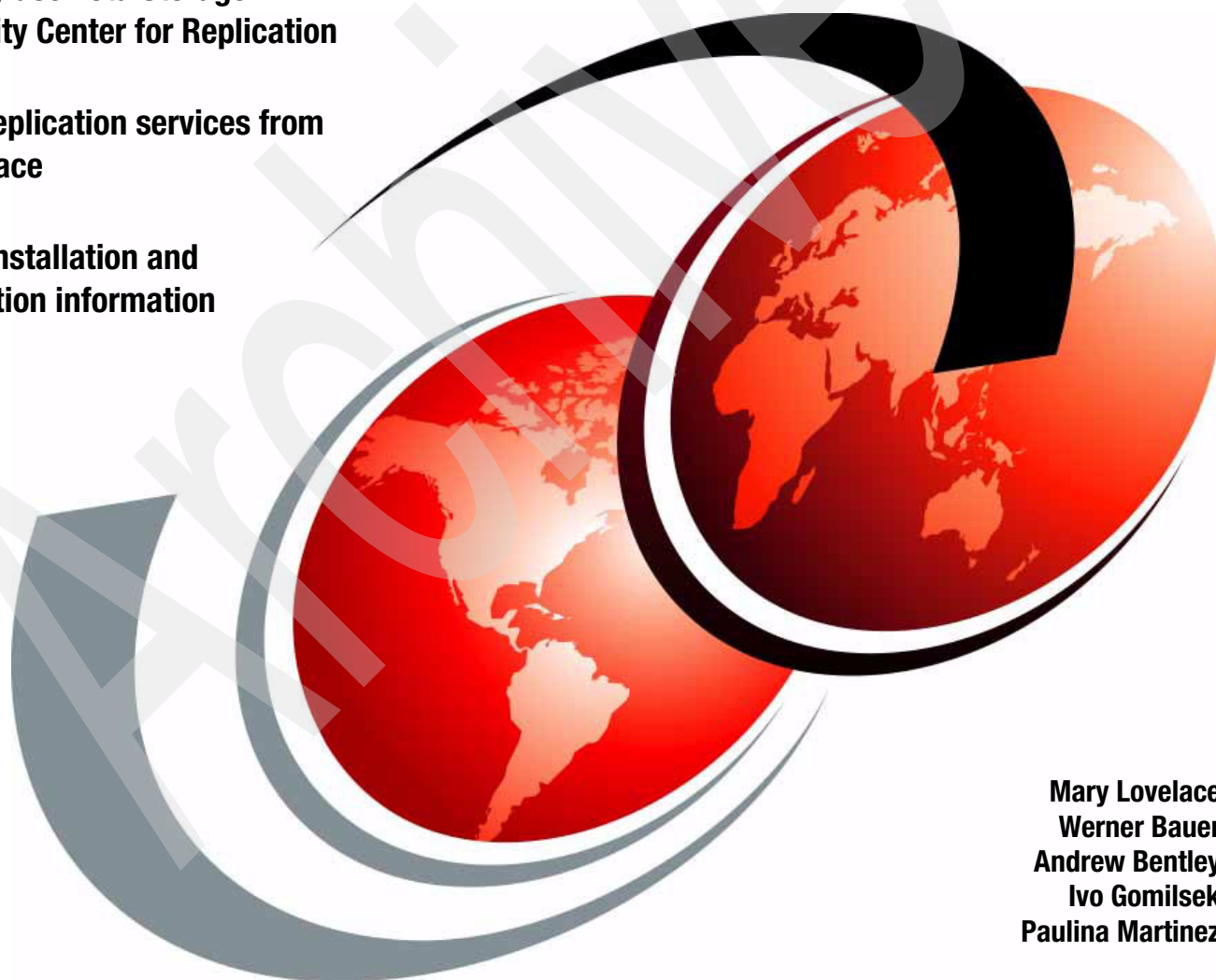


IBM TotalStorage Productivity Center for Replication on Windows 2003

Effectively use TotalStorage
Productivity Center for Replication

Manage replication services from
one interface

Detailed installation and
configuration information



Mary Lovelace
Werner Bauer
Andrew Bentley
Ivo Gomilsek
Paulina Martinez

Redbooks



International Technical Support Organization

**IBM TotalStorage Productivity Center for Replication
on Windows 2003**

April 2007

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Note: Before using this information and the product it supports, read the information in “Notices” on page vii.

