IBM Spectrum Virtualize Family Storage
Replication Adapter
3.7.0

User Guide

IBM

Note

Before using this document and the product it supports, read the information in

Contents

Figures

About this guide

This guide describes how to install, configure, and use the IBM Spectrum Virtualize Family Storage Replication Adapter.

Who should use this guide

This guide is intended for system administrators or others who install and use the VMware Site Recovery Manager with the supported storage systems.

It is important to have an understanding of the following systems:

- Storage area networks (SANs)
- Spectrum Virtualize Family Metro/Global-Mirror Copy Services (for more information, see "Related information and publications" on page vii)
- IBM Stretched Cluster
- IBM HyperSwap function
- The capabilities of your storage system

Conventions used in this guide

The notices that are used in this publication highlight key information.

Note: These notices provide important tips, guidance, or advice.

Important: These notices provide information or advice that might help you avoid inconvenient or difficult situations.

⚠️ **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice appears before the instruction or situation in which damage can occur.

Related information and publications

You can find additional information and publications related to the IBM Spectrum Virtualize Family Storage Replication Adapter at the following websites:

- IBM FlashSystem 5200, 5000, 5100, Storwize® V5100 and V5000E in IBM Documentation (ibm.com®/docs/en/flashsystem-5x00)
- IBM FlashSystem 7200 and Storwize V7000 in IBM Documentation (ibm.com/docs/en/flashsystem-7x00)
- IBM Storwize V7000 Unified in IBM Documentation (ibm.com/docs/en/flashsystem-v7000u)
- IBM SAN Volume Controller in IBM Documentation (ibm.com/docs/en/sanvolumecontroller)
- IBM FlashSystem® V9000 in IBM Documentation (ibm.com/docs/en/flashsystem-v9000)
- IBM FlashSystem 9200 and 9100 in IBM Documentation (ibm.com/docs/en/flashsystem-9x00)
- IBM Spectrum Virtualize in IBM Documentation (ibm.com/docs/en/spectrumvirtualsoftw)
- SAN Volume Controller V4.3.0 Advanced Copy Services (redbooks.ibm.com/redbooks/pdfs/sg247574.pdf)
- SAN Volume Controller Best Practices and Performance Guidelines (redbooks.ibm.com/redbooks/pdfs/sg247521.pdf)
- VMware Documentation (vmware.com/support/pubs)
- VMware Product Support (vmware.com/support)
- VMware Knowledge Base (kb.vmware.com)

Getting information, help, and service

If you need help, service, technical assistance, or want more information about IBM products, you can find various sources to assist you. You can view the following websites to get information about IBM products and services and to find the latest technical information and support.

- IBM (ibm.com)
- IBM Publications Center website (www.ibm.com/resources/publications)
- IBM Directory of Worldwide Contacts (www.ibm.com/planetwide)

Sending comments

Your feedback is important in helping to provide the most accurate and highest quality information.

Procedure

To submit any comments about this publication or any other IBM storage product documentation:

- Send your comments by email to ibmdocs@us.ibm.com. Be sure to include the following information:
  - Exact publication title and version
  - Publication form number (for example, GA32-1234-00)
  - Page, table, or illustration numbers that you are commenting on
  - A detailed description of any information that should be changed

Introduction

The IBM Spectrum Virtualize Family Storage Replication Adapter (SRA) is a software add-on that integrates with the VMware vCenter Site Recovery Manager (SRM) solution to run failovers together with supported storage systems.

The IBM Spectrum Virtualize Family SRA extends SRM capabilities and uses replication and mirroring as part of the SRM comprehensive Disaster Recovery Planning (DRP) solution.

VMware administrators can automate the failover of storage systems at the protected (primary) SRM site to a recovery (secondary) SRM site. Immediately upon a failover, the VMware ESX/ESXi servers at the recovery SRM site initiate the replicated datastores on the mirrored volumes of the recovery storage system.

When the protected site is back online, you can run failback from the recovery site to the protected site by clicking **Reprotect** in the SRM.

Note: The supported storage systems for the Spectrum Virtualize Family SRA are listed in the release notes, and are referred throughout the documentation as "Spectrum Virtualize Family," "storage systems," or "Spectrum Virtualize software."

Concept diagram

Spectrum Virtualize Family can use the IBM Spectrum Virtualize Family SRA add-on that works with each instance of VMware vCenter SRM (protected or recovery).

shows how an IBM SAN Volume Controller is integrated in a typical VMware SRM disaster recovery solution.
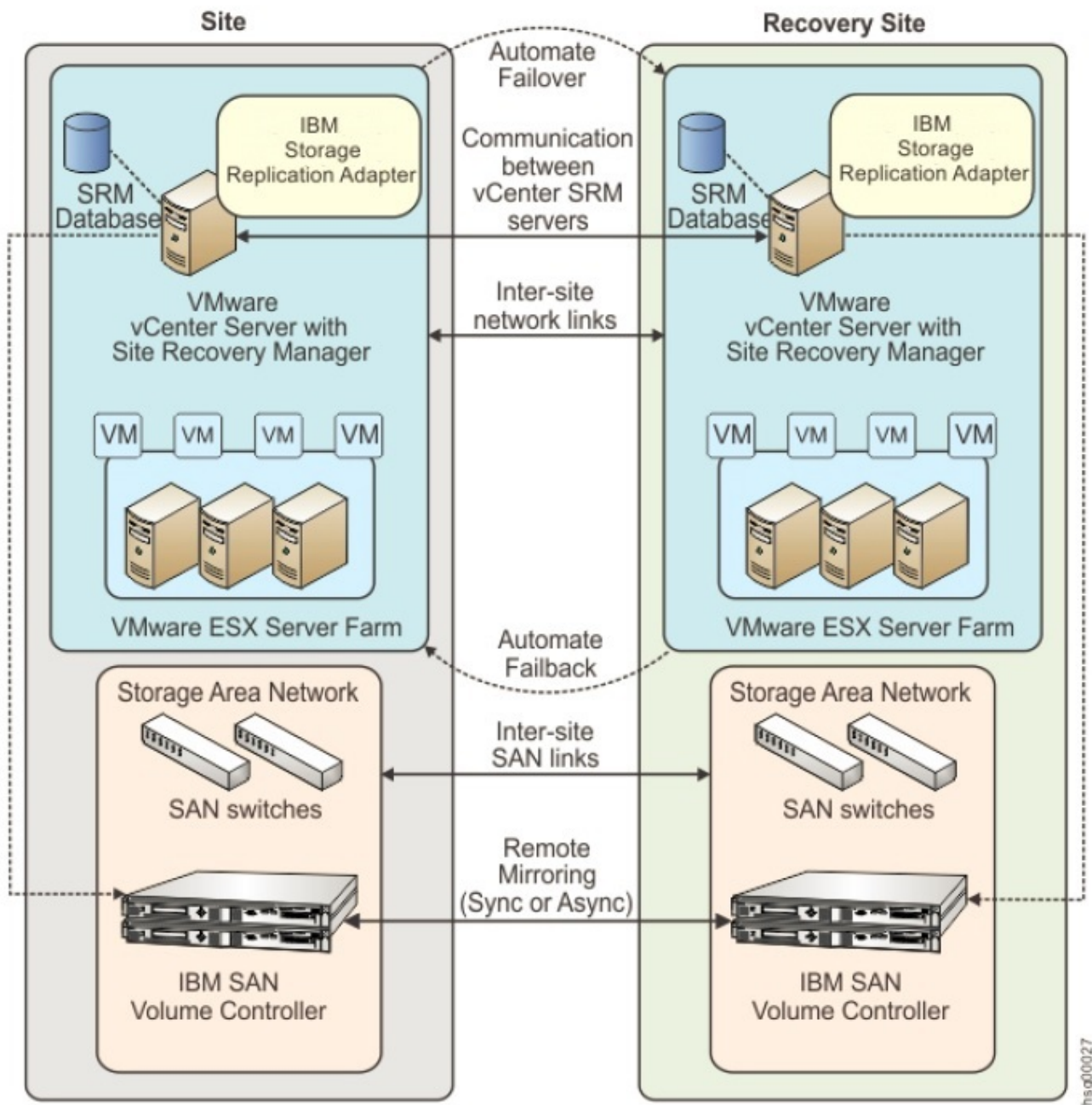
Figure 1. Concept diagram

Compatibility and requirements

For up-to-date information about the compatibility and requirements of the IBM Spectrum Virtualize Family SRA, see the latest release notes.

You can obtain the latest release notes on the IBM Documentation (ibm.com/docs/en).

Note: Refer to the relevant VMware documentation for information about how to install the compatible versions of vCenter Server, Site Recovery Manager, and vSphere Web Client. Also, refer to the latest installation and configuration instructions for VMware ESX and ESXi servers.

Preparation

Depending on your specific site configuration, preparation is required as described in the following topics.

Preparing the SRA environment

Before you install the IBM Spectrum Virtualize Family SRA, you must prepare the storage environment.

Procedure

1. Verify that the supported storage system microcode version is used (for information, refer to the release notes).
2. Create appropriate-sized target volumes on the recovery (secondary) site Spectrum Virtualize Family. If you are using the IBM Spectrum Virtualize Family, create Metro/Global-Mirror relationships between the source and target volumes and add the relationships to consistency groups, as needed. If you are using IBM Stretched Cluster, create appropriate-sized stretched volumes as needed. If you are running IBM HyperSwap, create appropriate-sized HyperSwap volumes as needed.

   Note: For more information about Metro/Global Mirror Copy Services, click here. For more information about IBM Stretched Cluster, click here. For more information about IBM HyperSwap, click here.

3. Create a user on the Spectrum Virtualize Family with the appropriate privileges for the Spectrum Virtualize Family SRA.

   For SRA non-preconfigured settings, a user with "Administrator" or higher privilege is needed. For SRA preconfigured settings, a user with "CopyOperator" or higher privilege is needed.

   Important: Use the same user name and password on both the protected (primary) and the recovery site.

   Note: SRA only supports non-preconfigured settings for IBM Stretched Cluster and IBM HyperSwap.

Verifying the mirroring configuration

All storage systems, volumes, and VMware ESX hosts at both sites must be properly connected to their remote counterparts and configured for site mirroring.

