SANtricity ES Storage Manager
Remote Volume Mirroring User Guide

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Data Replicator Software Premium Feature

This topic describes how to obtain, enable, activate, and use the Data Replicator Software premium feature for SANtricity ES Storage Manager Version 10.77.

About the Data Replicator Software Premium Feature

The Data Replicator Software premium feature is for online, real-time replication of data between two storage arrays in separate locations. When you create a remote volume mirror, a mirrored volume pair is created.

The mirrored volume pair is created from two standard volumes, which are logical structures that are created on a storage array for data storage. A standard volume can be a member of only one mirrored pair. The pair consists of a primary volume at a local storage array and a secondary volume at a remote storage array.

If a disaster occurs, or if there is a catastrophic failure in the local storage array, you can promote the secondary volume in the remote storage array to the role of primary volume to take over responsibility for maintaining computer operations.

Primary Volumes and Secondary Volumes

Before you can create a remote volume mirror, you must enable and activate the Data Replicator Software premium feature on both the local storage array and the remote storage array. If a volume does not exist on either the local storage array or the remote storage array, you must create the volumes. Both the local storage array and the remote storage array show the primary volume and the secondary volume.

When both the primary volume and the secondary volume are available, you can create a mirrored pair. When the remote volume mirror is first created, a full synchronization automatically occurs. The data from the primary volume is copied completely to the secondary volume.

Mirror Repository Volumes

When you activate the Data Replicator Software premium feature on the storage array, two mirror repository volumes are created in one of the pools on the storage array. The controller stores mirroring information on this volume, which includes information about remote writes that are not yet complete. You can use this information to recover from controller resets and the accidental shutting down of storage arrays.

- **Capacity of the mirror repository volumes** –
  - You can create the mirror repository volumes from the unconfigured free capacity of the pool.
  - You can create a new pool and its member mirror repository volumes from the unconfigured free capacity of the storage array.
  - The default names of the mirror repository volumes are Mirror Repository 1 and Mirror Repository 2. You cannot change these names.
  - The activation process creates the mirror repository volumes with equal capacity. In a dual controller storage array, the default capacity for both mirror repository volumes is either 128 MB or 256 MB. You can neither increase the capacity nor decrease the capacity.
- **Mirror RAID levels of the mirror repository volumes** – When you activate the Data Replicator Software premium feature and create the pool and mirror repository volumes from the unconfigured free capacity of the storage array, you select the RAID level for the pool. However, when you create the mirror repository volumes from an existing storage array, you do not select the RAID level.

ATTENTION Potential loss of data – Because the data stored on the mirror repository volumes is critical, do not create mirror repository volumes in an existing pool that has RAID level 0. If you create a new pool for the mirror repository volumes, do not select RAID level 0.

Using Other Premium Features with Data Replicator Software

You can use the Data Replicator Software premium feature with the following premium features that are enabled and active on the primary storage array.

- **SANshare® Storage Domains** – Go to Using the SANshare Storage Domains Premium Feature with Data Replicator Software on page 2.
- **Snapshot Volume** – Go to Using the Snapshot Volume Premium Feature with Data Replicator Software on page 2.
- **Volume Copy** – Go to Using the Volume Copy Premium Feature with Data Replicator Software on page 2.
- **Dynamic Volume Expansion (DVE)** – Go to Using the Dynamic Volume Expansion Premium Feature with Data Replicator Software on page 3.

Using the SANshare Storage Domains Premium Feature with Data Replicator Software

The SANshare Storage Domains premium feature lets hosts share access to volumes in a storage array. A storage domain is created when you define a collection of hosts (a host group) or a single host and then define a volume-to-logical unit number (LUN) mapping. This mapping lets you define which host group or host will have access to a particular volume in the storage array.

The storage domain definitions for the local storage array and the remote storage array are independent of each other. If these definitions are put in place while the secondary volume is in a secondary role, it reduces the administrative effort that is associated with site recovery if it becomes necessary to promote the volume to a primary role.

Using the Snapshot Volume Premium Feature with Data Replicator Software

A snapshot volume is a point-in-time image of a volume. Do not mount a snapshot volume on the same server on which the primary volume is mounted in a remote volume mirror.

Using the Volume Copy Premium Feature with Data Replicator Software

The Volume Copy premium feature copies data from a source volume to a target volume within the same storage array.

- A primary volume in a remote volume mirror can be either a source volume or a target volume in a volume copy.
- You can create a volume copy on the primary volume in a mirrored pair, but you cannot create a volume copy on a secondary volume in a mirrored pair. You can make a copy of a secondary volume in two ways:
  - Promote the secondary volume to the role of primary volume.

ATTENTION Potential loss of data access – If a role reversal is started while a volume copy is in progress, the volume copy fails and cannot be restarted.

  - Create a snapshot volume of the secondary volume, and then perform a volume copy on the snapshot volume.

Using the Dynamic Volume Expansion Premium Feature with Data Replicator Software

Dynamic Volume Expansion (DVE) increases the capacity of a volume. The increased capacity is achieved by using the free capacity that is available on the pool of the standard volume or the snapshot repository volume.

Performing a DVE operation does not interrupt access to data on pools, volumes, or drives.

You can perform a DVE operation on a primary volume or a secondary volume of a mirrored pair. However, you cannot perform a DVE operation on a mirror repository volume.

NOTE To perform a DVE operation, the remote volume mirror must be in an Optimal status. The Properties pane in Logical view shows the status of a volume.

Switching Zoning Configurations for Data Replicator Software

Because of possible restrictions at the host level, the Data Replicator Software configurations contain Fibre Channel switches. These Fibre Channel switches are zoned so that a single host adapter can access only one controller in a storage array. Additionally, all configurations use a separate zone for the ports that are reserved for the Data Replicator Software premium feature.

NOTE Do not zone the uplink port (E_port) that connects (cascades) switches within a fabric.

