s Initiators Auths Media
Extent Name	Quroum String identifier of the extent.
Туре	File Y Type used as extent.
Path	/mnt/Data_Vol/Quorum
File size	512 MB Size offered to the initiator. (up to 8EB=8388608TiB. actual size is depend on your disks.)
Comment	You may enter a description here for your reference.
Add Cancel	

Extents added! Now click the + sign next to targets and configure those.

	been applied successfully.							
Targets								
Extent	Name	Path		Siz	•			
	Quroum	/mnt/Data_Vol/Quorum		51	2 MiB			4 💢
	SQLBak	/mnt/Data_Vol/SQLBak	/mnt/Data_Vol/SQLBak			1024MiB		
	SQLData	/mnt/Data_Vol/SQLData	/mnt/Data_Vol/SQLData			2048MiB		
	SQLLog	/mnt/Data_Vol/SQLLog		10	24MiB			d 💢
	Extents must be de	fined before they can be used, and	extents cannot be used r	nore than once.				+
Target	Name	Flags	5 LUNs	P	G	IG	AG	
	At the highest leve	l, a target is what is presented to th	ne initiator, and is made up	of one or more exte	nts.			+
Note:	must add at least Portal Group	and Initiator Group and Extent.						

Configure the following options for each target (Quorum, SQLData, SQLLog, SQLBak).

ervices iSCSI Ta	rget   Target   Add
ettings Targets Por	tals Initiators Auths Media
Target Name	Quorum Base Name will be appended automatically when starting without 'iqn.'.
Target Alias	Optional user-friendly string of the target.
Туре	Disk V Logical Unit Type mapped to LUN.
Flags	Read/Write (rw)
Portal Group	Tag1 V The initiator can connect to the portals in specific Portal Group.
Initiator Group	Tag1 v The initiator can access to the target via the portals by authorised initiator names and networks in specific Initiator Group.
Comment	You may enter a description here for your reference.
LUNO	
Storage	Quroum (/mnt/Data_Vol/Quorum) 🔽 The storage area mapped to LUN0.

Targets added! The target name is the label presented to the computer node over the iSCSI network.

ettings         Targets         Portal           Image: Image of the state of the	Is Initiators Auths	Media							
Targets									
Extent	Name Path					Size			
	Quroum	/mnt/Data_Vol/0	Quorum		512M	iB	0	? 🗙	
	SQLBak	/mnt/Data_Vol/S	QLBak		1024N	1iB	6	d 🗙	
	SQLData	/mnt/Data_Vol/S	QLData		2048N	ЛiВ	6	d 🗙	
	SQLLog	/mnt/Data_Vol/S	QLLog		1024N	1iB	0	d 🗙	
	Extents must be define	ed before they can be	used, and e	xtents cannot be used more than once	2.			+	
Target	Name		Elage		DC.	IC	AC		
Target	Name	ach istat:Ouorum	Flags	LUNS	PG 1	1G	AG	1.2 🛀	
Target	Name iqn.2007-09.jp.ne.pe	each.istgt:Quorum	rw rw	LUN0=/mnt/Data_Vol/Quorum	PG 1 1	1G 1 1	AG none	47 🗙 27 😫	
Target	Name iqn.2007-09.jp.ne.pe iqn.2007-09.jp.ne.pe iqn.2007-09.jp.ne.pe	each.istgt:Quorum each.istgt:SQLBak each.istgt:SQLData	rw rw rw rw	LUNS=/mnt/Data_Vol/Quorum LUN0=/mnt/Data_Vol/SQLBak LUN0=/mnt/Data_Vol/SQLData	PG 1 1 1	1G 1 1 1	AG none none none	47 🗙 47 💥 47 💥	
Target	Name iqn. 2007-09.jp.ne.pe iqn. 2007-09.jp.ne.pe iqn. 2007-09.jp.ne.pe iqn. 2007-09.jp.ne.pe	each.istgt:Quorum each.istgt:SQLBak each.istgt:SQLData each.istgt:SQLLog	rw rw rw rw rw rw	LUN0=/mnt/Data_Vol/Quorum LUN0=/mnt/Data_Vol/SQLBak LUN0=/mnt/Data_Vol/SQLData LUN0=/mnt/Data_Vol/SQLLog	PG 1 1 1 1 1 1 1 1	IG 1 1 1 1 1	AG none none none none	4 × 4 × 4 ×	

Extent defines the storage area of the target.

## 3.3 CREATE THE CLUSTER VM'S (DC AND CLUSTER NODES)

Now we are ready to start creating the VM's. Under the "Commands" section, select "Create virtual machine". Enter a Virtual machine name and select a datastore (this datastore maps to a folder on your local drive) then click "Next";

Create Virtual Machine		×
Pages	Name and Location	
Name and Location Guest Operating System Memory and Processors	Enter a descriptive name for your new v datastore where its configuration files wi	irtual machine and specify the ill be saved.
Hard Disk	Name: ClusterDC	
Properties	Datastore 🔺	Capacity Available
	ISOs	137.3 GB 80.6 GB
Network Adapter	standard	137.3 GB 105.12 GB
Properties		
CD/DVD Drive		
Properties		
Floppy Drive		
Properties		
USB Controller		
Help	Bac	k Next Cancel

Select the Operating System type (Enterprise Edition for clustering) and click "Next";

🖶 Create Virtual Machine		×
Pages		Guest Operating System
Name and Location Guest Operating System Memory and Processors		Select the operating system you plan to instal in your virtual machine. Your selection will be used to recommend settings and optimize performance.
Hard Disk Properties		Operating System:
Network Adapter Properties	=	<ul> <li>Novell Netware</li> <li>Solaris operating system</li> <li>Linux operating system</li> </ul>
CD/DVD Drive Properties		<ul> <li>Other operating systems</li> <li>Version: Microsoft Windows Server 2003, Enterprise Ed ▼</li> </ul>
Floppy Drive Properties		▶ Product Compatibility
USB Controller	~	
Help		Back Next Cancel

Select the RAM (256MB for DC and 512MB for each cluster node) and CPU (1 each) then click "Next";

Create Virtual Machine		×
Pages		Memory and Processors
Name and Location	^	
Guest Operating System		Memory
Memory and Processors		Increasing a virtual machine's memory allocation can improve its performance but may also impact other running applications.
Hard Disk		
Properties		Size: 256 MB
Network Adapter		• Recommended Size (256 MB)
Properties	=	Recommended Minimum (128 MB)
		The guest operating system may not start up below this size.
CD/DVD Drive		Recommended Maximum (8192 MB)
Properties		Memory swapping may occur above this size.
Floppy Drive		Processors
Properties		Select the number of processors carefully. We do not recommend
		reconfiguring this value after installing the guest operating system.
USB Controller		Count: 1 -
	~	
Holp		Pack Novt Canad
neip		Back Next Cancel

#### Select to create a new virtual disk;

Create Virtual Machine	×
Pages	Hard Disk
Name and Location Guest Operating System Memory and Processors	A virtual disk is a special type of file, which will start small and then grow larger as you add applications and data to your virtual machine.
Hard Disk	Choose this option to add a blank disk to your virtual machine.
Properties	Use an Existing Virtual Disk
Network Adapter	Choose this option to reuse or share a hard disk from another virtual machine.
Properties	• Don't Add a Hard Disk
CD/DVD Drive	
Properties	
Floppy Drive	
Properties	
USB Controller	
Help	Back Next Cancel

Supply a size for the virtual disk and select SCSI bus (SCSI ID 0 for the VM boot drives in our example), make sure to pre allocate the disk space for the virtual disks. Click "Next";

🖶 Create Virtual Machine		×
Pages		Properties
Name and Location Guest Operating System Memory and Processors	^	How much software and data should this hard disk be able to store? Capacity: 10 🖨 GB 🔻
Hard Disk Properties		Location: [standard] ClusterDC/ClusterDC.vmdk Browse 105.12 GB available
Network Adapter Properties	=	<ul> <li>▶ File Options</li> <li>▶ Disk Mode</li> </ul>
CD/DVD Drive Properties		Virtual Device Node       Adapter:     IDE 0       Device:     0
Floppy Drive Properties		▶ Policies
USB Controller		
Help		Back Next Cancel

The Windows 2003 cluster nodes need a min 15GB disk drive and 10GB for the DC.

