# IBM Tivoli Storage Productivity Center for Replication for System z

Version 4.2.2.3

# *Installation and Configuration Guide*

SC27-2321-07

IBM Tivoli Storage Productivity Center for Replication for System z
Version 4.2.2.3

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**Note**
Before using this information and the product it supports, read the information in "Notices" on page 45.

This edition applies to version 4, release 2, modification 2, fix pack 3 of IBM Tivoli Storage Productivity Center for Replication for System z (product numbers 5698-B30 and 5698-B31) and to all subsequent releases and modifications until otherwise indicated in new editions.

This edition replaces SC27-2321-06.

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# Tables

# About this guide

This section briefly describes the audience, content, and organization of this book, and provides details related to the IBM® Tivoli® Storage Productivity Center for Replication information suite.

This guide provides task-oriented installation and configuration information for these variations of IBM Tivoli Storage Productivity Center for Replication:

- IBM Tivoli Storage Productivity Center for Replication for System z®
- IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z

For z/OS® installation, this guide is to be used as a supplement to the *IBM Tivoli Storage Productivity Center for Replication for System z Program Directory* or the *IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z Program Directory*, which contains the majority of the installation and configuration information for that platform.

## Intended audience

This publication is intended for administrators or users who are installing and using IBM Tivoli Storage Productivity Center for Replication on z/OS.

## Accessing the IBM Tivoli Storage Productivity Center for Replication Information Center

This topic explains how to access the IBM Tivoli Storage Productivity Center for Replication Information Center.

You can access the information center in the following ways:

- On the publications CD, a readme.txt file describes how to start the information center depending on platform and mode.
- The IBM Tivoli Storage Productivity Center for Replication graphical user interface includes a link to the information center.
- Go to the Web at http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp:

## Publications and related information for Tivoli Storage Productivity Center for Replication for System z publications

This topic lists the publications in the IBM Tivoli Storage Productivity Center for Replication library and other related publications.

### Information Centers

You can browse product documentation in the IBM Tivoli Storage Productivity Center for Replication for System z Information Center at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp

## Publications

The IBM Publications Center website offers customized search functions to help you find the publications that you need. Some publications are available for you to view or download free of charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM Publications Center on the web at www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss

The IBM Publications Center website also offers you a notification system for IBM publications. Register and you can create your own profile of publications that interest you. The publications notification system sends you a daily email that contains information about new or revised publications that are based on your profile. Access the publications notification system from the IBM Publications Center on the web at www.ibm.com/e-business/linkweb/publications/servlet/pbi.wss to subscribe.

The following publications make up the IBM Tivoli Storage Productivity Center for Replication for System z library:

*IBM Tivoli Storage Productivity Center for Replication for System z Installation and Configuration Guide*
: This guide contains instructions for installing and configuring the product on z/OS.

*Program Directory for IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z*
: This Program Directory includes installation instructions associated with IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z.

*Program Directory for IBM Tivoli Storage Productivity Center for Replication for System z*
: This Program Directory presents information concerning the material and procedures associated with the installation of IBM Tivoli Storage Productivity Center for Replication for System z.

*Program Directory for IBM WebSphere® Application Server for z/OS*
: This Program Directory presents information related to installing IBM WebSphere Application Server for z/OS V6.1.0.

*Program Directory for IBM WebSphere Application Server OEM Edition*
: This Program Directory presents information related to installing IBM WebSphere Application Server OEM Edition for z/OS V6.1.0.

*IBM WebSphere Application Server OEM Edition for z/OS Configuration Guide*
: This guide contains configuration instructions associated with IBM WebSphere Application Server OEM Edition for z/OS.

*IBM Tivoli Storage Productivity Center for Replication for System z User's Guide*
: This guide contains task-oriented instructions for using the product graphical user interface (GUI) to manage copy services.

*IBM Tivoli Storage Productivity Center for Replication for System z Command-Line Interface User's Guide*
: This guide provides information about how to use the product's command-line interface (CLI).

*IBM Tivoli Storage Productivity Center for Replication for System z Problem Determination Guide* **(GC27-2320)**
This guide assists administrators or users who are troubleshooting problems with the product.

**WebSphere Application Server for z/OS product website**
This website provides information about WebSphere Application Server for z/OS, including links to sources of related information such as redbooks, white papers, and ebooks. To view the website, go to http://www-01.ibm.com/software/webservers/appserv/zos_os390/.

### Redbooks and white papers

*Performance Monitoring and Best Practices for WebSphere on z/OS* **(SG24-7269)**
This IBM Redbooks® publication provides a structure that you can use to set up an environment that is tuned to meet best performance and catch eventual performance bottlenecks.

*DB2® for z/OS and WebSphere: The Perfect Couple* **(SG24-6319)**
This IBM Redbooks publication provides a broad understanding of the installation, configuration, and use of the IBM DB2 Universal Driver for SQLJ and JDBC in a DB2 for z/OS and OS/390® Version 7, and DB2 for z/OS Version 8 environment, with IBM WebSphere Application Server for z/OS for z/OS Version 5.02. It describes both type 2 and type 4 connectivity (including the XA transaction support) from a WebSphere Application Server on z/OS to a DB2 for z/OS and OS/390 database server.

## Web resources

Listed here are the websites and information center topics that relate to IBM Tivoli Storage Productivity Center for Replication.

### Websites

- IBM Tivoli Storage Productivity Center

  www.ibm.com/systems/storage/software/center/standard/index.html

  This website describes the feature, benefits, and specifications of Tivoli Storage Productivity Center. It also provides a link to product support, data sheets, resource library, and white papers.
- Tivoli Storage Productivity Center for Replication

  www.ibm.com/systems/storage/software/center/replication/index.html

  This website describes the feature, benefits, and specifications of Tivoli Storage Productivity Center for Replication. It also provides a link to the Software Online Catalog to purchase the product and licenses.
- Tivoli Storage Productivity Center Technical Support

  www.ibm.com/support/entry/portal/Overview/Software/Tivoli/Tivoli_Storage_Productivity_Center_Standard_Edition

  This website provides links to downloads and documentation for all currently supported versions of Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication.
- Supported Storage Products List

  http://www-01.ibm.com/support/docview.wss?uid=swg21386446

  This website provides links to the supported storage products for each version of Tivoli Storage Productivity Center for Replication.

- IBM WebSphere Application Server

  www.ibm.com/software/webservers/appserv/was/

  This website describes the IBM WebSphere Application Server offerings and provides links for downloading a trial version, purchasing IBM WebSphere Application Server, and viewing online publications and demos.
- IBM DB2 Software

  www.ibm.com/software/data/db2/

  This website describes the DB2 offerings and provides links for downloading a trial version, purchasing DB2, and viewing analyst reports, online publications, and demos.
- IBM System Storage® Disk Systems

  www.ibm.com/servers/storage/disk/

  This website provides links to learn more about the IBM System Storage disk systems products and offerings, including DS6000™ and DS8000®. It also provides links for viewing support and services, software and solutions, and other resources.
- IBM System Storage SAN Volume Controller

  www.ibm.com/servers/storage/software/virtualization/svc/index.html

  This website describes the IBM System Storage SAN Volume Controller offering and provides links for requesting a quote for and purchasing System Storage SAN Volume Controller and viewing online publications, white papers, and case studies.
- IBM Storwize V7000

  www.ibm.com/systems/storage/disk/storwize_v7000/index.html

  This website describes the Storwize® V7000 offerings and provides links for requesting a quote and viewing online publications and white papers.
- IBM XIV Storage System

  www.ibm.com/systems/storage/disk/xiv

  This website describes the XIV® system offering and provides links for requesting a quote for an XIV system and viewing online publications, white papers, and demos.
- System z (and z/OS)

  www.ibm.com/systems/z/

  This website provides links to learn more about IBM System z offerings and software. It also includes information about upcoming webcasts, blogs, and demos.

## Forums

- Tivoli Forums

  www.ibm.com/developerworks/forums/tivoli_forums.jspa

  This website provides a forum that you can use to discuss issues pertaining to Tivoli Storage Productivity Center, Tivoli Storage Productivity Center for Replication, and other Tivoli products. This website includes a link for obtaining the forum using a Rich Site Summary (RSS) feed.
- Technical Exchange Webcasts

  www-01.ibm.com/software/sysmgmt/products/support/supp_tech_exch.html

  This website provides webcasts in which technical experts share their knowledge and answer your questions. Visit this site often to see upcoming topics and presenters or to listen to previous webcasts.

## Providing feedback about publications

Your feedback is important to help IBM provide the highest quality information. You can provide comments or suggestions about the documentation from the IBM Tivoli Storage Productivity Center for Replication Information Center.

Go to the information center at http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp and click **Feedback** at the bottom of the information center Welcome page or topic pages.

# New for Tivoli Storage Productivity Center for Replication for System z 4.2.2.3

There are no new features in IBM Tivoli Storage Productivity Center for Replication for System z version 4.2.2.3.

For limitations and known issues for 4.2.2.3, go to the Tivoli Storage Productivity Center support site at http://www.ibm.com/support/entry/portal/Overview/Software/Tivoli/Tivoli_Storage_Productivity_Center_Standard_Edition. In the **Search support and downloads** field, search for the document *Limitations and known issues for Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication 4.2.2.3*.

# New for Tivoli Storage Productivity Center for Replication for System z 4.2.2.2

Use this information to learn about new features and enhancements in IBM Tivoli Storage Productivity Center for Replication for System z version 4.2.2.2. This information highlights the changes since the last release of Tivoli Storage Productivity Center for Replication for System z.

**Additional support for space-efficient volumes in Global Mirror with Practice sessions**

You can use extent space-efficient volumes as copy set volumes for Global Mirror with Practice sessions for System Storage DS8000 6.3 or later.

For more information, go to the Tivoli Storage Productivity Center for Replication for System z information center at http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp and search for *copy sets*.

**New features**

The following features are new for Tivoli Storage Productivity Center for Replication for System z version 4.2.2.2.

**Reflash After Recover option for Global Mirror Failover/Failback with Practice sessions**

You can use the **Reflash After Recover** option with System Storage DS8000 version 4.2 or later. Use this option to create a FlashCopy® replication between the I2 and J2 volumes after the recovery of a Global Mirror Failover/Failback with Practice session. If you do not use this option, a FlashCopy replication is created only between the I2 and H2 volumes.

For more information, go to the Tivoli Storage Productivity Center for Replication for System z information center at http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp and search for *session properties*.

**No Copy option for Global Mirror with Practice and Metro Global Mirror with Practice sessions**

You can use the **No Copy** option with System Storage DS8000 version 4.2 or later. Use this option if you do not want the hardware to write the background copy until the source track is written to. Data is not copied to the I2 volume until the blocks or tracks of the H2 volume are modified.

For more information, go to the Tivoli Storage Productivity Center for Replication for System z information center at http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp and search for *session properties*.

**StartGC H1->H2 command for Global Mirror sessions**

You can use the StartGC H1->H2 command with TotalStorage Enterprise Storage Server® Model 800, System Storage DS8000, and System Storage DS6000. This command establishes Global Copy relationships between site 1 and site 2, and begins asynchronous data replication from H1 to H2.

For more information, go to the Tivoli Storage Productivity Center for Replication for System z information center at http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp and search for *session commands*.

# New for Tivoli Storage Productivity Center for Replication for System z 4.2.2.1

Use this information to learn about new features and enhancements in Tivoli Storage Productivity Center for Replication for System z version 4.2.2.1. This section highlights the changes since Tivoli Storage Productivity Center for Replication for System z 4.2.2.

