IBM XIV Storage Replication Adapter
Version 2.2.0

User Guide

GA32-1067-05

Note
Before using this document and the product it supports, read the information in "Notices" on page 39.

Edition notice

Publication number: GA32-1067-05. This edition applies to version 2.2.0 of the IBM XIV Storage Replication Adapter and to all subsequent releases and modifications until otherwise indicated in a newer publication.

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About this guide

This guide describes how to prepare for, install, configure, and use the IBM® XIV® Storage Replication Adapter.

Who should use this guide

This guide is intended for system administrators who are familiar with the VMware vCenter, Site Recovery Manager, and vSphere platforms, and with the IBM XIV Storage System.

Conventions used in this guide

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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.

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You can find additional information and publications related to the IBM XIV Storage Replication Adapter on the following information sources.

- IBM Knowledge Center(ibm.com/support/knowledgecenter)
- IBM XIV Storage System on IBM Knowledge Center (ibm.com/support/knowledgecenter/STJTAG)
- VMware vCenter Site Recovery Manager Documentation (www.vmware.com/support/pubs)
- VMware Technical Resources (www.vmware.com/technical-resources)
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Chapter 1. Introduction

The IBM XIV Storage Replication Adapter (SRA) is a software add-on that integrates with the VMware vCenter Site Recovery Manager (SRM) platform and enables site-to-site failovers together with IBM XIV storage systems.

The IBM XIV SRA extends the VMware vCenter Site Recovery Manager capabilities by allowing it to employ the XIV replication and mirroring features for continuous XIV storage availability at both the protected site and recovery site.

Using the IBM XIV SRA, VMware administrators can automate the failover of an XIV system at the protected (primary) SRM site to an XIV system at a recovery (secondary) SRM site. Immediately upon a failover, the ESX and ESXi servers at the recovery SRM site start using the replicated datastores on the mirrored volumes of the secondary XIV system.

When the primary site is back online, failback from the recovery site to the primary site can be performed manually or automatically.

Concept diagram

The following figure illustrates how two XIV storage systems are integrated in a typical VMware SRM disaster recovery solution. The IBM XIV SRA is used on the VMware vCenter Site Recovery Manager server at both the protected and recovery sites.

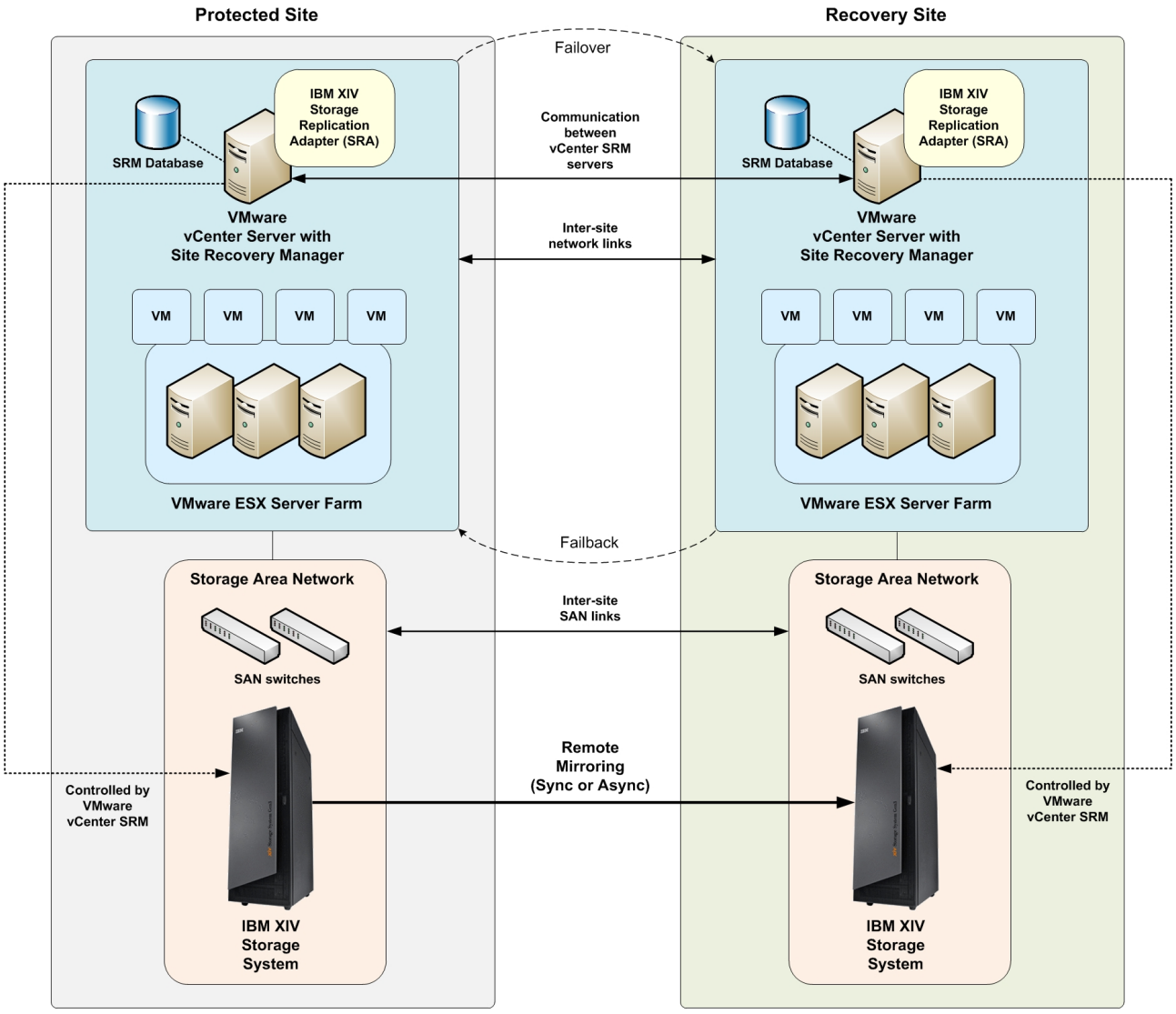

Figure 1. XIV storage systems in a typical protection and recovery deployment

Volume mapping principles

At both the protected and recovery sites, the IBM XIV SRA aims to best achieve the following configuration goals on the XIV storage system, if possible:

- Keep the volume LUN numbers upon failover, and reuse the same ones upon failback.
- Map volumes with the same LUN IDs across all the specific ESXi hosts that are requested for the failover.
- In more scenarios, map volumes to a cluster that contains all the specific ESXi hosts that are requested for the failover, rather than mapping to individual hosts.

Note: The above configuration goals are attained on a best-effort basis, depending on the specific configuration scenario at the protected and recovery sites.

The following figure illustrates the volume mapping principles (attained on a best-effort basis):

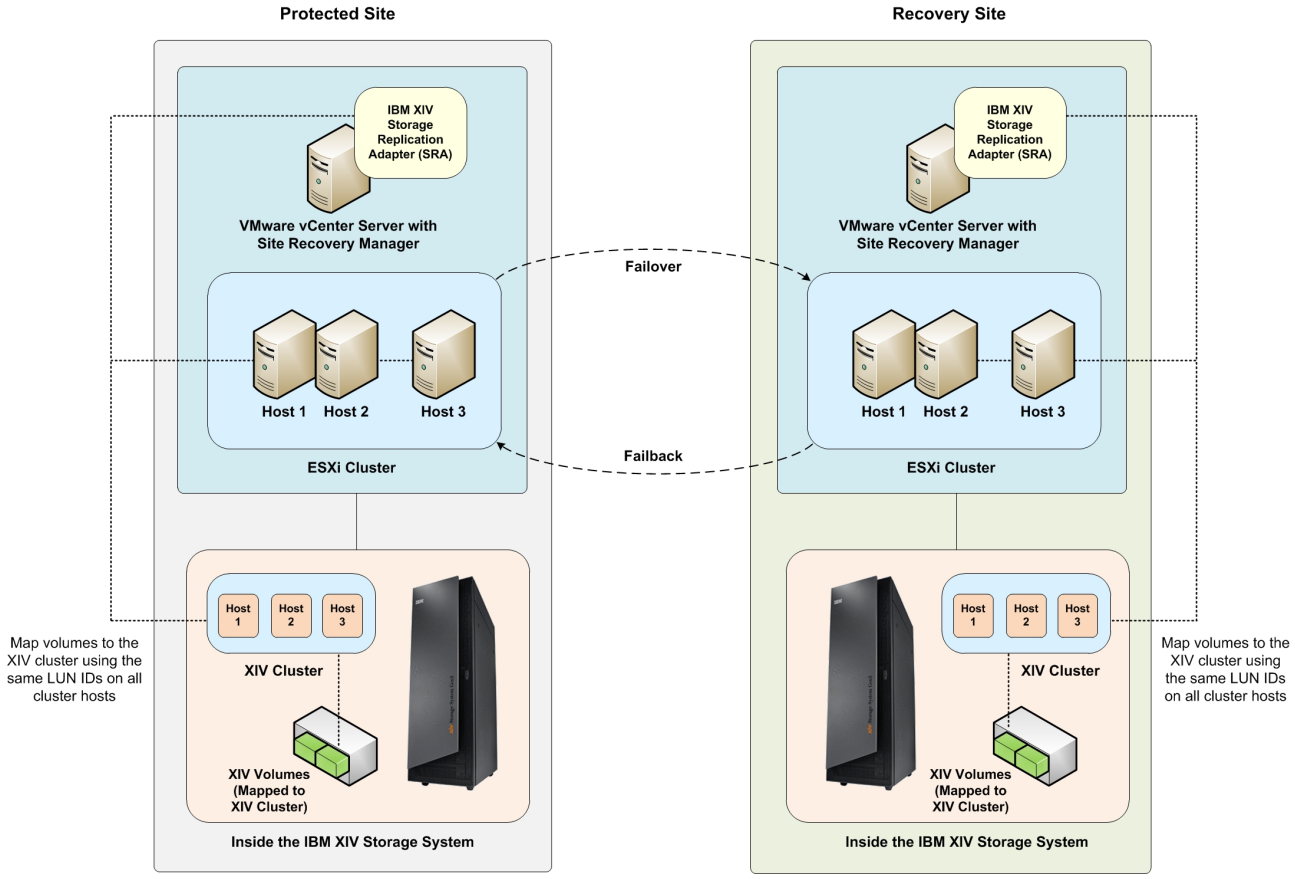

Figure 2. Best-effort XIV volume mapping principles

For in-depth understanding of how the different IBM XIV SRA operations are carried out, see "Initiating XIV SRA operations" on page 28.

Compatibility and requirements

For the complete and up-to-date information about the compatibility and requirements of the IBM XIV Storage Replication Adapter, refer to the latest release notes.

You can find the latest release notes on the IBM Storage Host Software Solutions Information Center (publib.boulder.ibm.com/infocenter/strhosts/ic).

Note: Refer to the relevant VMware documentation for information about how to install the compatible versions of vCenter Server and vSphere Client. You should also refer to the latest installation and configuration instructions for ESXi servers.

Important: To learn about the requirements for using VMware vCenter Site Recovery Manager (SRM) at your sites, refer to the Administration Guide that was issued for the SRM version that you are using. The guide is available at the VMware vCenter Site Recovery Manager Documentation website (www.vmware.com/support/pubs/srm_pubs.html).

Before you proceed

Before you proceed to the Preparation chapter, you must have access to a workstation on which your preferred XIV storage management software is locally installed or accessible via a remote connection.

You can manage the IBM XIV Storage System by using the XIV graphical user interface (GUI) or XIV command-line interface (XCLI).

For additional assistance and more information about how to obtain, install, and use the IBM XIV Storage System management software, refer to the IBM XIV Storage System Information Center (publib.boulder.ibm.com/infocenter/ibmxiv/r2).

Chapter 2. Preparation

Preparation is required depending on your specific site configuration.

Prior to installing and using the IBM XIV Storage Replication Adapter (SRA), the following verification tasks are required:

- Verifying the XIV mirroring configuration
- Verifying the VMware vCenter SRM installation

To learn about how to prepare your sites from scratch, refer to "Setting up site-to-site mirroring from scratch" on page 7.

Verifying the XIV mirroring configuration

All XIV systems, volumes, and ESXi hosts at both the protected (primary) and recovery (secondary) sites must be properly connected to their remote counterparts and configured for site mirroring.

