

IBM Storage Fusion HCI System Metro Sync Disaster Recovery Use Case









IBM Redbooks

IBM Storage Fusion HCI System: Metro Sync Disaster Recovery Use Case

June 2023

Note: Before using this information and the product it supports, read the information in "Notices" on page v.

First Edition (June 2023)

This edition applies to Version 2, Release 4, Modification 0 of IBM Spectrum Fusion HCI.

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Contents

Notices	/ i
Preface vi Authors. vi Now you can become a published author, too! vii Comments welcome. vii Stay connected to IBM Redbooks i>	i i K
Chapter 1. Metro sync disaster recovery deployment models 1 1.1 Introduction 2 1.2 Deployment Models 2 1.2.1 Deployment Type #1 3 1.2.2 Deployment Type #2 4	2331
Chapter 2. IBM Spectrum Fusion HCI Metro sync disaster recovery installation. 5 2.1 Installation. 6 2.1.1 Pre-requisites 6 2.1.2 Site1 installation for Deployment type #1 6 2.1.3 Site1 installation for Deployment type #2 6 2.1.4 Site2 Installation 15 2.1.5 Tiebreaker installation 23	5 3 5 5 5 5 5
Chapter 3. Application failover and failback. 35 3.1 Application Failover/Failback between local site and remote site. 36 3.1.1 Pre-requisites for application failover/failback. 36 3.1.2 Setting up applications for disaster recovery. 37 3.1.3 Failover. 43 3.1.4 Failback. 49	5 5 7 3 9
Related publications 55 IBM Redbooks 55 Online resources 55 Help from IBM 55	5555

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Preface

Metro sync disaster recovery (DR) provides two-way synchronous data replication between IBM Spectrum Fusion[™] HCI clusters installed at two sites. In the event of a site disaster, applications can be failed over to the second site. The replication between the sites is synchronous, hence, the Metro sync DR solution is only available for metropolitan distance data centers with 40 millisecond latency or less.

Note: The procedures described in this paper for IBM Spectrum Fusion HCI 2.4 Metro sync DR are the same for IBM Storage Fusion HCI 2.5.2 Metro-DR.

This IBM Redpaper publication will help you install and configure the new Metro sync DR function). The use case will show the end to end process with the failover and failback of the WordPress application.

Note: IBM Spectrum Fusion HCI and IBM Spectrum Fusion have become IBM Storage Fusion HCI System and IBM Storage Fusion. This edition uses the IBM Spectrum® brand names and will be updated with the next edition. See Evolving the IBM Storage Portfolio Brand Identity and Strategy to learn more about how IBM Storage Fusion HCI System and IBM Storage Fusion are key to the IBM Storage Portfolio.

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1

Metro sync disaster recovery deployment models

IBM Spectrum Fusion HCI provides a feature, Metro sync DR, to achieve a highly available storage infrastructure. This chapter describes the Metro sync DR use case for disaster recovery.

1.1 Introduction

Metro sync DR (Disaster Recovery) provides two-way synchronous data replication between IBM Spectrum Fusion HCI clusters installed at two sites. In the event of a site disaster, applications can be failed over to the second site. The replication between the sites is synchronous, hence, the Metro sync DR solution is only available for metropolitan distance data centers with 40 millisecond latency or less.

The Metro sync DR architecture consists of the following components as shown in Figure 1-1.

- 1. Home Site This is the first site in the Metro sync DR configuration, also referred to by Local site or Home Site or Site1 in this guide.
- 2. Remote Site This is the second site in the Metro sync DR configuration, also referred to as Remote Site or Site2 in this guide.



3. Tiebreaker

Figure 1-1 Metro sync DR configuration

IBM Spectrum Fusion HCI is based on IBM Spectrum Scale and uses its "stretch cluster" feature to provide a unique active-active resiliency across data centers that are up to 150km distant. This is achieved via spanning an IBM Spectrum Scale file system across two IBM Spectrum Fusion and Red Hat OpenShift Container Platform (OCP) clusters and synchronously replicating the data between both availability zones as shown in Figure 1-2 on page 3. The goal is to allow for an IBM Spectrum Fusion to synchronously replicate data to another nearby IBM Spectrum Fusion, each with their own OpenShift clusters.



Figure 1-2 Metro sync DR component architecture

1.2 Deployment Models

There are two deployment models for Metro sync DR configuration.

1.2.1 Deployment Type #1

As a client, you buy a single IBM Spectrum Fusion appliance. Later, as the business requirements increase, you need another IBM Spectrum Fusion appliance as well if you want to achieve disaster recovery. In this case as shown in Figure 1-3, you convert the first appliance into Site1 (Refer to 2.1.2, "Site1 installation for Deployment type #1" on page 6 for the steps) and then continue with installation of the second appliance as Site2.



Figure 1-3 Deployment model Type #1 for setting up disaster recovery

1.2.2 Deployment Type #2

As a client, based on business requirements, you plan to have disaster recovery. In this case, you would have to purchase two IBM Spectrum Fusion appliances, see Figure 1-4. The installation of the two appliances will be done in sequence. During IBM Spectrum Fusion appliance setup, on the Disaster Recovery step, ensure to select the appropriate options. For the first rack install, select Site1 and for the second appliance install, select Site2. Refer to 2.1, "Installation" on page 6.



Figure 1-4 Deployment model Type #2 for setting up disaster recovery

2

IBM Spectrum Fusion HCI Metro sync disaster recovery installation

IBM Spectrum Fusion HCI provides a feature, Metro sync DR, to achieve a highly available storage infrastructure. This chapter describes the Metro sync DR installation steps based on the selected deployment model.

2.1 Installation

This section will guide you through the installation of the IBM Spectrum Fusion appliances in a Metro sync DR configuration. It will also guide to install the Tiebreaker and configure it.

2.1.1 Pre-requisites

Before you begin installation, you need to ensure that the IBM Spectrum Fusion HCI appliance is setup in datacenter as per guidance from IBM. Refer to the following links in IBM Documentation to setup the appliance:

1. Instructions to setup the appliance in Data Center

https://www.ibm.com/docs/en/spectrum-fusion/2.4?topic=hci-planning-prerequisite
s

2. Instructions to setup network and connectivity between Metro sync DR clusters

```
https://www.ibm.com/docs/en/spectrum-fusion/2.4?topic=recovery-general-metro-sy
nc-dr-prerequisites
```

2.1.2 Site1 installation for Deployment type #1

If you have considered Deployment type #1 from 1.2.1, "Deployment Type #1" on page 3, you would need to convert the configuration from standalone to Site1. Use the following steps to complete the Site1 configuration:

- 1. Log in to OpenShift Container Platform web console of Standalone site.
- 2. Go to ibm-spectrum-fusion-ns namespace.
- 3. Go to Workload → Secret, then, search and open secret: userconfig-secret.
- 4. Change the value of metrodrsite to Site1 i.e. "metrodrsite": "site1" as shown in Figure 2-1 and save.



Figure 2-1 Update metrodrsite variable to Site1

The Disaster recovery section in the **Dashboard** page is enabled and the **Disaster recovery** page is available in the menu.

2.1.3 Site1 installation for Deployment type #2

If you have considered deployment type #2 from 1.2.2, "Deployment Type #2" on page 4, follow these steps to start the Site1 install.

Network configuration

Follow these steps to set up the network configuration:

- 1. Enter the details of the Network configuration as show in Figure 2-2 on page 7.
- 2. Click on Validate Network button.

Spectrum Fusion Install	
Switch type	
elect the type of switches that will be used to provide access to the client's network.	
Fusion switches Client switches Rack units 20 and 21	
Network settings	
This information will provide access to the client's network.	
AG ID	Link name
166	rackae4iink
DpenShift VLAN ID	OpenShift VLAN name
921	vlan921
Storage VLAN ID	
3201	
Porte	Port type
▲ > port selected ~	Trunk ~
Native VLAN ID	
1	
ITP server addreas	Transceiver
9.42.106.2	40 GbE QSFP Fiber/DAC/AOC ~
Advanced(optional)	
Link Aggregation Control Protocol (LACP)	
Spanning Tree Protocol (STP)	
Validate network	

Figure 2-2 Network Configuration

The Network configuration provisions Node IP, configures DHCP, and NTP as shown in Figure 2-3, Figure 2-4, and Figure 2-5 on page 8.

IBM Spectrum Fusion Install		0
Network validation When the process completes, verify that each mac address has been assigned a hostname and IP address.		
Provisioning node IP (016)	Collect logs 速	~
Verw meet strage		

Figure 2-3 Network configuration - Provisioning node IP

IBM Spectrum Fusion Install		0
Network validation		
When the process completes, verify that each mac address has been assigned a hostname and IP address.		
C DHCP configuration (40%)	Collect logs 🛓	~
View meet steps		

Figure 2-4 Network configuration - DHCP configuration

IBM Spectrum Fusion Install	0
Network validation When the process completes, wrify that each mac address has been assigned a hostname and IP address.	
NTP configuration (70%)	Collect logs 坐 🗸 🗸
View next stops	

Figure 2-5 Network configuration - NTP configuration

3. The network configuration is completed successfully as shown in Figure 2-6.

18M Spectrum Fusion Instal	0
Network validation When the process completes, verify that each mac address has been assigned a hostname and JP address.	
Connection complete!	Collect logs 👱 🗸 🗸
Vervinand Steps	

Figure 2-6 Network configuration - Successful completion

4. Click the **View next steps** button. This page will continue with the installation as shown in Figure 2-7.

IBM Spectrum Fusion Install	0
	Next steps1 The client needs this URL to continue the install. 172.20.102.30:3000/isfsetup

Figure 2-7 Next Steps

IBM Spectrum Fusion installer

The following steps describe the installation process for IBM Spectrum Fusion:

1. To proceed further with IBM Spectrum Fusion install, use the URL as shown in Figure 2-7 for your system.

2. You are presented with a **License agreement** page. Read the License agreement and Privacy policy. Then, accept the license and click on **Continue** button as shown in Figure 2-8.

18H Spectrum Foolen Instal	0
License agreement	
Before installing IBM Spectrum Fusion, please read the following license agreement carefully.	
Read our loonte agreement 18M Princy policy	
I accept the license agreement	
Continue	

Figure 2-8 License agreement

3. The **Getting Started** page displays the procedure for Install process as shown in Figure 2-9.

IBM Spectrum Fusion Install			
Getting started	Getting started		
O Network precheck	Welcome to IBM Spectrum Fusion installation. There are two phases in this install process, but before we begin let's get over a few things that will help you along the way.		
C Image registry	1. Fusion software installation (120 min) In the first install phase, we will download Spectrum Fusion images and create a three node Openshift Container Platform cluster.		
O Disaster recovery	2. Cluster expansion (60 min)		
Global data platform	In the second phase, the cluster will be expanded to include all nodes, and the global data platform service will be initialized.		
O Network customization			
O Custom certificate			
upper la			
			_
		Back	Next

Figure 2-9 Install procedure

4. The **Network precheck** page displays all the nodes of the appliance along with the other details like MAC address, status, location, hostname, and IP address as shown in Figure 2-10.

