



Hewlett Packard
Enterprise

HPE Storage Replication Pack 8.7.0 for VMware® Site Recovery Manager™ Virtual Appliance User Guide

Abstract

This document provides information for installing, configuring, and managing the HPE Nimble. The software combines HPE Replication Software with VMware SRM to ensure the highest performing and most reliable disaster protection for all virtualized applications.

Notices

The information contained herein is subject to change without notice. The only warranties for Hewlett Packard Enterprise products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Hewlett Packard Enterprise shall not be liable for technical or editorial errors or omissions contained herein.

Confidential computer software. Valid license from Hewlett Packard Enterprise required for possession, use, or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Links to third-party websites take you outside the Hewlett Packard Enterprise website. Hewlett Packard Enterprise has no control over and is not responsible for information outside the Hewlett Packard Enterprise website.

Acknowledgments

Adobe, the Adobe logo, Acrobat, and the Adobe PDF logo are either registered trademarks or trademarks of Adobe in the United States and/or other countries.

Google™ and the Google Logo are registered trademarks of Google LLC.

Microsoft® and Windows® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Oracle®, Java, and MySQL are registered trademarks of Oracle and/or its affiliates.

VMware®, VMware NSX®, VMware vCenter®, and VMware vSphere® are registered trademarks or trademarks of VMware, Inc. and its subsidiaries in the United States and other jurisdictions.

All third-party marks are property of their respective owners.



Contents

- Introduction..... 6**
- VMware vCenter Site Recovery Manager Virtual Appliance Overview..... 7**
- Stretched Storage..... 9**
- SRA Overview..... 10**
- Supported configurations..... 12**
- Prerequisites for installing and configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA 13**
 - HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Network ports 14
- Installing HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA..... 15**
- Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA..... 16**
 - Steps to configure HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage System required for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA..... 16
 - HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system setup..... 16
 - Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system at protected and recovery sites..... 16
 - Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system for Standard storage 17
 - Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Storage system for Stretched Storage..... 18
 - Configuring VMware vCenter Server for hosts and clusters..... 19
 - Steps to configure HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA in VMware vCenter Site Recovery Manager Virtual Appliance..... 20
 - Add Array Pair..... 20
 - Stretched Storage Configuration..... 22
 - Examples to add Array Pair..... 24
- Managing HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration..... 27**



HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration Parameters.....	27
Manage HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration.....	29
View configuration	29
Modify configuration.....	29
Copy configuration.....	29
Reset configuration.....	30
Removing HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA.....	31
SRA behavior during SRM operations.....	32
Test.....	32
Clean Up.....	32
Recovery Operation from Protected Site to Recovery Site	32
2 Data Center Configurations.....	32
Planned Migration.....	32
Disaster Recovery.....	32
Disaster Recovery with Forced Recovery.....	33
3 Data Center Configurations with 3PAR Synchronous Long Distance (SLD).....	33
Planned Migration.....	33
Disaster Recovery.....	34
Disaster recovery with forced recovery.....	35
3 Data Center Configurations with Peer Persistence (3DC-PP).....	35
Planned Migration.....	35
Disaster Recovery.....	36
Disaster Recovery with Forced Recovery.....	37
Reprotect Operation (after SRM recovery of VMs from protected site to recovery site).....	37
Recovery Operation from Recovery Site to Protected Site (Failback).....	37
Reprotect Operation (after SRM recovery of VMs from recovery site to protected site).....	38
Default behavior for SRA.....	39
Dynamic Access Restriction support	39
Important notes.....	41
SRM behavior.....	41
SRA behavior.....	41
Limitations of SLD and 3DC-PP configuration.....	42
Support for Stretched Storage.....	43
Remote Copy Behavior.....	43
Related documents and terminology.....	44
Typographic conventions.....	48
Support and other resources.....	49
Accessing Hewlett Packard Enterprise Support.....	49
Accessing updates.....	49
Remote support.....	50



Warranty information.....	50
Regulatory information.....	50
Documentation feedback.....	50



Introduction

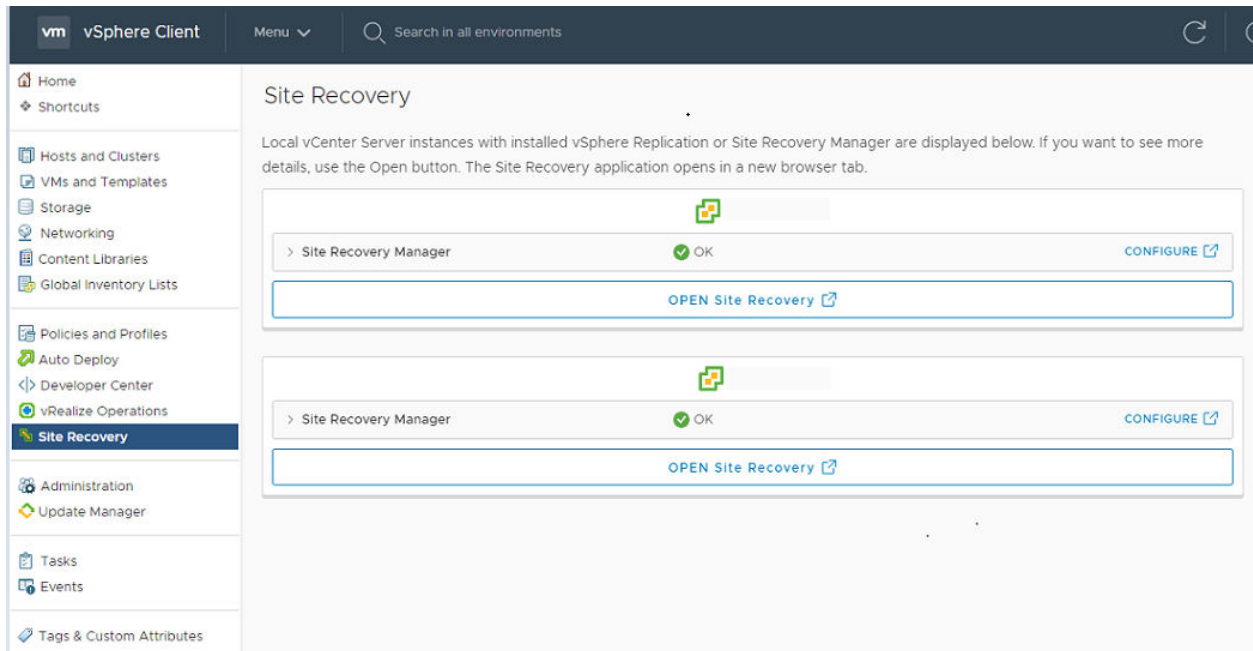
HPE Storage Replication Pack for VMware® Site Recovery Manager™ Virtual Appliance (HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA) is an adapter to VMware vCenter Site Recovery Manager™ Virtual Appliance (SRM).

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA enable SRM to work with HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems for array-based replication. HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA are installed on SRM servers. It enables communications between SRM and HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems thus facilitating remote replication.

For information on VMware and the VMware Site Recovery Manager Virtual Appliance, see the VMware website [**https://www.vmware.com/products/site-recovery-manager/**](https://www.vmware.com/products/site-recovery-manager/).

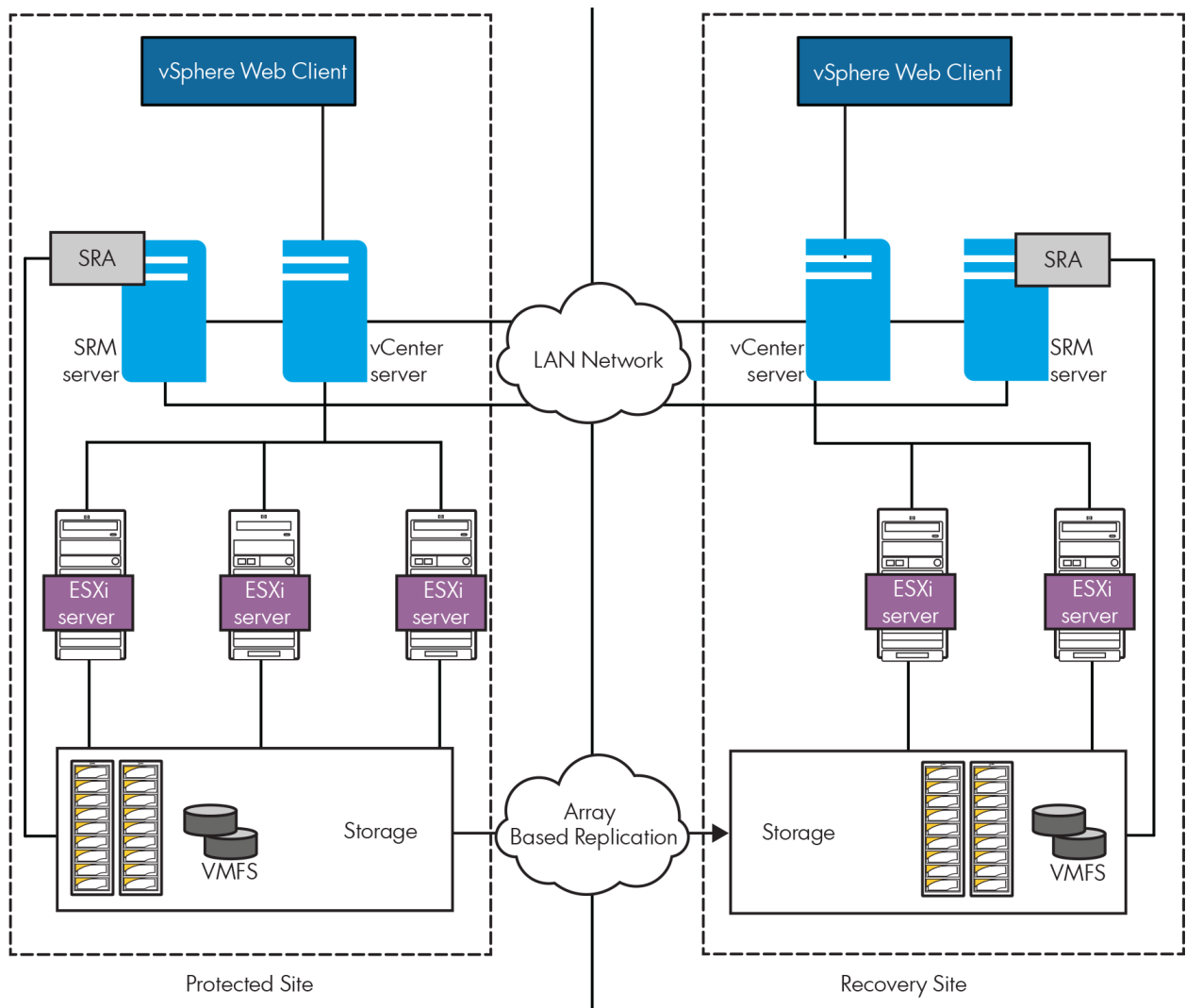
VMware vCenter Site Recovery Manager Virtual Appliance Overview

SRM works as a plug-in component for VMware vCenter and integrates its functionality in VMware vCenter.