Before you install the IBM Spectrum Virtualize Family SRA, verify that the following prerequisites are completed:

- Your local Spectrum Virtualize Family at the protected (primary) site has mirroring connectivity with the target Spectrum Virtualize Family at the recovery (secondary) site. For IBM Stretched Cluster, stretched volumes are created, and both copies of a stretched volume are online. For IBM HyperSwap, HyperSwap volumes are created, and both the primary volume and secondary volume of a HyperSwap volume are online.
- The name of each Spectrum Virtualize Family is unique at both the protected and the recovery sites.
- The target name of any target Spectrum Virtualize Family (remote copy system) is identical to the predefined System Name of that same remote Spectrum Virtualize Family.
- The storage pools that contain the replicated volumes at both the protected and recovery sites are sufficient for creating the snapshots of all replicated volumes concurrently.
- For non pre-configured environments, an extra space for Test Failover and Failover is necessary. Ensure that enough space is available in the pool for it.

- Remote copying is defined for all Spectrum Virtualize Family-based volumes that you intend to protect as part of your Disaster Recovery Plan (DRP). For IBM Stretched Cluster, stretched volumes are created, and both copies of a stretched volume are online. For IBM HyperSwap, HyperSwap volumes are created, and both the primary volume and secondary volume of a HyperSwap volume are online. For more information, click here.
- Protected volumes are mapped to the protected VMware ESX hosts. For Stretched Cluster, the stretched volumes are mapped to both the protected and recovery VMware ESX hosts. For IBM HyperSwap, the primary volume of a HyperSwap is mapped to both the protected and recovery VMware ESX hosts.
- For non-preconfigured environments, the recovery Spectrum Virtualize Family-based volumes remain unmapped.
- The recovery VMware ESX/ESXi hosts are defined as Spectrum Virtualize Family hosts at the recovery site. For IBM Stretched Cluster and IBM HyperSwap, the recovery VMware ESX/ESXi hosts are defined as storage hosts in Spectrum Virtualize.
- Recovery VMware ESX/ESXi host ports are FC-zoned with the storage system at the recovery site, and are visible by that storage system.

⚠️ **Attention:** Confirm with your storage administrator that all the requirements are met.

Supported iSCSI configurations for mirroring

Single session or multi-session iSCSI configurations are supported for mirroring.

Single-session configuration
The following single-session configurations are supported:

- A VMware ESX server with one NIC port and a single IPv4 address space configured on it. At the same time, the Spectrum Virtualize Family has a single target IPv4 address space configured on an Ethernet port. This configuration results in a single path from the VMware ESX server to each iSCSI LUN.
- A VMware ESX server with one NIC port and a single IPv4 address space configured on it. At the same time, the Spectrum Virtualize Family has two target IPv4 address spaces configured on Ethernet ports, one on each node. This configuration results in two paths visible from the VMware ESX server to each iSCSI LUN.

Multi-session configuration

A maximum of four sessions are supported between a VMware ESXi Server and a Spectrum Virtualize Family node (canister). Therefore, a maximum of eight paths are available to the disk/LUN. For example, four paths or sessions are available to each Spectrum Virtualize Family node (canister) from the iSCSI Qualified Name (IQN) of each iSCSI initiator.

Note: For more information about iSCSI host attachment of VMware hosts, see Guidelines for the Attachment of VMware iSCSI Hosts to SAN Volume Controller and Storwize V7000 – Errata.

Verifying the VMware vCenter Site Recovery Manager installation

Before you start to run the IBM Spectrum Virtualize Family SRA container, you must ensure that the VMware SRM is already installed and accessible at the protected (primary) site as well as the recovery (secondary) site.

Procedure

1. Log in to the VMware vSphere Web Client.

Figure 2. VMware vSphere Web Client login screen
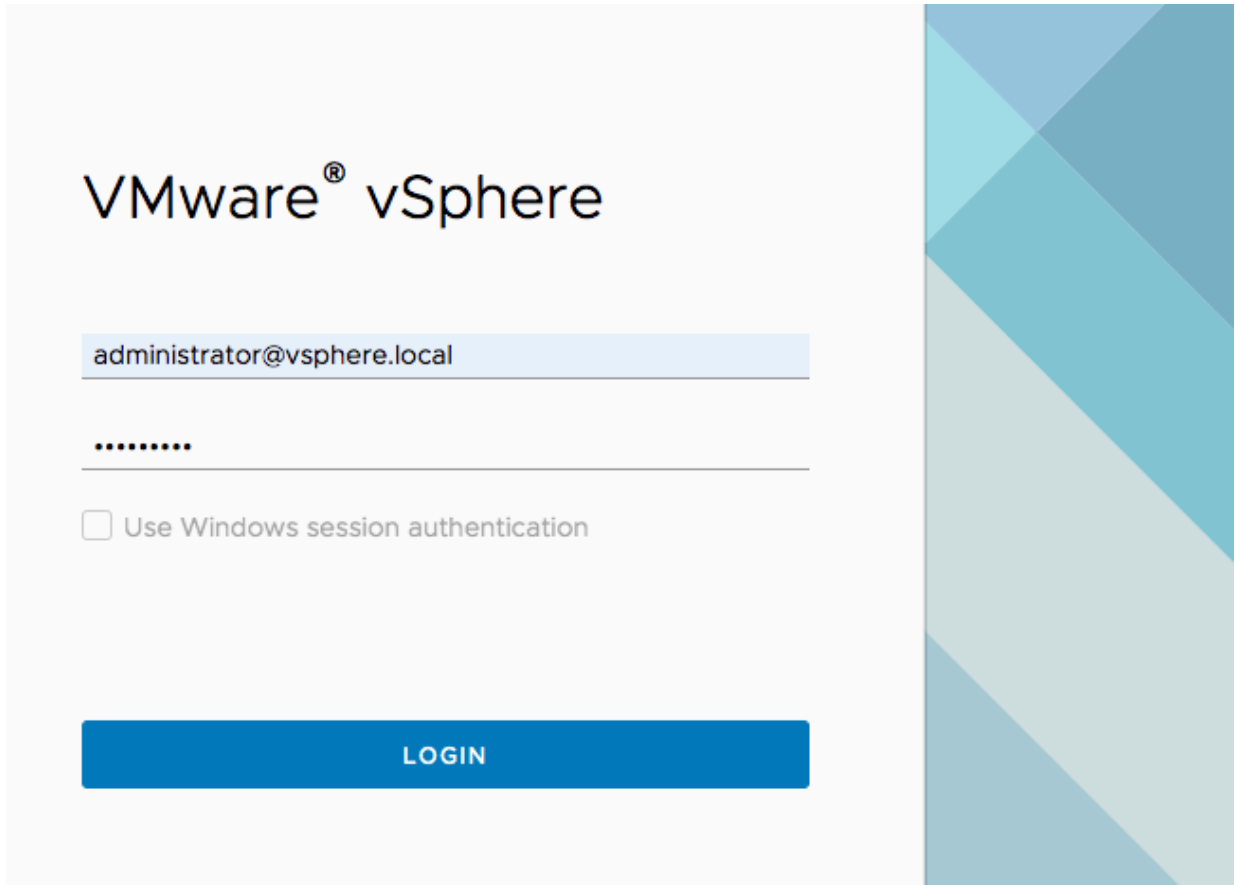
2. Go to the Web Client home page and verify that the **Site Recovery** icon is displayed, as shown in .
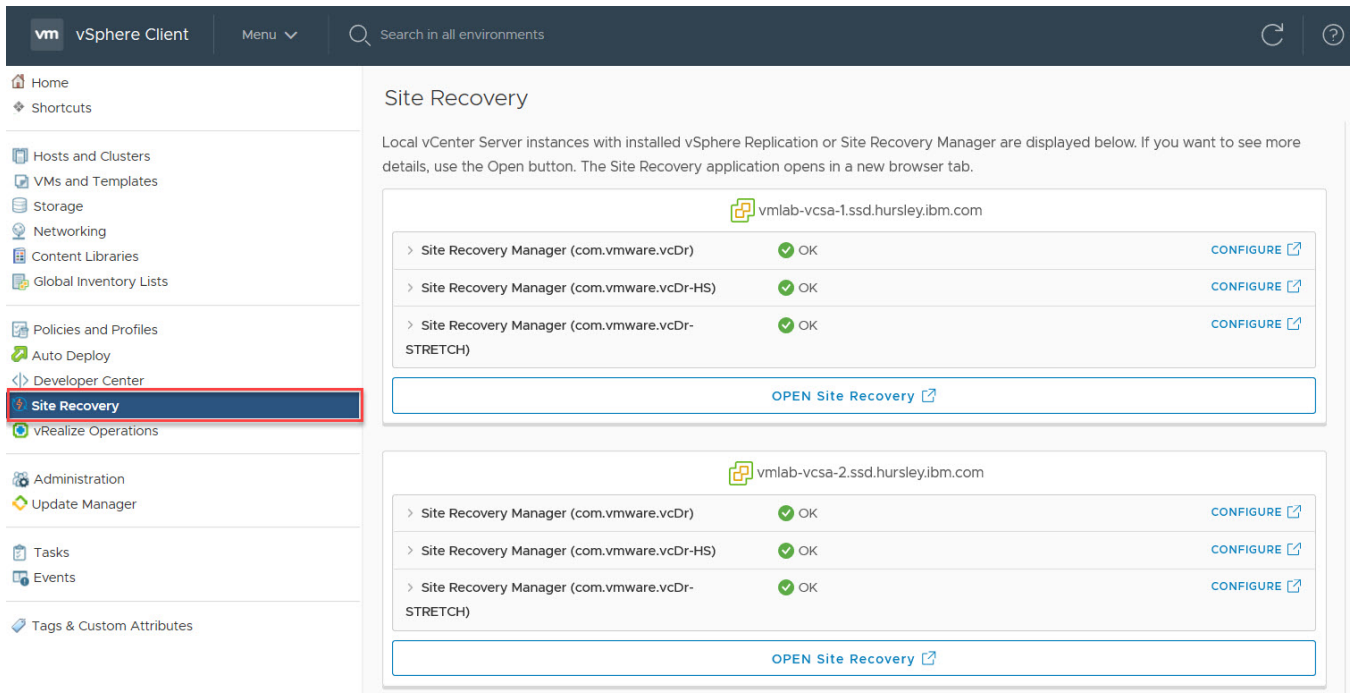

Figure 3. VMware vSphere Web Client home page – Site Recovery icon

Note: For more information on how to install VMware Virtual Center Server and the Site Recovery Manager virtual application, refer to the *VMware Virtual Center installation and administration guide.*

Installation

After you finish the required preparation, you can run the IBM Spectrum Virtualize Family SRA container.