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First Edition (April 2007)

This edition applies to Version 3, Release 1 of TotalStorage Productivity Center for Replication (product number 5608-TRA) and Version 3, Release 1 of TotalStorage Productivity Center for Replication for Two Site Business Continuity (product number 5608-TRB).

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Preface

The IBM® TotalStorage® Productivity Center for Replication V3.1 is designed to manage the advanced copy services provided by IBM Enterprise Storage Server® (ESS) Model 800, IBM System Storage™ DS8000™, IBM System Storage DS6000™, and IBM SAN Volume Controller (SVC).

This IBM Redbooks® publication provides an introduction to TotalStorage Productivity Center for Replication. It provides information about planning for the installation of TotalStorage Productivity Center for Replication, step-by-step installation instructions, and how to setup and use it on a Windows® 2003 platform.

Additional TotalStorage Productivity Center for Replication Redbooks for the Linux® and AIX® platforms are:

- ▶ *IBM TotalStorage Productivity Center for Replication on AIX*, SG24-7407
- ▶ *IBM TotalStorage Productivity Center for Replication on Linux*, SG24-7411

The team that wrote this book

This book was produced by a team of specialists from around the world working at the International Technical Support Organization, San Jose Center.

Mary Lovelace is a Consulting IT Specialist at the International Technical Support Organization. She has more than 20 years of experience with IBM in large systems, storage and Storage Networking product education, system engineering and consultancy, and systems support. She has written many Redbooks about TotalStorage Productivity Center and z/OS® storage products.

Werner Bauer is a Certified Consulting IT Specialist in Germany. He has 26 years of experience in storage software and hardware, as well with S/390® and z/OS. His areas of expertise include disaster recovery solutions in enterprises that use the unique capabilities and features of the IBM disk storage servers, ESS and DS6000/DS8000. He has written extensively in various Redbooks including these topics: Transactional VSAM, DS6000/DS8000 concepts and architecture, and DS6000/DS8000 Copy Services. He holds a degree in Economics from the University of Heidelberg and in Mechanical Engineering from FH Heilbronn.

Andrew Bentley is an IBM Certified IT Specialist in Australia, and he currently works as an IT Architect for IBM Integrated Technology Delivery Division. He has 20 years of experience in the IT field. He has worked at IBM for over eight years. His area of expertise is Storage. He has previously written Redbooks about IBM tape products and has also presented at a number of IBM technical conferences. He currently holds a position with IBM A/NZ Technical Experts Council.

Ivo Gomilsek is an IT Specialist for IBM Services, Slovenia, and he supports the Central and Eastern European Region in designing, deploying, and supporting SAN, storage, and DR solutions. His areas of expertise include SAN, storage, HA systems, IBM eServer xSeries® servers, network operating systems (Linux, Microsoft® Windows, and OS/2®), and Lotus® Domino® servers. He holds several certifications from various vendors (IBM, Red Hat, Microsoft). Ivo has contributed to various other Redbooks about Tivoli® products, SAN, Linux/390, xSeries, and Linux.

Paulina Martinez is an IBM Software Engineer in Tucson, Arizona, and she currently works in TPC-R System Verification Test. Her areas of expertise include TotalStorage Productivity Center for Replication, DS6000/DS8000 Copy Services and ESS800 Copy Services. Paulina holds a dual degree in Management Information Systems and Operations Management from the University of Arizona.

Thanks to the following people for their contributions to this project:

Bob Haimowitz
International Technical Support Organization, Raleigh Center

Sangam Racherla
International Technical Support Organization, San Jose Center

Randy Blea
Jeff Placer
IBM Tucson

Linda Gillman
IBM San Jose

Rosemary McCutchen
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TotalStorage Productivity Center for Replication introduction

This chapter provides an overview of TotalStorage Productivity Center for Replication and how it fits in the TotalStorage Productivity Center product suite. It reviews copy services functions and then describes how they are implemented in TotalStorage Productivity Center for Replication. The architecture of TotalStorage Productivity Center for Replication and the communication paths it uses are documented. Terms that are used throughout the book are explained.