VMware vCenter Site Recovery Manager Virtual Appliance:

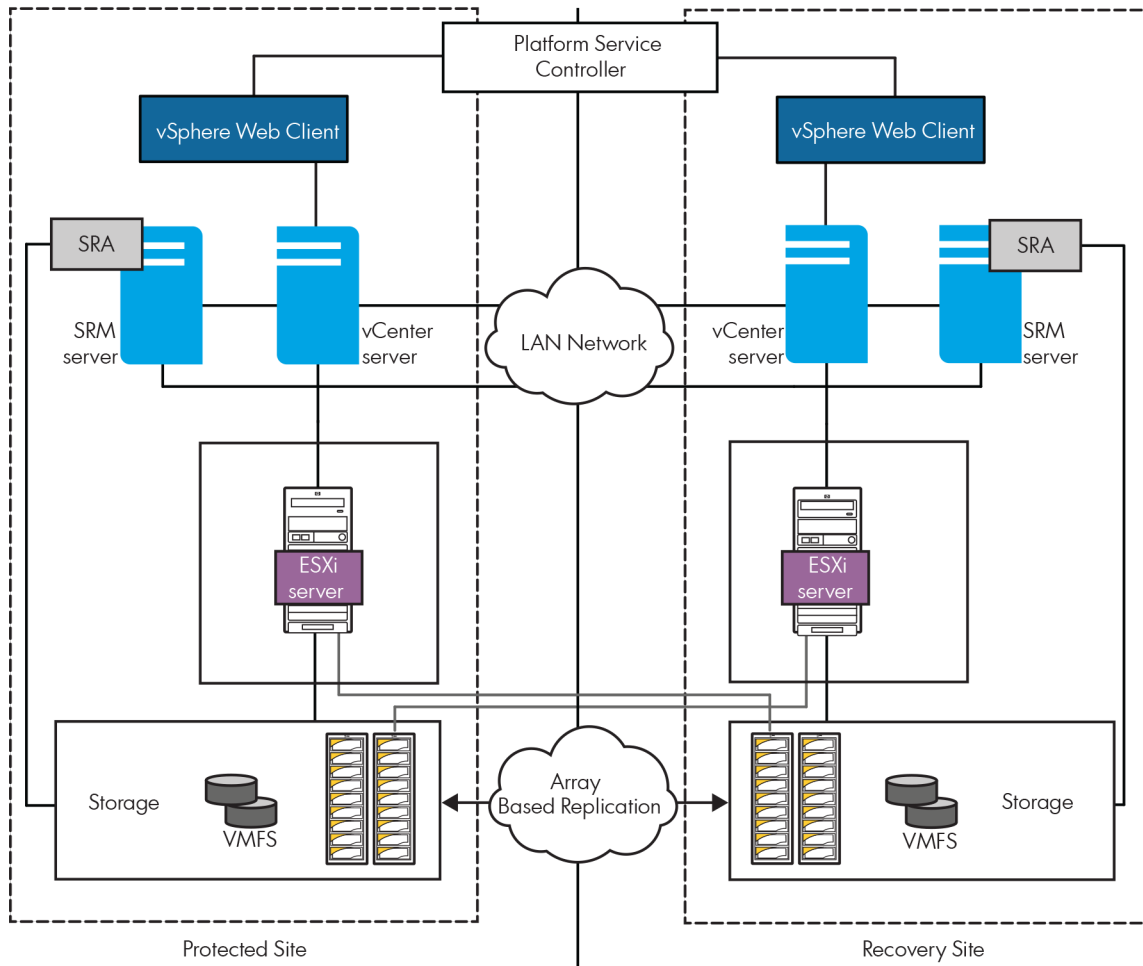
- Builds, manages, tests, and executes disaster recovery solutions for virtual infrastructure implementations.
- Uses the storage replication mechanism between the protected site and the recovery site for disaster recovery of the protected site virtual infrastructure.
- Creates a recovery point objective by creating a protection group at the protected site. The protection group contains replicated virtual machines.
- Creates a recovery plan at the recovery site for the protection group at the protection site.
 - The recovery plan can be tested at any time at the recovery site to verify that recovery point objective can be achieved at the time of disaster.
 - The recovery plan can be executed at disaster time or at any desired time at the recovery site to guarantee that recovery point objective is met.



SRM communicates with HPE Remote Copy Software for storage replication through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. You can get information about Remote Copy volume groups that exist in HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR to SRM from HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. The Site Recovery Manager identifies datastores and RDM devices in the Remote Copy volume group (also known as consistency groups). These datastores and RDM devices have corresponding virtual volumes in the Remote Copy volume group and replicates between the protected site and the recovery site.

Stretched Storage

Stretched storage is implemented in environments where disaster/downtime avoidance is a key requirement. This operation combines synchronous replication with array-based clustering.



The integration of stretched storage with Site Recovery Manager 6.1 onwards, allows users to achieve:

- Planned maintenance downtime avoidance
- Zero-downtime disaster avoidance

For more information, see VMWare vCenter installation procedure documentation at <https://www.vmware.com/support/pubs/>.



SRA Overview

HPE Storage Replication Adapter (SRA) is a plug-in to VMware vCenter Site Recovery Manager that enables interaction between Site Recovery Manager (SRM) and the storage controller. HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Software for VMware vCenter SRM integrates VMware SRM with HPE Remote Copy replication software. HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA software combines HPE Remote Copy Software and HPE Virtual Copy Software with VMware SRM to ensure the highest performing and most reliable disaster protection for all virtualized applications.

Features

- SRA Interface enables SRM to execute the workflows like, query SRA properties and capabilities and discovery of replicated storage.
- Accelerate recovery for the virtual environment through automation.
- Promote reliable recovery by enabling nondisruptive testing.
- Automated site recovery.
- Leverage the high performance, reliability, and simplicity of HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR replication capabilities.

SRM Operations

The following operations are supported in Standard storage and Stretched storage:

• Test Failover

When you create or modify a recovery plan, test it before you use it for planned migration or disaster recovery.

Testing a recovery plan, ensures that the virtual machines are recovered correctly to the recovery site. If you do not test recovery plans, a disaster recovery situation might not recover all virtual machines, which may result in data loss.

Testing a recovery plan exercises nearly every aspect of a recovery plan, although Site Recovery Manager makes several concessions to avoid disrupting ongoing operations on the protected and recovery sites.

With the help of HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA, Site Recovery Manager creates temporary snapshots of replicated storage at the recovery site.

For array-based replication, Site Recovery Manager rescans the arrays to discover them. If you explicitly assign test networks, Site Recovery Manager connects recovered virtual machines to a test network. If virtual machine network assignment is Auto, Site Recovery Manager assigns virtual machines to temporary networks that are not connected to any physical network.

• Clean up

After you test a recovery plan, you can return the recovery plan to the ready-state by running a cleanup operation. Site Recovery Manager performs several cleanup operations after a test.

- Powers off the recovered virtual machines
- Replaces recovered virtual machines with placeholders, preserving their identity and configuration information
- Cleans up replicated storage snapshots that the recovered virtual machines used during the test

• Recovery

You can use Site Recovery Manager to implement different types of recovery from the protected site to the recovery site.

- Planned Migration



The orderly evacuation of virtual machines from the protected site to the recovery site. Planned migration prevents data loss when migrating workloads in an orderly fashion. For planned migration to succeed, both sites must be running and fully functioning.

- **Disaster Recovery**

Similar to planned migration except that the disaster recovery does not require that both sites be up and running. For example, the protected site goes offline unexpectedly. During a disaster recovery operation, failure of operations on the protected site is reported but otherwise ignored.

- **Reprotect**

After a recovery, the recovery site becomes the new protected site, but it is not protected yet. If the original protected site is operational, you can reverse the direction of protection to use the original protected site as a new recovery site to protect the new protected site.

Manually re-establishing protection in the opposite direction by recreating all protection groups and recovery plans is time consuming and prone to errors. Site Recovery Manager provides the reprotect function, which is an automated way to reverse protection.

After Site Recovery Manager performs a recovery, the protected virtual machines start up on the recovery site. Because the former protected site might be offline, these virtual machines are not protected. By running reprotect when the protected site comes back online, you reverse the direction of replication to protect the recovered virtual machines on the recovery site back to the original protected site.

For the reprotect operation to succeed, the Remote Copy links between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays configured between the protected and recovery arrays must be up and running.

Supported features

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA integrate with SRM to support the following HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR configurations for SRM Standard storage (Non-Stretched storage) and Stretched storage features:

- **Two data center configuration:** The arrays in the protected and recovery sites configured in VMware SRM, and HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA are connected with each other using either 3PAR synchronous or asynchronous periodic or asynchronous streaming replication modes for the Standard storage (Non-Stretched storage) configurations or with synchronous replication mode for SRM Stretched storage feature.
- **Synchronous Long Distance (SLD):** SLD combines synchronous and periodic asynchronous replication to replicate a Remote Copy group to two separate target arrays. VMware SRM/HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA is configured with protected and recovery sites between the arrays which have periodic replication modes.
- **3 data center (3DCC-PP):** In 3DC-PP, the primary (site A) and secondary (site B) arrays has the Peer Persistence relationship characterized by synchronous replication and a quorum witness enabled by the `auto_failover` and `path_management` policies. The Remote Copy group policy associated is `mt_pp`. A VMware Metro Cluster has access to the Peer Persistence volumes on sites A and B. The Remote Copy group is extended to site C with periodic replication mode from both site A and site B. The ESXi hosts and the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR array in site C, the ESXi hosts and one of the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays in sites A or B are part of the VMware SRM configuration with site A and site B hosts in SRM protected site and the site C hosts in the SRM recovery site.



