Migration Tool User's Guide

IBM TotalStorage Productivity Center for Replication
Migration Tool
User's Guide

Version 3 Release 3.3

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

Fourth Edition (November 2007)

This edition applies to IBM TotalStorage Productivity Center for Replication 3.3.3 and to all subsequent releases and modifications until otherwise indicated in new editions.

Order publications through your IBM representative or the IBM branch office servicing your locality. Publications are not stocked at the address below.

IBM welcomes your comments. A form for reader's comments is provided at the back of this publication. If the form has been removed, you may address your comments to:
International Business Machines Corporation
Design & Information Development
Department CGFA
PO Box 12195
Research Triangle Park, NC 27709-9990
U.S.A.

You can also submit comments by selecting Feedback at www.ibm.com/storage/support/.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Contents

Migration tool overview

This topic provides an overview of the IBM(R) TotalStorage(R) Productivity Center for Replication migration tool.

About this edition:

This edition of the *Migration Tool User's Guide* incorporates several changes, primarily the introduction of two new session types. Changes are marked by revision bars (|) in the left margin.

The IBM TotalStorage Productivity Center for Replication migration tool helps users to convert their current copy-services configuration to the IBM TotalStorage Productivity Center for Replication solution. The migration tool facilitates the transition to this product. The migration tool can migrate the following session types:

- FlashCopy(R)
- Metro Mirror
- Global Mirror
- Metro Global Mirror (Enterprise Remote Copy Management Facility [eRCMF] only)

The migration tool is a standalone command-line interface (CLI) application that is not integrated as part of the IBM TotalStorage Productivity Center for Replication CLI. You can run it on Windows(R), AIX(R), and Linux(R).

For input, the migration tool takes an indication of the type of migration being performed as well as an input and output filename as parameters, depending on the type of migration being performed.

A detailed description of the various input files can be found in the following documents:

- Global Mirror Utility installation information, provided with the GMU distribution package
- IBM TotalStorage DS8000 Command-line Interface User's Guide
- IBM TotalStorage Enterprise Storage Server(R) Command-Line Interfaces User's Guide
- Enterprise Remote Copy Management Facility V4 User's Guide

As output, the migration tool creates two IBM TotalStorage Productivity Center for Replication CLI command script files, two DS CLI script files for Global Mirror and Metro Global Mirror sessions, and an output log file. The migration tool can convert the following files to valid IBM TotalStorage Productivity Center for Replication CLI scripts:

- eRMCF configuration files

- GMU configuration files
- ESS CLI scripts
- DS CLI scripts

Supported migrations

This topic provides details on the source applications that the IBM TotalStorage Productivity Center for Replication migration tool converts into CLI script files.

The migration tool converts the following applications to CLI script files:

- Enterprise Remote Copy Management Facility (eRCMF)
- Global Mirror Utility (GMU)
- ESS command-line interface
- DS command-line interface

Enterprise Remote Copy Management Facility

This topic provides information on eRCMF.

eRCMF is a multisite disaster recovery solution that provides automated repair of inconsistent peer-to-peer-remote-copy (PPRC) pairs. eRCMF is a scalable, flexible open-systems ESS solution that protects business data during planned and unplanned outages.

The eRMCF input files are structured text files. There are two types of files:

- Enterprise.dat files that contain overall system configuration information
- Volumeset.dat files that contain the set of volumes that create a single volume set or session

For eRCMF, there is only one enterprise.dat file, but there can be one or more volumeset.dat files. Each eRCMF volumeset.dat file is translated into a separate TotalStorage Productivity Center for Replication session within the single TotalStorage Productivity Center for Replication CLI script file. Note that not all eRCMF volume-set types are migrated to TotalStorage Productivity Center for Replication sessions because some volumeset types do not have corresponding TotalStorage Productivity Center for Replication session types. Table 1 shows the eRCMF volumeset types that are migrated by this version of the tool:

Table 1. eRCMF volumeset types to TotalStorage Productivity Center for Replication session types

eRCMF volume-set type	TotalStorage Productivity Center for Replication session type
NOFCPY	Metro Mirror failover-failback (FOFB)
SITE2FCPY with PRACTICESITE2FCPY	Metro Mirror FOFB and FlashCopy
SITE2FCPY	Metro Mirror FOFB with Practice
GLOBALNOFCPY	Global Mirror FOFB
GLOBALSITE2FCPY with PRACTICESITE2FCPY	Global Mirror FOFB and FlashCopy
GLOBALSITE2FCPY	Global Mirror FOFB with Practice
METROGLOBALNOFCPY	Metro Global Mirror
METROGLOBALSITE3FCPY with PRACTICESITE3FCPY	Metro Global Mirror and FlashCopy

For the eRCMF practice volumeset types shown in Table 1, there is no corresponding session type that includes practice volumes that are used in the same manner as the eRCMF session. In this case, the migration tool creates two TotalStorage Productivity Center for Replication sessions with the second being a FlashCopy session between the proper host volumes and practice volumes. These two sessions provide the same function as the practice session with the exception that you must manually create the practice copies. Manually creating the practice copies includes doing a suspend and recover to create a consistent dataset on the corresponding host volumes, issuing the flash command to the practice session, and restarting the original session after the practice copies are created.

The following tables highlight how the various eRCMF SITE2FCPY volumes map to their corresponding IBM TotalStorage Productivity Center for Replication roles:

eRCMF GLOBALSITE2FCPY Role	TotalStorage Productivity Center for Replication Global Mirror FOFB with Practice Role
Host 1	H1
Host 2	H2
Shadow 2	I2
Journal 2	J2

eRCMF GLOBALSITE2FCPY with PRACTICESITE2FCPY Role	TotalStorage Productivity Center for Replication Global Mirror FOFB and FlashCopy Role
Host 1	Global Mirror: H1
Host 2	Global Mirror: H2 & FlashCopy: H1
Journal 2	Global Mirror: J2
Shadow 2	FlashCopy: T1

eRCMF SITE2FCPY Role	TotalStorage Productivity Center for Replication Metro Mirror FOFB with Practice Role
Host 1	H1
Host 2	H2
Shadow 2	I2

eRCMF SITE2FCPY with PRACTICESITE2FCPY Role	TotalStorage Productivity Center for Replication Metro Mirror FOFB and FlashCopy Role
Host 1	Metro Mirror: H1
Host 2	Metro Mirror: H2 & FlashCopy: H1
Shadow 2	FlashCopy: T1

For migration of a Global Mirror or Metro Global Mirror session, two DS CLI script files are created to stop the running Global Mirror session. If you do not have the DS CLI installed on your system, but have access to an ESSNI server, you can use the essmigratecli utility (this is valid only for the ESS storage server). You can use this utility to run the DS CLI script files without an installed DS CLI. You should execute these script files before you issue the Start command to the migrated IBM TotalStorage Productivity Center for Replication session.

