

# Step by Step: SQL Server 2019 FCI in OCI



### Introduction

If you are deploying business-critical applications in Oracle Cloud Infrastructure (OCI), it's crucial to understand and leverage the availability SLA (Service Level Agreement) provided by OCI for optimal uptime and reliability. OCI's SLA varies based on the deployment strategy you choose:

**Deployment across Availability Domains**: OCI offers a 99.99% availability SLA when you deploy two or more Virtual Machines (VMs) across different Availability Domains within the same OCI region.

**Deployment across Fault Domains**: If you deploy VMs across Fault Domains, OCI provides a 99.95% availability SLA. It is important to note that not every OCI region has multiple Availability Domains, so in some regions, deployments across Fault Domains will be your only option.

**Single VM Deployment**: For deployments involving a single VM, the SLA stands at 99.9%.

This framework means that OCI guarantees a certain level of external connectivity based on how you deploy your VMs:

It's important to note that the SLA covers the availability of the VM itself, not the applications or services running on it. To ensure application availability, additional measures such as application monitoring, recovery planning, data replication, and transactional replication (for databases like SQL Server) are necessary. Strategies might include load balancing, clustering, or data replication to manage application availability effectively.

To meet the criteria for the 99.99% availability SLA in OCI, it's essential to deploy your VMs across multiple Availability Domains. This post will guide you on designing your OCI infrastructure to facilitate SQL Server Failover Cluster Instances that span Availability Domains, ensuring maximum uptime and reliability for your critical business applications.

### **Create the VCN and Subnets**

In this guide, I assume you have some familiarity with Oracle Cloud Infrastructure (OCI) and a basic understanding of networking concepts. I will illustrate common configuration tasks with descriptions, and where necessary, provide additional guidance to navigate some of the common challenges encountered in OCI networking.

Starting with a well-thought-out network plan is crucial. This document won't cover the intricacies of cloud network planning, so the following example should be considered just one of many possibilities. Your network configurations may vary significantly. However, an important consideration is to plan for the use of at least three Availability Domains, allocating one for each cluster node and another for the file share witness. The important thing required for clustering is that each Availability Domain MUST be in a different subnet.

Although we are not covering configurations that span Fault Domains instead of Availability Domains, the same applies to clusters that span Fault Domains - all nodes must reside in different subnets.

In our scenario, we will set up three subnets across three different Availability Domains within a single Virtual Cloud Network (VCN) in OCI.

VCN: 10.0.0/16

- AD1: 10.0.0/18
- AD2: 10.0.64.0/18
- AD3: 10.0.128.0/18

OCI's user interface can change, but at the time of writing, the process for creating a new VCN and three subnets is straightforward in the OCI console. The specifics can be found in OCI's documentation or through its user interface, which guides you through the necessary steps for VCN and subnet creation.

# **Create the VCN**

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ate In Compartment		
stechnology (root)		
IPv4 CIDR Blocks		
() You can assign up to 5 IPv4 CIDR blocks to a VC	N. There must be at least one IPv4 CIDR block assigned to a VCN. Learn more.	
Pv4 CIDR Blocks		
10.0.0.0/16 ×		
Pv4 Example: 10.0.0.0/16		
DNS Resolution Use DNS hostnames in this VCN.		
Required for instance hostname assignment if you plan to use VCN I	NS or a third-party DNS, This choice cannot be changed after the VCN is created. Learn more	
Required for instance hostname assignment if you plan to use VCN I ONS Label WISECCLUSTED	NS or a third-party DNS. This choice cannot be changed after the VCN is created. <u>Learn more</u>	
Required for instance hostname assignment if you plan to use VCN I DNS Label WSFCCLUSTER Serverated from virtual cloud network name if not specified.	NS or a third-party DNS. This choice cannot be changed after the VCN is created. <u>Learn more</u>	
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# Create three subnets in the VCN

Create Subnet	
Name	
AD1	
Consta la Companianat	
sistechnology (root)	0
and and and and	
Subnet Type	
Regional (Recommended)	Availability Domain-specific
instances in the subnet can be created in any availability domain in the region. Useful for high availability.	Instances in the subhet can only be created in one availability domain in the region.
Availability Domain	
NgZI:US-ASHBURN-AD-1	0
IPv4 CIDR Block	
IPv4 CIDR Block	
10.0.0/18	
Specified IP addresses: 10.0.0.0-10.0.63.255 (16,384 IP addresses)	
IPv6 Prefixes	
Maximum amount of 0 IPv6 prefixes per Subnet. IP ranges of the IPv6 prefixes must not overlap. Learn more.	
Route Table Compartment in siostechnology (root) (Change compartment)	
Default Route Table for WSFC-CLUSTER1	\$
Subnet Access	
Private Subnet	Public Subnet
Prohibit public IP addresses for Instances in this Subnet	Allow public IP addresses for Instances in this Subnet
DNS Resolution  DNS Postmarnes in this Subnet Allows assignment of DNS hostmarne when launching an instance.  DNS Label	
AD1	
Only letters and numbers, starting with a letter, 15 characters max.	
DNS Domain Name Read-only	
<dns-label>.wsfccluster1.oraclevcn.com</dns-label>	
Dhcp Options Compartment in siostechnology (root) (Change compartment)	
Default DHCP Options for WSFC-CLUSTER1	0
Security Lists	
You can associate up to 5 network security lists with the subnet.	
Security List Compartment in siostechnology (root) (Change compartment)	×
Default Security List for WSFC-CLUSTER1	0
	+ Another Security List
Resource logging	
Enable resource longing to allow receives tracking travialesharting and data includes	
Enable resource logging to allow resource racking, roubleshooting, and data insights	
Resource logging disabled	
Show Tagging Options	
Create Subper Cancel	

#### Create Subnet

Name		
AD2		
Create In Compartment		
slostechnology (root)		0
Srihnet Time		
Regional (Recommended)	Availability Domain-specific	
Instances in the subnet can be created in any availability domain in the region. Useful for high availability.	Instances in the subnet can only be created in one availability domain in the region.	1
		]
Availability Domain		
NqZI:US-ASHBURN-AD-2		0
IPv4 CIDR Block		
IDed CIDD Block		
10.064.0/18		
Specified IP addresses: 10.0.64.0-10.0.127.255 (16.384 IP addresses)		
IPv6 Prefixes		
Maximum amount of 0 IPv6 prefixes per Subnet. IP ranges of the IPv6 prefixes must not overlap. Learn more.		
Porter Table Compartment in stostechnology (root) (Change compartment)		^
		*
Subnet Access		
Private Subnet	Public Subnet	
Prohibit public IP addresses for Instances in this Subnet	Allow public IP addresses for Instances in this Subnet	
DNS Resolution Use DNS hostnames in this Subnet Allows assignment of DNS hostname when launching an instance.		
DNS Label		
AD2		
Only letters and numbers, starting with a letter. 15 characters max.		
DNS Domain Name Read-only		
<dns-label>.wsfccluster1.oraclevcn.com</dns-label>		
Dhcp Options Compartment in siostechnology (root) (Change compartment)		
Default DHCP Options for WSFC-CLUSTER1		C
Sociurity Liste		
Security Lists		
You can associate up to 5 network security lists with the subnet.		
Security List Compartment in stostechnology (root) ( <u>Change compartment</u> ) Default Security List for INSEC-CLUSTED1		• ×
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		+ Another Security List
Resource logging		
Enable resource logging to allow resource tracking, troubleshooting, and data insights		
Resource logging disabled		
Show Tagging Options		6
No		¥ 

#### Create Subnet

Name	
AD3	
Create In Compartment	
siostechnology (root)	٥
Subnet Type	
Regional (Recommended)	Availability Domain-specific
Instances in the subnet can be created in any availability domain in the region. Useful for high availability.	Instances in the subnet can only be created in one availability domain in the region.
Availability Domain	
NqZ:US-ASHBURN-AD-3	<u>،</u>
IBv4 CIDB Block	
IF V4 OID'N DIOCK	
IPv4 CIDR Block	
Sectified (P addresses: 10.0.128.0-10.0.191.255 (16.384 (P addresses)	
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IPv6 Prefixes	
Maximum amount of 0 IPv6 prefixes per Subnet. IP ranges of the IPv6 prefixes must not overlap. Learn more.	
Route Table Compartment in siostechnology (root) (Change compartment)	
Default Route Table for WSFC-CLUSTER1	0
Subnet Access	
Private Subnet	Public Subnet
Prohibit public IP addresses for Instances in this Subnet	Allow public IP addresses for Instances in this Subnet 🗸
DNS Resolution Use DNS hostnames in this Subnet Allove suggement of DNS hostname when laurching an instance. DNS Label	
AD3	
Only letters and numbers, starting with a letter. 15 characters max.	
DNS Domain Name Read-only	
<dns-label>.wsfccluster1.oraclevcn.com</dns-label>	
Dhcp Options Compartment in siostechnology (root) (Change compartment)	
Default DHCP Options for WSFC-CLUSTER1	0
Security Lists	
You can associate up to 5 network security lists with the subnet.	
Security List Compartment in siostechnology (root) (Change compartment)	
Default Security List for WSFC-CLUSTER1	•
	+ Another Security List
Posouroo logging	
nesource rogging	
Enable resource logging to allow resource tracking, troubleshooting, and data insights	
Resource logging disabled	
Show Tagging Options	
Create Subnet Cancel	

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# **Create the Internet gateway**

The internet gateway is how our instances will gain access to the internet. In your network you may not want your instances to be able to access the internet, but for this example we will enable it and add it to our default route table.

Create Internet Gateway	Help
Name	
101	
Create In Compartment	
siostechnology (root)	0
Se Show advanced options	
	6
Create Internet Gateway Gancel	

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# Edit the Default Security List

Networking > Virtual cloud networks > WS	FC-CLUS	TER1 » Security I	List Details							
	Def	ault Seci	urity List	t for WSF	C-CLU	STER1				
	Instand	e traffic is contro	lled by firewall r	ules on each Insta	nce in addition	to this Security I	list			
	Move	resource Ad	Id tags Term	linate						
	See	curity List Infor	rmation	lags						
AVAILABLE	ос	ID:o2piaa Sho	<u>ow Copy</u>			Compartme	nt: siostechnology (roo	ot)		
	Cre	ated: Mon, Dec	18, 2023, 23:41:	42 UTC						
Resources	Ing	ress Rule	es							
Ingress Rules (2)	Add	i Ingress Rules	Edit Ren	nove						
Egress Rules (1)		Stateless -	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allows	Description	
		No	0.0.0.0/0	TCP	All	3389		TCP traffic fo r ports: 3389	Remote Access	:
		No	10.0.0/16	All Protocols				All traffic for all ports	Open in Subnet	:
	0 sel	ected						Showing	2 items < 1 of 1	>

# **Edit the route table**

Edit the route table so that all traffic destined for outside the VCN is routed through the internet gateway.

Add Route Rules	Help
Important: For a route rule that targets a Private IP, you must first enable "Skip Source/Destination Check" on the VNIC that the Private IP is assigned to.	
Route Rule	
Target Type	
Internet Gateway	\$
Destination CIDR Block	
00.0.0	
Example: 10.0.0/24	
Target Internet Gateway in siostechnology (root) (Change compartment)	
161	0
Description Ontional	
Maximum 256 characters	
	+ Another Route Rule
Add Route Rules Gancel	

# **Create Network Security Group**

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Create Network	Security Group				<u>Help</u>
Basic Info     F     Security Rules     N	rst, provide basic information about the group. Next, you will add security rules ame ① open reate In Compartment siostechnology (root) Show advanced options				\$

	ork Security Group						<u>Help</u>
Basic Info Security Rules	Add Security Rules Optionally add one or more rules to	the network secur	ity group. <u>Learn more about se</u>	ecurity rules.			
	✓ Rule						×
	Stateless (i)						
	Direction		Source Type (i)		Source CIDR (i)		
	Ingress	\$	CIDR		\$ 10.0.0/16		
					Specified IP addresses: addresses)	10.0.010.0.255.255 (65,536 IP	
	IP Protocol (i)		Source Port Range Option	al (i)	Destination Port Ra	nge Optional (i)	
	All Protocols	\$	All		All		
	Allows:						
	Description Optional						
	Allow all traffic within the VCN						
	Maximum 255 characters						
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# **Edit the security list**



These settings allow unfettered access across availability domains, and allows RDP access from anywhere. You may consider limiting which IP addresses can RDP to your instances or even setting up a "jump VM" used exclusively for RDP access from the public network.

### **Edit DHCP options**

For active directory to work correctly, you must set the DC1 as the primary DNS server in the DHCP options as shown below. In this case, we set it to 10.0.0.100, which is the static IP of the domain controller we are configuring. You should also add your domain to the custom search domain. In this case, we will use the domain called datakeeper.local, which we will build later when we configure our domain controller.