Supported configurations

For information about the supported hardware and software platforms, see the Single Point of Connectivity Knowledge for HPE Storage Products (SPOCK) website [**https://www.hpe.com/storage/spock**](https://www.hpe.com/storage/spock).



Prerequisites for installing and configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA installation file is distributed as .tar.gz archives and requires SRM Appliance Management interface to complete the installation.

- HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA uses HPE Web Services API server (WSAPI) to communicate with HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system. For HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA to function, HPE WSAPI service must be up and running.

For more information, see the HPE Web Services API Developer's Guide at <https://www.hpe.com/support/hpesc>.

- HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA requires the following configurations on the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system:
 - HPE Remote Copy Software license on the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.
 - HPE Virtual Copy Software license on the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.
 - For using Stretched storage in HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA, you must have Peer persistence license.
 - HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system user with edit permission.
 - In the SLD configuration scenario, A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System. SRM and SRA are configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C, where site A is the protected site and site C is the recovery site.

Prior to SRM recovery operation to Site C and when the protected site storage array is up and running, ensure that the VVs at site A (configured in SRM protected site) have the replication roles as primary.

Use 3PAR CLI commands and 3PAR SSMC to view and get the roles as primary.

- In the 3DC-PP configuration, A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System. Multi-Target Peer Persistence (MT_PP) configuration is set up for these SLD groups. The sites A and B can be configured in the VMware Metro Storage Cluster (vMSC) configuration, where the Remote Copy groups are in Peer Persistence configuration between A and B. The ESXi hosts in the sites A and B are in the VMware vSphere HA cluster and have uniform host access to the replicated Peer Persistence Remote Copy group volumes. SRM/SRA is configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C, where site A is the protected site and site C is the recovery site. SRM/SRA can also be configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems B and C instead of systems A and C, where site B is the protected site and site C is the recovery site.
- The target names in the Remote Copy configuration must match the system names.

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Network ports

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA uses HTTPS port managed by HPE Web Services API server service.

This HTTPS port must be configured on the firewall for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA to communicate with HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.

Installing HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA

Prerequisites

- To obtain the SRA file for installation, extract the installation package distributed as .zip archive. The extracted folder contains the following files:
 - `hpe3parsra_x.x.x.x.tar.gz` - SRA files distributed as .tar.gz for installation.
 - `hpe3parsra_x.x.x.x.tar.gz.HPc` - HPE code signed file.
 - `binarychecker` - Contains binary checker utility (hpbinarychecker) for Windows and Linux platforms.
- Before installing the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Software, you must verify the signed installation package using the following command on a Windows or Linux system.
`hpbinarychecker --input hpe3parsra_x.x.x.x.tar.gz.HPc.`

NOTE: Microsoft Visual C++ 2013 and 2015 Redistributable Packages (x86) must be installed on Windows Server for running the HPE binary checker tool.

About this task

Site Recovery Manager Appliance Management Interface is used to install HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA.

The SRA installation files are distributed as `.tar.gz` archives.

NOTE: While installing SRA 8.4.1 or later, remove any previous installed versions of SRA. **Copy Configuration** option is not supported for any versions of SRA.

Procedure

1. Log in to the SRM Appliance Management Interface as admin.
2. Click **Storage Replication Adapters**, and click **New Adapter**.
3. Click **Upload**, navigate to the folder that contains the SRA installation file or SRA tarball and select it.
4. A confirmation message displays after successful upload. Click **Close**.
The SRA details appear in the Site Recovery Manager Appliance Management Interface.
5. Log in to the vSphere Client or the vSphere Web Client.
6. Click **Site Recovery** > **Open Site Recovery**, select a site pair, and click **View Details**.
7. In the **Site Pair** tab, go to **Configure** > **Array Based Replication** > **Storage Replication Adapters**, and click **Rescan Adapters** to view the installed SRA.



Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA

Steps to configure HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage System required for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system setup

This section describes the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system setup required for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA.

Any HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system acting as an array manager (at the protected site or at the recovery site) in SRM setup must be configured with HPE Remote Copy Software.


HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA support synchronous, asynchronous periodic, and asynchronous streaming replication modes in 1:1, 1:N, and N:1. For more information about Remote Copy configurations, see the *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software User's Guide*.

NOTE: When using Peer Motion to perform data migration, the Remote Copy configurations and SRM setup must be re-established with the new array after migration. For more information about re-establishing Remote Copy configurations, see the *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Peer Motion Manager User Guide* or *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software User's Guide*.

Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system at protected and recovery sites

About this task

This section describes the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage configurations that must be performed at the protected and recovery sites.

 **IMPORTANT:** Make sure that you do these configurations both at the protected and recovery sites.

Procedure

1. Make sure that the correct version of HPE Operating System with the appropriate licensed features is available.
2. Create a user on the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.
3. Register ESXi hosts on the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.



Before a LUN from the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system can be exported to the ESXi host, register the ESXi host WWNs/iSCSI names on the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system by creating a host entry. Perform this operation on both the protected and recovery sites.

4. Create Common Provisioning Groups (CPGs) to use during the creation of virtual volume.
5. Create virtual volumes.

To meet the replication requirement of the virtual infrastructure, create the required number of virtual volumes. For more information about creating virtual volumes, see the *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR OS CLI Administrator's Manual*.

6. Set up the HPE Remote Copy Software.

HPE Remote Copy Software provides the capability to copy virtual volumes from a protected site to a recovery site.

Set up a Remote Copy link between the protected and recovery site. Create a Remote Copy volume group at the protected site. A corresponding Remote Copy group is automatically created at the recovery site. Ensure that the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system hardware is set up appropriately for creating a Remote Copy configuration between the protected site and recovery site. For more information about setting up HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software, 3PAR SLD, and 3DC-PP configurations, see the *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software User Guide*.

NOTE:

- You can create a Remote Copy configuration between the protected and recovery sites using one of the following protocols:
 - RCIP
 - RCFC

For information about implementing Remote Copy, see the *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software User's Guide*.

Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system for Standard storage

About this task

This section describes the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage configurations that must be performed only at the protected site. As part of configuration, few additional steps must be followed at the recovery site also.

Procedure

1. Create Remote Copy Group on the primary storage system.
2. Admit the virtual volume to the Remote Copy volume group.

A virtual volume contains virtual infrastructure data (datastore, virtual disk, and RDM disk). Replication of virtual infrastructure data is enabled by admitting virtual volumes to the Remote Copy volume group. Each virtual volume at the protected site is mapped to a corresponding virtual volume at the recovery site. Data in each virtual volume at the protected site is synced with the data in the corresponding virtual volume at the recovery site whenever Remote Copy is active. For more information about adding virtual volumes to Remote Copy volume groups, see the *HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software User Guide*.

3. Export the primary virtual volume to the primary ESXi host (create a VLUN).



NOTE: From SRA 8.4 onwards, it is not mandatory to export the secondary volumes.

From SRA 8.4 onwards, the configuration parameters are found in *sraconfig.cfg* file and can be edited. For default parameters, see section **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration Parameter**. The export and unexport functionality of SRA changes based on the values of the configuration parameters.

4. In the SLD configuration scenario, A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System. SRM and SRA are configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C, where site A is the protected site and site C is the recovery site.
5. In the 3DC-PP configuration, A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System. Multi-Target Peer Persistence (MT_PP) configuration is set up for these SLD groups. The sites A and B can be configured in the VMware Metro Storage Cluster (vMSC) configuration where the Remote Copy groups are in Peer Persistence configuration between A and B. The ESXi hosts, in the sites A and B are in the VMware vSphere HA cluster and have uniform host access to the replicated Peer Persistence Remote Copy group volumes. SRM/SRA is configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C, where site A is the protected site and site C is the recovery site. SRM/SRA can also be configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems B and C instead of systems A and C, where site B is the protected site and site C is the recovery site.

Configuring HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Storage system for Stretched Storage

About this task

This section describes the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage configurations that you must perform on both the protected and recovery sites.

Procedure

1. Create Remote Copy Group from primary to recovery storage system.

NOTE: Create Remote copy in Sync mode for stretched storage support.

2. Admit the virtual volumes to the Remote Copy volume group.
 3. All associated hosts are connected to both the primary and secondary arrays.
 4. Set the same WWN for the replicated volumes which are admitted to the Remote Copy group in Primary to recovery storage system.
 5. Configure peer persistence.
 - a. Classic Peer Persistence with policy path_management.
 - b. Active Peer Persistence with policy active_active.
 - For fresh install, set the active_active policy.
 - For an already running setup, switch from Classic Peer Persistence to Active Peer Persistence.
- For more information on switching the policy, see **Converting a Classic Peer Persistence Remote Copy configuration to Active Peer Persistence using the CLI**.
6. Export the virtual volumes to the ESXi hosts on both sites (create a VLUN).



7. Value of DAR flag must be set to **True** on both SRM sites. For more information on changing the parameter value, see **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration Parameters**.
8. To successfully run unplanned migration, the following steps have to be taken as a part of initial configuration:
 - a. Edit the `vmware-dr.xml` file on both SRM sites.
 - b. Log in to the SRM Virtual Appliance and navigate to the following path to find the XML file: `\opt\vmware\srm\conf\vmware-dr.xml`
 - c. Open the XML file in a text editor and modify it to add the following:

```
<storage>
<forcePrepareAndReverseReplicationForNoopDevices>true</forcePrepareAndReverseReplicationForNoopDevices>
</storage>
```
 - d. Restart the SRM service on both SRM sites.

Configuring VMware vCenter Server for hosts and clusters

About this task

This section describes how to configure the VMware vCenter Server for hosts and clusters.

Procedure

1. Discover LUNs on the ESXi hosts.
2. Rescan the HBA to verify if the VLUN is visible to the ESXi host. Perform rescan only after you export the VLUNs to the ESXi host.

NOTE: The steps to configure VMware vCenter Server for hosts and clusters remain same for stretched storage. Confirm that for Stretched Storage, the datastore is also visible on the recovery site.

3. Create a VMFS Datastore.
4. Deploy VMs as required on the protected site.

NOTE: For SLD and 3DC-PP configuration, after the arrays are added in the SRM Array Manager successfully, if you select the primary array, two target arrays are listed. Configure SRM/SRA between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C or B and C.

For SLD Configuration, the remote copy group role can either be primary on site A or site B. In case, if both the arrays A and B are down (arrays in the synchronous replication mode), then perform the disaster recovery to site C. But before performing the reprotect operation from recovery site to the protected site, make sure that the remote copy group role is primary at the array configured in the protected site.