Switch zoning configurations are typically set up by using the switch management software that is provided by the manufacturer of the Fibre Channel switch. This software should have been included with the materials that were provided when the switch was purchased.

When two or more Fibre Channel switches are cascaded together, the switch management software combines the ports for all of the switches that are linked. For example, if two 16-port Fibre Channel switches are cascaded with a physical connection using a Fibre Channel cable, the switch management software shows ports 0 through 31 participating in the fabric rather than two switches each with ports 0 through 15. Therefore, a zone that is created containing any of these ports can exist on multiple cascaded switches.

Journaling File Systems and Data Replicator Software

When you are using a journaling file system, you cannot gain read-only access to a remote volume. A journaling file system does not let you mount the remote volume in Windows (NTFS); however, you can mount the snapshot of the remote volume.

Prerequisites for Creating a Remote Volume Mirror

Make sure the following prerequisites have been met before you create a remote volume mirror between two storage arrays:

- The Data Replicator Software premium feature has been activated. For more information about enabling and activating the premium feature, go to Activating the Data Replicator Software Premium Feature on page 5.
- The local storage array contains two mirror repository volumes.

- The local storage array contains the primary volume, and the remote storage array contains the secondary volume. If either volume does not exist, you must create it before you can create the remote volume mirror.
- The secondary volume meets these requirements:
  - The RAID level of the secondary volume can be different from the RAID level of the primary volume.
  - The capacity of the secondary volume must be equal to or greater than the capacity of the primary volume.

Obtaining the Data Replicator Software Premium Feature Key

Before you can create a remote volume mirror, you must obtain the Data Replicator Software premium feature key, enable the premium feature, and activate it. If you have purchased the Data Replicator Software premium feature, contact your Sun Customer Care Center representative to obtain the premium feature key. The Sun Customer Care Center representative will need the 30-character string in the **Feature Enable Identifier** field in the Premium Features and Feature Pack Information window.

1. In the Array Management Window, select **Storage Array >> Premium Features**.

   The Premium Features and Feature Pack Information window opens. The **Premium Features** list shows the premium features that are installed on the storage array.
2. Find and record the 30-character string in the **Feature Enable Identifier** field.

   The Sun Customer Care Center representative uses the Feature Enable Identifier to generate the premium feature key.
3. Contact the Sun Customer Care Center representative to obtain the premium feature key.
4. Copy the Data Replicator Software premium feature key to a directory from which you can retrieve it.

   The default directory is `C:\\Documents and Settings\My Documents`.

NOTE You can enable and activate the Data Replicator Software premium feature now, or you can wait until you are ready to create a remote volume mirror.

Enabling the Data Replicator Software Premium Feature

Before you can create a remote volume mirror, you must obtain the premium feature key, enable the premium feature, and activate it. You do not have to activate the Data Replicator Software premium feature until you are ready to use it.

1. On the menu bar in the Array Management Window, select **Storage Array >> Premium Features**.

   The Premium Features and Features Pack window opens and shows a list of premium features installed on the storage array.
2. Select **Data Replicator Software**, and click **Enable**.

   The `My Documents` directory appears.
3. Is the Data Replicator Software premium feature key file in the `My Documents` directory?
   - **Yes** – Go to step 4.
   - **No** – Navigate to the appropriate directory, and go to step 4.
4. Select the Data Replicator Software premium feature key file, and click **OK**.

   The Enable Premium Feature confirmation message appears.
5. Click **Yes**.

   The Premium Features installed on storage array list shows the Data Replicator Software premium features as enabled but deactivated.

Activating the Data Replicator Software Premium Feature

Before you can create a remote volume mirror, you must obtain the Data Replicator Software premium feature key, enable the premium feature, and activate it. You do not have to activate the Data Replicator Software premium feature until you are ready to use it.

When you activate the Data Replicator Software premium feature, two default mirror repository volumes are created.

- The default names of the mirror repositories are Mirror repository 1, which is owned by controller A, and Mirror repository 2, which is owned by controller B. You cannot change the default names of the mirror repository volumes.
- The mirror repository volumes have either 128-MB or 256-MB volume capacity. You cannot change the default capacities of the mirror repository volumes.

To activate the Data Replicator Software premium feature, perform these steps:

1. On the menu bar in the Array Management Window, select **Storage Array >> Data Replicator Software >> Activate**.

   The Introduction (Activate Data Replicator Software) wizard appears.
2. Select how to assign volume capacity and where to place the mirror repository volumes.

   You can select how to assign volume capacity and where to place the mirror repository volumes in two ways:
   — **From the free capacity of existing pools** – Go to Creating Mirror Repository Volumes in an Existing Pool on page 6.
   — **From the unconfigured free capacity of the storage array** – Go to Creating a Pool and Mirror Repository Volumes from the Unconfigured Capacity of the Storage Array on page 5.

Creating a Pool and Mirror Repository Volumes from the Unconfigured Capacity of the Storage Array

You can use the total unconfigured capacity of the storage array, or you can use the unconfigured capacity of the unassigned drives in the storage array.

1. In the Introduction (Activate Data Replicator Software) wizard, select **Unconfigured capacity (create a new pool)**, and click **Next**.

   The Activate Data Replicator Software - Create Pool wizard appears.
2. In the **Pool Name** text box, type a unique name for the pool.
3. Select one of the drive selection methods.
   — **Automatic** – The storage management software generates a list of available capacity and drive options for each available RAID level.
   — **Manual** – The storage management software generates a list of unselected drives.
4. Click **Next**.
   — If you selected **Automatic**, an empty Select Capacity table and a drop-down list of available RAID levels appear. Go to step 5.
   — If you selected **Manual**, a populated Unselected Drives table, an empty Selected Drives table, and a drop-down list of available RAID levels appears.
5. On the **Select RAID level** drop-down list, select the RAID level for the pool.