Edit DHCP Options		Help
Name Read-only		
Default DHCP Options for WSFC-CLUSTER1		
DNS Type		
Internet and VCN Besolver	Custom Besolver	
Instance can resolve host names within the VCN and internet host names. No Internet Gateway is required.	Specify one to three DNS Servers IP addresses below. At least one is required.	~
DNS Sanuer Addrese		
10.0.0.100		
NIC Parenth Damain Tune		+ Another DNS Server
Subnet Search Domain		
Sends the subnet domain name to DHCP clients based on their subnet membership. Example: subnet1.vcn1.oraclevcn.com		
Sends the VCN domain name to DHCP clients based on their VCN membership. Example: von1.oraclevcn.com		
<ul> <li>Custom Search Domain Sends the provided fully qualified domain name (FQDN) to DHCP clients. Use this option with more advanced DNS scenarios.</li> </ul>		
Search Domain		
datakeeper.local		
Save changes Gancel		

### **Provision the VMs**

Now that the VCN is configured, it is time to start provisioning the VMs. In this example we are going to use Windows Server 2022 and SQL Server 2019. However, the steps described in this article are almost identical across all versions of Windows Server and SQL Server, so you shouldn't have any issues regardless of which version of Windows or SQL Server you plan to use.

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Before you begin, it is once again important to start with a plan. In this case you will want to plan your server names, IP addresses and their availability zone placement. As mentioned earlier, each cluster node and the file share witness must each reside in a different availability zone.

In the example configuration, we will deploy active-directory in an instance (DC1) that will also act as a file share witness.

AD1 - DC1 (10.0.0.100)

AD2 - SQL1 - (10.0.64.100, 10.0.64.101, 10.0.64.102)

AD3 - SQL2 - (10.0.128.100, 10.0.128.101, 10.0.128.102)

You may have noticed that each of the cluster nodes (SQL1, SQL2) have three IP addresses.

The first address is the private IP address of the instance. The other two IP addresses will be added as secondary addresses on each instance. These IP addresses account for the core cluster IP address and the virtual IP address associated with the SQL Server FCI network name resource.

When we provision the cluster nodes we will use the base Windows Server 2022 images with no SQL Server software included. Instead we will download the SQL Server installation media and use a perpetual SQL Server license instead of the "pay-as-you-go" licensing available on the Marketplace.

The following sections illustrate the process of provisioning the three VMs used in this example.

### **Provision DC1 in FD1**

When choosing an instance type you must size it properly for the workload. This is similar to what you would do if you were sizing a physical server to use on-premises, but the difference is that you can adjust the size easily if you over-provision, or under-provision the first time, or if your workload increases or decreases over time.

When specifying the instance details, make sure you choose the right VCN and the subnet for proper placement. On this first screen you also specify the static IP you want to associate with this instance.

feate compute instance				
reate an instance to deploy and run applications, or save	as a reusable Terratorm sta	ck for creating an instance with Resource Manager.		
ame				
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reate in compartment				
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Availability domain				
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On-demand capacity     Paramining on demand capacity     Paramining on demand capacity     Paramining on the statement on target of the statement of the s	he instance can be reclaimed at any exactly inservation	See.		
Place the instance on a remote direct memory access (FEMA) net	work, called a <u>compute cluster</u>			
Fault domain				^
There should I precify a limit domain?				· ·

Image and shape A shape is a template that determines the number of CPUs, amount of memory, and other resources allocated to an instance. The image is the operating system that runs on top of the shape.	Collapse
Windows Server 2022 Standard Image bald: 2023 10:10-0	Change Image
Stape	
VM.Standard.E4.Flex Vroat microre, 2 core OCPU, 16 GB memory, 2 Glops network bandwidth O	Change shape
Primary VNIC information	Collapse
A virtual network interface card (MIC) connects your instance to a virtual cloud network (VCN) and endpoints in and outside the VCN. Having a public IP address is required to make this instance accessible from the internet.	
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801	
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VCN in sisstechnology (root) (Change compartment)	
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25 Show advanced potions	
Login credentials An initial password will be generated when you create the instance. It will be available on the details screen for the newly launched instance. You must reset the password when you sign in to the instance for the first time.	
Boot volume	
A <u>boot volume</u> is a detachable device that contains the image used to boot the compute instance.	
Specify a custom boot volume size <u>Values and creating</u> write with volume size. Stor values size. Stor 0:68. When you openly a custom boot volume size, service limits apply.	
Use in-framsit encryption Excertise, add in transit derivem the instance. The book volumes.	

# **Provision SQL1 in FD2**

As discussed earlier, this example uses the base install of Windows Server 2022. SQL Server 2019 will be downloaded later and used for the SQL Server FCI installation.

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# **Provision SQL2 in FD3**

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ive migration
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/y two migrated if you do not prestrively record the instance before the due date.

### **Adding Additional Volumes**

Each server in the cluster requires at least one additional volume. These volumes are crucial for the storage needs of the SQL Server FCI and are replicated by SIOS DataKeeper.

#### **Multiple Volumes**

You can add multiple volumes to separate your data, logs, and backups.

Storage Types: Various storage types are available to suit different requirements.

#### **Attachment Methods**

There are multiple ways to attach storage to your servers.

#### Example Configuration

Below, we have included screen captures demonstrating one of the many possible storage configurations. This serves as a practical example to aid in understanding the setup process. This process should be completed on SQL1 and SQL2.

# **Create Block Volumes**

First, create the block volumes in the right Availability domain for SQL1 and SQL2.

Create block volume	He
ame	
SQL1-DATA	
reate in compartment	
slastechnology (root)	0
vailability domain	
NgZr:US-ASHBURN-AD-2	0
50 Size must be between 50 GB and 32,768 GB (32 TB). Volume performance varies with volume size.	
Target volume performance Performance based auto-tune Off Off	
Turning on performance based auto-tune will adjust the volume's performance automatically between the V specified for Default and Maximum VPUs/GB, inclusive. When turned on, Default VPUs/GB cannot be set to 120 and Maximum VPUs/GB must be at least 10 VPUs/GB higher than Default VPUs/GB. Turning it off will change the volume's performance back to the Default VPUs/GB setting. Learn more Balanced VPUs/GB ()	/PUs o 0 or
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Cross region replication Enables asynchronous cross region volume replication. <u>Learn more</u> ON OFF cryption Encrypt using Oracle-managed keys Leaves all encryption-related matters to Oracle.	
Cross region replication Enables asynchronous cross region volume replication. Learn more	
Cross region replication Enables asynchronous cross region volume replication. Learn more	
Cross region replication	
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Backup policies	
It is detached. When reattached, its performance is automatically adjusted to the	xevious setting. Learn more
Turning on detached volume auto-tune will change the volume's performance auto	prnatically to Lower Cost when
Detached volume auto-tune	
optimize performance. Learn more See Oracle Storage Cloud Pricing for Volume Performance Units (VPUs) cost	details.
Balanced choice for most workloads including those that perform random I/O suc Actual performance depends on the attached instance's shape. Select the approp	h as boot disks. Learn more inate instance shape to

# Create block volume

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NqZI:US-ASHIBURN-AD 3	90 -73
Volume size and performance	
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Volume size (in GB)	
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Size must be between 50 GB and 32,768 GB (32 TB). Volume performance varies with volume size.	
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# **Attach Volumes**

Now that the volumes have been created, you must attach them to the instances.

# Attach block volume

<u>Help</u>

Volume	
Select volume CID	
Volume in siostechnology (root) (Change compartment)	
SQL1-DATA	\$
OCID:tod2wq Show Copy	
Target performance: Balanced	
<b>VPU:</b> 10	
IOPS: 3000 IOPS (60 IOPS/GB)	
Throughput: 24.00 MB/s (480 KB/s/GB)	
Attachment type	
O Let Oracle Cloud Infrastructure choose the best attachment type	
Paravirtualized	
Use in-transit encryption	
Access	
Read/write	
Configures the volume attachment as read/write, not shared with other instances. This enables attachment to a single instance only and is	the default
Read/write - shareable	
Configures the volume attachment as read/write, shareable with other instances. This enables read/write attachment to multiple instances.	
<ul> <li>Read only - shareable</li> <li>Configures the volume attachment as read-only, enabling attachment to multiple instances.</li> </ul>	
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Attach Cancel	

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Attached block volumes	Name 🔺	State	Volume type	Device path	Туре	Access	Size	VPU	Multipath	Attached
Attached VNICs Boot volume	<u>SQL1-</u> DATA	Attached	Block volume	-	paravirtualized	Read/write	50 GB	10	No	Tue, Dec 19, 2023, 23:43:56 UTC
Console connection					10-21/02				s	showing 1 item < 1 o

# Attach block volume

\$

### Volume

Select volume OCID

Volume in siostechnology (root) (Change compartment)

SQL2-DATA

OCID: ...vqfnpa Show Copy

Target performance: Balanced

VPU: 10

IOPS: 3000 IOPS (60 IOPS/GB)

Throughput: 24.00 MB/s (480 KB/s/GB)

#### Attachment type

O Let Oracle Cloud Infrastructure choose the best attachment type

○ ISCSI

Paravirtualized

Use in-transit encryption

#### Access

#### Read/write

Configures the volume attachment as read/write, not shared with other instances. This enables attachment to a single instance only and is the default configuration.

#### Read/write - shareable

Configures the volume attachment as read/write, shareable with other instances. This enables read/write attachment to multiple instances.

#### O Read only - shareable

Configures the volume attachment as read-only, enabling attachment to multiple instances.



Attach Cancel

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Attach blo	ock volume								
Name 🔺	State	Volume type	Device path	Туре	Access	Size	VPU	Multipath	Attached
SQL2- DATA	<ul> <li>Attached</li> </ul>	Block volume	-	paravirtualized	Read/write	50 GB	10	No	Tue, Dec 19, 2023, 23:45:38 UTC
								S	howing 1 item 🗸 1 of 1

# **Key Points to Remember**

The setup is flexible. You can configure one or more volumes based on your specific needs.

Consider different storage types and attachment methods available for your configuration.

# Add the Secondary IP Addresses

In order for Windows Server Failover Clustering to work properly in OCI, you have to add the cluster IP address as secondary address on the virtual network interface (VNIC) attached to SQL1 and SQL1. As you recall, we discussed using the following IP addresses on each of our cluster nodes.

	SQL1	SQL2
Primary Address	10.0.64.100	10.0.128.100
Cluster IP 1 (core cluster resource)	10.0.64.101	10.0.128.101
Cluster IP 2 (SQL Server Cluster IP)	10.0.64.102	10.0.128.102

On both SQL1 and SQL2, edit the attached VNIC to add the secondary addresses.

Resources	sources IPv4 Addresses							
Metrics IPv4 Addresses	Assign Secondary Private IP	Assign Secondary Private IP Address						
	Private IP Address	Public IP Address	Fully Qualified Domain Name	Assigned				
	10.0.64.100 (Primary IP)	129.213.95.108 (Ephemeral)	sql2 Show Copy	Tue, Dec 19, 2023, 00:47:52 UTC				
	10.0.64.101	(Not Assigned)		Wed, Dec 20, 2023, 02:41:17 UT C				
	10.0.64.102	(Not Assigned)	-	Wed, Dec 20, 2023, 02:41:34 UT C				
				Showing 3				

### IPv4 Addresses

Assign Secondary Private IP Address				
Private IP Address	Public IP Address	Fully Qualified Domain Name	Assigned	
10.0.128.100 (Primary IP)	129.213.47.151 (Ephemeral)	-	Wed, Dec 20, 2023, 02:59:55 UT C	
10.0.128.101	(Not Assigned)	-	Wed, Dec 20, 2023, 03:01:50 UT C	
10.0.128.102	(Not Assigned)	-	Wed, Dec 20, 2023, 03:02:06 UT	
			Showing 3	

### **Create the Domain**

For resilience, you should provision multiple AD controllers across different availability zones, but for the purposes of this guide, we are just going to provision one AD controller. Follow the screenshots below to configure AD on DC1.

Log on using the credentials listed in the Instance Details section. You will be prompted to reset your password.