**IBM Storwize V7000 Unified**

Storwize V7000 Unified is a virtualized storage system that includes Storwize V7000 and Storwize V7000 File Module. Storwize V7000 Unified is designed to consolidate block and file workloads into a single storage system for simplicity of management, reduced cost, highly scalable capacity, performance, and high availability. Storwize V7000 Unified also offers improved efficiency and flexibility through built-in solid state drive (SSD) optimization, thin provisioning and non-disruptive migration of data from existing storage. The system can virtualize and reuse existing disk systems offering a greater potential return on investment.

Data for Storwize V7000 Unified storage systems is collected, monitored, displayed, and reported in Tivoli Storage Productivity Center and data replication is supported by Tivoli Storage Productivity Center for Replication.

# New for Tivoli Storage Productivity Center for Replication for System z 4.2.2

Use this information to learn about new features and enhancements in Tivoli Storage Productivity Center for Replication for System z version 4.2.2 This section highlights the changes since Tivoli Storage Productivity Center for Replication for System z 4.2.1.

Tivoli Storage Productivity Center for Replication for System z 4.2.2 supports IBM XIV Storage System. You can use the following session types for an XIV system:

**Snapshot**
Snapshot is a new session type that creates a point-in-time copy (snapshot) of a volume or set of volumes without having to define a specific target volume. The target volumes of a Snapshot session are automatically created when the snapshot is created.

**Metro Mirror Failover/Failback**
Metro Mirror is a method of synchronous, remote data replication that operates between two sites that are up to 300 kilometers apart. You can use failover and failback to switch the direction of the data flow.

**Global Mirror Failover/Failback**
Global Mirror is a method of asynchronous, remote data replication that operates between two sites that are over 300 kilometers apart. You can use failover and failback to switch the direction of the data flow.

Tivoli Storage Productivity Center for Replication for System z support for XIV system includes the following new features.

**Support for volume nickname**
For XIV system sessions, you can provide the volume ID or the volume nickname as a parameter value when you add or remove copy sets by using the command line interface (CLI) commands **mkcpset** and **rmcpset**.

In addition, you can include the XIV system volume ID or the volume nickname in a comma-separated value (CSV) file that is used to import copy set information. You can import the CSV file by using the **importcsv** command or the Tivoli Storage Productivity Center for Replication for System z graphical user interface (GUI). CSV files that are exported from Tivoli Storage Productivity Center for Replication for System z for XIV system sessions include the volume nickname rather than the volume ID. CSV files are exported by using the **exportcsv** command.

**New CLI commands**
The following CLI commands are new. For more information about new and updated CLI commands for Tivoli Storage Productivity Center for Replication for System z 4.2.2, see the IBM Tivoli Storage Productivity Center for Replication for System z Command-line Interface User's Guide.

**cmdsnapgrp**
Use the **cmdsnapgrp** command to run a specific action against a snapshot group that is in an XIV system Snapshot session. A snapshot group is a grouping of snapshots of individual volumes in a consistency group at a specific point in time.

**lssnapgrp**
Use the **lssnapgrp** command to view snapshot groups that are in an XIV system Snapshot session.

**lssnapgrpactions**
Use the **lssnapgrpactions** command to specify the session and snapshot group name that you want to view available actions for.

**lssnapshots**
Use the **lssnapshots** command to view snapshots that are in a snapshot group in an XIV system session.

# Chapter 1. Installing IBM Tivoli Storage Productivity Center for Replication for System z overview

This topic describes the basic steps necessary to install IBM Tivoli Storage Productivity Center for Replication for System z.

This information pertains *only* to the installation and configuration of IBM Tivoli Storage Productivity Center for Replication on System z. You can find additional installation and configuration information about z/OS in the *IBM Tivoli Storage Productivity Center for Replication for System z Program Directory* or *IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z Program Directory*. In this guide, "System z" refers to the server, and "z/OS"refers to the operating system.

## Introducing IBM Tivoli Storage Productivity Center for Replication for System z

This section provides an overview of IBM Tivoli Storage Productivity Center for Replication for System z, and IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z.

### Tivoli Storage Productivity Center for Replication for System z

IBM Tivoli Storage Productivity Center for Replication for System z provides replication management for IBM System Storage DS8000, IBM System Storage DS6000, IBM TotalStorage Enterprise Storage Server Model 800, IBM System Storage SAN Volume Controller, IBM Storwize V7000 Unified, IBM Storwize V7000, and XIV system storage systems.

You can use Tivoli Storage Productivity Center for Replication for System z for replication management regardless of whether the type of data on the system is extended count key data or fixed-block architecture.

You can use the following functionality for replication management:

- Volume protection to exclude any volumes from being used for disaster-protection copy operations.
- Command prompting to confirm storage administrator actions before running the copy services commands.
- User roles for administrative levels of access.
- Site awareness to indicate site locations of the storage volumes and to help assure copies are done correctly.
- Metro Global Mirror support for System Storage DS8000, providing failover and failback support, fast re-establishment of three-site mirroring, quick resynchronization of mirrored sites using incremental changes only, and data currency at the remote site.

## IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z (z/OS)

IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z provides a disaster-recovery solution that helps to protect you from storage system failures.

You can use Tivoli Storage Productivity Center for Replication Basic Edition for System z with Basic HyperSwap® to perform the following tasks:

- Monitoring for events that indicate a storage device has failed
- Determining if the failing storage device is part of a Metro Mirror (synchronous peer-to-peer remote copy [PPRC]) pair
- Determining from policy, the action to be taken
- Ensuring that data consistency is not violated
- Swapping the I/O between the primary logical devices in the consistency group with the secondary logical devices in the consistency group (performing a HyperSwap for IBM System Storage DS8000, System Storage DS6000, IBM TotalStorage Enterprise Storage Server 800).
- Performing FlashCopy point-in-time replication for IBM System Storage DS8000, System Storage DS6000, IBM TotalStorage Enterprise Storage Server 800.
- Allowing only z/OS attached count key data (CKD) volumes to be added to the HyperSwap session.

Tivoli Storage Productivity Center for Replication Basic Edition for System z provides only HyperSwap and FlashCopy sessions and not the full functionality of the other IBM Tivoli Storage Productivity Center for Replication products.

Tivoli Storage Productivity Center for Replication Basic Edition for System z is available at no cost. If you want to use Tivoli Storage Productivity Center for Replication Two Site Business Continuity or Tivoli Storage Productivity Center for Replication Three Site Business Continuity a license is required for each product.

The z/OS HyperSwap license is required for Basic HyperSwap.

## Tivoli Storage Productivity Center for Replication Two Site Business Continuity

You can use Tivoli Storage Productivity Center for Replication Two Site Business Continuity to obtain continuous availability and disaster recovery solutions by using point-in-time replication, which includes FlashCopy and Snapshot, and continuous replication, which includes Metro Mirror and Global Mirror.

You can set up Metro Mirror and Global Mirror sessions to replicate data in both the forward and reverse directions.

Use Tivoli Storage Productivity Center for Replication Two Site Business Continuity to create and manage the following session types:

- FlashCopy:
  - FlashCopy replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server Model 800
  - FlashCopy replication for SAN Volume Controller
  - FlashCopy replication for Storwize V7000
  - FlashCopy replication for Storwize V7000 Unified

- Snapshot:
  - Snapshot replication for the XIV system
- Global Mirror:
  - Global Mirror Single Direction replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Global Mirror Single Direction replication for SAN Volume Controller
  - Global Mirror Single Direction replication for Storwize V7000
  - Global Mirror Single Direction replication for Storwize V7000 Unified
  - Global Mirror Failover/Failback replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Global Mirror Failover/Failback replication for SAN Volume Controller
  - Global Mirror Failover/Failback replication for Storwize V7000
  - Global Mirror Failover/Failback replication for Storwize V7000 Unified
  - Global Mirror Failover/Failback replication for XIV system
  - Global Mirror Failover/Failback with Practice replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Global Mirror Failover/Failback with Practice replication for SAN Volume Controller
  - Global Mirror Failover/Failback with Practice replication for Storwize V7000
  - Global Mirror Failover/Failback with Practice replication for Storwize V7000 Unified
  - Global Mirror Either Direction with Two-Site Practice replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
- Metro Mirror:
  - Metro Mirror or Global Copy replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Metro Mirror for Single Direction replication for SAN Volume Controller
  - Metro Mirror for Single Direction replication for Storwize V7000
  - Metro Mirror for Single Direction replication for Storwize V7000 Unified
  - Metro Mirror for Failover/Failback replication for SAN Volume Controller
  - Metro Mirror for Failover/Failback replication for Storwize V7000
  - Metro Mirror for Failover/Failback replication for Storwize V7000 Unified
  - Metro Mirror Failover/Failback replication for XIV system
  - Metro Mirror for Failover/Failback with Practice replication for SAN Volume Controller
  - Metro Mirror for Failover/Failback with Practice replication for Storwize V7000
  - Metro Mirror for Failover/Failback with Practice replication for Storwize V7000 Unified
  - Metro Mirror Failover/Failback or Global Copy replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Metro Mirror Failover/Failback replication for HyperSwap for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800

- Metro Mirror Failover/Failback replication for Open HyperSwap for the System Storage DS8000

## Tivoli Storage Productivity Center for Replication Three Site Business Continuity

You can use Tivoli Storage Productivity Center for Replication Three Site Business Continuity to obtain continuous availability and disaster recovery solutions by using point-in-time replication, which includes FlashCopy and Snapshot, and continuous replication, which includes Metro Mirror, Global Mirror, and Metro Global Mirror to secondary and tertiary sites.

You can set up Metro Mirror and Global Mirror sessions to replicate data in both the forward and reverse directions. With Tivoli Storage Productivity Center for Replication Three Site Business Continuity, you can also use Metro Global Mirror (with failover and failback to switch production sites between each of the three sites and return to the original configuration.

**Important:** Tivoli Storage Productivity Center for Replication Three Site Business Continuity requires that Tivoli Storage Productivity Center for Replication Two Site Business Continuity is installed and a separate license is required for both products.

Use Tivoli Storage Productivity Center for Replication Three Site Business Continuity to create and manage the following session types:

- FlashCopy:
  - FlashCopy replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server Model 800
  - FlashCopy replication for SAN Volume Controller
  - FlashCopy replication for Storwize V7000
  - FlashCopy replication for Storwize V7000 Unified
- Snapshot:
  - Snapshot replication for the XIV system
- Global Mirror:
  - Global Mirror Single Direction replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Global Mirror Single Direction replication for SAN Volume Controller
  - Global Mirror Single Direction replication for Storwize V7000
  - Global Mirror Single Direction replication for Storwize V7000 Unified
  - Global Mirror Failover/Failback replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Global Mirror Failover/Failback replication for SAN Volume Controller
  - Global Mirror Failover/Failback replication for Storwize V7000
  - Global Mirror Failover/Failback replication for Storwize V7000 Unified
  - Global Mirror Failover/Failback replication for XIV system
  - Global Mirror Failover/Failback with Practice replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Global Mirror Failover/Failback with Practice replication for SAN Volume Controller
  - Global Mirror Failover/Failback with Practice replication for Storwize V7000

  - Global Mirror Failover/Failback with Practice replication for Storwize V7000 Unified
  - Global Mirror Either Direction with Two-Site Practice replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
- Metro Mirror:
  - Metro Mirror or Global Copy replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Metro Mirror for Single Direction replication for SAN Volume Controller
  - Metro Mirror for Single Direction replication for Storwize V7000
  - Metro Mirror for Single Direction replication for Storwize V7000 Unified
  - Metro Mirror for Failover/Failback replication for SAN Volume Controller
  - Metro Mirror for Failover/Failback replication for Storwize V7000
  - Metro Mirror for Failover/Failback replication for Storwize V7000 Unified
  - Metro Mirror Failover/Failback replication for XIV system
  - Metro Mirror for Failover/Failback with Practice replication for SAN Volume Controller
  - Metro Mirror for Failover/Failback with Practice replication for Storwize V7000
  - Metro Mirror for Failover/Failback with Practice replication for Storwize V7000 Unified
  - Metro Mirror Failover/Failback or Global Copy replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Metro Mirror Failover/Failback with HyperSwap replication for System Storage DS8000, System Storage DS6000, and TotalStorage Enterprise Storage Server 800
  - Metro Mirror Failover/Failback with Open HyperSwap replication for System Storage DS8000
- Metro Global Mirror:
  - Metro Global Mirror replication for System Storage DS8000 (with failover and failback)
  - Metro Global Mirror replication for System Storage DS8000 and TotalStorage Enterprise Storage Server 800 (with failover and failback)
  - Metro Global Mirror with Practice replication for System Storage DS8000 and TotalStorage Enterprise Storage Server 800 (with failover and failback)
  - Metro Global Mirror with HyperSwap replication for System Storage DS8000 and TotalStorage Enterprise Storage Server 800 (TotalStorage Enterprise Storage Server 800 can be only in the H1 role.)