Prior to installing and using the IBM XIV SRA, make sure that:

- Your local XIV system at the protected site has mirroring connectivity with the target XIV system at the recovery site.
- The name of each XIV system is unique in both the protected and recovery sites.
- The **Target Name** of any target XIV system (remote mirrored system; see example in Figure 3) is identical to the predefined System Name of that same remote XIV system (see example in Figure 4 on page 6).

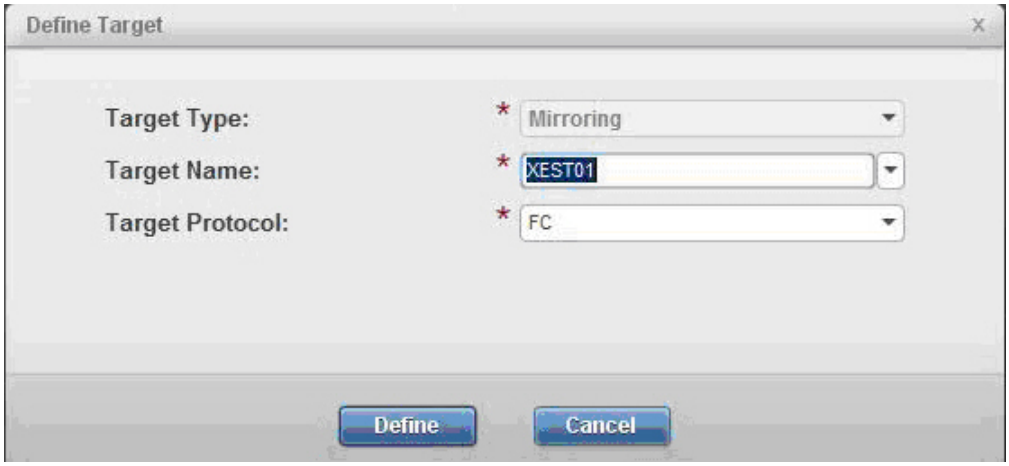

Figure 3. Define Target dialog box – Target Name is "XEST01"

Figure 4. Properties information – System Name is "XEST01"

Verifying the VI

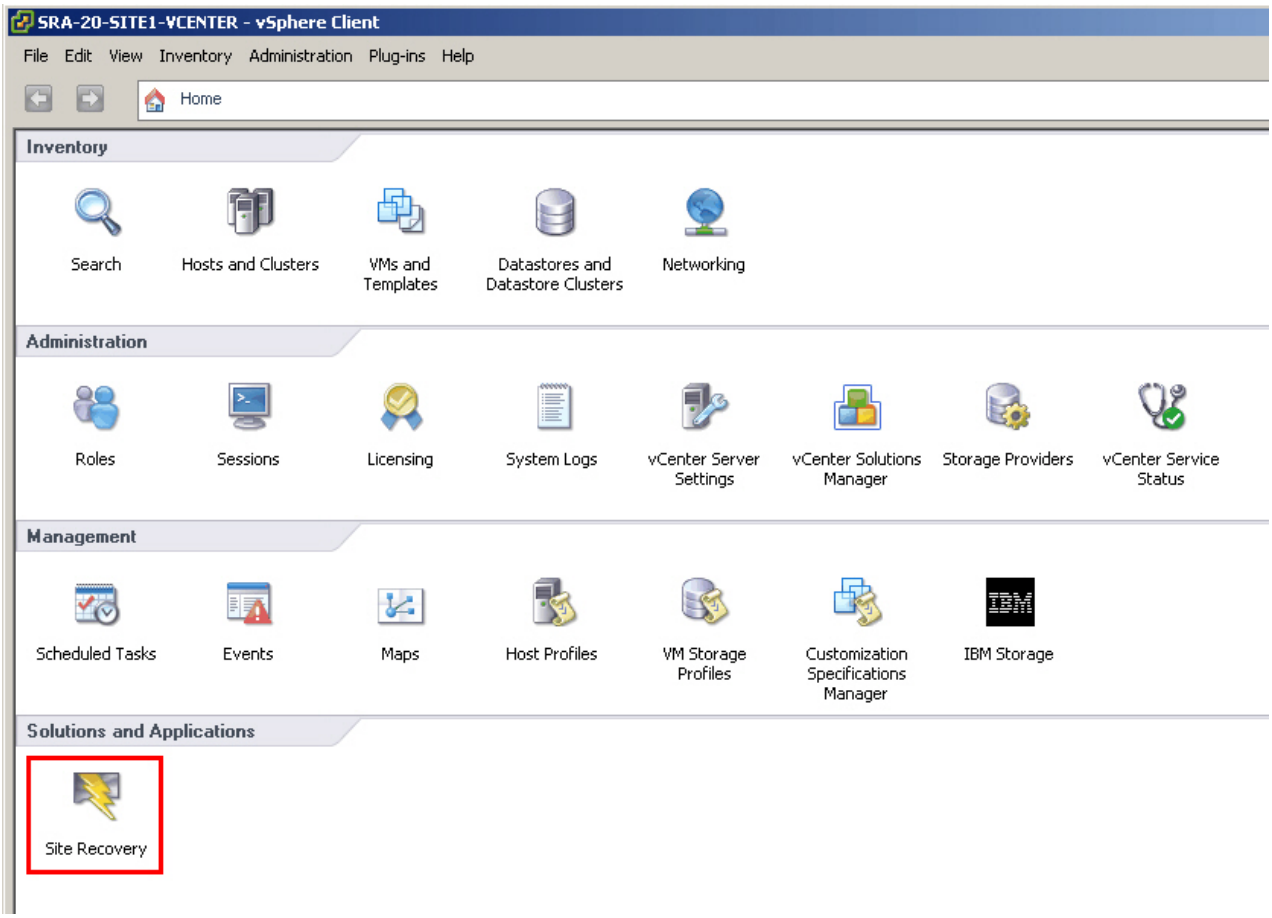

Figure 5. VMware vSphere Client – Site Recovery Manager is installed

Setting up site-to-site mirroring from scratch

This section covers the specific scenario when no previous setup for mirroring has been preformed at your sites.

The specific scenario of setting up mirroring from scratch includes the following configuration stages:

Note:

- If your sites are already partially configured for mirroring, perform only the stages or steps that are relevant to your specific case.
- The following sections provide setup examples from version 3.0.x of the XIV GUI. If you are using an older or a newer XIV GUI version, refer to its online help or documentation.

Stage 1: Establish XIV mirroring connection

Your first task is to determine which of your XIV systems should be used as the protected (primary) system, and which should be used as the recovery (secondary) system.

About this task

Complete the following procedure to define a mirroring connection with the secondary XIV system.

Important: The target XIV system at the remote site must already be up and running, as well as added to the XIV GUI before you can set the mirroring connection to it. In addition, all iSCSI or FC connections to the remote XIV system must be operational as well. Confirm with your storage administrator that the remote XIV system is ready for establishing the mirroring connection.

Procedure

1. On the XIV management GUI, go to **Remote** > **Mirroring Connectivity**
2. Right-click the XIV system that you want to use as the primary system, and then click **Create Target**. The Define Target dialog box appears.

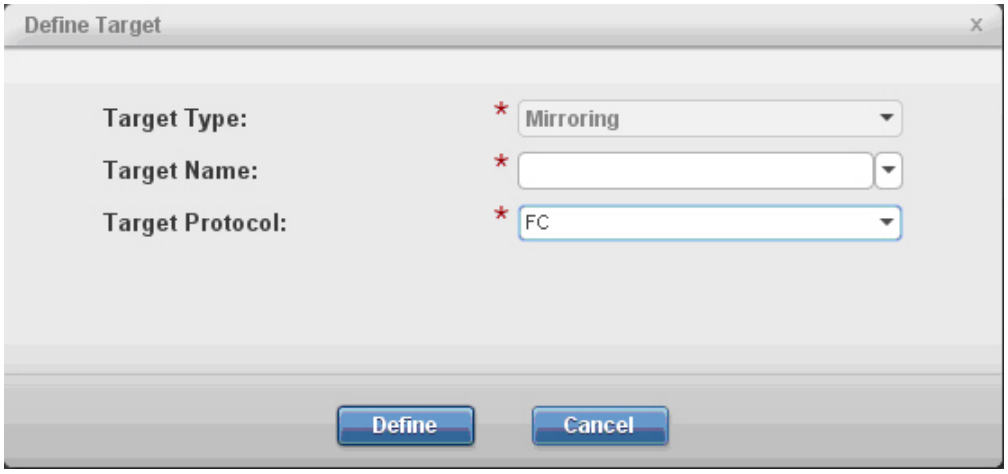

Figure 6. XIV Management GUI – Define Target dialog box

3. From the **Target Name** drop-down list, select the name of the XIV system that should be used as the target system.
4. From the **Target Protocol** drop-down list, select the connection type (FC or iSCSI) to the selected target system.
5. Click **Define**. The interface panels of the two XIV systems are displayed.

6. Click **Show Auto Detected Connections**, located above the two interface panels.

Figure 7. Show Auto Detected Connections button

The auto-detected physical connections (iSCSI or FC) between the two XIV systems are displayed graphically as green arrow lines between the interface connections of both XIV systems.

Important: Fibre Channel (FC) connections can be auto-detected only through proper FC zoning. Confirm with your storage administrator that FC zoning has been properly set in advance.

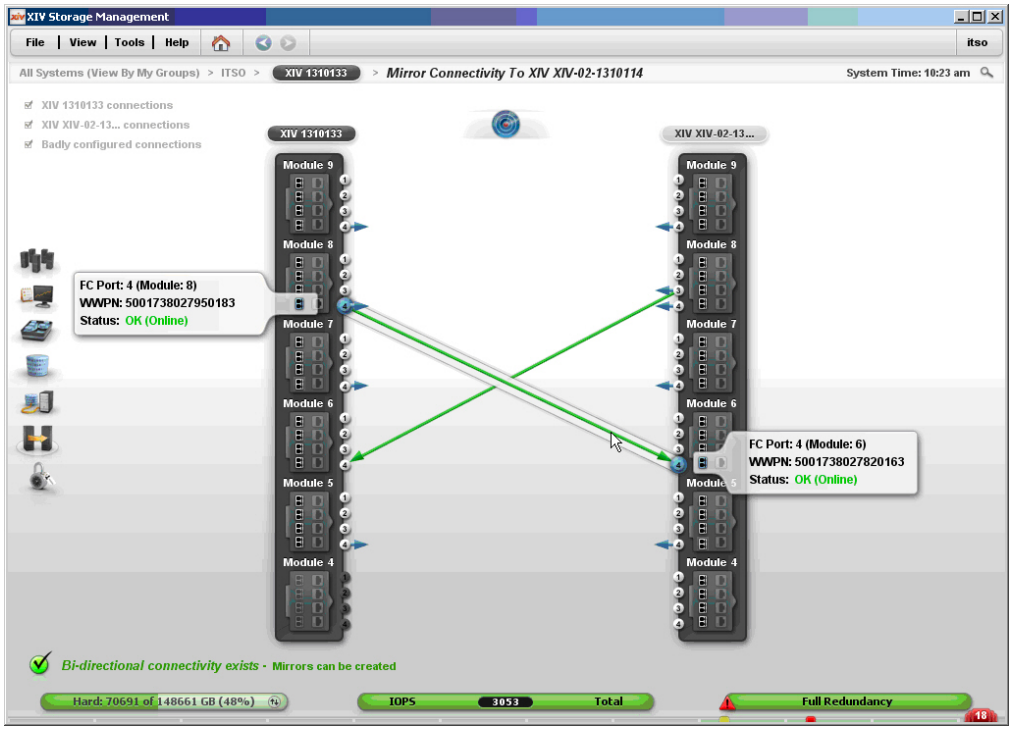

Figure 8. XIV Management GUI – Detected connections

7. Click **Approve** to use the graphically displayed connections.

Figure 9. XIV Management GUI – Approve button

Note: You can also define new connections manually by clicking a port on the primary system and then by dragging a blue arrowed line to the corresponding port on the target system (see Figure 10 on page 10). Placing the arrow head on the target port initiates the connection.