## **Enable Active Directory Domain Services**

📥 Add Roles and Features Wizard

# Select server roles

DESTINATION SERVER

×

X

DC1 Select one or more roles to install on the selected server. Before You Begin Installation Type Roles Description Server Selection Active Directory Domain Services Active Directory Certificate Services (AD DS) stores information about Server Roles Active Directory Domain Services objects on the network and makes Active Directory Federation Services Features this information available to users Active Directory Lightweight Directory Services and network administrators. AD DS AD DS Active Directory Rights Management Services uses domain controllers to give **Device Health Attestation** Confirmation network users access to permitted DHCP Server resources anywhere on the network DNS Server through a single logon process. Fax Server File and Storage Services (1 of 12 installed) Host Guardian Service Hyper-V Network Policy and Access Services Print and Document Services Remote Access  $\overline{\Box}$ Remote Desktop Services Volume Activation Services Web Server (IIS) П Windows Deployment Services Windows Server Update Services < Previous Next > Install Cancel 📥 Add Roles and Features Wizard DESTINATION SERVER Installation progress DC1 View installation progress Feature installation

Configuration required. Installation succeeded on DC1. Active Directory Domain Services Additional steps are required to make this machine a domain controller. Promote this server to a domain controller Group Policy Management Results **Remote Server Administration Tools Role Administration Tools** AD DS and AD LDS Tools Active Directory module for Windows PowerShell AD DS Tools Active Directory Administrative Center AD DS Snap-Ins and Command-Line Tools You can close this wizard without interrupting running tasks. View task progress or open this 1 page again by clicking Notifications in the command bar, and then Task Details. Export configuration settings

< Previous

Next >

Close

Cancel

### **Promote Server to Domain Controller**

Before you begin this process, enable the local Administrator account on the server and set the password. If you don't, you will receive this message when you try to promote the domain controller.



Once you have the Administrator account enabled and the password set, proceed with the Post-Deployment Configuration



🚡 Active Directory Domain Services Configuration Wizard 🛛 🗖						$\times$
Deployment Configuration					ARGET SER	VER DC1
Deployment Configuration Domain Controller Options Additional Options Paths Review Options Prerequisites Check Installation Results	Select the deployment operation Add a domain controller to ar Add a new domain to an exist Add a new forest Specify the domain information for Root domain name: More about deployment configure	n existing domaining forest or this operation datakee	n :per.loca			
-		< Previous	Next >	Install	Cancel	
Active Directory Domain Service	s Configuration Wizard			-		×
Additional Option	S			т.	ARGET SER	VER DC1
Deployment Configuration Domain Controller Options DNS Options Paths Review Options Prerequisites Check Installation Results	Verify the NetBIOS name assigned The NetBIOS domain name:	d to the domain DATAKE	and change it if ne	ecessary		
		< Previous	Next >	Install	Cancel	
		< ricvious	ITCAL >	mistan	Cancel	

Active Directory Domain Service	es Configuration Wizard			-	
Paths				Т	ARGET SERVER DC1
Deployment Configuration	Specify the location of the AD [	DS database, log files, a	nd SYSVOL		
DNS Options	Database folder:	C:\Windows\	NTDS		
Additional Options	Log files folder:	C:\Windows\	NTDS		
Paths	SYSVOL folder:	C:\Windows\	SYSVOL		
Review Options					
Prerequisites Check					
Installation					
Results					
	More shout Active Directory of	the			
	More about Active Directory pa	itns			
		< Previous	.ext >	Install	Cancel
Active Directory Domain Service	es Configuration Wizard			_	
•	-				
Paviau Options				Т	ARGET SERVER
veview Options					DC1
	Paulaurus calastians				
Deployment Configuration	Configure this server as the first	t Active Directory dom	ain controller i	in a new forest.	<u>^</u>
Domain Controller Options	comgare and server as are mo	cheate birectory dom		in a new torest	
DNS Options	The new domain name is "data	keeper.local". This is als	o the name of	f the new forest.	
Additional Options	The NetBIOS name of the dom	ain: DATAKEEPER			
Paths	Forest Functional Level: Windo	ws Server 2016			
Review Options		0 2010			
Prerequisites Check	Domain Functional Level: Wind	lows Server 2016			
Recults	Additional Options:				
Results	Global catalog: Yes				
	DNS Server Ves				
	Divis Server, Tes				
	Create DNS Delegation: No				$\sim$
	These settings can be exported additional installations	to a Windows PowerSh	ell script to au	utomate	View script
	More about installation options				
		< Previous N	ext >	Install	Cancel



Before enabling Active Directory Domain Services, you must enable the local Administrator account and log on with that account.

Using your favorite RDP program, connect to DC1 using the public IP address associated with the instance. Add the Active Directory Domain Services role.



d Roles and Features wiz	tard – 🗆 🗙			
onfirm installa	tion selections Destination Server			
efore You Begin	To install the following roles, role services, or features on selected server, click Install.			
Installation Type  Restart the destination server automatically if required				
erver Selection erver Roles	Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.			
	Active Directory Domain Services			
onfirmation	Group Policy Management			
loculte	Remote Server Administration Tools			
courto	Role Administration Tools			
	AD DS and AD LDS Tools			
	AD DS Tools			
	Active Directory Administrative Center			
	AD DS Snap-Ins and Command-Line Tools			
	Export configuration settings Specify an alternate source path			
	< Previous Next > Install Cancel			
10.1	<pre>&lt; Previous Next &gt; Install Cancel</pre>			
d Roles and Features Wiz	< Previous     Next >     Install     Cancel       card     -     -     ×			
d Roles and Features Wiz	tard - X DESTINATION SERVER			
d Roles and Features Wiz	< Previous     Next >     Install     Cancel       card     -     -     ×       DESTINATION SERVER DC1     DC1			
d Roles and Features Wiz Stallation prog	< Previous     Next >     Install     Cancel       card     -     -     X       OPPESS     DESTINATION SERVER DC1       View installation progress			
d Roles and Features Wiz Stallation proc efore You Begin Istallation Type	< Previous     Next >     Install     Cancel       card     -     -     X       DESTINATION SERVER DC1     DESTINATION SERVER DC1			
d Roles and Features Wiz Stallation proc efore You Begin Istallation Type erver Selection	< Previous     Next >     Install     Cancel       tard     -     -     ×       OPESS     DESTINATION SERVER DC1       View installation progress       I Feature installation			
d Roles and Features Wiz Stallation proc lefore You Begin Istallation Type erver Selection erver Roles	< Previous     Next >     Install     Cancel       card     -     -     X       DESTINATION SERVER DC1       View installation progress       Image: Transmission of the server of			
d Roles and Features Wiz stallation proc efore You Begin istallation Type erver Selection erver Roles eatures	< Previous     Next >     Install     Cancel       card     -     -     X       DESTINATION SERVER DC1       View installation progress       Image: Previous Provide A services			
d Roles and Features Wiz stallation proc efore You Begin Installation Type erver Selection erver Roles eatures	<       Previous       Next >       Install       Cancel         card       -       -       X         DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       Image: Configuration required. Installation succeeded on DC1.         Configuration required. Installation succeeded on DC1.       ^         Active Directory Domain Services Additional steps are required to make this machine a domain controller.       ^			
d Roles and Features Wiz stallation proc lefore You Begin istallation Type erver Selection erver Roles eatures .D DS	<       Previous       Next >       Install       Cancel         card       -       -       X         DESTINATION SERVER DC1       DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       •       •       •         Image: Service Signation required. Installation succeeded on DC1.       •       •         Active Directory Domain Services Additional steps are required to make this machine a domain controller.       •         Promote this server to a domain controller       •			
d Roles and Features Wiz stallation proc efore You Begin istallation Type erver Selection erver Roles eatures D DS confirmation	<       Previous       Next >       Install       Cancel         card       -       -       X         DESTINATION SERVER DC1       DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       •       •       •         Configuration required. Installation succeeded on DC1.       •       •       •         Active Directory Domain Services Additional steps are required to make this machine a domain controller. Promote this server to a domain controller       •       •         Group Policy Management       •       •       •       •			
d Roles and Features Wiz stallation proc efore You Begin hstallation Type erver Selection erver Roles eatures .D DS :onfirmation esults	<       Install       Cancel         card       -       -       ×         DESTINATION SERVER DC1       DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       •       •       •         Image: Configuration required. Installation succeeded on DC1.       •       •       •         Active Directory Domain Services Additional steps are required to make this machine a domain controller.       •       •         Promote this server to a domain controller       •       •       •         Group Policy Management Remote Server Administration Tools       •       •       •			
d Roles and Features Wiz stallation proc efore You Begin estallation Type erver Selection erver Roles eatures D DS confirmation esults	< Previous       Next >       Install       Cancel         card       -       -       ×         DESTINATION SERVER DC1       DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       •       •         Configuration required. Installation succeeded on DC1.       •       •         Active Directory Domain Services Additional steps are required to make this machine a domain controller. Promote this server to a domain controller       •         Group Policy Management Remote Server Administration Tools Role Administration Tools       •			
d Roles and Features Wiz tallation proc efore You Begin istallation Type erver Selection erver Roles eatures D DS onfirmation esults	< Previous       Next >       Install       Cancel         tard       -       -       ×         DESTINATION SERVER DC1       DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       •       •       •         Configuration required. Installation succeeded on DC1.       •       •       •         Active Directory Domain Services Additional steps are required to make this machine a domain controller. Promote this server to a domain controller       •       •         Group Policy Management Remote Server Administration Tools AD DS and AD LDS Tools       •       •       •			
d Roles and Features Wiz Stallation proc lefore You Begin hstallation Type erver Selection erver Roles eatures LD DS Confirmation esults	Install       Cancel         tard       –       –       ×         DESTINATION SERVER DC1       DESTINATION SERVER DC1       DESTINATION SERVER DC1         View installation progress       •       •       •         Image: Configuration required. Installation succeeded on DC1.       •       •       •         Active Directory Domain Services       •       •       •       •         Additional steps are required to make this machine a domain controller.       •       •       •         Promote this server to a domain controller       •       •       •       •         Group Policy Management       •       •       •       •       •         Active Directory nodule for Windows PowerShell       •       •       •       •         Active Directory module for Windows PowerShell       •       •       •       •			
d Roles and Features Wiz stallation proc efore You Begin hstallation Type erver Selection erver Roles eatures LD DS confirmation esults	< Previous			
d Roles and Features Wiz stallation proc efore You Begin istallation Type erver Selection erver Roles eatures ID DS confirmation esults	< Previous			
d Roles and Features Wiz stallation proc efore You Begin istallation Type erver Selection erver Roles eatures D DS confirmation esults	< Previous			
d Roles and Features Wiz stallation proc efore You Begin installation Type erver Selection erver Roles eatures .D DS confirmation esults	< Previous			

After the installation completes, promote this server to a domain controller.

	• ©   🍢	Manage
<b>A</b>	Post-deployment Configura TASKS V X	
0	Promote this server to a domain controller Feature installation	
	Configuration required. Installation succeeded on DC1. Add Roles and Features	
	Task Details	

For our purposes we are going to create a new domain.

📥 Active Directory Domain Service	- 🗆 ×					
Deployment Conf	iguration		TARGET SERVER DC1			
Deployment Configuration Domain Controller Options Additional Omain Controll Paths Review Options Prerequisites Check Installation Results	Select the deployment operation Add a domain controller to an existing Add a new domain to an existing Add a new forest Specify the domain information for Root domain name:	xisting domain g forest this operation datakeeper.loca				
	More about deployment configurati	ons				
Active Directory Domain Service	es Configuration Wizard	< <u>P</u> revious <u>N</u> ext >	Install Cancel			
Deployment Configuration Domain Controller Options DNS Options Additional Options Paths Review Options Prerequisites Check Installation Results	Select functional level of the new for Forest functional level: Domain functional level: Specify domain controller capabilities Ogmain Name System (DNS) ser Global Catalog (GC) Read only domain controller (RC Type the Directory Services Restore Passwor <u>d</u> : Confirm password:	rest and root domain Windows Server 2016 Windows Server 2016 es ver DDC) Mode (DSRM) password ••••••••••				
		< <u>Previous</u> <u>N</u> ext >	Install			
Active Directory Domain Service:	s Configuration Wizard			-		Х
--	--	--	----------------	--------	---------------------	------------------------
NS Options				TAR	GET <mark>SE</mark>	RVER DC1
A delegation for this DNS se	erver cannot be created because th	e authoritative parent zone cannot b	e found S	show m	nore	×
Deployment Configuration Domain Controller Options DNS Options Additional Options Paths Review Options Prerequisites Check Installation Results	Specify DNS delegation options					
Active Directory Domain Service:	More about DNS delegation	< Previous Next >	Install		Canc	el
Active Directory Domain Services	More about DNS delegation s Configuration Wizard	< Previous Next >	Install	TAR	Canc	el × RVER DC1
Active Directory Domain Service: Additional Option: Deployment Configuration Domain Controller Options DNS Options Additional Options	More about DNS delegation s Configuration Wizard S Verify the NetBIOS name assign The NetBIOS domain name:	ed to the domain and change it if ne DATAKEEPER	<u>Install</u>	TAR	Canc	el × RVER DC1
Active Directory Domain Service: Additional Option Deployment Configuration Domain Controller Options DNS Options Additional Options Paths Review Options Prerequisites Check Installation	More about DNS delegation s Configuration Wizard S Verify the NetBIOS name assign The NetBIOS domain name:	ed to the domain and change it if ne DATAKEEPER	ecessary	TAR	Canc GET SE	el × RVER DC1
Active Directory Domain Service: Additional Option Deployment Configuration Domain Controller Options DNS Options Additional Options Paths Review Options Prerequisites Check Installation Results	More about DNS delegation s Configuration Wizard S Verify the NetBIOS name assigned The NetBIOS domain name:	ed to the domain and change it if ne DATAKEEPER	cessary	TAR	Canc GET SE	el × RVER DC1