1.1 TotalStorage Productivity Center for Replication overview

The basic functions of TotalStorage Productivity Center (TPC) for Replication provide management of FlashCopy®, Metro Mirror and Global Mirror capabilities for the IBM ESS Model 800, IBM DS6000, and IBM DS8000. It also manages FlashCopy and MetroMirror for IBM SAN Volume Controller. Figure 1-1 shows the TPC for Replication environment.

TPC for Replication is designed to simplify management of advanced copy services by:

- ▶ Automating administration and configuration of these services with wizard-based session and copy set definitions
- ▶ Providing simple operational control of copy services tasks, including starting, suspending and resuming
- ▶ Offering tools for monitoring and managing copy sessions

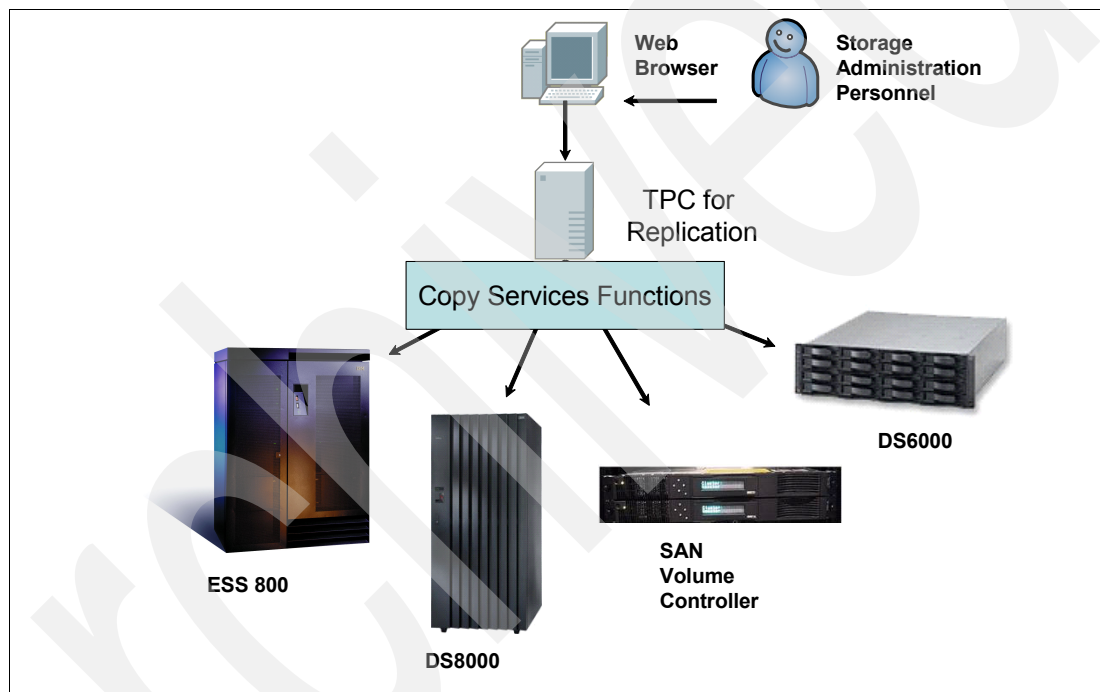


Figure 1-1 TPC for Replication environment

1.1.1 Replication task management and automation

TPC for Replication is designed to automate key replication management tasks to help you improve the efficiency of your storage replication. A simple graphical user interface is used to configure automation, manage ongoing activities and monitor progress of all key tasks. Your IT experts can use a single integrated tool for storage management, a feature designed to save administrators time and effort. Here we review the copy services advanced functions.

FlashCopy

The IBM FlashCopy feature is a point-in-time copy capability that can be used to help reduce application outages caused by backups and other data copy activities. FlashCopy is designed to enable data to be copied in the background while making both source and copied data available to users almost immediately. With its copy-on-write capability, the only data copied is that which is about to be changed or overlaid. Copies can be made quickly, after which data can be backed up and capacity reallocated.

This form of replication creates a replica (or T-zero copy) of the source within the same physical storage subsystem. Both the source and target volumes exist within the same storage subsystem. The ESS and DS8000 products provide multiple LSS (Logical Subsystems) within a single physical subsystem box. These products support local (same box) replication where the source volume is in one LSS and the target volume is in another LSS. For a FlashCopy session in TPC for Replication, Figure 1-2 shows the volume relationship established as part of the session creation.