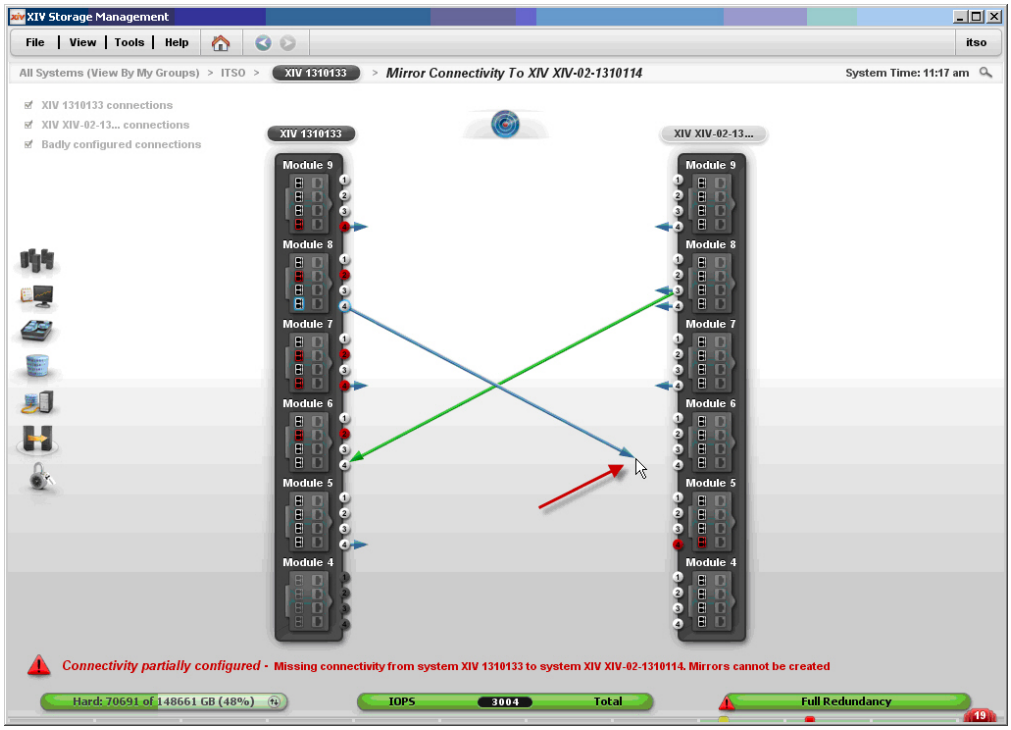

Figure 10. XIV Management GUI – Detected connections

8. Right-click the arrowed line of a connection that you want to enable, and then click **Activate** on the pop-up menu.

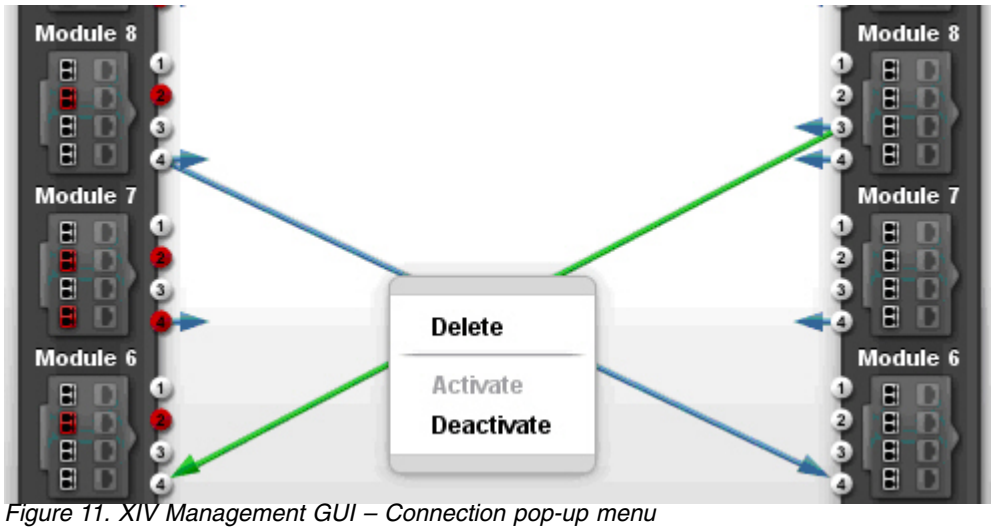

Figure 11. XIV Management GUI – Connection pop-up menu

Important:

- Make sure that a bi-directional connection is established with the target XIV system.
- If you are using the XIV CLI (XCLI), establish a bi-directional connection manually. For more information, refer to the XCLI documentation.

Stage 2: Create a storage pool for the protected volumes

In this preparation stage you create a storage pool for the protected volumes.

About this task

After the mirroring between the XIV systems is set, create a storage pool for the protected volumes on the Primary XIV system.

Procedure

1. On the XIV management GUI, focus on the primary XIV system, and then click **Pools** > **Storage Pools**.
2. Click **Add Pool** and then define the pool size and name in the Add Pool dialog box.

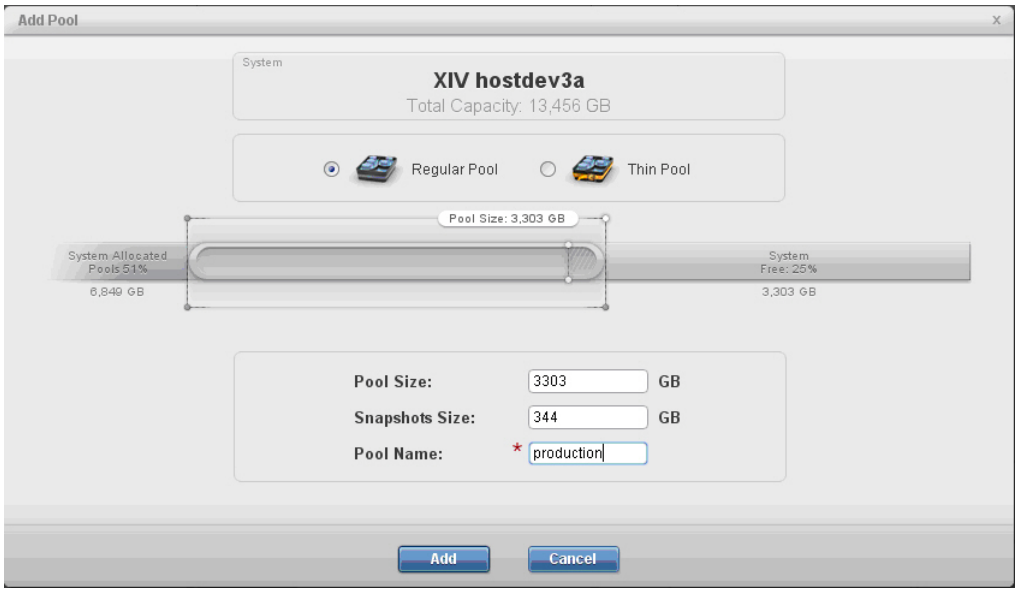

Figure 12. XIV Management GUI – Add Pool dialog box

3. Click **Add**. The storage pool is created.

Stage 3: Create a storage pool for the recovery volumes

In this preparation stage you create a storage pool for the recovery volumes.

Procedure

Complete the pool creation procedure (see "Stage 2: Create a storage pool for the protected volumes" on page 10) at the recovery (secondary) site as well. When you do so, you may want to give an identical name to the storage pool at the recovery site.

Stage 4: Create protected volumes

In this preparation stage you create protected volumes.

About this task

After the storage pool is created, create the protected volumes on it.

Procedure

1. On the XIV management GUI, focus on the primary XIV system, and then click **Pools** > **Volumes by Pools**.

2. Click **Add Volumes**. The Create Volumes dialog box is displayed.
3. From the **Select Pool** drop-down list, select the pool you created in the previous stage, and then define the number of volumes, as well as the size of volumes that you want to create in this pool.

Important: The size of the volume must be 17 GB or more.

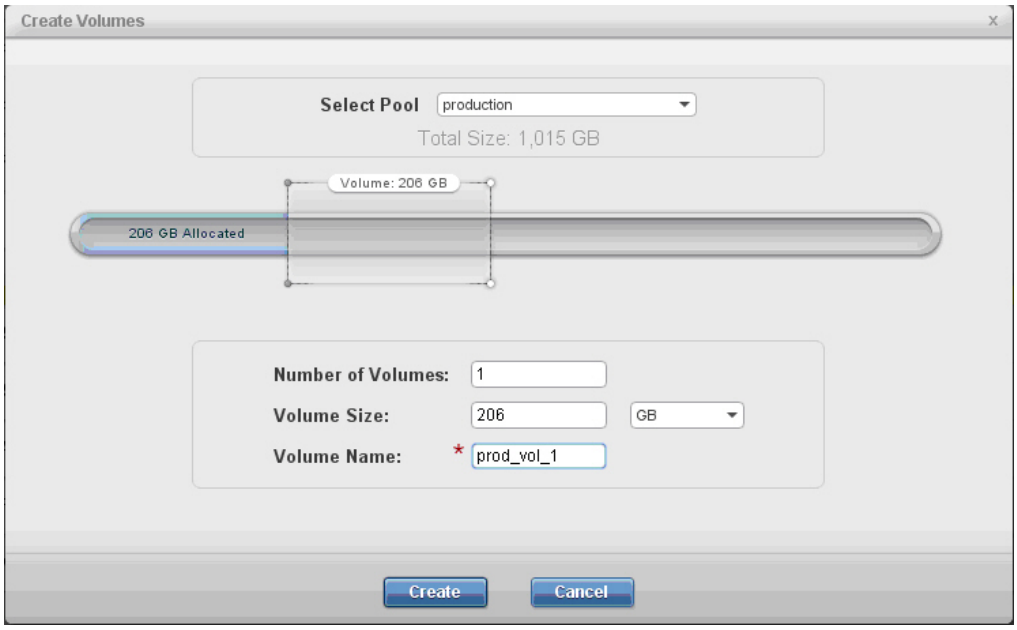

Figure 13. XIV Management GUI – Create Volumes dialog box

4. Click **Create**.

Stage 5: Create recovery volumes

In this preparation stage you create recovery volumes.

Procedure

Complete the volume creation procedure (see: "Stage 4: Create protected volumes" on page 11) at the recovery (secondary) site as well. When you do so, keep in mind:

- You might want to give identical names to the volumes at the recovery site.
- The volumes at the recovery site must have the same size as the volumes at the protected site.

Stage 6: Map protected volumes to protected ESXi hosts

In this preparation stage you map protected volumes to protected ESXi hosts.

About this task

After you have created protected volumes, map the volumes to the primary ESXi hosts that are to be protected by SRM, and then rescan these hosts.

Procedure

1. On the XIV management GUI, focus on the primary XIV system, and then go to **Hosts and Clusters** > **Volumes by Hosts**. The ESXi hosts that are already mapped to the XIV system are displayed.
2. Double-click a host to which you want to map volumes. The list of currently mapped volumes (mapped to the host) is displayed on the right.
3. From the XIV volumes list on the left, select the volume or volumes that you want to map to the host, and then click **Map**.