Supported Enterprise Options for eRCMF migrations

The following options are migrated from eRCMF to TotalStorage Productivity Center for Replication:

- Freeze&Go / Freeze&Stop

  Starting with TotalStorage Productivity Center for Replication version 3.3.3, the Freeze and Stop functionality is now supported. eRCMF supports this functionality as well through the Freeze&Stop global keyword specified in the Enterprise.dat file. If the Freeze&Stop keyword is specifed, the migration tool will create the appropriate TotalStorage Productivity Center for Replication CLI command in the output file to keep the same setting on all applicable sessions that are created during the migration. Since Freeze&Go is the default setting for a TotalStorage Productivity Center for Replication session, there will be no corresponding CLI command created for that setting.

- RemoveSCSIReserve

  Starting with TotalStorage Productivity Center for Replication version 3.3.3, the Remove Reserves functionality is now supported. eRCMF supports this functionality as well through the RemoveSCSIReserve global keyword specified in the Enterprise.dat file. If the RemoveSCSIReserve keyword is specifed, the migration tool will create the appropriate TotalStorage Productivity Center for Replication CLI command in the output file to keep the same setting on all applicable sessions that are created during the migration.

Considerations for eRCMF migration

There are several considerations to keep in mind before the migration:

- During a migration, it is possible that eRCMF might be running with a different production site from the one corresponding to the first volume specified in the VolumeSet tuple.
- eRCMF always does an enterprise-wide freeze in case of a mirroring problem and armed automatic site split.

These considerations are described in detail below.

A different production site

The TotalStorage Productivity Center for Replication migration tool imports an eRCMF VolumeSet into a TotalStorage Productivity Center for Replication session as specified in the VolumeSet tuple. As such, the first volume found in the tuple is the H1 volume. During a migration, it is possible that eRCMF might be running with a different production site from the one corresponding to the first volume in the tuple. You must ensure that each VolumeSet that is to be migrated

is in a normal state and the production site corresponds to the volumes in the first column of the tuple definition. Otherwise, the session start in TotalStorage Productivity Center for Replication fails because the mirroring is actually running in the opposite direction or is in an unexpected state due to previous VolumeSet recovery activities in eRCMF. Table 2 shows the eRCMF VolumeSet states that are considered normal in this context:

Table 2. eRCMF VolumeSet states

eRCMF VolumeSets Type	State
Metro Mirror	InSync
Global Mirror	GlobalMirror
Metro Global Mirror	InSync, between primary and intermediate site GlobalMirror, between intermediate and remote site

It is recommended that you unload the eRCMF VolumeSet in eRCMF before you start the TotalStorage Productivity Center for Replication session to avoid both applications attempting to monitor the same volumes. When the unload command is executed, eRCMF does not terminate any hardware relations, so this does not affect the ability of TotalStorage Productivity Center for Replication to seamlessly take over the running pairs. Note that eRCMF does not unload the final remaining VolumeSet. In this case, you need to shut down eRCMF on both eRCMF servers before starting the TotalStorage Productivity Center for Replication session.

Enterprise-wide freeze

One special consideration for eRCMF Metro Mirror configurations (Metro Mirror as well as Metro Global Mirror VolumeSets) is the fact that eRCMF always does an enterprise-wide freeze in case of a mirroring problem and armed automatic site split. This means that all defined LSS pairs in the active Enterprise.dat configuration file are frozen.

The unload of a VolumeSet does not remove the active LSS pair definitions for the freeze. So, if a mirroring error occurs during the migration from eRCMF to TotalStorage Productivity Center for Replication, and eRCMF is armed for automatic site splits, and the transferred VolumeSet has only been unloaded from eRCMF, then eRCMF still freezes the LSS pairs of the transferred VolumeSets that might already be running as TotalStorage Productivity Center for Replication sessions.

This is not a change to standard eRCMF behavior, but it should be considered during the migration process. eRCMF can still issue the enterprise-wide freeze until both eRCMF servers are stopped or the LSS pairs are removed from the

Enterprise.dat file and eRCMF is restarted. If such a freeze does occur, you need to issue a start to the affected TotalStorage Productivity Center for Replication sessions to restart replication.

Global Mirror Utility (GMU)

The ESS Global Mirror Utility (GMU) is a standalone tool that provides a management layer for ESS Model 800, DS8000, and DS6000 Global Mirror two- or three-site Failover/Failback support.

The GMU input files are XML files. There are two types of files:

- Configuration
- Security

There can be multiple files of each type for a single configuration.

The security files contain the user names and passwords for accessing the copy services servers. The migration tool does not accept and parse security files; you must edit the output CLI file to add the appropriate user names to the **adddevice** commands. The configuration files contain the boxes, paths, session, and volume information. You must specify the configuration files to the migration tool when it is run.

Note:

For 1750 (DS6000) or 2107 (DS8000) storage servers, you must ensure that the type and pom fields are correctly entered in the GMU configuration file for each server.

The migration tool is capable of migrating GMU configurations to two different IBM TotalStorage Productivity Center for Replication session types: Global Mirror FOFB and Global Mirror FOFB with Practice. If the 'D' volumes are present in the GMU configuration file, the migration tool will create a Global Mirror FOFB with Practice session. If the 'D' are not present in the GMU configuration file, the migration tool will create a Global Mirror FOFB session. The following tables highlight how the various GMU volumes map to their corresponding IBM TotalStorage Productivity Center for Replication roles:

GMU Role – No 'D' Volumes	**TotalStorage Productivity Center for Replication Global Mirror FOFB**
A	H1
B	H2
C	J2

GMU Role	TotalStorage Productivity Center for Replication Global Mirror FOFB with Practice Role
A	H1
B	I2
C	J2
D	H2

For migration of a Global Mirror session, two DS CLI script files are created to stop the running Global Mirror session. If you do not have the DS CLI installed on your system, but have access to an ESSNI server, you can use the essmigratecli utility (this is valid only for the ESS storage server). This utility can be used to run this DS CLI script file without an installed DS CLI. You should execute these script files before you issue the **Start** command to the migrated IBM TotalStorage Productivity Center for Replication session.