ths			TARGET SERVER DC1
eployment Configuration	Specify the location of the AD D	S database, log files, and SYSVOL	
omain Controller Options	Database folder:	C:\Windows\NTDS	
DNS Options	Log files folder:	C:\Windows\NTDS	
additional Options	SYSVOL folder:	C:\Windows\SYSVOL	
	-		
rerequisites Check			
stallation			
mine			
esuits			
	More about Active Directory pat	hs	
		< Previous Next >	Install
		< Previous Next >	Install Cancel
ive Directory Domain Service	s Configuration Wizard	< <u>P</u> revious <u>N</u> ext >	Install Cancel
ive Directory Domain Service	s Configuration Wizard	< Previous Next >	Install Cancel
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ive Directory Domain Service view Options	s Configuration Wizard	< <u>P</u> revious <u>N</u> ext >	Install Cancel Cancel Cancel TARGET SERVER DC1
ive Directory Domain Service view Options	s Configuration Wizard	< <u>P</u> revious <u>N</u> ext >	Install Cancel C
ive Directory Domain Service VIEW Options eployment Configuration	s Configuration Wizard Review your selections:	< Previous Next >	Install Cancel
ive Directory Domain Service view Options eployment Configuration omain Controller Options	s Configuration Wizard Review your selections: Configure this server as the first	< <u>Previous</u> <u>Next &gt;</u>	Install Cancel C
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ive Directory Domain Service view Options eployment Configuration omain Controller Options DNS Options dditional Options aths eview Options rerequisites Check stallation esubs	s Configuration Wizard Review your selections: Configure this server as the first The new domain name is "datak The NetBIOS name of the domai Forest Functional Level: Window Domain Functional Level: Window Additional Options: Global catalog: Yes DNS Server: Yes	< <u>Previous</u> <u>Next</u> > Active Directory domain controller in a ne eeper.local". This is also the name of the r in: DATAKEEPER s Server 2016 ws Server 2016	Install Cancel
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ive Directory Domain Service view Options eployment Configuration omain Controller Options DNS Options dditional Options aths eview Options rerequisites Check stallation esuita	s Configuration Wizard Review your selections: Configure this server as the first The new domain name is "datak The NetBIOS name of the domain Forest Functional Level: Window Domain Functional Level: Window Domain Functional Level: Window Comain Functional Level: Window Domain Functional Level: Window Comain Functional	< <u>Previous</u> <u>Next &gt;</u> Active Directory domain controller in a ne eeper.local". This is also the name of the r in: DATAKEEPER s Server 2016 ws Server 2016	Install Cancel
ive Directory Domain Service view Options eployment Configuration omain Controller Options DNS Options dditional Options aths eview Options rerequisites Check stallation euto	s Configuration Wizard Review your selections: Configure this server as the first The new domain name is "datak The NetBIOS name of the domai Forest Functional Level: Window Domain Functional Level: Window Domain Functional Level: Window Additional Options: Global catalog: Yes DNS Server: Yes Create DNS Delegation: No These settings can be exported to	< <u>Previous</u> <u>Next &gt;</u> Active Directory domain controller in a ne eeper.local". This is also the name of the r in: DATAKEEPER s Server 2016 ws Server 2016	Install Cancel
ive Directory Domain Service view Options eployment Configuration omain Controller Options DNS Options dditional Options aths eview Options rerequisites Check stallation esuits	s Configuration Wizard Review your selections: Configure this server as the first The new domain name is "datak The NetBIOS name of the domai Forest Functional Level: Window Domain Functional Level: Window Domain Functional Level: Window Additional Options: Global catalog: Yes DNS Server: Yes Create DNS Delegation: No These settings can be exported to additional installations	< <u>Previous</u> <u>Next</u> > Active Directory domain controller in a ne eeper.local". This is also the name of the r in: DATAKEEPER is Server 2016 ws Server 2016	Install Cancel

Active Directory Domain Service	s Configuration Wizard	-		×
Prerequisites Cheo	:k	TAR	GET SE	RVER DC1
<ul> <li>All prerequisite checks pass</li> </ul>	ed successfully. Click 'Install' to begin installation. Si	how m	nore	×
Deployment Configuration Domain Controller Options	Prerequisites need to be validated before Active Directory Domain Services is inst computer	alled o	on this	
DNS Options	Rerun prerequisites check			
Additional Options	View results			
Review Options	adapter, both IPv4 and IPv6 static IP addresses should be assigned to both IPv6 Properties of the physical network adapter. Such static IP address(es) a	IPv4 a assignr	nd ment	^
Prerequisites Check	should be done to all the physical network adapters for reliable Domain Na (DNS) operation.	ame Sy	stem	
Installation Results	A delegation for this DNS server cannot be created because the authoritating zone cannot be found or it does not run Windows DNS server. If you are in with an existing DNS infrastructure, you should manually create a delegation DNS server in the parent zone to ensure reliable name resolution from outs domain "datakeeper.local". Otherwise, no action is required.	ve par tegrati on to th side th	ent ing his e	Í.
	<ol> <li>Prerequisites Check Completed</li> </ol>			
	All prerequisite checks passed successfully. Click 'Install' to begin installation	on.		$\sim$
	A If you click Install, the server automatically reboots at the end of the promotic More about prerequisites	on ope	ration.	
	< <u>P</u> revious <u>N</u> ext > <u>I</u> nstall		Cano	:el

Reboot DC1 and move on to the next section.

## Join SQL1 and SQL2 to the Domain

$\times$	
computer	
-	IPv6 enabled
Computer	Name/Domain Changes X
	/elcome to the datakeeper.local domain.
	ОК
	Computer

## **Prepare the Storage**

Once SQL1 and SQL2 are added to the domain, connect to the instances with the Domain Admin account you created to complete the rest of the configuration steps. The first thing you need to do is to attach and format the EBS volumes that we added to SQL1 and SQL2 as shown below.

New Simple Volume Wizard		×
	Welcome to the New Volume Wizard	Simple
	This wizard helps you create a simple	volume on a disk.
	A simple volume can only be on a sin	gle disk.
	To continue, click Next.	
	< <u>B</u> ack	Next > Cancel
ew Simple Volume Wizard		×
Specify Volume Size Choose a volume size that	is between the maximum and minimum	n sizes.
Maximum disk space in M	102397	
Minimum disk space in ME	8	
Smple volume size in MB:	102397	
	< <u>B</u> ack	Next > Cancel

### Assign Drive Letter or Path

For easier access, you can assign a drive letter or drive path to your partition.

<ul> <li>Assign the following drive letter:</li> <li>Mount in the following empty NTF</li> <li>Do not assign a drive letter or drive</li> </ul>	D v S folder: Browse e path
	< <u>B</u> ack <u>N</u> ext > Cancel
New Simple Volume Wizard	×
Format Partition To store data on this partition, you m	ust format it first.
Choose whether you want to format t	his volume, and if so, what settings you want to use.
O Do not format this volume	
Format this volume with the following the second	lowing settings:
File system:	NTFS ~
Allocation unit size:	Default 🗸
Volume label:	New Volume
Perform a quick format	
Enable file and folder co	mpression
	< Back Next > Cancel

### **Configure Failover Clustering Feature**

Enable the Failover Clustering feature on both SQL1 and SQL2.

Run this PowerShell command on SQL1 and SQL2

Install-WindowsFeature -Name Failover-Clustering -IncludeManagementTools

### Validate your Cluster

Run this PowerShell command from SQL1 or SQL2

```
Test-Cluster -Node sql1, sql2
```

Depending upon the version of Windows Server you are using, you will see some warnings about Network and possibly storage. The network warning will likely tell you that each cluster node is accessible via a single interface. Earlier versions of Windows will warn you about the lack of shared storage.

You can ignore both of those errors as they are expected in a cluster hosted on OCI. As long as you have received no Errors, you can proceed with the next section. If you receive any errors, fix them, then run validation again and continue on to the next section.

### **Create the Cluster**

Next, you will create the cluster. In the example below, you will notice I use the two IP addresses we planned to use, 10.0.64.101 and 10.0.128.101. You can run this Powershell from either cluster node.

```
New-Cluster -Name cluster1 -Node sql1, sql2 - StaticAddress 10.0.64.101, 10.0.128.101
```

**Please Note**: do NOT try to create the cluster via the WSFC GUI. You will find that because the instances are using DHCP, the GUI will not give you the option to assign IP addresses for the cluster and instead will hand out duplicate IP addresses.

### Add the File Share Witness

To maintain the cluster quorum, you need to add a witness. In OCI, the type of witness you will want to use is a File Share Witness. The file share witness must reside on a server that resides in a different Fault Domain than the two cluster nodes.

In the example below, the file share witness will be created on DC1, which resides in FD1.

On DC1, create a file share and assign the cluster name object (CNO) read-write permissions on the folder. Add permissions for the CNO on both the Share and Security tab of a folder that you created, In the example below I created a folder called "Witness".

Advanced Sharing	×	×
Permissions for Witness      Select Users, Computers, Service Accounts, or Groups      Object Types	×	×
Select Users, Computers, Service Accounts, or Groups Object Types	×	×
Object Types		×
Select the types of objects you want to find. Object types: Built-in security principals Service Accounts Computers Groups Users	OK Ca	ncel

1	Witness Properties		×	
4	Permissions for Witness		×	×
	Share Permissions <u>G</u> roup or user names: Stress Everyone Stress (DATAKEEPER) Cluster1 (DATAKEEPER)	R\Administrators) ster1\$)		
		A <u>d</u> d	<u>R</u> emove	í
	Permissions for cluster1	Allow	Deny	
	Full Control Change Read			
		Cancel	Acch	
	UK	Cancel	Apply	

📜 Wit	tness Prope	ties				$\times$	
Genera	al Sharing	Security	Previous Ven	sions	Customize		
Gr Gr Gr Gr Gr Gr Gr Gr Gr Gr Gr Gr Gr G	Permissi Security Object nam Group or us SYST admin Admin Cluste	ons for W ne: C:\W ser names EM istrator (D/ istrators (I r1 (DATA)	Vitness Vitness : ATAKEEPER\ DATAKEEPER KEEPER\cluste	admini \Admin er1\$);	strator) nistrators)		×
Foi	Permissions Full cont Modify Read & List folde Read	s for cluste rol execute er contents	er1		Allow	Remove	*
			OK		Cancel	Apply	t

Once the folder has been created and the appropriate permissions have been assigned to the CNO, run the following PowerShell command on SQL1 or SQL2.

Set-ClusterQuorum -Cluster cluster1 -FileShareWitness \\dc1\Witness Your cluster should now look like the following when you launch the Failover Cluster Manager on SQL1 or SQL2.



## **Creating the SQL Server FCI**

### Install DataKeeper Cluster Edition

Before you can move on with the next steps, you will need to install DataKeeper Cluster Edition on both SQL1 and SQL2. Download the setup executable and run the DataKeeper setup on both nodes. Refer to the SIOS documentation for specific guidance on the installation.

### Create the DataKeeper Volume Resource

Launch the DataKeeper UI on either of the cluster nodes and create your DataKeeper Volume Resource as shown below.

Connect to both servers, first SQL1 and then SQL2

ᡖ sios d	ataKeeper		_		×
Enter t	he server to connect to				
Provide to.	the name or IP address for the se	erver you	would like	e to conne	ct
Server:	sql1				
		Cor	nnect	Cano	cel

If you have connected to both servers and the storage is configured properly, the Server Overview Report should look something like this.