#### Select "Add a network adapter" and the network selection browse opens

🖶 Create Virtual Machine		×
Pages	Network Adapter	
Name and Location Guest Operating System Memory and Processors	Network adapters give your virtual machine access to port groups that have been configured for virtual machine use on the host. If no such port groups have been configured, you will not be able to connect to any network	
Hard Disk Properties	→ Add a Network Adapter	
Network Adapter	Don't Add a Network Adapter	
Properties		
CD/DVD Drive Properties		
Floppy Drive Properties		
USB Controller		
Help	Back Next Cancel	H
help	Dack Next Calleer	

Select "Host only" for this vNIC and click "Next";

🖶 Create Virtual Machine		×
Create Virtual Machine  Pages Name and Location Guest Operating System Memory and Processors Hard Disk Properties Network Adapter Properties CD/DVD Drive Properties Floppy Drive Properties	Properties         Which network will your virtual machine access?         Network Connection:       HostOnly         Bridged         Connect at Power On:         NAT	
USB Controller		
Help	Back Next Cancel	

Select to use an ISO image for the vCD drive and click the browse button,

🖶 Create Virtual Machine	×
Pages	CD/DVD Drive
Name and Location Guest Operating System Memory and Processors	CD and DVD media can be accessed on the host system or on your local computer.
Hard Disk Properties	→ Use a Physical Drive Choose this option to give the guest operating system access to a
Network Adapter Properties	• Use an ISO Image     Choose this option to give the guest operating system access to an     ISO image residing on the host file system.
CD/DVD Drive Properties	
Floppy Drive Properties	• Don't Add a CD/DVD Drive
USB Controller	
Help	Back Next Cancel

The datastore browser opens, drill down and select the Windows 2003 R2 Enterprise ISO (or Windows 2003 Enterprise for a cluster node) and click "OK". At the "create virtual machine window" click "Next";

🖶 Select File			×
Inventory	Contents	Informatio	n
<ul> <li>D-95918.corp.northampto</li> </ul>	📁 SQL Server x86 Ent	Name:	ISOs
🔻 👹 ISOs	📁 Windows Server Enterprise 2003 R2 v	Type:	Datastore
SQL Server x86 E		Capacity:	137.304 G
Windows Server E		Available:	80.604 GB
Standard			
1			
File Type: ISO Image (*.iso)	▼		
		_	
		ОК	Cancel

At the next screen do not add a floppy drive and click "Next";

🖶 Create Virtual Machine	×
Pages	Floppy Drive
Name and Location Guest Operating System Memory and Processors	Floppy media can be accessed on the host system or on your local computer.
Hard Disk Properties	Host Media     Use a Physical Drive     Choose this option to give the guest operating system access to a
Network Adapter Properties	<ul> <li>Use a Floppy Image</li> <li>Choose this option to give the guest operating system access to a floppy image on the host file system</li> </ul>
CD/DVD Drive Properties	Create a New Floppy Image     Choose this option to create a new floppy image on the host file     system.
Floppy Drive Properties	
USB Controller	Don t Add a Floppy Drive
Help	Back Next Cancel

Do not add a USB controller and click "Next";

🖶 Create Virtual Machine	د
Pages	USB Controller
Name and Location Guest Operating System Memory and Processors	A USB controller gives your virtual machine access to USB devices plugged into the host.
Hard Disk Properties	<ul> <li>Add a USB Controller</li> <li>Don't Add a USB Controller</li> </ul>
Network Adapter Properties	
CD/DVD Drive Properties	
Floppy Drive	
USB Controller	
Ready to Complete	
Help	Back Next Cancel

#### At the last screen click "Finish" to complete the VM

🖶 Create Virtual Machine		×
Pages	Ready to Complete	
Name and Location Guest Operating System Memory and Processors	Please verify that your ner Name:	w virtual machine is configured correctly. ClusterDC
Hard Disk Properties	Location: Guest Operating System: Memory:	[standard] Microsoft Windows Server 2003, Enterpri 256 MB
Network Adapter Properties	Processors: Hard Disk:	1 8 GB
CD/DVD Drive Properties	CD/DVD Drive: USB Controller:	Using "[ISOs] Windows Server Enterpris No
Floppy Drive	▶ More Hardware	
Ready to Complete		w Raala Fisiala Causala
Power	on your new virtual machine no	Back Finish Cancel

Create the remaining VMs (node 1 and node 2) using Windows 2003 Enterprise software. Use a sparse (not pre allocated) 15 - 20GB virtual disk for each node, also add 2 more vNICs, these will be used for the Heartbeat and iSCSI networks. This is done as follows;

With the base VM created, select the first node and under the "Command" section click "Add hardware", the following screen appears. Click "Network adapter" and the vNIC properties appear;

🖶 Add Hardware Wizard		X
Pages       Hardware Type       Hard Disk       Properties       Ready to Complete	Hardware Type Select a device from the following list: Hard Disk Hard Disk CD/DVD Drive Floppy Drive Serial Port Serial Port Parallel Port Passthrough SCSI Device Sound Adapter USB Controller	
Help	Back Next Cancel	

Select the "VMnet2" option from the drop down list and click "Next". Add in a 3<sup>rd</sup> vNIC for VMnet3, then click "Finish" to complete. Do this for the second cluster node too.

Now complete the following;

- Install the windows operating systems on each VM and create a domain controller with a test domain on ClusterDC.
- Configure Public networking between the 3 VM's and join the 2 nodes to the domain.
- Configure the iSCSI network between the VM's and the NAS VM.
- Configure the heartbeat network between the cluster node VMs.
- Mount the Windows 2003 server iSCSI initiator software installer and install the iSCSI extensions, this will require a reboot.

Once this is done you may proceed with the rest of the instructions in this document. *If you are unsure with any aspect of the NOS build or configuration consult your Windows administrator for help with this.* 

#### 3.4 ATTACHING THE ISCSI LUNS

Once the cluster nodes have been created and networking configured we need to start the Windows iSCSI initiator and discover the iSCSI LUNs. Open the Windows Control Panel and click the iSCSI Initiator. The following dialog appears! Click the 'Discovery' tab.

iSCSI Initiator Properties			
General Discovery Targets Persistent Targets Bound Volumes/Devices			
The iSCSI protocol uses the following information to uniquely identify this initiator and authenticate targets.			
Initiator Node Name: iqn.1991-05.com.microsoft:sqlclnode1.uktrading. co.uk			
To rename the initiator node, click Change.			
To authenticate targets using CHAP, click Secret to specify a CHAP secret.			
To configure IPSec Tunnel Mode addresses, click <u>I</u> unnel			
OK Cancel Apply			

You may use IPsec for secure communications. Most importantly your iSCSI traffic should pass over a private, segregated network.