   The Select capacity table shows the available volumes for the RAID level.
6. In the Select capacity table, select the drives and capacities for the new pool, and click **Next**.

   The Preview (Activate Data Replicator Software) wizard appears.
7. Click **Finish**.

The Completed (Activate Data Replicator Software) message appears.

8. Click **OK**.

   The Data Replicator Software premium feature is active, and the Logical pane shows the new pool and the two member mirror repository volumes.

Creating Mirror Repository Volumes in an Existing Pool

The capacity of the mirror repository volumes comes from the free capacity in the existing pool. By default, the mirror repository volumes each have either 128-MB or 256-MB capacity. You cannot create the mirror repository volumes on a pool with insufficient capacity. You cannot change the default capacities of the mirror repository volumes.

1. In the Introduction (Activate Data Replicator Software) wizard, select **Free capacity on existing pools**.
2. From the list of available pools, select a pool in which to place the mirror repository volumes, and click **Next**.

   The Preview (Activate Data Replicator Software) wizard appears.
3. Click **Finish**.

   The Completed (Activate Data Replicator Software) message appears.
4. Click **OK**.

   The Data Replicator Software premium feature is active, and the Logical pane shows the two mirror repository volumes in the pool.

Creating a Remote Volume Mirror

Before you create a remote volume mirror, verify that all of the prerequisites have been met. For more information, go to Prerequisites for Creating a Remote Volume Mirror on page 3.

1. Open the Array Management Windows of both the local storage array and the remote storage array.
2. Verify that the Data Replicator Software premium feature has been activated on both the local storage array and the remote storage array
3. In the Array Management Window of the local storage array, select the **Logical** tab.
4. In the Logical pane of the local storage array, select the primary volume for the remote volume mirror.
5. On the menu bar in the Array Management Window, select **Volume >> Data Replicator Software >> Create**.

   The Introduction (Activate Data Replicator Software) wizard appears.
6. Click **Next**.

   The Select Storage Array (Create Remote Volume Mirror) dialog appears. The **Storage Arrays** list shows the remote storage arrays.
7. Select a storage array, and click **Next**.

   The Select Secondary Volume (Create Remote Volume Mirror) wizard appears.
8. Go to Selecting the Secondary Volume.

Selecting the Secondary Volume

Prerequisites

Before you select the secondary volume, perform these tasks on the secondary volume candidate:

1. Back up all data to the volume.
2. Stop all I/O activity to the volume.

3. Unmount the file system of the volume.

After you have selected the remote storage array and the primary volume, perform these steps:

1. In the Select Secondary Volume (Create Remote Volume Mirror) wizard, select the secondary volume.

NOTE The secondary volume must have a capacity equal to or greater than the capacity of the primary volume.

2. Click Next.

   The Set Write Mode (Create Remote Volume Mirror) wizard appears.
3. Go to Setting the Write Mode.

Setting the Write Mode

The secondary host ports on the storage arrays are reserved for data synchronization between the primary volume and the secondary volume in a mirrored volume pair. You can set the remote volume mirror to write either synchronously or asynchronously.

- **Synchronous mode** – In the synchronous mode, the controller on the primary volume on the storage array sends an I/O completion message back to the host storage array after the data has been successfully copied to the secondary storage array. The synchronous mode is the preferred mode of operation because it offers the best chance of full data recovery from the secondary storage array in the event of a disaster; however, the data recovery can degrade the I/O performance of the host.
- **Asynchronous mode** – In the asynchronous mode, the controller on the primary storage array sends an I/O completion message to the host storage array before the data has been successfully copied to the secondary storage array. The asynchronous mode offers faster host I/O performance; however, it does not guarantee that data was successfully written to the secondary volume or that the write requests were completed on the secondary volume in the same order they were initiated.

NOTE If you select the asynchronous mode, select whether to add the secondary volume to a write consistency group.

- **Add to write consistency group option** – A write consistency group makes sure that the secondary volume receives write requests in the sequence initiated by the controller of the primary volume. You have the option of adding the secondary volume to a write consistency group.

To set the write mode for the remote volume mirror, perform these steps:

1. In the Set Write Mode (Create Remote Volume Mirror) wizard, select either the **Synchronous mode** or the **Asynchronous mode**.
2. Click **Next**.

   The Select Synchronization Settings (Create Remote Volume Mirror) wizard appears.
3. Go to Setting the Synchronization Priority and the Synchronization Method on page 8.

Setting the Synchronization Priority and the Synchronization Method

You can set the priority for allocating system resources to synchronizing the remote volume mirror. When a remote volume mirror synchronizes, system resources are allocated to the process.

- Higher synchronization priorities allocate more resources to the process and might degrade I/O performance.
- Lower synchronization priorities allocate fewer resources to the process and have less impact on normal I/O performance.

After you set the initial synchronization priority and synchronization method, you can change it. For more information about resynchronizing volumes in a remote volume mirror, go to Resynchronizing Volumes in a Remote Volume Mirror on page 12.

1. In the Select Synchronization Settings (Create Remote Volume Mirror) wizard, select the synchronization priority on the **Priority** slide bar.
2. Select either **Manual resynchronization** or **Automatic resynchronization**.
   - **Automatic resynchronization** – Resynchronization starts immediately after communication is restored between unsynchronized mirrored volumes.
   - **Manual resynchronization**– The mirrored pair must be manually resynchronized each time communication is restored between unsynchronized mirrored volumes.
3. Click **Next**.

   The Preview (Create Remote Volume Mirror) wizard appears.
4. Go to Completing the Remote Volume Mirror.

Completing the Remote Volume Mirror

After you have selected the synchronization settings, perform these steps to complete the remote volume mirror.