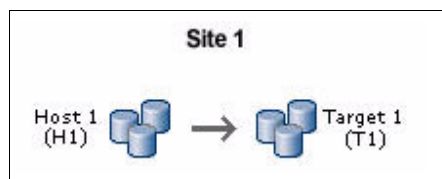


Figure 1-2 Flashcopy session

Metro Mirror

Metro Mirror is designed to constantly maintain an up-to-date copy of the primary location data at a remote site within the metropolitan area. Synchronous mirroring techniques are designed to maintain data currency between two sites. Because mirrored data is a time-consistent image of the original data, this can help you avoid a long and complicated data recovery process before restoring business operations.

A Metro Mirror session is a form of synchronous remote replication designed to operate over distances under 300 kilometers. With Metro Mirror, the source is located in one subsystem and the target is located in another subsystem. Metro Mirror replication maintains identical data in both the source and target. In synchronous replication, changes made to the source data are propagated to the target before the write is committed to the requesting host. Figure 1-3 shows a Metro Mirror session icon in TotalStorage Productivity Center for Replication.

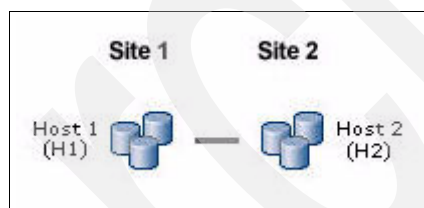


Figure 1-3 Metro Mirror session

Global Mirror

Global Mirror (DS6000, DS8000 and ESS 800 only) is designed to help maintain data currency at a remote site within a few seconds of the local site, regardless of distance. It includes exceptional capabilities such as self-managed cross-system data consistency groups, which help protect data integrity for large applications across a wide variety of flexible system configurations. TPC for Replication V3.1 also extends support for ESS Model 800 by providing management support for the Global Mirror feature.

These copying and mirroring capabilities are designed to help give users constant access to critical information during both planned and unplanned local outages. And TPC for Replication provides key configuration, administration and monitoring tools to manage these capabilities. For businesses in on demand fields, these capabilities are essential for managing data availability and resiliency and sustaining business continuity.

Global Mirror is a method of continuous asynchronous replication. It is intended to enable data replication at distances over 300 kilometers. When a write is issued to the source copy, the change is propagated to the target copy, but subsequent changes are allowed to the source copy before the target copy verifies that it has received the change. However, because data changes are not applied synchronously, you can potentially lose some data. Figure 1-4 shows a Global Mirror session icon in TotalStorage Productivity Center for Replication.

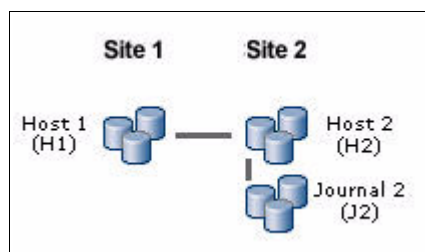


Figure 1-4 Global Mirror session

Note: While TPC for Replication supports a multiple of defined Global Mirror sessions, only a single active session per subsystem pair can be supported due to the limitations imposed at the underlying hardware. SVC Global Mirror is not currently supported.

1.2 TotalStorage Productivity Center product set

The IBM TotalStorage Productivity Center for Replication product is designed to support customers management requirements for data replication utilizing IBM storage subsystems. There are two components of the TPC for Replication package.

- ▶ TotalStorage Productivity Center for Replication
- ▶ TotalStorage Productivity Center for Replication Two Site BC

TotalStorage Productivity Center for Replication is considered the base, while TotalStorage Productivity Center for Replication Two Site BC adds advanced features to assist in disaster recovery events. Figure 1-5 shows the relationship between the generally available TotalStorage Productivity Center product components and TotalStorage Productivity Center for Replication. As you can see, TotalStorage Productivity Center for Replication is a standalone package which complements the TotalStorage Productivity Center product.