IBM Spectrum Fusion Install					0
 Getting started Network precheck 	Network prechec Verify nodes are online and prop If changes to your node settings a	k erty configured. rre needed, contact your network team.	earn more		
Image registry	Nodes				
O Disaster recovery	Q. Search				Restart precheck C
Global data platform	MAC address	Status	Location	Hostname	IP address
O Network customization	08:c0:eb:ff:38:46	Connected	RUS	compute-0.rackae2.mydomain.com	172.20.102.28
Custom certificate	08:c0:eb:ff:37:de	Connected	RU6	compute-1.rackae2.mydomain.com	172.20.102.29
Optional	08:c0:eb:ff:34:f2	Connected	RU7	compute-2.rackae2.mydomain.com	172.20.102.30
	b8:ce:f6:74:f1:2e	Connected	RUS	compute-3.rackae2.mydomain.com	172.20.102.31
	b8:ce:f6:74;f1:26	Connected	RU9	compute-4.rackae2.mydomain.com	172.20.102.32
	b8:ce:16:47:26:42	Connected	RU10	compute-5.rackae2.mydomain.com	172.20.102.33
	b8:ce:f6:47:28:fe	Connected	RU11	compute-6.rackae2.mydomain.com	172.20.102.34
	b8:ce:f6:47:27:96	Connected	RU12	compute-7.rackae2.mydomain.com	172.20.102.35
	b8:ce:16:47:27:06	Connected	RU13	compute-8.rackae2.mydomain.com	172.20.102.36
	08:r0:eh:ff:36:fa	Connected	R112	control-0 rackaa2 midomain com	172 20 102 25
					Back Next

Figure 2-10 Network precheck

5. Select the image registry as per your requirements as shown in Figure 2-11. enter the details and click **Next.**

 Gindig darkal Gindig darkal	IBM Spectrum Fusion Install		Ø
• Inversion Important and the docube docube data manages from angle (top data manages). User more docubes and the docube docube data manages from angle. User more docubes and the docube docube data manages. User more docubes and the docube docube docubes docubes and the docubes doc	Getting started	Image registry	Í
Image registry Public inage registry Image registry Public inage registry <td>Network precheck</td> <td>The system needs to download software images from a registry to install OpenShift and IBM Spectrum Fusion software. Select the registry that will be used to install the required software images. Learn more</td> <td></td>	Network precheck	The system needs to download software images from a registry to install OpenShift and IBM Spectrum Fusion software. Select the registry that will be used to install the required software images. Learn more	
Data ter recordy Charles ter recordy <td>Image registry</td> <td>Public image registry</td> <td></td>	Image registry	Public image registry	
Cabbal data platform Bigle regostrory Option contribute <	C Disaster recovery	Connect to public image repositories. Requires Connect to a private image repository. Required access to your organization' OpenShit publi socret and IEM entitlement key, installation.	
Network cutorization OpenShift mage reposition OpenShift mage reposition PenShift mage reposition OpenShift mage reposition Demonstrate OpenShift mage reposition Demonstrate OpenShift mage reposition Demonstrate Demonstrate Demonstrate OpenShift mage reposition Demonstrate Demonstrate Demonstrate OpenShift mage reposition Demonstrate Diff perform Fusion mages reposition Demonstrate Diff perform Statemark Demonstrate Deposition Demonstrate	Global data platform	Registry configuration	
Custom certificate Openanditi Openanditi Openanditi Sectors certificate Openanditi Openanditi Sectors certificate Openanditi Sectors certificate Openanditi Sectors certificate Openanditi	O Network customization		
Uterases pardire@in.dm.com Aft lery / Pessend IBM Spectrum Fusion images repository Repository self. https://tyc-abell-devoge-team-teat-offline-docker-local.antifactory.awg-devoge.com<43/thci-truit/isf_operator Bock Net	Custom certificate Optional	OpenShift Images repository Repository set yc-abeli-devops-team-prod-test-offline-docker-local.antifactory.swg-devops.com:643/hci-2.3.0/prod_build_oc	
spontariangenetications API lary / Passand IBM Spectrum Fusion images repository Repository cath https://tyc-abali-decopt-team-test-offline-docker-local.attifactory.sag-deviop.com/43./toc-truits/is_portator Back Next		Username	
IBM Spectrum Fusion Images repository Repository path https://hys-abell-devops-team-test-offline-docker-local.artifactory.sorg-devops.com/43/hci-truit/ral_operator		spectra region.com.com A71 kery / Password	
Repeating yeah https://hyc-abell-devops-team-test-offline-docker-local.artifactory.swg.devops.com/43/hci-truist/ral_operator Back Next		1BH Spectrum Fusion images repository	
https://ty-keie-devopr-team-tear-donae-docker-tockLantactory.awg-devopLcom-s44.3/to-truiti/at_opirator Back Next		Repository path	
Back Heat		nttps://nyc-abe#-devops-team-test-ontine-docker-iocal-artinactory.swg-devops.com/34-3/htt=frust/ist_operator	
			Back

Figure 2-11 Image registry

6. In the **Disaster recovery** page as shown in Figure 2-12 on page 11, select the 2nd tile which is the first site of the Disaster Recovery pair.

Click Next to continue.

IBM Spectrum Fusion Install					0
Getting started	Disaster recovery				
Network precheck	A disaster recovery configuration provides synchronous or by connecting the storage networks used by the clusters.	data replication between two Spectrum Fusion HCI clusters . Learn more			
 Image registry 	How do you intend to use this cluster?				
Disaster recovery Global data platform Network customization					
Custom certificate Optional	A standaione cluster (you can make this the first site in a disaster recovery pair later)	This is the first site being set up for a disaster recovery pair.	The is the second site being set up in a deaster recovery pair. The first site has already been fully configured.		
				Back	

Figure 2-12 Disaster Recovery

7. On the **Global data platform** page as shown in Figure 2-13, select the appropriate building block. Click **Next**.

IBM Spectrum Fusion Install				0
Getting started	Global data platform			
Network precheck	IBM Spectrum Fusion HCI is composed of multi-node buil capacity or resiliency of your storage configuration. Select	ding blocks. The number of building blocks determines the the configuration best fits your organization's storage and		
 Image registry 	data protection needs. Learn more			
O Disaster recovery	•			
Global data platform				
O Network customization				
O Custom certificate	Stronger data resiliency	Better storage efficiency		
Optional	 Two building blocks (4+2p) that can withstand the simultaneous failure of two nodes Maximize the risk of data loss due to hardware failures 	 One building block (8+3p) that can withstand the simultaneous failure of three nodes Maximize the amount of usable storage at the expense of resiliency 		
	Storage efficiency Usable capacity	Storage efficiency Usable capacity		
	67 % Отів	73 % Отів		
	(Above values are estimates.)	(Above values are estimates.)		
	Hide advanced 🔺			
	Because OpenShift clusters typically run a mix of workloa that you use the default 4 MiB block size, which is optimiz deployed to the Openshift cluster are specifically workloa	ds with different I/O characteristics, it is recommended ed for mixed workloads. If the applications that will be ds that drive large or small IOs, you can customize the		
			Back	

Figure 2-13 Global data platform

8. On the **Network customization** page as shown in Figure 2-14, enter the details of the OpenShift network and storage network.

IBM Spectrum Fusion Install				
Getting started	Network customization			
 Network precheck 	OpenShift network			
 Image registry 	The RedHat OpenShift cluster will use this net	vork configuration. This pre-populated configuration can be changed		
 Disaster recovery 	10.0.0/12	23		
 Global data platform 	Service network CIDR			
	10.21.0.0/16			
Network customization				
Custom certificate Optional	Storage network IBM Spectrum Fusion will use this network cor configuration can be changed.	figuration as its internal storage network. This pre-populated		
	CIDR address			
	192.168.192.0/18			
	Gateway address			
	192.168.192.1			
	IP address range			
	192.168.192.11	- 192.168.255.254		
			Back	

Figure 2-14 Network customization

9. On the **Custom certificate** page as shown in Figure 2-15, provide the details of your organization certificate, if any.

Click Finish to start the installation.

3M Spectrum Fusion Install	
Getting started	Custom certificate
Network precheck	OpenShit will be configured with a self-signed certificate by default. It is recommended that you upload a certificate provided by a Certificate Authority. Learn more
 Image registry 	Certificate upload method
 Disaster recovery 	An a species of the support of the type is crit.
Global data platform	apps.rackae2.mydomain.com.crt x
Network customization	Private kay (PEM format, unencrypted)
Custom certificate Optional	MILE-QIRIANREgenviceSoreBADEFAASCIRk-wegSigleEAAAIRACCe2Q20(D)P4IIp Ag20042/TMS688huUAISAIAKAISUbuleeHitTSBateREVEGEFUNKhe 6-wi782IRINX56sM0nxg3LatHy97mFCW0+fmgLXQ3eTRBAKeOde6YAPa+23 Mite-onten-dol.econX-ubh-do-ubb-dol.exten-tensor-t-en-d
	Back Finish

Figure 2-15 Custom certificate

10.Once the Install completes, the message is displayed as shown in Figure 2-16 on page 13.

Note: Ensure to download the OpenShift Password and CoreOS Key and/or copy the credentials from the page.

11. Once the OpenShift credentials are downloaded, confirm by clicking on the checkbox.

12.Now, click on the IBM Spectrum Fusion button to proceed with the install.

Initializing OpenShift			
Configuring a three node Red Hat OpenShift cluster.			
 IBM Spectrum Fusion installation completed (100%) 		Collect logs 🛓 🗸 🗸	
OpenShift Credentials			
To complete this installation, use your Red Hat OpenShift credentials to lo	into IBM Spectrum Fusion, via Single sign-on (SSO).		
1. Download			
Download your Red Hat OpenShift Password and CoreOS Key 🛓			
I have downloaded the OpenShift Password and CoreOS Key			0
2. Launch			
The final Spectrum Fusion software install phase is almost complete, and y mentioned above, Fusion and OCP can be logged into using the credentials	iou can monitor its progress when you log into fusion. As (SSO).		
Username			
kubeadmin	6		
Password			
wiabK-b2nkz-nBYfv-oGwKx	6	2	

Figure 2-16 Initializing OpenShift

OpenShift configuration and Global data platform installation

This section describes the steps for the OpenShift configuration and Global data platform installation:

1. Wait for the OpenShift configuration and global data platform installation to complete successfully as shown in Figure 2-17.



Figure 2-17 Final installation process of IBM Spectrum Fusion

2. Click on the **Launch Fusion** button in Figure 2-17 to go to the IBM Spectrum Fusion **Quick start** page.

3. Now, we are ready to use IBM Spectrum Fusion as shown in Figure 2-18.



Figure 2-18 IBM Spectrum Fusion Quick start page

Disaster Recovery

On IBM Spectrum Fusion, in the left pane menu, click on **Disaster recovery** option. The **Disaster recovery** page is shown in Figure 2-19.

×	IBM Spectrum Fusion	rackag3	ଡ ନ	¢,	
Quick	: start	See Disaster recovery is in a critical state	recovery sta	atus for de	etails
Event					
Appli	cations	Disaster recovery	Actions		~
Backu	qu	Synchronous replication between two sites,	·		
Disas	ter recovery				
Cloud	Satellite	Step 2 of 2			
Infras	structure	Connect the tiebreaker			
Servi	ces	Read the documentation on Setting u	up the tiebre	aker to	
Settin	ngs	learn more about the requirements a the virtual machine	ind how to co	onfigure	
		Tiebreaker IP address			
		apps.rackag2 apps.rackag3			
		Tiebreaker user ID			
		Enter user ID			
		Tiebreaker Tiebreaker password			
		Enter password		٢	
		Connect			

Figure 2-19 Disaster recovery option

2.1.4 Site2 Installation

This section describes the steps to install Site2, irrespective of whatever deployment type is chosen from 1.2, "Deployment Models" on page 3.

Network configuration

- 1. Enter the details of the Network configuration as show in Figure 2-20.
- 2. Click on the Validate Network button.

IBM Spectrum Fusion Install		
Switch type		
Select the type of switches that will be used to provide access to the client's network.		
Fusion switches Client switches Sack unts 20 and 21		
Network settings		
This information will provide access to the client's network.		
LAG ID	Link name	
166	rackae4link	
OpenShift VLAN ID	OpenShift VLAN name	
921	vian921	
Storage VLAN ID		
3201		
R-st-	Barthian	
1 × port selected ~	Trunk 🗸	
Native VLAN ID		
NTP server address	Transceiver	
9.42.106.2	40 GbE QSFP Fiber/DAC/ADC ~	
AdvanceSoptional) Link Aggregation Control Protocol (LACP) Saminit The Protocol (CACP)		
Validate network		

Figure 2-20 Network configuration

The Network configuration provisions Node IP, configures DHCP, and NTP as shown in Figure 2-21, Figure 2-22 on page 16, and Figure 2-23 on page 16.