Refer to the following sections for more information.

Downloading the SRA

You can download the IBM Spectrum Virtualize Family SRA from the VMware website.

http://www.vmware.com/go/download-srm

Running the SRA container

Once you have downloaded the IBM Spectrum Virtualize Family SRA from the VMware website, use the VMware SRM Appliance Management interface to run it on the SRM server.

Before you begin

It is suggested that you stop your currently installed version of the SRA container before running a different version. You must satisfy all of the prerequisites that are listed in "Preparation" on page 3 before you run the SRA container.

Procedure

Complete the following steps to run the IBM Spectrum Virtualize Family SRA container on the SRM server.

1. Log in to the VMware SRM Appliance Management interface as admin.
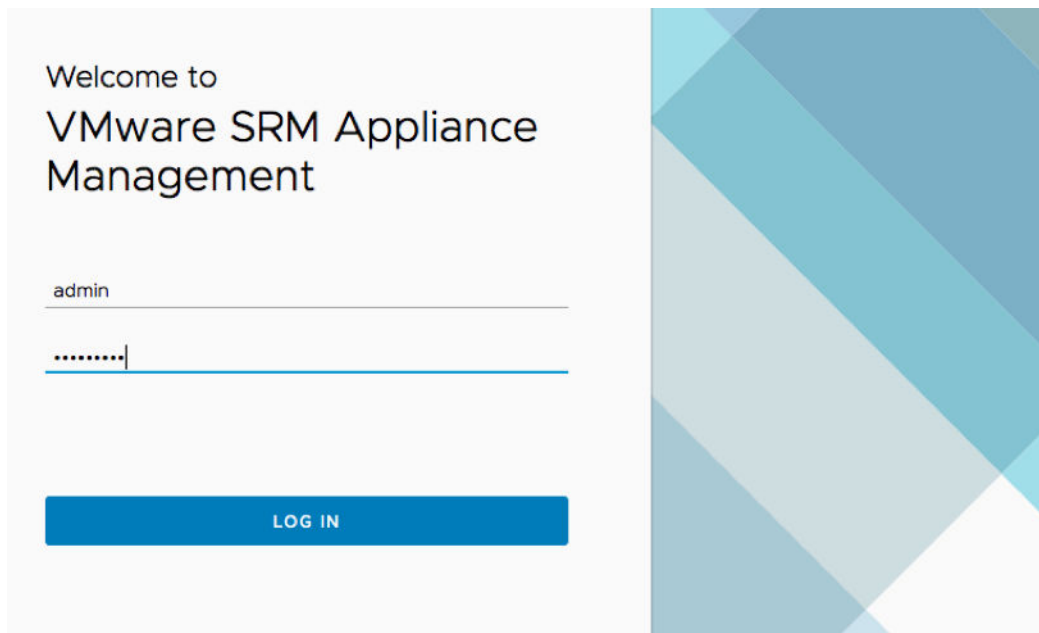
Figure 4. VMware SRM Appliance Management interface login screen

2. In the **SRM Appliance Management** interface, click **Storage Replication Adapters > NEW ADAPTER**, as shown in Figure 5 on page 8.
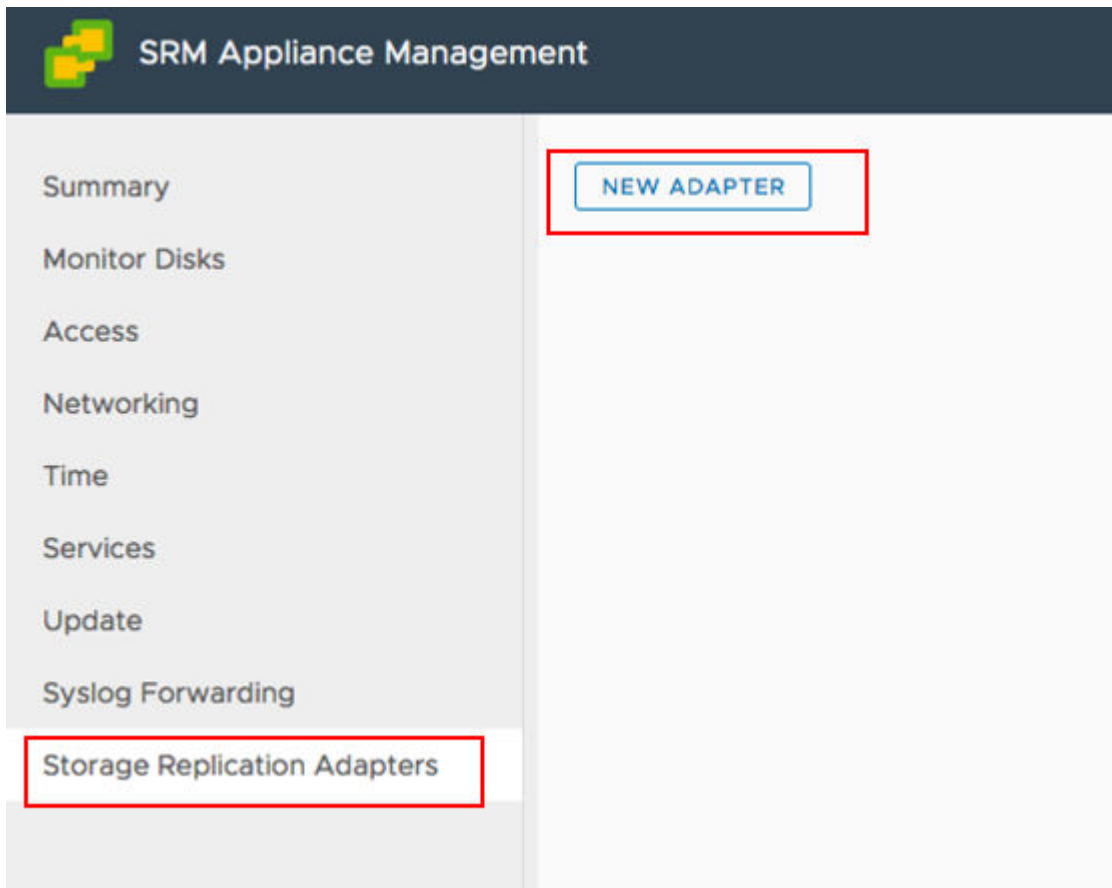
Figure 5. NEW ADAPTER button on Storage Replication Adapters view in SRM Appliance Management interface

3. Click **Upload**, navigate to the directory where you saved the SRA file, and double-click it.

   The SRA upload process begins.

4. When the upload process finishes, click **Close**.

   The SRA card is displayed on the Storage Replication Adapters view, as shown in .
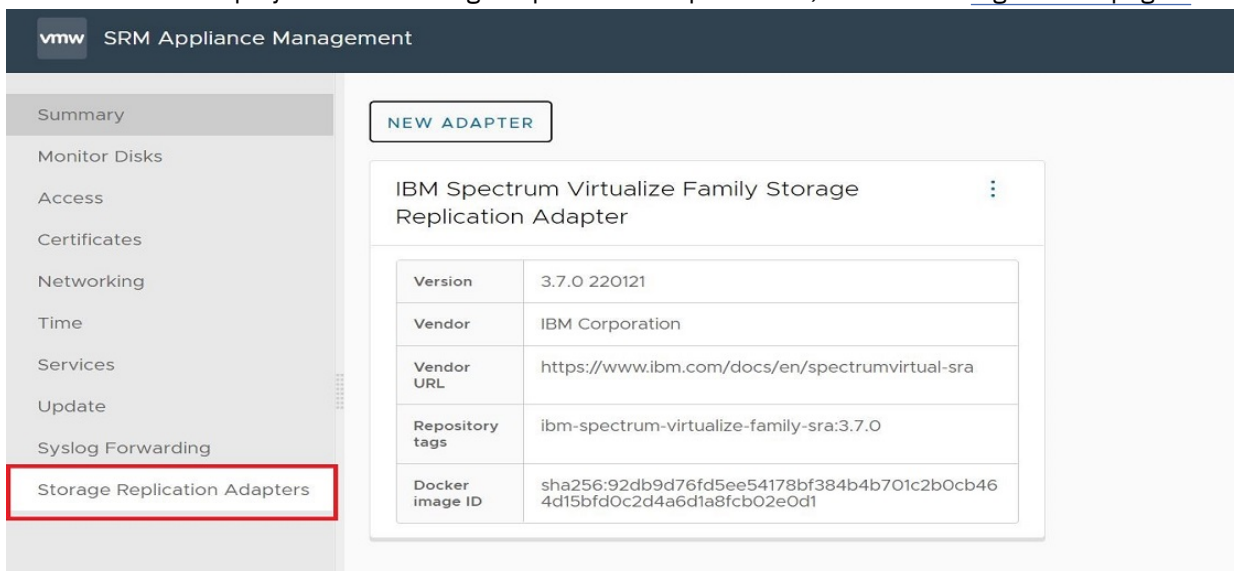
Figure 6. Card for new SRA displayed on Storage Replication Adapters view

5. Log in to the vSphere Web Client.

6. Click **Site Recovery > Open Site Recovery**, select a site pair, and click **View Details**.

7. On the **Site Pair** tab, click **Configure > Array Based Replication > Storage Replication Adapters > RESCAN ADAPTERS**.

Once the rescan is complete, the **Status** field value is updated to OK.

Figure 7. After running RESCAN ADAPTERS on the Site Pair tab on the Site Recovery view

Deleting an SRA

To delete an IBM Spectrum Virtualize Family Storage Replication Adapter from the SRM Server, use the VMware SRM Appliance Management interface.

Procedure

Complete the following steps to delete an SRA from the SRM Server.

Note: If you delete an SRA, any currently running operations involving storage arrays controlled by this adapter are interrupted, including, but not limited to, Recover, Test, Cleanup, and Reprotect.