1. In the text box in the Preview (Create Remote Volume Mirror) wizard, type `Yes`, and click **Finish**.
   - If other volumes on the remote storage array meet the criteria to be a secondary volume, the Creation Successful (Create Remote Volume Mirror) confirmation message appears. Go to step 2.
   - If no other volumes on the remote storage array meet the criteria to be a secondary volume, the Completed (Create Remote Volume Mirror) message appears. Go to step 3.
2. Are you creating another remote volume mirror?
   - **Yes** – Click **Yes**. The Select Primary Volume (Create Remote Volume Mirror) dialog appears. To continue creating another remote volume mirror, go to Creating a Remote Volume Mirror on page 6.
   - **No** – Click **No**. The Completed (Create Remote Volume Mirror) message appears. Go to step 3.
3. On the Completed (Create Remote Volume Mirror) message, click **OK**.
   - In the Array Management Windows of both the local storage array and the remote storage array, the Logical panes show the mirrored volume pairs as members of their pools. In the Array Management Window of the local storage array, the Properties pane shows the Mirror status as Synchronizing, and the Synchronization - Progress bar shows the estimated time to completion.
   - To view detailed information about the volumes in a remote volume mirror, go to either Viewing Information about a Remote Volume Mirror or a Mirror Repository Volume in the Storage Array Profile on page 9 or Viewing Information about a Remote Volume Mirror or a Mirror Repository Volume in the Properties Pane on page 10.

Controller Ownership/Preferred Path in a Remote Volume Mirror

During a remote volume mirroring operation, the same controller must own both the primary volume and the secondary volume. If both volumes do not have the same preferred controller when a remote volume mirror starts, the ownership of the secondary volume is automatically transferred to the preferred controller of the primary volume.

- When the remote volume mirror is completed or is stopped, ownership of the secondary volume is restored to its preferred controller.
- If ownership of the primary volume is changed during the remote volume mirror, ownership of the secondary volume is also changed.

If a controller fails under any of the following conditions, you must manually change controller ownership to the alternate controller to allow the remote volume mirror to finish.

- A remote volume mirror has a status of In Progress.
- The preferred controller of the primary volume fails.
- The ownership transfer does not occur automatically during a failover.

ATTENTION Possible loss of data – Verify that either the volumes are not in use or a multi-path driver is installed on the host. If you change the controller ownership/preferred path while an application is using one of the volumes, I/O activity is disrupted, and I/O errors occur unless a multi-path host is installed on the host. If a multi-path driver is not installed on the host, or if the multi-path driver is not the RDAC multi-path driver, you must make operating system-specific modifications to make sure that the moved pools can be accessed on the new path.

To change the controller ownership/preferred path setting, go to Changing the Controller Ownership/Preferred Path for a Remote Volume Mirror.

Changing the Controller Ownership/Preferred Path for a Remote Volume Mirror

1. In the Array Management Window, select the **Logical** tab.
2. In the Logical pane, right-click the volume for which to change the controller ownership and preferred path.
3. Select **Change >> Ownership/Preferred Path**.
4. Select the new controller.

NOTE A dot identifies the current path and current controller. When the current path and current controller are not the preferred path and preferred controller, you can select them.

The Confirm Change Ownership/Preferred Path message appears.

5. Click **Yes**.

Viewing Information about a Remote Volume Mirror or a Mirror Repository Volume in the Storage Array Profile

The storage array profile shows the most detailed information about the components of a remote volume mirror and the mirror repository volumes. You can view detailed information about individual volumes in a remote volume mirror and paired volumes in a remote volume mirror. You can view detailed information about the mirror repository volumes in a storage array. You can also save the storage array profile information as a text file.

You can also view information about a remote volume mirror in the Properties pane under the **Logical** tab. For more information, go to Viewing Information about a Remote Volume Mirror or a Mirror Repository Volume in the Storage Array Profile on page 9.

You can save all of the information or specific information under the **Repositories** tab or the **Mirrors** tab.

1. In the Array Management Window of either the local storage array or the remote storage array, select the **Summary** tab.
2. In the Status area, click **Storage Array Profile**.

   The storage array profile opens.
3. Select the **Volumes** tab.
4. Select either the **Mirrors** tab or the **Repositories** tab.

   The Profile for Storage array page appears.
5. Perform either of these actions:
   - **To return to the Array Management Window without saving the information** – Click **Close**.
   - **To save the information** – Click **Save As**, and go to step 6.
6. In the Section Selection area in the Save Profile window, perform either of these actions:
   - Select **All Sections**, and go to step 7.
   - Select **Select Sections**, select each section for which to save the information, and go to step 7.
7. To save the file, perform either of these actions.
   - **Save the file in the default** `My Documents` **directory** – Go to step 8.
   - **Save the file in another directory** – On the **Look in** drop-down list, select a directory in which to save the file, and go to step 8.
8. In the **File name** text box, type a name for the file, and click **Save**.

   The file is saved as a `<Profile date>*.txt` file.

Viewing Information about a Remote Volume Mirror or a Mirror Repository Volume in the Properties Pane

The Properties pane shows of the physical and logical characteristics of a single volume in a mirrored pair or a single mirror repository volume. The Properties pane is view-only. You can view more detailed information or save the information in **Storage Array Profile** under the **Summary** tab. For more information, go to Viewing Information about a Remote Volume Mirror or a Mirror Repository Volume in the Storage Array Profile on page 9.

1. In the Array Management Window, select the **Logical** tab.
2. In the Logical pane, select either the primary volume or the secondary volume in the mirrored pair.

   The Properties pane shows the properties for the selected volume. The Mirror status under Mirroring properties shows the synchronization status of the mirrored pair. When the primary and secondary volumes are synchronizing, the Mirror status shows a synchronizing icon.

Viewing the Logical Elements of the Secondary Volume in a Remote Volume Mirror

1. In the Array Management Window of local storage array, select the **Logical** tab.
2. In the Logical pane, right-click the secondary volume of the remote volume mirror.
3. Select **View Associated Logical Elements**.