## Architecture

IBM Tivoli Storage Productivity Center for Replication for System z consists of several key components. This topic identifies these components and shows how they are related.

**IBM Tivoli Storage Productivity Center for Replication for System z server**

**Database**

A single database instance serves as the repository for all IBM Tivoli Storage Productivity Center for Replication for System z data.

**GUI** You can manage and monitor replication from the graphical user interface (GUI).

**CLI** You can issue commands for major IBM Tivoli Storage Productivity Center for Replication for System z functions from the command-line interface (CLI).

# Tivoli Storage Productivity Center for Replication user interfaces

IBM Tivoli Storage Productivity Center for Replication provides a graphical user interface (GUI) and a command line interface (CLI) for managing data replication and disaster recovery.

## Graphical user interface

Tivoli Storage Productivity Center for Replication uses a GUI with the following features:

**Navigation tree**
The left panel provides categories of tasks that you can perform in Tivoli Storage Productivity Center for Replication. Clicking a task opens a main page in the content panel.

**Health Overview**
This area is below the navigation tree and shows a status summary for all sessions, storage systems, host systems, and management servers that Tivoli Storage Productivity Center for Replication is managing.

**Content area**
The right panel displays content based on the item you selected in the navigation tree.

You can view help for the currently displayed panel by clicking the **?** icon in the upper-right corner.

You can view the information center on the Web by clicking the **i** icon in the upper-right corner. You must have Internet access to view the information center.

When you log on to the GUI, by default you see the Health Overview panel in the content area.

## Command line interface

You can use the Tivoli Storage Productivity Center for Replication CLI interactively using the **csmcli** utilities. This CLI can be used either as an efficient way to accomplish simple tasks directly or as a script for automating functions.

**Note:** For security, the CLI runs only on the management server. You can run the CLI remotely using a remote-access utility, such as secure shell (SSH) or Telnet.

For Tivoli Storage Productivity Center for Replication on Windows, you can specify remote access to Linux or AIX® terminals if you have enabled Telnet on your Windows server.

# Chapter 2. Prerequisites and pre-installation tasks

This topic lists the prerequisites and pre-installation tasks that you must perform before you install IBM Tivoli Storage Productivity Center for Replication on z/OS.

Use the prerequisites and pre-installation tasks to verify that your system meets the requirements for installing IBM Tivoli Storage Productivity Center for Replication on z/OS.

**Note:** To successfully run and use IBM Tivoli Storage Productivity Center for Replication on open systems, see *IBM Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication Installation and Configuration Guide* in the IBM Tivoli Storage Productivity Center Information Center.

## Prerequisites for z/OS

This topic lists the hardware and software prerequisites for installing IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z and Tivoli Storage Productivity Center for Replication for System z.

The following prerequisites must be met before you install Tivoli Storage Productivity Center for Replication Basic Edition for System z and Tivoli Storage Productivity Center for Replication for System z.

### Hardware requirements

- Machine: System z architecture
- Minimum disk space requirement: see the *Program Directory* for details
- Storage system requirements:
  - System Storage DS8000:
    - System Storage DS8000 Hardware Management Console (HMC) V4.3 microcode
    - Release 2 minimum firmware level 6.2.410.30 or Release 3 minimum firmware level 63.1.32.0
    - Advanced Copy services licenses
    - Optional Ethernet adapters for Tivoli Storage Productivity Center for Replication
      - Single image - feature code 1801
      - Dual image - feature code 1802 and 1803
  - System Storage DS6000:
    - Minimum firmware level 6.2.2.64
    - Advanced Copy services licenses
  - TotalStorage Enterprise Storage Server Model 800:
    - Minimum firmware level 2.4.4.72
    - Feature codes 240 - PRC and 2240 - PRC
  - System Storage SAN Volume Controller
    - Minimal version 4.2.1
    - Copy services licenses
  - Storwize V7000

- Minimal version 6.1.0

– Storwize V7000 Unified
  - Minimal version 1.3

**Note:** The Java™ Virtual Machine requires a minimum of 512 MB of memory allocated to UNIX System Services.

## Software requirements

- Operating system: z/OS V1.9 or later.
- WebSphere Application Server OEM Edition for z/OS V6.1 or WebSphere Application Server for z/OS V6.1
- (Optional) DB2 Version 9.1 or later

  **Attention:** If DB2 is used, application security must be turned off.

## Open HyperSwap requirements

The following hardware and software is required for the Open HyperSwap feature. Open HyperSwap provides HyperSwap functionality for open systems. The use of Open HyperSwap is optional. For information about Open HyperSwap, refer to the *IBM Tivoli Storage Productivity Center User's Guide*.

- AIX version 5.3 or 6.1 with the following modules. (You can find the supported AIX version for each Tivoli Storage Productivity Center for Replication release in the support matrix at http://www-01.ibm.com/support/docview.wss?rs=40 &context=SSBSEX&context=SSMN28&context=SSMMUP&context=SS8JB5 &context=SS8JFM&uid=swg21386446&loc=en_US&cs=utf-8&lang=en. Click the link for the applicable release under Agents, Servers and GUI.)
  – Subsystem Device Driver Path Control Module (SDDPCM) version 3.0.0.0 or later
  – Multi-Path Input/Output (MPIO) module version 2.0.0.1. or later
- System Storage DS8000 5.1 or later.

For more information about the latest requirements for Open HyperSwap, see the IBM Multipath Subsystem Device Driver Path Control Module (PCM) Version 3.0.0.0 README for AIX at ftp://ftp.software.ibm.com/storage/subsystem/aix/3.0.0.0/sddpcm.readme.3.0.0.0.txt.

## Fixes and updates for Basic HyperSwap

To ensure that you have the latest z/OS APARs, updates, and program temporary fixes PTFs required to support Basic HyperSwap, you can get the latest IBM HOLDDATA and then use fix category IBM.Function.HyperSwap to select and apply the appropriate PTFs or to identify any PTFs that are missing. The latest HOLDDATA is supplied with all IBM products and service offerings (SMP/E RECEIVE ORDER, ShopzSeries, ServiceLink, Custom-built Product Delivery Option [CBPDO], ProductPac®, ServerPac, SystemPac®) and can be obtained from the HOLDDATA Website at http://service.software.ibm.com/holdata/390holddata.html. Use the full two year file only. After receiving the latest HOLDDATA, you can use the `SMP/E REPORT MISSINGFIX` command to identify missing HyperSwap PTFs as follows:

```
SET BDY(GLOBAL).
  REPORT MISSINGFIX ZONES(tgtzone)
    FIXCAT(IBM.Function.HyperSwap).
```

For more information about the REPORT MISSINGFIX command, see the SMP/E for z/OS Commands document at http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/GIMCOM41/CCONTENTS?SHELF=GIM2BK80&DN=SA22-7771-13&DT=20090609031147. For a general discussion on how to use fix categories, see Simplifying PSP Buckets at http://publibz.boulder.ibm.com/zoslib/pdf/IEA-PDF-SMP35-SimplifyingPSPBuckets.pdf.

# Required tasks before installation

This topic provides tasks you must perform before you attempt to install IBM Tivoli Storage Productivity Center for Replication.

## Choosing a database program to use with Tivoli Storage Productivity Center for Replication for System z: Derby or DB2

You can use an Apache Derby 10.3 or IBM DB2 V9.1 or later database with IBM Tivoli Storage Productivity Center for Replication for System z. Derby is provided with Tivoli Storage Productivity Center for Replication for System z.

### Using Derby

If you do not already have DB2 for z/OS in your environment or you do not want to use IBM DB2, Apache Derby 10.3 is provided with IBM Tivoli Storage Productivity Center for Replication for System z. Derby, which is referred to as an embedded database or zero-administration database, creates internal tables and requires less post-installation and configuration maintenance than DB2.

### Installing DB2 on z/OS

This topic presents information that is useful for those users who have limited experience with IBM DB2.

These instructions are for customers who are using DB2 only within the context of IBM Tivoli Storage Productivity Center for Replication. The IBM DB2 Information Center has current information about DB2. For more information see the DB2 Version 9.1 for z/OS Information Center at http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=%2Fcom.ibm.db2z9.doc%2Fsrc%2Falltoc%2Fdb2z_09_prodhome.htm.

**DDF and the JDBC Universal Driver are required**

Integrating DB2 into your z/OS environment is fairly straightforward when you have configured DB2 with SMP/E.

**Note:** You must have the Distributed Data Facility (DDF) installed and configured. The JDBC Universal Driver installed to drive the DDF. When defining the DDF, use the DB2 username and password. You can create the DDF through the JAAS-J2C authentication mechanism in the WebSphere Application Server Administrator Console.

For more information about configuring DB2 on z/OS, see “Configuring DB2 for z/OS” on page 17.

## Configuring IBM WebSphere Application Server

IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z and IBM Tivoli Storage Productivity Center for Replication for System z require IBM WebSphere Application Server OEM Edition for z/OS or IBM WebSphere Application Server for z/OS to be configured in your environment.

For more information about configuring WebSphere Application Server OEM Edition for z/OS, see the *IBM WebSphere Application Server OEM Edition for z/OS Configuration Guide*.

For information about configuring WebSphere Application Server for z/OS, see the WebSphere Application Server information center at http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/index.jsp. On the **How Do I** tab in the right frame, click **Install an application serving environment (z/OS)**.

## Installing IBM WebSphere Application Server V6.1 on z/OS

This topic presents information that is useful for those users who have limited experience with IBM WebSphere Application Server.

If you have limited experience with WebSphere Application Server, the information in this topic helps you get started when installing IBM Tivoli Storage Productivity Center for Replication for System z.

**Note:** These instructions are for customers who are using WebSphere Application Server only within the context of Tivoli Storage Productivity Center for Replication for System z.

**DDF and the JDBC Universal Driver are required when using DB2**

Integrating WebSphere Application Server into your z/OS environment is fairly straightforward when WebSphere Application Server has been configured with SMP/E.

**Note:** You must have the Distributed Data Facility (DDF) installed and configured.
When defining the DDF, use the DB2 username and password. You can create the DDF through the JAAS-J2C authentication mechanism in the IBM WebSphere Application Server Administrator console. For more information about DB2, see "Configuring DB2 for z/OS" on page 17.

**IBM WebSphere Application Server naming conventions are case-sensitive**

During the installation of IBM Tivoli Storage Productivity Center for Replication, you are requested to provide the WebSphere node, cell, and server names used during the installation of WebSphere.

The installation of WebSphere calls for a long name and a short name for the node, cell, and server entities. It is recommended that you use the same names, but in this format: uppercase for long name and lowercase for short name.