DataKeeper - [SIOS DataKeeper\R	eports\Server Overview]
<u>File</u> <u>Action</u> <u>View</u> <u>H</u> elp	
🗢 🔿 🔀 🖬	
<ul> <li>SIOS DataKeeper</li> <li>Jobs</li> <li>Reports</li> <li>Job Overview</li> <li>Server Overview</li> </ul>	Server Overview Report
g serie orenen	▲ SQL1.DATAKEEPER.LOCAL (SQL1)
	Volume Mirror Role State File System Total Size
	D None C Not mirrored NTFS 100.00 GB
	▲ SQL2.DATAKEEPER.LOCAL (SQL2)  Not mirrored Volume Mirror Role State File System Total Size D None Not mirrored NTFS 100.00 GB

Click Create Job to start the Job Creation Wizard

SIOS DataKeep	er	-		×
Create a new	job			
A job provides a name and descri	logical grouping of related mir ption for this new job to help r	rors an <mark>d serve</mark> r emembe <mark>r</mark> it.	s. <mark>Provid</mark> e	a
Job name:				
Job description:	Job description:			
		Create Job	Canc	el
SIOS DataKeep	er	-		×
Create a new	job			
A job provides a name and descr	logical grouping of related min iption for this new job to help r	rrors and server emember it.	s. Provide	e a
Job name:	D-Drive			
Job description:	SQL Server Data			
		Create Job	Cano	el

Sew Mirror	a Source	×
Choose a Source Choose a Target Configure Details	Choose the server with the source volume. Server: SQL1.DATAKEEPER.LOCAL Connect to Server. Choose the IP address to use on the server. IP address: 10.0.2.100 / 24 Choose the volume on the selected server. Volume: D	ver ver
New Mirror	Next Cance — — — — — — — — — — — — — — — — — — —	2 <b> </b> ×
Choose a Source Choose a Target Configure Details	Source server:       SQL1.DATAKEEPER.LOCAL         Source IP address:       10.0.2.100         Source volume:       D         Choose the server with the target volume.         Server:       SQL2.DATAKEEPER.LOCAL         Choose the IP address to use on the server.         IP address:       10.0.3.100 / 24         Choose the volume on the selected server.         Volume:       D	ver v
	Previous Next Cance	:

DataKeeper supports both synchronous and asynchronous replication. For replication between availability zones in the same region, choose synchronous. If you want to replicate across regions or even across cloud providers, choose asynchronous

Sew Mirror	re Details	-		×
Choose a Source Choose a Target Configure Details	Source server: SQL1.DATAKEEPER.LOCAL Source IP address: 10.0.2.100 Source volume: D Specify how the data should be compressed when sent to the tar None How should the source volume data be sent to the target volume Asynchronous Synchronous Synchronous Maximum bandwidth: 0 Use 0 for unlimited	get.		
	Previous	Done	Car	ncel

Click "Yes" here to register the DataKeeper Volume resource in Available Storage in the cluster

Yes

No



The DataKeeper Volume D now appears in Failover Cluster Manager in Available Storage.



### Install the First Node of the SQL Server FCI on SQL1

Now that the core cluster has been created and the DataKeeper volume resource is in Available Storage, it is time to install SQL Server on the first cluster node. As mentioned earlier, the example here illustrates a cluster configuration using SQL 2019 and Windows 2022, but all the steps described in this example are virtually identical, regardless of which version of Windows Server or SQL Server you are trying to deploy.

Follow the example below to install SQL Server on SQL1

# SQL Server 2019 Developer Edition

Select an installation type:

### <u>B</u>asic

Select Basic installation type to install the SQL Server Database Engine feature with default configuration.

## Custom

Select Custom installation type to step through the SQL Server installation wizard and choose what you want to install. This installation type is detailed and takes longer than running the Basic install.

# Download Media

Download SQL Server setup files now and install them later on a machine of your choice.

(i) \_ ×

SQL Server transmits information about your installation experience, as well as other usage and performance data, to Microsoft to help improve the product. To learn more about data processing and privacy controls, and to turn off the collection of this information after installation, see the documentation

15:2002.4709.1

<sup>SQL Server 2019</sup> Developer Editio	n		© – ×
Specify SQL Server media downlo	ad target loc	ation	
MEDIA LOCATION CASQL2019	Browse	MINIMUM 8994 MB DOWNLO/ 1426 MB	FREE SPACE AD SIZE
	Close	< <u>P</u> revious	Install 15.2002.4709.1

SQL Server Installation Center			×
Planning Installation Maintenance	1	New SQL Server stand-alone installation or add features to an existing installation Launch a wizard to install SQL Server 2019 in a non-clustered environment or to add features to an existing SQL Server 2019 instance.	,
Tools Resources		Install SQL Server Reporting Services Launch a download page that provides a link to install SQL Server Reporting Services. An internet connection is required to install SSRS.	
Options		Install SQL Server Management Tools Launch a download page that provides a link to install SQL Server Management Studio, SQL Server command-line utilities (SQLCMD and BCP), SQL Server PowerShell provider, SQL Server Profiler and Database Tuning Advisor. An internet connection is required to install these tools.	
	ĸ	Install SQL Server Data Tools Launch a download page that provides a link to install SQL Server Data Tools (SSDT). SSDT provides Visual Studio integration including project system support for Microsoft Azure SQL Database, the SQL Server Database Engine, Reporting Services, Analysis Services and Integration Services. An internet connection is required to install SSDT.	
	<b>-&gt;</b> 🐮	New SQL Server failover cluster installation Launch a wizard to install a single-node SQL Server 2019 failover cluster.	
	¥?Î	Add node to a SQL Server failover cluster Launch a wizard to add a node to an existing SQL Server 2019 failover cluster.	
Microsoft SQL Server 2019	-	Upgrade from a previous version of SQL Server Launch a wizard to upgrade a previous version of SQL Server to SQL Server 2019. Click here to first view Upgrade Documentation	
S Install a SOL Server Failover Clu	ister	New Machine Learning Server (Standalone) installation	×
Product Key Specify the edition of SQL Set	rver 2019 to install.		
Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files	Validate this in of authenticity Evaluation, or Books Online, - has the same s development o	stance of SQL Server 2019 by entering the 25-character key from the Microsoft certificate or product packaging. You can also specify a free edition of SQL Server. Developer, Express. Evaluation has the largest set of SQL Server features, as documented in SQL Serv and is activated with a 180-day expiration. Developer edition does not have an expiration et of features found in Evaluation, but is licensed for non-production database applicatio nly. To upgrade from one installed edition to another, run the Edition Upgrade Wizard.	e ver h, on
nstall Failover Cluster Rules	Specify a free	e edition:	
eature Selection eature Rules eature Configuration Rules Ready to Install installation Progress Complete	<u> </u>	pduct key:	

🐮 Install a SQL Server Failover Clu	uster			-		×
License Terms						
To install SQL Server 2019, y	ou must accept the Microsoft Software Licen	se <mark>Term</mark> s.				
Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Install Failover Cluster Rules Feature Selection Feature Rules Feature Configuration Rules Ready to Install Installation Progress Complete	<ul> <li>MICROSOFT SOFTWARE LICENSE</li> <li>MICROSOFT SQL SERVER 2019 DEV</li> <li>These license terms are an agreeme affiliates). They apply to the softwar updates (except to the extent such siterms, in which case those different Microsoft's rights relating to pre-up THESE LICENSE TERMS, YOU HAV ACCEPT THESE TERMS. IF YOU DO</li> <li>IMPORTANT NOTICE: AUTOMATION this software is installed on servers prior to SOL Server 2010 for composition SQL Server transmits information about performance data, to Microsoft to help privacy controls, and to turn off the col documentation.</li> </ul>	TERMS VELOPER ent between you e named above services or upda terms apply pro- odated software E THE RIGHTS E O NOT ACCEPT C UPDATES TO or devices runni pronts of any of accy Statement your installation improve the prod lection of this info	and Microsoft C and any Microso tes are accompa ospectively and d or services). IF BELOW. BY USIN THEM, DO NOT PREVIOUS VER ing any supporte thom) this softwo experience, as well duct. To learn more promation after insta	orporation (or nied by new o o not alter you YOU COMPLY GTHE SOFTV USE THE SOF SIONS OF SQL d editions of S stre will automs	one of it: software r addition ir or WITH VARE, YO TWARE. SERVER. QL Server SERVER. QL Server Copy	s al U <u>If</u> <u>Print</u>
			< <u>B</u> ack	<u>N</u> ext >	Canc	el
Microsoft Update	ck for important updates					
Product Key License Terms Global Rules <b>Microsoft Update</b> Product Updates Install Setup Files Install Failover Cluster Rules Feature Selection Feature Rules Feature Configuration Rules Ready to Install Installation Progress Complete	Microsoft Update offers security and software, including SQL Server 2019 the Microsoft Update website. Use <u>Microsoft Update FAQ</u> <u>Microsoft Update FAQ</u> <u>Microsoft Update Privacy Statement</u>	d other important ). Updates are deli or updates (recom	updates for Windo ivered using Autor mended)	ows and other N natic Updates, o	ficrosoft r you can v	visit
			< <u>B</u> ack	<u>N</u> ext >	Cance	el