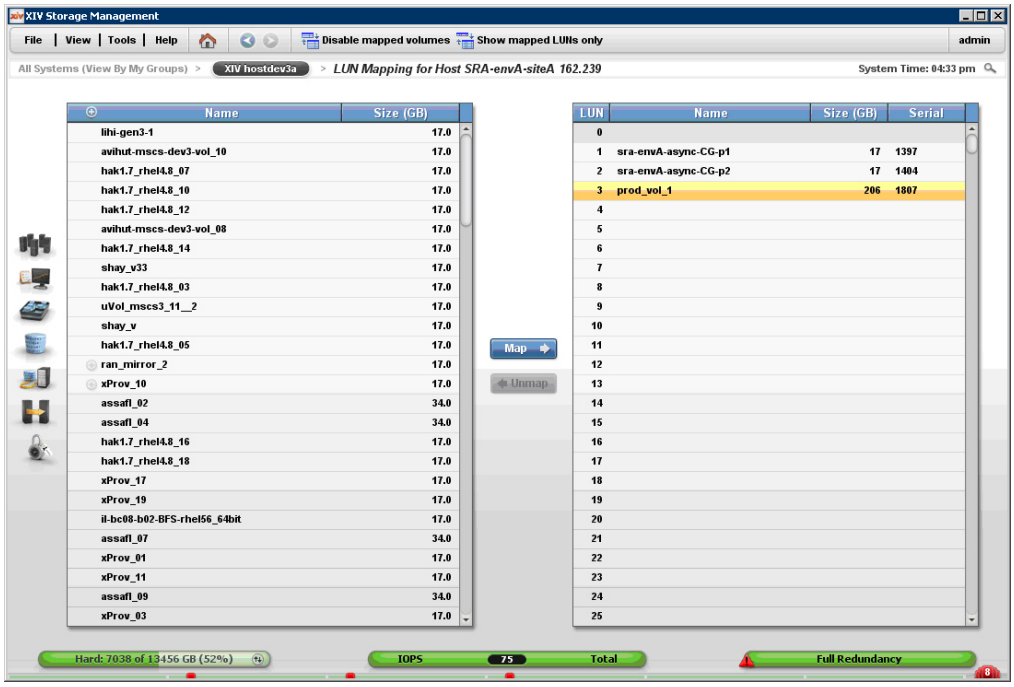

Figure 14. XIV Management GUI – LUN Mapping for Host panel

4. Click **Back** to go back to the main GUI window, and verify that the volumes are mapped.

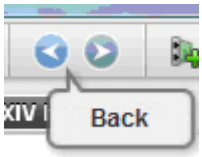

Figure 15. Back button

Stage 7: Define recovery ESXi hosts

In this preparation stage you define recovery ESXi hosts.

About this task

After mapping the protected volumes to the protected ESXi hosts, you can start defining your recovery (secondary) ESXi hosts as XIV hosts at the recovery site.

Important: The recovery ESXi hosts should be connected over iSCSI or FC to the recovery XIV system. For FC, proper zoning must be predefined.

Procedure

1. On the XIV management GUI, focus on the secondary XIV system (at the recovery site), and then go to **Hosts and Clusters** > **Hosts and Clusters**.
2. Click **Add Host**. The Add Host dialog box appears.

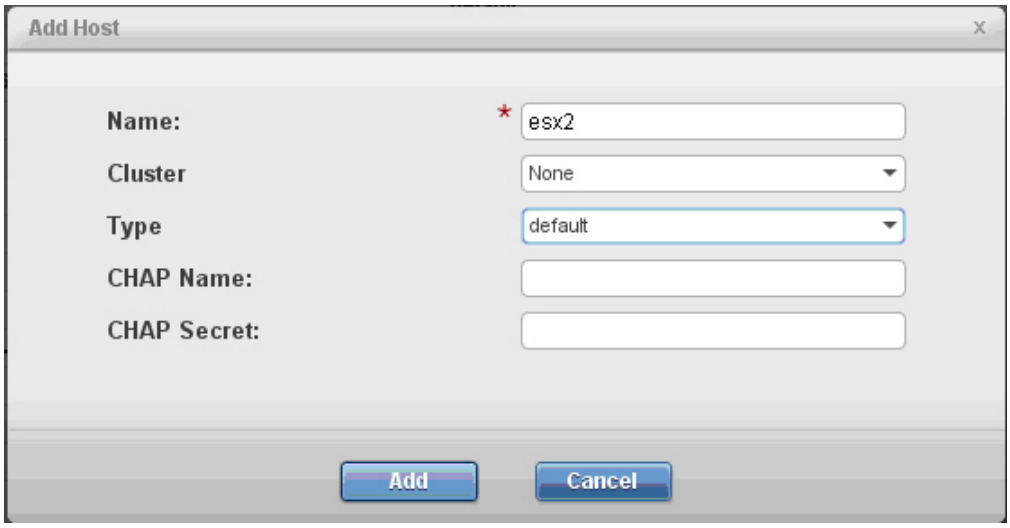

Figure 16. XIV Management GUI – Add Host dialog box

3. Enter the name and details of the recovery host, and then click **Add**. The host is added to the list of hosts.
4. On the list of hosts, right-click the name of the host you have added, and then click **Add Port**.
5. Enter the communication port details, and then click **Add**.

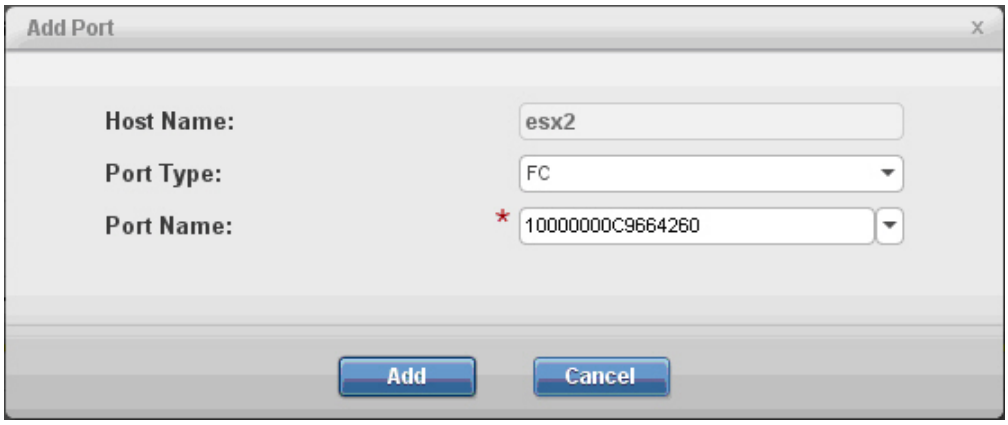

Figure 17. XIV Management GUI – Add Port dialog box

Note: Step 5 repeats for multipathed Fibre Channel (FC) connections.

6. Repeat steps 2 –5 for each recovery host at the recovery site.

Note: The procedure above is for a single host. If some hosts are part of a cluster, go to **Hosts and Clusters** > **Hosts and Clusters**, hold down the SHIFT key and select these hosts. Then, right-click the selection and click **Create a Cluster with Selected Hosts** on the pop-up menu.

Stage 8: Define mirroring for volumes

In this preparation stage you define mirroring for volumes.

About this task

After the recovery hosts are defined as XIV hosts at the recovery site, you can start defining the volume mirroring. The mirroring direction is from the protected site to the recovery site, and can be either synchronous (Sync) or asynchronous (Async). If you choose asynchronous mirroring, set the required Recovery Point Objective (RPO).

Procedure

1. On the XIV management GUI, focus on the primary XIV system, and the go to **Pools** > **Volumes by Pools**. The list of available storage pools is displayed.
2. Select the storage pool on which protected volumes exist, and then open the volume tree of that pool.

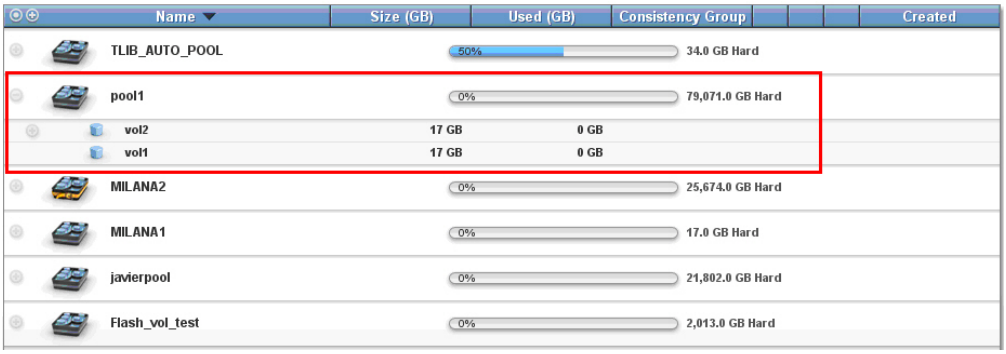

Figure 18. XIV Management GUI – Volumes of a storage pool

3. Double-click a volume to be mirrored, and then click **Create Mirror**. The Create Mirror dialog box appears.

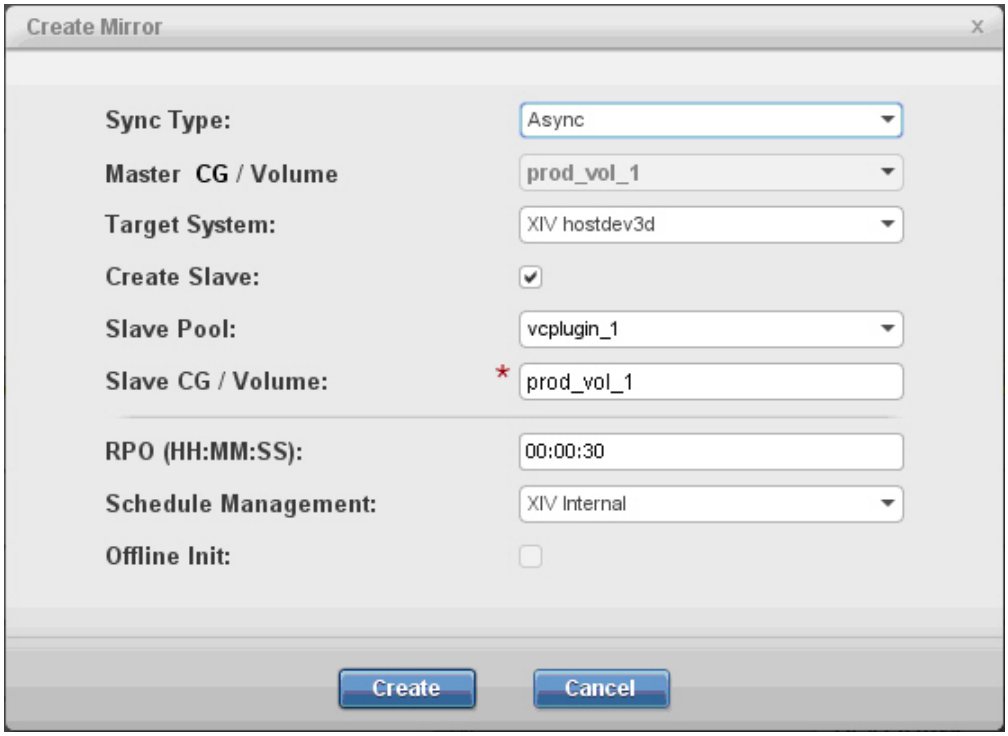

Figure 19. XIV Management GUI – Create Mirror dialog box – for a volume

4. Select the mirroring type (Sync or Async) and enter the relevant mirroring details.
5. Click **Create**. The mirroring is set for the volume.
6. Repeat steps 3 on page 15 – 5 for every volume that requires mirroring.
7. Go to **Remote** > **Mirroring Connectivity**, right-click a newly created volume mirror and then click **Activate**. Repeat this action for all mirrored volumes.

Important: Make sure that the volume mirroring connection is activated for each mirrored volume.

Stage 9: Define consistency groups (optional)

If your volumes require replication in consistency with each other (for example, when a datastore consists of more than one volume), create a consistency group for these volumes.

About this task

Create one consistency group for the primary XIV system, and one for the secondary XIV system.

Procedure

1. On the XIV management GUI, focus on the primary XIV system, and the go to **Volumes** > **Consistency Groups**. The list displays all existing consistency groups and a group of unassigned volumes.

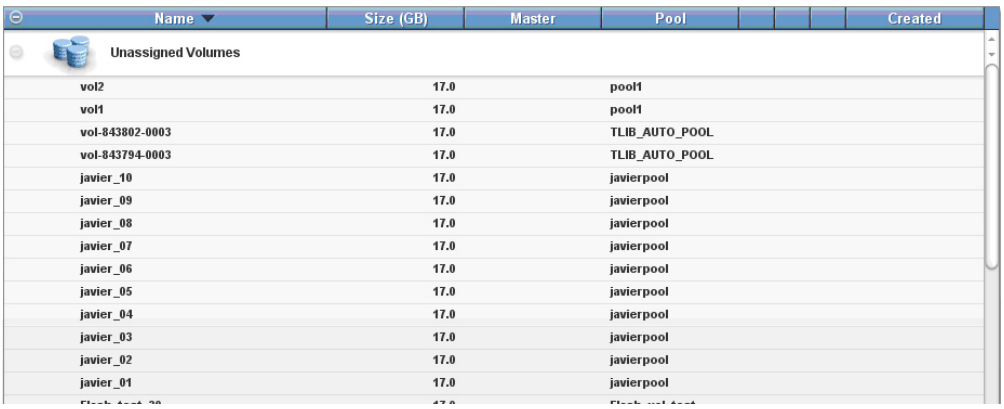

Figure 20. XIV Management GUI – List of unassigned volumes

2. Click **Create Consistency Group**. The Create Consistency Group dialog box appears.
3. Enter the consistency group's name and select the storage pool on which it should be created. Then, click **Create**.
   The Create Mirror dialog box appears.