The View Associated Logical Elements pop-up appears and shows these logical elements:

— The primary volume and secondary volume and their locations.

— The mirror repository volumes and their locations.

Viewing the Physical Components or the Logical Elements of the Primary Volume in a Remote Volume Mirror

1. In the Array Management Window of the storage array that contains the primary volume, select the **Logical** tab.
2. In the Logical pane, right-click the primary volume, and perform either of these actions:
   — **View the logical elements of the primary volume** – Select **View >> Associated Logical Elements**. The View Associated Logical Elements pop-up appears and shows visual representations of these elements: the primary volume and the secondary volume in the remote volume mirror and their locations and the mirror repository volumes in the storage array and their locations.
   — **View the physical components of the primary volume** – In the Properties pane, click **View Associated Physical Components**. The View Associated Physical Components pop-up appears and shows a visual representation of the primary volume in the remote volume mirror.

Changing the Write Mode and the Consistency Group Membership in a Remote Volume Mirror

The write mode of a remote volume mirror is selected when it is created. When you change the write mode in an remote volume mirror, you can also change the secondary volume's membership in a write consistency group. For more information about write modes and write consistency groups, go to Setting the Write Mode on page 7.

NOTE Before you change the write mode, verify the current write mode to make sure that the change you are making is to the other write mode.

1. In the Array Management Window of the storage array that contains the primary volume, select the **Logical** tab.
2. In the Logical pane, right-click the primary volume of the mirrored pair.
3. Select **Change >> Write Mode**.

   The Change Write Mode dialog appears. The Mirrored pairs table shows all mirrored pairs in both the local storage array and the remote storage array.
4. Select one or more mirrored pairs. To select all mirrored pairs, click **Select All**.
5. Select either the synchronous write mode or the asynchronous write mode.
6. Are you adding the secondary volume of the mirrored pair to a write consistency group?
   — **Yes** – Select the **Add to consistency group** check box.
   — **No** – Go to step 7.
7. Click **OK**.

   The Change Write Mode confirmation message appears.
8. Click **Yes**.

   The Mirroring properties section on the Properties pane in the Array Management Window for the local storage array shows the following information:
   — The mirror status is Synchronized.
   — The write mode is either synchronous or asynchronous.

— The secondary volume is either write consistent or not write consistent.
— The Resynchronization method is either manual or automatic.

Resynchronizing Volumes in a Remote Volume Mirror

There are two resynchronization methods:

- **Manual resynchronization** – Go to Manually Resynchronizing Volumes in a Remote Volume Mirror on page 15.
- **Automatic resynchronization** – Go to Automatically Resynchronizing Volumes in a Remote Volume Mirror on page 14.

For more information about synchronization and resynchronization in remote volume mirrors, go to these topics:

- Normally Synchronized Volumes in a Remote Volume Mirror on page 13
- Unsynchronized Volumes in a Remote Volume Mirror on page 14
- Setting the Synchronization Priority and the Synchronization MethodSetting the Synchronization Priority and the Synchronization Method on page 8
- Changing the Synchronization Priority and the Synchronization Method of a Remote Volume Mirror on page 12
- Resynchronizing Volumes in a Remote Volume Mirror on page 12

You might need to periodically test the communication between the primary volume and the secondary volume in a remote volume mirror, especially after resynchronizing the volumes. For more information, go to Testing Communication Between the Primary Volume and the Secondary Volume in a Remote Volume Mirror on page 18.

Changing the Synchronization Priority and the Synchronization Method of a Remote Volume Mirror

The synchronization priority defines how much processing time and resources are allocated to synchronizing the primary volume and the secondary volume of a remote volume mirror relative to system performance. Increasing the synchronization priority of a remote volume mirror might degrade system performance. You can set the synchronization priority for a remote volume mirror at any time. Synchronization priorities can affect these operations:

- Performing a copyback
- Performing a Dynamic Volume Expansion (DVE)
- Reconstructing a volume
- Initializing a volume
- Changing the segment size of a volume
- Defragmenting a pool
- Adding free capacity to a pool
- Changing the RAID level of a pool

To change the synchronization priority and the synchronization method after a remote volume mirror was created, perform these steps:

1. In the Array Management Window of the storage array that contains the primary volume of the mirrored pair, right-click the **Logical** tab.
2. Select **Change >> Synchronization Settings**.

   The Change Synchronization Settings dialog appears.
3. In the Mirrored pairs table, select the primary volume and the remote volume for which to change the synchronization priority. To select all volumes, click **Select All**.
4. On the **Select Synchronization Priority** slide bar, select the synchronization priority for the mirrored pair.

5. Select either **Manual resynchronization** or **Automatic resynchronization**.
   - **Automatic resynchronization** – Resynchronization starts immediately after communication is restored between unsynchronized mirrored volumes.
   - **Manual resynchronization** – The mirrored pair must be manually resynchronized each time communication is restored between unsynchronized mirrored volumes.
6. Click **OK**.

   The Change Synchronization Settings confirmation message appears.
7. Click **Yes**.

   The Change Synchronization Priority - Progress bar shows the progress of the resynchronization priority change process for a remote volume mirror.
8. Click **OK**.

Normally Synchronized Volumes in a Remote Volume Mirror

In a normally synchronized remote volume mirror, controller owners manage the transfer of data from the primary volume to the secondary volume. In a normal remote volume mirror, these events happen:

1. The primary volume receives a write request from a host.
2. The controller owner on the storage array logs information about the write operation to a mirror repository volume in the storage array.
3. The controller owner writes the data to the primary volume.
4. The controller owner starts a data transfer operation to the secondary volume on the secondary storage array.