1. Log in to the VMware SRM Appliance Management interface as `admin`.
2. Click **Storage Replication Adapters**.
3. Find the appropriate SRA card, open its drop-down menu, and select **Delete**.
4. Confirm that you are aware of the results of deleting the adapter and click **Delete**.

   The SRA is deleted.

Configuration

After the Spectrum Virtualize Family SRA files have been uploaded to the SRM Server via the SRM Appliance Management interface, and the SRA container is running on the SRM VA, various configuration tasks can be performed, as described in the following sections.

Updating the SRA configuration file

There are two methods you can use to update the SRA configuration file settings on an SRM Server, as described in the following subsections.

Important: The SRA configuration file must be updated on both the protected (primary) site and the recovery (secondary) site SRM VA. The **preConfiguredEnv** setting must be consistent for both sites.

Updating the SRA configuration file from the SRA container volume (preferred method)

Updating the SRA configuration file on an SRM Server from the SRA container volume is the preferred method. To use this method, complete the following steps.

Procedure

1. Switch to the SRA configuration volume directory located on the SRM VA server:

   `/var/lib/docker/volumes/<Docker_Image_ID>-v/_data`

2. For detail, please check the mount information by using the following command:

   `docker inspect <Container_ID>`

3. Modify the SRA configuration file `sra.settings` under the directory `IBMSpectrumVirtualizeFamilySRA`.

4. Run the `docker` command to verify the result:

   `docker exec <Container_ID> cat /srm/sra/conf/IBMSpectrumVirtualizeFamilySRA/sra.settings`

Updating the SRA configuration file from the SRM Appliance Management Interface

Complete the following steps to updating the SRA configuration file on an SRM Server from the SRM Appliance Management Interface.

Procedure

1. Log in to the **VMware SRM Appliance Management Interface**.
2. Click **Storage Replication Adapters**.
3. Click the drop-down menu within the SRA card on the **Storage Replication Adapters** pane and select **Download configuration archive**, as shown in Figure 8 on page 12.
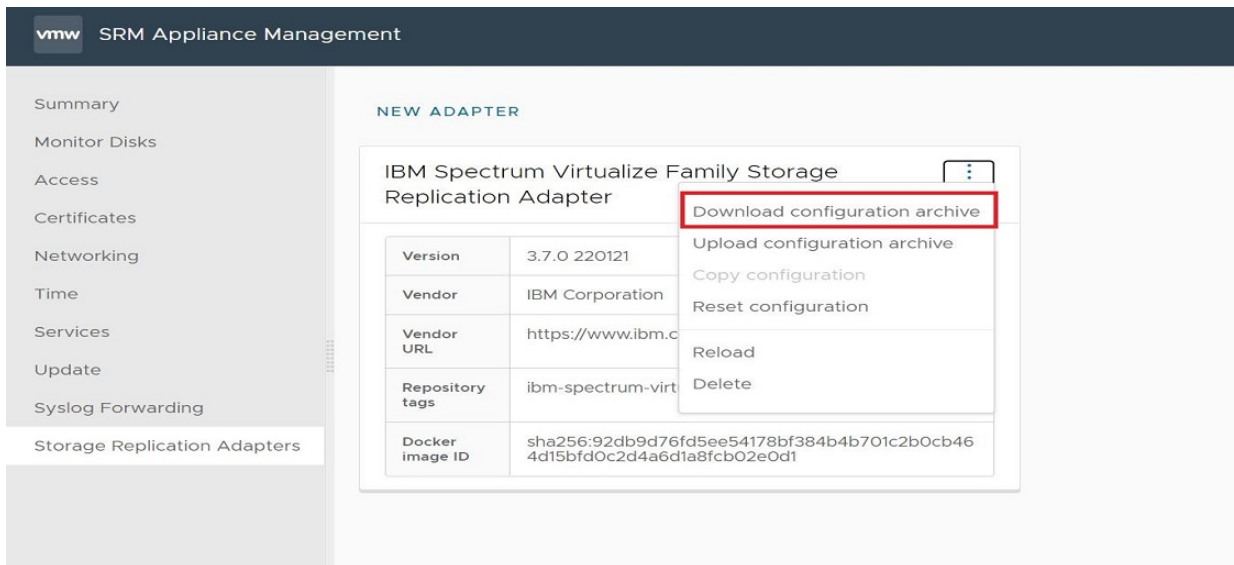
Figure 8. Downloading the configuration archive

4. Extract the archive and modify the SRA configuration file `sra.settings` under the directory `IBMSpectrumVirtualizeFamilySRA`.
   For example, uncompress the archive with the command `tar -pzxvf`:

```
$ tar -pzxvf ibm-spectrum-virtualize-family-sra_3_6_0.tar.gz
x ./
x ./sra-configuration-version.txt
x ./IBMSpectrumVirtualizeFamilySRA/
x ./IBMSpectrumVirtualizeFamilySRA/sra.settings
```

Important: Don't modify the file `sra-configuration-version.txt`. SRM would use this file to match the digest of the current configuration. If the two hashes don't match, the change would be rejected.

5. Compress the SRA configuration files as a `tar.gz`.
   For example, compress the archive with the command `tar -pzcvf`:

```
$ tar -pzxvf ibm-spectrum-virtualize-family-sra_3_6_0.tar.gz
    IBMSpectrumVirtualizeFamilySRA sra-configuration-version.txt
a ./IBMSpectrumVirtualizeFamilySRA/
a ./IBMSpectrumVirtualizeFamilySRA/sra.settings
a ./sra-configuration-version.txt
```

6. Back on the **Storage Replication Adapters** pane in the SRM Appliance Management interface, click the drop-down menu within the SRA card and select **Upload configuration archive**, as shown in Figure 9 on page 13.
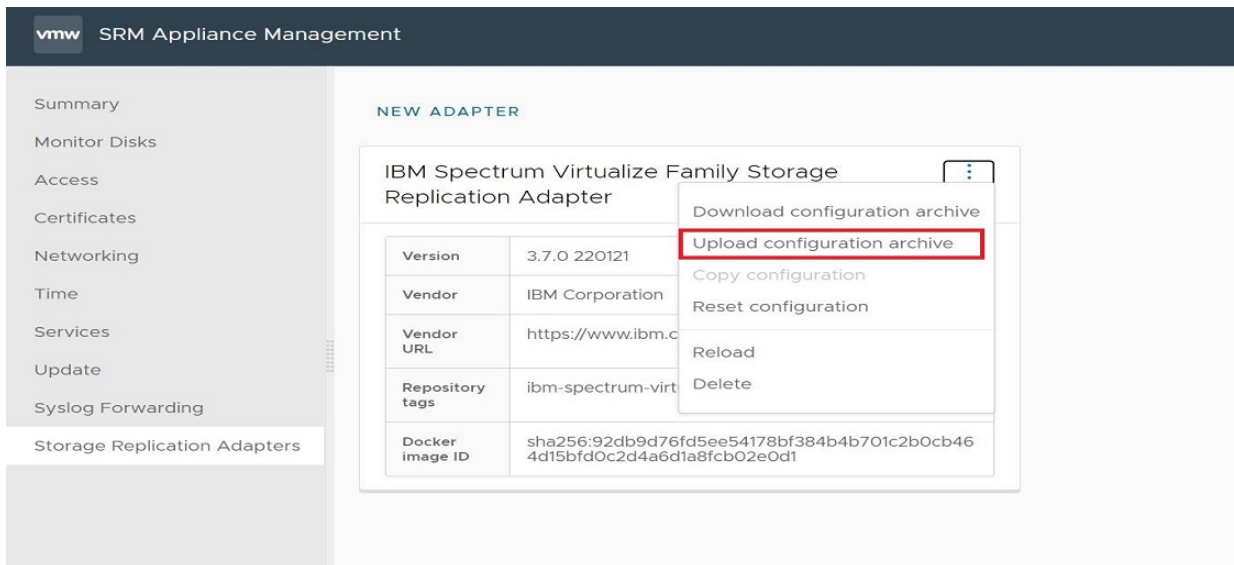
Figure 9. Uploading the configuration archive

7. Run the `docker` command to verify the result:

```
docker exec <Container_ID> cat /srm/sra/conf/IBMSpectrumVirtualizeFamilySRA/
sra.settings
```

Configuring force recovery setting

Update the force recovery setting from within the SRA configuration file `sra.settings`.

The default setting is disabled. To forcefully perform a recovery operation, change the **force** flag value from *False* to *True*.

Important: Do not enable this configuration in a regular working environment. Only enable this setting after consulting IBM Support, in a disaster scenario. Be sure to disable the configuration after the task is complete. Leaving the configuration enabled may lead to data loss or corruption.

Configuring source and target volume backup settings

Source and target volume backup settings must be configured for the following recovery scenarios provided by VMware SRM 5.0 or later:

- Planned failover
- Disaster recovery

To do this, configure Spectrum Virtualize Family SRA to create FlashCopy backups of the remote copy source and target volumes by setting **protectSource** and **protectTarget** to `True` in `sra.settings`. (For more information, see "Updating the SRA configuration file" on page 11.)

Note: Stretched and HyperSwap volumes within IBM Stretched Cluster and IBM HyperSwap features do not have a source or target. As a result, the SRA does not create FlashCopy backups even if **protectSource** and **protectTarget** are set to `True`.

Before completing the update process, set the following MDisk group IDs within `sra.settings`:

- **sourceMDiskGroupID**
- **recoveryMDiskGroupID**
- **testMDiskGroupID**

Note:

- **testMDiskGroupID** must be set before promoting target volumes to the VMWare ESX server and recovering VMs on them.

- If the Spectrum Virtualize Family SRA fails to back up the source or target volumes, no warning message is displayed. Check the backups on the storage system or check the messages in the SRM log files.

Configuring preconfigured environments

If the **preconfiguredEnv** option is set to `True` in the SRA configuration file `sra.settings`, some additional steps must be completed before Spectrum Virtualize Family SRA can function properly.

About this task

To complete these tasks you must use the storage system GUI or tools that are part of the storage system that you use.

Note: IBM Spectrum Virtualize Family SRA does not support preconfigured mode for IBM Stretched Cluster or IBM HyperSwap.