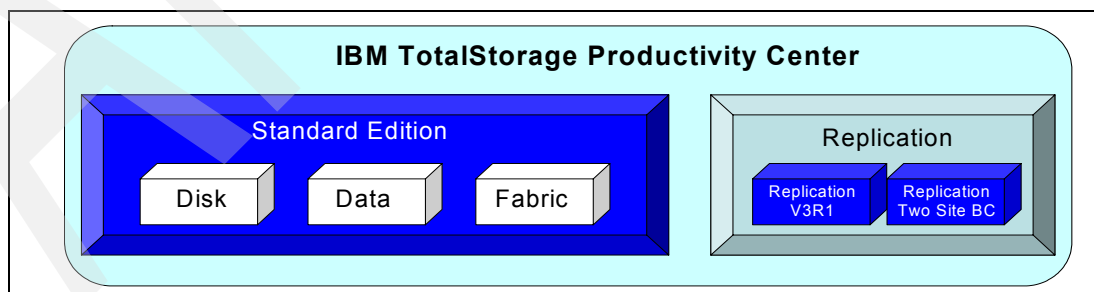


Figure 1-5 TotalStorage Productivity Center product set

1.2.1 TotalStorage Productivity Center for Replication

As we have seen TotalStorage Productivity Center for Replication is a member of the IBM TotalStorage Productivity Center product family. The product offers the following features:

- ▶ Metro Mirror for ESS model 800, DS6000, and / or DS8000 (unidirectional from source to target)
- ▶ Metro Mirror for SVC (unidirectional from source to target)
- ▶ Global Mirror for ESS model 800, DS6000, and / or DS8000 (unidirectional from source to target)
- ▶ FlashCopy for ESS model 800, DS6000, and / or DS8000
- ▶ FlashCopy for SVC

1.2.2 TotalStorage Productivity Center for Replication Two Site BC

TPC for Replication Two Site Business Continuity (BC) provides disaster recovery management through planned and unplanned failover and failback automation for the IBM ESS Model 800, IBM DS6000, and IBM DS8000.

TPC for Replication Two Site BC helps you manage replication to a remote backup site through Metro Mirror or Global Mirror. The software is designed to allow you to monitor the progress of the copy services so you can verify the amount of replication that has been done as well as the amount of time needed to complete the replication.

Automated failover is designed to keep your critical data online and available to your users even if your primary site fails. When the primary site comes back on, the software manages failback to the default configuration as well.

Like TotalStorage Productivity Center for Replication, TotalStorage Productivity Center for Replication Two Site BC is a member of the TotalStorage Productivity Center product family and requires TotalStorage Productivity Center for Replication to be installed first. In addition to the base features already described, TotalStorage Productivity Center for Replication Two Site BC offers:

- ▶ Support for redundant TotalStorage Productivity Center for Replication servers.
- ▶ Support for the following additional session types for ESS model 800, DS6000, and / or DS8000.
 - Two site Metro Mirror, ability to control the session in both directions (from site 1 to site 2 or visa versa).
 - Two site Global Mirror, ability to control the session in both directions (from site 1 to site 2 or visa versa).
- ▶ Replication Performance Monitoring showing the progress towards completion of hardware replication.
 - For Metro Mirror, the progress towards getting all data to full duplex.
 - For Global Mirror, the progress towards getting all data to fully joined in the session.
 - For FlashCopy without persistent specified, the progress of getting background copy complete

TPC for Replication offers a high availability capability, so you can manage your replication even if the main TotalStorage Productivity Center for Replication server experiences a failure. With a second server operating as an active standby, services can switch quickly to the backup server to maintain copy services operations if the primary server goes off-line.

1.2.3 Application design

TotalStorage Productivity Center for Replication is designed to scale to large numbers of volumes, supporting up to 100,000 copy sets, providing the capability to issue freeze and run commands for a metro mirror environment, and providing FlashCopy (FC) establish capabilities for FlashCopy operations with virtually no overhead.

The TotalStorage Productivity Center for Replication product utilizes Java™, WebSphere® and DB2® to provide the required copy services management functions.

To ensure that environmental consistency is maintained during server restarts, persistent data from the TotalStorage Productivity Center for Replication environment is maintained within the IBM DB2 UDB database built as part of the installation process. This data is accessed using standard JDBC™ calls from within the WebSphere application. The WebSphere application name CSM stands for Copy Services Manager.

As we can see in Figure 1-6 the CSM module manages the aspects of the environment except for the relevant communications interfaces.