Click 'Add' and enter the NAS VM IP address from the iSCSI network not the Public network and click "OK". Leave the default port 3260.

iSCSI Initi	ator Prope	rties			X
General	Discovery	Targets	Persistent Targets	Bound Volu	umes/Devices
_ <u>⊺</u> arge	et Portals —			·	
Add	dress	Port	Adapter	IP	Address
	10.10.5	3260	Derault	De	
	Add		<u>R</u> emove	R <u>e</u> fre	sh
jsns	Servers —				
Na	ne				
	A <u>d</u> d		Re <u>m</u> ove	Refre	sh
			ОК	Cancel	Apply

## The 'Add' portal dialog

iSCSI Initiator Properties		×
Add Target Portal		×
Type the IP address or DNS name and want to add. Click Advanced to select session to the portal.	d socket number of the portal you : specific settings for the discovery	
IP address or DNS name:	Port: 3260 <u>A</u> dvanced	.
	OK Cancel	
SNS Servers		

On the 'Targets' tab click each disk in turn and select 'Logon'. Check the 'Automatically restore......' checkbox and select 'OK'.

iSCSI Initiator Properties
General Discovery Targets Persistent Targets Bound Volumes/Devices
Select a target and click Log On to access the storage devices for that
Log On to Target
Target name:
ign.2007-09.jp.ne.peach.istgt:disk1
Automatically restore this connection when the system boots
Enable multi-path
Only select this option if iSCSI multi-path software is already installed on your computer.
Advanced OK Cancel
iqn.2007-09.jp.ne.peach.istgt:disk8 Connected iqn.2007-09.jp.ne.peach.istgt:disk9 Connected
Details Log On Refresh

Go to the 'Bound volumes\devices' tab and select 'Bind All'. Finally, click 'OK'.

iSCSI Initiator Properties			
General Discovery Targets Persistent Targets Bound Volumes/Devices			
Description The iSCSI initiator service will not complete initialization until all persistently bound volumes and devices are available to the computer. If a service or application uses an iSCSI volume and/or device then that volume and/or device should be persistently bound so that it will be available when the service or application is started by Windows. In addition to persistently binding the volume and/or device, the target must also have been added as a persistent target by selecting "Automatically restore this connection" in the Logon to Target dialog.			
Volume/Mount Point/Device         W?/mpio#disk&ven_freebsd∏_iscsi_disk&rev_0001#1&7/6ac24&0         \\?\mpio#disk&ven_freebsd∏_iscsi_disk&rev_0001#1&7/6ac24&0         \\         \\dottype       \mpin#disk&rev_0001#1&7/6ac24&0			
OK Cancel Apply			

If you now open disk management you will be asked to initialise the disks. Do this, ensuring you do not select the option to convert the disks to dynamic disks.

Initialize Disk You must initializ Select disks:	e a disk before Logical Disk Manager can access it.	×	
✓ Disk 1 ✓ Disk 2 ✓ Disk 3 ✓ Disk 4			
Use the following partition style for the selected disks: <ul> <li>MBR (Master Boot Record)</li> <li>GPT (GUID Partition Table)</li> </ul> Note: The GPT partition style is not recognized by all previous versions of			
Itanium-based c	OK Cancel		
Unknown 8.79 GB Not Initialized	8.79 GB Unallocated		
Disk 4 Unknown 2.93 GB Not Initialized	2.93 GB Unallocated		

Create your disk partitions in the usual manner. All disks online and formatted!

Disk 0 Basic 15.00 GB Online	System Reser 100 MB NTFS Healthy (System, Healthy (Boot, Page File, Crash Dump,
Disk 1 Basic 499 MB Online	Quorum (Q:) 497 MB NTFS Healthy (Primary Partition)
Disk 2 Basic 6.83 GB Online	SQLBak (V:) 6.83 GB NTFS Healthy (Primary Partition)
Disk 3 Basic 8.79 GB Online	SQLData (R:) 8.79 GB NTFS Healthy (Primary Partition)
Disk 4 Basic 2.93 GB Online	SQL Logs (T:) 2.93 GB NTFS Healthy (Primary Partition)
Unallocated	Primary partition

P

#### 3.5 INSTALLING THE WINDOWS 2003 CLUSTER

Now we need to install and configure the first node into the new cluster, shutdown Node2. Boot the first Node and open cluster administrator and select the option to create a new cluster;

Open Connection to Cluster	<u>?</u> ×	
<u>A</u> ction:		
Create new cluster		
<u>C</u> luster or server name:		
V	<u>B</u> rowse	
<u> </u>	Cancel	

Click "Next" at the welcome screen;

New Server Cluster Wizard		×
	Welcome to the New Server Cluster Wizard	
	This wizard helps you create a new server cluster. Using this wizard, you specify the computer that will be the first node in the cluster. After you finish the wizard, you can add additional nodes by using Cluster Administrator.	
	This wizard requires that you provide the following information: - The cluster's domain - A cluster name that is unique in the domain - The name of the first computer to be added to the cluster - A static IP address - Logon information for a user account in the domain for the cluster service account	
	I o continue, ciick ivext.	
	< Back Next > Cancel	

Select the domain and enter a unique cluster name, then click "Next";

New Server Cluster Wizard	×
<b>Cluster Name and Domain</b> Specify the name of the new server cluster and the domain in which it will be created.	
Select or type the name of the domain in which the cluster will be created. Only computers in this domain can be members of the cluster.           Domain:           TEST	
Type a cluster name that is unique in the domain. This must be a valid computer name. <u>C</u> luster name:	
< <u>B</u> ack <u>N</u> ext > C	Cancel

Confirm the node to add to the cluster and click "Next";

New Server Cluster Wizard	×
Select Computer The computer must be a member of the domain you specified.	
Enter the name of the computer that will be the first node in the new cluster.	
<u>C</u> omputer name:	
sqinode1 Browse	
Ad <u>v</u> anced	
< <u>B</u> ack <u>N</u> ext >	Cancel

Review any errors or warnings from the analysis stage and click "Next" to proceed;

New Server Cluster Wizard	×
<b>Analyzing Configuration</b> Please wait while the wizard determines the cluster configuration.	
<ul> <li>✓ Checking for existing cluster</li> <li>✓ Establishing node connection(s)</li> <li>✓ Checking node feasibility</li> <li>✓ Finding common resources on nodes</li> <li>✓ Checking cluster feasibility</li> </ul>	
Tasks completed.	
<u>V</u> iew Log <u>D</u> etails <u>R</u> Click Next to continue. Click Back to change the configuration.	e-analyze
< <u>B</u> ack	Cancel

Enter a unique IP Address for the cluster and click "Next";

New Server Cluster Wizard	×
IP Address Enter an IP address that cluster management tools will u cluster.	ise to connect to the
IP <u>A</u> ddress: 192 . 168 . 1 . 20	
< <u>B</u> ack	. <u>Next&gt;</u> Cancel

Enter the cluster service account credentials and click "Next";

New Server Cluster Wizard			
<b>Cluster Servi</b> Enter login be run.	ice Account n information for the domain account under which the cluster service will		
<u>U</u> ser name:	test		
<u>P</u> assword:	•••••		
<u>D</u> omain:	TEST		
This acc for prope	ount will be given local administrative rights on all nodes of this cluster to allow r operation.		
	< <u>B</u> ack <u>N</u> ext > Cancel		

Review the proposed configuration and click "Next";

ew Server Cluster Wizard	X
Proposed Cluster Configuration Verify that you want to create a cluster with	h the following configuration.
Cluster name: Cluster1.TEST Cluster IP address: 192.168.1.20\255.255.255.0 Cluster network: Public - Private and Public VMware Accelerated AMD PCNet Adapte Primary Address: 192.168.1.11 \ 255.255 Cluster service account credentials: Name:test	er .255.0
Password <sup>*</sup> ***********************************	
	< <u>B</u> ack <u>Next</u> Cancel

Once the cluster has been configured review any errors or warnings and click "Next" to proceed;

New Server Cluster Wizard	×
<b>Creating the Cluster</b> Please wait while the cluster is configured.	Ê
<ul> <li>Image: Heanalyzing cluster</li> <li>Image: Configure cluster services</li> <li>Image: Image: Version Configure resource types</li> <li>Image: Image: Version Configure resources</li> </ul>	
<u>V</u> iew Log <u>D</u> etails <u>⊟</u> et	UV.
< <u>B</u> ack ( <u>Next</u> ) Ca	ncel

#### Finally click "Finish" to exit;

New Server Cluster Wizard		
	Completing the New Server Cluster Wizard	
	You have successfully completed the New Server Cluster Wizard.	
	View Log	
	To close this wizard, click Finish.	
	< <u>B</u> ack <b>(Finish</b> ) Cance	:

Now the first cluster node is active and managing the resources you may now boot SQLNode2. From within inside cluster administrator on SQLNode1, right click the cluster and select new > node and the add node wizard will start.