Procedure

1. Create an equal number of FlashCopy (target) volumes as the Remote Copy target volumes on the recovery (secondary) site storage system.
2. Create a background copy and incremental FlashCopy mapping between Remote Copy target volumes and the previously created FlashCopy target volumes on the recovery site storage system.
3. If the remote copies are in a consistency group, create a corresponding FlashCopy consistency group and configure the corresponding FlashCopy to the FlashCopy consistency group.
4. Map the Remote Copy target and FlashCopy target volumes to the recovery site vSphere servers.
5. Create an equal number of FlashCopy (target) volumes as the Remote Copy source volumes on the protected (primary) site storage system.
6. Create a background copy and incremental FlashCopy mapping between Remote Copy source volumes and the previously created FlashCopy target volumes on the protected site storage system.
7. If the remote copies are in a consistency group, create a corresponding FlashCopy consistency group and configure the corresponding FlashCopy to the FlashCopy consistency group.
8. Map the Remote Copy source and FlashCopy target volumes to the protected site vSphere servers.

   Note:

   - FlashCopy configuration on the protected site is for the test recovery and recovery operations, after the **reprotect** operation on the recovery site.
   - FlashCopy (target) volumes are resynchronized during recovery.

Configuring non-preconfigured environments

If the **preconfiguredEnv** option is set to `False` in the SRA configuration file `sra.settings`,IBM Spectrum Virtualize Family SRA runs in non-preconfigured mode, creates volumes and FlashCopy, and attaches and detaches volumes to and from the host. But in order for the SRA to function correctly in this mode, some additional configuration is required.

About this task

To configure needed settings for the SRA running in non-preconfigured mode, you must update the SRA configuration file, `sra.settings`. To learn how, see "Updating the SRA configuration file" on page 11.

Procedure

1. Set appropriate values for the following parameters in `sra.settings`:

   SaveExportInformation
   The default setting is disabled. To enable this feature, change the flag value from *False* to *True*.

   Note:

- When the flag is enabled, SRA uses the original host mapping that was configured before the failover, to export storage LUNs during the failback process.
- When the flag is disabled, SRA continues to use the host list shared by SRM to export storage LUNs.

testMDiskGroupID
Instructs Spectrum Virtualize Family SRA on which MDisk group on the recovery site storage system creates the FlashCopy (target) volumes during test recovery operations.

volumeType
Set the volume type as Standard, Thin Provisioned (Space Efficient), or Compressed Volume depending on your requirement. Spectrum Virtualize Family SRA creates the same type of volume during test recovery or recovery.

Note:

- If you back up remote copy source or target volumes during recovery, the **soruceMDiskGroupID** must be an MDisk group ID on the protected (primary) Spectrum Virtualize Family cluster. Likewise, on the recovery (secondary) site Spectrum Virtualize Family, the **recoveryMDiskGroupID** must also be an MDisk group ID.
- MDisk group ID should be a valid single numeric value.

2. Save the `sra.settings` file and run the `docker` command to verify the result:

```
docker exec <Container_ID> cat
/srm/sra/conf/IBMSpectrumVirtualizeFamilySRA/sra.settings
```

Setting SRA user privileges

Setting Spectrum Virtualize Family SRA user privileges differs depending on whether you have a preconfigured environment or a non-preconfigured environment.

Refer to the following guidelines for each case.

Preconfigured environment
If **preconfiguredEnv** is set to `True` in the SRA configuration file `sra.settings`, a **CopyOperator** privilege is enough if you first create the needed volumes and map them to the recovery site VMware ESX servers.

Non-preconfigured environment
If **preconfiguredEnv** is set to `False` in the SRA configuration file `sra.settings`, an **Administrator** privilege is necessary for Spectrum Virtualize Family SRA to complete the following tasks:

- Create snapshot volumes and map them to the VMware ESX servers at the recovery site.
- Run test recovery operations.

   Note: If the replicated targets are pre-mapped to the recovery site VMware ESX servers, a **CopyOperator** privilege is enough for recovery operations.

Checking the configuration

To check the SRA configuration, complete the following steps.

Procedure

1. Run the following command:

   `docker exec -it <container_ID> java -jar srachecktool.jar`

   Note: The container ID should be the latest one.
2. Enter the user name and password.

Usage

Use the IBM Spectrum Virtualize Family SRA to run dependable Disaster Recovery Planning (DRP). The Spectrum Virtualize Family SRA also protects VMware sites with their storage system-based datastores.

This includes:

Creating the Target Volumes and Metro/Global Mirror Relationships

You must create an equal number of target VDisks (for Metro/Global Mirror targets) and source VDisks on the recovery site Spectrum Virtualize Family.

Important:

- Create Metro/Global Mirror relationships between the source and target VDisks and add them to consistency groups, as explained in "Preparing the SRA environment" on page 3.
- Before you use the Spectrum Virtualize Family SRA, make sure that the Metro/Global Mirror relationships and consistency groups are in a consistent synchronized state.
- For Stretched Cluster, make sure that the two copies of a stretched volume reside in different sites and that both copies are online.
- For IBM HyperSwap, make sure that the primary volume and secondary volume of a HyperSwap volume are online.

Adding an array pair to the VMware Site Recovery Manager

To add an array pair to VMware Site Recovery Manager, complete the following steps.

Procedure

1. In the VMware vSphere Web Client, click **Site Recovery > Open Site Recovery > NEW SITE PAIR**.
2. Enter the Remote Virtual Center host name, user name, and password when prompted and click **NEXT**.
3. Click one of the sites you want to pair and click **Next**.
4. Confirm the connection by clicking **CONNECT**.
5. Review your selected settings and click **FINISH**.
6. Click **VIEW DETAILS** to verify the information on the Summary pane, as shown in Figure 10 on page 18.
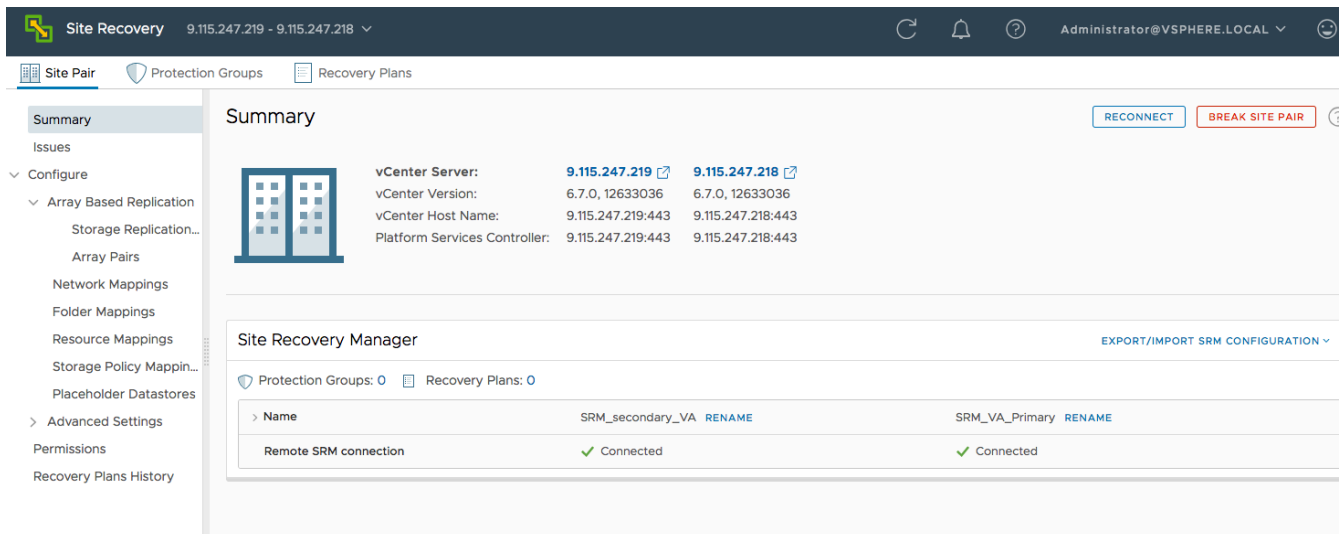
Figure 10. Summary pane showing connection between local site and paired site

7. On the **Site Pair** tab, click **Configure > Array Based Replication > Array Pairs** to open the Array Pairs pane, as shown in Figure 11 on page 18.

Figure 11. Array Pairs pane

8. Click **ADD** to add an array manager.

9. On the **Add Array Pair - Storage replication adapter** pane, select **IBM Spectrum Virtualize Family Storage Replication Adapter** and click **NEXT**, as shown in Figure 12 on page 19.

Figure 12. Add Array Pair - Storage replication adapter pane

10. On the **Local array manager** pane, as shown in , enter the array manager information as detailed after the figure and then click **Next**.