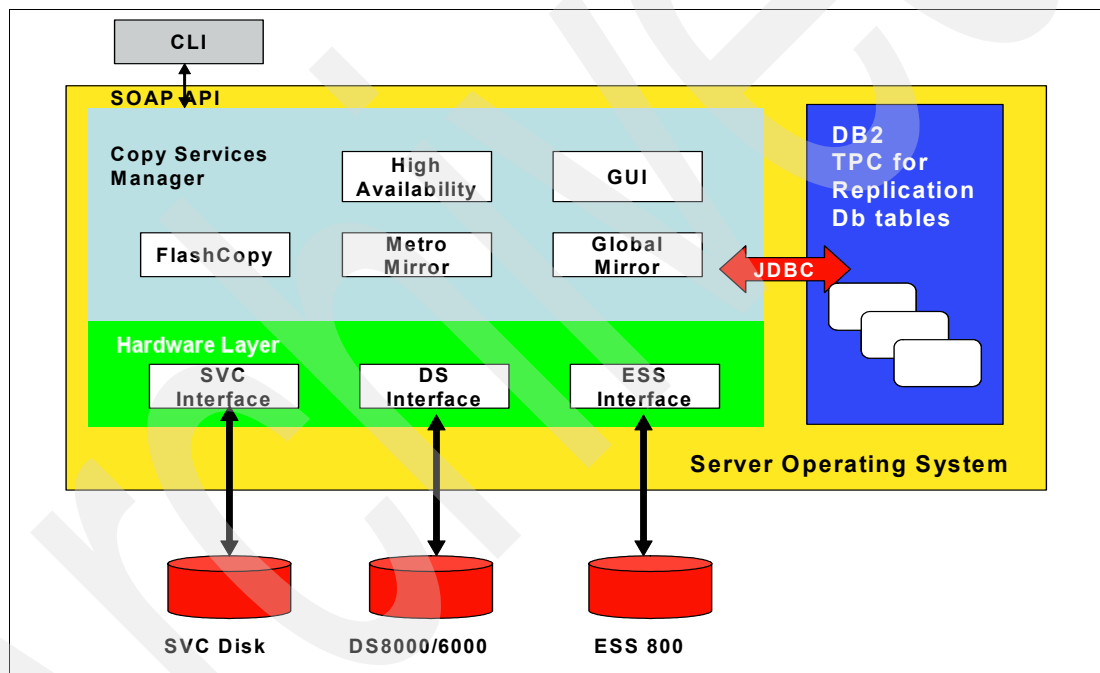


Figure 1-6 Application design

Commands from the TotalStorage Productivity Center for Replication server are passed from the CSM to the hardware layer and then packaged via the relevant subsystem interface. These packets are then passed to the destination storage subsystem via the IP communications path established as part of the storage subsystem add process. In Figure 1-7 on page 7, we can see the communications from the CSM to an ESS or DS storage subsystem. In this instance a command from CSM is received by the ESS or DS interface and packaged as a CCW packet. This CCW packet is then sent to the CCW server (listening on TCP/IP port 2433) which then passes the CCW commands to the functional code residing in the storage subsystem. The return journey is achieved in the same way.