ESS command-line interface

The migration tool supports migration from ESS 800 CLI script files to IBM TotalStorage Productivity Center for Replication CLI script files.

Note:

Not every command is converted to an IBM TotalStorage Productivity Center for Replication CLI command.

The migration tool accepts an ESS 800 CLI script file, parses the script file, and creates two IBM TotalStorage Productivity Center for Replication CLI script files. However, the only ESS CLI commands that the migration tool supports are the **create snmp** and **rsExecuteTask** commands. These commands are parsed to create the equivalent IBM TotalStorage Productivity Center for Replication CLI commands, which are placed in the output CLI script file. All other ESS CLI commands are ignored.

To properly parse the **rsExecuteTask** command, the server on which you are running the migration tool must have the IBM ESS CLI installed, and must also be able to access the copy services server on which the tasks reside. The actual task on the server is investigated to determine how to migrate those commands to IBM TotalStorage Productivity Center for Replication CLI commands. If the server on which the migration tool is executed does not have access to the copy services server, the migration will not be successful.

For migration of a Global Mirror session, a DS CLI script file is created to stop the running Global Mirror session. Included with the migration tool download is an essmigratecli utility that can be used to run this DS CLI script file on an ESS 800. This

script file should be executed before you issue the **Start** command to the migrated IBM TotalStorage Productivity Center for Replication session.

Only the following **esscli** commands are translated by the migration tool:

- create snmp
- rsExecuteTask

The following ESS 800 saved task types are translated for an **rsExecuteTask** command:

Note:
These commands may not be translated on a one-to-one mapping to IBM TotalStorage Productivity Center for Replication CLI commands.

- PPRCEstablishPair
- FCEstablish
- PPRCEstablishPaths
- OpenCloseSession
- ManageSessionMember
- AsyncPPRCStartResume

DS command-line interface

The migration tool supports migration from DS CLI script files to IBM TotalStorage Productivity Center for Replication CLI script files.

The migration tool can accept a single DS CLI script file. It parses the script file and creates two IBM TotalStorage Productivity Center for Replication CLI script files. The input script file should only contain commands that pertain to a single session. Note that not every command is converted to an IBM TotalStorage Productivity Center for Replication CLI command.

For migration of a Global Mirror session, two DS CLI script files are created to stop the running Global Mirror session. These script files should be executed before you issue the **Start** command to the migrated IBM TotalStorage Productivity Center for Replication session.

Only the following **dscli** commands are translated by the migration tool:

- chsession
- mkflash
- mkgmir
- mkpprc
- mkpprcpath
- mksession

Note:

These commands may not be translated on a one-to-one mapping to IBM TotalStorage Productivity Center for Replication CLI commands.

Output files

This section describes the various output files produced by the migration tool.

IBM TotalStorage Productivity Center for Replication CLI script files

The migration tool creates two CLI script files. The first of these files is the adddevice file; "adddevice" is appended to the filename. This script file contains only the adddevice commands that are used to provide storage subsystem information to TotalStorage Productivity Center for Replication. The output file is generated in the specified working directory. This file should be executed first to pass the storage subsystem information to TotalStorage Productivity Center for Replication.

You should monitor the TotalStorage Productivity Center for Replication GUI or CLI and wait until the connection has been made with each storage subsystem and they have reached a connected state before running the second CLI script file. Waiting ensures that data found in the second file is in the TotalStorage Productivity Center for Replication data store. If all of the storage subsystems already exist in TotalStorage Productivity Center for Replication because of a previous manual creation via the GUI or CLI, this file can be skipped.

There might be cases where the information contained in the source configuration files is not sufficient to create a complete IBM TotalStorage Productivity Center for Replication CLI command. In this case, the migration tool informs you that the output script file is not complete. You need to edit the output script file and insert the appropriate information.

Use the following command to execute the output script file:

```
csmcli.[bat|sh] -script script_name
```

where *script_name* is a fully qualified path name to the script.

The second script file contains the rest of the TotalStorage Productivity Center for Replication CLI commands necessary to create a configuration similar to the source configuration. This output file is generated in the specified working directory. This file should be executed after TotalStorage Productivity Center for Replication has connected to each of the storage subsystems used in the configuration. If the file is executed before TotalStorage Productivity Center for Replication has completed importing the storage subsystem information, it is possible for errors to occur.

There might be cases where the information contained in the source configuration files is not sufficient to create a complete IBM TotalStorage Productivity Center for Replication CLI command. In this case, the migration tool informs you that the output script file is not complete. You need to edit the output script file and insert the appropriate information.

Note that the PPRC path creation statements are commented-out by default as it is likely that they exist. Also note that TotalStorage Productivity Center for Replication verifies existing paths on a session start command and creates the minimum required paths if none already exist. If you want to force IBM TotalStorage Productivity Center for Replication to create the specific paths specified in the script file, uncomment the mkpath commands by removing the leading pound sign (#) from each that you want to execute.

Use the following command to execute the output script file:

```
csmcli.[bat|sh] -script script_name
```

where *script_name* is a fully qualified path name to the script.

DS CLI script files

For migrations of Global Mirror or Metro Global Mirror sessions, the migration tool creates two or three DS CLI script files, respectively, that aid in the transition of the running Global Mirror or Metro Global Mirror session.

The first DS CLI script file is the rmgmir script.

Before a Global Mirror or Metro Global Mirror session is taken over by TotalStorage Productivity Center for Replication, you must terminate the Global Mirror session, remove the source volumes from the session, and close the session on all LSSs. The first file contains the DS CLI command(s) to terminate the running Global Mirror session. The terminate command causes the running session to complete one more consistency group and then stops the session. This script should be run after the IBM TotalStorage Productivity Center for Replication CLI script files are executed, and before the TotalStorage Productivity Center for Replication start command is issued to the resulting session. To ensure a consistent set of data, after executing this script file, wait until the session terminates before executing the second DS CLI script file.

It is recommended that you use the DS CLI **showgmir** command to check the status of the terminate command. When this command no longer returns any information about the session, then the session has terminated and you can continue with the next DS CLI script file.

The second DS CLI script file created by the migration tool contains the commands to remove the source volumes from the session and close the session on all LSSs.

The third DS CLI script file, created only for MGM migrations, contains commands necessary to ensure that the Incremental Resync flag is specified on all of the Metro Mirror pairs of the MGM session. It is critically important that the Incremental Resync flag is specifed for a IBM TotalStorage Productivity Center for Replication MGM session to operate properly in certain failure scenarios. If the Incremental Resync flag is not already specifed on the MM pairs, you must execute this script file to enable it.