Figure 21. XIV Management GUI – Create Consistency Group dialog box

4. Define mirroring for the consistency group (CG) you have created. The mirroring should be of the same type and characteristics of the mirrored volumes that you intend to add to the group. Then, click **Create**.

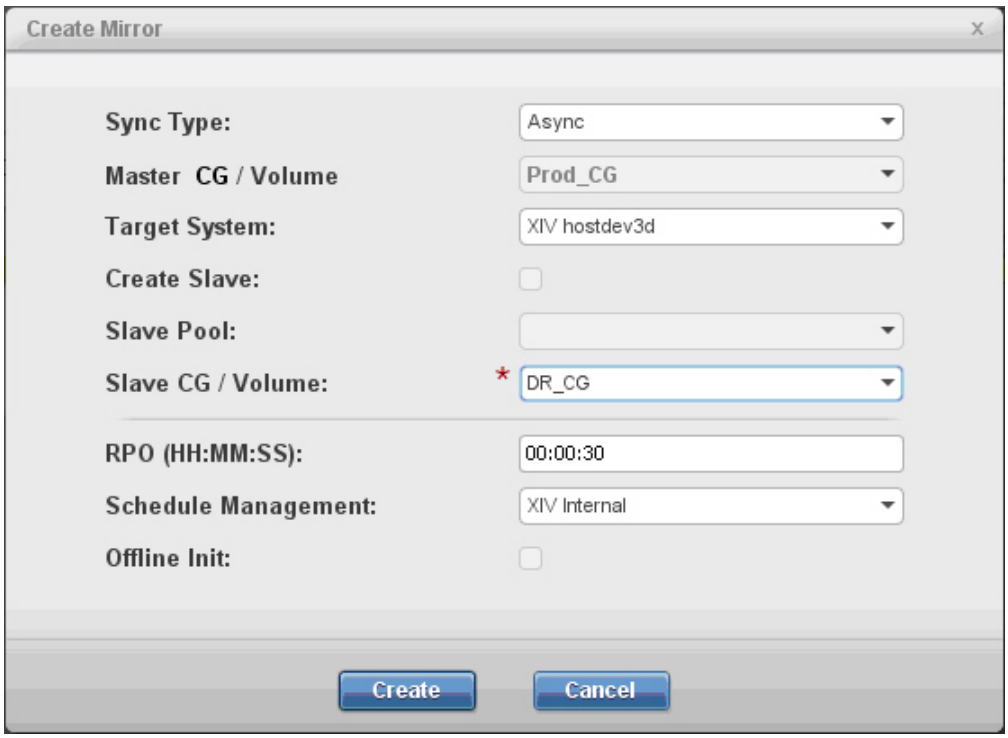

Figure 22. XIV Management GUI – Create Mirror dialog box – for a CG

5. Go to **Remote** > **Mirroring** and add the relevant mirrored volumes to the consistency group.
   The mirrored volumes are now part of the mirrored consistency group.

Figure 23. XIV Management GUI – Add Mirrored Volumes to CG dialog box

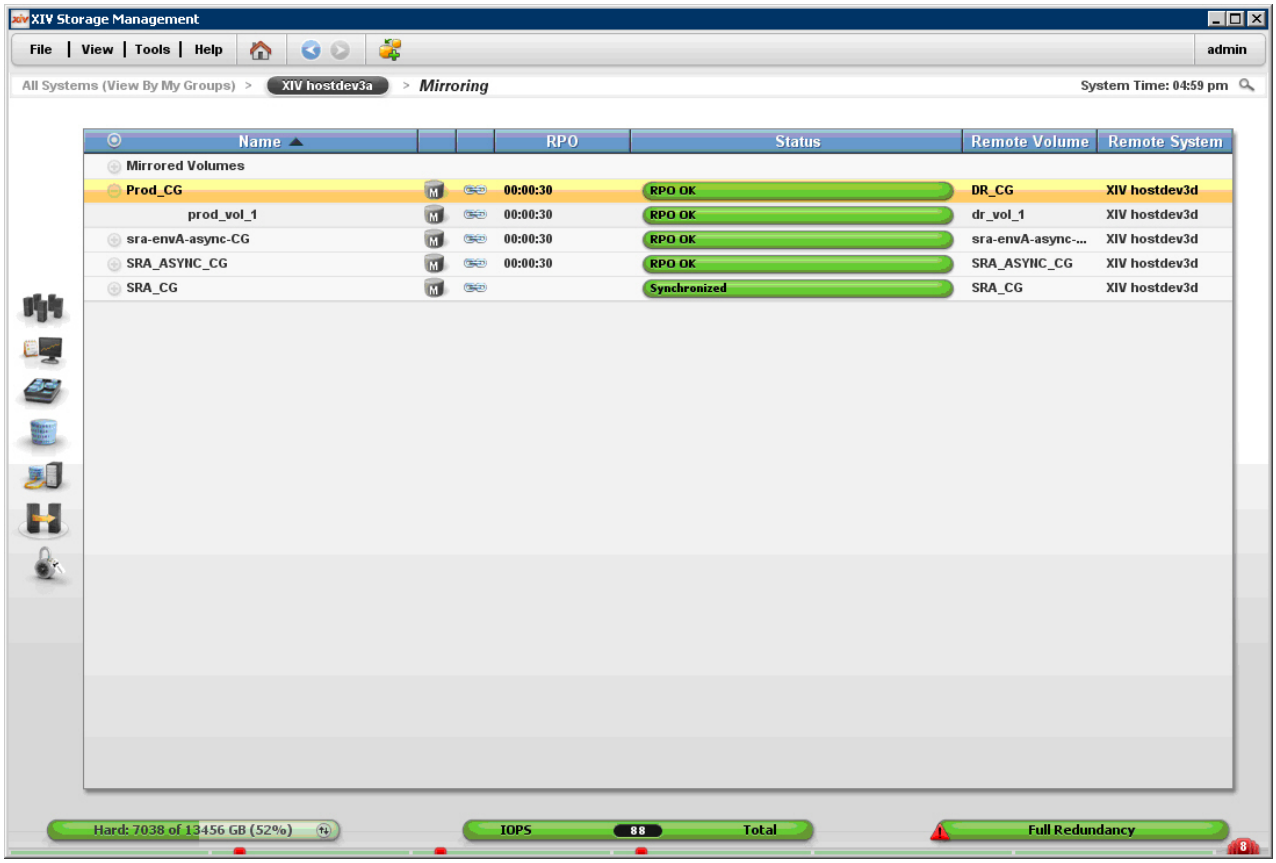

Figure 24. XIV Management GUI – Mirrored volumes in a consistency group

Chapter 3. Installation

After the required preparation has been performed, you can start the IBM XIV SRA installation.

This chapter describes:

Running the IBM XIV SRA installation wizard

This section describes how to run the IBM XIV Storage Replication Adapter installation wizard.

About this task

Complete the following procedure on the VMware vCenter SRM server to install the IBM XIV SRA.

Note: You can upgrade from version 2.1.0, 2.1.1, or 2.1.1.1 to version 2.2.0 by performing this installation procedure, without having to uninstall the existing version.

Procedure

1. Run the installation package file: .
   `IBM_XIV_Storage_Replication_Adapter-2.2.0-build-x64.exe`
2. From the language selection dialog box, select the language that you want to use in the installation wizard, and then click **OK**.

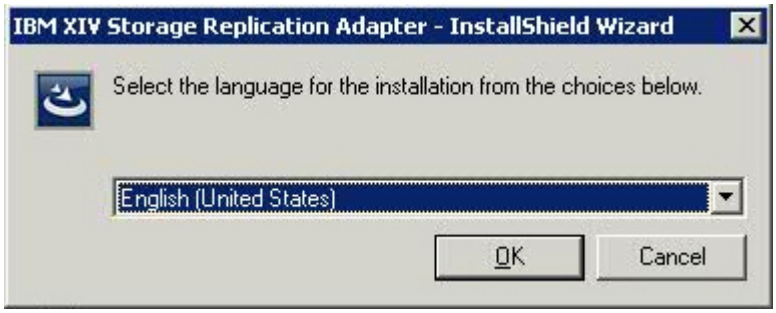

Figure 25. Language selection dialog box

   The installation wizard of IBM XIV Storage Replication Adapter starts.
3. Click **Next**. The License Agreement panel is displayed.
4. Read the IBM License Agreement and then select **I accept the terms in the license agreement**.
5. Click **Next**. The Ready to Install the Program panel is displayed.

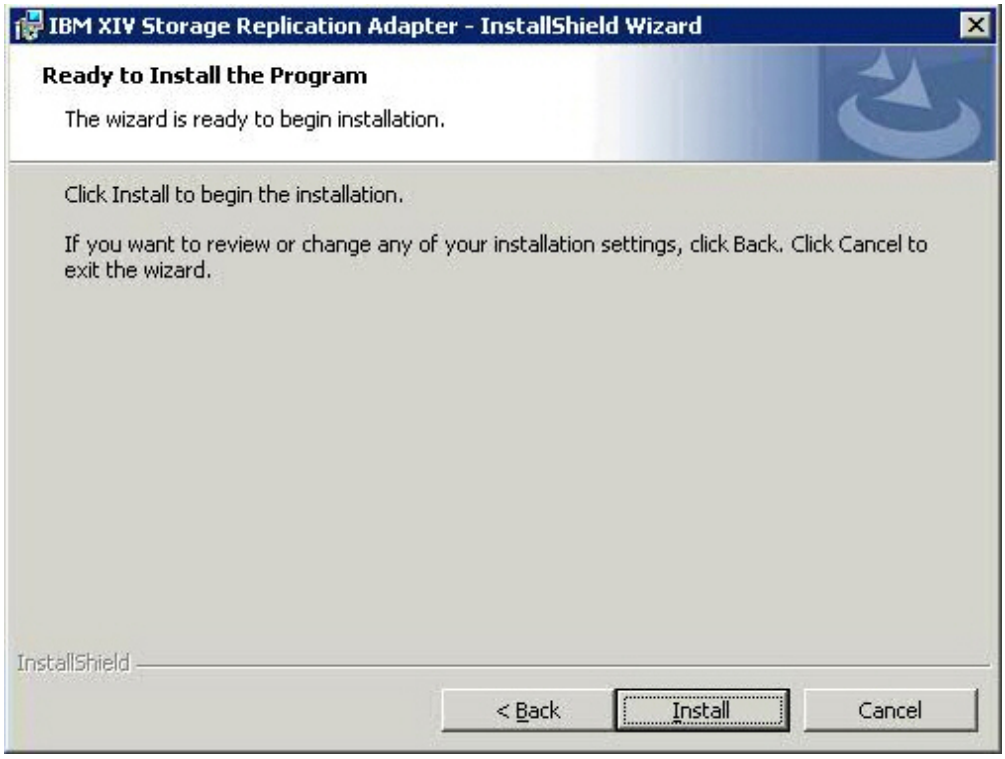

Figure 26. Ready to Install the Program panel

6. Click **Install** to begin the installation.

Note: The IBM XIV SRA files are installed in the SRM installation directory (default: `C:\Program Files\VMware\VMware vCenter Site Recovery Manager`), under the subfolder: `\storage\sra\IBM XIV`

After the installation is complete, the Completed panel is displayed.

7. If you want to display the user guide or release notes for the installed version, keep the appropriate check box selected. Otherwise, clear the check box of the document that you do not want to display. Then, click **Finish**.