The communication between a primary volume and a secondary volume can be either suspended or become unsynchronized. If the communication between the primary volume and the secondary volume breaks, these events happen:

1. The status of the mirrored pair changes to Unsynchronized.
2. A Needs Attention status appears for the storage array.
3. Data is written to the primary volume.
4. Write requests to the primary volume are logged.
5. The controller owner sends an I/O completion to the host sending the write request. Although the host can continue to send write requests to the primary volume, no data transfer takes place to the secondary volume. Writes to the secondary volume are suspended pending the restoration of communications between the primary volume and the secondary volume.

When connectivity is restored between the primary volume and the secondary volume, the mirrored pair is ready to be resynchronized.

NOTE When the primary volume and the secondary volume are resynchronized, only data that has changed on the primary volume after the break in communication is transferred to the secondary volume.

ATTENTION Possible loss of data – If communication is broken after resynchronization starts between the primary storage array and the secondary storage array, the new data might mix with the old data on the secondary volume and render the data unusable in a disaster recovery situation.

Unsynchronized Volumes in a Remote Volume Mirror

The communication between a primary volume and a secondary volume can either be suspended or become unsynchronized. If the communication between the primary volume and the secondary volume breaks, these events occur:

1. The status of the mirrored pair changes to Unsynchronized.
2. A Needs Attention status appears for the storage array.
3. Data is written to the primary volume.
4. Write requests to the primary volume are logged.
5. The controller owner sends an I/O completion to the host sending the write request. Although the host can continue to send write requests to the primary volume, no data transfer takes place to the secondary volume. Writes to the secondary volume are suspended pending the restoration of communications between the primary volume and the secondary volume.

When connectivity is restored between the primary volume and the secondary volume, the mirrored pair is ready to be resynchronized.

NOTE When the primary volume and the secondary volume are resynchronized, only data that has changed on the primary volume after the break in communication is transferred to the secondary volume.

ATTENTION Possible loss of data – If communication is broken after resynchronization starts between the primary storage array and the secondary storage array, the new data might mix with the old data on the secondary volume and render the data unusable in a disaster recovery situation.

For more information about synchronization and resynchronization in remote volume mirrors, go to these topics:

- Normally Synchronized Volumes in a Remote Volume Mirror on page 13
- Setting the Synchronization Priority and the Synchronization Method on page 8
- Changing the Synchronization Priority and the Synchronization Method of a Remote Volume Mirror on page 12
- Resynchronizing Volumes in a Remote Volume Mirror on page 12
- Manually Resynchronizing Volumes in a Remote Volume Mirror on page 15
- Automatically Resynchronizing Volumes in a Remote Volume Mirror on page 14

You might need to periodically test the communication between the primary volume and the secondary volume in a remote volume mirror, especially after resynchronizing the volumes. For more information, go to Testing Communication Between the Primary Volume and the Secondary Volume in a Remote Volume Mirror on page 18.

Automatically Resynchronizing Volumes in a Remote Volume Mirror

When automatic resynchronization is selected, the controller owner of the primary volume automatically starts resynchronizing the data on the remote volume mirror pair immediately after communication is restored between the primary volume and the remote volume.

ATTENTION Possible loss of data – If a resynchronization is interrupted while in progress, another resynchronization automatically starts immediately after communication is restored between the primary volume and the remote volume, which could destroy data integrity.

With automatic resynchronization, you cannot add a secondary volume to a write consistency group; therefore, write consistency during the resynchronization process is not preserved. The write order is not consistent until the entire write consistency group achieves Optimal status. When the write consistency group is in an Optimal state, consistency is achieved.

- For more information about synchronization and resynchronization go to these topics:
  - Normally Synchronized Volumes in a Remote Volume Mirror on page 13
  - Unsynchronized Volumes in a Remote Volume Mirror on page 14
  - Setting the Synchronization Priority and the Synchronization Method on page 8
  - Changing the Synchronization Priority and the Synchronization Method of a Remote Volume Mirror on page 12
  - Resynchronizing Volumes in a Remote Volume Mirror on page 12
  - Manually Resynchronizing Volumes in a Remote Volume Mirror on page 15
- You might need to periodically test the communication between the primary volume and the secondary volume in a remote volume mirror, especially after resynchronizing the volumes. For more information, go to Testing Communication Between the Primary Volume and the Secondary Volume in a Remote Volume Mirror on page 18.

Manually Resynchronizing Volumes in a Remote Volume Mirror

When manual resynchronization is selected, you must manually resynchronize and resume the data transfer on a remote volume mirror after communication is restored between the primary volume and the remote volume. Manual resynchronization is the recommended setting for all remote volume mirrors for three reasons:

- You determine when resynchronization starts, so you can manage the process to mitigate the potential impact on I/O performance.
- In a disaster recovery situation, manual resynchronization offers the best chance of retrieving valid data.
- When the secondary volume is in a write consistency group, manual resynchronization preserves the write order.

For more information about synchronization and resynchronization in remote volume mirrors, go to these topics:

- Normally Synchronized Volumes in a Remote Volume Mirror on page 13
- Unsynchronized Volumes in a Remote Volume Mirror on page 14
- Setting the Synchronization Priority and the Synchronization Method on page 8
- Normally Synchronized Volumes in a Remote Volume Mirror on page 13
- Resynchronizing Volumes in a Remote Volume Mirror on page 12
- Automatically Resynchronizing Volumes in a Remote Volume Mirror on page 14

You might need to periodically test the communication between the primary volume and the secondary volume in a remote volume mirror, especially after resynchronizing the volumes. For more information, go to Testing Communication Between the Primary Volume and the Secondary Volume in a Remote Volume Mirror on page 18.

Reversing the Roles of the Primary Volume and the Secondary Volume in a Remote Volume Mirror

If the primary volume in a remote volume mirror fails in a disaster situation, you can reverse the roles of the primary volume and the secondary volume to transfer the data back to the restored volume. Reversing the roles promotes the secondary volume to the role of primary volume and demotes the primary volume to the role of secondary volume in a remote volume mirror.