IE	BM Spectrum Fusion Install			?
	Network validation When the process completes, verify that each mac address has been assigned a hostname and IP address.			
	Provisioning node IP (0%)	Collect logs	Ł v	
	View next stops			

Figure 2-21 Network configuration - Provisioning node IP

IBM Spectrum Fusion Install		0
Network validation When the process completes, verify that each mac address has been assigned a hostname and IP address.		
C DHCP configuration (40%)	Collect logs 🛓	~
Verse rosist atraps		

Figure 2-22 Network configuration - DHCP configuration

18M Spectrum Fusion Install		Ø
Network validation When the process completes, verify that each mac address has been assigned a hostname and IP address.		
NTP configuration (70%)	Collect logs 🛓	~
Ven net steps		

Figure 2-23 Network configuration - NTP configuration

3. The network configuration has completed successfully as shown in Figure 2-24.

IBM Spectrum Fusion Install	0
Network validation When the process completes, verify that each mac address has been assigned a hostname and IP address.	
Connection complete!	Collect logs 👱 🗸 🗸
Verw next steps	

Figure 2-24 Network configuration - Successful completion

4. Click the **View next steps** button. This page will further guide to proceed with installation as shown in Figure 2-25.



Figure 2-25 Next Steps

IBM Spectrum Fusion installer

The following steps describe the installation process for IBM Spectrum Fusion:

- 1. To proceed with IBM Spectrum Fusion install, use the URL as shown in Figure 2-25 on page 16 for your system.
- 2. You are presented with a **License agreement** page. Read the License agreement and Privacy policy. Then, accept the license and click the **Continue** button as shown in Figure 2-26.

License agreement Before installing TBM Spectrum Fusion, please read the following license agreement carefully. Read our License agreement IBM Privacy policy Cartonal
License agreement Before installing TBM Spectrum Fusion, please read the following license agreement carefully. Read our License agreement IBM Privacy policy Cationue
Before installing IBM Spectrum Fusion, please read the following license agreement carefully. Read our license agreement IBM Provide policy Continue Continue
Read our license agreement ISM Privacy policy Continue Continue
I accept the license agreement Continue
Castonue

Figure 2-26 License agreement

3. The **Getting Started** page displays the procedure for Install process as shown in Figure 2-27.

IBM Spectrum Fusion Install	
Getting started	Getting started
O Network precheck	Welcome to IBM Spectrum Fusion installation. There are two phases in this install process, but before we begin let's get over a few things that will help you along the way.
Image registry	1. Fusion software (installation (120 min) In the first install phase, we will download Spectrum Fusion images and create a three node Openshift Container Platform cluster.
O Disaster recovery	2. Cluster expansion (60 min)
Global data platform	In the second phase, the cluster will be expanded to include all nodes, and the global data platform service will be initialized.
O Network customization	
O Custom certificate	
Optional	
	Back Next

Figure 2-27 Install procedure

 The Network precheck page displays all the nodes of the appliance along with the other details like MAC address, status, location, hostname, and IP address as shown Figure 2-28.

Note: If any issues are indicated in the page, the recommendation is to connect with IBM to resolve the issue before proceeding further.

Click the Next button.

IBM Spectrum Fusion Install					0
Getting started	Network prechec	k			
C: Network precheck	Verify nodes are online and prop If changes to your node settings a	erly configured. are needed, contact your network team.	earn more		
C Image registry	Nodes				
O Disaster recovery	Q. Search				Restart precheck
Global data platform	MAC address	Status	Location	Hostname	IP address
O Network customization	08:c0:eb:ff:38:46	Connected	RU5	compute-0.rackae2.mydomain.com	172.20.102.28
Custom certificate	08:c0:eb:ff:37:de	Connected	RU6	compute-1.rackae2.mydomain.com	172.20.102.29
Optional	08:c0:eb:ff:34:f2	Connected	RU7	compute-2.rackae2.mydomain.com	172.20.102.30
	b8:ce:f6:74:f1:2e	 Connected 	RUS	compute-3.rackae2.mydomain.com	172.20.102.31
	b8:ce:f6:74:f1:26	Connected	RU9	compute-4.rackae2.mydomain.com	172.20.102.32
	b8:ce:f6:47:26:42	Connected	RU10	compute-5.rackae2.mydomain.com	172.20.102.33
	b8:ce:f6:47:28:fe	Connected	RU11	compute-6.rackae2.mydomain.com	172.20.102.34
	b8:ce:f6:47:27:96	Connected	RU12	compute-7.rackae2.mydomain.com	172.20.102.35
	b8:ce:f6:47:27:06	Connected	RU13	compute-8.rackae2.mydomain.com	172.20.102.36
	08:c0:eh:ff:36:fe	@ Connected	P112	control-0 rackae2 murlomain.com	172 20 102 25
					Back Next

Figure 2-28 Network precheck

5. Select the image registry as per your requirements as shown in Figure 2-29. Enter the details and click the **Next** button.

IBM Spectrum Fusion Install			C
Getting started	Image registry		
Network precheck	The system needs to download software images from a registry to install OpenShift and IBM Spectrum Fusion software. Select the registry that will be used to install the required software images. Learn more		
Image registry	Public image registry		
O Disaster recovery	Connect to public image repositories. Requires Connect to a private image repository. Required access by pur organization's OpenShift pull secret image must be accessible to proceed with the and 18M entitlement key. installation.		
Global data platform	Registry configuration		
O Network customization	O single repository 🕑 Hotoper repositories		
O Curtom cortificate	OpenShift images repository		
Optional	Repository path		
	vyc-abell-devops-team-prod-test-offline-docker-local.artifactory.swg-devops.com:443/hci-2.3.0/prod_build_oc		
	Username		
	spandhre@in.ibm.com		
	API key / Password		
	•		
	18M Spectrum Fusion images repository		
	Repository path		
	https://hyc-abell-devops-team-test-offline-docker-local.artifactory.swg-devops.com:443/hci-truist/ist_operator		
		Back	Next

Figure 2-29 Image registry

- 6. To configure Disaster recovery between two sites, you need to get the connection details of Site1. The following instructions show how to get the credentials:
 - a. Login to OpenShift of Site1
 - i. oc login -u kubeadmin -p <passwd of Site1> <api_url of Site1>
 - b. Switch to ibm-spectrum-fusion-ns project
 - i. oc project ibm-spectrum-fusion-ns
 - c. Get the secret name for secret fusion-admin-controller-manager
 - i. oc get sa fusion-admin-controller-manager -oyaml

From the command output, get the secret name for the fusion-admin-controller-manager-token secret shown here:

Example name: fusion-admin-controller-manager-token-9mq6b

- d. Retrieve token from this secret mentioned in the service account
 - i. oc get secret fusion-admin-controller-manager-token-9mq6b -o yaml
- 7. In the **Disaster recovery** page as shown in Figure 2-30 do the following steps:
 - a. Select the 3rd tile which is the second site of the Disaster Recovery pair.
 - b. Provide the Site1 details API URL of Site1 and token retrieved in the prior step. Click the **Next** button to continue.

IBM Spectrum Fusion Install					0
Getting started	Disaster recovery				
Network precheck	A disaster recovery configuration provides synchronous of by connecting the storage networks used by the clusters.	data replication between two Spectrum Fusion HCI cluster Learn more	•		
Image registry	How do you intend to use this cluster?				
Disaster recovery Network customization Custom certificate					
Optional	3				
	A standalone cluster (you can make this the first site in a disaster recovery pair later)	This is the first site being set up for a disaster recovery pair.	This is the second site being set up in a disaster recovery pair. The first site has already been fully configured.		
	Connect to the first site				
	This cluster will connect to the first site and begin to con site's Disaster recovery page.	figure disaster recovery. The URL and credentials can be fo	und on the first		
	Kubernetes API URL	Fusion service account API token			
	https://api.rackae2.mydomain.com:6443	JEFmdmIweTBNRIN3Z3RHSEQ1SWdycGpk	aHNxOUFxSFQ4		
				Back	Next

Figure 2-30 Disaster Recovery

8. On the **Global data platform** page as shown in Figure 2-31, select the appropriate building block.

Click the Next button.

Im Fusion RLG is compased of multi-noch build even even of the second se	ng blocks. The number of building blocks determines he configuration bent fits your organization's storage	s the and		
•				
data resiliency	Better storage efficiency			
ilding blocks (4+2p) that can withstand huttaneous failure of two nodes ize the risk of data loss due to hardware	 One building block (8+3p) that can withstand the simultaneous failure of three nodes Maximize the amount of usable storage at the expense of resiliency 	2		
ficiency Usable capacity	Storage efficiency Usable capacity			
Отів	73 % Отів			
lues are estimates.)	(Above values are estimates.)			
	data resiliency liding blocks (4-2p) that can withstand ultimous failure of two nodes ze the risk of data less due to hardware listency Usable espacity O Tra Loss are estimates.)	data reallincy Hatter starage efficiency Hidre globack (64-29) that can withstand baseness failure of the roods De holding bloback (64-29) that can withstand the simulacess failure of the endos Soft failure in the simulacess failure of the simulacess failure of the simulacess failure of the second the simulacess failure of the simulace second of the simulacess failure of the simulacess failure of the simulaces (Above values are estimates)	data resultincy Heter storage efficiency Hidreg block (d-2p) that can withstand benesses taking of that can withstand the simulation staking of three nodes	data resultincy Exter stragge efficiency uiding blocks (dx -2p) that can withstand blacensu failure of the no redds: get the rak of data loss due to hardware - On building blocks (dx -2p) that can withstand the simulacensu failure of the results that can even with standing blocks (dx -2p) that can withstand the simulacensu failure of the results that can even be any of the simulacensu failure of the results that can even the same estimates. D rule (Above values are estimates.) (Above values are estimates.)

Figure 2-31 Global data platform

9. On the **Network customization** page as shown in Figure 2-32. Enter the details of the OpenShift network and storage network.

IBM Spectrum Fusion Install				0
 Getting started 	Network customization			
Network precheck	OpenShift network			
 Image registry 	The RedHat OpenShift cluster will use this network confi	guration. This pre-populated configuration can be changed.		
	Pod network CIDR	Pod network host prefix		
 Disaster recovery 	10.0.0/12	23		
Global data platform	Service network CIDR			
	10.21.0.0/16			
Network customization				
Custom certificate	Storage network			
	IBM Spectrum Fusion will use this network configuration configuration can be changed.	as its internal storage network. This pre-populated		
	CIDR address			
	192.168.192.0/18			
	Gateway address			
	192.168.192.1			
	IP address range			
	192.168.192.11	- 192.168.255.254		
			Back	Next

Figure 2-32 Network customization

10.On the **Custom certificate** page as shown in Figure 2-33 on page 21, provide the details of your organization certificate, if any.

Click the **Finish** button to start the installation.