🚰 Cluster Administrator - [CLUSTER1 (Cluster1.TEST)]			
💼 Eile View Window Help			_ & ×
16 🔍 🔺 🖆 🕒 🖫	- 🟥 🏢		
	Name		
	Active Groups		
Electronic Resources	Active Resources		
	Network Interfaces		
Pause Node			
Resu <u>m</u> e Node			
<u>Evict Node</u>			
Start Cluster Service			
Stop Cluster Service			
New	Group Ctrl+G		
Configure Application	<u>R</u> esource Ctrl+N		
Properties	Node		
	<u>C</u> luster		
Adds nodes to the cluster			

Click "Next" through the welcome screen and you will be asked to provide the computer name of the node you wish to add. Browse for the computer name and select from the list returned. Click the "Add" button to confirm the node;

Add Nodes Wizard			
Select Computers The computers must be a member of the domain you specified.			
Enter the names of the computers that will be added to the cluster.			
Computer name:		Browse	
Selected computers:	SQLNODE2	Add	
		Remove	
		Advanced	
		<u> </u>	
	< <u>B</u> ack	tt > Cancel	

For the add node action use a minimal configuration by clicking the advanced button. Click "Next" to proceed.

Note: This step is not necessary when deploying a Windows 2008 cluster!

Adva	anced Configuration Options	? ×
0	Typical (full) configuration	
	This option is appropriate for most installations and will result in a completely configured server cluster.	
۲	Advanced (minimum) configuration	
	Only select this option for complex configurations where you do not want the wizard to automatically locate and include all the storage to be managed by th cluster.	e
	You can manually add these storage devices after completing the wizard.	
	For more information, click Help.	
	OK Cancel Help	

Cluster administrator analyses the configuration, review any errors or warnings.

Add Nodes Wizard	×
<b>Analyzing Configuration</b> Please wait while the wizard determines the cluster configuration.	
<ul> <li>✓ Checking for existing cluster</li> <li>✓ Establishing node connection(s)</li> <li>✓ Checking node feasibility</li> <li>✓ Finding common resources on nodes</li> <li>✓ Checking cluster feasibility</li> </ul>	
Tasks completed.	
<u>V</u> iew Log <u>D</u> etails <u>R</u> e Click Next to continue. Click Back to change the configuration.	-analyze
< <u>B</u> ack <u>Next</u> >	Cancel

Supply the cluster service account credentials

Add Nodes Wizard		
<b>Cluster Servi</b> Enter login be run.	ice Account n information for the domain account under which the cluster service will	
<u>U</u> ser name:	test	
Password:	••••••	
<u>D</u> omain:	TEST	
This acc for prope	ount will be given local administrative rights on all nodes of this cluster to allow r operation.	
	< <u>B</u> ack <u>N</u> ext > Cancel	

Review the proposed configuration and click "Next";

l Nodes Wizard	2
Proposed Cluster Configuration Verify that you want to add nodes to a clu	uster with the following configuration.
Cluster name:	
Cluster IP address: 192.168.1.20\255.255.255.0	
Cluster network: Public - Private and Public	
Primary Address: 192.168.1.11 \ 255.25	5.255.0
Cluster service account credentials: Name:test Password: *******	▼
	View Log
To add nodes to a cluster with this configurati	on, click Next.
	< <u>B</u> ack <u>Next</u> > Cancel

The node(s) is\are added to the cluster, again review any errors or warnings

Add Nodes Wizard	×
Adding Nodes to the Cluster Please wait while the cluster is configured.	
<ul> <li> <b>Reanalyzing cluster</b> </li> <li> <b>Configure cluster services</b> </li> <li> <b>Configure resource types</b> </li> <li> <b>Configure resources</b> </li> <li> <b>Configure resources</b> </li> </ul>	
	<u>V</u> iew Log <u>D</u> etails <u>B</u> etry
	< <u>B</u> ack. <u>N</u> ext > Cancel

Finally click "Finish" when the wizard has completed;

Add Nodes Wizard		×
	Completing the Add Nodes Wizard	
	You have successfully completed the Add Nodes Wizard.	
	<u>V</u> iew Log To close this wizard, click Finish.	
	< Back Finish Cancel	

Now the cluster has both nodes configured you should see the following in cluster administrator. Notice all resources owned by SQLNode1

🚰 Cluster Administrator - [CLUSTER	1 (Cluster1.TEST)]						_ 8	×
💼 Eile View Window Help							_ 2	×
10 💽 🔺 🔊 🐿								
⊡- 💼 CLUSTER1	Name	State	Owner	Group	Resource Type	Description		
🛱 🔚 Groups	Disk Q:	Online	SQLNODE1	Cluster Group	Physical Disk			
Cluster Group	Disk 5:	Online	SQLNODE1	Group 0	Physical Disk			
Group 0	Cluster IP Address	Online	SQLNODE1	Cluster Group	IP Address			
Group 1	🛄 Cluster Name	Online	SQLNODE1	Cluster Group	Network Name			
Resources	Disk T:	Online	SQLNODE1	Group 1	Physical Disk			
Active Groups								
Active Resources								
Network Interfaces								
E 🚽 SQLNODE2								
Active Groups								
Active Resources								
····· Network Interfaces								
	1							
	1							
, For Help, press F1	,							-

Open the networks information and set the properties for each item;

🚰 Cluster Administrator - [CLUSTER	1 (Cluster1.T	EST)]					_ 8 ×
💼 Eile View Window Help							_ & ×
🚳 🔿 🔺 🖄 🎦 🛍							
E-G CLUSTER1	Node	Network	State	Adapter	Address	Description	
🖻 🧰 Groups	Resolved the second sec	Heartbeat	Up	VMware A	10.10.10.10		
Cluster Group	Rection 12	Heartbeat	Up	VMware A	10.10.10.12		
Group 0							
Resources							
Cluster Configuration							
Resource Types							
E Networks							
Public Rename	Ctrl	+M					
Network In New		•					
Configure #	pplication						
Active Grou							
Network Interfaces							
SQLNODE2							
Active Groups							
Active Resources							
Interfaces							
	I						
Displays the properties of the selected item	1						

IMPORTANT: Ensure that on the iSCSI network connection in Cluster Administrator, you uncheck the 'Enable this network for cluster use' checkbox.