**Editing the IWNINSTL job**

When you edit the IWNINSTL job, be sure that the case matches the following definitions on UNIX System Services (USS) in the was.env file located at the following path under the symlink:

```
<WAS_Home>/WAS_CELL_NAME.WAS_NODE.BBOS001/was.env.
```

**Note:** The previous path might vary depending on your system settings. A path might resemble this example `/WebSphere/V6R1/WAS_CELL_NAME.WAS_NODE.BBOS001/was.env`

```
WAS_HOME=-PathPrefix-/<WAS_Home>/V6R1/AppServer
WAS_USER=#was_user
WAS_PASSWD=#was_passwd
WAS_GROUP=#was_group
WAS_SERVER=#was_server
```

```
WAS_NODE=#was_node
WAS_CELL=#was_cell
JAVA_HOME=-PathPrefix-/<WAS_Home>/V6R1/AppServer/java

TPCR_InstallRoot=-PathPrefix-/usr/lpp/Tivoli/RM
TPCR_ProductionRoot=-PathPrefix-/var/Tivoli/RM
DB_TYPE=#dbtype
```

Replace the strings based on the following:

*WAS_HOME*
: The home directory of the IBM WebSphere Application Server on the USS.

*WAS_USER*
: The administrative user ID of the IBM WebSphere Application Server.

*WAS_PASSWD*
: The password for the *WAS_USER* to access the IBM WebSphere Application Server.

*WAS_GROUP*
: The UNIX System Services group that owns the IBM WebSphere Application Server files and directories. To determine your *WAS_GROUP*, perform an **ls -l** command from OMVS, and view the group that owns the files.

*JAVA_HOME*
: the location in which Java binary files are installed.

  The following parameters can be found on the USS by browsing the following symlink: `-Path_prefix-/WAS_Home/WAS_CELL_NAME.WAS_NODE_NAME. WAS_CONTROL_PROCESS/was.env` (This symlink points to the following path `-Path_prefix-/WAS_Home/V6R1/AppServer/profiles/default/config/cells/WAS_CELL_NAME/nodes/WAS_NODE/servers/SERVER_NAME/was.env`). You can use the TSO ISHELL command to browse the `was.env` file to find the following parameters for IWNINSTL:
  - -WAS_SERVER is defined in this file as WAS_SERVER_NAME
  - -WAS_NODE is defined in this file as WAS_NODE
  - -WAS_CELL is defined in this file as WAS_CELL

*TPCR_InstallRoot*
: The location in which IBM Tivoli Storage Productivity Center for Replication for System z was installed by the SMP/E APPLY step. This directory requires read access only.

*TPCR_ProductionRoot*
: The location in which IBM Tivoli Storage Productivity Center for Replication for System z stores the database and command-line interface. It is intended that data requiring read and write access be in this path.

  **Note:** Do not change the *TPCR_InstallRoot* or *TPCR_ProductionRoot* paths. You can modify the -pathprefix-, but be sure that the correct -pathprefix- is assigned in the IWNINSTL job.

*DB_TYPE*
: The type of database that IBM Tivoli Storage Productivity Center for Replication for System z will use. Valid options are DB2 or EMBEDDED. If this value is set to DB2 then IBM Tivoli Storage

Productivity Center for Replication for System z will be configured to use the DB2. If DB2 is configured for this node additional steps are required to set up the data source. If this value is set to EMBEDDED then IBM Tivoli Storage Productivity Center for Replication for System z will be configured to set up an embedded database and no further configuration will be required. The WAS_USER parameter supplied will become the default IBM Tivoli Storage Productivity Center for Replication for System z administrator.

**Verify the Java heap size for the z/OS servant region**
Verify the Java heap size as described in "Verifying the Java heap size for the z/OS servant region" on page 25.

## Configuring RACF for WAS on System z

This topic provides a brief overview of how to configure Resource Access Control Facility (RACF®) for IBM WebSphere Application Server, and provides links to detailed documentation.

When you enable WebSphere Application Server security, ensure that there is a WebSphere administrator user or group defined in RACF on the target system that has authority for running both WebSphere Application Server data sets and DB2 data sets.

**Note:** For additional information, refer to "Recommended settings for your DB2 instance" on page 17.

The default administrator account for WebSphere Application Server for z/OS is WSADMIN and the default administrator account for WebSphere Application Server OEM Edition for z/OS is WOEMCFG. If security regulations require that the default user account does not have access authority to DB2 data sets, then the STORGROUP storage group must be defined to DB2 (rather than the system default storage group, SYSDEFLT) and the data sets must be mapped to a volume that the user account can write to.

This setup allows the WebSphere Application Server user to write to DB2 databases and prevents RACF errors. If RACF errors occur, the IBM Tivoli Storage Productivity Center for Replication Login panel displays the following message:

```
Unable to connect to server at this time, try again later.
```

Another result of incorrectly setting up the RACF and Unix System Services (USS) permissions for the database is that the Tivoli Storage Productivity Center for Replication authentication mechanism (which requires access to the database) issues a message that you have the wrong user ID and password.

When you enable security on the WebSphere Application Server Administrator Console, select the check boxes **Enable Administrative security** and **Enable application security**. You cannot log on to the graphical user interface or command-line interface if you do not enable Administrative security. However, Tivoli Storage Productivity Center for Replication does not require that you use Java 2 security, so this check box does not have to be selected.

For more information about configuring RACF for WebSphere Application Server for z/OS, see the WebSphere Application Server Information Center at

http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/index.jsp. The information related to RACF is under WebSphere Application Server (z/OS) in the information center.

# Chapter 3. Installing IBM Tivoli Storage Productivity Center for Replication for System z

This topic describes the steps required to install and configure IBM Tivoli Storage Productivity Center for Replication for System z or IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z.

To install the IBM Tivoli Storage Productivity Center for Replication for System z, follow these steps:

1. Ensure that your system meets the minimum software and hardware requirements. See "Prerequisites for z/OS" on page 7 for more information.
2. Verify you have the latest z/OS APARs, updates, and PTFs needed to support Basic HyperSwap. Use either the Technical help database for Mainframe Preventive Service Planning buckets website at www14.software.ibm.com/webapp/set2/psp/srchBroker or the Enhanced PSP Tool or ServiceLink. To learn more about the website and the Enhanced Service Planning Tool, see the IBM Education Assistant website at publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp. In the search box, enter `Enhanced Preventive Service`, then click the link in the results section.
3. Install WebSphere Application Server with SMP/E. See "Configuring IBM WebSphere Application Server" on page 9 for more information.
4. If you are using the zero-administration embedded database (Derby 10.3), go to the next step. If you are not using the zero-administration database, install IBM DB2. See "Installing DB2 on z/OS" on page 9 for more information.
5. Check the Resource Access Control Facility (RACF) permissions as described in "Configuring RACF for WAS on System z" on page 12. Otherwise check the permissions of your security application.
6. Install IBM Tivoli Storage Productivity Center for Replication for System z with SMP/E.
   a. Customize jobs
   b. Run jobs without errors

   **Attention:** When installing IBM Tivoli Storage Productivity Center for Replication Version 4.2 on z/OS 1.11, an S0C4 abend might occur during the SMP/E APPLY step due to the STGINIT parameter being used in the DIAGxx member of the PARMLIB dataset. If the abend occurs, remove the STGINIT parameter from the DIAGxx member, or use an existing DIAG member without the STGINIT parameter. Then, issue the command `SET DIAG=`*xx* to activate the changed member. Alternatively, you can also install APAR OA30425, which fixes this abend.

   See the *Program Directory for IBM Tivoli Storage Productivity Center for Replication for System z* or *Program Directory for IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z* for detailed installation instructions.
7. Ensure you complete the following steps if you are running DB2
   a. Customize and run IBM Tivoli Storage Productivity Center for Replication DB2 jobs.
   b. Run DB2Binder. See "Recommended settings for your DB2 instance" on page 17
   c. Create DB2 Data source in IBM WebSphere Application Server. See "Customizing DB2 for z/OS" on page 21.

d. (Optional) Test data source in IBM WebSphere Application Server.

See "Configuring DB2 for z/OS" on page 17 for more information on recommended settings for DB2.

8. Ensure you complete the post-installation steps for z/OS after you have installed IBM Tivoli Storage Productivity Center for Replication for System z.
   a. Customize the IWNINSTL job
   b. Run IWNINSTL with no errors. See "Running IWNINSTL" on page 25 for more information.
9. Access the IBM Tivoli Storage Productivity Center for Replication GUI. See Accessing the IBM Tivoli Storage Productivity Center for Replication GUI for more information.

# Chapter 4. Post-installation tasks for z/OS

This topic presents the post-installation steps that you need to take after you have installed IBM Tivoli Storage Productivity Center for Replication on z/OS.

## Configuring Derby 10.3 (zero-administration)

If you are using the Derby configuration, you must run the IWNINSTL job.

Complete the steps in "Running IWNINSTL" on page 25.

## Configuring DB2 for z/OS

This topic presents the steps to configure DB2 for your installation of IBM Tivoli Storage Productivity Center for Replication for z/OS.

To review the best practices for tuning DB2 in your z/OS environment see the following IBM Redbooks publication:

- Performance Monitoring and Best Practices for WebSphere on z/OS (SG24-7269-00) This publication provides information on data source tuning and the WebSphere connection pool and DB2 threads tuning.
- DB2 for z/OS and WebSphere; The perfect couple (SG24-6319-00) This publication provides information on DB2 UDB for z/OS and OS/390 and DB2 performance tuning in a WebSphere Application Server z/OS environment.

Configuring DB2 in your z/OS environment requires that you run post-configuration sample jobs. These jobs reside in HLQ.ASAMPLIB, and are described in Table 1 on page 20.

These jobs execute SQL statements to create and configure the necessary data schema for IBM Tivoli Storage Productivity Center for Replication.

The general steps to configure DB2 for z/OS are in this order:

### Recommended settings for your DB2 instance

This topic lists the recommended settings for the DB2 instance in your z/OS environment.

It is recommended that you ensure that the following settings have been applied to your DB2 instance:

1. Create the image copies of the DB2 directory and catalog the DSNTIJIC sample provided with DB2.
2. Ensure you have created a database plan and that a storage group exists. By default the storage group is SYSDEFLT.

   You can use SYSDEFLT or create your own storage group. Be sure that this storage group has enough space and, if possible, mount it on a separate volume. The space required for the database storage group should be 1 GB or larger.

   **Note:** You might see a message: `DSNT408I SQLCODE = -904, ERROR: UNSUCCESSFUL EXECUTION CAUSED BY AN UNAVAILABLE RESOURCE 00000220, AND`

RESOURCE NAME. If you see this message, you probably ran out of space on the volume that DB2 is pointing to. To fix this problem, perform the following actions:

a. Ensure that SPUFI, the DB2 interactive tool, is set up and ready for you to use:
   1) From TSO prompt, issue the **DB2ALLOC 9** command.
   2) Type `ispf option l.db` and press Enter.
   3) Select option **d** and ensure that the database matches the DB2 subsystem (DBG1).
   4) Select option **1** SPUFI.
   5) Choose a dataset to run the SQL from, and a dataset to output to. (For example: USRLCL.SPUFI.SQL and USRLCL.SPUFI.OUT).

b. To edit the data set you created, perform the following steps:
   1) (Note that in the following text, //SYSIN DD can also be CSMGROUP.) Look for the STORGROUP you set in the IWNDBALO job:

```
//SYSIN DD
CREATE DATABASE CSM
STOGROUP SYSDEFLT
```

   You can change the STORGROUP used in either of the following ways:

   - Alter the STOGROUP itself by entering these commands:

```
SELECT VOLID FROM SYSIBM.SYSVOLUMES WHERE SGNAME='SYSDEFLT';
SELECT VOLID FROM SYSIBM.SYSVOLUMES WHERE SGNAME='CSMGROUP';
```

     If your work volume is not in the list, run this command: `ALTER STOGROUP CSMGROUP ADD VOLUMES ('WRK246');`.