After the DS CLI script files have been executed, IBM TotalStorage Productivity Center for Replication is then able to take over the session.

Log file

The migration tool also creates a text file containing informational and error messages pertaining to the migration carried out. The location of the log file is determined by the user-configurable settings in the log4j.properties file in the properties sub-directory.

Migration tool prerequisites

A Java(TM) Runtime Environment of version 1.4.2 or higher must be installed on the server where the migration tool will be executed. The JAVA_HOME environment variable must be set to point to the installation directory of the 1.4.2 or higher JRE.

On Windows, you can verify or add this by clicking the **Environment Variables** button on the Advanced tab to the System Properties panels. You can reach the System Properties panels through the Control Panel window. On AIX and Linux, you can verify the presence of the JAVA_HOME variable using the **env** command. If you do not see the JAVA_HOME variable in the output of the **env** command, you can add it using the export command: `export JAVA_HOME=/opt/IBM/TPC-R/WAS/java`

Note:

Ensure that this command points to the actual installation directory of the JRE on your specific server.

Installing the migration tool

To install the IBM TotalStorage Productivity Center for Replication migration tool, perform the following steps.

1. Install the tool with Windows, AIX, or Linux.

   The installation package for the migration tool is distributed as a ZIP file for Windows and as a tar file for AIX and Linux.

   Using Windows: Move the migration tool ZIP file to the desired installation directory and unzip the file using a standard Windows ZIP utility. This installs the CSM-Migration directory into the desired directory.

   Using AIX or Linux: Move the migration tool tar file to the desired installation directory and untar the file using the tar command. This installs the CSM-Migration directory into the desired directory.

2. Edit the three Properties files located in the CSM-Migration\properties subdirectory:

   csmmigrate.properties
   If you plan to perform ESS 800 migrations, add this line to the csmmigrate.properties file: `esscli.install=C:/Program Files/IBM/IBM ESS CLI`. This line details the full path of the ESS CLI install directory in order for the migration tool to properly access the ESS 800 task repository on the copy services server. You must ensure that the line is changed to point to the ESS CLI installation directory on your machine.
   Note:
   Even on a Windows platform, you must use the forward slash (/) for each separator.
   log4j.properties
   This properties file contains configuration information for the migration tool logging facility. You can edit entries in this file to change the method in which the migration tool logs information:
   `log4j.appender.dest2.File=c:/temp/CsmMigration.log` indicates the location of the log file generated by the migration tool. You must ensure that it points to a valid directory.

   You can vary the amount of logging information displayed to the console and the log file by modifying the following entry:

   ```
   log4j.rootCategory=ERROR, dest1, dest2
   ```

Change ERROR to the following settings to get increasingly more logging information:

```
WARNING
INFO
DEBUG
```

essmigratecli.properties

Edit this properties file when you convert Global Mirror sessions created using the ESSCLI, and want to automate the steps to terminate the session. For more information, see Using the ESS Migration command-line interface.

Using the migration tool

The topic describes how to use the IBM TotalStorage Productivity Center for Replication migration tool, and provides possible user scenarios.

Scenarios

The following scenarios briefly describe how you can use the migration tool.

FlashCopy scenario

Execute the migration tool by passing in the proper input file and matching migration type. The result is two IBM TotalStorage Productivity Center for Replication CLI scripts. Run these scripts through the IBM TotalStorage Productivity Center for Replication CLI to create and prepare the IBM TotalStorage Productivity Center for Replication FlashCopy session. The session is then ready for you to issue a **Start** or **Flash** command.

Metro Mirror scenario

Execute the migration tool by passing in the proper input file and matching migration type. The result is two IBM TotalStorage Productivity Center for Replication CLI scripts. Run these scripts through the IBM TotalStorage Productivity Center for Replication CLI to create and prepare the IBM TotalStorage Productivity Center for Replication Metro Mirror session. The session is then ready for you to issue a **Start** command.

Global Mirror scenario

Execute the migration tool by passing in the proper input file and matching migration type. The result is two IBM TotalStorage Productivity Center for Replication CLI scripts. Run these scripts through the IBM TotalStorage Productivity Center for Replication CLI to create and prepare the IBM TotalStorage Productivity Center for Replication session.

At this point the session is created, but the Global Mirror session is still running independently from IBM TotalStorage Productivity Center for Replication. You must remove all volumes from the Global Mirror session either manually or through the output DS CLI script, close the session on all LSSs, and terminate the running Global Mirror session; note, however, that you do not need to terminate the Global Copy or FlashCopy relationships.

To use the generated DS CLI script files to accomplish this, first execute the rmgmir DS CLI script file. This will terminate the running Global Mirror session. Monitor the Global Mirror session via DS CLI or DS GUI to verify when the Global Mirror session has properly terminated. Then execute the second DS CLI script file. When this file completes successfully, the running Global Mirror session has been terminated and it is now possible for TotalStorage Productivity Center for Replication to take over the session. To minimize the amount of time

that the Global Mirror session is not consistently protecting your data, execute these steps as quickly as possible and then start the TotalStorage Productivity Center for Replication session as soon as the second DS CLI script file completes successfully.

After you confirm that these steps have completed and the Global Mirror session has terminated, you can issue the **Start** command to the IBM TotalStorage Productivity Center for Replication session and the Global Mirror session will be started up again under IBM TotalStorage Productivity Center for Replication.

Metro Global Mirror scenario

Execute the migration tool by passing in the proper input file and matching migration type. The result is two IBM TotalStorage Productivity Center for Replication CLI scripts. Run these scripts through the IBM TotalStorage Productivity Center for Replication CLI to create and prepare the IBM TotalStorage Productivity Center for Replication session.

At this point the session is created, but the Global Mirror session portion of the MGM session is still running independently from IBM TotalStorage Productivity Center for Replication. You must remove all volumes from the Global Mirror session either manually or through the output DS CLI script, close the session on all LSSs, and terminate the running Global Mirror session; note, however, that you do not need to terminate the Metro Mirror, Global Copy, or FlashCopy relationships. Also, IBM TotalStorage Productivity Center for Replication enables the Target Read and Incremental Resync flags on the Metro Mirror pairs in the MGM session. It is important that the MM pairs that are being assimilated also have these flags enabled. If the Incremental Resync flag is already set on the Metro Mirror pairs, it is not necessary to execute the “ir” script.