Figure 13. Local array manager pane

CIM Address of Local Spectrum Virtualize Cluster
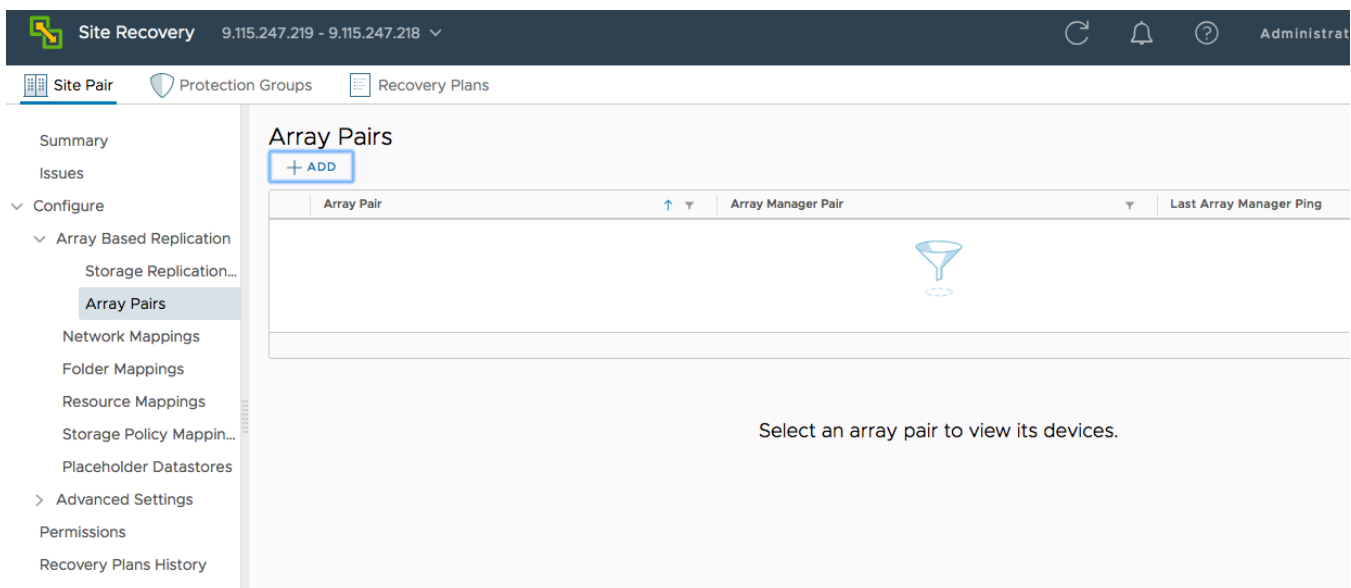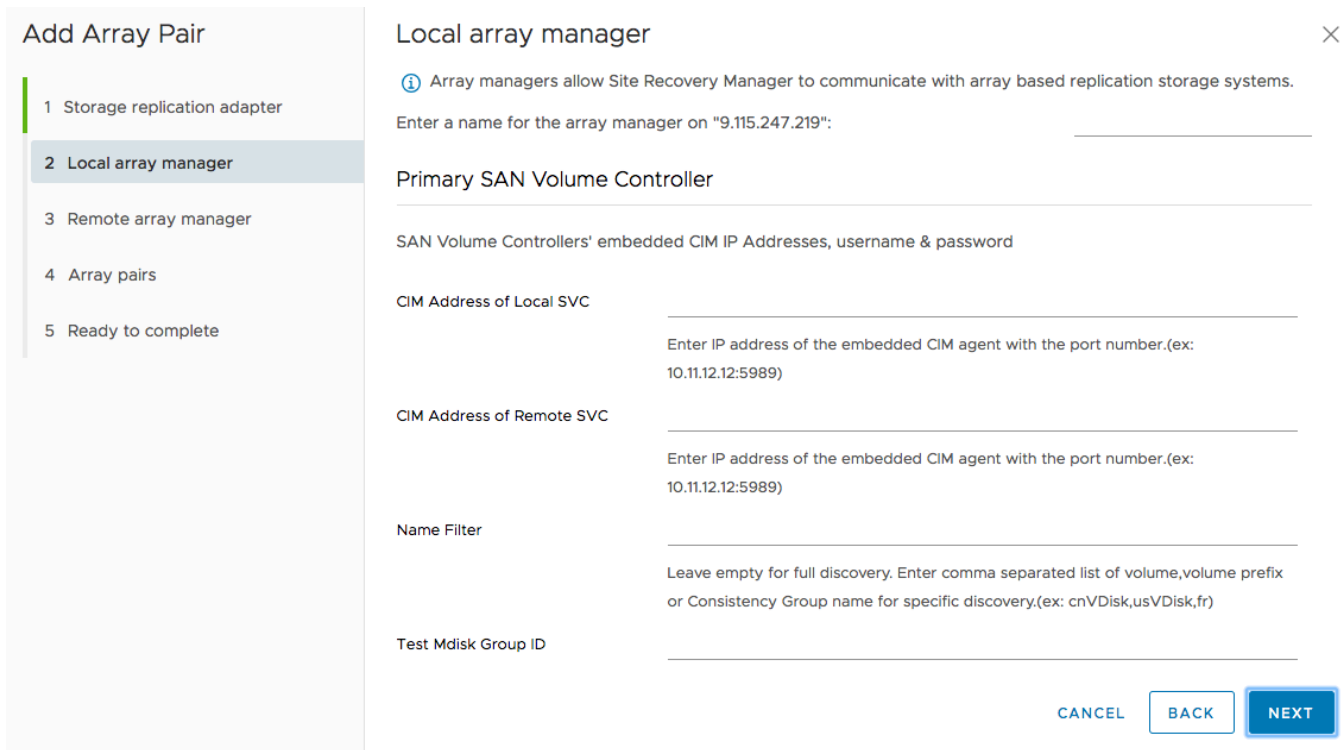Enter the CIMOM address and CIM port of the local Spectrum Virtualize Cluster.

Note: Spectrum Virtualize SRA supports only port 5989 to connect to CIMOM through https.

CIM Address of Remote Spectrum Virtualize Cluster
Enter the CIMOM address and CIM port of the remote Spectrum Virtualize Cluster. The addresses can either be IP addresses or fully qualified domain names.

Note:

- Enter the same CIMOM address and CIM port as the primary Spectrum Virtualize Cluster, if you are using IBM Stretched Cluster or IBM HyperSwap.
- If `M:N` topology is being used, enter any one of the Spectrum Virtualize Clusters (`N`) on the remote site for the CIM Address of the remote Spectrum Virtualize Cluster. The term `M:N` refers to the number of Spectrum Virtualize Clusters on the local site (`M`) and remote site (`N`). No calculations are derived from this term. `M:N` is only used to denote the replication process.

- Spectrum Virtualize multiple port configuration is supported with SRA when 1:1 Spectrum Virtualize topology is used. With Spectrum Virtualize M:N topology and multiple port configuration, replication may not work as SRA communicates with Spectrum Virtualize PORT 1.

Name Filter
This field is optional. To run a full discovery, keep this field empty. To filter volume names or consistency groups, enter the volume name/prefix or consistency group name/prefix to run the filter operation.

Note: For more information, see "Filtering volumes and consistency groups by name" on page 21.

Test Mdisk Group ID
Input an Mdisk group ID for the local Spectrum Virtualize Cluster, which will be used to create flash copies in when running the test operation.

Note:

- MDisk group ID should be a valid single numeric value.
- If an Mdisk group ID is set here, SRA will ignore the value of Test Mdisk Group ID set in the SRA Utility.

User name
Enter the user name that is configured on the CIMOM.

Password
Enter the password that is configured on the CIMOM.

Important: The user name and password for local and remote Spectrum Virtualize CIMOMs must be the same.

11. On the **Remote array manager** pane, as shown in Figure 14 on page 20, enter the remote array manager information as detailed above and then click **Next**.

Figure 14. Remote array manager pane

12. On the **Array pairs** pane, enable the array pairs and then click **Next**.
13. On the **Ready to complete** pane, click **Finish**.

The Array Pairs pane is displayed, as shown in Figure 15 on page 21. If there are new replicated devices that need to be discovered, click **Refresh**.

Figure 15. Array Pairs pane, array pair added and enabled

⚠️ **Attention:** All Spectrum Virtualize Family-replicated VDisks that participate in SRM and belong to the same remote copy consistency group are shown under a single local consistency group. To avoid data inconsistencies, when adding replicated VDisks to the same VM or datastore, all VDisks used by a single VM or application must be added to the same consistency group.

Filtering volumes and consistency groups by name

Use the **Name Filter** option if you only want to see SRM managed replicated volumes.

Before you begin

Note: Use of the **Name Filter** field is optional. It can be left empty to enable full discovery, as shown in Figure 15 on page 21.

Procedure

1. On the Array Pairs pane in the VMware vSphere Web Client, select an array pair and then select **Edit Local Array Manager** from the **ARRAY MANAGER PAIR** drop-down menu to open the **Edit Array Manager** pane, as shown in Figure 16 on page 22.

Figure 16. Edit Local Array Manager selection

2. Enter the consistency group name or prefix and volume name or volume name prefix in the **Name Filter** field on the **Edit Local Array Manager** pane, as shown in Figure 17 on page 22.

Figure 17. Edit Local Array Manager pane with Name Filter information entered

Note: You can enter multiple volume names or volume prefixes, multiple consistency group names, or prefixes, or both.

3. Fill in the **Username** and **Password** fields.

4. Click **Save**.

The name filter is added to the local array and is displayed on the Array Pairs pane.

Note: An error is issued if you enter the volume names on the local site and a matching remote site volume name is not found, as shown in Figure 18 on page 23.
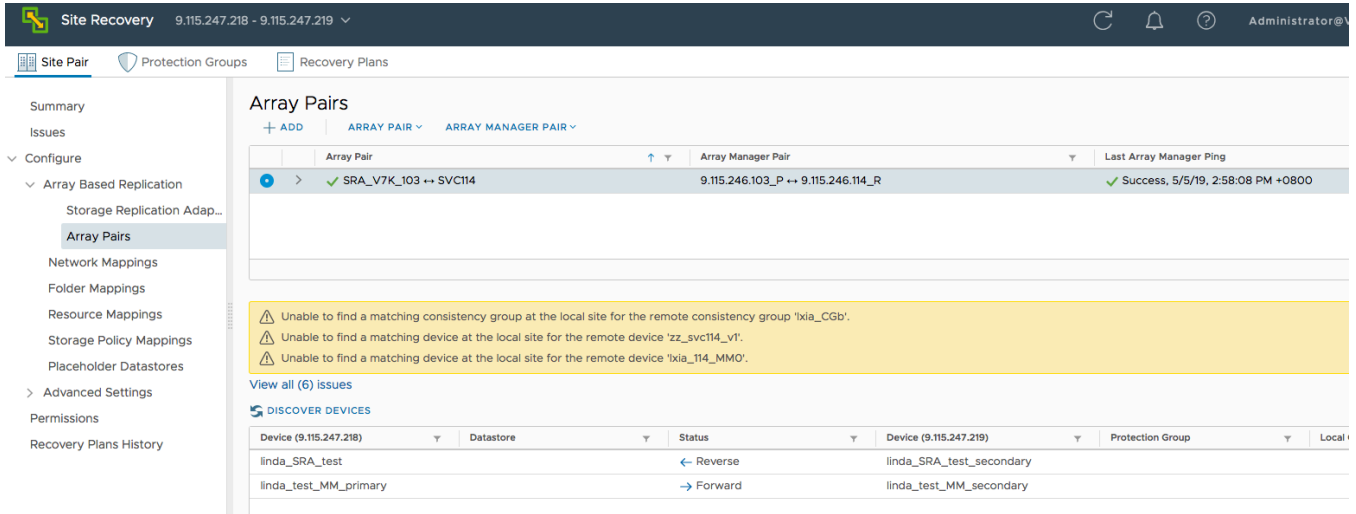
Figure 18. Array Pairs pane after adding name filter to local array