   - Recreate the IBM Tivoli Storage Productivity Center for Replication database by entering these commands:

```
DROP DATABASE CSM;
COMMIT;
DROP STOGROUP CSMGROUP;
COMMIT;
CREATE STOGROUP CSMGROUP VOLUMES('XXXXXX') VCAT DB2DB;
```

3. Ensure that the IBM Tivoli Storage Productivity Center for Replication administrative ID that you are going to use has DB2 SYSADM authority. This ID should also have authority to access the WebSphere Administration Server Console to set up a JDBC data source, as described in "Running the DB2 sample jobs for a z/OS installation" on page 19.
4. Bind your DB2 instance to the TCP/IP server with the JDBC bind utility provided with DB2. This can be done using omvs (shown below), or by using a z/OS job. For example, the following values bind JDBC to the URL db-server.ibm.com on the default port 446. Confirm with your DB2 administrator which port you are using.

```
java com.ibm.db2.jcc.DB2Binder \
 -url jdbc:db2://db-server.ibm.com:446/<db2_system_name> \
 -user DB2_Admin \
 -password DB2_PASSWRD \
 -collection NULLID
 -size 6
```

   You might want to consult with the DB2 administrator about the user name and password of the user who has SYSADM authority. You can also grant this authority to your ID by issuing the following DB2 SQL command:

```
GRANT SYSADM TO DB2_ID;
```

   Use the following command to list and ensure that *DB2_ID* has the necessary SYSADM authority:

```
SELECT * FROM SYSIBM.SYSUSERAUTH;
```

For full usage, help, and a sample JCL script to run, see the DB2 Binder utility information in the DB2 Version 9.1 for z/OS information center at http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=%2Fcom.ibm.db2z9.doc%2Fsrc%2Falltoc%2Fdb2z_09_prodhome.htm

5. Define and alter the size of the DB2 buffer pool with this console command issued directly to the DB2 subsystem:

   ```
   -DB28 ALTER BPOOL(BP32K) VPSIZE(22000)
   ```

   The following confirmation is displayed:

   ```
   DSNB522I  -DB28 VPSIZE FOR BP32K HAS BEEN SET TO 22000
   DSN9022I  -DB28 DSNB1CMD '-ALTER BPOOL' NORMAL COMPLETION
   ```

   To see what buffer pools you have, issue the following command:

   ```
   -db28 dis bpool(*)
   ```

6. When running the DB2 sample DSNTIJUZ, ensure that you specify a large number for the parameter, idthtoin, or set it to zero to dedicate function to it.

## Running the DB2 sample jobs for a z/OS installation

This topic presents information on editing and running the DB2 sample jobs for a z/OS installation.

As a prerequisite to running any of the jobs described in this topic, ensure that you have started DB2.

**Attention:** Running these jobs after you have already successfully installed Tivoli Storage Productivity Center for Replication results in a loss of session management, function, and device knowledge, after which Tivoli Storage Productivity Center for Replication will not run. Run these jobs only during the initial installation or if you want to purposely clean up all of data.

All the jobs described in Table 1 on page 20 return a status code of 0. This ensures that the full SQL job is run, because DB2 otherwise stops running after 10 errors. Such behavior produces undesirable effects because of pre-existence checking in the SQL statements. So, it is not a problem if, for example, you see error code 201 statements during delete-statement execution; this simply ensures that the latest database tables are installed.

**Note:** Other error codes that do not cause problems in this context include:

**100** One of the following exceptions occurred:

- The result of the SELECT INTO statement or the subselect of the INSERT statement was an empty table. (This is the most likely reason for an error code in the IWNDB jobs.)
- The number of rows identified in the searched UPDATE or DELETE statement was zero.
- The position of the cursor referenced in the FETCH statement was after the last row of the result table.
- The fetch orientation is invalid.

**204** An undefined object or constraint name was detected.

**601** A duplicate object or constraint name was detected.

**612** A duplicate column name was detected in the object definition or ALTER TABLE statement.

Run the jobs in the order they are listed in the table, and check the status job queue to verify successful creation and execution messages.

**Note:** The jobs are not ready to run as-is. They need appropriate job cards for the system on which they run and possibly other modification. Do not edit the HLQ.SAMPLIB and HLQ.ASAMPLIB datasets: instead, make your own copy of the HLQ.SAMPLIB member (called HLQ.ASAMPLIB), and modify and use that copy. HLQ.SAMPLIB is one of the data sets managed by SMP/E when installing and maintaining products and should not be modified by anything other than SMP/E.

Before executing any of the jobs, ensure that WebSphere Application Server has been allocated and started:

1. If you have not already mounted the WebSphere Application Server HFS dataset, do it now:
   a. In Interactive System Productivity Facility, (ISPF), issue this command
      ```
      tso ish
      ```
   b. Enter the path name:
      ```
      //<WAS_Home>/AppServer/
      ```
   c. Click the **File Systems** menu at the top and press Enter.
   d. Select option 3 to mount a file system.
   e. When the prompt opens, enter:
      ```
      For the file system name:  HLQ.WEBSPHERE.HFS
      For the file system type:  hfs
      ```

      **Note:** This HFS customization can be found in the customization jobs for WAS. For more information, refer to the WAS administrator for this dataset.
   f. Press Enter to process.
2. Start the WebSphere Application Server. From the console, issue the command:
   ```
   START BBO6ACR,JOBNAME=BBOS001,ENV=WAS_CELL_NAME.WAS_NODE_NAME.WAS_CONTROL_PROCESS
   ```

*Table 1. Jobs that you need to edit in HLQ.ASAMPLIB before running*

| **Locate and edit this job in HLQ.ASAMPLIB (as described in the Note above)** | **Purpose of the job** |
|---|---|
| IWNDBALO | Submit this DB2 job first as it creates the underlying database for the rest of the jobs. |
| IWNDBSHL | This sample creates the SAN Volume Controller, Storwize V7000 Unified, or Storwize V7000 hardware layer database. This database is used for cataloging information about clusters and storage representations. |
| IWNDBELM | This sample creates the element catalog table, which stores information about size, type, and availability of volumes. |
| IWNDBHWL | This sample creates the hardware layer table that stores information pertaining to ESS 800 (2105 models), DS 8000 (2107 models), and DS 6000 (1750 models). |

*Table 1. Jobs that you need to edit in HLQ.ASAMPLIB before running (continued)*

| Locate and edit this job in HLQ.ASAMPLIB (as described in the Note above) | Purpose of the job |
|---|---|
| IWNDBREP | This sample creates the Tivoli Storage Productivity Center for Replication table which stores session, relational, high availability, and state information. |
| IWNDBHAE | This sample provides high availability backup for the element catalog. |
| IWNDBHAH | This sample provides high availability backup for the hardware layer. |
| IWNDBHAR | This sample provides high availability backup for the Tivoli Storage Productivity Center for Replication table. |
| IWNDBHAS | This sample provides high availability backup for the SAN Volume Controller, Storwize V7000 Unified, or Storwize V7000 hardware layer. |
| IWNDBMIG | This sample updates any table changes that have occurred from release to release of Tivoli Storage Productivity Center for Replication. |
| IWNDB2ZZ | This sample sets the initial user that will have access to Tivoli Storage Productivity Center for Replication. It also sets the communication default for the server to the Tivoli Storage Productivity Center for Replication CLI and GUI. |
| **Important:** After you have run these jobs, perform the following tasks:<br>• Use SPUFI to ensure that you have successfully created the database. For information about SPUFI for DB2 9.1, see http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.db29.doc.apsg/db2z_executesqlspufi.htm<br>• Ensure that the data in the database tables is in UNICODE. | |

After these DB2 configuration steps have been completed, go to the steps outlined in "Running IWNINSTL" on page 25 to set up the data source, applications, security, Java Virtual Machine, and libraries in the WebSphere Application Server.

## Customizing DB2 for z/OS

This topic explains the procedure for customizing DB2 for z/OS.

Complete the following steps to customize DB2 for z/OS.

1. Add DB2 datasets to the link list. This step is required if you are using the DB2 type 2 connection.
   - While updating the PARMLIB members, in the SYS1.PARMLIB, add a PROG*xx* for concatenation of the DB2.V9R1M0.SDSNLOD2 datasets:

```
LNKLST ADD NAME(STD.LINKLIST)                                  /* DB
          DSNAME(DB2.V9R1M0.PROD.SDSNLOD2)
          VOLUME(DTBAS6)                                            /*
APF ADD DSNAME(DB2.V9R1M0.PROD.SDSNLOD2) /*
          VOLUME(DTBAS6)                                             /*
```

For more information on updating the z/OS PARMLIB member, see *MVS™ PARMLIB updates panel: DSNTIPM* in the DB2 Version 9.1 for z/OS Information Center at http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=%2Fcom.ibm.db2z9.doc%2Fsrc%2Falltoc%2Fdb2z_09_prodhome.htm.

- Use the installation CLIST ISPF panels during the DB2 installation. To use the ISPF panels, you must first make the DB2 ISPF library available to TSO and then invoke the installation CLIST DSNTINST in ISPF mode. Concatenate the DB2 ISPF libraries to your typical allocations by issuing the following commands:

```
PROFILE WTP MSGID
ALLOCATE DDNAME(ISPMLIB)
   DSN('prefix.SDSNSPFM' + 'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB)
   DSN('prefix.SDSNSPFP' + 'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB)
   DSN('prefix.SDSNSPFS' + 'ISP.SISPSLIB' 'ISP.SISPSENU')
   SHR REUSE
```

  For more information on the installation CLIST see *Tailoring DB2 jobs to your environment using the installation CLIST* in the DB2 Version 9.1 for z/OS Information Center at http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=%2Fcom.ibm.db2z9.doc%2Fsrc%2Falltoc%2Fdb2z_09_prodhome.htm.

2. Open the WebSphere Admin console in your Web browser. The following URL is the default value:

   `http://host_name:9080/ibm/console/login.do`

   The following URL is the default secured port:

   `https://host_name:9043/ibm/console/logon.jsp`

3. Set the following environment variables, as described below, by clicking **Environment** > **WebSphere Variables**. When you have set these variables, click **Save to master config**.

   ```
   DB2UNIVERSAL_JDBC_DRIVER_NATIVEPATH
   DB2UNIVERSAL_JDBC_DRIVER_PATH
   DB2_JDBC_DRIVER_PATH
   ```

   These environment variables must define paths to .jar files that connect WebSphere to DB2 using IBM Java.

   - The path to DB2UNIVERSAL_JDBC_DRIVER_NATIVEPATH is similar to the following:

     `DB2_INSTALL_PATH/lib`

     Verify that the following files are present:
     - `libdb2dsnx9ldj.so`
     - `libdb2dsnx9ld8.so`
     - `libdb2os390j2.so`
     - `libdb2os390j2_g.so`

   - The path to DB2UNIVERSAL_JDBC_DRIVER_PATH is similar to the following:

     `DB2_INSTALL_PATH/jcc/classes`

     Verify that the following files are present:

     ```
     db2jcc.jar
     db2jcc_javax.jar
     db2jcc_license_cisuz.jar
     ```

- The path to DB2_JDBC_DRIVER_PATH is the same as DB2UNIVERSAL_JDBC_DRIVER_PATH.