Steps to configure HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA in VMware vCenter Site Recovery Manager Virtual Appliance

About this task

This section describes how to configure HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA in Site Recovery Manager Virtual Appliance.

1. Log in to **vSphere Client** or **vSphere Web Client**.
2. Click **Site Recovery** > **Open Site Recovery** select a site pair, and click **View Details**.
3. In the **Site Pair** tab, go to **Configure** > **Array Based Replication** > **Array Pairs** and click **Add** button, to add a new Array manager.

Add Array Pair

About this task

Array managers allow Site Recovery Manager to communicate with array-based replication storage systems. To add array pair, Array manager must be configured for both protected and recovery sites and it can be configured by providing the connection parameters of HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.

As part of each Array manager configuration, user must provide the connection parameters of both Local and Remote HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.

- **Local HPE Storage system**—HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system at the local site.
- **Remote HPE Storage systems**—HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems at the remote site and involved in storage replication with the local system.

Procedure

1. Click **VMware vSphere webClient** > **Site Recovery**.
The **Add Array Manager** window appears.
2. Enter a display name for the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.
3. Enter the following connection parameters for both Local and Remote HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system section.
 - a. **Host name or IP Address of HPE Storage system**—Enter the host name or IP address of the storage system at the protected or recovery sites providing storage replication.
 - b. **Remote Copy group name discovery filters** —The filtering condition to discover RC groups. (Applicable only for Local Storage System)



NOTE:

- You can use the prefix to discover specific RC groups in an array. Wildcard characters (*,?) can be used to specify the filter condition. Filtering reduces the time to discover the RC groups in an HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.
- You can specify multiple filter conditions separated by commas.
- If you do not specify any filtering conditions, then SRA discovers all Remote Copy groups in the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system.
- Enter the same filtering condition for both the local and target arrays.

-
- c. User name of the HPE Storage system**— User name that HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA uses to connect to the Storage system.
- d. Password of the HPE Storage system**— Password that HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA uses to connect to the Storage system.

For examples on array manager connection parameters, refer [Examples to add Array Pair](#).

4. Click Next.

The wizard displays the message Ready to complete.

5. Click Finish.

After configuration, the wizard displays both HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system arranged in a paired state.



The discovery of the devices starts automatically after the arrays are paired and they are displayed as shown in the figure:

The screenshot shows the SRM GUI with the 'Array Pairs' section selected. The 'Array Pairs' table lists a pair named 'DRO3PAR03 ↔ DROTEST19' with status 'Success' and a timestamp '4/16/19, 12:24:32 PM +0530'. Below it, the 'DISCOVER DEVICES' section shows a table with columns: Device (IP), Datastore, Status, Device (IP), Protection Group, and Local Consistency Group. The table contains three rows of discovered devices.

Array Pairs			Last Array Manager Ping		
Array Pair	Array Manager Pair		Device (IP)	Protection Group	Local Consistency Group
DRO3PAR03 ↔ DROTEST19	LocalArray14 ↔ RemoteArray19	Success, 4/16/19, 12:24:32 PM +0530			

Device (15.218.170.80)	Datastore	Status	Device (15.218.170.81)	Protection Group	Local Consistency Group
CERTPV1		→ Forward	CERTRV1		CERTRC
CERTPVV1		→ Forward	CERTRVV1		CERTRCG1

NOTE: This version of SRA expects both Local and Remote HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system connection parameters as part of each array manager configuration.

If Array manager is already available from previous version of SRM, select the array pair and click **Edit array manager** and provide the required details.

If Remote System connection parameters are missing, then the discover devices operation may fail with the message

"Unable to get peer HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system connection information. Make sure that you have provided HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system connection information".

To resolve this, click **Edit array manager** and provide the required remote system details.

NOTE: It is recommended to configure one protected group per Remote Copy group.

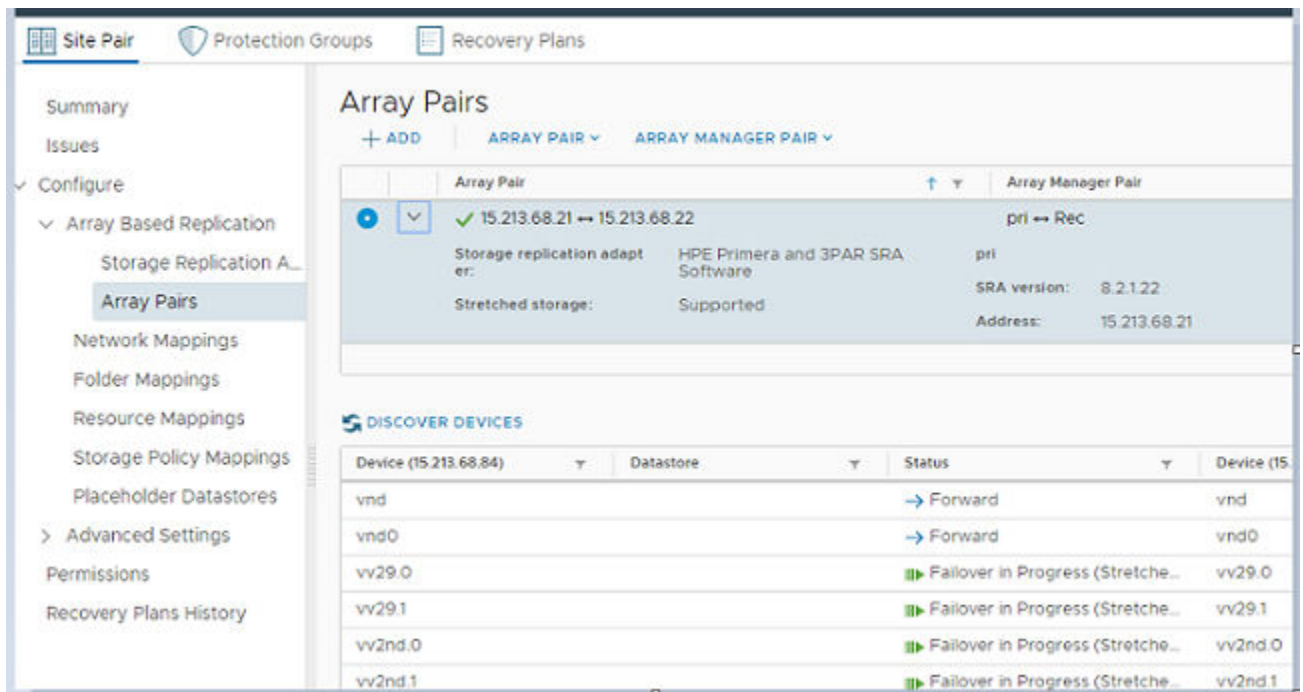
If multiple Remote Copy groups are included in one protected group, it is recommended to set the same sync time on all the periodic Remote Copy groups.

Stretched Storage Configuration

About this task

For stretched storage configuration, both the arrays in the array pair must have peer persistence license. For the respective array pair, SRM GUI must report it as **Stretched Storage: Supported** as shown:





If you already have Protection groups created for a previous version of SRA and are trying to configure Stretched Storage by installing another version of SRA, you may not see the **Stretched storage: Supported** feature due to a limitation of SRM.

Perform the following workaround:

Procedure

1. Remove the Protection Groups.
2. Under **Array Pair**, select **Disable** to disable the array pair.
3. Enable the array pair.

Until SRM displays **Stretched storage: supported**, do not create the protection groups and recovery plan for the stretched storage devices.

For an SLD configuration, after the Array Manager is added successfully, if you select the primary array, two target arrays are listed. Configure SRM/SRA between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C.



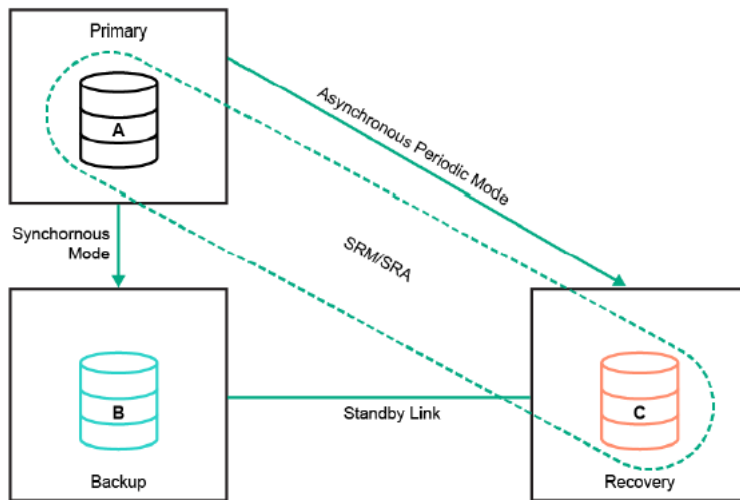


Figure 1: SLD configuration

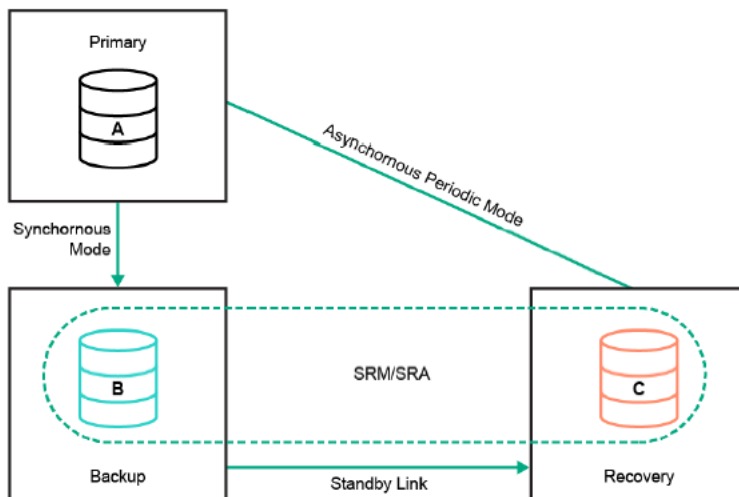


Figure 2: 3DC-PP configuration

SDL and 3DC-PP configuration in SRM/SRA can be done either way as shown in Figure 2 and Figure 3.

NOTE: For both SLD and 3DC-PP configurations, refresh the devices for enabled array pairs in **Devices** tab, under **Array Managers** of SRM GUI, when all the Remote Copy links are up among all the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays.

Examples to add Array Pair

This chapter explains the array manager connection parameters for various remote copy configurations.