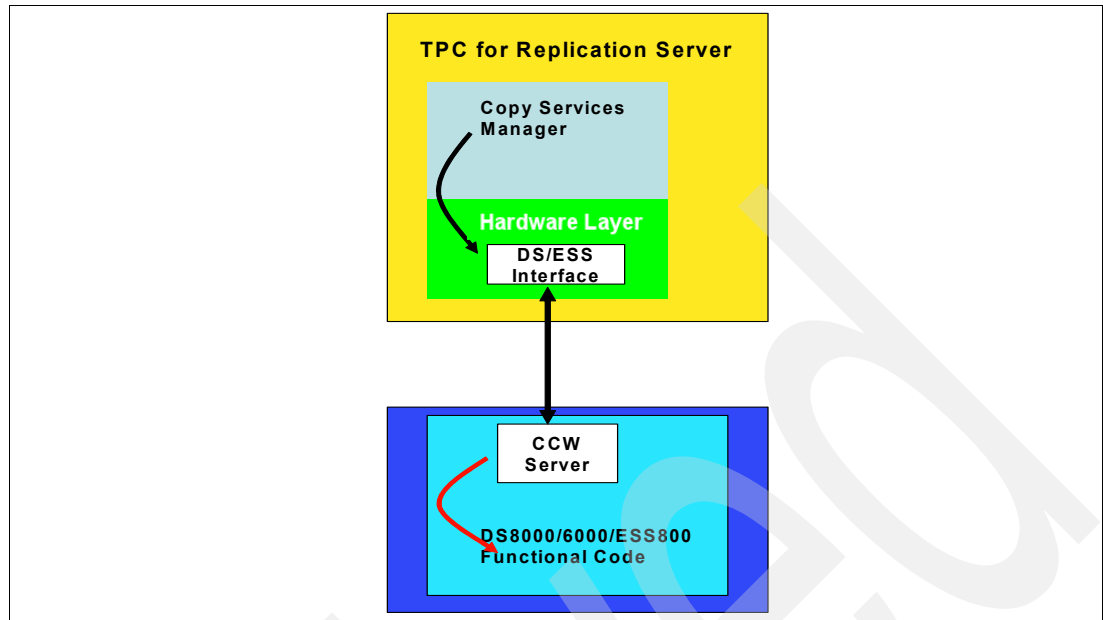


Figure 1-7 CSM to storage communications

In Figure 1-8, we can see that communications with the ESS and DS infrastructure is direct, whereas SVC communications are via the CIMOM services that are included as part of the standard SVC Master Console.

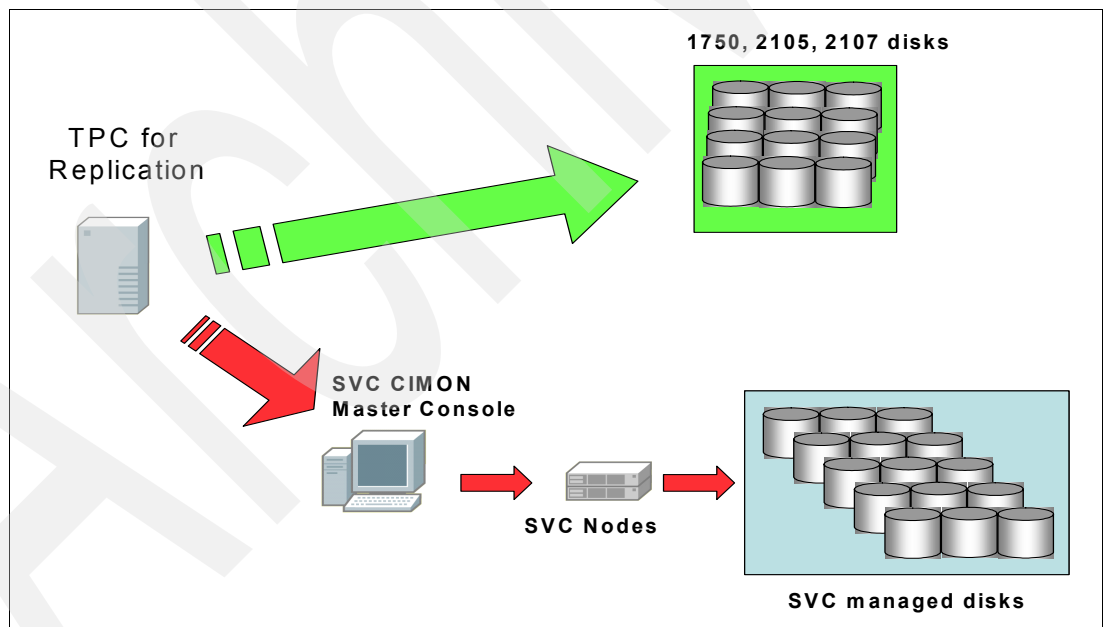


Figure 1-8 Server to hardware communications

1.3 Terminology

It is *essential* that you understand the following concepts and how they are used to enable the functionality of the replication environment. As such, the terminology is captured here along with a brief explanation of the term itself.

- ▶ **Copy Set:** A set of volumes that represent copies of the same data. All volumes in a Copy set must be of the same type and size. The number of volumes in a Copy set and the roles that each volume in a Copy set plays in the replication session is determined by the session policy.
- ▶ **Session:** The replication session is the fundamental concept which TotalStorage Productivity Center for Replication is built upon. The Copy sets within a session form a consistency group. Actions taken against the session are taken against all of the Copy sets within the session. The session policy determines what type of replication is to be controlled via the session and determines what actions and states are allowable in the session.
- ▶ **Source:** This is a Copy Set role, used in hardware support type sessions. The volume that plays this role in the Copy Set is the source volume of the Copy Set.
- ▶ **Target:** This is a Copy Set role, used in hardware support type sessions. The volume that plays this role in the Copy Set is the target volume of the Copy Set.
- ▶ **HostSite1 (H1):** This is a Copy Set role. The volume that plays this role in the Copy Set is the volume that is to be mounted and online to the application when the session has site 1 as the production site.
- ▶ **HostSite2 (H2):** This is a Copy Set role. The volume that plays this role in the Copy Set is the volume that is to be mounted and online to the application when the session has site 2 as the production site.
- ▶ **JournalSite2 (J2):** This is a Copy Set role. The volume that plays this role in the Copy Set is the volume that is used to maintain Global Mirror consistency when production is on site 1.