5. Select **Edit Remote Array Manager** from the **ARRAY MANAGER PAIR** drop-down menu to open the **Edit Array Manager** pane.
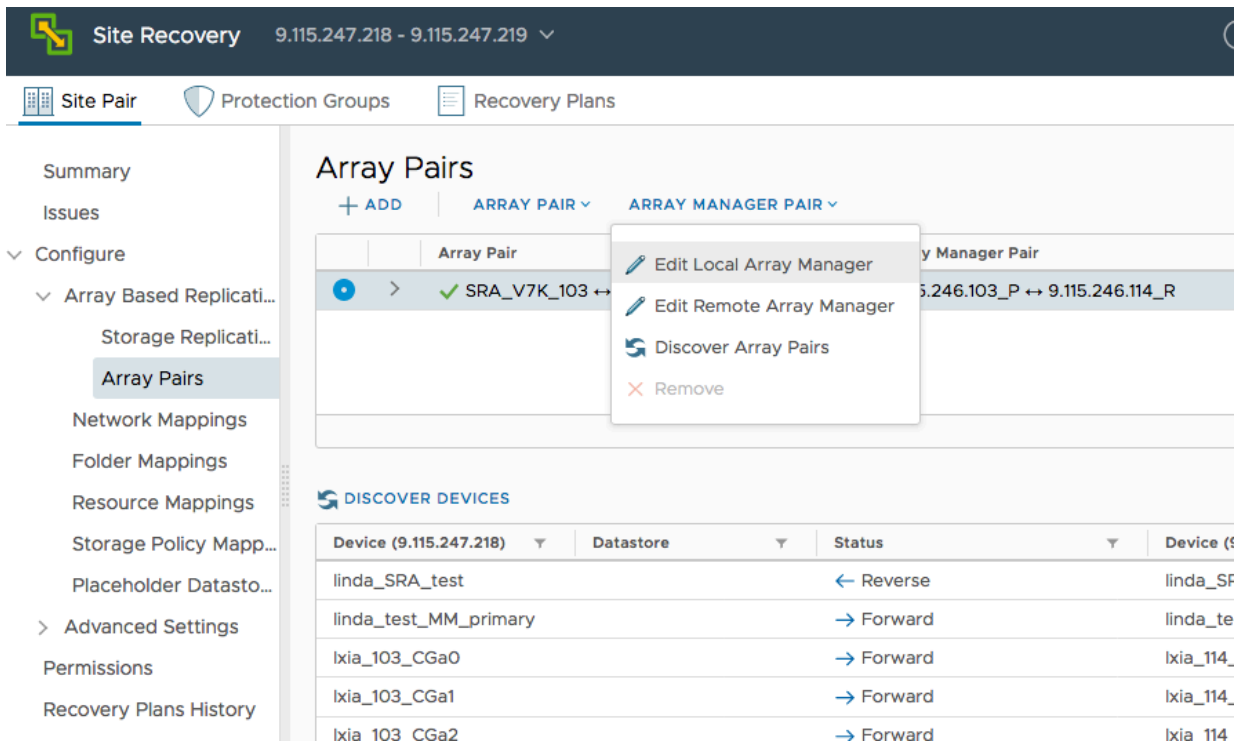
6. Enter the consistency group name or prefix and volume name or volume name prefix in the **Name Filter** field on the **Edit Remote Array Manager** pane.

Note: You can enter multiple volume names or volume prefixes, multiple consistency group names, or prefixes, or both.

Note: Prefixes for the volume name can be different for each site, but prefixes must be paired with the remote site array manager. For example, if the local site volume name is `Pri_WinXP`, and on the remote site it is mapped to `Rec_WinXP`, then you could enter the prefix `Pri` in the **Name Filter** field for the local site and the prefix `Rec` on the remote site. To use the name filter for the consistency group, enter the same names and prefixes at both the local and remote sites.

7. Fill in the **Username** and **Password** fields.

8. Click **Save**.

The name filter is added to the remote array and is displayed on the Array Pairs pane, as shown in Figure 19 on page 23.

Figure 19. Array Pairs pane after adding name filter to remote array

Filtering different consistency groups and volumes

When the **Name Filter** shows the volumes that belong to any consistency group, it shows volumes only if the prefix matches to all volumes in that consistency group.

As shown in the Storwize V7000 management GUI in , if you enter the name or prefix and it does not match all of the names in the consistency group, it ignores other volumes of that consistency group. For more information, see .
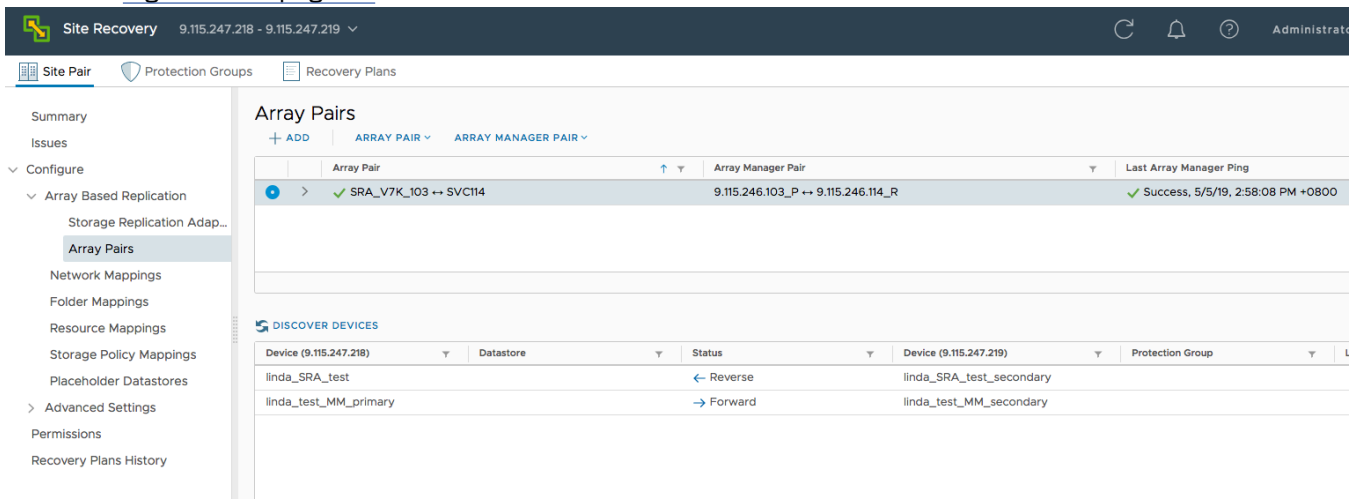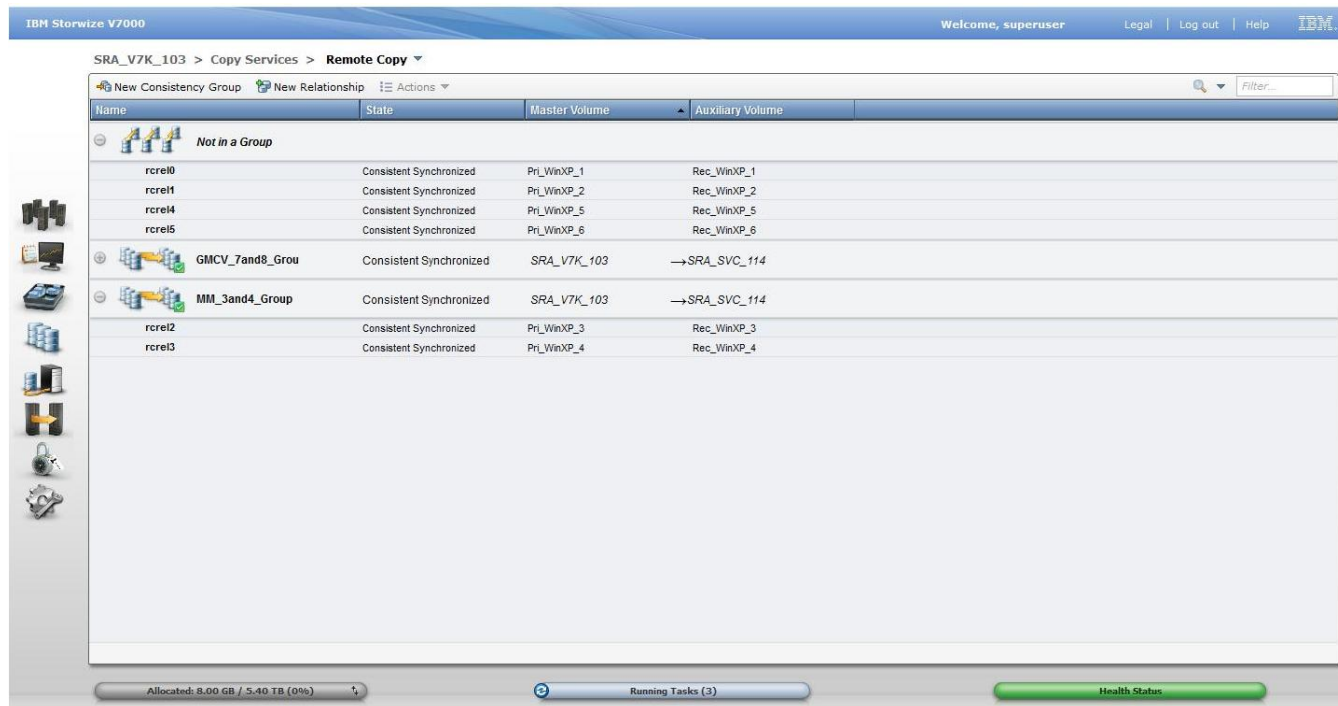

Figure 20. Storwize V7000 management GUI – volumes and consistency groups

Table 1. Name Filter Output		
Local site: Name Filter value	**Remote site: Name Filter value**	**Devices that are displayed on SRM**
GMCV	GMCV	Pri_WinXP_7, Pri_WinXP_8
Pri	Rec	Full Discovery
Pri_WinXP_1, Pri_WinXP_7	Rec_WinXP_1,Rec_WinXP_7	Only Pri_WinXP_1 display.
Pri_WinXP_7,Pri_WinXP_8, Pri_WinXP_3,Pri_WinXP_6	Rec_WinXP_7,Rec_WinXP_8, Rec_WinXP_3,Rec_WinXP_6	All display except Pri_WinXP_3

Running a Test procedure

Depending on the SRA configuration, you might have to perform extra tasks for the test procedure to work.