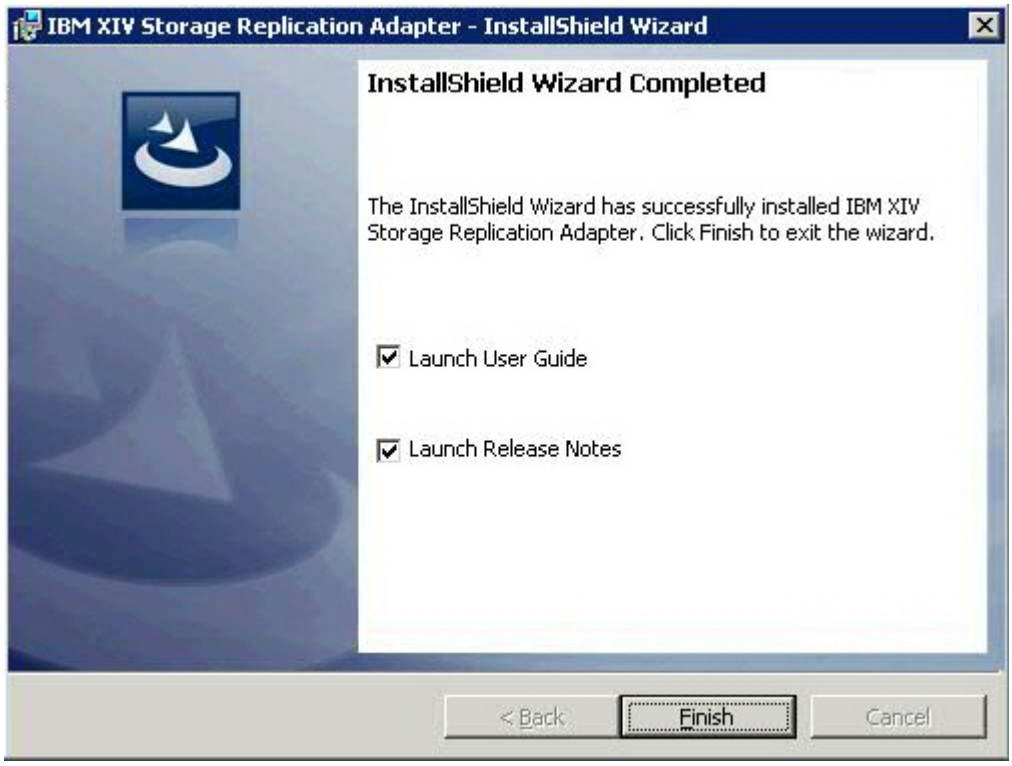

Figure 27. User Guide and Release Notes® check boxes selected

Verifying the SRA installation

After the installation, you can verify that the IBM XIV SRA is properly installed.

Procedure

1. On the vSphere client application, go to **Site Recovery** > **Array Managers**.
2. Click the top hierarchy of a listed array, and then click the **SRAs** tab.

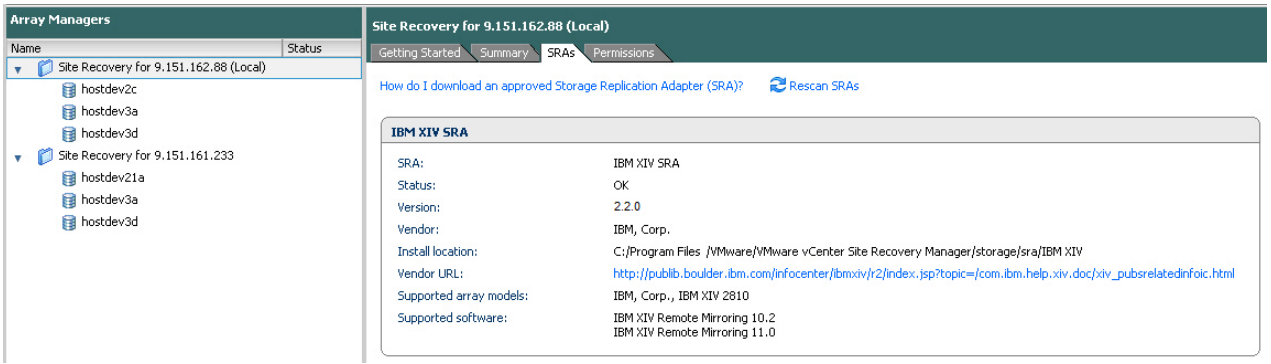

Figure 28. Array Managers – SRAs tab

3. Click **Rescan SRAs** and then verify that the correct IBM XIV SRA version details are displayed.

Removing the SRA software

If you want to remove the IBM XIV SRA from the SRM server, perform the Windows Server software removal procedure.

Procedure

1. From the Control Panel, click **Programs** > **Programs and Features**, and select IBM XIV Storage Replication Adapter from the list of installed programs.
2. Click **Uninstall**. The uninstallation wizard guides you through the uninstallation steps.

Chapter 4. Usage

This chapter describes the usage of the IBM XIV SRA together with VMware SRM for performing dependable Disaster Recovery Planning (DRP) and protecting VMware sites that utilize XIV storage resources.

This includes:

Adding an XIV storage system as an Array Manager

After the IBM XIV SRA is installed, you can start adding IBM XIV storage systems (referred to as *array managers*) to your protected and recovery sites, as described in the following procedure.

Procedure

1. On the Array Managers panel, right-click the name of the site to which you want to add an XIV system, and then click **Add Array Manager**.
   The SRM Add Arrays wizard appears.

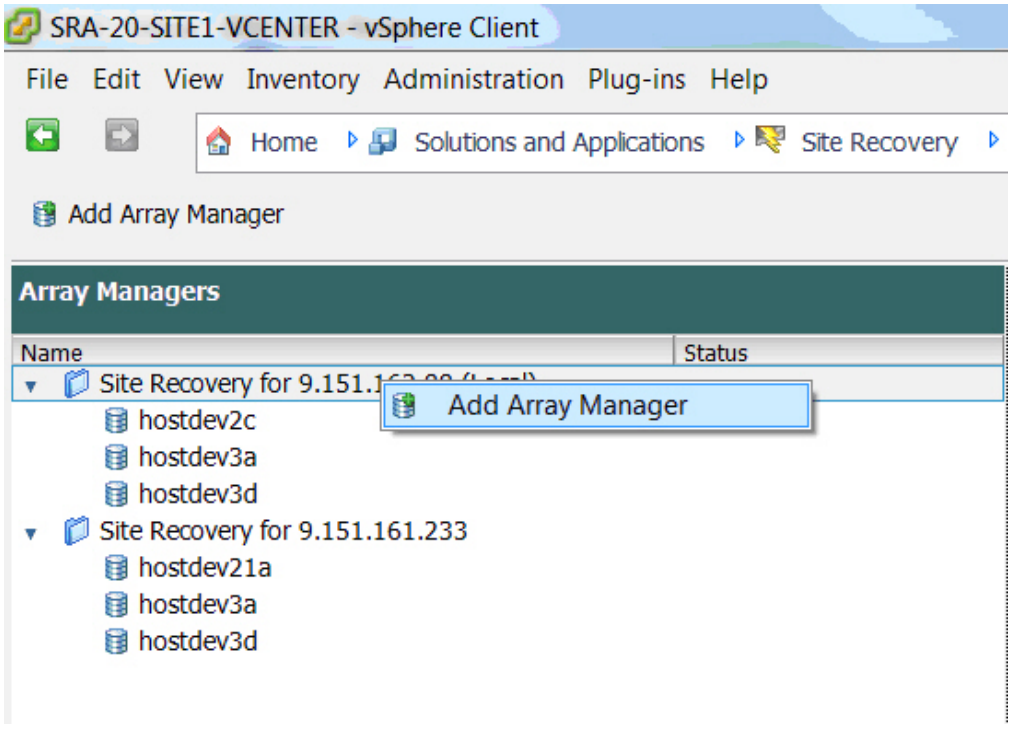

Figure 29. Add Array Manager

2. In **Display Name**, type a name for the XIV system (array manager), and select IBM XIV SRA from the SRA Type drop down list (if not already selected). Then, click **Next**.

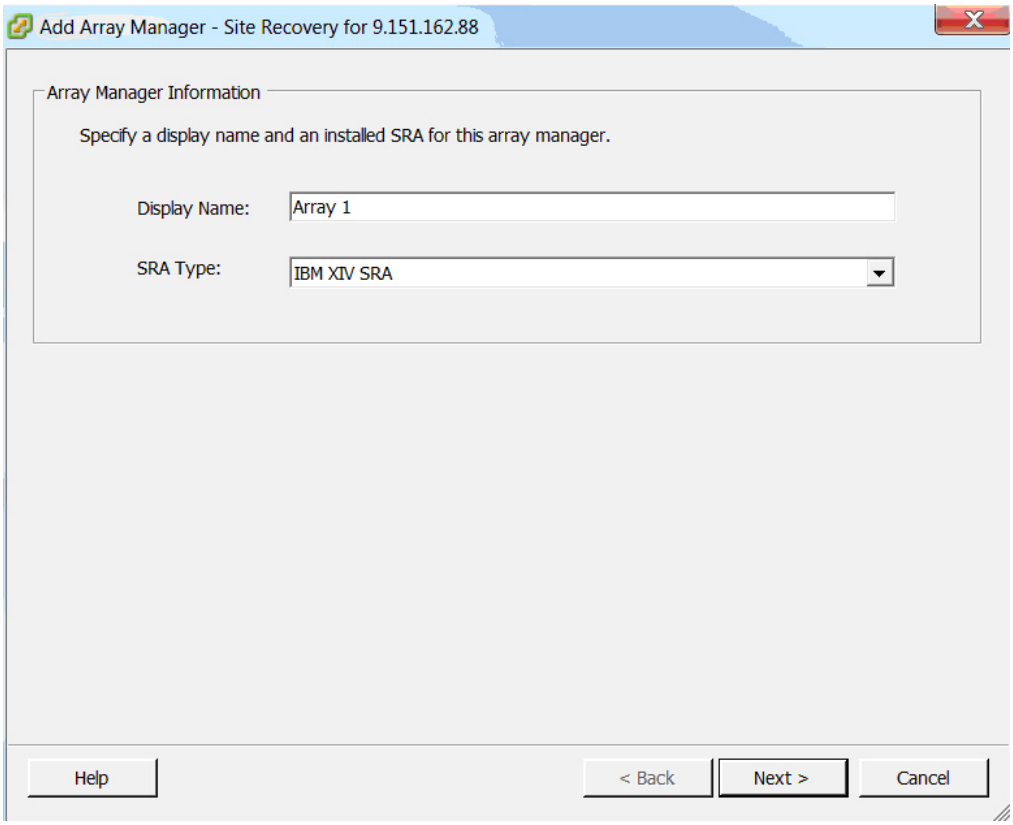

Figure 30. Add Array Manager – Array Manager Information

The XIV System panel is displayed (see Figure 31 on page 27).

3. Enter the following connection parameters for the XIV system that you want to add:
   - **First Management IP Address / Hostname** – Primary IP address or hostname of the XIV system that you want to add.
   - **Second Management IP Address / Hostname** – Alternative IP address or hostname of the XIV system that you want to add.
   - **Third Management IP Address / Hostname** – Another alternative IP address or hostname of the XIV system that you want to add.

Important:

- You must fill in all three text fields.
- If you have only two addresses, you can use the primary address in the First text field, and use the second address in the Second and Third text fields.
- If you have only one address, enter it in all three text fields.

   - **Username** – User name for accessing the specified XIV system.
   - **Password** – Password for accessing the specified XIV system.

Important: You must use login credentials of a storage administrator.