Custom certificate OperShift will be configured with a self-signed certificate by default. It is recommended that you upd revolved by a Cartificate Authority. Learn more Certificate soluce methel Pite update Operation Certificate is a 1946. Supported file type is ort. AppLackae2.mydomain.com.crt	ead a certificate		
OpenShift will be configured with a self-signed certificate by default. It is recommended that you up provided by a Certificate Authority. Learn more Certificate upload Text input Image: Text input Text input March file size is 3MB. Supported file type is ort. apps.rackae2,mydomain.com.crt	ood a certificate		
Certificate upload Text Input Text Input Max (Te size is 31%). Exponented file type is ort. apps.rackae2.mydomain.com.crt	×		
The spinor The set input The set is 1946. Supported file type is ort. apps.rackae2.mydomain.com.crt	x		
apps.rackae2.mydomain.com.crt	×		
Private key (PEM format, unencrypted)			
BEGIN PRIVATE KEY MILEvOIBADANB&qahiko@voBAQEFAASCBKcwggSjAgEAAoIBAQC4s2pQ1QyP4IIp Ag20p442VIS63kt8btuUA0ISA4/pxp3bolluqeEteH135mbfER2WEGEdFDUnKyte 6wix78ztRNPX96uM0xg3lsaH1y9YhPCMP0+FmgUXg3dFRakk6o0ds9YLAp+293 VisfamUTBPA-SEXPUL_Vision_UKD_voL4Av_DMA_VXUW_voL720C518tP0			
		Back	Finish
	Transfer (Versionale, beloggen) — — EGGIN REPORT EKEY MILE (Versionale Key MILE (Versionale) MILE (Versionale)	 Terrent Bergerner Kern MIErolanan Begerner Kern	Teneter (Verk Indian Landergen) Im EGIN (RMINE REVTI

Figure 2-33 Custom certificate

11. Once the Install completes, the message is displayed as shown in Figure 2-34.

Note: Ensure to download the OpenShift Password and CoreOS Key and/or copy the credentials from the page.

12.Once the OpenShift credentials are downloaded, confirm by clicking on the checkbox.13.Now, click the **IBM Spectrum Fusion** button to proceed with the install.

Configuring a three node Red Hat OpenShift cluster.			
IBM Spectrum Fusion installation completed (100%)		Collect logs 👱 🗸 🗸	
OpenShift Cradentials			
opensnin credennals			
to complete this installation, use your Red Hat OpenShift credentials to log in	to IBM Spectrum Pusion, via Single sign-on (SSU).		
1. Download			
Download your Red Hat OpenShift Password and CoreOS Key 👱			
I have downloaded the OpenShift Password and CoreOS Key			0
2. Launch			
The final Spectrum Fusion software install phase is almost complete, and you mentioned above, Fusion and OCP can be logged into using the credentials (S	can monitor its progress when you log into fusion. As 50).		
Username			
kubeadmin			
Pasoword			
wiabK-b2nkz-nBYfv-oGwKx	6		

Figure 2-34 Initializing OpenShift

OpenShift configuration, Global data platform installation, and Disaster recovery connections

This section describes the steps to for the OpenShift configuration, Global data platform installation, Disaster recovery connections:

1. Wait for the OpenShift configuration, global data platform installation and disaster recovery connections to complete successfully as shown in Figure 2-35.

IBM Spectrum Fusion Install		Ø
OpenShift configuration		
Configuring Red Hat OpenShift on your nodes.		
All node conversions are complete.		~
Global data platform installation		
Configuring storage on all of your nodes.		
TBM Spectrum Scale storage installation is succeeded.		~
Disaster recovery connections	<u> </u>	
Establishing connection between your disaster recovery (DR) sites.	L2×	
MethoDR installation completed successfully,		~
Launch Fusion \rightarrow		
and the second		

Figure 2-35 Final installation process of IBM Spectrum Fusion

- 2. Click the Launch Fusion button in Figure 2-35 to go to the IBM Spectrum Fusion Quick start page.
- 3. Now, we are ready to use IBM Spectrum Fusion as shown in Figure 2-36.

× IBM Spectrum Fusion rac	kae2				
Oakk start Events Applications Datater recovery Cloud Satellite Infrastructure ~ Services Settings	Container-native data servir Red Hat OpenShift and IBM Access data anywhere with a secure global simple to deploy, secure, and operate.	ces platform for Cloud Paks data platform that is			
	Manage storage & infrastructure	CSI provisioning made easy Lean how to maximize your container workloads in OpenShift and IBM Spectrum Fusion.	Ad more tike Increase the capacity of your IBM Spectrum Sce storage cluster: C Increase The Capacity of Your IBM Spectrum Sce Storage Cluster:	Affinition Affinition Affinition Affinition Affinition Affinition	, , , , , , , , , , , , , , , , , , ,
	Protect applications from data loss	Preparing for disaster recovery View the documentation and learn more about preparing your cluster for disaster recovery		1	

Figure 2-36 IBM Spectrum Fusion Quick start page

Disaster recovery

On the **IBM Spectrum Fusion** page, in the left pane menu, click the **Disaster recovery** option. The **Disaster recovery** page is shown as Figure 2-37.

× IBM Spectrum Fusion	rackae2	② A \$ Ⅲ
Quick start	Node firmware upgrades are available	See Nodes to begin upgrading
Events		
Applications	Disaster recovery	Actions 🗸
Disaster recovery	Synchronous replication between two sites.	
Cloud Satellite		
Infrastructure \vee	Synchronization failed	
Services		
Settings	Remote apps.rackae1 Q Local apps.rackae2 Tiebreaker	Health summary

Figure 2-37 Disaster recovery

2.1.5 Tiebreaker installation

A special tiebreaker node is hosted at a third site and is used to determine which cluster is in charge of the data in the event that the network between the two clusters is severed. Configuring a Metro sync DR topology requires several network connections to be made between the two clusters and the tiebreaker.

The following are the installation requirements:

- ► Hardware requirements are CPU 2 cores, Memory 4G, a raw disk with less than 20 GB
- For software requirements, see https://www.ibm.com/docs/en/spectrum-scale/5.1.5?topic=gpfs-software-requiremen ts
- For tiebreaker allowed ports, see https://www.ibm.com/docs/en/spectrum-fusion/2.4?topic=planning-firewall-require ments-spectrum-fusion-hci

Download the IBM Spectrum Scale Data Management 5.1.X.0 from IBM Entitled System Support. The following steps show the download and installation:

1. Login into the Entitled Systems Support (ESS) portal as shown in Figure 2-38.



Figure 2-38 Entitled Systems Support (ESS) portal

2. Click on My Entitled Software link in the page as shown in Figure 2-39.

← → C ◇ A = https://www.ibm.com/servers/eserver/ess/ProtectedServlet.wss
IBM Entitled Systems Support My Entitled Software \checkmark My Entitled Hardware \checkmark My Inventory \checkmark
Entitled Systems Support website (ESS) is IBM go-to place to view and manage software (Power, Storage) and hardware (Power, Storage, IBM Z). In general, most products offered by IBM Systems purchased through our IBM Digital Sales representatives or business partners, when using the IBM Configurator for e-business, are afterwards accessed on this website. Several IBM products can also be directly purchased here. There are 3 main sections: • My Entitled Software - activities related to Power and Storage software - download licensed, free and trial software media, place software update orders and manage software keys.

Figure 2-39 Entitled Systems Support website

3. Click on Software Downloads link as shown in Figure 2-40 on page 25.



Figure 2-40 Software Downloads

4. Search for the product 5771 as shown in Figure 2-41 and Figure 2-42.



Figure 2-41 Search Product

5. Select the product 5771-PP7 (IBM Spectrum Fusion HCI) as shown in Figure 2-42.



Figure 2-42 Select the product

6. The selected product is displayed as shown in Figure 2-43. Click on the **Continue** button.

Sontware	Download	S				
tart Step 1: Production	t > Step 2: Language S ftware based on all active o can be found in Help secti	Show all supported software				
By categ	ory	By machine	By product ()	Mobile Application		
Product:	Select	~	Add Product	Download on the App Store		
Stop 1: Salast produ	ct			Web App		

Figure 2-43 Selected product display

7. Click the checkbox as shown in Figure 2-44. Click the **Continue** button.

A Entitled Systems Support My Entitle	led Software 🗸 My Entitled Hardware 🗸 My Inventory 🗸		0 B	. @) 1	Ç \$	
My entitled software > Software Downlo							
Software Downlo	ads						
Start Step 1: Product Step 2: Languag	e Step 3: Package ► Step 4: T&Cs Step 5: Method Step 6: Do	wnload	ESD extended authorizations				
Step 3: Product download package selecti	Show all supported software	9					
	Current products		Mobile Application				
✓ Select all	Search package title:		Download on the App Store				
Product/Release	Download Package	Size (MB)	PMA Web App				
5771-PP7 details	IBM Spectrum Fusion HCI	13634	alan di				
02.02.00 <u>packages</u>	5809: IBM Spectrum Fusion for HCI v02.02.00, ENU, ESD	13634					
Total download size (MB):		13634					

Figure 2-44 Confirm the selected products

8. Read the License Terms and click on the **I agree** button as shown in Figure 2-45 on page 27.

← → C	O A ≈ http	ps://www.ibm.com/servers/eserver/ess/ProtectedServlet.wss	E \$		¥	*	=
IBM Entitled Systems	s Support My Entit	led Software 🗸 My Entitled Hardware 🗸 My Inventory 🗸	ية. ية	(?)	Ç;		8
My entitled soft Softwa	ware > Software Downlo	ads > ads					
Start Step 1: I	Product Step 2: Languag	e Step 3: Package Step 4: T&Cs ► Step 5: Method Step 6: Download	ESD extended authorizations				
Step 4: Terms a	nd conditions		Show all supported software				
		Current products	Mobile Application				
Product		Product Name	Download on the App Store				
5771-PP7	details	IBM Spectrum Fusion HCI	PM4 Web App				
Release		Selected content					
02.02.00	License Terms	5809: IBM Spectrum Fusion for HCI v02.02.00,ENU,ESD					
To begin downlo terms and condi disagree to exit I agree	oading, click the I agree bu itions for all products you a I disagree I	tton below. By clicking I agree you agree that you have had the opportunity to are downloading and that such terms and conditions govern this transaction. Se	review the least I				

Figure 2-45 License Terms confirmation

9. Select the download method as shown in Figure 2-46 and click on the Continue button.



Figure 2-46 Download method

10. Review the download details as shown in Figure 2-47 and click on **Download now** button.

tart Step 1: Pro	duct Step 2: La	inguage Step 3: Package Step 4: T&Cs Step 5: Method Step 6: I	Download	ESD extended authorizations		
tep 6: Download v	vith Download D	✓ Show all supported software				
		Current products		Mobile Application		
Product/Release		Download Package	Size (MB)	Google Play		
5771-PP7	<u>details</u>	IBM Spectrum Fusion HCI	13634	PMA Web App		
02.02.00	packages	5809: IBM Spectrum Fusion for HCI v02.02.00,ENU,ESD	13634			
	IBM Spectrum	Scale Data Mgmt	1315			
	IBM Spectrum	Protect Plus V10.1.10 vSnap Installer for v7 Multiling	335			
	IBM Spectrum	Protect Plus V10.1.10 vSnap Installer for v8 Multilingual	372			
	IBM Spectrum	Protect Plus V10.1.10 Product Upgrade Multilingual	4076			
	IBM Spectrum	Protect Plus V10.1.10 Agent for Kubernetes and OpenShift English	1			
	IBM Spectrum	Protect Plus V10.1.10 Server for OS	7534			

Figure 2-47 Start download

11.Once the download is complete, navigate to the download folder. List the contents of the directory. You should be able to see the files as listed in Example 2-1.