To use the generated DS CLI script files to accomplish this, first execute the rmgmir DS CLI script file. This will terminate the running Global Mirror session. Monitor the Global Mirror session via DS CLI or DS GUI to verify when the Global Mirror session has properly terminated. Then execute the second DS CLI script file. Finally, execute the “ir” DS CLI script file. When these scripts complete successfully, the running Global Mirror session has been terminated and it is now possible for TotalStorage Productivity Center for Replication to take over the session. To minimize the amount of time that the Global Mirror session is not consistently protecting your data, execute these steps as quickly as possible and then start the TotalStorage Productivity Center for Replication session as soon as the third DS CLI script file completes successfully.

After you confirm that these steps have completed and the Global Mirror session has terminated, you can issue the Start command to the IBM TotalStorage Productivity Center for Replication session and the Metro Global Mirror session will be started up again under IBM TotalStorage Productivity Center for Replication.

Command line parameters for Windows

In a Windows environment, from the CSM-Migration\bin directory, or with the CSM-Migration\bin directory in your path, enter the following command: **csmmigrate.bat *-d* <working directory> *-f* <input file> *-t* <type of migration> *-o* <output file>** The parameters for that command are:

-d

Specifies the full path to the working directory that contains the input file or files, and is used for the generated output file or files.

-f

Specifies the input file.

-t

Specifies the type of migration to perform. The options are:

- *ercmf*
- *gmu*
- *dscli*
- *esscli*

-o

Specifies the name of the output file. This file is created in the same directory that you specified with the *-d* flag. All files use this base file name specified here with various suffixes appended to it.

Command line parameters for AIX Windows

In an AIX environment, enter the following command: **./csmmigrate.sh *-d* <working directory> *-f* <input file> *-t* <type of migration> *-o* <output file>**.

Command line parameters for Linux Windows

In a Linux environment, enter the following command: **./csmmigrate.sh *-d* <working directory> *-f* <input file> *-t*<type of migration> *-o* <output file>**.

After output file creation

After the output files are created, open each file and verify that the information for each command is complete. When the migration tool does not have enough information to fully implement a command, it fills in the missing information with *XXXX*. Any commands containing XXXX will not execute successfully if you run them without making modifications. You can also make other changes to the commands in the output files, such as changing the session names to be created.

If you want, you can make alterations to the commands in the output files. For example, you should change the names of the sessions to be created in IBM TotalStorage

Productivity Center for Replication; after you create the session name in IBM TotalStorage Productivity Center for Replication, you will not be able to change the session name. To avoid this problem, replace all occurrences of the default session names with the desired name before you execute the output script file using the IBM TotalStorage Productivity Center for Replication CLI.

Notes:

- When the generated TotalStorage Productivity Center for Replication CLI adddevice script file is run, the CLI asks for the passwords for each storage subsystem that is being added. Unfortunately, there is no prompt from the CLI that tells you which storage subsystem it is requesting. If you are adding multiple storage subsystems, it is necessary to keep track of the order in which the storage subsystems are added so that you can specify the passwords.
- The default session types for the newly created Global Mirror and Metro Mirror sessions are gmfofb and mmfofb, respectively. If you do not have the appropriate license, or if you want use a Metro Mirror or Global Mirror session without failover/failback capability, you must change it to gm or mm in these script files.

Using the ESS Migration command-line interface

This topic describes the ESS Migration command-line interface (CLI).

Included with the install package is the essmigratecli tool. Use this tool to execute the output DS CLI script file generated to terminate running Global Mirror sessions on ESS 800 boxes, when there is no DS HMC installed that allows the use of native DSCLI to control ESS 800 boxes.

To properly set up this tool, you must edit the essmigratecli.properties file in the CSM-Migration\properties directory. You must edit the following fields:

- essni.address=x.xx.xxx.xxx
- essni.username=xxxxxxxx
- essni.password=xxxxxx

If you do not want to specify the essni password in the properties file, do not include this line in the properties file. You are then prompted for the password at the command line while the application is running.

To use the ESS Migration CLI in a Windows environment, run the following command: `essmigratecli.bat -script <filename>`.

To use the ESS Migration CLI tool in an AIX or Linux environment, run the following command: `essmigratecli.sh -script <filename>`

Example of the eRMCF configuration file after migration

This topic provides an example of the eRCMF configuration file before and after migration.

The contents of the Enterprise.dat file before migration are:

```
Freeze&Go;
TwoWay
SITES Tucson WinstonSalem
#disablesync
enablesync
syncmode rcp -p
enableTrace
removeSCSIreserve

BEGIN_SNMP
        Manager 192.168.1.1
        Manager hal.tucson.ibm.com
END_SNMP

BEGIN_MC
        CONSOLE 9.11.233.113 #  8k04
        SITE Tucson
        DS 2107-75:02191       5005076304FFC47F
END_MC

BEGIN_MC
        CONSOLE 9.11.233.116  #  8k05
        SITE WinstonSalem
        DS 2107-75:04131       5005076303FFC143
END_MC

## Outcenter 8002 - 8001 Development
        BEGIN_ESS_PAIR
                DS 2107-75:02191       5005076304FFC47F
                NUM_LINKS 2      # value = Number of PPRC links with
this ESS as primary
                PPRC_LINK 0003 0003 00 ## Fibre
                PPRC_LINK 0133 0133 00 ## Fibre

                DS 2107-75:04131       5005076303FFC143
                NUM_LINKS 2      # value = Number of PPRC links with
this ESS as primary
                PPRC_LINK 0003 0003 00 ## Fibre
                PPRC_LINK 0133 0133 00 ## Fibre

                LSS_PAIRS
                00 * 00 *
                10 * 10 *
```

```
                13 * 13 *
        END_ESS_PAIR

VOLUME_SETS
ds1 # DS8k, main VS with unused single DS volume definitions
ds2 # DS8k
gm1 # GM volumeset
```