4. Set up a data source provider through the WebSphere Admin console by navigating to **Resources** > **JDBC** > **JDBC Providers**.
   a. Click the JDBC provider link.
   b. Select the **node** and **server** as the scope in the pull-down menu, and click **New**.
   c. Follow the wizard instructions to create the provider, using the following values:

      ```
      Database type:        DB2
      Provider type:        DB2 Universal JDBC driver provider
      Implementation type:  Connection pool data source
      Name:                 CSMProvider
      ```

      Click **Next**.
   d. Ensure the path information is correct on the panel:

      ```
      Class path: ${DB2UNIVERSAL_JDBC_DRIVER_PATH}/db2jcc.jar
      ${UNIVERSAL_JDBC_DRIVER_PATH} /db2jcc_license_cu.jar
      ${DB2UNIVERSAL_JDBC_DRIVER_PATH} /db2jcc_license_cisuz.jar

      Directory location ${DB2UNIVERSAL_JDBC_DRIVER_PATH}:
           /usr/lpp/db2/db2810/jcc/classes/
      Native library path ${DB2UNIVERSAL_JDBC_DRIVER_NATIVEPATH}:
           /usr/lpp/db2/db2810/lib/
      ```

      Click **Next**.
   e. Verify your settings, then click **Finish**.
   f. Save your changes to the master configuration.
5. After you have set up a data source provider, set up a data source through the WebSphere Admin console by navigating to **JDBC providers** > **CSMProvider**.
   a. Click the **Data sources** link.
   b. Select **node** and **server** as the scope in the pull-down menu.
   c. Click **New**.
   d. Follow the wizard instructions to create the data source, entering the following information in the editable text areas:

      ```
      Data source name: CSMDS
      JNDI name:        jdbc/CSMDS
      ```

      If you have already defined a component-managed authentication alias for DB2, use the pull-down menu to select it here, otherwise follow the relevant step below on how to configure this.

      Click **Next**.
   e. Select the existing JDBC provider that you created earlier from the pull-down menu.
   f. Depending on which connection type you use, enter the following information in the editable text areas:

      **Note:** Optionally, you can issue the command *db2_database_name* **DISPLAY DDF** on the z/OS console to determine the DB2 location, the DB2 host name (IP address), and the DB2 port number.

      Type 2 driver details:

```
Database name:  Your DB2 location
Driver type:    2
Server name:    Your DB2 host name
Port number:    Your DB2 port number (default is 446)
```

Type 4 driver details:

```
Database name:  Your DB2 location
Driver type:    4
Server name:    Your DB2 host name
Port number:    Your DB2 port number (default is 446)
```

and check the check box **Use this data source in container managed persistence (CMP)**, then click **Next**.

g. Verify your settings, then click **Finish**.

h. Save your changes to the master configuration.

6. Set up J2EE Connector Architecture (J2C) authentication through the WebSphere Admin console by navigating to **Resources** > **JDBC** > **Data sources**.

   a. Click the data source that you created.

   b. On the right-hand side of the panel, under the heading **Related Items**, click **J2EE Connector Architecture (J2C) authentication data entries**.

   c. Click **New**. Then enter any alias (for example, sysadm) and your DB2 user ID and password.

   d. Click **OK**.

   e. Save your changes to the master configuration.

   f. Return to the jdbc/CSMDS data source.

   g. Select **sysadm** (or alias name that you chose) as the component-managed authentication alias.

   h. Select **sysadm** (or alias name that you chose) as the container-managed authentication alias.

   i. Click **Apply**.

   j. Click the **Save** link and then the **Save** button.

7. Verify the configuration through the WebSphere Admin console by navigating to **Resources** > **JDBC** > **Data sources**.

   a. Select the data source that you created earlier and click **Test connection**.

      Data Sources based on the type 2 JDBC drivers need access to the T2 native library. The IBM WebSphere Application Server runtime provides that access for node-scoped data sources. The test connection service, however, does not provide access to the native files at the node level. Therefore, when you create these data sources at the node scope, create the same configurations at the server scope for testing purposes. Click **Test connection** operation at the server level to determine whether the data source settings are valid.

   b. You should see a message that connection was successful.

   c. If you get a failure message, read the message to determine the problem. Review the preceding steps to ensure they were done correctly.

8. Restart IBM WebSphere Application Server.

   At this point, the customization for DB2 is done. You can now log on to the IBM Tivoli Storage Productivity Center for Replication graphical user interface (GUI) through Mozilla Firefox or Internet Explorer at the following URL:

   **If you are using WebSphere Application Server OEM Edition for z/OS**

   `https://host_name:32209/CSM/`

   **If you are using WebSphere Application Server for z/OS**

   `https://host_name:9443/CSM/`

You can access the CLI using the following USS path: `-path prefix-/var/Tivoli/RM/CLI`

## Verifying the Java heap size for the z/OS servant region

Use the IBM WebSphere Application Server Administrator Console to check the Java heap size (**Application servers** > **Server1** > **Process Definition** > **Servant** > **Java Virtual Machine**) for the IBM z/OS servant region. The size of this region affects the performance of IBM Tivoli Storage Productivity Center for Replication.

The default Java heap size is 512 MB, which supports fewer than 25,000 role pairs. Increasing the Java heap size to 768 MB increases support to a maximum of 50,000 role pairs. For more information on how to set up the Java heap size, see the WebSphere Application Server information center at http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/index.jsp.

### IEFUSI and IEALIMIT Considerations

Verify that the `IEFUSI` or `IEALIMIT` installation exits are not limiting the size of the WebSphere Application Server address spaces. For more information about these installation exits and modifying address space, see *z/OS V1R12.0 MVS Installation Exits*, *z/OS V1R12.0 MVS Initialization and Tuning Guide*, and *z/OS V1R12.0 MVS Initialization and Tuning Reference*. You can find these documents at http://www-03.ibm.com/systems/z/os/zos/bkserv/r12pdf/.

If you are using `IEFUSI` to restrict the size of the address spaces, add the following program properties table (PPT) statements to `SYS1.PARMLIB` for each of the address spaces to remove the size restriction:

```
"PPT PGMNAME(BBOSR)    NOHONORIEFUSIREGION"         /* WAS Servant Region */
"PPT PGMNAME(BBODAEMN) NOHONORIEFUSIREGION"         /* WAS Daemon Region  */
"PPT PGMNAME(BBOCTL)   NOHONORIEFUSIREGION"         /* WAS Control Region */
```

If you are using `IEALIMIT` to restrict the size of the address spaces, see the *IEALIMIT — User Region Size Limit Exit* chapter in *z/OS V1R12.0 MVS Installation Exits* to remove the size restriction.

## Running IWNINSTL

This topic describes how to run IWNINSTL to set up the data source, applications, security, Java Virtual Machine, and libraries in the WebSphere Application Server. You must run IWNINSTL if you use DB2 or Derby.

The IWNINSTL job sets up the data source, applications, security, Java Virtual Machine, and libraries in the WebSphere Application Server. It also points the properties files to the correct locations on your machine. Edit the job according to the notes given. Once you submit the job, it should take several minutes to complete. Progress can be seen by browsing the logs described below.

Copy and edit IWNINSTL in HLQ.ASAMPLIB, and then run it. When you code the IWNINSTL job, be sure that the case matches the following definitions in the was.env file located under the symlink:`<WAS_HOME>/WAS_CELL_NAME.WAS_NODE.BBOS001/was.env`.

The actual was.env file location is:`/<WAS_HOME>/V6R1/AppServer/profiles/default/config/cells/WAS_CELL_NAME/nodes/WAS_NODE/servers/SERVER_Name/was.env`.

```
//IWNINSTL EXEC PGM=BPXBATCH
//STDOUT DD PATH='/etc/install_RM.log'
// PATHOPTS=(OCREAT,OTRUNC,OWRONLY),
// PATHMODE=(SIRWXU),
// PATHDISP=KEEP
//STDERR DD PATH='/etc/install_RM_err.log'
// PATHOPTS=(OCREAT,OTRUNC,OWRONLY),
// PATHMODE=(SIRWXU),
// PATHDISP=KEEP
//STDOARN DD*
SH
/usr/lpp/Tivoli/RM/scripts/installRM.sh
//STDENV DD*
CLASSPATH=/usr/lpp/Tivoli/RM/scripts
WAS_HOME=/<WAS_HOME>/V6R1/AppServer
WAS_USER=#was_user
WAS_PASSWD=#was_passwd
WAS_GROUP=#was_group
WAS_SERVER=#was_server
WAS_NODE=#was_node
WAS_CELL=#was_cell
JAVA_HOME=/<WAS_HOME>/V6R1/AppServer/java
TPCR_InstallRoot=/usr/lpp/Tivoli/RM
TPCR_ProductionRoot=/var/Tivoli/RM
DB_TYPE=#dbtype
//************************************
//* PRINT OUT LOG AND ERROR INFO
//************************************
//LOGOUT EXEC PGM=IKJEFT01,DYNAMNBR=300,COND=EVEN
//SYSTSPRT DD SYSOUT=*
//HFSOUT DD PATH='PATH='-PathPrefix-/etc/install_RM.log'
//HFSERR DD PATH='PATH='-PathPrefix-/etc/install_RM._err.log''
//STDOUTL DD SYSOUT=*,DCB=(RECFM=VB,LRECL=133,BLKSIZE=137)
//STDERRL DD SYSOUT=*,DCB=(RECFM=VB,LRECL=133,BLKSIZE=137)
//SYSPRINT DD SYSOUT=*
//SYSTSIN DD *
OCOPY INDD(HFSOUT) OUTDD(STDOUTL)
OCOPY INDD(HFSERR) OUTDD(STDERRL)
/*
```

After the job has run check the `-PathPrefix-/etc/` directory using iShell or in OMVS, and look for the log files.

Job return codes 0 and 1 are acceptable. For other job return codes, see the error and log files printed from the last step.

**If you are using WebSphere Application Server OEM Edition for z/OS**

The customization for Tivoli Storage Productivity Center for Replication is done at this point. You can now log on to the graphical user interface (GUI) through Mozilla Firefox or Internet Explorer at this URL:

`https://host_name:32209/CSM/`

**If you are using WebSphere Application Server for z/OS**

You can now log on to the GUI at this URL:

`https://host_name:9443/CSM/`

## Preparing to use Basic HyperSwap from z/OS

This topic provides information on how to prepare to use Basic HyperSwap on IBM z/OS.

For information about Open HyperSwap, refer to the *IBM Tivoli Storage Productivity Center User's Guide*.

## HyperSwap configuration considerations

**On System z, HyperSwap requires that all RESERVEs are converted to global enqueues (ENQs).**

When a planned or unplanned HyperSwap is initiated and a RESERVE exists on any PPRC device, the RESERVE might be lost. To prevent data integrity exposure, configure GRS to convert RESERVEs to Global ENQs:

1. Run the ENQ/RESERVE/DEQ Monitor with filtering REQTYPE of NCRESERVE to gather reports on non-converted RESERVEs issued by the system. For more information about using the ENQ/RESERVE/DEQ monitor tool, see *z/OS MVS Planning: Global Resource Serialization* document. Determine the list of volumes that require converted serialization.
2. Using the GRSRNLxx member of SYS1.PARMLIB, add an RNLDEF customization parameter.
3. Use a PATTERN entry to convert any RESERVE that might be issued against HyperSwap-managed volumes to Global ENQs.
4. Use an RNLDEF statement to convert all RESERVEs to Global ENQs:
   `RNLDEF RNL(CON) TYPE(PATTERN) QNAME(*).`

   **Note:** For additional information on converting RESERVEs to Global ENQs, see the section about GRSRNLxx (global resource serialization resource name lists) in the latest version of the *z/OS MVS Initialization and Tuning Reference*.
5. When RESERVEs have been converted to GRS Global ENQs, the ENQs may take longer to resolve if the ISGLOCK structure is too small to process each global ENQ independently. If this occurs, you might want to increase the size of your ISGLOCK structure. For information on GRS, including guidelines on how to resize your ISGLOCK structure, see the latest version of the *z/OS MVS Planning: Global Resource Serialization* document.