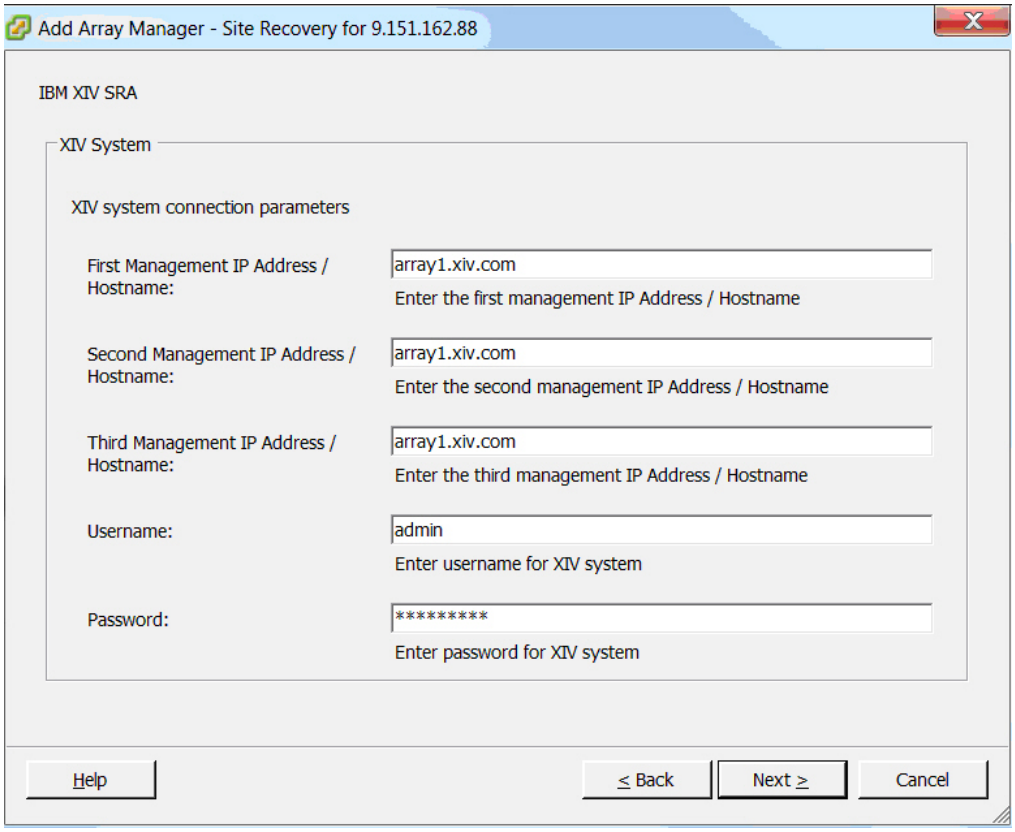

Figure 31. Add Array Manager – Array Manager Information

4. Click **Next**. If the connection to the XIV system is successful, a message about the connection success is displayed and you can click **Finish** to exit the wizard. If the connection is not successful, click **Back** and check the XIV connection parameters.

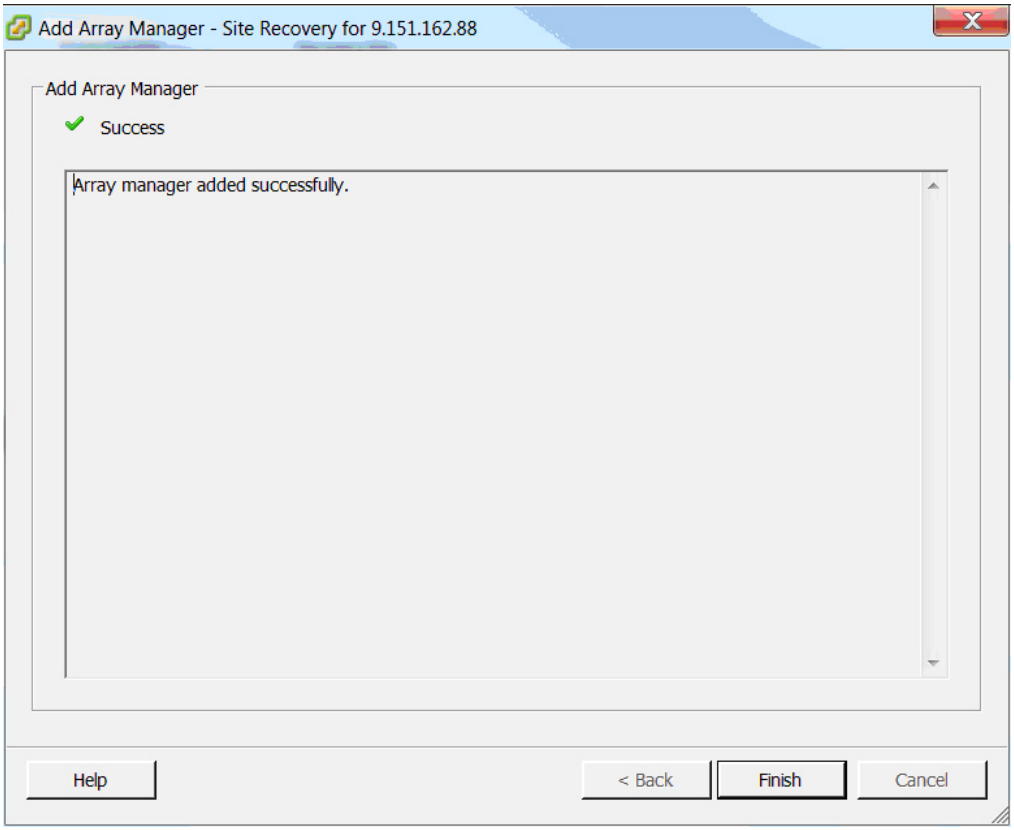

Figure 32. Add Array Manager – Success

Initiating XIV SRA operations

The IBM XIV SRA supports different VMware vCenter SRM operations, as detailed in the following table.

Table 1. IBM XIV SRA operation types

Operation type	Description or reference
Add XIV storage arrays	See "Adding an XIV storage system as an Array Manager" on page 25.
Refresh XIV volume information (display updated information)	See Figure 35 on page 31.
Create protection groups and recovery plans for XIV volumes and datastores that utilize these volumes.	See Figure 34 on page 30.

Table 1. IBM XIV SRA operation types (continued)

Operation type	Description or reference
Test (failover test)	Test the storage replication configuration by creating snapshots at the recovery site and then mapping these snapshots, in the following manner: • In case of synchronous mirroring, the snapshots are created at the recovery site and are mapped to the ESXi host or hosts. • In case of asynchronous mirroring, the last replicated snapshot is duplicated at the recovery site and then mapped to the ESXi host or hosts. • At the end of the failover test workflow, these temporary snapshots are unmapped and deleted.
Cleanup	Delete existing snapshots after the Test operation. Only the snapshots that were created by the IBM XIV SRA are deleted.
Recovery (failover)	Switch the operation to the recovery site in case of a planned migration or an unplanned disaster (when the protected site is unavailable), in the following manner: 1. At the recovery site, the XIV SRA creates snapshots of the volumes as backup. If the recovery is part of a planned migration (as opposed to unplanned disaster), the protected site volumes are first locked to read-only state. 2. The XIV SRA promotes the recovery site volumes to Master volumes (role). 3. The XIV SRA maps these volumes to the ESXi host or hosts.
Reprotect	Reverse the replication direction and mirroring from failed-over devices to the primary protected devices, in the following manner: 1. The XIV SRA creates a fail-safe snapshot of the previously protected volumes. 2. The XIV SRA unmaps the volumes at the original protected site and sets these volumes as the mirror targets. 3. The XIV SRA changes the role of the previously protected volumes to Slave volumes (role). 4. The XIV SRA activates the mirroring and restores the replication between the two sites.

Note: Depending on the XIV mirroring type:

- If the mirroring is asynchronous, the IBM XIV SRA starts the synchronization job before the initiation of the Test, Recovery, and Reprotect operations.
- If the mirror is synchronous, the IBM XIV SRA only verifies that the mirroring state is indeed synchronized before initiating the Test, Recovery, and Reprotect operations.

Tip:

- To better visualize the Test, Recovery, and Reprotect operations, see "Concept diagram" on page 1.
- For more information about the snapshot aspects of Test, Recovery, and Reprotect, see "Snapshot creation principles" on page 31.

The following figures show the typical contents of the following tabs, which are available when a specific XIV system is selected on the SRM Array Managers panel:

- **Summary** – Displays general details regarding the selected XIV system and its interoperability with the IBM XIV SRA
- **Array Pairs** – Displays the details of XIV systems that are paired with the selected XIV system. You can enable or disable the pairing as needed.
- **Devices** – Displays the details of mirrored volumes that are defined on the selected XIV system, including information regarding the mirroring direction, remote volume, related datastore, protection group and consistency group.

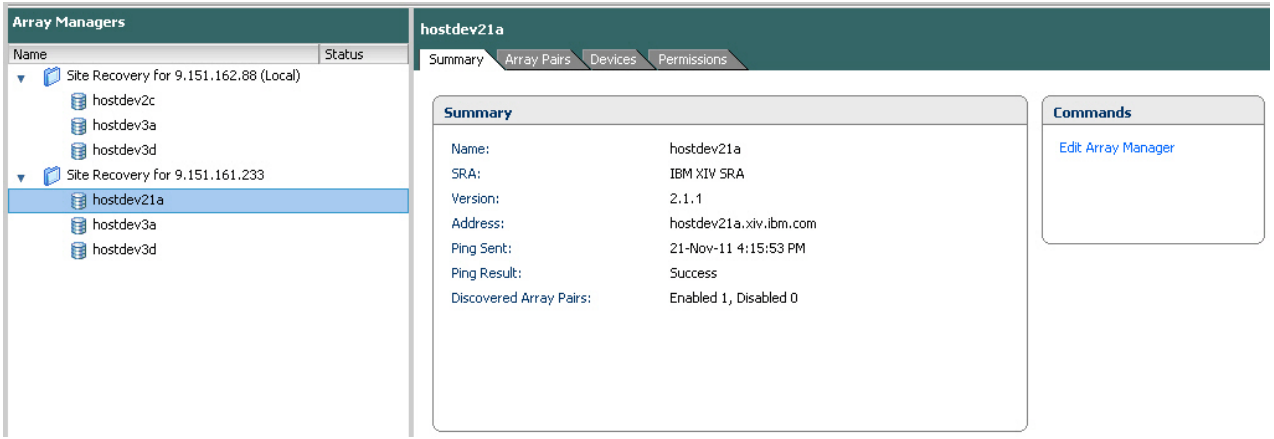

Figure 33. Array Managers – XIV system – Summary tab

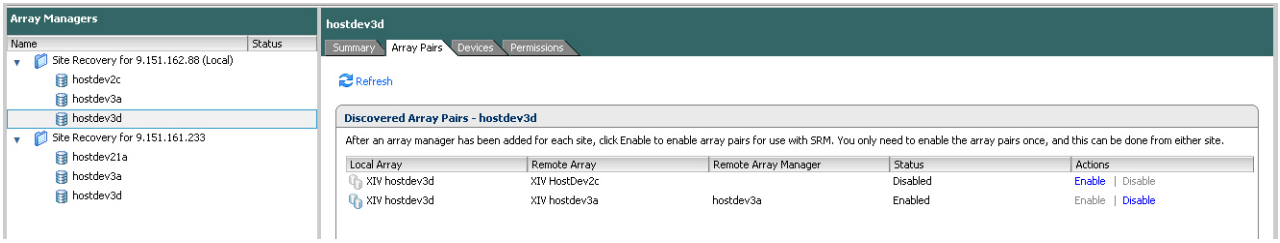

Figure 34. Array Managers – XIV system – Array Pairs tab

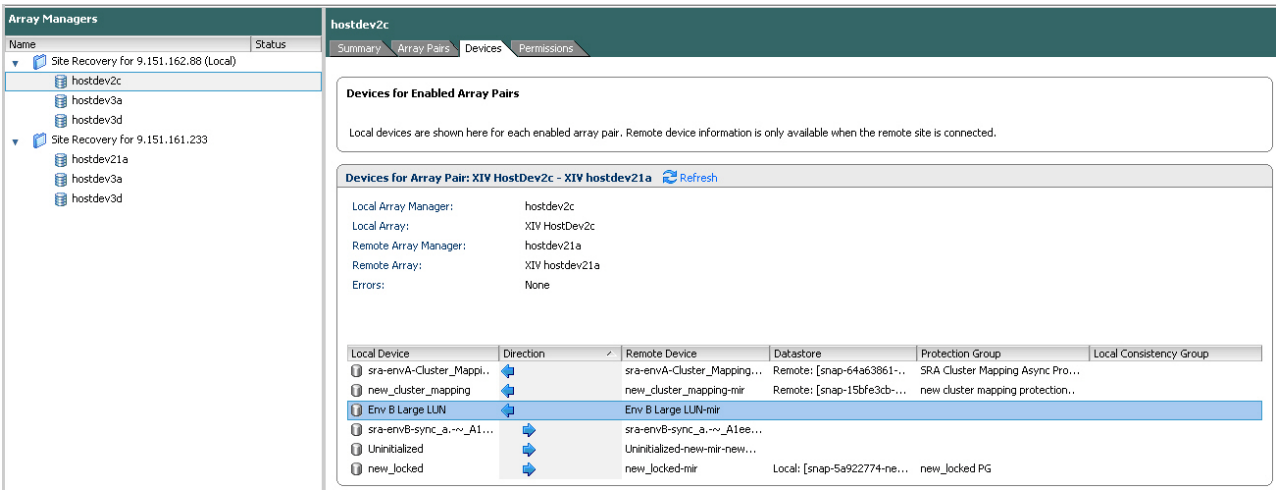

Figure 35. Array Managers – XIV system – Devices tab

For more detailed information about how to operate Site Recovery Manager and perform complete DRP for your VMware server sites, refer to the relevant VMware vCenter Site Recovery Manager documentation.