The Enterprise.dat file contains three volumesets, ds1, ds2, and gm1. The contents of the three volumeset files before migration are as follows:

```
ds1:
NAME ds1

TYPE Site2Fcpy
PracticeSite2Fcpy

PRODUCTION Tucson

# outcenter8002 - Outcenter8001
2107-75:02191:10:000   *       2107-75:04131:10:000   2107-
75:04131:10:160
2107-75:02191:10:001   *       2107-75:04131:10:001   2107-
75:04131:10:161
2107-75:02191:10:002   *       2107-75:04131:10:002   2107-
75:04131:10:162
2107-75:02191:10:003   *       2107-75:04131:10:003   2107-
75:04131:10:163
2107-75:02191:10:004   *       2107-75:04131:10:004   2107-
75:04131:10:164

ds2:
NAME ds2
TYPE Site2Fcpy

PRODUCTION Tucson

# outcenter8002 - Outcenter8001
2107-75:02191:13:000   *       2107-75:04131:13:000   2107-
75:04131:13:160
2107-75:02191:13:001   *       2107-75:04131:13:001   2107-
75:04131:13:161
2107-75:02191:13:002   *       2107-75:04131:13:002   2107-
75:04131:13:162


gm1:
NAME gm1

TYPE GlobalNoFcpy              # No FlashCopy is used for this GM
volumeset

BEGIN_MASTER 2107-75:02191 00 * 1
END_MASTER
BEGIN_MASTER 2107-75:04131 00 * 1
END_MASTER
```

```
PRODUCTION Tucson
## tuples:
#Site 1 HVol         Site 1 SVol  Site 1 JVol          Site 2 HVol
Site 2 SVol Site 2 JVol
2107-75:02191:00:000 *            2107-75:02191:01:000 2107-
75:04131:00:000 *           2107-75:04131:01:000

2107-75:02191:00:001 *            2107-75:02191:01:001 2107-
75:04131:00:001 *           2107-75:04131:01:001

2107-75:02191:00:002 *            2107-75:02191:01:002 2107-
75:04131:00:002 *           2107-75:04131:01:002

2107-75:02191:00:003 *            2107-75:02191:01:003 2107-
75:04131:00:003 *           2107-75:04131:01:003
```

When the migration tool is executed on this example eRCMF configuration, it generates four files, two CLI script files and two DS CLI script files. The following lines show the contents of the CLI adddevice script file that you created with the migration tool. Certain information must be added to the adddevice CLI commands for them to run successfully:

```
adddevice -devtype ds -ip XXX.XXX.XXX.XXX;XXX.XXX.XXX.XXX -username
XXXXX -location WinstonSalem
adddevice -devtype ds -ip XXX.XXX.XXX.XXX;XXX.XXX.XXX.XXX -username
XXXXX -location Tucson
```

The following lines show the contents of the second CLI script file created the by the migration tool. Note the difference between the J2 volumes for the eRCMF ds1.dat file which are specified as decimal numbers and the J2 volumes for the ds1_practice session which are specified as hexadecimal numbers:

```
#mkpath -src DS8000:2107.02191:LSS:00.0003 -tgt
DS8000:2107.04131:LSS:00.0003
#mkpath -src DS8000:2107.02191:LSS:00.0133 -tgt
DS8000:2107.04131:LSS:00.0133
#mkpath -src DS8000:2107.02191:LSS:10.0003 -tgt
DS8000:2107.04131:LSS:10.0003
#mkpath -src DS8000:2107.02191:LSS:10.0133 -tgt
DS8000:2107.04131:LSS:10.0133
#mkpath -src DS8000:2107.02191:LSS:13.0003 -tgt
DS8000:2107.04131:LSS:13.0003
#mkpath -src DS8000:2107.02191:LSS:13.0133 -tgt
DS8000:2107.04131:LSS:13.0133
mksess -cptype mmfofb -desc "Migrated Metro Mirror Session" ds1
mkcpset -h1 DS8000:2107.02191:VOL:1000 -h2 DS8000:2107.04131:VOL:1000
ds1
mkcpset -h1 DS8000:2107.02191:VOL:1001 -h2 DS8000:2107.04131:VOL:1001
ds1
mkcpset -h1 DS8000:2107.02191:VOL:1002 -h2 DS8000:2107.04131:VOL:1002
ds1
mkcpset -h1 DS8000:2107.02191:VOL:1003 -h2 DS8000:2107.04131:VOL:1003
ds1
```

```
mkcpset -h1 DS8000:2107.02191:VOL:1004 -h2 DS8000:2107.04131:VOL:1004
ds1
mksess -cptype fc -desc "Migrated FC Session" ds1_practice
mkcpset -quiet -h1 DS8000:2107.04131:VOL:1000 -t1
DS8000:2107.04131:VOL:10A0 ds1_practice
mkcpset -quiet -h1 DS8000:2107.04131:VOL:1001 -t1
DS8000:2107.04131:VOL:10A1 ds1_practice
mkcpset -quiet -h1 DS8000:2107.04131:VOL:1002 -t1
DS8000:2107.04131:VOL:10A2 ds1_practice
mkcpset -quiet -h1 DS8000:2107.04131:VOL:1003 -t1
DS8000:2107.04131:VOL:10A3 ds1_practice
mkcpset -quiet -h1 DS8000:2107.04131:VOL:1004 -t1
DS8000:2107.04131:VOL:10A4 ds1_practice
mksess -cptype pmm -desc "Migrated Metro Mirror Practice Session" ds2
mkcpset -h1 DS8000:2107.02191:VOL:1300 -h2 DS8000:2107.04131:VOL:1300 -
i2 DS8000:2107.04131:VOL:13A0 ds2
mkcpset -h1 DS8000:2107.02191:VOL:1301 -h2 DS8000:2107.04131:VOL:1301 -
i2 DS8000:2107.04131:VOL:13A1 ds2
mkcpset -h1 DS8000:2107.02191:VOL:1302 -h2 DS8000:2107.04131:VOL:1302 -
i2 DS8000:2107.04131:VOL:13A2 ds2
mksess -cptype gmfofb -desc "Migrated Global Mirror Session" gm1
mkcpset -h1 DS8000:2107.02191:VOL:0000 -h2 DS8000:2107.04131:VOL:0000 -
j2 DS8000:2107.04131:VOL:0100 gm1
mkcpset -h1 DS8000:2107.02191:VOL:0001 -h2 DS8000:2107.04131:VOL:0001 -
j2 DS8000:2107.04131:VOL:0101 gm1
mkcpset -h1 DS8000:2107.02191:VOL:0002 -h2 DS8000:2107.04131:VOL:0002 -
j2 DS8000:2107.04131:VOL:0102 gm1
mkcpset -h1 DS8000:2107.02191:VOL:0003 -h2 DS8000:2107.04131:VOL:0003 -
j2 DS8000:2107.04131:VOL:0103 gm1
mksnmp -server 192.168.1.1
mksnmp -server hal.tucson.ibm.com
```

The following line is the contents of the DSCLI rmgmir file that was created because one of the volumsets in this example was a Global Mirror session. You should run this script file through the DS CLI and then use the **showgmir** DS CLI command to wait until the Global Mirror session has been terminated.

```
rmgmir -dev IBM.2107-7502191 -lss 00 -session 1
```

Finally, the following lines comprise the contents of the second DS CLI script file created by the migration tool. After the Global Mirror session has successfully terminated, run this script file before issuing the start to the TotalStorage Productivity Center for Replication session.

```
chsession -dev IBM.2107-7502191 -lss 00 -action remove -volume 0000 1
chsession -dev IBM.2107-7502191 -lss 00 -action remove -volume 0001 1
chsession -dev IBM.2107-7502191 -lss 00 -action remove -volume 0002 1
chsession -dev IBM.2107-7502191 -lss 00 -action remove -volume 0003 1
rmsession -dev IBM.2107-7502191 -lss 00 1
```

Example of the GMU configuration file after migration

This topic gives an example that shows the GMU configuration file before and after migration.