1:1 remote copy configuration

- Site A is protected site and Site B is recovery site.
- Remote copy pair is between system1 and system2.
- System1 is part of site A and system2 is part of site B.



Site A Array manager configuration	Site B Array manager configuration
Enter the details of system1 as Local HPE Storage	Enter the details of system2 as Local HPE Storage
Enter the details of system2 as Remote HPE Storage	Enter the details of system1 as Remote HPE Storage

N:1 remote copy configuration

- Site A is protected site and Site B is recovery site.
- Remote copy pair is between system1 and system 3 besides system2 and system3.
- System1 and system2 are part of site A and system3 is part of site B.

Site A Array manager configuration	Site B Array manager configuration
There are two Array manager configurations for Site A: First Array manager configuration <ul style="list-style-type: none"> ◦ Enter the details of system1 as Local HPE Storage. ◦ Enter the details of system3 as Remote HPE Storage. Second Array manager configuration <ul style="list-style-type: none"> ◦ Enter the details of system2 as Local HPE Storage. ◦ Enter the details of system3 as Remote HPE Storage. 	Enter the details of system3 as Local HPE Storage . Enter the details of system1 and system2 as Remote HPE Storage . system1 and system2 can be specified, separated by commas. For specific format, refer section Adding Multiple Array Pair for same Array Manager .

Adding Multiple Array Pair for same Array Manager

If a local HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system are configured with multiple remote storage systems and the same needs to be configured for the array pair, then the hostnames or IP addresses for the remote systems can be specified in a comma-separated format. If all the remote system uses the same username and password, the same can be specified one time in the username and password field.

If the remote system uses different usernames and passwords, they have to be specified in a comma-separated format. When specifying multiple IP addresses, username, and password, follow the sequence mentioned:

Table 1: Remote HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems

Parameter	Sequence
Host name or IP Address	IP Address of sysem1, IP Address of system2...
User name	Username of system1, Username of system2...
Password	Password of system1, Password of system2...



3DC-SLD and 3DC-PP configuration

- For SRM, there are two sites; consider Site A as protected site and Site B as recovery site.
- System1 is the primary system, system2 is the synchronous backup system, and system3 is the asynchronous periodic backup system.

Site A Array Manager configuration	Site B Array Manager configuration
Local HPE Storage system configuration Enter the details of system1 as Local HPE Storage .	Local HPE Storage system configuration Enter the details of system3 as Local HPE Storage .
Remote HPE Storage systems configuration Enter the details of system2 and system3 in comma-separated format as Remote HPE Storage .	Remote HPE Storage systems configuration Enter the details of system1 and system2 in comma-separated format as Remote HPE Storage .



Managing HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration

Users can manage HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA configuration using Site Recovery Manager Appliance Management Interface and management options.

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration Parameters

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA support different configuration parameters which fall under many categories. A separate configuration file is used for managing each category.

The configuration files and their parameters are as follows:

sralog.cfg

The log related parameters are stored in *sralog.cfg* file and the following parameters can be edited.

Configuration parameter	Description
LogLevel	Overrides the default output message level. The different message levels are error, warning, info, debug, and trace and the default is info.
MaxLogFileSize	Specifies the log file size limit (in MB). Default is 10MB.
LogBackupCount	Specifies the maximum log history files; besides the latest log file to maintain. Default is 20.

storagedevice.cfg

The storage device-related parameters are stored in *storagedevice.cfg* file and the following parameters can be edited:

Configuration parameter	Description
Ports	The default ports are 8080, 443. If HPE Web Services API server service is configured with a different port, then add those ports list separated by commas.
ConnectionTimeout	The time limit in seconds that HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA will try to connect to the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system. Default value is 15.
CommandTimeout	The time limit in seconds that HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA will wait for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system command to respond. Default value is 30.

sraconfig.cfg

The parameter related to SRA operation is stored in *sraconfig.cfg* file and the following parameter can be edited:

Configuration parameter	Description
DynamicAccessRestriction	<p>The default value is False. SRA does not perform any unexport operation in such a scenario.</p> <p>If value is set to True, then SRA exposes LUNs only to the specified HBA initiators provided by SRM. Any exposure of the participating LUNs made to other initiators, not on the requested list is removed.</p>
UnexportVolumesDuringFailover	<p>The default value is True. SRA unexports the volumes during failover. If volumes are part of a virtual volume set, then all the other volumes in the set are unexported as well.</p> <p>If value is set to False, then SRA does not perform any unexport operation.</p>
UseIndividualVolumeToExport	<p>The default value is True. SRA uses individual virtual volumes for exporting to hosts and/or host-sets.</p> <p>If value is set to False, then SRA uses manually created VVSets to export to hosts and/or host-sets.</p>
UseIndividualHostToExport	<p>The default value is True. SRA uses individual hosts for exporting virtual volumes or virtual volume sets.</p> <p>If value is set to False, then SRA uses host-sets for exporting virtual volumes or virtual volume sets.</p>
UseHostMatchedSetToExport	<p>The default value is False. SRA uses host or host set type to export to hosts.</p> <p>If value is set to True, then SRA uses matched set type for exporting to hosts. Volumes will be exported to all the ports configured to hosts using the same LUN ID.</p>
DoNotExportVolumes	<p>The default value is False. SRA exports recovery side volumes to respective ESXi Hosts.</p> <p>If value is set to True, the volumes at the recovery side must be manually exported to the ESXi hosts as a part of initial configuration.</p> <p>NOTE: This is the default behavior for SRA 8.2.0.</p>
SaveExportInformation	<p>The default value is True. SRA stores the export information in the repository to try to keep original exports.</p>
RemoveDuplicateExportTemplate	<p>The default value is True. SRA removes any duplicate export templates during failover to avoid multiple exports.</p> <p>If value is set to False, then SRA does not remove any duplicate exports.</p>
ForceFailover	<p>The default value is False. SRA does not perform storage failover operation when the Remote Copy links are up and volumes are not in synced state.</p> <p>Set value to True if failover operation is to be performed, irrespective of whether the data is current or not.</p>

Manage HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration


Users can manage HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA configuration using Site Recovery Manager Appliance Management Interface and management options as explained :

View configuration

About this task

Configuration parameters can be viewed by downloading the configuration archive.

Procedure

1. Log in to the Site Recovery Manager Appliance Management Interface as admin.
2. In the Site Recovery Manager Appliance Management Interface, click **Storage Replication Adapters**.
3. Select the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage Replication Adapter and from the drop-down menu (), click **download configuration archive**.
4. HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA configuration files are downloaded as .tar.gz archives.


Extract the archive file to view the configuration files.

Modify configuration

About this task

Certain configuration parameters can be modified and uploaded.

Procedure

1. Log in to the Site Recovery Manager Appliance Management Interface as admin.
2. In the Site Recovery Manager Appliance Management Interface, click **Storage Replication Adapters**.
3. Select the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage Replication Adapter and from the drop-down menu (), click **download configuration archive**.

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA configuration files are downloaded as .tar.gz archives.

4. Extract the archive file to view the configuration files.
5. Modify the required configuration parameters.

Refer **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration Parameters** for more details.


6. Create a .tar.gz archive of the modified files, and click **upload configuration archive** to upload the files.

Copy configuration

About this task

Copy configuration is used to copy the configuration file from one SRA to another if there are multiple HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRAs installed.

Procedure

1. Log in to Site Recovery Manager Appliance Management Interface as admin.
2. From the Site Recovery Manager Appliance Management Interface, click **Storage Replication Adapters**.
3. Select the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage Replication Adapter and from the drop-down menu (), click **copy configuration**.
4. Select the source file from **Source adapter** and target file from **Target adapter** drop-down list.
5. Click **copy**.

The configurations from the source file are copied to the target file.

Reset configuration

About this task


The procedure to reset the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA configuration to its factory settings is explained in this section.

If there is a change in the Remote Copy configuration outside the context of SRM, reset SRA and upload the necessary configuration bundle if required, followed by discover arrays, discover devices, test, and cleanup.

NOTE: If you reset an SRA, any currently running operations involving storage arrays controlled by this adapter are interrupted. This operation includes but not limited to Recover, Test, Clean up, and Reprotect.

It is recommended not to reset an SRA if 'Reprotect' operation is pending for any one of the Recovery Plans. This is because local disaster recovery state cache created during the failover operation will be removed during reset, and it may affect the 'Reprotect' operation.

Procedure

1. Log in to the Site Recovery Manager Appliance Management Interface as admin.
2. In the Site Recovery Manager Appliance Management Interface, click **Storage Replication Adapters**.
3. Select HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage Replication Adapter.
4. From the drop-down menu (), click **reset configuration**.

Removing HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA


About this task

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA from Site Recovery Manager Server can be uninstalled by using Site Recovery Manager Appliance Management Interface.

NOTE: While uninstalling SRA, any currently running operations involving storage arrays and controlled by this adapter are interrupted. The operations include, but not limited to Recover, Test, Cleanup, and Reprotect.

It is recommended not to remove an SRA if **Reprotect** operation is pending for any one of the Recovery Plans. This is because local disaster recovery state cache created during the failover operation will be removed during delete and it may affect the **Reprotect** operation.

Procedure

1. Log in to the Site Recovery Manager Appliance Management Interface as admin.
2. In the Site Recovery Manager Appliance Management Interface, click **Storage Replication Adapters**.
3. Select the appropriate Storage Replication Adapter and from the drop-down menu (), click **Delete**.
4. Confirm that you are aware of the results of deleting the adapter, and click **Delete**.



SRA behavior during SRM operations

This chapter describes the SRA behavior during SRM operations, such as test, failover, and failback.

Test

Use the test option to perform nondisruptive recovery operations. SRM communicates with HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA using the remote storage information obtained during the discovery process. SRA creates snapshots of the remote virtual volumes and presents them to the recovery ESXi server. During this recovery process, the VMs continue to run at the production site (protected site). You can verify that the VMs are running at the recovery site.

Clean Up

Perform the Cleanup operation after verifying that the VMs are running at the recovery site using the Test operation. SRA does a cleanup (unpresent and delete) of the previously created snapshots.

Recovery Operation from Protected Site to Recovery Site

More information

[2 Data Center Configurations](#)

2 Data Center Configurations

2 Data Centers (2DC) are configured with either of the following:

- SRM Standard storage feature with either Synchronous or asynchronous periodic or asynchronous streaming replication mode.
- SRM stretched storage feature with synchronous replication mode.