ATTENTION Potential loss of data access – If you try to reverse roles between the secondary volume and the primary volume while a volume copy is in progress, the role reversal succeeds, but the volume copy fails and cannot be restarted.

NOTE You cannot perform a volume copy on a secondary volume in a remote volume mirror. To create a volume copy of a secondary volume, you must reverse the roles of the secondary volume and the primary volume, and then perform the volume copy on the new primary volume.

NOTE While a remote volume mirror is synchronizing, you cannot perform a volume copy on either the primary volume or the secondary volume.

NOTE If you reverse roles between a secondary volume with less capacity than the primary volume has, the role reversal succeeds, but the usable capacity of the new secondary volume (the original primary volume) equals the total capacity of the new primary volume (the original secondary volume).

Promoting the Secondary Volume or Demoting the Primary Volume in a Remote Volume Mirror

You can either promote the secondary volume to the role of primary volume, or you can demote the primary volume to the role of secondary volume.

1. In the Array Management Window of the storage array that contains the volume you are changing, click the **Logical** tab.
2. Right-click the volume you are changing.

NOTE The primary volume can be on the remote storage array, and the secondary volume can be on the local storage array.

— **Promoting the secondary volume to the role of primary volume** – Select **Change >> Role to Primary**. The Change to Primary message appears. Click **Yes**. The roles of the primary volume and the secondary volume are reversed.

— **Demoting the primary volume to the role of secondary volume** – Select **Change >> Role to Secondary**. The Change to Secondary message appears. Click **Yes**. The roles of the primary volume and the secondary volume are reversed.

Suspending a Remote Volume Mirror

1. In the Array Management Window of the storage array with the primary volume, select the **Logical** tab.
2. In the Logical pane, right-click the primary volume of a mirrored pair, and select **Suspend Mirroring**.

   The Suspend Mirrored Pair dialog appears. The Mirrored pairs table shows all mirrored pairs in the local storage array and in the remote storage array.
3. Select one or more mirrored pairs to suspend. To select all mirrored pairs, click **Select All**.
4. Click **Suspend**.

   The Suspend Mirror Relationship - Confirmation message appears.
5. In the text box, type `Yes`, and click **OK**.

The Suspend Mirrored Pair - Progress bar shows the progress of the suspension.

6. Click **OK**.

   The Properties pane in the Array Management Window that contains the suspended primary volume shows the Mirror status as Suspended. The Suspended icon appears next to the primary volume icon and the secondary volume icon in the Logical pane in the Array Management Window.

About Resumed Remote Volume Mirrors

When a remote volume mirror is suspended, data continues to read to the primary volume, but the data is not written to the secondary volume. Writes to the primary volume are persistently logged in to the mirror repository volumes.

After communications are restored in a remote volume mirror, data transfer between the primary volume and the secondary volume must be resynchronized.

- **Automatic resynchronization** – The data transfer automatically starts immediately after the volumes are resynchronized.
- **Manual resynchronization** – You must manually resume the remote volume mirror to restart the data transfer. A suspended remote volume mirror stays in a Suspended status until it is manually resumed.

After the remote volume mirror resumes, data is automatically written to the secondary volume. Only the regions of the primary volume that changed since the mirrored pair was suspended are written to the secondary volume

ATTENTION Possible loss of data access – When you resume a remote volume mirror when either the primary volume or the secondary volume is a member of a write consistency group, all other suspended remote volume mirrors for mirrored pairs in the write consistency group also resume.

NOTE When the write mode is synchronous, you do not need to resynchronize the primary volume and the secondary volume after you resume the remote volume mirror.

Resuming a Remote Volume Mirror

1. In the Array Management Window of the storage array with the primary volume, select the **Logical** tab.
2. In the Logical pane, right-click the primary volume of the mirrored pair, and select **Resume Mirroring**.

   The Resume Mirrored Pair dialog appears. The Mirrored pairs table shows all suspended mirrored pairs in the local storage array and in the remote storage array.
3. Select one or more mirrored pairs. To select all mirrored pairs, click **Select All**.
4. Click **Resume**.

   The Resume Mirrored Pair - Confirmation message appears.
5. Click **Yes**.

   The remote volume mirror resumes. The Properties panes in the Array Management Windows for the local storage array and the remote storage array show the mirror status as Synchronized for both the primary volume and the secondary volume.

Testing Communication Between the Primary Volume and the Secondary Volume in a Remote Volume Mirror

You might need to test the communication between the primary volume and the secondary volume in a remote volume mirror. This situation applies especially when the resynchronization method is manual or during a disaster recovery scenario. For more information about synchronization and resynchronization in remote volume mirrors, go to these topics:

- Normally Synchronized Volumes in a Remote Volume Mirror on page 13
- Unsynchronized Volumes in a Remote Volume Mirror on page 14
- Setting the Synchronization Priority and the Synchronization Method on page 8
- Changing the Synchronization Priority and the Synchronization Method of a Remote Volume Mirror on page 12
- Resynchronizing Volumes in a Remote Volume Mirror on page 12
- Automatically Resynchronizing Volumes in a Remote Volume Mirror on page 14

To test the communication between volumes in a remote volume mirror, perform these steps:

1. In the Array Management Window of either the primary volume or the secondary volume, select the **Logical** tab.
2. In the Logical pane, right-click the volume.
3. Select **Test Mirror Communication**.

   The Mirror Communication Test Progress message appears.

NOTE This process might take a while to complete.

Deleting a Volume from a Mirrored Pair in a Storage Array

You can delete either a primary volume, a secondary volume, or both volumes from a mirrored pair in a storage array.

ATTENTION Do not remove a mirror relationship to back up a mirrored volume. To perform backups of either the primary volume or the secondary volume, suspend the remote volume mirror so that the mirror relationship is not broken.