**Sharing the HyperSwap managed devices outside of the sysplex.**

When a HyperSwap is invoked, XCF is used to coordinate all the systems in the sysplex through the swap. Any system outside the sysplex will not participate in the swap, and will be unaware that the device has been swapped. In certain cases, the system outside the sysplex will continue using the old primary volumes following a swap, resulting in data integrity exposures.

## Address spaces

Basic HyperSwap requires two address spaces: the HSIB Management address space, and the HSIB API address space. You can start both of these address spaces by adding simple procedures to SYS1.PROCLIB, and then by issuing the `START procmemname` command manually, or by including the command in the COMMNDxx member of your SYS1.PARMLIB. The examples of the PROCLIB members:

**HSIB Management address space example**

Type the following:

```
//HSIB JOB MSGLEVEL=(1,1),TIME=NOLIMIT,REGION=0M
//IEFPROC EXEC PGM=IOSHMCTL
```

**HSIB API address space example**

Type the following:

```
//IOSHSAPI JOB  MSGLEVEL=(1,1),TIME=NOLIMIT,REGION=0M
//         EXEC PGM=IOSHSAPI
```

Before you can use Basic HyperSwap, you must start both address spaces.

**HSIB Management address space start command**

Type `START HSIB`.

**HSIB API address space**

Type `START IOSHSAPI`.

### Commands

Once you are running Basic HyperSwap, you can use additional commands for gathering information or controlling a Basic HyperSwap session on z/OS.

*Table 2. Additional Basic HyperSwap commands on z/OS*

| Command | Result |
|---|---|
| D HS,STATUS | Displays the status of HyperSwap. This command also displays any reasons why Basic HyperSwap may be disabled, and the current policies for the Basic HyperSwap Session. |
| D HS,CONFIG(DETAIL,ALL) | Displays the detailed configuration for the current Basic HyperSwap session. This will list the volumes and status of all pairs in the Basic HyperSwap configuration. |
| SETHS SWAP | Performs a planned HyperSwap. This can be done instead of issuing the **HyperSwap** command from IBM Tivoli Storage Productivity Center for Replication. |
| SETHS DISABLE | Disable HyperSwap by operator command. This prevents a HyperSwap from being performed, either by command or automatically. |
| SETHS ENABLE | Enable HyperSwap by operator command. This allows a HyperSwap to be performed, either by command or automatically, if HyperSwap is not disabled for other reasons. |

## Hints and tips for installing on z/OS

This topic provides hints, tips, and workarounds for problems that might arise when installing Tivoli Storage Productivity Center for Replication for System z.

**You cannot connect to the server with the GUI when local-host is defined in csmConnections.properties**

In rare cases, you might not have local-host resolution on your local machine, preventing the graphical user interface (GUI) from connecting to the management server. In this case, you must:

1. Edit the `csmConnections.properties` file, located in *`websphere_home`*`/AppServer/profiles/`*`websphere_profile`*`/properties` directory, and change the `csm.server.address` property to the IP address or host name of the local system.
2. Restart the graphical user interface (GUI) so that it can connect to the local system.

3. Edit the `repcli.properties` file, which is also located in the WebSphere `properties` directory, and change the `server` property to the IP address or host name of the local system.

**Important:**
When you upgrade to a new version or release of Tivoli Storage Productivity Center for Replication for System z, any changes that you have made to properties files such as `csmConnections.properties` and `repcli.properties` are overwritten. If you want to continue to use customized properties files, make copies of the files before you perform the upgrade. After the upgrade is complete, you can update the new property files to include the custom properties from your saved files. Do not replace the new property files with your old files because the new files might have been updated for the new version or release of Tivoli Storage Productivity Center for Replication for System z.

# Chapter 5. Subscribing to IBM Tivoli Storage Productivity Center technical support Web site

It is a good practice to subscribe to the IBM Tivoli Storage Productivity Center technical support Web site to receive information about important technical notes, flashes, and APAR information.

For more information about technical support, see the IBM Tivoli Storage Productivity Center Support website at www.ibm.com/support/entry/portal/Overview/Software/Tivoli/Tivoli_Storage_Productivity_Center_Standard_Edition.

To receive future support notifications, go to the right and under Stay informed, click **Subscribe**. You are required to enter your IBM ID and password. After you are authenticated, the Subscriptions page is displayed which provides the following information:

- How to create and organize subscriptions
- How you are notified about subscriptions
- How to specify the frequency of email notifications
- How to subscribe for specific topics per product
- How to unsubscribe

# Chapter 6. Uninstalling on z/OS

This topic presents the steps for uninstalling Tivoli Storage Productivity Center for Replication on IBM z/OS.

Some of the information in the following steps is generic and must be made specific for your particular installation.

1. Use a job file as shown in the following example to remove Tivoli Storage Productivity Center for Replication function modification identifiers (FMID), Hierarchical File System (HFS) files, and data sets. If you have multiple z/OS systems attached to the same driver, you must detach all systems other than the system on which you are uninstalling Tivoli Storage Productivity Center for Replication.

```
//REMTPCRM JOB ,'SMP DELETE',REGION=0M,MSGCLASS=H,MSGLEVEL=(1,1),
//  NOTIFY=&SYSUID
//*-------------------------------------------------------------
//* The purpose of this job is to DELETE TPCR product and
//* its associated datasets.
//* Fill in volser, CSI and HFS dataset names
//*-------------------------------------------------------------
//SMPE EXEC  PGM=GIMSMP,REGION=0M      SMP/E EXEC STATEMENT
//SMPLOG DD DUMMY
//SMPOUT   DD  SYSOUT=*
//SMPRPT   DD  SYSOUT=*
//SMPLIST  DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SMPSNAP  DD  DUMMY
//SMPHOLD  DD  DUMMY
//*SMPTLIB DD   UNIT=3390,VOL=SER=volser,DISP=SHR
//SMPTLIB DD   UNIT=3390,VOL=SER=TPCRM1,DISP=SHR
//SMPCSI  DD  DSN=TPCRM.SMPE.SYSD.CSI,DISP=OLD  your csi dataset name
//SYSUT1   DD  UNIT=SYSDA,SPACE=(CYL,(200,50)),DISP=(,DELETE)
//SYSUT2   DD  UNIT=SYSDA,SPACE=(CYL,(33,1)),DISP=(,DELETE)
//SYSUT3   DD  UNIT=SYSDA,SPACE=(CYL,(33,1)),DISP=(,DELETE)
//SYSUT4   DD  UNIT=SYSDA,SPACE=(CYL,(33,1)),DISP=(,DELETE)
//SMPWRK1  DD  UNIT=SYSDA,SPACE=(CYL,(25,25,200)),
//             DISP=(,DELETE),DCB=BLKSIZE=6160
//SMPWRK2  DD  UNIT=SYSDA,SPACE=(CYL,(25,25,200)),
//             DISP=(,DELETE),DCB=BLKSIZE=6160
//SMPWRK3  DD  UNIT=SYSDA,SPACE=(CYL,(90,45,2000)),
//             DISP=(,DELETE),DCB=BLKSIZE=3200
//SMPWRK4  DD  UNIT=SYSDA,SPACE=(CYL,(25,25,500)),
//             DISP=(,DELETE),DCB=BLKSIZE=3200
//SMPWRK6  DD  UNIT=SYSDA,SPACE=(CYL,(200,75,2000)),
//             DISP=(,DELETE),DCB=BLKSIZE=6160
//SMPPTFIN DD *
++FUNCTION(DELPROD) .
++VER(Z038)
  DELETE(HIWN42B,JIWN42Y,JIWN42X).
/*
//SMPCNTL DD *
  SET BDY(GLOBAL) .
  RECEIVE LIST SYSMODS .
  SET BDY(RMTZN) .
  APPLY S(DELPROD) BYPASS(ID) C(ALL) .
  SET BDY(RMDZN) .
  ACCEPT S(DELPROD) C(ALL) .
  SET BDY(RMTZN) .
  UCLIN .
  DEL SYSMOD(DELPROD) .
```

```
  ENDUCL .
  SET BDY(RMDZN) .
  UCLIN .
  DEL SYSMOD(DELPROD) .
  ENDUCL .
  SET BDY(GLOBAL) .
  REJECT DELETEFMID(HIWN42B) NOFMID .
  REJECT DELETEFMID(JIWN42Y) NOFMID .
  REJECT DELETEFMID(JIWN42X) NOFMID .
  LIST ALLZONES FORFMID(HIWN42B) .
  LIST ALLZONES FORFMID(JIWN42Y) .
  LIST ALLZONES FORFMID(JIWN42X) .
/*
//*
//*----- This step will unmount HFS datasets associated with TPCR
//*
//UNMOUNT EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN  DD *
   PROFILE WTPMSG MSGID
   TIME
   UNMOUNT FILESYSTEM('TPCRM.HFS.SYSD') IMMEDIATE
   UNMOUNT FILESYSTEM('TPCRM.VAR.TIVOLI.RM.HFS.SYSD') IMMEDIATE
/*
//DELETE EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=*
//SYSIN    DD *
  DELETE   TPCRM.AIWNHFS.SYSD
  DELETE   TPCRM.AIWNHFSX.SYSD
  DELETE   TPCRM.ASAMPLIB.SYSD
  DELETE   TPCRM.SAMPLIB.SYSD
  DELETE   TPCRM.HFS.SYSD
  DELETE  'TPCRM.VAR.TIVOLI.RM.HFS.SYSD'
                         /*                                */
                         /*  DELETE ALL SMPE DATASETS      */
                         /*                                */
  DELETE   TPCRM.SMPE.SYSD.CSI CLUSTER
  DELETE   TPCRM.SMPE.GLOBAL.SMPLOG.SYSD
  DELETE   TPCRM.SMPE.GLOBAL.SMPLOGA.SYSD
  DELETE   TPCRM.SMPE.RMDZN.SMPLOG.SYSD
  DELETE   TPCRM.SMPE.RMDZN.SMPLOGA.SYSD
  DELETE   TPCRM.SMPE.RMTZN.SMPLOG.SYSD
  DELETE   TPCRM.SMPE.RMTZN.SMPLOGA.SYSD
  DELETE   TPCRM.SMPE.SMPLTS.SYSD
  DELETE   TPCRM.SMPE.SMPMTS.SYSD
  DELETE   TPCRM.SMPE.SMPPTS.SYSD
  DELETE   TPCRM.SMPE.SMPSTS.SYSD
  DELETE   TPCRM.SMPE.SMPSCDS.SYSD
/*
//
```

2. If you are using IBM DB2, complete the following tasks:
   - Ensure that WebSphere Application Server for z/OS is in the stop state. For instructions for stopping WebSphere Application Server for z/OS, see the IBM WebSphere Application Server Version 6.1 Information Center on the web at publib.boulder.ibm.com/infocenter/wasinfo/v6r0/topic/com.ibm.websphere.express.doc/info/exp/ae/rrun_svr_timezones.html.
   - Issue the following command in your DB2 command processor or by modifying one of the provided sample jobs:

     ```
     DROP DATABASE #RM.Database.Name COMMIT;
     ```

3. Specify the enterprise archive (EAR) files from the WebSphere Application Server environment. To specify EAR files, you can use the scripting console or the WebSphere Application Server Administrator Console. For the scripting console, enter this command on a single line:

```
/<WAS_Home>/AppServer/profiles/default/bin/wsadmin.sh
-username **** -password **** -conntype NONE
> $AdminApp list
> $AdminApp uninstall CSM
> $AdminApp uninstall CSMGUI
> $AdminConfig save
```

Enter the **list** command to ensure that the applications are uninstalled.

```
> $AdminApp list
```

4. Remove the log files from these directories:

```
/<WAS_Home>/profiles/default/logs/CSM/
/<WAS_Home>/profiles/default/logs/essniTrace/
/<WAS_Home>/profiles/default/logs/essApiTrace/
/<WAS_Home>/profiles/default/logs/svcApiTrace/
```

## Uninstalling DB2 or Apache Derby

You can use an Apache Derby 10.3 or DB2 V9.1 or later database with IBM Tivoli Storage Productivity Center for Replication for System z. Derby is provided with Tivoli Storage Productivity Center for Replication for System z. If you have both databases installed on your z/OS system, you can uninstall one of the databases under the following conditions:

- If you are not using DB2 for applications other than Tivoli Storage Productivity Center for Replication for System z on you z/OS system and want to uninstall DB2 and use Derby, see the IBM Information Management Software for z/OS Solutions Information Center on the web at publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.dzic.doc/dzhome.htm for instructions.
- If you want to use DB2 rather than Derby, you can uninstall Derby from your z/OS system as follows:
  1. Ensure that WebSphere Application Server for z/OS is in the stop state.
  2. Log on to z/OS UNIX System Services and issue the following command:

     ```
     rm -R TPCR_ProductionRoot
     ```

# Chapter 7. Upgrading and migrating

Use this information to upgrade from a previous release to the latest release of IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z or upgrade to the latest release of IBM Tivoli Storage Productivity Center for Replication for System z.