Example 2-1 Downloaded files

```
[root@metroDRAG2-tiebreaker-2 tmp]# ls
Spectrum_Scale_Data_Management-5.1.6.0-x86_64-Linux-install.sh
systemd-private-552311a87a9244faafdc49ef361fcbee-chronyd.service-bUy7QJ
```

12. Change the permissions of the file as shown in Example 2-2.

Example 2-2 Permission change

[root@metroDRAG2-tiebreaker-2 tmp]# chmod +x Spectrum_Scale_Data_Management-5.1.6.0-x86_64-Linux-install.sh

13. Start the installation as shown in Figure 2-48 on page 29 and Figure 2-49 on page 30. Input the details as requested.

```
[root@metroDRAG2-tiebreaker-2 tmp]# ./Spectrum_Scale_Data_Management-5.1.6.0-x86_64-Linux-install.sh
Extracting License Acceptance Process Tool to /usr/lpp/mmfs/5.1.6.0 .
tail -n +660 ./Spectrum_Scale_Data_Management-5.1.6.0-x86_64-Linux-install.sh | tar -C /usr/lpp/mmfs/5.1.6.0 -xvz --exclude=installer
--exclude=*_rpms --exclude=*_debs --exclude=*rpm --exclude=*tgz --exclude=*deb --exclude=*tools* 1> /dev/null
Installing JRE ...
If directory /usr/lpp/mmfs/5.1.6.0 has been created or was previously created during another extraction,
.rpm, .deb, and repository related files in it (if there were) will be removed to avoid conflicts with the ones being extracted.
tail -n +660 ./Spectrum_Scale_Data_Management-5.1.6.0-x86_64-Linux-install.sh | tar -C /usr/lpp/mmfs/5.1.6.0 --wildcards -xvz
ibm-java*taz 1> /dev/null
tar -C /usr/lpp/mmfs/5.1.6.0/ -xzf /usr/lpp/mmfs/5.1.6.0/ibm-java*tgz
Defaulting to --text-only mode.
Invoking License Acceptance Process Tool ..
/usr/lpp/mmfs/5.1.6.0/ibm-java-x86_64-80/jre/bin/java -cp /usr/lpp/mmfs/5.1.6.0/LAP_HOME/LAPApp.jar com.ibm.lex.lapapp.LAP
-l /usr/lpp/mmfs/5.1.6.0/LA_HOME -m /usr/lpp/mmfs/5.1.6.0 -s /usr/lpp/mmfs/5.1.6.0 -text_only
LICENSE INFORMATION
The Programs listed below are licensed under the following
License Information terms and conditions in addition to the
Program license terms previously agreed to by Client and
IBM. If Client does not have previously agreed to license
terms in effect for the Program, the International Program
License Agreement (i125-3301-15) applies.
Program Name (Program Number):
IBM Spectrum Scale Data Management Edition 5.1.6.0 (5737-
F34)
IBM Spectrum Scale Data Management Edition 5.1.6.0 (5641-
DM1)
Press Enter to continue viewing the license agreement, or
enter "1" to accept the agreement, "2" to decline it, "3"
to print it, "4" to read non-IBM terms, or "99" to go back
to the previous screen.
1
License Agreement Terms accepted.
Extracting Product RPMs to /usr/lpp/mmfs/5.1.6.0 ...
tail -n +660 ./Spectrum_Scale_Data_Management-5.1.6.0-x86_64-Linux-install.sh | tar -C /usr/lpp/mmfs/5.1.6.0 ...
ganesha_rpms/sles15 gpfs_rpms/rhel7 gpfs_rpms/rhe18 gpfs_rpms/rhe19 gpfs_rpms/sles15 object_rpms/rhe18 smb_rpms/rhe17
cloudkit gpfs_debs gpfs_rpms manifest 1> /dev/null
  - Public_Keys
   - ansible-toolkit
  - cloudkit/dependencies
   - ganesha_debs/ubuntu/ubuntu20
   - ganesha_debs/ubuntu/ubuntu22
   - gpfs_debs/ubuntu/ubuntu20
   - gpfs_debs/ubuntu/ubuntu22
  - hdfs_rpms/rhel/hdfs_3.1.1.x
   - hdfs_rpms/rhel/hdfs_3.2.2.x
  - hdfs rpms/rhel/hdfs 3.3.x
   - smb_debs/ubuntu/ubuntu20
   - smb_debs/ubuntu/ubuntu22
   - zimon_debs/ubuntu/ubuntu20
   - zimon_debs/ubuntu/ubuntu22
   - ganesha_rpms/rhel7
   - zimon_rpms/sles15
   - cloudkit
   - gpfs_debs
   - gpfs_rpms
   - manifest
Removing License Acceptance Process Tool from /usr/lpp/mmfs/5.1.6.0 ...
rm -rf /usr/lpp/mmfs/5.1.6.0/LAP_HOME /usr/lpp/mmfs/5.1.6.0/LA_HOME
Removing JRE from /usr/lpp/mmfs/5.1.6.0 ...
rm -rf /usr/lpp/mmfs/5.1.6.0/ibm-java*tgz
```

Figure 2-48 Install

Product packages successfully extracted to /usr/lpp/mmfs/5.1.6.0
Cluster installation and protocol deployment
To install a cluster or deploy protocols with the IBM Spectrum Scale Installation Toolkit:
/usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale -h
To install a cluster manually: Use the GPFS packages located within /usr/lpp/mmfs/5.1.6.0/gpfs_ <rpms debs=""></rpms>
To upgrade an existing cluster using the IBM Spectrum Scale Installation Toolkit:
 Review and update the config: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale config update
Update the cluster configuration to reflect the current cluster config:
/usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale config populate -N <node></node>
Use online or offline upgrade depending on your requirements:
- Run the online rolling upgrade: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale upgrade -h
 Run the offline upgrade: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale upgrade config offline -N;
/usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale upgrade run
You can also run the parallel offline upgrade to upgrade all nodes parallely after shutting down GPFS
and stopping protocol services on all nodes.
You can run the parallel offline upgrade on all nodes in the cluster, not on a subset of nodes.
To add nodes to an existing cluster using the IBM Spectrum Scale Installation Toolkit:
1) Add nodes to the cluster definition file: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale node add -h
 Install IBM Spectrum Scale on the new nodes: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale install -h
 Deploy protocols on the new nodes: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale deploy -h
To add NSDs or file systems to an existing cluster using the IBM Spectrum Scale Installation Toolkit:
1) Add NSDs or file systems to the cluster definition: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale nsd add -h
2) Install the NSDs or file systems: /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale install -h
To update the cluster definition to reflect the current cluster config examples:
/usr/lpp/mmfs/5.1.6.0/ansible-toolkit/spectrumscale config populate -N <node></node>
 Manual updates outside of the installation toolkit
Sync the current cluster state to the installation toolkit prior to upgrade
 Switching from a manually managed cluster to the installation toolkit
o get up and running quickly, consult the IBM Spectrum Scale Protocols Quick Overview:
<pre>ittps://www.ibm.com/docs/en/STXKQY_5.1.5/pdf/scale_povr.pdf</pre>

Figure 2-49 Install (continuation)

14. Navigate to the ansible toolkit directory as shown in Example 2-3.

Example 2-3 Ansible toolkit directory

[root@metroDRAG2-tiebreaker-2 tmp]# cd /usr/lpp/mmfs/5.1.6.0/ansible-toolkit

15. View the contents of the directory as shown in Example 2-4. Verify if you can see a file named spectrumscale.

Example 2-4 Directory contents of ansible-toolkit directory

```
[root@metroDRAG2-tiebreaker-2 tmp]# cd /usr/lpp/mmfs/5.1.6.0/ansible-toolkit
[root@metroDRAG2-tiebreaker-2 ansible-toolkit]# ls
README ansible cli documentation externallibs license
spectrumscale
```

16. Install the toolkit as shown in Example 2-5 using the following command:

./spectrumscale setup -s <IP of the scale cluster master node>

Example 2-5 Ansible-toolkit install

[root@metroDRAG2-tiebreaker-2 ansible-toolkit]# ./spectrumscale setup -s 10.11.123.47 [INFO] Installing prerequisites for install node [INFO] Installing Ansible version 2.9.15. [INFO] Install Toolkit setup type is set to Spectrum Scale (default). If an ESS is in the cluster, run this command to set ESS mode: ./spectrumscale setup -s server_ip -st ess [INFO] Your ansible controller node has been configured to use the IP 10.11.123.47 to communicate with other nodes. [INFO] Port 10080 will be used for package distribution. [INFO] SUCCESS [INFO] Tip : Designate protocol, nsd and admin nodes in your environment to use during install:./spectrumscale -v node add <node> -p -a -n [root@metroDRAG2-tiebreaker-2 ansible-toolkit]#

17.Get the secrets of the following Spectrum Scale keys as shown in Example 2-6.

Example 2-6 Secrets of IBM Spectrum Scale

```
oc get secret ibm-spectrum-scale-core-ssh-key-secret -n ibm-spectrum-scale -ojsonpath="{.data.ssh-authorizedkeys}"
oc get secret ibm-spectrum-scale-core-ssh-key-secret -n ibm-spectrum-scale -ojsonpath="{.data.ssh-privatekey}"
oc get secret ibm-spectrum-scale-core-ssh-key-secret -n ibm-spectrum-scale -ojsonpath="{.data.ssh-publickey}"
```

 Validate the secrets from Step 17 are present in the file tiebreaker_nodedefinition.json as shown in Example 2-7.

Example 2-7 Secret validation

[root@metroDRAG2-tiebreaker-2 ansible-toolkit]# cd /usr/lpp/mmfs/5.1.6.0/ansible- toolkit/ansible/vars [root@metroDRAG2-tiebreaker-2 vars]# cat tiebreaker_nodedefinition.json

19.Copy the yaml files as shown in Example 2-8.

Example 2-8 Copy the yaml files

[root@metroDRAG2-tiebreaker-2 vars]# cp /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/ansible/sample/playbook_tiebreakernode_install.yml /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/ansible/sample/set_json_variables_tb.yml /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/ansible/

20.Navigate to the ansible directory to run the playbook as shown in Example 2-9.

Example 2-9 Run the ansible playbook

[root@metroDRAG2-tiebreaker-2 vars]# cd /usr/lpp/mmfs/5.1.6.0/ansible-toolkit/ansible/ [root@metroDRAG2-tiebreaker-2 ansible]# ansible-playbook playbook_tiebreakernode_install.yml

21. Ensure the playbook runs successfully as shown in Figure 2-50.

[root@metroDRAG2-tiebreaker-2 ansible]# ansible-playbook playbook_tiebreakernode_install.yml [WARNING]: provided hosts list is empty, only localhost is available. Note that the implicit localhost does not match 'all'
PLAY [localhost] ******
TASK [Gathering Facts] ************************************
TASK [Read all intermediate output from Resource Details] ************************************
<pre>TASK [Check valid json file] ok: [localhost] => { "changed": false, "msg": "All assertions passed" }</pre>
TASK [prepare Authorize all SSH keys] ************************************
TASK [shell] skipping: [10.11.123.47]
TASK [shell] skipping: [10.11.123.47]
TASK [prepare Change the Port 12345 in ssh_config] ************************************
TASK [prepare Change the Port 12345 in sshd_config] ************************************
TASK [prepare Restart the sshd service] ************************************
TASK [Create a file in tiebreaker to avoid mounting any filesystem] ************************************
PLAY RECAP

Figure 2-50 Successful completion of ansible playbook

22.Get the secret by using the command as given in Example 2-10.

Example 2-10 Get the secret

[root@metroDRAG2-tiebreaker-2 ansible]# echo "/dev/vdb" | base64

23.Patch the secret on any of the sites of the IBM Spectrum Fusion metrodr pair as shown in Example 2-11.

Example 2-11 Secret patched on the IBM Spectrum Fusion rack

```
% oc patch secret isf-metrodr-config-secret -n ibm-spectrum-fusion-ns -p
'{"data":{"TieBreakerDevice":"secret from Step 22"}}'
secret/isf-metrodr-config-secret patched
```

Tiebreaker configuration from IBM Spectrum Fusion GUI

Now that we finished the install steps we are ready to finish the Metro sync DR configuration from the IBM Spectrum Fusion GUI. Follow these steps:

- 1. Login to the IBM Spectrum Fusion Gui.
- 2. Go to Disaster Recovery page.
 - Add Tiebreaker IPs and Credentials on the **Disaster recovery** page as shown in Figure 2-51 on page 33.
 - Click on the **Connect** button.