The contents of the file before migration are:

```
<asyncpprc>
   <boxes>
       <ess wwnn="5005076300C02D94" sequence="18596" type="2105">
       <lss num="0x000" ssid="0x9000"/>
     </ess>
     <ess wwnn="5005076300C0863d" sequence="18597" type="2105">
       <lss num="0x0" ssid="0x9000"/>
     </ess>
   </boxes>
     <pprcpaths>
     <path source="18596:0x000" target="18597:0x000">
       <said source="0024" target="0028" />
      </path>
   </pprcpaths>
     <session id="4" cginterval="30" maxdraintime="240"
maxcoordinterval="75">
     <master lss="18596:0x000"/>
   </session>
     <volumes>
     <relationship avol="18596:0x000:000-001" bvol="18597:0x000:002-
003"
       cvol="18597:0x000:004-005" dvol="18597:0x000:001-002"/>
      <relationship avol="18596:0x000:007-008" bvol="18597:0x000:009-
010"
       cvol="18597:0x000:010-011" dvol="18597:0x000:007-008"/>
    </volumes>
 </asyncpprc>
```

When the migration tool is executed on this example GMU configuration, it generates four files: two TotalStorage Productivity Center for Replication CLI script files and two DS CLI script files.

The following lines show the contents of the adddevice script file created by the migration tool. Certain information must be added to the **adddevice** CLI commands for them to run successfully:

```
adddevice -devtype ess -ip XXX.XXX.XXX.XXX;XXX.XXX.XXX.XXX -username
XXXXX
adddevice -devtype ess -ip XXX.XXX.XXX.XXX;XXX.XXX.XXX.XXX -username
XXXXX
```

The second TotalStorage Productivity Center for Replication CLI file created by the migration tool contains the remainder of the CLI commands necessary to put the configuration information into TotalStorage Productivity Center for Replication:

```
#mkpath -src ESS:2105.18596:LSS:00.0024 -tgt ESS:2105.18597:LSS:00.0028
mksess -cptype pgm -desc "Migrated Global Mirror Practice Session"
session_4
chsess -maxdrain 240 -coordint 75 session_4
mkcpset -h1 ESS:2105.18596:VOL:0000 -i2 ESS:2105.18597:VOL:0002 -j2
ESS:2105.18597:VOL:0004 -h2 ESS:2105.18597:VOL:0000 session_4
mkcpset -h1 ESS:2105.18596:VOL:0001 -i2 ESS:2105.18597:VOL:0003 -j2
ESS:2105.18597:VOL:0005 -h2 ESS:2105.18597:VOL:0001 session_4
mkcpset -h1 ESS:2105.18596:VOL:0007 -i2 ESS:2105.18597:VOL:0009 -j2
ESS:2105.18597:VOL:000a -h2 ESS:2105.18597:VOL:0007 session_4
mkcpset -h1 ESS:2105.18596:VOL:0008 -i2 ESS:2105.18597:VOL:000a -j2
ESS:2105.18597:VOL:000b -h2 ESS:2105.18597:VOL:0008 session_4
```

In this example, the migration tool also creates two DS CLI script files for terminating and cleaning up the Global Mirror session. The following line is the contents of the rmgmir DS CLI file that is used to terminate the GM session. After executing this script, use the **showgmir** DS CLI command to wait until the Global Mirror session has been terminated:

```
rmgmir -dev IBM.2105-18596 -lss 00 -session 4
```

The following lines comprise the contents of the second DS CLI script file created by the migration tool. After the Global Mirror session has successfully terminated, run this script file before issuing the start to the TotalStorage Productivity Center for Replication session:

```
chsession -dev IBM.2105-18596 -lss 00 -action remove -volume 0000 4
chsession -dev IBM.2105-18596 -lss 00 -action remove -volume 0001 4
chsession -dev IBM.2105-18596 -lss 00 -action remove -volume 0007 4
chsession -dev IBM.2105-18596 -lss 00 -action remove -volume 0008 4
rmsession -dev IBM.2105-18596 -lss 00 4
```

Limitations and known issues

This topic describes the limitations and known issues present in the migration tool.

Incorrect LSS placement

For some Global Mirror session migrations, the subordinate LSSs are not correctly placed in the output DS CLI script. It is important that you manually check and, if necessary, edit the commands to ensure that the running Global Mirror sessions are completely terminated before you issue the **Start** command to IBM TotalStorage Productivity Center for Replication. The command you need to edit is the **rmgmir** command. If there are subordinate LSSs in the current configuration that are not present in the **rmgmir** command, you should edit the command as follows: `rmgmir -lss 2105.18596/00 27 2105.18596/00:2105.18597/01`. The master:subordinate relationships are shown as Master:Subordinate; for example, 2105.18596/00:2105.18597/01. If multiple subordinates are present in the currently running Global Mirror session, simply add more Master:Subordinate clauses to the end of the command.

Redundant path command in GMU migration

In GMU migrations, there is typically a redundant **mkpath** command in the output script file. This is a result of the method in which Global Mirror control paths are specified in the GMU configuration file; you should simply delete one of the redundant **mkpath** commands from the file.

Master LSS not parsed in DS CLI Migration of Global Mirror Session

For DSCLI migrations of Global Mirror sessions, the master LSS is sometimes not handled correctly. As a result, the **rmsession** and **rmgmir** commands are not filled out completely: `rmsession -dev XXXXX -lss XX 01 rmgmir -dev XXXXX -lss XX 01`. You must place the valid device and LSS information into the command for the script to function properly.