The Heartbeat needs only internal access;

Heartbeat Prope	rties	<u>?</u> ×
General		
Big Hearth	peat	
<u>N</u> ame:	Heartbeat	
<u>D</u> escription:		
Enable thi This netwo C Dient a Interna C All cor	is network for cluster use ork performs the following role in the cluster: access only (public network) al cluster communications only (private network) munications (mixed network)	
State: Subnet mask:	Up 255.255.255.0	
	OK Cancel <u>Apply</u>	

The Public should be set to Mixed Communication access;

Public Properties		? ×
General		
Public 🕄		
<u>N</u> ame:	Public	
<u>D</u> escription:		
Enable thi     This netwo     Client a     O Interna     O All corr	is network for cluster use ork performs the following role in the cluster: access only [public network] al cluster communications only (private network) mmunications (mixed network)	
State: Subnet mask:	Up 255.255.255.0	
	OK Cancel Apply	

Test your cluster configuration by moving a cluster group from one node to another. Right click a group and select "Move group". The resource will transfer to the partner node;

🔚 Cluster Administrator - [CLUSTER	t1 (Cluster1.TEST)]					_ 8 ×
🚰 Eile View Window Help						_ 8 ×
🚳 👁 📐 🗡 🖆 🛀	:- ## M					
🖃 🍓 CLUSTER1	Name	State	Owner	Resource Type	Description	
Groups	Ctrl+B	Online	SQLNODE1	Physical Disk		
Cluster Iake Offline     Cluster Iake Offline     Mo⊻e Group     Net     Delete	Ctrl+T Ctrl+D					
Rename Net New SQLNO Configure Applicati	Ctrl+M ion					
Act Properties  Network Interfaces  SQLNODE2  Active Groups						
Active Resources						
Moves an entire group from one node to a	nother					

Groups 0 and 1 transferred to SQLNode2;

Guster Administrator - [CLUSTER]	t1 (Cluster1.TEST)]						_ 8 ×
	1- EE III						
E-G CLUSTER1	Name	State	Owner	Group	Resource Type	Description	
CLUSTERI CL	Name Dick Q: Dick S: Cluster IP Address Cluster Name Dick T: Dick T:	State Online Online Online Online Online	Owner       SQLNODE1       SQLNODE1       SQLNODE1       SQLNODE1       SQLNODE2	Group Cluster Group Group O Cluster Group Cluster Group Group 1	Resource Type Physical Disk IP Address Network Name Physical Disk	Description	
For Help, press F1							

#### 3.6 CREATE THE MICROSOFT DISTRIBUTED TRANSACTION COORDINATOR RESOURCE

Next we need to create a cluster resource and group for the Distributed Transaction Coordinator service.

In Cluster Administrator right click 'Groups' and select 'New' > 'Group'. Give the group a name and click 'Next' then add available nodes and click 'Finish'. Right click the newly created group and select 'New' > 'Resource'. Give the resource a name 'INST1DTC IP', from 'Resource Type' drop down list select 'IP Address' and click 'Next'. Select available nodes and click 'Next'. Click 'Next' through dependencies, enter an IP Address and mask for the public network (192.168.0.30 and 255.255.255.0) and click 'Finish'.

Right click the group and select 'New' > 'Resource'. Give the resource a name 'INST1DTC Name'. From the drop down list select 'Network name' as the resource type and click 'Next'. Select available nodes and click 'Next'. Add IP Address resource as a dependency and click 'Next'. Enter the unique network name and uncheck the 'DNS registration must succeed' checkbox then click 'Finish'.

If the DTC disk drive has already been discovered by Cluster Administrator you may skip this paragraph. Otherwise, right click the group and select 'New' > 'Resource'. Give the resource a name 'DTC Data' and from the drop down list select 'Physical Disk' as the resource type, then click 'Next'. Select available nodes and click 'Next'. Click 'Next' through the dependencies. From the drop down list on the parameters dialog select the disk drive to use (P:) then click 'Finish'.

Lastly create the DTC resource by right clicking the group and selecting 'New' > 'resource'. Give the resource a name 'INST1DTC SVC' and select 'Distributed Transaction Coordinator' from the 'Resource Type' drop down list, then click 'Next'. Select available nodes and click 'Next'. At the dependency dialog select the resources for Network Name and Physical Disk only (These resources must be online for the service to start) then click 'Finish'. Now right click the group and bring it online.

## 4 INSTALLING THE SQL SERVER INSTANCE.

For clarification the following terms are used;

VM is a virtual machine. NIC is a network Interface Card. vNIC is a virtual Network Interface Card. DC is a Windows Domain Controller. NOS refers to the Windows operating system. HA is the VMWare high availability technology used by VMWare Virtual Infrastructure. ESX is the server operating system used by host machines in the VMWare Virtual Infrastructure.

You should have already created the user account(s) for the SQL Server services and also the cluster Windows groups for these services. With that done, it's now time to start the installation.

Note: The installation process between SQL Server 2005 and SQL Server 2008 has changed extensively.

Due to the issues with the RTM version of the SQL Server 2008 installation media it is necessary to 'Slipstream' the Service Pack 1 media to create a trouble free installation.

Installing SQL Server 2008 onto a Windows 2003 cluster requires the following prerequisites;

Windows 2003 SP2 Hotfix 937444 (Filestream Hotfix) Windows Installer 4.5 .NET FrameWork 3.51

Due to the issues with the RTM version of the SQL Server 2008 installation media it is also necessary to 'Slipstream' the Service Pack 1 media to create a trouble free installation.

#### 4.1 CREATE THE SQL SERVER FAILOVER INSTANCE.

Firstly extract the service pack executable to a temporary folder using the following syntax at the command prompt.

C:\en\_sql\_server\_2008\_sp1\_x64.exe /x:C:\SP1

Now browse the SQL Server media directories and locate\install the Windows installer and .NET FrameWork, also install the Filestream hotfix (listed above). Once you have all the prerequisites installed, you may launch the SP1 support files installer. The installer is located at;

C:\SP1\x64\setup\1033\sqlsupport.msi

After the support files have been installed, launch the SQL Server 2008 setup from the command prompt using;

Z:\setup.exe /PCUSource=C:\SP1



At the SQL Server 2008 splash screen select "Installation" from the left menu, then select "New SQL Server failover cluster installation".



The installation will start and the following screen will shortly appear, click "OK" when prompted.

🚼 SQL Server 2008 Setup		
Setup Support Rules Setup Support Rules identify problem:	; that might occur when you install SQL Server Setup support files. Failures	must be
corrected before Setup can continue.		XXZZBBB
Setup Support Rules	Operation completed. Passed: 6. Failed 0. Warning 0. Skipped 0.	
	Hide details <<	<u>R</u> e-run
	View detailed report	
	Rule	Status
	Minimum operating system version	Passed
	Setup administrator	Passed
	Restart computer	Passed
	Windows Management Instrumentation (WMI) service	Passed
	Consistency validation for SQL Server registry keys	Passed
	Long path names to files on SQL Server installation media	Passed
	,	
	ОК	Cancel Help
🔊 Start 🗍 🚱 🥭 🛛 🔤 Command P	Prompt 🛛 📸 SQL Server Instal 🛛 📃 Document - Word 🛛 📸 SQL Se	rver 200 🦓 🛃 🛃 🏷 🗿 13:55

Click "Install" to install setup support files.