	🛇 🛕 🕶 https://console-ibm-spectrum-fusion-ns.apps.isf-racki.rtp.raleigh.i bm.com /disasterRecovery	☆ ♡ ± ★ 🖻 ≡
trum Fusion	isf-racki	@ ^ ¢ III
	Disaster recovery Synchronous replication between two sites.	Actions Y
ry	Image: Second	Step 2 of 2 Connect the tiebreaker Connect the tiebreaker Connect the tiebreaker Connect the requirements and how to configure Content the requirements and how to configure Content C

Figure 2-51 Add tiebreaker IPs and Credentials

Verify IBM Spectrum Scale status with mmgetstate -a from OCP shown in Example 2-12.

Example 2-12	Verify IBM S	Spectrum Scale	with mmgetstate -a	command
	,			

sh-4.4#	mmgetstate	– a
---------	------------	-----

Node number	Node name	GPFS state
1	control-0.daemon.ibm-spectrum-scale.stg.rackag2	active
2	<pre>control-1.daemon.ibm-spectrum-scale.stg.rackag2</pre>	active
3	<pre>control-2.daemon.ibm-spectrum-scale.stg.rackag2</pre>	active
4	compute-1.daemon.ibm-spectrum-scale.stg.rackag2	active
5	compute-2.daemon.ibm-spectrum-scale.stg.rackag2	active
6	compute-0.daemon.ibm-spectrum-scale.stg.rackag2	active
7	compute-0.daemon.ibm-spectrum-scale.stg.rackag3	active
8	<pre>compute-1.daemon.ibm-spectrum-scale.stg.rackag3</pre>	active
9	<pre>compute-2.daemon.ibm-spectrum-scale.stg.rackag3</pre>	active
10	<pre>control-0.daemon.ibm-spectrum-scale.stg.rackag3</pre>	active
11	<pre>control-1.daemon.ibm-spectrum-scale.stg.rackag3</pre>	active
12	<pre>control-2.daemon.ibm-spectrum-scale.stg.rackag3</pre>	active
13	gpfs-tiebreaker	active
sh-4.4#		

3

Application failover and failback

This chapter describes the steps to set up and demonstrate the failover and failback of the WordPress application between a local site and remote site with IBM Spectrum Fusion HCI.

3.1 Application Failover/Failback between local site and remote site

In case of disaster or maintenance work on any of the sites, you need to setup the applications for recovery. IBM Spectrum Fusion provides a simple method for setting up the application(s) for disaster recovery (DR).

3.1.1 Pre-requisites for application failover/failback

Before the application(s) is setup for disaster recovery, complete the following steps:

1. Ensure the health status of the Disaster Recovery is "healthy" as shown in Figure 3-1.

$\leftarrow \ \rightarrow \ {\tt G}$	O 🔒 🖻 https://console-ibm-spectrum-fusion-ns.apps.rackag2.mydomain.com/disasterRecovery	☆ · · · · · · · · · · · · · · · · · · ·	=
× IBM Spectrum Fusion	rackag2	⑦ 유 #	
Quick start	Node firmware upgrades are available	See Nodes to begin upgrad	ling
Events			
Applications	Disaster recovery	Actions ~	
Backup	Synchronous replication between two sites.	ν.	-
Disaster recovery			
Cloud Satellite		Health summary	
Infrastructure	×		
Services			
Settings	Occal Remote apps.rackag2 Tiebreaker	Replication is healthy You have no issues to display at this time.	

Figure 3-1 Disaster Recovery user interface

2. The application is deployed and displays on the **Applications** page in the **Local** tab as shown in Figure 3-2 on page 37.

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× івм	Spectrum Fusion	rackag2										ጸ	¢ .	
Quick star Events		Applicatio	ns											
Applicatio	ins	Local	Remote											
Backup Disaster re	ecovery	Applications are aut	omatically ge	nerated for ea	ach OpenShift project	on the local site.								
Cloud Sate Infrastruc Services Settings	ture	 Select applica data protection 	tions to as n capabili	sign ties.			Disaster recov Synchronize ap between two s apps are recov disaster. Learn more	ery oplication data ites to ensure y erable in the en	your vent of a	Backup policies Regularly schedi quick recovery fr	iled back om data	kups en loss.	×	
		Replication status:	Filter	~	Backup status: Filte	er 🗸	Q wordp	ores				×	۲	
		Name	Used (GiB)	Capacity (GiB)	Replication status	Home site		Backup status	Last backup on	Success rate	Poli	icies		
		wordpress- application- rackag2	0.00	2	 Not protected 	apps.rackag2.my	/domain.com	 No policy 		0/0	0			
		wordpress- application2- rackag2	0.00	0	 Not protected 	apps.rackag2.my	/domain.com	 No policy 		0/0	0			
		Items per page: 1	00 ~ 1-	2 of 2 items						1~ 1	of 1 page	4	•	

Figure 3-2 User deployed applications showing up on Applications page

3.1.2 Setting up applications for disaster recovery.

You can use the IBM Spectrum Fusion user interface to setup one or multiple applications for DR. There are multiple ways to setup one or multiple applications. This section describes the methods and steps setup the application(s) for disaster recovery.

Setting up a single application for DR

This section describes several methods of setting up a single application for DR.

Method1: Applications user interface.

Here are the steps for setting up the DR Method1 using the application user interface:

- 1. Go to the **Applications** page shown in Figure 3-3.
- 2. On the **Local** tab, you can view the applications.
- 3. For the application you wish to enroll for disaster recovery, go to the end of that row and click on the three dots to open the menu.
- 4. Click on Add disaster recovery.

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× IBM Spectrum Fusion	rackag2									8	¢.
Quick start	Applica	ations									
Events Applications	Local	Re	emote								
Backup Disaster recovery	Applications	are automatic	ally generated	for each OpenShift pi	roject on the local site.						
Cloud Satellite Infrastructure Services Settings	∽ Select ap data prote	Select applications to assign data protection capabilities.		Ŷ	Disaster recovery Synchronize application data between two sites to ensure your apps are recoverable in the event disaster. Learn more		lata ure your le event of a	Backup policies Regularly scheduled backup quick recovery from data lo Learn more			×
	1 item select	ed Select a	Capacity	Replication	Home site	Assign ba Backup	Last backup	Add disas	Policies	🗇 Cai	incel
	wordpress- application- rackag2	0.25	2	- Not protected	apps.rackag2.mydomain.co	m – No policy	on	0/0	0		:
	wordpress- application2- rackag2	0.00	2	 Not protected 	apps.rackag2.mydomain.co	m – No policy		0/0	þetails Assign poli	CV.	
	Items per pa	ge: 100 ~	1-2 of 2 ite	ems				1 ~	Add disast	er recovery	

Figure 3-3 Enroll application for disaster recovery from Applications page

Method 2: Applications details page

Here are the steps for setting up the DR Method2 using the Application details page.

- Click on the application from the Applications page.
- ► The **Application details** page opens up as shown in Figure 3-4 on page 39.
- Click on **Actions** to open the menu.
- ► Click on Add disaster recovery from the drop-down menu.



Figure 3-4 Application details page

Method 3: Application overview page

You can also setup an application for disaster recovery from the **Overview** tab of the **Applications details** page.

Here are the steps for setting up the DR Method3 using the **Overview** tab:

- Open the **Application details** page.
- Click on Overview tab.
- In the Disaster recovery section, click on Add disaster recovery button as shown in Figure 3-5.



Figure 3-5 Application Overview tab Add disaster recovery button

Setting up multiple applications for DR

You can enroll multiple applications for DR simultaneously described in the following steps:

- 1. Open the **Applications** page.
- 2. On the **Local** tab, click the **checkbox** next to each Application name as shown in Figure 3-6.
- Click on the Add disaster recovery button to enroll the selected applications for disaster recovery.

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	IBM Spectrum Fusion	rackag2								?		ሩ	
Quic	start	Applicat	ions										
Even	ts												
Appli	cations	Local	Rei	mote									
Back	up	-											
Disas	ter recovery	Applications are	automatica	lly generated for eac	h OpenShift project	on the local site.							
Cloue	l Satellite											×	
Infra	structure	\sim				Disaster reco	very		Backup polici	es			
Servi	ces	Select appli	cations t	o assign	የሸየ	between two	sites to ensure yo	our	quick recovery	from data	kups e a loss.	nable	
Setti	ngs	data protect	ion capa	abilities.		apps are reco disaster.	verable in the eve	ent of a					
					\checkmark	Learn more			Learn more				
		2 items selected					Assign backup	policy E	Add disaste	r recovery	@	Cancel	
		Name	Used (GiB)	Capacity (GiB)	Replication status	Home site	Backup status	Last backup on	Success rate	Po	licies		
		wordpress- application- rackag2	0.25	2	 Not protected 	apps.rackag2.mydomain.com	- No policy		0/0	0			
		wordpress- application2- rackag2	0.00	2	 Not protected 	apps.rackag2.mydomain.com	 No policy 		0/0	0			
		Items per page:	100 ~	1-2 of 2 items					1 ~	1 of 1 pag	е	•	

Figure 3-6 Enroll multiple applications for disaster recovery

Add application(s) for Disaster recovery

Once the **Add disaster recovery** button is clicked using any of the methods described, the DR enrollment process is initiated. In the background, the storage is replicated and synchronized across the two sites. The persistent volumes associated with the application is shared and becomes visible across both the sites.

Follow these steps to complete the DR enrollment process:

- 1. You will see a dialog box for confirmation as shown in Figure 3-7 on page 41.
- 2. Click on the Add button to confirm the completion of the action.

$\leftarrow \ \rightarrow \ {\tt G}$	O A https://console-ibm-spectrum-fusion-ns.apps.rackag2.mydomain.com/applications/wordpress-application-rackag2	☆	⊚ ⊀ ¥ ◙ ≡
× IBM Spectrum Fusion			⑦ 옷 ╬ ⅲ
Quick start	S The backup & restore service is in a critical state		See Services for details
Events Applications Backup Disaster recovery Cloud Satellite Infrastructure	Applications / Wordpress-application-rackag2 Overview Backup this applis Backup this applis Direction - rackag2	Assign policy	Actions ~
Services Settings	Storage A summary of PVC storage 1 applications selected Used Add disaster recovery O.25 GB Replicate data and etcd metadata between both sites for the selected Capacity usage by PVCs	Events Warning	View all Recent
	0.25 GB used (1.75 GB available Cancel Judd Used Available 100% Eliser-spectrum-fusion	No events found There are no warning eve found for this application	nts
	Disaster recovery Protect this and leading form a site outside humphiling supplying outside	Inventory	

Figure 3-7 Confirmation dialog box for Disaster Recovery

3. The disaster recovery enrolment for the application(s) is started and as the message **Adding disaster recovery** is displayed for the number of applications selected as shown in Figure 3-8.

$\leftarrow \ \rightarrow \ \mathbf{G}$	O 🔒 https://console-ibm-spectrum-fusion-ns.apps.rackag2.mydomain.com/applications/wordpress-application-rackag2	☆	▽ ⊻ 💥 🛙	=			
× IBM Spectrum Fusion	rackag2		@ ^ \$				
Quick start Events Applications Backup Disaster recovery	Storage A summary of PVC storage and storage classes utilized by this application. Used Capacity O.25 GiB 2 GiB Capacity usage by PVCs	Warning Recent Adding disaster recent wordpress-applicati rackag2 modified.					
Cloud Satellite Infrastructure Services Settings	0.25 GB used (1.75 GB available) 2 GB total Used Available 100% ibm-spectrum-fusion	No event There are n found for th	ts found ho warning events his application.				
	Disaster recovery Synchronized This application is fully protected from a site outage via sychronous replication.	Inventory Storage (2) 2 Persistent Volume Claims Resources (21)					
	Backups The summary provides details about the backup activity of this application. Soccessful backups 0 % (0/0) Used capacity by policy	2 Config Map 2 Deploymer 2 Pods 2 Replica Se 1 Routes 10 Secrets 2 Services	ps nts ts				

Figure 3-8 Disaster recovery enrollment process in progress

- 4. Once the enrollment is complete, the application can be viewed as **Synchronized**. The replication status is shown as **Synchronized** on both sites.
 - a. On the local site, it is seen on the following pages.
 - i. On the Local tab of the Applications page as shown in Figure 3-9.