Snapshot creation principles

Snapshots are created when the following SRM operations are initiated: Test, Recovery, and Reprotect.

Table 2 summarizes the snapshot creation principles per SRM operation type.

Table 2. SRM operations and snapshot creation

VMware vCenter SRM operation	Results	Snapshot name format
Test (a site-to-site failover test is performed)	Snapshots of the target XIV volumes are created, unlocked for read-write, and then mapped and used at the recovery site. **Note:** These volume snapshots are unmapped and deleted when the Cleanup operation is initiated after the Test operation is concluded.	`sra_test_<volume name>_<time stamp>`
Recovery (a site-to-site failover is performed)	Snapshots of the target XIV volumes are created at the recovery site before these volumes are opened for read-write operations.	`sra_synced_<volume name>`
Reprotect (the previously protected site becomes the recovery site)	Snapshots of the original source XIV volumes are created before these volumes can be used as the mirroring target.	`sra_synced_<volume name>`

Note: When using consistency groups, the name of each consistency group replaces the volume in the snapshot name. For more information about XIV consistency groups, refer to the IBM XIV Storage System documentation.

To view the history log of these SRM operations, click **Recovery Plans** > **History**.

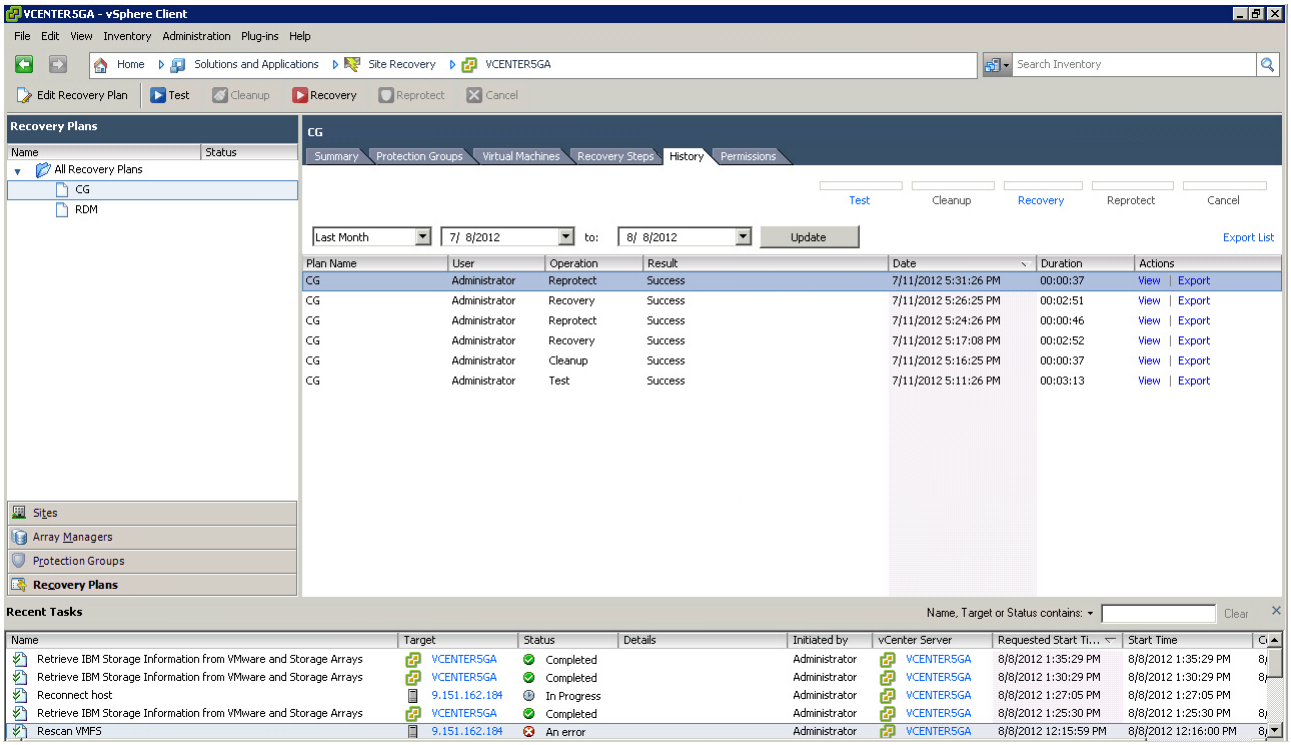

Figure 36. Recovery Plans – History tab

Chapter 5. Best practices

This chapter summarizes recommended practices when using the IBM XIV SRA.

Consider the following recommendations for:

- XIV storage pool snapshot size
- Naming convention
- Volumes in a consistency group
- Immediate log collection
- Reversing replication roles

XIV storage pool snapshot size

Consider allocating extra storage pool snapshot space for storage volumes.

As mentioned in "Verifying the XIV mirroring configuration" on page 5, the storage pools that contain the replicated volumes at both the protected and recovery sites should have sufficient size for creating the volume snapshots.

The requirement is to allocate a minimum of 17 GB for each XIV volume, with additional 17 GB as spare space.

As a best practice, if your volumes are working in a high write rate, consider allocating larger storage pool space for snapshots.

Naming convention

Naming storage pools and volumes across different sites might need identical names.

To avoid confusion and to attain a 100% duplicated recovery site, give identical names to the storage pools and volumes at both the protected and recovery sites.

Volumes in a consistency group

If the volumes of a single datastore are not grouped together, datastore consistency issues may arise.

To ensure datastore consistency in Recovery or Test operations, place all volumes of a single datastore in one consistency group. For more information about XIV consistency groups, refer to the IBM XIV Storage System documentation.

Immediate log collection

The SRA log information might be overwritten due to fast log filling and rotation.

To ensure that the full information is provided to IBM Support in case of a technical issue, it is recommended to collect the SRA log immediately, as explained in "Checking the log file" on page 35.

Reversing replication roles

When mirroring is enabled, the master volume or consistency group is designated as 'primary' and the slave volume or consistency group is designated as 'secondary'. If for any reason, the replication roles have been reversed, the IBM XIV SRA may fail to identify the current replication state properly.

To avoid replication failure, use the following XCLI commands:

- **mirror_list -x** to check the current replication role designations
- **mirror_change_destination** to switch the volume or consistency group replication roles

For full description of the relevant XCLI commands, refer to the IBM XIV Storage System documentation.

Chapter 6. Troubleshooting

This chapter can help you solve technical problems that you may encounter when using the IBM XIV SRA.

If you encounter an error, refer to the following troubleshooting sections:

- "Checking the log file"
- "Handling warning and error messages" on page 36

Note: For up-to-date information about known issues and possible workarounds, refer to the latest IBM XIV Storage Replication Adapter release notes.

Checking the log file

Events are recorded separately at each site in a log file (each site with its own log file).

About this task

The IBM XIV SRA log file records events at the local site. When encountering an issue and you are not sure whether the problem is at the local site or the remote site, you can collect a log file from the local site as well as from the remote site. These two log files may provide helpful information.

Note:

- It is recommended to always attach the log files when opening a new support request. In most cases you will be requested to provide the log file so that the support team could have more detailed information about the technical problem you encountered.
- Upon any technical issue that you might encounter, try to collect the SRA log immediately or as fast as possible, as it might be overwritten due to rapid log file filling and rotation.

Perform the following procedure to retrieve the SRA log together with other SRM logs at a given site (local or remote).

Procedure

1. From the vSphere Client Home page, go to **Solutions and Application** > **Site Recovery** > **Sites**.
2. Right-click on the local site name and then click **Export System Logs**.

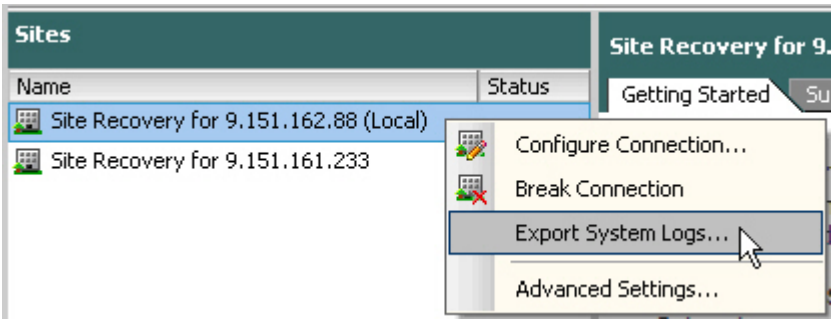

Figure 37. Clicking Export System Logs

3. Click **Browse** to set the directory to which you want to export the log file, and then click **OK**.

Note: When a volume mapping operation fails (for example, when the specified FC ports do not belong to any XIV host), the Test or Failover operations fail. However, SRM does not display a proper message, so the SRA log file can provide indication regarding the mapping failure.

Handling warning and error messages

The following tables summarize the different possible warnings or errors you might encounter when working with the IBM XIV SRA.

Table 3 lists the warning messages, and Table 4 on page 37 lists the error messages.

Table 3. IBM XIV SRA warning messages

Warning code number	Warning text	Recommended action
500	The replication process for this device is already in progress.	No further action is required.
2001	No access groups were provided during the Failover Test operation. Snapshots were created but could not be mapped.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
2002	Snapshot space in the storage pool may exceed its limit if snapshots are created for the requested groups or devices.	Extend the snapshot size for the pool, or delete old snapshots.
2003	Could not find hosts on the storage system that matches the provided initiators.	Verify that your ESX/ESXi hosts are defined in the storage arrays.
2004	The mapping operation has failed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.

Table 4. IBM XIV SRA error messages

Error code number	Error text	How to resolve
100	Command is not supported. An internal error has occurred.	Open a support request and receive specific guidance from the support team. In your request, attach the relevant log file or files.
101	Locale is not supported. An internal error has occurred.	Change to English locale or open a support request and receive specific guidance from the support team.
1001	Failed to connect.	Make sure that the IP address or hostname is correct, and verify your user credentials.
1002	Already in Test state.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1003	The snapshot for this storage device was not found.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1004	Removal of mapping for this device has failed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1005	The secondary volume or consistency group is not in consistency state.	Wait for the initialization or synchronization to complete, and then retry the operation.
1006	Failover operation could not be performed for this device.	Check the SRA log file, request assistance from your storage administrator, or open a support request
1007	The device could not be verified for a failover operation.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1008	The mapping removal and snapshot deletion operations could not be performed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1009	Could not find the remote mirroring definition for the storage device.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1010	The restore replication operation has failed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1011	The reverse replication operation has failed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.

Table 4. IBM XIV SRA error messages (continued)

Error code number	Error text	How to resolve
1012	Could not establish an immediate synchronization.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1013	There is insufficient space allocated in the storage pool for creating new snapshots for this device.	Extend the storage pool, or delete old snapshots.
1014	The operation has failed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1015	SRA internal error has occurred.	Open a support request and provide the information detailed in the log file.
1016	The failover preparation operation has failed.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1017	There is no mirror connectivity between the protected site and the recovery site.	Request assistance from your storage administrator.
1018	Failed to create snapshot for the storage device.	Check the SRA log file, contact your storage administrator, or open a support request.
1019	Already in Failover state.	Check the SRA log file, request assistance from your storage administrator, or open a support request.
1020	There are no target mirroring connections for this storage device.	Make sure that the mirroring connectivity for your recovery storage device is properly set. For assistance, contact your storage administrator.
1021	Unsupported XIV microcode version has been detected.	Make sure that the microcode version of the XIV storage array that you are trying to connect is supported. For more information, refer to the release notes.
1022	Insufficient user privileges.	Make sure that the user account you are using has the required privileges.
1023	Mirroring error: inactive mirroring.	Check the SRA log file or use the XIV management GUI to find the cause of this error.

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