💱 SQL Server 2008 Setup			
Setup Support Files			
Click Install to install Setup Support	files. To install or update SQL Serv	er 2008, these files are required.	
Setup Support Files	The following components are	required for SQL Server Setup:	
	Feature Name	Status	
	Setup Support Files		
	Gathering user settings.		
		<	Back Instal Cancel
🏄 Start 🛛 🞯 🥪 👘 🔤 Command	d Prompt 📸 SQL Server Instal.	📃 Document - Word 1 🎇 SQL	Server 200 🛛 👯 😏 🤧 😰 13:56

After the support rules have been checked, click "Next" to continue

Setup Support Rules identify problem corrected before Setup can continue.	s that might occur when you install SQL Server Setup support files. Failures m	ust be			
Setup Support Rules Product Key License Terms Feature Selection Disk Space Requirements Error and Licage Reporting	Operation completed. Passed: 23. Failed 0. Warning 0. Skipped 1.  Hide details_<< <u>View detailed report</u>	<u>R</u> e-run			
Error and Usage Reporting Cluster Installation Rules	Rule	Status			
Ready to Install	Microsoft .NET Application Security	Not applicable			
Installation Progress	Vetwork binding order	Passed			
Complete	Windows Firewall	Passed			
	DNS settings (W2K3SQL2K8-1)	Passed			
	WOW64 setup	Passed			
	Windows Management Instrumentation (WMI) service (W2K35QL2K8	Passed			
	Cluster Remote Access (W2K3SQL2K8-2)	Passed			
	Distributed Transaction Coordinator (MSDTC) installed (W2K3SQL2K8	Passed			
	Remote registry service (W2K35QL2K8-2)	Passed			
	DNS settings (W2K3SQL2K8-2)	Passed			
	,				
< Back Next > Cancel Help					

Enter your licence key or select a free edition to install!

Install a SQL Server Failover Cl	uster _
Product Key	
Specify the edition of SQL Serve	ar 2008 to install.
Setup Support Rules Product Key License Terms Feature Selection Disk Space Requirements Error and Usage Reporting Liuster Installation Rules Ready to Install Installation Progress Complete	Specify a free edition of SQL Server or provide a SQL Server product key to validate this instance of SQL Server 2008. Enter the 25-character key from the Microsoft certificate of authenticity or product packaging. If you specify Enterprise Evaluation, the instance will be activated with a 180-day expiration. To upgrade from one edition to another edition, run the Edition Upgrade Wizard. © Specify a free edition: Enterprise Evaluation © Enter the product key: JD8Y6-HQG69-P9H84-XDTPG-34MBE
	< <u>B</u> ack <u>N</u> ext > Cancel Help
itart 🔯 🛋 🗖 Com	nand P., 😤 SOL Server 🗐 Document 💓 Install a S

🎲 Install a SQL Server Failover Cluster	
Feature Selection     Select the Enterprise features to inst     clustered.	all. For clustered installations, only Database Engine Services and Analysis Services can be
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration Disk Space Requirements Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Cluster Network Configuration Cluster Security Policy Server Configuration Database Engine Configuration Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress	Eeatures:       Description:         Instance Features       Instance Features are instance-aware and have their instances on a computer.         Ø Full-Text Search       Analysis Services         Beporting Services       Shared Features         Ø Business Intelligence Development Studio       Clent Tools Connectivity         Integration Services       Clent Tools Compatibility         Clent Tools SDK       SQL Server Books Online         Ø Management Tools - Complete       SQL Clent Connectivity SDK         Microsoft Sync Framework       V
Complete	Shared feature directory:       C:\Program Files\Microsoft SQL Server\         Shared feature directory (x86):       C:\Program Files (x86)\Microsoft SQL Server\         <
lor nopp prosert : 2 Start 0 3 5 5 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	P 📸 SQL Server 🗒 Document 📸 Install a S 🚳 Cluster Adm 🦓 🥑 🥸 🔞 14:04

Select the features you wish to install and supply the path for the shared files.

Supply a unique virtual network name and an instance name

Instance Configuration	<b>n</b> ) for the SQL Server in:	stance.				
Setup Support Rules Product Key License Terms	Specify a netw failover cluster SQL Server Net	ork name for t on the networ t <u>w</u> ork Name:	he new SQL Server fa k.  DB-01-0001	ailover cluster. Th	is will be the name	used to identify your
Feature Selection Instance Configuration Disk Space Requirements Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Cluster Security Policy Feature Selection	<u>Default instance</u>	ance ance:	MSSQLSERVER			
	Instance <u>I</u> D: Instance <u>r</u> oot o	directory:	MSSQLSERVER C:\Program Files\Micr	osoft SQL Server	1	
Database Engine Configuration Error and Usage Reporting Cluster Installation Rules	SQL Server dire	ectory: Server instance	C:\Program Files\Micr	osoft SQL Server	\MSSQL10.MSSQL9	JERVER
Ready to Install Installation Progress Complete	Instance	Cluster Network Name	Features	Edition	Version	Instance ID
			L	< <u>B</u> ack	Next > Ca	ancel Help

Review the space requirements and click "Next",

🍀 Install a SQL Server Failover Clust	er	- <b>-</b> ×
Disk Space Requiremen	its	888
Review the disk space summary for	the SQL Server features you selected.	
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration <b>Disk Space Requirements</b> Cluster Resource Group Cluster Disk Selection Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Cluster Security Policy Server Configuration Database Engine Configuration Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress Complete	Disk Usage Summary:	
	<back next=""> Cancel</back>	Help
🏄 Start 🗍 🚱 🥌 🚽 🔤 Command	d P 🛚 🃸 SQL Server 🛛 🗒 Document 🛛 📸 Install a S 📓 Cluster Adm 🛛 🦓 🛃 🛃 🖏	14:08

Select the default name for the SQL Server cluster resource group or select a free group that already exists (displays a green tick).

🚼 Install a SQL Server Failover Clu	ster			
Cluster Resource Grou	<b>JP</b> Sup for your SQL S	ierver failover cluster.		
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration	Specify a n failover clu enter a nev <u>S</u> QL Ser	name for the SQL Server cluster ru ister resources will be placed. You w cluster resource group name to l ver cluster resource group name:	esource group. The cluster resource group is when i can choose to use an existing cluster resource g be created. SQL Server (MSSQLSERVER)	re SQL Server roup name or
Instance Configuration Disk Space Requirements <b>Cluster Resource Group</b> Cluster Disk Selection Cluster Network Configuration Cluster Network Configuration Cluster Security Policy Server Configuration Database Engine Configuration Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress Complete	Qualified (a) (b) (c) (c) (c) (c) (c) (c) (c) (c	Name Cluster Group SQL2K8INST1	Message The cluster group 'Cluster Group' contains resourc	e 'Cluster IP
			< Back Mext > Cancel	Refresh
<b>; , , , , , , , , , , , , , , , , , , ,</b>	and P 🛛 髋 SQL	. Server 🗐 Document	🐮 Install a S 🖓 Cluster Adm 🖗 J	1 🛃 🏷 📳 14

Select disk resources and click "Next",

🍀 Install a SQL Server Failover Cluster			
Cluster Disk Selection			
- Select shared cluster disk resources fo	r your SQL Se	rver failover cluster.	
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration Disk Space Requirements Cluster Resource Group	Specify the as the defa configuration Disk R: Disk T: Disk S:	shared disks to be ii ult drive for all datat in pages.	ncluded in the SQL Server resource cluster group. The first drive will be used bases, but this can be changed on the Database Engine or Analysis Services
Cluster Disk Selection	Available sh	ared disks:	
Cluster Network Configuration	Qualified	Disk	Message
Server Configuration	۲	Disk Q:	The disk resource 'Disk Q:' is already in use by resource 'MSDTC'. To use a
Database Engine Configuration	0	Disk R:	
Error and Usage Reporting	0	Disk T:	
Cluster Installation Rules Ready to Install		Disk S:	
Installation Progress			
Complete			
			Refresh
			< <u>B</u> ack Next > Cancel Help
🏄 Start 🛛 🚱 🥌 🔤 Command P	1 🏀 SQL	Server 📃 🗒 Doc	ument2 🔯 Install a S 🌚 Cluster Adm 🖗 💐 🧶 🌚 14:10