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	IBM Spectrum Fusion	rackag2							0	ዶ	¢ :	
Quic	:k start	Applicatio	ons									
App	lications	Local	Ren	note								
Bacl Disa	kup ster recovery	Applications are a	utomatical	ly generated for e	ach OpenShift project on t	he local site.						
Clou Infra Serv Sett	id Satellite astructure iices iings	∨ Select applic data protecti	ations t on capa	o assign bilities.	ţ.	Disaster reco Synchronize a between two apps are reco disaster. Learn more	very pplication data sites to ensure your verable in the event of a	Backup policie Regularly sche quick recovery Learn more	es duled bao from dat	ckups ena a loss.	×	
		Replication status	Filter	~	Backup status: Filter	✓ Q word				×	۲	
		Name	Used (GiB)	Capacity (GiB)	Replication status	Home site	Backup La status on	st Succes ckup rate	s	Policies		
		wordpress- application- rackag2	0.25	2	Synchronized	apps.rackag2.mydomain.com	n – No policy	0/0		0		
		wordpress- application2- rackag2	0.00	2	 Not protected 	apps.rackag2.mydomain.com	n – No policy	0/0		0		
		Items per page:	100 ~	1–2 of 2 items				1~ :	L of 1 pag	,e 4	•	

Figure 3-9 Local site - Applications page

ii. On the Application details page in the Overview tab as shown in Figure 3-10.

$\leftarrow \ \ \rightarrow \ \ G$	🔘 🔒 https://console-ibm-spectrum-fusion-ns.apps.rackag2.mydomain.com/applications/wordpress-application-rackag2	公	${igsidential}$	坐 💥 🔯	=	
× IBM Spectrum Fusion	rackag2		0	ዳ 🗘		
Quick start Events Applications Backup Disaster recovery Cloud Satellite Infrastructure Services Settings	Storage A summary of PVC storage and storage classes utilized by this application. Used Capacity O.2.5 G GB 2 G GB Capacity usage by PVCs 0.25 GB used (1.75 GB available) 2 GB total Used Available 2 GB total Used Available 2 GB total	Events Warning Output No events found There are no warning ev found for this applicatio	Recent	View all		
	Disaster recovery Synchronized This application is fully protected from a site outage via sychronous replication. Backups The summary provides details about the backup activity of this application. Successful backups 0 % (0/0)	Inventory Storage (2) 2 Persistent Volume Cla Resources (21) 2 Config Maps 2 Deployments 2 Pods 2 Replica Sets 1 Routes 10 Secrets 2 Services	ims			

Figure 3-10 Application details page - Overview tab

- b. On the remote site, go to the **Applications** page.
 - i. Go to the Remote tab of remote site as shown in Figure 3-11 on page 43.

$\leftarrow \ \ \rightarrow \ \ C$	O 🔒 https://console-ibm-spectrum-fusion-ns.ap	pps.rackag3.mydomain.com/applications#tab	p=remote රූ	\odot	* *	○ =
× IBM Spectrum Fusion	rackag3			0	ጸ	4
Quick start Events	Applications					
Applications	Local Remote					
Backup Disaster recovery Cloud Satellite Infrastructure	Applications hosted on apps.rackag2.mydor site.	nain.com that are in a disaster recovery rela	tionship with the local			,
Services Settings	Select which applications to failover to the local cluster.		Failover Move applications that were running on the remote cluster over to the local cluster. Learn more			Î
	Replication status: Filter 🗸	Q word			×	\$
	□ Name	Replication status	Home site			
	wordpress-application-rackag2	Synchronized	apps.rackag2.mydomain.com		1	2
	wordpress-application2-rackag2	Synchronized	apps.rackag2.mydomain.com		1	2
	Items per page: 25 V 1-2 of 2 item	15		1∨ 1 of 1 page	4	•

Figure 3-11 Remote site - Applications page

3.1.3 Failover

The applications are enrolled for disaster recovery and the persistent volumes are shared across the sites. In case, Site1 is unavailable due to unknown reasons or for planned maintenance work, the applications can still be accessed from Site2.

View the applications for failover by following these steps:

- 1. Login to IBM Spectrum Fusion of the remote site.
- 2. Go to Applications page.
- 3. Click on Remote tab.

- 4. View the applications as shown in Figure 3-12.
 - a. The Replication status should show as Synchronized.
 - b. The Home site should reflect the local site server URL.

$\leftarrow \ \ \rightarrow \ \ G$	O A https://console-ibm-spectrum-fusion-ns.apps	.rackag3.mydomain.com/applications#tab	p=remote ි	8	k 🗰 🖸 🗉
× IBM Spectrum Fusion	rackag3			0	8 ¢ III
Quick start Events	Applications				
Applications	Local Remote				
Backup Disaster recovery Cloud Satellite	Applications hosted on apps.rackag2.mydomai site.	<i>in.com</i> that are in a disaster recovery rela	tionship with the local		
Infrastructure Services Settings	 Select which applications to failover to the local cluster. 		Failover Move applications that were running on the remote cluster over to the local cluster. Learn more		×
	Replication status: Filter 🗸 🗸	Q word			× 🕸
	Name	Replication status	Home site		
	wordpress-application-rackag2	 Synchronized 	apps.rackag2.mydomain.com		1
	wordpress-application2-rackag2	Synchronized	apps.rackag2.mydomain.com		P-8
	Items per page: 25 ∨ 1–2 of 2 items			1∨ 1 of 1 page	•

Figure 3-12 View applications for failover on the remote site

Initiate the failover process

This section describes the steps of the failover process:

1. Select an application for failover on the remote site as shown in Figure 3-13.

$\leftarrow \ \ \rightarrow \ \ \mathbf{C}$	O 🔒 https://console-ibm-spectrum-fusion-ns.apps.rackag3.mydomai	n.com/applications#tab=remote	\$	9 🕹 💥 🛛	⊇ ≡
× IBM Spectrum Fusion	rackag3		0	ዳ ¢	
Quick start Events	Applications				
Applications Backup	Local Remote				
Disaster recovery Cloud Satellite	Applications hosted on <i>apps.rackag2.mydomain.com</i> that are in a site.	disaster recovery relationship with the local			
Infrastructure Services Settings	Select which applications to failover to the local cluster.	Failover Move applications that were running on the remote cluster over to the local cluster. Learn more		د	¢
	1 item selected Select all 2 items		Failov	ver 🛣 Cance	L
	Name	eplication status Home site			
	wordpress-application-rackag2	Synchronized apps.rackag2.mydoma	in.com	8-8	
	wordpress-application2-rackag2	Synchronized apps.rackag2.mydoma	in.com	8-8 10	
	Items per page: 25 v 1–2 of 2 items		1∨ 1of1p	age ∢ ▶	

Figure 3-13 Failover process

2. Click on **the Failover** button to initiate failover. The dialog box will appear as shown in Figure 3-14 on page 45.

$\leftarrow \ \ \rightarrow \ \ \mathbf{G}$	O 🔒 https://console-ibm-spectrum-fusion-ns.apps.rackag3.mydomain.com/applications#tab=remote		⊠ ± ¥ ⊠ ≡
× IBM Spectrum Fusion			© % 4 III
Quick start Events Applications Backup Disaster recovery Cloud Satellite Infrastructure	Applications site.		×
Services Settings	1 application selected Select wh failover remote applications failover to This action will create the Persistent Volumes (PVs) and Persistent Volume Claims (PVCs) belonging to the applications in the local site. Learn more Step 1 Scale the applications to zero at the remote site. This prevents application instances at each site from	ning	
	1 Item select writing to the same PVs at the same time, which could lead to corruption. Step 2 Deploy the applications at the local site (this site), including their PVCs. This will create an automatic linkage to the mirrored PVs.		Failover 🛣 Cancel
	wordpr	domain.com	2
	Items per page. 2000 Exercision	rdomain.com 1 ~	E loflpage ∢ →

Figure 3-14 Confirmation message for failover process initiation.

3. The replication status for the application is changed from **Synchronized** to **Failover in progress** on the **Remote** tab of the remote site as shown in Figure 3-15.

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×	IBM Spectrum Fusion	rackag3		٨	¢	
Quio Eve	:k start nts	Applications				
Арр	lications	Local Remote				
Bac Disa Clou	kup ister recovery id Satellite	Applications hosted on apps.rackag2.mydomain.com that are in a disaster recovery relationship with the local site.				
Infr Serv Sett	astructure rices ings	Select which applications to failover to the local cluster.			×	
		Replication status: Filter, 🗸 🔍 word		×	۲	
		Name Replication status Home site				
		wordpress-application-rackag2 Failover in progress apps.rackag2.mydomain.com	n		₽•B	
		wordpress-application2-rackag2 Synchronized apps.rackag2.mydomain.com	n		₽•8	
		Items per page: 25 V 1-2 of 2 items	1∨ 1 of 1 pag	B 4	•	

Figure 3-15 Failover progress

4. Once the failover is complete for the application, the Failover complete message is displayed as shown in Figure 3-16.

$\leftarrow \ \ \rightarrow \ \ G$	O 🔒 https://console-ibm-spectrum-fusion-ns.ap	🔾 🔒 https://console-ibm-spectrum-fusion-ns.apps.rackag3. mydomain.com /applications#tab=remote 😚						
× IBM Spectrum Fusion	rackag3				٩	¢		
Quick start Events Applications Backup Diaastar racowary	Applications	_		 Failover com The local site prepared for deployment of application-m Next steps 	plete is now the of wordpre ackag2.	ss-	×	
Cloud Satellite	Applications hosted on <i>apps.rackag2.mydom</i> site.	aain.com that are in a disaster recovery relationship	with the local					
Services Settings	Select which applications to failover to the local cluster.	Fallove on the r local club Learn m	ar pipplications that were running remote cluster over to the luster. more			×		
	Replication status: Filter 🗸	Q word			×	\$		
	Name	Replication status	Home site					
	wordpress-application2-rackag2	Synchronized	apps.rackag2.mydomain.com			₽-		
	Items per page: 25 ∨ 1−1 of 1 item			1 ∨ 1 of 1 pag	ie 4	•		

Figure 3-16 Failover completion message

5. The failed over application(s) is removed from the **Remote** tab of the remote site as shown in Figure 3-17.

$\leftarrow \rightarrow G$	C A https://console-ibm-spectrum-fusion-ns.apps.rackag3.mydomain.com/applications#tab=remote	☆ 🛛	± * ⊠ ≡
× IBM Spectrum Fusion	rackag3		우 🗘 🗰
Quick start Events Applications Backup Disaster recovery Cloud Satellite	Local Remote Applications hosted on apps.rackag2.mydomain.com that are in a disaster recovery relationship with the listle. Select which applications to	iocal hs that were running	×
Infrastructure Services Settings	 Select which applications to failover to the local cluster. Replication status: Filter 	uster over to the	×®
	Name Replication status	Home site	
	auto-filebrowser-project-0530301 OSynchronized	apps.rackag2.mydomain.com	Ŧ
	filebrowser Synchronized	apps.rackag2.mydomain.com	₽+B
	newapp Synchronized	apps.rackag2.mydomain.com	₽.
	wordpress-application2-rackag2 Synchronized	apps.rackag2.mydomain.com	B+B
	Items per page: 25 V 1-4 of 4 items	1∨ 1 of 1 page	• •