Extraneous volumes in a GM or MGM session are not removed

In a DS CLI or ESS CLI session, it is possible to specify in the input script file more volumes than are actually being replicated. So, in your DS CLI input file, you might have a **mksession** command that adds volumes into the session that are not being actively replicated as part of the Global Mirror session. The migration tool does not create **chsession** commands in the output DS CLI file to remove these volumes from the Global Mirror session. Only for volumes that become part of a Global Mirror copy set are corresponding DS CLI commands created in the output dscli file. You must manually remove the extraneous files from the running Global Mirror session before running any of the script files created by the migration tool.

Specifying multiple input files on the command line

Specifying multiple input files on the command line has not been fully tested and is restricted.

After starting a migrated Metro Global Mirror session, the state stays in Preparing

Due to the differences in the flag settings for Metro Global Mirror relationships between eRCMF and TotalStorage Productivity Center for Replication, you might encounter a situation where after you start up the migrated Metro Global Mirror session, the state does not go to Prepared. A workaround is to restart the TotalStorage Productivity Center for Replication server. When it starts back up, it queries the hardware relationships and updates its session status to Prepared. In order to avoid a possible Freeze impact by MM heartbeat loss, you should disable the heartbeat function before restarting the server.

Troubleshooting

This topic describes how to troubleshoot the migration tool.

Runtime errors

Table 3. Runtime errors

Error	Meaning
You receive an error similar to the following: `log4j:ERROR setFile(null,true) call failed java.io.FileNotFoundException: c:\temp\CsmMigration.log`, indicating that the system cannot find the path specified.	The migration tool is trying to create the output log file in a directory that does not exist. To resolve this problem, edit the log4j.properties file to ensure that the log4j.appender.dest2.File setting corresponds to a valid directory location on your system.
You receive an error that begins similar to the following: 20 Jun 2006 10:39:25,562 ERROR: parse(): IOException caught java.io.IOException: CreateProcess:	The IBM ESS CLI must be installed on the server on which you are running the migration tool. If it is properly installed, ensure that the ESS CLI install directory is set correctly in the esscli.install setting in the csmmigrate.properties file. Also, ensure that you are using forward slashes (/) even on Windows platforms when you create this property entry.
You are running an ESS CLI migration and no errors are reported but your output file is empty.	The ESS CLI might not be installed correctly. This might occur when the INSTALL environment variable is not specified or is specified incorrectly. To verify proper ESS CLI installation, run the following command: **esscli list task -*s* <Address of Copy Services server found with rsExecuteTask command>**
You are performing a GMU migration with 1750 (DS6000) or 2107 (DS8000) storage servers that are being placed into the output files as 2105 (ESS) boxes.	Your GMU configuration file may not be filled out completely. For 1750 or 2107 storage servers, you must ensure that the type and pom fields are correctly entered in the GMU configuration file for each 1750 or 2107 server.

Error	Meaning
When running the DS CLI script file to terminate the Global Mirror session, you get the DS CLI error on the session removal command, that volumes are still active in the session.	There appears to be a caching or timing issue in the DS CLI that causes status of the volumes to not be updated properly in the DS CLI. If you encounter this error, execute the script a second time and the session removal should complete properly.
No output placed into the output files for an expected session.	See meaning in next row:

Session type invalid (or type and practice combination for eRCMF)
`04 Apr 2007 17:07:22,039 ERROR:  Invalid volumeset type and practice type combination: ALLFCPY/none. Can not migrate volumeset ds5`
 	
Invalid format of copy set - check the xml file
 	
`04 Apr 2007 17:10:44,129 INFO :  Parsing GMU file: C:\dev\csmmt\gmudocexample.xml`
`04 Apr 2007 17:10:44,350 ERROR:  End event threw exception`
`java.lang.reflect.InvocationTargetException`
`at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)`
`at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:85)`	

Installation errors

The following error has been fixed in version 1.0.2 of the migration tool. If you receive this error while installing version 1.0.2 or later, you are attempting to install the migration tool incorrectly. Please refer to Installing the migration tool for installation instructions.

Table 4. Installation errors

Error	Meaning
Installing IBM TotalStorage Productivity Center for Replication V3.1 Migration Tool... `C:\Program Files\IBM\Java142\jre\bin\jar` is not recognized as an internal command, external command, operable program or batch file. Installation Complete.	No jar.exe file is found in the JAVA_HOME directory. To resolve this problem, perform the following steps: 1. Perform a manual installation of the migration tool and copy the csm-mt.jar file from the CSM-CD directory to the location in which you want to install the tool. 2. Use archiving software to extract the contents of the jar file. This creates the same directory structure that would be created by the migration tool installation.

Appendix A. Notices

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

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

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:
IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

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

IBM World Trade Asia Corporation
Licensing
2-3 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan

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

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

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

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

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:
IBM Corporation
MW9A/050
5600 Cottle Road
San Jose, CA 95193
U.S.A.

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

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

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly.

Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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

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

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

AIX

AIX 5L(TM)

Alert on LAN(TM)

Asset ID(TM)

AT(R)

BladeCenter(R)

Current(R)

DB2(R)

DB2 Universal Database(TM)

DirMaint(TM)

ECKD(TM)

Electronic Service Agent(TM)

Enterprise Storage Server

eServer(TM)

FlashCopy

HiperSockets(TM)

i5/OS(R)

iSeries(TM)

IBM

ibm.com(R)

IntelliStation(R)

iSeries

Lotus Notes(R)

Multiprise(R)

Netfinity(R)

NetServer(TM)

NetView(R)

Notes(R)

OS/400(R)

POWER(TM)

Predictive Failure Analysis(R)

pSeries(R)

RACF(R)

Redbooks(TM)

S/390(R)

ServeRAID(TM)

ServerProven(R)

SurePOS(TM)

System i(TM)

System p(TM)

System p5(TM)

System Storage(TM)

System x

System z(TM)

System z9(TM)

Tivoli(R)

Tivoli Enterprise(TM)

Tivoli Enterprise Console(R)

Tivoli Management Environment(R)

TotalStorage

Virtualization Engine(TM)

Wake on LAN(R)

xSeries(R)

z/OS(R)

z/VM(R)

z/VSE(TM)

zSeries(R)

Intel(R), Itanium(R), and Pentium(R) are trademarks of Intel Corporation in the United States, other countries, or both.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft(R), Windows, and Windows NT(R) are trademarks of Microsoft Corporation in the United States, other countries, or both.

Red Hat and all Red Hat-based trademarks and logos are trademarks or registered trademarks of Red Hat, Inc., in the United States and other countries.

SET is a registered trademark of SET Secure Electronic Transaction LLC in the United States and other countries.

UNIX(R) is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Index