Install Failover Cluster R							
	Rules						
Setup rules identify potential pro can continue.	oblems that	t might occur while run	ning Setup. Failures mu	ist be corrected bef	ore Setup		
nstall Failover Cluster Rules	Operation	completed. Passed: 19	Failed 0. Warning 1.	Skipped 0.			
Feature Selection							
Feature Rules							_
eature Configuration Rules	Hide de	tail <u>s</u> <<				<u>R</u> e-ru	in
eady to Install	View deta	iled report					
nstallation Progress	Basult	Pula			Charles		•
omplete	Result	Microsoft Cluster Sen	vice (MSCS) cluster verif	fication warnings	Warning		
		Permete registry consi		ication warnings	Dassed		-
		Demain controller			Passed		-
		Windows Firewall			Passed		- 1
		DNIS settings (SOI 1)			Passed		-
		WOW64 setup			Passed		
		SOI 2019 minimum (	TP for Upgrade and Sid	le hy Side Support	Passed		
		Windows Manageme	nt Instrumentation (WA		Darced		-
		Cluster Remote Acce		in service (SQLL)	Dacced		-
		Distributed Transactio	on Coordinator (MSDTC)	installed (SOL2)	Passed		-
		Remote registry service	ce (SOL2)	(instance (seec)	Passed		
		······					•
				< <u>B</u> ack	<u>N</u> ext >	Cancel	
Install a SOL Server Failover Cluster							~
					-		×
Feature Selection Select the Developer features to in	nstall.						×
Feature Selection Select the Developer features to in	nstall.	wing for Reporting Service	es2 Download it from	n the web			×
Feature Selection Select the Developer features to in Install Failover Cluster Rules Reature Selection	nstall.	king for Reporting Servic	ves? Download it from	n the web			×
Feature Selection Select the Developer features to in Install Failover Cluster Rules eature Selection eature Rules	Install.	king for Reporting Servic	ves? <u>Download it fron</u>	n the web Feature description			×
Feature Selection Select the Developer features to in Install Failover Cluster Rules eature Selection eature Rules Instance Configuration Cluster Resource Group Instar Dick Selection	totall. €eatures: Instance ✓ Da	oking for Reporting Servic Features Itabase Engine Services SOL Server Replication	ves? <u>Download it fron</u>	n the web Feature description The configuration instance feature of isolated from othe	and operation f a SQL Server in:	of each nstance is stances. SQL	×
Feature Selection Select the Developer features to in Install Failover Cluster Rules eature Selection eature Rules Instance Configuration Iluster Resource Group Iluster Disk Selection Iluster Network Configuration	● Loc Eeatures: Instance	oking for Reporting Servic Features Itabase Engine Services ] SQL Server Replication ] Machine Learning Sen	ves? <u>Download it fron</u>	n the web Feature description The configuration instance feature of isolated from othe <u>P</u> rerequisites for se	and operation f a SQL Server in r SQL Server in: lected features:	of each nstance is stances. SQL	×
Feature Selection Select the Developer features to in Install Failover Cluster Rules eature Selection eature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration erver Configuration	stall. €eatures: Instance Da C	oking for Reporting Servic Features tabase Engine Services ] SQL Server Replication ] Machine Learning Sen [] R	ves? <u>Download it fron</u>	n the web Feature description The configuration instance feature of isolated from othe <u>P</u> rerequisites for se Already installed:	and operation f a SQL Server in r SQL Server in: lected features:	of each nstance is stances. SQL	×
Feature Selection Select the Developer features to in stall Failover Cluster Rules eature Selection eature Rules stance Configuration Cluster Disk Selection Cluster Disk Selection Cluster Network Configuration erver Configuration atabase Engine Configuration	nstall. €eatures: Instance Ø Da	king for Reporting Service Features tabase Engine Services SQL Server Replication Machine Learning Sen R Python Java	ves? <u>Download it fron</u>	n the web Feature description The configuration instance feature of isolated from othe <u>P</u> rerequisites for se Already installed: 	and operation f a SQL Server in r SQL Server in lected features: erShell 3.0 or hi	of each nstance is stances. SQL	×
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Feature Selection Select the Developer features to in stall Failover Cluster Rules eature Selection eature Rules stance Configuration luster Disk Selection luster Disk Selection luster Network Configuration erver Configuration atabase Engine Configuration eature Configuration Rules eady to Install stallation Progress omplete	stall.	Features         Itabase Engine Services         SQL Server Replication         Machine Learning Services         Python         Java         Full-Text and Services         PolyBase Query Services         PolyBase Query Services         All	vices and Language	n the web Feature description The configuration instance feature of isolated from othe <u>P</u> rerequisites for se Already installed: Undows Pow To be installed fro <u>D</u> isk Space Require Drive C: 1427 MB r	and operation f a SQL Server in r SQL Server in lected features: erShell 3.0 or hi m media: ments equired, 12937	of each nstance is stances. SQL igher MB available	×
Feature Selection Select the Developer features to in stall Failover Cluster Rules eature Selection eature Rules istance Configuration luster Resource Group luster Disk Selection luster Network Configuration erver Configuration atabase Engine Configuration eature Configuration Rules eady to Install istallation Progress omplete	Instance n	Peatures         tabase Engine Services         SQL Server Replication         Machine Learning Sen         R         Python         Java         Full-Text and Semantia         Data Quality Services         PolyBase Query Service         Inselect All         Optimized directory:	ves? Download it from vices and Language c Extractions for Sea e for External Data UDEC data >	n the web Feature description The configuration instance feature of isolated from othe Prerequisites for se Already installed: Windows Pow To be installed fro Disk Space Require Drive C: 1427 MB r	and operation f a SQL Server in r SQL Server in lected features: erShell 3.0 or hi <u>m media:</u> ments equired, 12937	of each nstance is stances. SQL igher MB available	
Feature Selection Select the Developer features to in Install Failover Cluster Rules eature Selection eature Rules instance Configuration Cluster Disk Selection Cluster Network Configuration erver Configuration eature Configuration eature Configuration Rules eady to Install installation Progress Complete	stall.	Prestures         tabase Engine Services         SQL Server Replication         Machine Learning Sen         Python         Java         Full-Text and Semantic         Data Quality Services         PolyBase Query Service         Inselect All         Opt directory:	vices and Language	n the web Feature description The configuration instance feature of isolated from othe Prerequisites for se Already installed: L. Windows Pow To be installed fro Disk Space Require Drive C: 1427 MB r	and operation f a SQL Server in r SQL Server in lected features: erShell 3.0 or hi m media: ments equired, 12937	of each nstance is stances. SQL igher MB available	
Feature Selection Select the Developer features to in Install Failover Cluster Rules eature Selection eature Rules Instance Configuration Cluster Disk Selection Cluster Network Configuration eature Configuration eature Configuration Rules eady to Install Installation Progress Complete	stall.	Presenting for Reporting Services         tabase Engine Services         SQL Server Replication         Machine Learning Services         Python         Java         Full-Text and Semantia         Data Quality Services         PolyBase Query Service         Inselect All         Dott directory:         All         Unselect All         Dott directory:         Ature directory (x86):	vices and Language	n the web Feature description The configuration instance feature of isolated from othe Prerequisites for se Already installed: Windows Pow To be installed fro Disk Space Require Drive C: 1427 MB r rosoft SQL Server\ rosoft SQL Server\	and operation f a SQL Server in r SQL Server in lected features: erShell 3.0 or hi m media: ments equired, 12937	of each nstance is stances. SQL igher MB available	
Feature Selection Select the Developer features to in stall Failover Cluster Rules eature Selection eature Rules stance Configuration custer Resource Group uster Disk Selection custer Network Configuration erver Configuration eatures Engine Configuration eature Configuration Rules eady to Install stallation Progress complete	stall.	Peatures         tabase Engine Services         SQL Server Replication         Machine Learning Services         Python         Java         Pull-Text and Semantia         Data Quality Services         PolyBase Query Service         Inselect All         Oot directory:         ature directory (x86):	ves? Download it from frices and Language c Extractions for Sea e for External Data UDEC d the sea C:\Program Files\Micci C:\Program Files\Micci	n the web Feature description The configuration instance feature of isolated from othe Prerequisites for se Already installed: Windows Pow To be installed fro Disk Space Require Drive C: 1427 MB r rosoft SQL Server\ installed Server\ Ndicrosoft SQL Server\	and operation f a SQL Server in r SQL Server in lected features: erShell 3.0 or hi m media: ments equired, 12937	of each nstance is stances. SQL igher MB available	

The name you specify below is the client access point. This is the name your application servers will use when they want to connect to the SQL Server FCI.

🐮 Install a SQL Server Failover Clust	ter					-	o x		
Instance Configuration	1								
Specify the name and instance	D for the inst	ance of SQL Ser	ver. Instance ID b	ecomes part of t	he installation path	٦.			
Install Failover Cluster Rules Feature Selection	Specify a no your failove	Specify a network name for the new SQL Server failover cluster. This will be the name used to identify your failover cluster on the network.							
Feature Rules	SQL Server	Net <u>w</u> ork Name:	sqlcluster						
Cluster Resource Group Cluster Disk Selection	Default in	nstance							
Cluster Network Configuration	O Named I	nstance:	MSSQLSERVER						
Database Engine Configuration	Instance <u>I</u> D:		MSSQLSERVER						
Ready to Install Installation Progress	SQL Server	directory:	C:\Program File	Microsoft SQL	Server\MSSQL15.N	1SSQLSER/VER			
Complete		Cluster	Network Name	Features	Edition	Version	Inst		
🐮 Install a SQL Server Failover Clust	ter				< <u>B</u> ack <u>P</u>	<u>v</u> ext >	Cancel		
Cluster Resource Grou	<b>P</b> group for your	SQL Server failo	ver cluster.						
Install Failover Cluster Rules Feature Selection	Specify a na failover clus or enter a n	ame for the SQL ster resources wi ew cluster resou	Server cluster res Il be placed. You o rce group name to	ource group. The can choose to us o <mark>be</mark> creat <mark>e</mark> d.	e cluster resource o se an existing clust	group is where er resource gro	SQL Server up name		
Instance Configuration Cluster Resource Group	<u>S</u> QL Serv	ver cluster resour	ce group name:	SQL Server (MS	SQLSERVER)		~		
Cluster Disk Selection	Qualified	Name	M	essage					
Server Configuration	۲	Available Storag	ge Th	e cluster group '	Available Storage' i	s rese <mark>rved</mark> by W	indows Fai		
Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete		Liuster Group	Ih	e cluster group 't	Liuster Group' is re	served by Wind	Refrech		
							Tenesi		
					< Васк	vext >	Cancel		

髋 Install a SQL Server Failover Clust	er			_		×
Cluster Disk Selection Select shared cluster disk resou	irces for your S	QL Server failover cluster.				
Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group <b>Cluster Disk Selection</b>	Specify the s used as the o Services con	shared disks to be included in the SQL default drive for all databases, but this figuration pages. per Volume D	. Server resource cluster gr s can be changed on the [	roup. The first dri Database Engine o	ve will be or Analysis	
Cluster Network Configuration Server Configuration	<u>A</u> vailable sha	ared disks:				
Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete	Qualified	Disk DataKeeper Volume D	Message		<u>R</u> efrest	h
			< <u>B</u> ack	<u>N</u> ext >	Cancel	

On this screen you will add the SQL1 secondary IP address we identified earlier in the planning section of <u>Part</u> 1 of this series.

10	Install	a SOL	Server	Failover	Cluster
-	11130011	0 JQL	201401	1 0110101	CIUSCU

## **Cluster Network Configuration**

Select network resources for your SQL Server failover cluster.

Install Failover Cluster Rules	Specify the network se	ettings for this	s failover cluster:				
Feature Selection	IP Type	DHCP 4	Address	Subnet Mask	Subnet(s)	Network	
Feature Kules	✓ IPv4	1	0.0.2.102	255.255.255.0	10.0.2.0/24	Cluster N	etwork 2
Cluster Resource Group	IPv4			255.255.255.0	10.0.3.0/24	Cluster No	etwork 1
Cluster Resource Group Cluster Disk Selection <b>Cluster Network Configuration</b> Server Configuration Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete				23322320	10.0.5.0/24	Cluster N	etwork 1
				< Bac	k Nevt >	[]	<u>R</u> efresh
				< <u>D</u> ac	K <u>N</u> ext >	Cal	ncei
To Install a SQL Server Failover Cluste	er					-	×
Server Configuration Specify the service accounts and Install Failover Cluster Rules Feature Selection	d collation configuration Service Accounts C	ollation		count for each			
Feature Rules		thus that you			JQE JEIVEI SEIVICE		_
Instance Configuration	Service		Account N	lame	Password	Startup Typ	e
Cluster Resource Group	SQL Server Agent	a Facina	DATAKEEPE	R\dave	•••••••••	Manual	~
Cluster Disk Selection	SQL Server Databa	Se Engine	DATAKEEPE		•••••	Manual	~
Cluster Network Configuration	SQL Full-text Filter	Daemon Laui				Automatic	
Server Configuration	SQL Server Browse	r	NT AUTHO	KIIT LUCAL		Automatic	
Feature Configuration Ready to Install Installation Progress Complete	Grant Perform V This privilege er to information o <u>Click here for de</u>	folume Mainte hables instant fisclosure by a <u>etails</u>	enance Task privi file initialization allowing deleted o	lege to SQL Sen by avoiding zero content to be ac	ver Database Engir bing of data pages cessed.	ne Service . This may lea	d
				< <u>B</u> ac	k <u>N</u> ext >	Car	ncel

📸 Install a SQL Server Failover Cluste	r.	-		×		
Database Engine Config	juration					
Specify Database Engine authen parallelism, Memory limits, and F	tication security mode, administrators, data directories, TempDB, Max degree of ilestream settings.					
Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete	Server Configuration       Data Directories       TempDB       MaxDOP       Memory       FILESTREAM         Specify the authentication mode and administrators for the Database Engine.       Authentication Mode       Image: Content of the Database Engine.         Authentication Mode       Image: Content of the Database Engine.       Image: Content of the Database Engine.         Mixed Mode (SQL Server authentication and Windows authentication)       Specify the password for the SQL Server system administrator (sa) account.         Enter password:       Image: Content of the Database Engine.         Specify SQL Server administrators       Image: Content of the Database Engine.					
	Add Qurrent User     Add     Remove       < Back	ext >	Cancel			

In this example we left tempdb on the D drive. However, for best performance it is recommended that you locate tempdb on a non-replicated volume.

### **Database Engine Configuration**

Specify Database Engine authentication security mode, administrators, data directories, TempDB, Max degree of parallelism, Memory limits, and Filestream settings.

Install Failover Cluster Rules	Server Configuration Data Dir	rectories TempDB MaxDOP Memory FILE	STREAM
Feature Selection	Data root directory:	D:\	
Instance Configuration	System database directory:	D:\MSSQL15.MSSQLSERVER\MSSQL\Data	
Cluster Resource Group	User database directory:	D:\MSSQL15.MSSQLSERVER\MSSQL\Data	
Cluster Network Configuration	User database <u>log</u> directory:	D:\MSSQL15.MSSQLSERVER\MSSQL\Data	
Server Configuration	Bac <u>k</u> up directory:	D:\MSSQL15.MSSQLSERVER\MSSQL\Backup	
Feature Configuration Rules			
Ready to Install			
Complete			
		< <u>B</u> ack	Next > Cancel