## Supply an IP address and click "Next",

etup Support Rules	Spe	cify the network	settings for this failove	r cluster:		
icense Terms		IP Type	Address	Subnet Mask	Network	
eature Selection		IPv4	172.168.10.17	255.255.0.0	Local Area Connection	
stance Configuration						
isk Space Requirements						
uster Resource Group						
uster Disk Selection						
uster Network Configuration						
uster Security Policy						
erver Configuration						
atabase Engine Configuration						
ror and Usage Reporting						
uster Installation Rules						
eady to Install						
stallation Progress						
omplete						
						D - G h
						Rerresh

Supply the security group resources for the clustered SQL Server services and click "Next",

🎲 Install a SQL Server Failover Clust	er				<u> </u>
Cluster Security Policy					
Configure the security policy for yo	ur SQL Server failover cluster.				
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration Disk Space Requirements Cluster Resource Group Cluster Disk Selection Cluster Network Configuration <b>Cluster Security Policy</b> Server Configuration Database Engine Configuration Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress Complete	Specify global or local security doma SQL Server failover cluster. All reso Server service accounts as members Database Engine domain group: SQL Server Agent domain group:	in groups for the clustered : urce permissions are control UKTRADING\SQL2K8x64 UKTRADING\SQL2K8x64	services that will	be installed as pa	it of your clude SQL
		< <u>B</u> ack	<u>N</u> ext >	Cancel	Help
🔭 nonp) prosert 1 🐉 Start 📙 🚱 🧔 🚽 🔤 Comman	d P 🛛 🃸 SQL Server 🛛 🗒 Docume	nt2  🃸 Install a S	🚮 Cluster Ad	m] 👯 😏 😏	🏂 💼 14:13

Supply your service account details and passwords and click the "Collation" tab,

server connyuration				
Specify the configuration.				
etup Support Rules	Service Accounts Collation			
roduct Key				
cense Terms	Microsoft recommends that you us	e a separate account for each	SQL Server servi	ice.
eature Selection	Service	Account Name	Password	Startup Type
nstance Configuration	SQL Server Agent		1	Manual 📃
isk Space Requirements	SQL Server Database Engine			Manual 📃
luster Resource Group				
luster Disk Selection				
luster Network Configuration		Use the sa	me account for a	all SQL Server services
luster Security Policy				
erver Configuration	These services will be configured a	automatically where possible to	use a low privile	ede account. On
atabase Engine Configuration	some older Windows versions the	user will need to specify a low	privilege accoun	t. For more
rror and Usage Reporting	information, click Help.			
luster Installation Rules	Service	Account Name	Password	Startup Type
eady to Install	SQL Full-text Filter Daemon Launc			Manual
nstallation Progress	SQL Server Browser	NT AUTHORITY\LOCAL		Automatic 💌
omplete				

Select the collation and click "Next",

🚼 Install a SQL Server Failover Cluster		
Specify the configuration.		
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration Disk Space Requirements Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Cluster Network Configuration Cluster Security Policy <b>Server Configuration</b> Database Engine Configuration Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress Complete	Service Accounts       Collation         Database Engine:	<u>Customize</u>
	< <u>B</u> ack <u>N</u> ext > Cancel	Help
Start 0 3 Start 7 3 Start	ompt 🛛 📸 SQL Server Instal 🗍 🗒 Document2.rtf 🛛 📸 Install a SQL Se 🦓	3 🕄 🏷 🔂 14:17

Provision administrator accounts and any data directories then click "Next",

Database Engine Config	uration	
Specify Database Engine authentical	ion security mode, administrators and data directories.	
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration Disk Space Requirements Cluster Oisk Selection Cluster Oisk Selection Cluster Security Policy Server Configuration <b>Database Engine Configuration</b> Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress Complete	Account Provisioning       Data Directories       FILESTREAM         Specify the authentication mode and administrators for the Databas         Authentication Mode	se Engine. tion) SQL Server administrators have unrestricted access to the Database Engine.
	<u> </u>	xt > Cancel Help

🎇 Install a SQL Server Failover Cluster	r		
Database Engine Configu	uration		
- Specify Database Engine authenticati	ion security mode, administrators ar	nd data directories.	
Setup Support Rules Product Key License Terms Feature Selection Instance Configuration Disk Space Requirements Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Cluster Network Configuration Cluster Security Policy Server Configuration Database Engine Configuration Error and Usage Reporting Cluster Installation Rules Ready to Install Installation Progress Complete	Account Provisioning Data Dir Data root directory: System database directory: User database directory: User database log directory: Temp DB directory: Temp DB log directory: Baclup directory:	ectories FILESTREAM R:\/MSSQL10.MSSQLSERVER\/MSSQL\Data R:\/MSSQL10.MSSQLSERVER\/MSSQL\Data R:\/MSSQL10.MSSQLSERVER\/MSSQL\Data R:\/MSSQL10.MSSQLSERVER\/MSSQL\Data R:\/MSSQL10.MSSQLSERVER\/MSSQL\Data R:\/MSSQL10.MSSQLSERVER\/MSSQL\Data R:\/MSSQL10.MSSQLSERVER\/MSSQL\Backup	
		< <u>B</u> ack <u>N</u> ext > Cancel	Help
🐉 Start 🛛 🚱 🥶 🗍 🔤 Command I	Prompt	📃 Document2.rtf 🛛 🎇 Install a SQL Se 🦓 🍠 🍠	🏷 🔂 14:18

Review the cluster installation rules and click "Next",

🍀 Install a SQL Server Failover Clus	ter	
Cluster Installation Ru	les	
Setup is running rules to determin	e if the failover cluster installation operation will be blocked. For more informati	on, click Help.
Setup Support Rules Product Key License Terms	Operation completed. Passed: 9. Failed 0. Warning 0. Skipped 0.	
Feature Selection	Hide detail <u>s</u> <<	<u>R</u> e-run
Instance Configuration	View detailed report	
Disk Space Requirements		
Cluster Resource Group		Status
Cluster Disk Selection	Cluster supported for edition	Passed
Cluster Network Configuration	Operating system supported for edition	Passed
Cluster Security Policy	Windows Server 2003 FILESTREAM Hotfix Check	Passed
Server Configuration	Cluster Resource DLL Update Restart Check	Passed
Database Engine Configuration	FAT32 File System	Passed
Cluster Installation Rules	SQL Server 2000 Analysis Services (64-bit) install action	Passed
Ready to Install	Instance name	Passed
Installation Progress	Previous releases of Microsoft Visual Studio 2008	Passed
Complete	Update Setup Media Language Compatibility	Passed
юг тору ргозот 1	< Back Vext >	Cancel Help
🛃 Start 🛛 🞯 🥭 👘 🔤 Commar	nd Prompt 🛛 🃸 SQL Server Instal 🗐 Document2.rtf 🛛 📸 Install a	<b>SQL Se</b> 🦓 😏 🥩 🌆 14:19

Click "Install" to create the clustered instance of SQL Server 2008. The arrows below indicate that this installation is slipstreaming Service Pack 1.



When the installation completes click "Close" to finish and you will be returned to the SQL Server 2008 splash screen. Close the splash screen and the active setup in the command window will complete, you may now close the command window.

#### 4.2 ADD A CLUSTER NODE TO AN EXISTING CLUSTERED INSTANCE

Before launching the installer you will need to perform exactly the same steps as you carried out for the installation of the first node (pre reqs and slipstream initiation). The setup will slipstream the service pack to ensure a smooth installation.

To add a node to an existing instance, select "Add node to a SQL Server failover cluster". The Add cluster node wizard is exactly the same as the initial install up to the point where you specify licence key details. From here the installation continues as shown below.