Figure 3-17 Remote tab

6. Failed over application(s) appears on **Local** tab of the remote site as shown in Figure 3-18 on page 47.



Figure 3-18 Local tab of Remote site of Application page

7. Now, redeploy the failed over application(s) on remote site as shown in Figure 3-19.

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Red Hat OpenShift Container Platform										4 39	÷	Ø	kube:ad	min -
API Explorer			You are lo	gged in as a tem	porary administra	tive us	ser. Update the <u>cluste</u>	r OAuth confi	ig <u>uration</u> t	o allow oth	ers to log	in.		
Events		Project: wordpress	-application-rac	kag2 🔻										
Operators	`	Pods											Crea	te Pod
Workloads	*	▼ Filter ・	Name 👻 Sear	ch by name		7								
Pods		Name 1	Status 1	Ready 1	Restarts 1		Owner 1	Memory	I	CPU 1		Created	1	
Deployments		P wordpress-	C Running	1/1	0		RS wordpress-	-		-		G Just n	w	;
DeploymentConfigs		application-					application-							
StatefulSets		rackag2-549 fff5bbd-					rackag2-549f ff5bbd							
Secrets		n62nj												
ConfigMaps		wordpress- application-	C Running	1/1	0		RS wordpress- application-	-				O Just no	w	:
CronJobs		rackag2- mysql-					rackag2- mysql-							
Jobs		d74c5cf84-5 4pql					d74c5cf84							
DaemonSets														
ReplicaSets														
ReplicationControllers														
HorizontalPodAutoscalers														

Figure 3-19 Remote site - Application deployment from OpenShift console

8. Access redeployed application(s) from remote site as shown in Figure 3-20.

$\leftarrow \ \ \rightarrow \ \ C$	0 🔒	https://console-	opens	shift-consc	ole.apps.rack	ag3.mydomain.com	/k8s/ns/word;	press-application-rackag2/routes		ជ			${igsidential}$	⊻ *	0	=
Red Hat OpenShift Container Platfor	rm									4 39	Ð	0		kube:ad	lmin -	
ReplicaSets				3	You are log	ged in as a temporary	administrativ	e user. Update the <u>cluster OAuth co</u>	nfiguration t	o allow oth	ers to lo	g in.				
ReplicationControllers		Project: wo	rdpre	ss-applic	ation-racka	g2 🔻										
HorizontalPodAutoscalers		Routes												Creat	e Route	
Networking	~	T Filter	•	Name	• Search	by name		7								
Services			_													
Routes		Name	I			Status		Location 1	5	Service						
Ingresses		RT word	dpress	-applicatio	on-rackag2	Accepted		http://wordpress-application- rackag2.com/ 🖸 🍺		wordpre	ss-appli	cation-r	ackagi		:	
NetworkPolicies																
Storage	>															
Builds	>															
Observe	>															
Compute	>															
User Management	>															
wordpress-application-rackag2.com	~															

Figure 3-20 Remote site - OpenShift Console - Application route

9. View failed over application on remote site as shown in Figure 3-21.

$\leftrightarrow \rightarrow G$ C	> & wordpress-application-rackag2.com	☆	${igardown}$	* *	
🚯 🏟 wordpress-app 🖌 Customi	ize 😋 4 📮 0 🕂 New			Howdy, u	iser1 📃 🔍
	WORDPRESS-APP Just another WordPress site	NA 121	J		
	POSTS				
	wordpress-app-post	Search	2		
	WordPress (WP or WordPress.org) is a free and open-source content management system (CMS) written in hypertext preprocessor	RECENT POSTS			
	supported HTTPS. Features include a plugin architecture and a	wordpress-app-post			
	template system, referred to within WordPress as "Themes".	Hello world!			
	evolved to support other web content types including more traditional mailing lists and Internet fora, media galleries, membership sites, learning management systems (LMS) and online stores. One of the	RECENT COMMENTS			
	most popular content management system solutions in use,	A WordPress Commenter on Hello world!			
	October 2021	ARCHIVES			

Figure 3-21 Application access from remote site

3.1.4 Failback

Once the Site1 is back online, you may want to failback the applications from remote site (Site2) to local site (Site1).

View failed over application(s)

To view the failed over application(s) from local to remote site, follow the these steps:

- 1. Login to IBM Spectrum Fusion of local site (Site1).
- 2. Go to Applications page.
- 3. Go to the Remote tab.
- 4. Check for application(s) with Replication status as Synchronized.
- 5. Also, check the name of Home site. It should reflect the Site1 as shown in Figure 3-22.

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× IBM Spectrum Fusion	rackag2				8 ¢	
Quick start Events	Applications					
Applications Backup Disaster recovery Cloud Satellite	Local Remote Applications hosted on apps.rackag3.mydon site.	nain.com that are in a disaster recovery rel	ationship with the local			
Infrastructure Services Settings	Select which applications to failover to the local cluster.	••••	Failover Move applications that were running on the remote cluster over to the local cluster. Learn more		×	
	Replication status: Filter	Q word			× ©	
	Name wordprose-application-racked2	Replication status	Home site		ę	
	Items per page: 25 V 1-1 of 1 item	Synchronized	⊧→ apps.rackag2.mydomain.com	1 ∨ 1 of 1 page	4	

Figure 3-22 View failed over applications

Initiate failback process

Follow these steps to failback the application(s) from the remote site (Site2):

- 1. Login to IBM Spectrum Fusion of local site (Site1).
- 2. Go to the Applications page.
- 3. Go to the **Remote** tab.
- 4. Select application(s) for failback from the **Remote** tab of the local site.

5. Click Failover button as shown in Figure 3-23.

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	IBM Spectrum Fusion	rackag2		?	٨	¢	
Quick start Events Applications Backup Disaster recovery Cloud Satellite Infrastructure Services Settings		Applications Local Remote Applications hosted on apps.rackag3.mydomain.com that are in a disaster recovery relationship with the local site.					
		Select which applications to failover to the local cluster.				×	1
		1 item selected	Fail	over 2	2 (Cancel	
		Name Replication status Home site					
		wordpress-application-rackag2 Synchronized F apps.rackag2.mydomain.com	n			₽-B	
		Items per page: 25 V 1-1 of 1 item	1 ∽ 1 of 1	L page			

Figure 3-23 Select the application for failback and initiate failback process

- 6. The Failback dialog box message appears as shown in Figure 3-24.
- 7. Click on Failover button to initiate failback.

$\leftarrow \ \ \rightarrow \ \ \mathbb{G}$	♦ https://console-ibm-spectrum-fusion-ns.apps.rackag2.mydomain.com/applications#tab=remote	☆	© ⊻ * ⊠ ≡
× IBM Spectrum Fusion			◎ ° ¢ #
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Infrastructure Services Settings	1 application selected Select wh failover termote applications This action will create the Persistent Volumes (PVS) and Persistent Volume Claims (PVCs) belonging to the applications in the local site. Learn more Step 1 Scale the applications to zero at the remote site. This prevents application instances at each site from writing to the same PVs at the same time, which could lead to corruption.	sing ,	×
	Step 2 Step 2 Deploy the applications at the local site (this site), including their PVCs. This will create an automatic linkage to the mirrored PVs. wordor	domain.com	Fallover 🛓 Cancel
	Items per page Cancel Failover	1~	lof1page ∢ ≻

Figure 3-24 Failback dialog box

8. The message "failover initiated" is displayed for the failback initiated application(s) as shown in Figure 3-25 on page 51.



Figure 3-25 Failback message

9. The replication status is changed from **Synchronized** to **Failback in progress** as shown in Figure 3-26. Wait for the failback operation to complete.

\leftarrow	\rightarrow C	O 🔒 https://console-ibm-spectrum-fusion-ns.apps.rac	kag2.mydomain.com/applications#tal	b=remote 🏠	${igodot}$	* *	¢ 0	Ξ
	IBM Spectrum Fusion	rackag2				ጸ	¢	
Quid Ever App Bacl Disa Clou	E C IBM Spectrum Fusion Lick start Vents Applications Lackup Licad Satellife Arfastructuro Services Settings	Applications Local Remote Applications hosted on apps.rackag3.mydomain.com that are in a disaster recovery relationship with the local site.						
Intrastructure Services Settings		Select which applications to failover to the local cluster.		Failover Move applications that were running on the remote cluster over to the local cluster. Learn more				
		Replication status: Filter V Q	word			×	8	
		□ Name	Replication status	Home site				
		wordpress-application-rackag2	C Failback in progress	☐ apps.rackag2.mydomain.com			₽-B	
		Items per page: 25 ∨ 1–1 of 1 item			1∨ 1of1page	н. э н	•	

Figure 3-26 Failback operation progress is displayed

10. When the failback completes, the application is removed from the **Remote** tab of the **Applications** page as shown in Figure 3-27.

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	IBM Spectrum Fusion	rackag2				0	ጽ	¢		
Quick start Events Applications Backup Disaster recovery Cloud Satellite Infrastructure Services	Applications Local Remote Applications hosted on apps.rackag3.mydom site.	nuin.com that are in a disaster recovery rela	ationship with the local	th the local						
Sett	ngs	Select which applications to failover to the local cluster.		Move applications that were running on the remote cluster over to the local cluster. Learn more						
		Replication status: Filter 🗸 🗸	Q word				×	\$		
		Name	Replication status	Home	e site					
		No items match the current filter.								

Figure 3-27 Failed back application(s) removed from Remote tab of local site

11.Go to the **Local** tab of the **Applications** page. Check for the failed back application. It should reappear on **Local** tab of local site as shown in Figure 3-28.

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× IBM Spectrum Fusion	rackag2							۴	¢	
Quick start Events	Applications									
Applications Backup	Local Re	mote								
Disaster recovery Cloud Satellite	Applications are automatic	ally generated for e	ach OpenShift project on	he local site.						
Infrastructure Services Settings	Select applications data protection cap	to assign abilities.	Ť	Disaster red Synchronize between tw apps are red disaster. Learn more	covery e application data o sites to ensure you coverable in the even	Bac Reg quic t of a Lean	kup policies ularly scheduled ba ck recovery from da	ckups en ta loss.	×	
	Replication status: Filter	~	Backup status: Filter	~ Q wo	rd			×	\$	
	Name Used (GiB)	Capacity (GiB)	Replication status	Home site	Backup status	Last backup on	Success rate	Policies		
	wordpress- application- rackag2 0.00	0	Synchronized	apps.rackag2.mydomain.co	om – No policy		0/0	0		
	wordpress- application2- 0.14 rackag2	2	Synchronized	apps.rackag2.mydomain.co	om – No policy		0/0	0		
https://console-ibm-spectrum-fusion-ns.	Items per page: 100 ~	1-2 of 2 items	kag2				1 ∼ 1 of 1 pa	ge 4	+	

Figure 3-28 Check failed back application status on Local tab of local site

12. Access the redeployed application(s) on local site to ensure the application is up and running as shown in Figure 3-29 on page 53.



Figure 3-29 View failed back application(s) on local site

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this paper.

IBM Redbooks

The following IBM Redbooks publications provide additional information about the topic in this document. Note that some publications referenced in this list might be available in softcopy only.

- ▶ IBM Storage Fusion Backup and Restore for Cloud Pak for Data, REDP-5706
- ► IBM Storage Fusion Product Guide, REDP-5688

You can search for, view, download or order these documents and other Redbooks, Redpapers, Web Docs, draft and additional materials, at the following website:

ibm.com/redbooks

Online resources

These websites are also relevant as further information sources:

Evolving the IBM Storage Portfolio Brand Identity and Strategy

https://www.ibm.com/cloud/blog/evolving-the-ibm-storage-portfolio-brand-identit
y-and-strategy

IBM Spectrum Fusion documentation

https://www.ibm.com/docs/en/storage-fusion

► IBM Storage

https://www.ibm.com/storage

- IBM Storage Fusion https://www.ibm.com/products/storage-fusion
- IBM Storage Fusion HCI 2.5.2 Metro-DR https://www.ibm.com/docs/en/storage-fusion/2.5?topic=disaster-recovery

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REDP-5708-00

ISBN 0738461164

Printed in U.S.A.



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