For troubleshooting information, see "Managing test failure" on page 30.

Running a Test procedure on a preconfigured environment

The Spectrum Virtualize Family SRA completely automates the test procedure.

During the test procedure, the preconfigured FlashCopy target volumes are resynchronized. During the cleanup procedure, the preconfigured FlashCopy target volumes are stopped.

Ensure that all the steps that are outlined in "Configuring preconfigured environments" on page 14 are finished.

Running a Test procedure on a non-preconfigured environment

The Spectrum Virtualize Family SRA completely automates the test procedure.

During the test procedure, FlashCopy target volumes are created in the MDisk Group that is specified during the configuration. During the cleanup procedure, the FlashCopy target volumes that are created during the test procedure are deleted.

SRA Test procedure prerequisites:

- Ensure that there is enough free space available on the MDisk Group.
- Ensure that all the steps that are outlined in "Configuring non-preconfigured environments" on page 14 are finished.

Running a failover procedure

The Spectrum Virtualize Family SRA completely automates the failover procedure.

Note:

- For IBM Stretched Cluster, the synchronization between the two copies of a stretched volume is managed by IBM Stretched Cluster, so the active-active replication within a stretched volume is always running, unless one of the copies is offline.
- For IBM HyperSwap, the synchronization between the primary volume and the secondary volume of a HyperSwap volume is managed by the HyperSwap function, so the active-active replication within a HyperSwap volume is always running, unless one of the sites is offline.

For a planned failover, the Metro Mirror/Global Mirror direction is switched. Global Mirror with Cycling Mode is stopped with the target volume writable.

For an unplanned failover, the Metro Mirror/Global Mirror/Global Mirror with Cycling Mode is stopped with the target volume writable.

The Metro Mirror/Global Mirror/Global Mirror with Cycling Mode target volume is prompted to the vSphere Server as a production volume. During an SRA preconfigured failover procedure, the preconfigured FlashCopy is resynchronized.

SRA Failover procedure prerequisites:

- Ensure that all the steps that are outlined in "Configuring preconfigured environments" on page 14 are finished.
- Ensure that all the steps that are outlined in "Configuring non-preconfigured environments" on page 14 are finished.

Running a Reprotect procedure

The Spectrum Virtualize Family SRA completely automates the reprotect procedure.

Before you run the **Reprotect** action, ensure that the status of the Metro Mirror/Global Mirror/Global Mirror with Cycling Mode is not disconnected. Refresh the **SRM Array Managers Devices** pane to ensure that no error messages occur.

The Metro Mirror/Global Mirror/Global Mirror with Cycling mode direction changes from the original recovery site to the original protection site, and the mirroring action resumes.

For SRA with a non-preconfigured setting, the volume of the original protection site is masked from the vSphere Server to avoid any damage to the volume. The original protection site consists of the target volume of the Metro Mirror/Global Mirror/Global Mirror with Cycling Mode.

The following tasks are required for the SRA reprotect procedure:

- Ensure all the steps that are outlined in "Configuring preconfigured environments" on page 14 are finished.
- Ensure all the steps that are outlined in "Configuring non-preconfigured environments" on page 14 are finished.

Best practices

The following guidelines are important to follow while you configure the Spectrum Virtualize Family SRA.

Managing datastores and consistency groups

Follow these best practice guidelines while you manage datastores and consistency groups.

- The datastores of one VM should be in the same consistency group.
- The datastore of the VM and the raw disk in the VM should be in the same consistency group.
- You must have administrator privileges to install the Recovery Manager.
- Set the appropriate timeout and rescan values in SRM for the recovery of many VMs.

Troubleshooting

When an error occurs, check the status of Spectrum Virtualize Family, VMware ESX servers, vCenter servers, and SANs.

Managing `Reprotect` failure

Ensure firewall is enabled to connect both of the following:

- Site1 SRM to both sites of storage
- Site2 SRM to both sites of storage

Managing `Generic` failure

Ensure MDisk group ID configured in array pair or `sra.settings` file is valid single numeric value. String and list of IDs are not supported.

Managing `DiscoverArrays` failure

Verify the following items when you encounter a failure during Array Manager operation:

1. Check that the IP address is correct and in the correct format. For example, the format can resemble: `192.168.10.1:5989`.
2. Check that the user name and password are correct.
3. Check to see whether the Spectrum Virtualize Clusters are paired.

Managing `DiscoverDevices` failure

Important: Relationship and consistency group (CG) status typically is `consist_synchronized` or `consistent_copying` for Global Mirror with Cycling Mode.

Note: To handle device with unknown status, check SRA-STATUS file. If entries of required LUNs are present, clean it up if there are no pending operations for those LUNs.

Managing `recovery` failure

For environments that are not pre-configured, ensure that the following items are checked or corrected:

1. Recovery, after you switch from pre-configuration without a rescan of the SRA.
2. CIM user privilege problem, "administrator" access required.
3. After disaster recovery, it is necessary to wait a few minutes and then refresh the devices in the SRM Array Managers on both sites. This step is necessary to ensure that there is no error before the plan is re-protected.
4. All volumes part of a consistency group are not included in the SRM Recovery Plan.

For environments that are pre-configured, ensure that the following items are checked or corrected:

1. FlashCopy was not created.
2. Corresponding **fcmap** consistency group was not created.
3. The **Remotecopy** target volume is not mapped to the recovery site.
4. All volumes part of a consistency group are not included in the SRM Recovery Plan.

Managing `test failure`

For environments that are not preconfigured, ensure that the following are checked or corrected:

1. CIM user privilege problem, "administrator" access required.
2. Not enough space in the **mdisk** group.
3. Switching from pre-configured without rescan SRA.
4. The **Mdiskgroup** and volume type is not set for Spectrum Virtualize Family SRA.
5. All volumes part of a consistency group are not included in the SRM Recovery Plan.

For environments that are preconfigured, ensure that the following items are checked or corrected:

1. FlashCopy not created.
2. FlashCopy target volume is not mapped to host.
3. Corresponding FlashCopy consistency group not created.
4. FlashCopy target volume that is mapped to the host are shown as Mounted in Hosts and Clusters/Configuration/Storage/Devices.
5. All volumes part of a consistency group are not included in the SRM Recovery Plan.

Managing SRM procedures

1. Refresh the devices in the SRM array managers. If there are no errors, go to step "8" on page 31. Otherwise, continue to step "2" on page 30.
2. Check all the previously related remote copies in the SRA-STATUS file in the SRA installation directory. For example, `sudo docker exec -it <container id> cat /srm/sra/log/SRA-STATUS`. Retrieve `<container id>` from **sudo docker ps** command. The format of the SRA-STATUS file is shown in the following example:

   ```
   [ArrayID]|[LunID]=* [ArrayID] + "|CG;" +
   [RemoteCopyConsistencyGroupName]=*
   ```

   A sample of the content of the SRA-STATUS file can be seen in the following example:

   ```
   000002006E814E66|2=CREATEVOLUME@4;
   60:05:07:68:01:BA:05:39:98:00:00:00:00:00:00:2C
   TESTFAILOVER@4;
   60:05:07:68:01:BA:05:39:98:00:00:00:00:00:00:2C
   ```

   This example shows that the standalone remote copy (target volume id:[2]) in the array [000002006E814E66] was in testfailover status. Spectrum Virtualize Family SRA created a FlashCopy for the remote copy target [2] and the FlashCopy target volume id is [4]. The UUID is `60:05:07:68:01:BA:05:39:98:00:00:00:00:00:00:2C`.
3. Copy the SRA-STATUS file from container using **docker cp**. For example, `docker cp <container id>:/srm/sra/log/SRA-STATUS <local path>`.
4. Modify the SRA-STATUSS file and upload it to the container. For example, `docker cp <local path>/SRA-STATUS <container id>:/srm/sra/log/`.
5. Update SRA-STATUS file mode (664) and ownership (660:660).

   - To update file ownership run the following command:

     ```
     docker exec -it <container id> chown 660:660 /srm/sra/log/SRA-STATUS
     ```

   - To update the file mode, run the following command:

     ```
     docker exec -it <container id> chmod 664 /srm/sra/log/SRA-STATUS
     ```

6. Verify the content of SRA-STATUS file. For example, `docker exec -it <container id> cat /srm/sra/log/SRA-STATUS`.

7. Delete the SRA-STATUS file if none of the entries are required. For example, `docker exec -it <container id> rm /srm/sra/log/SRA-STATUS`.

8. Refresh the devices in the SRM array managers again to ensure that there are no errors.

Collect log files

If the problem cannot be resolved by following any of the troubleshooting tips, collect SRM log files for both sites from their respective paths `/var/log/vmware/srm` and contact IBM support.

Notices

These legal notices pertain to IBM Storage Host Software Solutions product documentation.

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
1623-14, Shimotsuruma, Yamato-shi
Kanagawa 242-8502 Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
Attn: Office of Legal Counsel
650 Harry Road
San Jose, CA 95120-6099
U.S.A.

33

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Terms and conditions for product documentation

Permissions for the use of these publications are granted subject to the following terms and conditions.

IBM Privacy Policy

At IBM we recognize the importance of protecting your personal information and are committed to processing it responsibly and in compliance with applicable data protection laws in all countries in which IBM operates.

Visit the IBM Privacy Policy for additional information on this topic at https://www.ibm.com/privacy/details/us/en/.

Applicability

These terms and conditions are in addition to any terms of use for the IBM website.

Personal use

You can reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You cannot distribute, display, or make derivative work of these publications, or any portion thereof, without the express consent of IBM.

Commercial use

You can reproduce, distribute, and display these publications solely within your enterprise provided that all proprietary notices are preserved. You cannot make derivative works of these publications, or reproduce, distribute, or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights

Except as expressly granted in this permission, no other permissions, licenses, or rights are granted, either express or implied, to the Publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions that are granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or as determined by IBM, the above instructions are not being properly followed.

You cannot download, export, or reexport this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

IBM trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available at http://www.ibm.com/legal/copytrade.shtml.

Index

V

IBM ®