😭 Add a Failover Cluster Node						
Cluster Node Configurat	ion					
Add a node to an existing SQL Server	failover cluster.					
Setup Support Rules Product Key License Terms <b>Cluster Node Configuration</b>	<u>SQ</u> L Server inst N <u>a</u> me of this no	ance name: ide:	MSSQLSERVER W2K35QL2K8-2	2		
Service Accounts Error and Usage Reporting	Instance Name	Cluster Network Name	Featu	res	Nodes	
Add Node Rules Ready to Add Node Add Node Progress Complete	MSSQLSERVER	D8-01-000	1 SQLEn	gine, SQLEngine\Rep	W2K35QL2KB-1	
	1			< <u>B</u> ack <u>N</u> ex	kt > Cancel	Help
🛃 Start 🛛 🚱 🥭 🔤 Command	Prompt	nent2.rtf	👔 SQL Servi	er Instal 📸 Add a	Failover	3 5 🔂 🖓

Confirm the instance you want to join and click "Next",

🎲 Add a Failover Cluster Node Service Accounts Specify the configuration. Setup Support Rules Microsoft recommends that you use a separate account for each SQL Server service. Product Key Service Account Name Password gine UKTRADING\x64sql2k8-srv Startup Type License Terms SQL Server Database Engine Manual Cluster Node Configuration SQL Server Agent UKTRADING\x64sql2k8-srv ••••••• Manual Service Accounts Error and Usage Reporting Use the same account for all SQL Server services Add Node Rules Ready to Add Node These services will be configured automatically where possible to use a low privilege account. On some older Windows versions the user will need to specify a low privilege account. For more information, click Help. Add Node Progress Complete Service Account Name Password Startup Type SQL Full-text Filter Daemon Launcher NT AUTHORITY\LOCAL SE... Manual SQL Server Browser NT AUTHORITY\LOCAL SE... Automatic < <u>B</u>ack <u>N</u>ext > Cancel Help 🏄 Start 🛛 🚱 🥭 🔤 Command Prompt... 🗒 Document2.rtf - ... 📸 SQL Server Instal... 📸 Add a Failover ... 🖏 😏 😏 🧐 17:22

Supply any passwords and click "Next" to continue,

Review the install rules and click "Next",

Add Node Rules		
Setup is running rules to determ	nine if the add node process will be blocked. For more information, click Help.	
Setup Support Rules	Operation completed. Passed: 11. Failed 0. Warning 0. Skipped 2.	
Product Key		
license Terms		
Iluster Node Configuration	Hide details <<	<u>R</u> e-run
Service Accounts	View detailed report	
Frror and Usage Reporting		
dd Node Rules	Rule	Status
leady to Add Node	Vumber or cluster nodes supported for edition	Passed
dd Node Progress	SQL Server Database Services feature state (W2K3SQL2K8-2)	Passed
omplete	SQL Server Analysis Services feature state (W2K3SQL2K8-2)	Not applicable
	Node and cluster edition match	Passed
	Windows Server 2003 FILESTREAM Hotfix Check	Passed
	Cluster Resource DLL Update Restart Check	Passed
	FAT32 File System	Passed
	SQL Server 2000 Analysis Services (64-bit) install action	Passed
	Instance name	Passed
	Previous releases of Microsoft Visual Studio 2008	Passed
	Update Setup Media Language Compatibility	Passed
	, , , , , , , , , , , , , , , , , , , ,	
	< Back Nevt	Cancel Help
171	· · · · · ·	

To add the cluster node click "Install". The arrows indicate that this installation is slipstreaming the service pack.



#### Setup progress!

🚼 Add a Failover Cluster Node		<u> </u>
Add Node Progress		
Setup Support Rules Product Key License Terms Cluster Node Configuration Service Accounts Error and Usage Reporting Add Node Rules Ready to Add Node Add Node Progress Complete	Performing Windows Installer actions. Install_sql_common_core_Cpu64_Action : Sqlmsirc_CheckFeatureDependency_64.	
	Next > Cancel H	<u>پله ا</u>
🏄 Start 🛛 🚱 🥥 👘 🔤 Comman	d Prompt 🗒 Document2.rtf 🛛 📸 SQL Server Instal 🛛 📸 Add a Failover 🛛 🛞 😏 🥸 🕼	17:25

Click "Next" to complete setup.

🍀 Add a Failover Cluster Node		
Add Node Progress		
Setup Support Rules Product Key License Terms Cluster Node Configuration Service Accounts	Setup process complete	Status
Error and Usage Reporting Add Node Rules Ready to Add Node Add Node Progress	Database Engine Services     SQL Server Replication     Full-Text Search     Client Tools Connectivity     Management Tools - Complete	Success Success Success Success Success Success Success Success Success
	Client Tools Backwards Compatibility     Business Intelligence Development Studio     Management Tools - Basic	Success Success Success
		Next > Cancel Help
🏄 Start 🛛 🞯 🥶 🗍 🔤 Command	d Prompt 🗐 Document2.rtf 🛛 🃸 SQL Server	r Instal 📸 Add a Failover 🛛 🛞 😏 🥵 🗊 19:47

#### Click "Close" to finish.

🎲 Add a Failover Cluster Node	
Complete	
Your SQL Server 2008 failover c	luster add node operation is complete.
Setup Support Rules Product Key License Terms Cluster Node Configuration Service Accounts Error and Usage Reporting Add Node Rules Ready to Add Node Add Node Progress <b>Complete</b>	Summary log file has been saved to the following location:         C:\Program_Files\Microsoft_SQL_Server\100\Setup_Bootstrap\Log\20100514_171400\Summary_w2k3sql2k8- 2_20100514_171400.txt         Information about the Setup operation or possible next steps:         Your SQL Server 2008 failover cluster add node operation is complete.
	Supplemental Information: The following notes apply to this release of SQL Server only. Microsoft Update For information about how to use Microsoft Update to identify updates for SQL Server 2008, see the Microsoft Update Web site <http: ?linkid="108409" fwlink="" go.microsoft.com=""> at http://go.microsoft.com/fwlink/?LinkId=108409. Reporting Services</http:>
	CloseHelp//
🎒 Start 🛛 🚱 🥥 🔤 Com	nand Prompt 📃 Document2.rtf 🛛 📸 SQL Server Instal 🛛 📸 Add a Failover 🛛 🤫 😏 😵 🚇 19:47

The command window completes. The node has now been added to the failover cluster.



## 5 **APPENDIX** A NAMED INSTANCES & NETWORK NAMES

During SQL Server installation setup requires you to supply an instance name for the SQL Server instance you are installing. On a non clustered system, the machine name is the instance name prefix. A virtual network name is essentially the same as a machine name in that it must be unique on the network.

Installations of SQL Server allow only one default instance, after that the rest must be named.

Take the following scenarios

#### 5.1 NON CLUSTERED

A non clustered server named <u>\\MYSERVER</u> has 2 SQL Server instances installed to it. When the administrator installed SQL server they created a named instance using the name "Instance1" and a default instance.

To log on to each instance you would use,

Default

**MYSERVER** 

Named

MYSERVER\Instance1

#### 5.2 CLUSTERED

A 2 node clustered system exists using the following details,

Node1

Node 2

Name = CL-01-002 IP = 10.200.1.18
Named SQL Instance
Network Name = DB-01-01 Instance Name = MSUAT

3

You can see the complexity added to the system as there are now more names and IP addresses used for the same computers. In the clustered environment it is important to remember to disregard the node names and IP addresses when connecting to SQL Server. Everything is referenced by the Network name. In the clustered environment the Network Name and note the machine name forms the instance prefix.

To logon to the default instance you use

DB-01-011

To logon to the named instance you use

DB-01-013\MSUAT

Practice these by using names of your own to substitute the items above and ensure you understand default and named instances in both clustered and non clustered environments.