Planned Migration

During the planned migration, SRM shuts down the VMs at the protected site and unmounts the datastores. If the volumes are not already replicated yet, SRA replicates the data from the protected site volumes to the recovery site volumes, reverses the replication direction, changes the status of the replicated virtual volumes as read-only at protected site and read/write at the recovery site. After this operation, SRM rescans the datastores at the recovery site and restarts the VMs. Snapshots are created for the replicated virtual volumes in the arrays at both protected and recovery sites for the local backup purposes.

If the remote copy links between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays are up and running, the SRA initiates the planned migration operation successfully, else SRA fails the planned migration operation.

SRA initiates the replication operation between the replicated volumes, one time before the VMs are shut down and, one time after the VMs are shut down.

Disaster Recovery

When the protected datacenter is unavailable due to any disasters or failures, the Remote Copy links of the datacenter are down, and SRM is still available in the protected site, you must run the SRM recovery plan with disaster recovery option to start the VMs at the recovery site.



The SRA recovery process is similar to planned migration, except that planned migration would fail when Remote Copy link between SRM protected and recovery site is down and disaster recovery tries to accomplish the task. If the Remote Copy links are down between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays at the protected site and recovery site, then the replication operation is not performed between the replicated volumes. If the Remote Copy links are up and running and if you choose this option, then disaster recovery behaves like a planned migration.

Disaster Recovery with Forced Recovery

When the protected data center is offline and the SRM is not able to perform its usual tasks or is unavailable, you can run the disaster recovery with the forced recovery option. Forced recovery starts the virtual machines on the recovery site without performing any operations on the protected site.

3 Data Center Configurations with 3PAR Synchronous Long Distance (SLD)

In the following SLD configuration scenario, A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System. SRM and SRA are configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C, where site A is the protected site and site C is the recovery site.

SLD configuration supports SRM recovery operation to site C only when both the arrays A and B are up and running (to perform any planned migration to site C) or when both the arrays A and B are down (to perform disaster recovery to site C). If either of the arrays A or B is down, SRM recovery operation to site C is not supported.

For 3DC-SLD and 3DC-PP, add A and B, C in the protected site and add C and A, B in the recovery site.

Planned Migration

During planned migration, SRM shuts down the VMs at protected site and unmounts the datastores. If the volumes are not replicated, SRA replicates the data from the protected site volumes to the recovery site volumes, reverses the replication direction, changes the status of the replicated virtual volumes as read-only at protected site and read/write at the recovery site. After this operation, SRM rescans the datastores at the recovery site and restarts the VMs. Snapshots are created for the replicated virtual volumes in the arrays at both protected and recovery sites for the local backup purposes.

SRA initiates the replication operation between the replicated volumes, one time before the VMs are shut down and, one time after the VMs are shut down.

If the 3PAR Remote Copy links between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays at site A and site C that are configured with SRM and SRA are up and running, SRA initiates the planned migration operation successfully, else, the SRA fails the planned migration operation. Prior to planned migration operation to site C, ensure that the remote copy group is primary and VMs are up at site A.

When the **Remote Copy links between A and C are up**, SRM and SRA functions in the following ways for different Remote Copy link states:

- **All links are up:** SRM initiates data transfer from A–C and also between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C. SRA initiates failover at C, C becomes the Failover System and takes the role of the Primary System. C will have the latest data.
- **A–B link is down and B–C link is either up or down:** SRM initiates data transfer from A to C through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–C. SRA initiates a failover at C, C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data.
- **B–C link is down:**



When A-B link is up: SRM initiates data transfer from A–C and also between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C. SRA initiates failover at C, C becomes the failover system and takes the role of the primary system. C will have the consistent and latest data.

Disaster Recovery

When the protected datacenter is unavailable due to any disasters or failures and the Remote Copy links between the datacenters are down and SRM is still available in the protected site, you must run the SRM recovery plan with disaster recovery option to start the VMs at the recovery site. The SRA recovery process is similar to planned migration, except that planned migration would fail when Remote Copy link between SRM protected, and recovery site is down and disaster recovery tries to accomplish the task. If the Remote Copy links are down between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays at the protected site and recovery site, the replication operation is not performed between the replicated volumes. If the Remote Copy links are up and running and if you choose the disaster recovery option, then this option behaves like a planned migration.

NOTE: When both the arrays A and B are up and running, prior to performing the SRM recovery operation to site C, ensure that the Remote Copy group is primary at site A.

SRM/SRA functions in the following ways for different Remote Copy link states:

- **All links are up:** In case, you perform disaster recovery instead of planned migration, SRM initiates data transfer from A to C and between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data.
- **All links are down:** In a situation, where either A or B will have the most current data between the two arrays, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA does not initiate any data transfer from either A or B to C. With the available data, C becomes the failover system and takes the role of the primary system.
- **A–C link is down and other two links are up:** HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA initiates the data transfer from A to B. When the sync is complete, SRA stops the RC groups between A–B and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. Before the failover operation at C, C gets the latest data from B. For more information, see section **Limitations of SLD and 3DC-PP configuration**.
- **A-B link is down and other two links are up:** SRM initiates data transfer from A to C through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–C and initiates a failover at C. C becomes the Failover System and takes the role of the Primary System. C gets the latest data from A.
- **B-C link is down and other two links are up:** SRM initiates data transfer from A to C and also A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data from A.
- **A-C and A-B links are down and other link (B-C) is up:** In a situation, where between the two arrays, either A or B will have the most current data, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA does not initiate any data transfer from either A or B to C. With the available data, C becomes the failover system and takes the role of the primary system.
- **A-C and B-C links are down and other link (A-B) is up:** In a situation, where between the two arrays, either A or B will have the most current data, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA

does not initiate any data transfer from either A or B to C. With the available data, C becomes the failover system and takes the role of the primary system.

- **A-B and B-C links are down and other link (A-C) is up:** SRM initiates data transfer from A-C through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A-C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data from A.

CAUTION: If C does not contain the most current data, any data which is in A and is replicated to B that is not replicated to C is discarded after SRM reprotect operation.

NOTE: For SLD Configuration in SRM 8.4.1 and later, the primary array configured to SRM can be either A or B.

Disaster recovery with forced recovery

When the protected datacenter is offline and SRM is not able to perform its usual tasks or is unavailable, you can run the disaster recovery with the forced recovery option. Forced recovery starts the virtual machines on the recovery site without performing any operations on the protected site. This operation behaves exactly like the operation mentioned in the disaster recovery section except that there is no sync operation initiated between the sites and the recovery site volumes are made read/write and VMs are brought online in the recovery site.

3 Data Center Configurations with Peer Persistence (3DC-PP)

In the following scenarios for 3DC-PP configuration, A is the Primary System, C the Asynchronous Periodic Backup System, and B the Synchronous Backup System. Multi-Target Peer Persistence (MT_PP) configuration is set up for these SLD groups. The sites A and B can be configured in the VMware Metro Storage Cluster (vMSC) configuration where the Remote Copy groups are in Peer Persistence configuration between A and B. The ESXi hosts in the sites A and B are in the VMware vSphere HA cluster and have uniform host access to the replicated Peer Persistence Remote Copy group volumes. SRM-SRA is configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C, where site A is the protected site and site C is the recovery site. SRM-SRA can also be configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems B and C instead of systems A and C, where site B is the protected site and site C is the recovery site.

The following scenarios for planned migration, disaster recovery, forced recovery, and reprotect are mentioned, considering that A is the protected site, C is the recovery site, and Remote Copy group role is Primary (Source) at A and Secondary at B. If the Remote Copy group role is Primary (Source) at B and Secondary at A irrespective of sites configured in SRM, then replace A with B for all the following scenarios.

If the Remote Copy group role is Primary-Rev at one side and Primary at another side, between A and B, then Primary-Rev is considered as Source.

SRM recovery operation including planned migration and disaster recovery to site C is supported in the 3DC-PP configuration only when both the arrays A and B are up and running (to perform any planned migration to site C) or when both the arrays A and B are down (to perform disaster recovery to site C). When either of the arrays A or B is down, SRM recovery operation to site C is not supported.

3PAR 3DC-PP configuration comes with both quorum and non-quorum configuration.

Planned Migration

In the following scenario, A is the protected site and C is the recovery site.

SRM shuts down the VMs at protected site and unmounts the Datastores. If the volumes are not already replicated, SRA replicates the data from the protected site volumes to the recovery site volumes, reverses the replication direction, changes the status of the replicated virtual volumes as read-only at protected site and read/write at the recovery site. SRM rescans the Datastores at the recovery site and restarts the VMs. Snapshots are created for the replicated virtual volumes in the arrays at both protected and recovery sites for the local backup purposes.



SRA initiates the replication operation between the replicated volumes, one time before the VMs are shut down and, onetime after the VMs are shut down.

If the 3PAR Remote Copy links between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays at sites A and C which are configured with SRM/SRA up and running, SRA initiates planned migration operation successfully, else, the SRA fails the planned migration operation.

When the Remote Copy links between A and C are up, SRM and SRA functions in the following ways for different Remote Copy link states:

- **All links are up:** SRM initiates the data transfer from A to C and between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data.
- **A–B link is down and B–C link is either up or down:** SRM initiates data transfer from A to C through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–C and initiates a failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data compared to site A.
- **B–C link is down:**
When A–B link is up: SRM initiates data transfer from A to C and between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C and initiates failover at C. C becomes the failover system and takes the role of the primary system. C has the consistent and latest data compared to site A.

Disaster Recovery

When the protected datacenter is unavailable due to any disasters or failures and the Remote Copy links between the datacenters are down and SRM is still available in the protected site, you must run the SRM recovery plan with disaster recovery option to start the VMs at the recovery site. The SRA recovery process is similar to planned migration, except that planned migration would fail when Remote Copy link between SRM protected, and recovery site is down and disaster recovery tries to accomplish the task. If the Remote Copy links are down between the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays at the protected site and recovery site, then the replication operation is not performed between the replicated volumes. If the Remote Copy links are up and running and if you choose the disaster recovery option, then this option behaves like a planned migration.

SRM/SRA functions in the following ways for different Remote Copy link states:

- **All links are up:** In case, where you perform disaster recovery instead of planned migration, SRM initiates data transfer from A to C and between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data compared to site A.
- **All links are down:** In a situation, where either A or B will have the most current data between the two arrays, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA does not initiate any data transfer from either A or B to C. With the available data, C becomes the failover system and takes the role of the primary system.
- **A–C link is down and other two links are up:** HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA initiates the data transfer from A to B. When the sync is complete, SRA stops the RC groups between A–B and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. Prior to failover operation at C, C gets the latest data from B. For more information, see **Limitations of SLD and 3DC-PP configuration**.
- **A–B link is down and other two links are up:** SRM initiates data transfer from A to C through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC



groups between A–C and initiates a failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data compared to site A.