Deleting a Primary Volume in a Mirrored Pair from a Storage Array

ATTENTION Possible loss of data – Depending on which premium features are enabled on the storage array, deleting a primary volume might delete all associated volumes, which can result in the permanent loss of the data on those volumes.

NOTE You cannot delete a primary volume while it is synchronizing.

When you delete a primary volume from a remote volume mirror, these events occur:

- The primary volume is deleted from the storage array.

  ATTENTION Loss of data – The volume is permanently deleted from the storage array, and all data on the primary volume is permanently lost.

- The mirror relationship breaks.

- The capacity of the deleted volume becomes unconfigured free capacity in the storage array and is available for creating new volumes.
- The secondary volume becomes a regular, standard volume and is able to accept both reads and writes.

To delete a primary volume in a mirrored pair from a storage array, perform these steps:

1. Stop all I/O activity to the primary volume, and unmount any file systems on the primary volume.
2. In the Array Management Window of the storage array that contains the primary volume, select the **Logical** tab.
3. In the Logical pane, right-click the primary volume, and select **Delete**.

   The Delete Volumes dialog appears.
4. Select one or more volumes to delete, and click **Delete**.

   The Confirm Delete Volume(s) message appears
5. In the text box, type Yes, and click **OK**.

   The Delete Volumes - Progress bar appears.
6. When the deletion is complete, click **OK**.

   The primary volume is deleted from the storage array. The secondary volume in the mirrored pair is a regular standard volume in the storage array.

ATTENTION Loss of data – The primary volume is permanently deleted from the storage array, and all data on the volume is permanently lost.

Deleting a Secondary Volume in a Mirrored Pair from a Storage Array

ATTENTION Possible loss of data – Depending on which premium features are enabled on the storage array, deleting a secondary volume might delete all associated volumes, which can result in the permanent loss of the data on those volumes.

NOTE You can delete a secondary volume while it is synchronizing.

When you delete a secondary volume, the mirror relationship is removed, and the remote volume mirror is destroyed.

ATTENTION Possible loss of data – Deleting a secondary volume results in the permanent loss of the data on the secondary volume.

To delete a primary volume in a mirrored pair from a storage array, perform these steps:

1. Stop all I/O activity on the secondary volume, and unmount any file systems on the secondary volume.
2. In the Array Management Window of the storage array that contains the secondary volume, select the **Logical** tab.
3. In the Logical pane, right-click the secondary volume, and select **Delete**.

   The Delete Volumes dialog appears.
4. Select one or more volumes to delete, and click **Delete**.

   The Confirm Delete Volume(s) message appears.
5. In the text box, type Yes, and click **OK**.

   The Delete Volumes - Progress bar appears.
6. When the deletion is complete, click **OK**.

   The mirror relationship is removed, and the remote volume mirror is destroyed.

ATTENTION Loss of data – The secondary volume is deleted, and the data on the secondary volume is permanently destroyed.

Removing a Remote Volume Mirror from a Storage Array

Removing a remote volume mirror from a storage array returns both the primary volume and the secondary volume to regular standard volumes. Normal I/O operations continue on the former primary volume. The former secondary volume is available for normal I/O operations. Both volumes are read-write enabled. A mirror relationship between the two volumes can be re-created unless one of the volumes has been deleted.

ATTENTION Possible loss of data access – Do not remove a mirror relationship to back up a mirrored volume. To back up either the primary volume or the secondary volume, suspend the remote volume mirror so that the mirror relationship is not broken.

NOTE No data on either volume is deleted.

1. In the Array Management Window of the storage array that contains the primary volume, select the **Logical** tab.
2. In the Logical pane, right-click the primary volume of a mirrored pair, and select **Remove Mirror Relationship**.

   The Remove Mirror Relationship dialog appears. The Mirrored pairs table shows all mirrored pairs in the local storage array and in the remote storage array.
3. Select one or more mirrored pairs for which to remove the relationship. To select all mirrored pairs, click **Select All**.
4. Click **Remove**.

   The Remove Mirror Relationship - Confirmation message appears.
5. Click **Yes**.

   The Remove Mirrored Pair - Progress bar shows the progress of the removal process.

Disabling the Data Replicator Software Premium Feature

Before you can disable the Data Replicator Software premium feature, the Data Replicator Software premium feature must have been deactivated on the storage array.

Deleting the Data Replicator Software premium feature on this storage array does not affect remote volume mirrors or the Data Replicator Software premium features of other storage arrays; however, another storage array cannot use this storage array as a remote storage array for creating a remote volume mirror.

NOTE To enable the Data Replicator Software premium feature again, you must either retrieve the Data Replicator Software premium feature key or obtain a new one from your Sun Customer Care Center representative.

1. In the Array Management Window, select **Storage Array >> Data Replicator Software >> Deactivate**.

   The Deactivate Data Replicator Software confirmation message appears.
2. Click **Yes**.

   The Data Replicator Software premium feature is deactivated, and the two mirror repository volumes are deleted from the storage array.

Deactivating the Data Replicator Software Premium Feature

Before you can deactivate the Data Replicator Software premium feature, all remote volume mirrors must have been deactivated on the storage array.

After you have deactivated the Data Replicator Software premium feature, you cannot create any more remote volume mirrors on the storage array.

Deleting the Data Replicator Software premium feature on this storage array does not affect remote volume mirrors or the Data Replicator Software premium features of other storage arrays; however, another storage array cannot use this storage array as a remote storage array for creating a remote volume mirror.

1. In the Array Management Window, select **Storage Array >> Data Replicator Software >> Deactivate**.

   The Deactivate Data Replicator Software confirmation message appears.
2. Click **Yes**.

   The Data Replicator Software premium feature is deactivated, and the two mirror repository volumes are deleted from the storage array.

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