📸 Install a SQL Server Failover Clu	ster		-		×
Ready to Install					
Verify the SQL Server 2019 fea	tures to be installed.				
Install Failover Cluster Rules	Ready to install the SQL Server 2019 failover cluster	n.			
Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration Database Engine Configuration Feature Configuration Rules <b>Ready to Install</b> Installation Progress Complete	Summary     Edition: Developer     Action: InstallFailoverCluster (Product Update installed:         Already installed:         Windows PowerShell 3.0 or higher         To be installed from media:         Microsoft Visual C++ 2017 Redistrib     General Configuration     Features         Database Engine Services         SQL Server Replication         Full-Text and Semantic Extractions from Data Quality Services         Instance configuration         Instance ID: MSSQLSERVER         Instance IDs         Set the set to t	ate) utable for Search			*
	Configuration file path:	Mecol crowro			*
	C:\Program Files\Microsoft SQL Server\150\Setup E	Bootstrap\Log\20210406_15	3041\Configur	ationFile.in	i
<u> </u>					
		< <u>B</u> ack	<u>I</u> nstall	Cance	I
🖇 Install a SOL Server Failover Clus	ter	< <u>B</u> ack	<u>I</u> nstall	Cance	×
Complete	ter	< <u>B</u> ack	<u>I</u> nstall 	Cance	×
S Install a SQL Server Failover Clus <b>Complete</b> Your SQL Server 2019 failover	ter cluster installation is complete with product updates.	< <u>B</u> ack	<u>I</u> nstall	Cance	×
Install a SQL Server Failover Clust Complete Your SQL Server 2019 failover Install Failover Cluster Rules	ter cluster installation is complete with product updates. Information about the Setup operation or possible i	< <u>B</u> ack	<u>I</u> nstall	Cance	×
Install a SQL Server Failover Clus <b>Complete</b> Your SQL Server 2019 failover Install Failover Cluster Rules Feature Selection Feature Rules	ter cluster installation is complete with product updates. Information about the Setup operation or possible r Feature	< <u>B</u> ack	Install —	Cance	×
Install a SQL Server Failover Clust Complete Your SQL Server 2019 failover Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration	tter          cluster installation is complete with product updates.         Information about the Setup operation or possible reference         Feature         Data Quality Services         Full-Text and Semantic Extractions for Search         Database Engine Services         SQL Server Replication         SQL Browser         SQL Writer	ext steps:       Status       Succeeded	<u>I</u> nstall	Cance	
Install a SQL Server Failover Clust Complete Your SQL Server 2019 failover Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration Database Engine Configuration	ter cluster installation is complete with product updates. Information about the Setup operation or possible of Feature Data Quality Services Full-Text and Semantic Extractions for Search Database Engine Services SQL Server Replication SQL Browser SQL Browser SQL Writer	< <u>B</u> ack next steps: Status Succeeded Succeeded Succeeded Succeeded Succeeded Succeeded		Cance	
Install a SQL Server Failover Clust Complete Your SQL Server 2019 failover Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration Database Engine Configuration Feature Configuration Rules	tter cluster installation is complete with product updates. Information about the Setup operation or possible of Feature Data Quality Services Full-Text and Semantic Extractions for Search Database Engine Services SQL Server Replication SQL Browser SQL Browser Details: Details:	ext steps:       Status       Succeeded       Succeeded       Succeeded       Succeeded       Succeeded       Succeeded       Succeeded       Succeeded	<u>I</u> nstall	Cance	
Install a SQL Server Failover Clust Complete Your SQL Server 2019 failover Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete	tter  cluster installation is complete with product updates.  Information about the Setup operation or possible of  Feature  Data Quality Services  Solution  Solution  Solution  Details:  Install successful.	< <u>B</u> ack next steps: Status Succeeded Succeeded Succeeded Succeeded Succeeded Succeeded Succeeded Succeeded Succeeded	Install		
Install a SQL Server Failover Clust Complete Your SQL Server 2019 failover Install Failover Cluster Rules Feature Selection Feature Rules Instance Configuration Cluster Resource Group Cluster Disk Selection Cluster Network Configuration Server Configuration Database Engine Configuration Feature Configuration Rules Ready to Install Installation Progress Complete	tter cluster installation is complete with product updates. Information about the Setup operation or possible of Feature Data Quality Services Full-Text and Semantic Extractions for Search Database Engine Services SQL Server Replication SQL Browser Cetails: Details: Install successful. Summary log file has been saved to the following log C\Program Files\Microsoft SQL Server\150\Setup B \Summary SQL1 20210406 153041.txt	< <u>B</u> ack next steps: Status Succeeded	<u>i</u> nstall	Cance	

## Install the second node of the SQL Server FCI on SQL2

It is now time to install SQL Server on SQL2.

SQL Server Installation Center		- 0	×
Planning		New SQL Server stand-alone installation or add features to an existing installation	^
Installation	1	Launch a wizard to install SQL Server 2019 in a non-clustered environment or to add	
Maintenance		readies to an existing see server zors instance.	
Tools	E C	Install SQL Server Reporting Services	
Resources		Launch a download page that provides a link to install SQL Server Reporting Services. An internet connection is required to install SSRS.	
Advanced		Install SQL Server Management Tools	
Options	-X-1	Launch a download page that provides a link to install SQL Server Management Studio, SQL Server command-line utilities (SQLCMD and BCP), SQL Server PowerShell provider, SQL Server Profiler and Database Tuning Advisor. An internet connection is required to install these tools.	
	K	Install SQL Server Data Tools Launch a download page that provides a link to install SQL Server Data Tools (SSDT). SSDT provides Visual Studio integration including project system support for Microsoft Azure SQL Database, the SQL Server Database Engine, Reporting Services, Analysis Services and Integration Services. An internet connection is required to install SSDT.	
	1	New SQL Server failover cluster installation	
		Launch a wizard to install a single-node SQL Server 2019 failover cluster.	
	JUST	Add node to a SQL Server failover cluster	
	\$U <b>U</b>	Launch a wizard to add a node to an existing SQL Server 2019 failover cluster.	
	1	Upgrade from a previous version of SQL Server	
Microsoft SQL Server 2019		Launch a wizard to upgrade a previous version of SQL Server to SQL Server 2019. Click here to first view Upgrade Documentation	
		New Machine Learning Server (Standalone) installation	~

Tailover Cluster Node					-		×
Product Key Specify the edition of SQL Serv	ver 2019 to install.						
Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Add Node Rules Cluster Node Configuration Feature Rules Ready to Add Node Add Node Progress Complete	Validate this instance of SQL Server 2019 by enterior of authenticity or product packaging. You can also Evaluation, or Express. Evaluation has the largest s Books Online, and is activated with a 180-day expination, b development only. To upgrade from one installed of Specify a free edition: Developer	ng the 2 specify et of SQ ration. I ut is lice edition t	5-character key a free edition o L Server feature eveloper editionsed for non-p o another, run	y from the I of SQL Serve es, as docur on does not production the Edition	Microso er: Devo mented have a databa Upgra	oft certifica eloper, I in SQL Se an expiration se applicat de Wizard.	te n, on
			< <u>В</u> аск	<u>N</u> ext	>	Cance	1
Tailover Cluster Node					-		×
License Terms To install SQL Server 2019, you	u must accept the Microsoft Software License Terms.						
Product Key License Terms Global Rules Microsoft Update Product Updates Install Setup Files Add Node Rules Cluster Node Configuration Feature Rules Ready to Add Node Add Node Progress Complete	MICROSOFT SOFTWARE LICENSE TERMS MICROSOFT SQL SERVER 2019 DEVELOPER These license terms are an agreement betwee affiliates). They apply to the software named a updates (except to the extent such services or terms, in which case those different terms app Microsoft's rights relating to pre-updated soft THESE LICENSE TERMS, YOU HAVE THE RIG ACCEPT THESE TERMS. IF YOU DO NOT ACC IMPORTANT NOTICE: AUTOMATIC UPDATI this software is installed on servers or devices prior to SOL Server 2010 for components of a SQL Server transmits information about your install performance data, to Microsoft to help improve th privacy controls, and to turn off the collection of the documentation.	n you a bove a update ly pros tware o <b>HTS BE</b> <b>CEPT TI</b> <b>ES TO F</b> running nu of the nut lation ex- e produ- nis inform	nd Microsoft nd any Micros s are accomp pectively and r services). IF LOW. BY USI HEM, DO NO PREVIOUS VE g any support or support this soft	Corporations soft service anied by r do not alte YOU COI NG THE S T USE THI RSIONS O ted edition ware will a ell as other pre about d stallation, se	on (or es or s new or er you MPLY OFTW E SOFT E SOFT Is of SO utomation usage ata pro- se the	one of its oftware additiona r or WITH VARE, YOU WARE. SERVER. QL Server ticolly Copy and cessing an	lf Print d
			< Back	Next	>	Cance	1

Microsoft Undate					
merosore opuate					
Use Microsoft Update to che	ck for importar	nt updates			
Product Key License Terms Slobal Rules Microsoft Update Product Updates Install Setup Files Add Node Rules Cluster Node Configuration Feature Rules Ready to Add Node Add Node Progress Complete	Micro softwi the M Use <u>Micro</u>	osoft Update offers security and other important updates for Windo are, including SQL Server 2019. Updates are delivered using Autom licrosoft Update website. e <u>Mi</u> crosoft Update to check for updates (recommended) o <u>soft Update FAQ</u> o <u>soft Update Privacy Statement</u>	ows and other Mic natic Updates, or y	rosoft ou can v	isit
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia	of problems that	< Back	Next >	Cance	×
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue.	I problems that	< Back	Next >	Cance	×
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. Add Node Rules Suster Node Configuration	I problems that Operation	< Back t might occur while running Setup. Failures must be corrected before n completed. Passed: 19. Failed 0. Warning 1. Skipped 0.	Next >	Cance	×
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. dd Node Rules luster Node Configuration eature Rules	of problems that Operation	< Back t might occur while running Setup. Failures must be corrected before n completed. Passed: 19. Failed 0. Warning 1. Skipped 0.	Next >	Cance	×
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. Add Node Rules Cluster Node Configuration eature Rules leady to Add Node	of problems that Operation Hide det	< <u>Back</u> t might occur while running Setup. Failures must be corrected before n completed. Passed: 19. Failed 0. Warning 1. Skipped 0.	Next >	Cance	×
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Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. dd Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress omplete	I problems that Operation Hide det	< <u>Back</u> t might occur while running Setup. Failures must be corrected before a completed. Passed: 19. Failed 0. Warning 1. Skipped 0. tail <u>s</u> << iiled report	Next >	Cance	X
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. dd Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress pomplete	I problems that Operation Hide det View deta Result	Exact Sector Control of the sector of the	Next >	Cance	run *
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Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. Ad Node Rules Iuster Node Configuration eature Rules eady to Add Node dd Node Progress omplete	I problems that Operation Hide det View deta Result	Eack     Second	Next >	Cance	run
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. dd Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress omplete	I problems that Operation Hide det View deta Result	Eack     Second	Next >	Cance	run
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Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. Ad Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress omplete	I problems that Operation Hide det View deta Result A O O O O O O O O O O O O O O O O O O	Exact Section Secti	Next >	Cance	
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. dd Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress omplete	I problems that Operation Hide det View deta Result A C C C C C C C C C C C C C C C C C C	Exact Sector Se	Next >         Image: Setup         Status         Warning         Passed	Cance	
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. dd Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress omplete	I problems that Operation Hide det View deta Result	Exact     Exact     Exact     In completed. Passed: 19. Failed 0. Warning 1. Skipped 0.     Exact     Tails <<         iiled report     Rule     Microsoft Cluster Service (MSCS) cluster verification warnings     Remote registry service (SQL2)     Domain controller     Windows Firewall     DNS settings (SQL2)     WOW64 setup     SQL 2019 minimum CTP for Upgrade and Side by Side Support     Windows Management Instrumentation (WMI) service (SQL1)     Cluster Remote Access (SQL1)	Next >	Cance	run
Add a Failover Cluster Node Add Node Rules Setup rules identify potentia can continue. Add Node Rules luster Node Configuration eature Rules eady to Add Node dd Node Progress iomplete	I problems that Operation Hide det View deta Result A CO CO CO CO CO CO CO CO CO CO CO CO CO	Exact Section Coordinator (MSDTC) installed (SQL1)	Next >         Image: Setup         Status         Warning         Passed	Cance	

📸 Add a Failover Cluster Node							-		×
Cluster Node Configura Add a node to an existing SQL S	ation erver failover cluste	r.							
Add Node Rules <b>Cluster Node Configuration</b> Cluster Network Configuration Service Accounts Feature Rules Ready to Add Node Add Node Progress	<u>S</u> QL Server inst N <u>a</u> me of this n <u>D</u> isk Space Rec	tance name: iode: quirements:	MSS SQL2 Driv	iQLSERVER 2 re C: 1427 MB requir	red, 84556 MB avail	able			~
Complete	Instance Name MSSQLSERVER	Cluster Network Name SQLCLUSTE	R	Features SQLEngine, SQ	Nodes SQL1				
					< <u>B</u> ack	<u>N</u> ext >		Cancel	

 $\times$ 

### **Cluster Network Configuration**

Specify additional IP addresses that are available and valid on the current node and subnet (previously-configured SQL Server failover cluster IP addresses are shown read-only and dimmed).