- **B-C link is down and other two links are up:** SRM initiates data transfer from A to C and also between A and B through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–B and between A–C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data compared to site A.
- **A-C and A-B links are down and other link (B-C) is up:** In a situation, where either A or B will have the most current data between the two arrays, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA does not initiate any data transfer from either A or B to C. With the available data, C becomes the failover system and takes the role of the primary system.
- **A-C and B-C links are down and other link (A-B) is up:** In a situation, where either A or B will have the most current data between the two arrays, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA does not initiate any data transfer from either A or B to C. With the available data, C becomes the failover system and takes the role of the primary system.
- **A-B and B-C links are down and other link (A-C) is up:** SRM initiates data transfer from A to C through HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA. When the sync is complete, SRA stops the RC groups between A–C and initiates failover at C. C becomes the Failover System and takes the role of the Primary System. C will have the consistent and latest data compared to site A.



CAUTION: If C does not contain the most current data, any data replicated to B that is not replicated to C is discarded after SRM reprotect operation.

Disaster Recovery with Forced Recovery

When the protected data center is offline and the SRM cannot perform its usual tasks or is unavailable, you can run the recovery with the forced recovery option. Forced recovery starts the virtual machines on the recovery site without performing any operations on the protected site. This operation behaves same as the operation mentioned in the disaster recovery, but there is no sync operation initiated between the sites. The recovery site volumes are made read/write and VMs are brought online in the recovery site.

Reprotect Operation (after SRM recovery of VMs from protected site to recovery site)

Reprotect operation is performed to configure protection in the reverse direction (from Site B to Site A) as a preparation for failback to the original state. Reprotect operation allows SRA to perform the replication from the recovery site where VMs are running after the failover to the protected site, which means for the 2DC configurations, Remote Copy links between the arrays has to be up and running before performing the reprotect operation.

For SLD and 3DC-PP configurations, the reprotect operation requires that the Remote Copy links between the new primary and both the targets to be up. If array C is the new primary system and if the links between array C–A and array C–B are up, then SRA starts the remote replication from array C–A and array C–B and waits until the sync is complete. During the reprotect operation, SRA triggers delta resync operation from array C–A and array C–B where C is the new primary system after failover. If the SRM recovery operation was performed when either array A–B or array B–C or both the Remote Copy links are down, as per the Remote Copy behavior, reprotect operation triggered by SRM through SRA will initiate a full copy from array C–B only (from array C–A, delta resync will be initiated).

Recovery Operation from Recovery Site to Protected Site (Failback)

Failback is a process that sets the replication environment to its original state at the protected site (local site).

For 2DC configuration, see section [Recovery Operation from Protected Site to Recovery Site](#).



For SLD and 3DC-PP configurations, ensure that both the arrays A and B are up before performing the failback operations.

For SLD configuration, before performing failback operation, ensure that the C-A and C-B Remote Copy links are up, SRA first performs the sync operation from C-A and C-B if links are up, makes the virtual volumes at site A (configured in SRM as protected site) as read/write and mounts the datastore and VMs are brought online.

For 3DC-PP configuration, SRA first performs the sync operation from C-A and C-B if links are up, makes the virtual volumes at either site A or site B (sites that were primary previously) as read/write and mounts the datastore and VMs are brought online.

Snapshots are created for the replicated virtual volumes in the arrays at both protected and recovery sites for the local backup purposes.

Reprotect Operation (after SRM recovery of VMs from recovery site to protected site)

Reprotect operation allows SRA to perform the replication from the protected site where VMs are running after the failback to the recovery site, which means for the 2DC configurations, remote copy links between the arrays has to be up and running before performing the reprotect operation.



Default behavior for SRA

About this task

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA 8.4.1 and later support various configuration parameters, which can be editing through the *sraconfig.cfg* file. For more information, see [HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA Configuration Parameters](#).

If none of the parameters are altered, the default behavior of SRA is as follows:

- By default, for standard storage, SRA unexports the volumes for all the ESXi hosts during the failover workflow.
- For Remote copy groups configured with Stretched storage, SRA does not perform any unexport operation, unless it is a Disaster Recovery scenario.
- Before unexporting the volumes, SRA saves the export information of the volumes in the repository, including the type of export and LUN IDs. While exporting the volumes back, SRA attempts to use the saved export information to perform the export. However, it is not guaranteed that SRA would be able to use the same export type and LUN ID.
- During the failover operation, SRA validates the exports for the recovery volumes. If the volumes are not exported, SRA exports the volume to the appropriate ESXi hosts.
- If the volumes are exported to hosts that are not configured with SRM, SRA does not disturb those exports and they remain intact.
- SRA removes any multiple exports. By default, it prefers export using individual VVs and individual Hosts.
- Both Classic Peer Persistence and Active Peer Persistence are supported only in Manual Transparent Failover (MTF) mode but not in Automatic Transparent Failover (ATF) mode. So, SRA does not support `auto_failover`, `auto_recover`, `auto_synchronize` policy.
- During failover operation from the protected site (A) to the recovery site (B), if volumes from site A are exported to a hostset (group of individual hosts), then the volumes on site B are exported to individual hosts instead of the hostset. Whereas during failback from site B to site A on the same set of volumes, volumes on the primary site (A) are again exported back to the same hostset before performing the failover operation. SRA stores the host or hostset information for the protected site and uses the stored information while exporting the volumes again on the same site, but SRA does not store the export information cross site. Therefore, SRA relies on the host information provided by SRM to export the volumes on the recovery site.

NOTE:

- The flags **UnexportVolumesDuringFailover** and **DoNotExportVolumes** are applicable only for Standard Storage and not for Stretched Storage.
 - SRA supports export using Host, Host-set and matched set. Export using **Port presents** option is not supported.
 - In case of NVMe hosts for **Test/Run** operation, though the configuration is set to **Host Matched Set**, LUNs are created to individual host because the storage system configured with NVMe does not support **Host Matched Set** exports to NVMe hosts.
-

Dynamic Access Restriction support

SRA 8.4.1 and later supports **Dynamic Access Restriction** (DAR). This feature is optional and set to **False** by default.

When **Dynamic Access Restriction** is set to **True**, and if the volumes are exported to the hosts configured with SRM, SRA validates on the recovery side. If there are any additional exports to ESXi hosts not configured with SRM, SRA removes those exports.





IMPORTANT: Before proceeding with the next operation, make sure that the datastore is visible on ESXi hosts of both the sites.



Important notes

SRM behavior

SRM might potentially time-out if multiple test failover or recovery operations are run simultaneously. Rerun the operation if the time-out error occurs. Alternatively, if the operations are run sequentially, the time-out error can be avoided.

SRA behavior

- The reserved virtual volume naming conventions for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA are as follows:

- SRM_RW_<VVID>
- SRM_RECOVER_RO_<VVID>
- SRM_TARGETBK_RO_<VVID>

- If SRM runs into a virtual volume promote operation during reprotect, you must retry the reprotect operation.
- Discover devices operation may fail with the message

```
"Unable to get peer HPE GreenLake for Block Storage, HPE Alletra 9000, HPE
Primera, and HPE 3PAR Storage system connection information. Make sure
that you have provided HPE GreenLake for Block Storage, HPE Alletra 9000,
HPE Primera, and HPE 3PAR Storage system connection information".
```

This is caused due to lack of Remote HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system Connection Parameters details.

To resolve this, click **Edit array manager** and provide the required remote system details.

- If a Remote Copy group is configured with Remote Copy group policies such as auto_failover, path_management or mt_pp, then the devices which are part of these Remote Copy groups are skipped during discover devices.
- SRA does not support the Remote Copy group that is configured with Remote Copy group policy auto_synchronize.
- Devices on the protected storage system must be read-only after **prepareFailover**. If needed, take snapshots of the source devices for restoration, if needed. Protected storage system becomes secondary (Remote Copy role Secondary-Rev) as part of failover. Devices under the secondary Remote Copy group will automatically have read-only access. Remote Copy will internally manage to take snapshots, in case something goes wrong during the failover process, in addition, HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA will also take a snapshot of the devices on the protected site of the SRM (Remote Copy role Primary) for restore purposes.
- After failover, the devices on the protected storage system must be read-only and devices on the recovery storage system as read-writable. Protected storage system becomes secondary (Remote Copy role Secondary-Rev). Devices under the secondary Remote Copy group will automatically have read-only access. Recovery storage system becomes primary (Remote Copy role Primary-Rev).
- More protection to the data on the recovery storage system. HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA take a snapshot of the devices on the recovery storage system of the SRM, before failover for optional restore purpose. The snapshot name will have the following prefix:
SRM_TARGETBK_RO_<VVID>.

- **Snapshots Management**

SRA creates snapshots during Test and Recovery operation as described previously.



- **Test**

During Test, SRA creates snapshots of the remote virtual volumes and presents them to the recovery ESXi server. The snapshot name will have the following prefix `SRM_RW_<VVID>`. Snapshots created during **Test** operation are deleted during Cleanup operation.

- **Recovery**

During SRM recovery from protected site to recovery site (failover operation), HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA take a snapshot of the devices on the protected site of SRM during `prepareFailover` for restoration if needed. Naming conventions for these snapshots are `SRM_RECOVER_RO_<VVID>`. HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR SRA also take a snapshot of the devices on the recovery storage system of the SRM before failover for optional restore purpose. The snapshot name has the prefix `SRM_TARGETBK_RO_<VVID>`. These snapshots will be deleted in the next SRM recovery from protected site to recovery site.

During SRM recovery from recovery site to protected site (failback operation), similar logic is followed in SRA. But the names of the snapshot in the protected site 3PAR will be `SRM_TARGETBK_RO_<VVID>` (already `SRM_RECOVER_RO_<VVID>` snapshots exist during the first failover) and the names of the snapshot in the recovery site will be `SRM_RECOVER_RO_<VVID>` (already `SRM_TARGETBK_RO_<VVID>` snapshots exist during the first failover). These snapshots will be deleted in the next SRM recovery from recovery site to protected site.

Therefore, there will be maximum of two snapshots existing for each VV of the RC groups in the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR arrays at any time.