## Migrating from a Metro Mirror session to a Metro Mirror with HyperSwap session

This topic describes how to migrate a Metro Mirror session to a Metro Mirror with HyperSwap session.

Ensure that the environment meets the following requirements:

- The existing Metro Mirror session uses CKD volumes
- You use only DS6000, DS8000, or ESS800 hardware.
- You have z/OS mainframes
- IBM Tivoli Storage Productivity Center for Replication is already installed.

Complete the following steps:

1. Make the z/OS installation of IBM Tivoli Storage Productivity Center for Replication the standby server for the current active server. This duplicates the session information, and enables the standby IBM Tivoli Storage Productivity Center for Replication to know of all the sessions and storage systems used by the active IBM Tivoli Storage Productivity Center for Replication instance.
2. Issue a **Takeover** command from the z/OS standby machine.
3. Shut down the previous active server to ensure you do not have two IBM Tivoli Storage Productivity Center for Replication servers.
4. From the Sessions panel, select View Modify Properties, and then select the Manage H1H2 with HyperSwap function. The configuration of the H1-H2 volumes is loaded to IOS, and the session gains HyperSwap functionality.

## Migrating and upgrading from a v3.x server to a v4.2 server

This topic describes how to migrate and upgrade from a v3.x server to a v4.2 server.

You can upgrade Tivoli Storage Productivity Center for Replication from v3.x to v4.2 on your existing server. During the upgrade, the Tivoli Storage Productivity Center for Replication server is unavailable. As this poses a risk to disaster recovery continuity, the following solution is advised to keep your environment capable of disaster recovery.

1. Install Tivoli Storage Productivity Center for Replication v3.x on a new temporary server. The Tivoli Storage Productivity Center for Replication version must be the same as the version of Tivoli Storage Productivity Center for Replication on the original server.
2. Add the new temporary Tivoli Storage Productivity Center for Replication server as a standby to the original Tivoli Storage Productivity Center for Replication server. This copies the configuration from the original server to the new server.

3. After synchronization of the standby server is complete, perform takeover on the new server.
4. On the new server, remove the original server from standby relationship.
5. Shut down Tivoli Storage Productivity Center for Replication on the original server.
6. Upgrade the original Tivoli Storage Productivity Center for Replication to version 4.2.
7. Define the original server as standby to the temporary new server.
8. After synchronization of the standby server is complete, perform takeover on the original server.
9. Remove the new temporary server from standby relationship.
10. Shut down Tivoli Storage Productivity Center for Replication on the temporary server.

## Upgrading from IBM Tivoli Storage Productivity Center for Replication for System z v4.1 to v4.2

This topic describes how to upgrade the management server from IBM Tivoli Storage Productivity Center for Replication for System z v4.1 to IBM Tivoli Storage Productivity Center for Replication for System z v4.2. This topic applies to IBM Tivoli Storage Productivity Center for Replication for System z and IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z.

Perform these steps to upgrade from IBM Tivoli Storage Productivity Center for Replication for System z v4.1 to IBM Tivoli Storage Productivity Center for Replication for System z v4.2:

1. Install IBM WebSphere Application Server OEM Edition for z/OS. See "Configuring IBM WebSphere Application Server" on page 9 for more information.
2. Remove the IBM Tivoli Storage Productivity Center for Replication for System z v4.1 function modification identifiers (FMIDs).

   **Note:** Do not delete the Derby or the DB2 database.
3. Install IBM Tivoli Storage Productivity Center for Replication for System z with SMP/E. See the *Program Directory for IBM Tivoli Storage Productivity Center for Replication Basic Edition for System z* for detailed installation instructions.
4. If running DB2, run IWNDBMIG to update any table changes that have occurred from release to release of IBM Tivoli Storage Productivity Center for Replication.
5. Edit and run IWNINSTL to set up the data source, applications, security, Java Virtual Machine, and libraries in the WebSphere Application Server. See "Running IWNINSTL" on page 25 for more information.

## Upgrading a license

This topic describes how to upgrade an existing two-site or three-site license for IBM Tivoli Storage Productivity Center for Replication for System z

Perform these steps to upgrade an existing two-site or three-site license:

1. Install IBM Tivoli Storage Productivity Center for Replication for System z two-site or three-site license with SMP/E. See the *IBM Tivoli Storage Productivity Center for Replication for System z Program Directory* for detailed installation instructions.
2. Run **IWNINSTL** with no errors.
3. Start IBM Tivoli Storage Productivity Center for Replication.

## Updating customized property files

When you upgrade to a new version or release of Tivoli Storage Productivity Center for Replication for System z, any changes that you have made to Tivoli Storage Productivity Center for Replication for System z properties files such as `csmConnections.properties`, `repcli.properties`, or `rmserver.properties` are overwritten.

If you want to continue to use customized properties files, make copies of the files before you perform the upgrade. After the upgrade is complete, you can update the new property files to include the custom properties from your saved files. Do not replace the new property files with your old files because the new files might have been updated for the new version or release of Tivoli Storage Productivity Center for Replication for System z.

# Chapter 8. Configuring

You must configure your IBM Tivoli Storage Productivity Center for Replication for System z environment immediately after installing the product. After it is configured, you do not have to perform these tasks again unless changes within your environment require it.

## Before you begin

This topic provides information about preparations for the configuration of IBM Tivoli Storage Productivity Center for Replication Two Site Business Continuity or IBM Tivoli Storage Productivity Center for Replication Three Site Business Continuity.

Before you begin, complete the following steps:

1. Ensure that you have installed IBM Tivoli Storage Productivity Center for Replication Two Site Business Continuity or IBM Tivoli Storage Productivity Center for Replication Three Site Business Continuity according to the *Installation and Configuration Guide*.
2. Ensure that the system administrator created your user account.

The graphical user interface (GUI) runs in a Web browser, such as the preferred Mozilla Firefox 2.0 or later or Internet Explorer 7. All communications among the server, clients, and hardware components are secured using secure sockets layer (SSL).

To modify the security setting, complete these steps:

1. Open the Internet Explorer Internet Options panel.
2. Click the **Security** tab.
3. On the Security panel, click **Custom Level**.
4. On the Security Settings panel, change the **Reset custom settings** field to `Low`.

## Starting the IBM Tivoli Storage Productivity Center for Replication GUI

After IBM Tivoli Storage Productivity Center for Replication has been installed, you can access the IBM Tivoli Storage Productivity Center for Replication GUI.

Go to the following URL to start the IBM Tivoli Storage Productivity Center for Replication GUI. Note that the Web address is case sensitive.

`https://`*`host_name`*`:port/CSM`

**Note:**

- You can verify the ports that are correct for your installation in the *`install_root`*`/AppServer/profiles/`*`profile_name`*`/properties/portdef.props` file. The ports is defined by the **`WC_defaulthost`** (HTTP port) and **`WC_defaulthost_secure`** (HTTPS port) properties within the file.

To log in to the command line interface, use the CLI user ID and password that you entered during the installation of IBM Tivoli Storage Productivity Center for Replication. This ID and password are the same as the Administrator ID and password that you entered when you installed the product.

## Setting the browser refresh rate

This topic describes how to set the browser refresh rate in the IBM Tivoli Storage Productivity Center for Replication graphical user interface (GUI).

The default browser refresh rate is 30 seconds.

You might want to adjust the browser refresh rate to meet your specific needs; for example, if you are using software designed for the visually impaired, you might want to extend the refresh rate so the browser does not refresh while the software is processing.

Perform these steps to set the browser refresh rate:

1. In the navigation tree, select **Advanced Tools**.
2. Type the auto-refresh rate in seconds, and click **Apply**.

## Setting WebSphere properties to avoid timeout errors

By default, a timeout error occurs if the Tivoli Storage Productivity Center for Replication graphical user interface (GUI) is not displayed in five minutes or less.

### Problem

A 504: Gateway Timeout error occurs. Tivoli Storage Productivity Center for Replication ends with an ABEND EC3 with reason code 04130007.

### Action

Perform these procedures to resolve this issue:

- Change the transaction service property by performing these steps:
  1. Start the WebSphere Application Server Console by going to the following URL:

     `https://host_name:port/ibm/console`

     where *host_name* is the host name of the management server and *port* is the port used for IBM WebSphere Application Server. You can find the port number in the *install_root*`/AppServer/profiles/`*profile_name*`/properties/portdef.props` file. The port is defined by the WC_adminhost_secure property within the file.
  2. Click **Servers** > **Application Servers** > *server_name* > **Web Container** > **Custom Properties**.
  3. Click **New**.
  4. Enter in the name as `ConnectionTimeoutResponse` and the value as `3600` for a one hour timeout, and then click **OK**.
  5. Save the changes.
  6. Restart IBM Tivoli Storage Productivity Center for Replication.

     **Tip:** If you also change the timeout recovery properties, wait until after you change all properties before restarting IBM Tivoli Storage Productivity Center for Replication.
- Change the timeout recovery property to lessen the negative impact of a GUI panel taking too long to load by performing these steps:

1. Start the WebSphere Application Server Console by going to the following URL:

   `https://host_name:port/ibm/console`

   where *host_name* is the host name of the management server and *port* is the port used for IBM WebSphere Application Server. You can find the port number in the *install_root*`/AppServer/profiles/`*profile_name*`/properties/portdef.props` file. The port is defined by the WC_adminhost_secure property within the portdef.props file.
2. Click **Servers** > **Application Servers** > **server** > **Server infrastructure** > **Administration** > **Custom Properties**.
3. Click **New**.
4. Enter the name as `protocol_http_timeout_output_recovery` and the value as `SESSION`, and then click **OK**.
5. Click **New** again to create a second custom property.
6. Enter the name as `protocol_https_timeout_output_recovery` and the value as `SESSION`, and then click **OK**.
7. Save the changes.
8. Restart IBM Tivoli Storage Productivity Center for Replication.

   **Tip:** If you also change the transaction service property, wait until after you change all properties before restarting IBM Tivoli Storage Productivity Center for Replication.

- Check the Java heap size on the management server. Use the IBM WebSphere Application Server Administrator Console to check the Java heap size (**Application servers** > **Server1** > **Process Definition** > **Servant** > **Java Virtual Machine**) for the IBM z/OS servant region. The size of this region affects the performance of IBM Tivoli Storage Productivity Center for Replication.

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