Add Node Rules	5	Spec	cify the ne	etwork <u>s</u> et	ttings for this fail	over cluster:			
Cluster Node Co	onfiguration		IP Ty	DHCP	Address	Subnet Mask	Subnet(s)		Network
Cluster Networ	rk Configuration		IPv4		10.0.3.102	255.255.255.0	10.0.3.0/24		Cluster Network 1
Feature Rules	LS .		IPv4		10.0.2.102	255.255.255.0	10.0.2.0/24		Cluster Network 2
Ready to Add N Add Node Prog Complete	ode ress								
									<u>R</u> efresh
							< <u>B</u> ack	<u>N</u> ext >	Cancel
📸 Add a Failove	er Cluster Node								- 🗆 ×
Cluster N Specify add Server failo Add Node Rules	etwork Config ditional IP addresses ver cluster IP address	that ar ses are Spec	tion e availabl shown re	e and val ad-only a twork <u>s</u> et	id on the current and dimmed). tings for this faild	node and subnet (ş wer cluster:	previously-con	figured SQL	
Cluster Node Co	onfiguration		IP Ty	DHCP	Address	Subnet Mask	Subnet(s)		Network
Cluster Networ	rk Configuration		IPv4		10.0.3.102	255.255.255.0	10.0.3.0/24		Cluster Network 1
Service Account	Add a Failover Clur	ter No	de						uster Network 2
Ready to Add N Add Node Prog Complete	SQL Services failover t failover t connectio cluster co	er Setu depen o other luster. ons bec	p detected dency usin r nodes do This may come unav ation?	d that ther ig an OR ro bes not ha impact mu ailable. D	re are multiple sub elationship for SQ ippen until all the ulti-homed cluster o you want to pro	nets. Because of this L Server multi-subnet etwork cards fail on configurations on a ceed with SQL Server	s, Setup sets th failover cluste the node that c subnet when cli multi-subnet fa	e IP address ring, so owns the ent ailover	
		in gui							_
	Copy messag	je					<u>Y</u> es	<u>N</u> o	
	Copy messag	je	SQL Serve	r Setup d	etected that ther	e are multiple subne	<u>Y</u> es	<u>N</u> o this, Setup sets	Refresh the IP address re



X

#### 🐮 Add a Failover Cluster Node

### **Service Accounts**

Ready to Add Node
Varify the SOL Server 2019 featurer to be installed as part of the add order operation
verify the SQL Server 2019 reactives to be installed as part of the add hode operation.
Add Node Rules Ready to add this node to the SQL Server 2019 failover cluster:
Cluster Node Configuration
Cluster Network Configuration – Edition: Developer
Service Accounts Action: AddNode (Product Update)
Feature Rules Prerequisites
Ready to Add Node
Add Node Progress
Complete Microsoft Visual C++ 2017 Redistributable
General Configuration
reatures     Database Engine Services
Full-Text and Semantic Extractions for Search
Data Quality Services
Instance Configuration     Instance Name: MSSOI SERVER
Instance ID: MSSQLSERVER
- Instance IDs
Configuration file path:
Collegeneration Film Missegeth SOL Secure 150 Seture Repeteters VLee V 20210407, 0755270 Configuration Film ini
< <u>B</u> ack <u>I</u> nstall Cancel
🕈 Add a Failover Cluster Node — — — — — — — — — — — — — — — — — — —
Complete
Complete Your SQL Server 2019 failover cluster add node operation is complete with product updates.
Complete Your SQL Server 2019 failover cluster add node operation is complete with product updates.
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Feature       Status
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Public Point Configuration         Service Accounts         Feature Rules         Data Quality Services         Succeeded         Succeeded
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Sol Writer         Dataile
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Data Bervices         Succeeded         Sol Writer         Sol Writer
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         SQL Server Replication         SQL Server Replication         SQL Server Replication         SQL Server Replication         SQL Browser         SQL Browser         SQL Moritar         Details:         Install successful.
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Data Quality Services         Succeeded         SQL Server Replication         Succeeded         SQL Browser         Succeeded         SQL Browser         Succeeded         Sourceeded         Quality Services         Succeeded         SQL Browser         Succeeded         Sourceeded         Sourceeded         Sourceeded         Sourceeded
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Data Quality Services         SQL Server Replication         Succeeded         SQL Server Replication         SQL Browser         SQL Browser         SQL Browser         Succeeded         Details:         Install successful.
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Data Quality Services         Succeeded         SQL Server Replication         Succeeded         SQL Browser         Succeeded         Complete
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Sol, Browser         Sol, Writer         Qetails:         Instal successful.
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Details:         Install successful.         Install successful.         Summary log file has been saved to the following location:
Complete         Your SQL. Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Nules         Ready to Add Node         Add Node Progress         Complete         Soll_Mriter         Details:         Install successful.         Install successful.         Summary log file has been saved to the following location:         C/Program Files/Microsoft SQL Server/150/Setup Bootstrap/Log/20210407 075537
Complete         Your SQL. Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         Feature Rules         Ready to Add Node         Add Node Progress         Complete         Data Quality Services         Succeeded         SQL Server Replication         Succeeded         SQL Browser         Succeeded         SQL Browser         Succeeded         Summary log file has been saved to the following location:         C\Program Files\Microsoft SQL Server\150\Se
Complete         Your SQL Server 2019 failover cluster add node operation is complete with product updates.         Add Node Rules         Cluster Node Configuration         Cluster Network Configuration         Service Accounts         reature Rules         Ready to Add Node         Add Node Progress         Complete         Details:         Information about the Setup operation or possible next steps:         Complete         Solut Quality Services         Succeeded         Solut Solution         Solut Writer         Solut Writer         Solut Solution         Solut Solution         Solut Solution         Solut Solution         Solut Writer         Succeeded         Solut Writer         Solut Solution         Solut Solution         Solut Writer         Summary log file has been saved
Once you have installed SQL Server on both cluster nodes, Failover Cluster Manager should look like this.

🗟 Failover Cluster Manager							
File Action View Help							
(= =) (2) 📰 🚺							
Failover Cluster Manager	Roles (1)						
✓ 1 cluster1.datakeeper.local	Search	Queries ▼ ↓↓	<b>v</b> 🔍				
Roles							
Nodes	Name	Status	Туре	Owner Node	Pri		
Storage     Networks     Outers Sugger	SQL Server (MSSQLSE	(*) Running	Other	SQL1	Me		
Cluster Events	<				>		
	SQL Server (MSSQLSERVER)			Preferred Owners: Any node			
	Name	Status	Inform				
	Storage						
	📇 DataKeeper Volume D			Online			
	Server Name						
	🖃 🍕 Name: sqlcluster	() Online					
	IP Address: 10.0	Online					
	IP Address: 10.0.3.102			Offline			
	Other Resources						
	E SQL Server	() Online					
	🚑 SQL Server Agent			( Online			
	Roles						
	SQL Server CEIP (MSSQLSERVER)			() Online			
	<				>		
	Summary Resources						
Roles: SOL Server (MSSOLSERVER)							

### **Install SQL Server Management Studio**

On SQL Server Versions 2016 and later, you must download and install SSMS as a separate option as shown below. Note: In earlier versions of SQL Server, SQL Server Management Studio (SSMS) was an option that you could choose to install during the SQL installation.

to SQL Server Installation Center		– 🗆 ×
Planning Installation Maintenance	ŧ	New SQL Server stand-alone installation or add features to an existing installation Launch a wizard to install SQL Server 2019 in a non-clustered environment or to add features to an existing SQL Server 2019 instance.
Tools Resources		Install SQL Server Reporting Services Launch a download page that provides a link to install SQL Server Reporting Services. An internet connection is required to install SSRS.
Advanced Options		Install SQL Server Management Tools Launch a download page that provides a link to install SQL Server Management Studio, SQL Server command-line utilities (SQLCMD and BCP), SQL Server PowerShell provider, SQL Server Profiler and Database Tuning Advisor. An internet connection is required to install these tools.
	K	Install SQL Server Data Tools Launch a download page that provides a link to install SQL Server Data Tools (SSDT). SSDT provides Visual Studio integration including project system support for Microsoft Azure SQL Database, the SQL Server Database Engine, Reporting Services, Analysis Services and Integration Services. An internet connection is required to install SSDT.
	ŧ	New SQL Server failover cluster installation Launch a wizard to install a single-node SQL Server 2019 failover cluster.
	şî	Add node to a SQL Server failover cluster Launch a wizard to add a node to an existing SQL Server 2019 failover cluster.
	1	Upgrade from a previous version of SQL Server Launch a wizard to upgrade a previous version of SQL Server to SQL Server 2019. Click here to first view Upgrade Documentation
	ŧ	New Machine Learning Server (Standalone) installation Launch a wizard to install Machine Learning Server (Standalone) on a Windows machine. This is typically used by data scientists as a standalone analysis server or as a SQL Server Machine Learning Services client.
Microsoft SQL Server 2019		



Microsoft SQL Server Management Studio with Azure Data Studio

# Welcome. Click "Install" to begin.

**RELEASE 18.8** 

Location:	
C:\Program Files (x86)\Microsoft SQL Server Management Studio 18	C <u>h</u> ange
By clicking the "Install" button, I acknowledge that I accept the <u>Privacy Sta</u> the License Terms for <u>SQL Server Management Studio</u> and <u>Azure Data Stu</u>	atement and Idio
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**RELEASE 18.8** 

Microsoft SQL Server Management Studio with Azure Data Studio

## Restart required in order to complete setup.

All specified components have been installed successfully.

The computer needs to be restarted before setup can continue.

Restart	<u>C</u> lose

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Once SSMS installs, connect to the cluster via the client access point. Your SQL Server FCI should look like this.



#### **Multi-Subnet Considerations**

One of the biggest considerations for running a SQL Server FCI in OCI is the fact that the cluster nodes reside in different subnets. Microsoft started to account for the fact that cluster nodes might reside in different subnets by adding the "OR" functionality in Windows Server 2008 R2 as described in the Microsoft documentation.



The important thing described in the documentation is the concept of the RegisterAllProvidersIP on the network name resource, which is enabled by default when you create a SQL Server FCI. As described, when this is enabled, two A records will be registered in DNS with the network name resource, one for each IP address.

Using the "OR" functionality, only the IP address associated with the active subnet will ever be online and the other one will be shown as offline. If your client supports adding multisubnetfailover=true to the connection string, then both IP addresses will be tried at the same time and the client will automatically connect to the active node. That is the easiest, and the default method of client redirection in a multi-subnet cluster.

The documentation goes on to say that if your client does NOT support the multisubnetfailover=true functionality, that you should "try to adjust the connection timeout in the client connection string by 21 seconds for each additional IP address. This ensures that the client's reconnection attempt does not timeout before it is able to cycle through all IP addresses in your multi-subnet FCI."

Disabling RegisterAllProvidersIP is another option that will work. By disabling the RegisterAllProvidersIP you will only have a single A record in DNS. The DNS A record will be updated each time the cluster fails over with the active cluster IP address associated with the name resource.

The downside of this scenario configuration is that your clients will cache the old IP address until

the time to live (TTL) expires. To minimize the delay in reconnection, it is recommended that you change the TTL on the name resource. This process is described here and an example is shown below that sets the TTL to 5 minutes

```
Get-ClusterResource -Name sqlcluster | Set-ClusterParameter
-Name HostRecordTTL -Value 300
```

Keep in mind that it also may take some time for the changes to your AD-integrated DNS server to propagate across your entire forest.

### **Summary**

This technical guide provides a comprehensive overview of setting up a SQL Server 2019 Failover Cluster Instance (FCI) in Oracle Cloud Infrastructure (OCI). It begins by highlighting the importance of understanding OCI's availability SLAs, which differ based on deployment strategies: 99.99% for deployments across Availability Domains, 99.95% across Fault Domains, and 99.9% for single VM deployments. The guide emphasizes that the SLA covers VM availability, not the applications or services running on it, thus necessitating additional measures for application availability.

The guide details the initial steps of creating a Virtual Cloud Network (VCN) and subnets in OCI, emphasizing the need for a network plan that accommodates at least three Availability Domains for clustering purposes. Each Availability Domain must be in a different subnet, a requirement applicable to clusters spanning Fault Domains as well. It provides specific configurations for setting up three subnets across different Availability Domains within a single VCN.

Further, the guide describes the process of creating an internet gateway and editing default security lists and route tables to facilitate access and security across Availability Domains. It also covers the configuration of DHCP options for Active Directory compatibility and outlines the steps for provisioning VMs with Windows Server 2022 and SQL Server 2019, emphasizing the importance of planning server names, IP addresses, and availability zone placements.

The guide then delves into adding additional volumes for SQL Server FCI storage needs, detailing the process of creating and attaching block volumes to instances. It also instructs on configuring secondary IP addresses for Windows Server Failover Clustering in OCI.

Next, the guide addresses domain controller setup, including enabling Active Directory Domain Services and promoting the server to a domain controller. It walks through the preparation of storage and enabling of the Failover Clustering feature on SQL1 and SQL2, along with cluster validation and creation processes.

The guide further discusses adding a File Share Witness to maintain cluster quorum and installing DataKeeper Cluster Edition for volume replication. It provides a step-by-step approach to installing SQL Server on the cluster nodes and SQL Server Management Studio, along with considerations for multi-subnet deployments.

In summary, this guide offers a detailed blueprint for deploying and configuring a SQL Server 2019 FCI in OCI, covering aspects from network setup and VM provisioning to clustering, storage configuration, and domain control setup, ensuring maximum uptime and reliability for business-critical applications.



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