SRA lacks any automatic function to delete these snapshots. You can decide to delete these snapshots manually after a successful failover. When a failover or failback operations is executed next time, SRA deletes the snapshots and creates snapshots.

- If the Remote Copy group status is in **New state** and test failover is initiated without selecting **Replicate recent changes**, then the operation fails.

The failure is due to the data not being replicated to target volumes as the status is still **New**. This operation must be retried by selecting **Replicate recent changes** or start the Remote Copy group before executing test failover.

- While specifying wildcard filters for Remote copy group, if wildcard filters are set different for the primary and recovery array, discover devices might display the following error:

Error - Unable to find a matching consistency group at the local site for the remote consistency group for the local consistency group <RCGName>

Additionally, the Remote copy group status in the discover devices GUI might show as **Unknown**. Specify the same wildcard filters for both the arrays to avoid this error.

Limitations of SLD and 3DC-PP configuration

In an SLD Remote Copy environment with three HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems (A, B, and C), where A—B is configured in synchronous mode, A—C in asynchronous periodic mode, and B—C is the standby link in asynchronous periodic mode, SRM/SRA is configured between HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems A and C.

- During the reprotect operation, SRA triggers a delta resync operation from C—A and C—B, where C is the new primary system after failover. If the SRM recovery operation was performed when either A—B or B—C or both the Remote Copy links were down, then as per the Remote Copy behavior, the reprotect operation triggered by SRM through SRA will initiate a full copy from C—B only (from C—A delta resync will be initiated).
- SRM recovery operation initiated at C does a delta sync from B to C and then initiate the failover operation at C. If the A—C link is down, as per the Remote Copy behavior, the data transfer from B—C becomes full-sync mode during SRM recovery operation at C.



NOTE: Setups having 3DC-SLD or 3DC-PP Remote Copy groups are not qualified for 2DC Remote Copy groups protection. Setups having 2DC Remote Copy groups are not qualified for 3DC-SLD or 3DC-PP Remote Copy groups protection.

Workaround: When all the Remote Copy links are UP, run the SRM Test operation at least one time before executing the disaster recovery at C when the A—C link is down, to avoid B—C going to FULL SYNC.

NOTE: In a single recovery plan, 3DC-PP groups must not be mixed with other Remote Copy groups such as 2DC, stretched storage, and SLD as they are not supported configuration.

Support for Stretched Storage

- During reprotect operation, `Synclone` command might fail due to multiple reasons, but reprotect might be successful. In such a scenario, make sure that the remote copy groups are in started and synced state after the completion of reprotect. If not, manually start the remote copy group by issuing `starttrcopygroup RCGName`.
- In an inoperable protected array, when you execute recovery (disaster recovery with forced Recovery) to migrate VMs to the recovery site in SRM, the recovery operation succeeds and prompts you to execute recovery once again. The protected storage array and links between storage arrays must be functional before executing recovery again.

- Error in recovery plan when you shut down the protected VMs.

Error: Operation timed out: 900 seconds - during Shutdown of VMs at Protected Site. If you use SRM to protect data stores on arrays that support dynamic swap, then running a disaster recovery when the protected site is partially operable or running a force recovery might cause errors when rerunning the recovery plan to complete protected site operations. One such error occurs when the protected site becomes operational, but SRM is unable to shut down the protected virtual machines. This error usually occurs when HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR array enables the protected LUNs as read-only, which renders ESXi unable to complete I/O for powered on protected virtual machines.

To complete the recovery workflow, reboot ESXi hosts on the protected site that affects read-only LUNs.

- As part of stretched storage configuration, it is required to have identical WWNs for both source and Target Remote Copy group volumes. In case, if the WWN is changed for a volume later, then the behavior of SRM operations is undefined for stretched storage devices.

Remote Copy Behavior

In a disaster recovery scenario, when the Remote Copy links are down, the Remote Copy group status might still be `Started`. A failover attempt is successful only when the Remote Group status becomes `Stopped`.

At the end of SRM recovery operation, Remote Copy group status will be stopped and volumes will be in stale state. Once the SRM Reprotect operation is complete, the group and volumes status will be changed to **Started** and **Synced**.



Related documents and terminology

For information about:	See:
Locating HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR documents	https://www.hpe.com/support/hpesc Search on the product name HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage . Click the link for your product, and then click Manuals .
HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system software	
Storage concepts and terminology	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage Concepts Guide
Using the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Management Console (GUI) to configure and administer HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Management Console User's Guide
Using the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR CLI to configure and administer storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Command Line Interface Administrator's Manual
CLI commands	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Command Line Interface Reference
Analyzing system performance	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR System Reporter Software User's Guide
Installing and maintaining the Host Explorer agent to manage host configuration and connectivity information	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Host Explorer User's Guide
Creating applications compliant with the Common Information Model (CIM) to manage HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR CIM API Programming Reference
Migrating data from one HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system to another	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR-to-3PAR Storage Peer Motion Guide
Configuring the Secure Service Custodian server to monitor and control HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Secure Service Custodian Configuration Utility Reference

Table Continued



For information about:	See:
Using the CLI to configure and manage HPE Remote Copy	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Remote Copy Software User's Guide
Updating HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR operating systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Upgrade Pre-Planning Guide
Identifying storage system components, troubleshooting information, and detailed alert information	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR F-Class, T-Class, and StoreServ 10000 Storage Troubleshooting Guide
Installing, configuring, and maintaining the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Policy Server	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Policy Server Installation and Setup Guide HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Policy Server Administration Guide
Planning for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system setup , including hardware specifications, installation considerations, power requirements, networking options, and cabling information for HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems	
HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 7200 and 7400 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 7000 Storage Site Planning Manual
HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 8000 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 8000 Storage Site Planning Manual
HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 10000 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 10000 Storage Physical Planning Manual HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 10000 Storage Third-Party Rack Physical Planning Manual
HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 20000 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 20000 Storage Site Planning Manual
Installing and maintaining HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage systems	

Table Continued



For information about:**See:**

Installing 7200 and 7400 Storage systems and initializing the Service Processor	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 7000 Storage Installation Guide HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 7000 Storage SmartStart Software User's Guide
Installing 8000 Storage systems and initializing the Service Processor	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 8000 Storage Installation Guide
Maintaining, servicing, and upgrading 7200 and 7400 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 7000 Storage Service Guide
Servicing and upgrading 8000 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 8000 Storage Service and Upgrade Guide
Servicing 20000 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 20000 Storage Drive Servicing Guide
Troubleshooting 7200 and 7400 Storage systems	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR 7000 Storage Troubleshooting Guide
Maintaining the Service Processor	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Service Processor Software User Guide HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Service Processor Onsite Customer Care (SPOCC) User's Guide
HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR host application solutions	
Backing up Oracle databases and using backups for disaster recovery	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Recovery Manager Software for Oracle User's Guide
Backing up Exchange databases and using backups for disaster recovery	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Recovery Manager Software for Microsoft Exchange 2007 and 2010 User's Guide
Backing up SQL databases and using backups for disaster recovery	HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Recovery Manager Software for Microsoft SQL Server User's Guide

Table Continued

For information about:**See:**

Backing up VMware databases and using backups for disaster recovery

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Management Plug-in and Recovery Manager Software for VMware vSphere User's Guide

Installing and using the HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR VSS (Volume Shadow Copy Service) Provider software for Microsoft Windows

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR VSS Provider Software for Microsoft Windows User's Guide

Best practices for setting up the Storage Replication Adapter for VMware vCenter

HPE Storage Replication Pack for VMware vCenter Site Recovery Manager User Guide

Installing and using vSphere Storage APIs for Array Integration (VAAI) plug-in software for VMware vSphere

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR VAAI Plug-in Software for VMware vSphere User's Guide

HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR terminology updates


- The server previously known as the **InServ** is now called **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Storage system**.
- The operating system previously known as the **InForm OS** is now called **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR OS**.
- The user interface previously known as the **InForm Management Console (IMC)** is now called **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR Management Console**.
- All products previously known as **Primera and 3PAR** products are now called **HPE GreenLake for Block Storage, HPE Alletra 9000, HPE Primera, and HPE 3PAR** products.




Typographic conventions

Table 2: Document conventions

Convention	Element
Bold text	<ul style="list-style-type: none">Keys that you pressText you typed into a GUI element, such as a text boxGUI elements that you click or select, such as menu items, buttons, and so on
Monospace text	<ul style="list-style-type: none">File and directory namesSystem outputCodeCommands, their arguments, and argument values
<Monospace text in angle brackets>	<ul style="list-style-type: none">Code variablesCommand variables
Bold monospace text	<ul style="list-style-type: none">Commands you enter into a command line interfaceSystem output emphasized for scannability

 **WARNING:**
Indicates that failure to follow directions could result in bodily harm or death, or in irreversible damage to data or to the operating system.

 **CAUTION:**
Indicates that failure to follow directions could result in damage to equipment or data.

NOTE:
Provides additional information.

Required
Indicates that a procedure must be followed as directed to achieve a functional and supported implementation based on testing at Hewlett Packard Enterprise.



Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
<https://www.hpe.com/info/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
<https://www.hpe.com/support/hpesc>

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:

Hewlett Packard Enterprise Support Center

<https://www.hpe.com/support/hpesc>

My HPE Software Center

<https://www.hpe.com/software/hpesoftwarecenter>

- To subscribe to eNewsletters and alerts:
<https://www.hpe.com/support/e-updates>
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:

<https://www.hpe.com/support/AccessToSupportMaterials>

-
- ❗ **IMPORTANT:** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Account set up with relevant entitlements.
-



Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which initiates a fast and accurate resolution based on the service level of your product. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

HPE Get Connected

<https://www.hpe.com/services/getconnected>

HPE Tech Care Service

<https://www.hpe.com/services/techcare>

HPE Complete Care Service

<https://www.hpe.com/services/completerecare>

Warranty information

To view the warranty information for your product, see the [warranty check tool](#).

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

<https://www.hpe.com/support/Safety-Compliance-EnterpriseProducts>

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

<https://www.hpe.com/info/reach>

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

<https://www.hpe.com/info/ecodata>

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

<https://www.hpe.com/info/environment>

Documentation feedback

Hewlett Packard Enterprise is committed to providing documentation that meets your needs. To help us improve the documentation, use the **Feedback** button and icons (at the bottom of an opened document) on the Hewlett Packard Enterprise Support Center portal (<https://www.hpe.com/support/hpesc>) to send any errors, suggestions, or comments. This process captures all document information.