Figure 1-9 shows the terms and how they relate to each other.

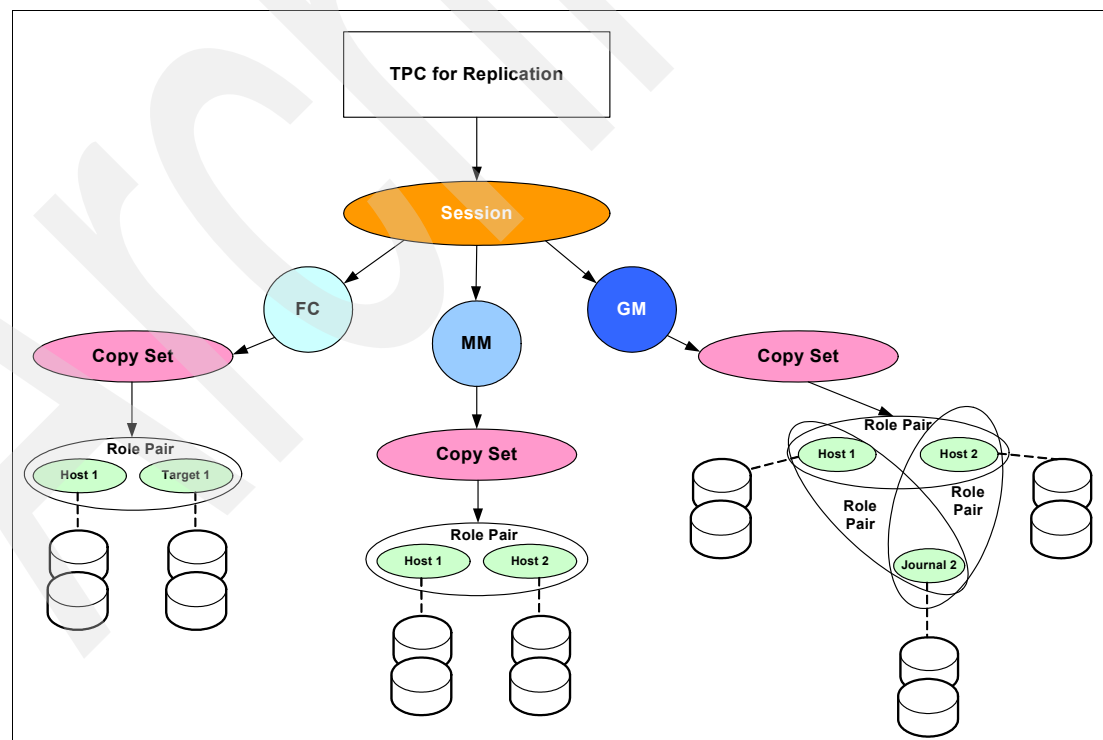


Figure 1-9 TotalStorage Productivity Center for Replication terminology

In addition, sessions themselves can exist in different states depending on the situation.

- ▶ **Defined:** Session created with or without Copy Sets but not started
- ▶ **Preparing:** Started and in the process of initialization or re-initialization. Will automatically transition to Prepared when all pairs are initialized (prepared).
- ▶ **Prepared:** All volumes are initialized (prepared).
- ▶ **Suspending:** Transitory state caused by Suspend command or suspending event. In the process of suspending copy operations.
- ▶ **Suspended:** Copying has stopped. For Metro Mirror, the application can continue writes. An additional recoverable flag indicates if data is consistent and recoverable.
- ▶ **TargetAvailable:** Recover command processing has completed. The target volume are write enabled. An additional recoverable flag indicates if data is consistent and recoverable.

Figure 1-10 shows the transitional relationship of these session states for a continuous replication session.

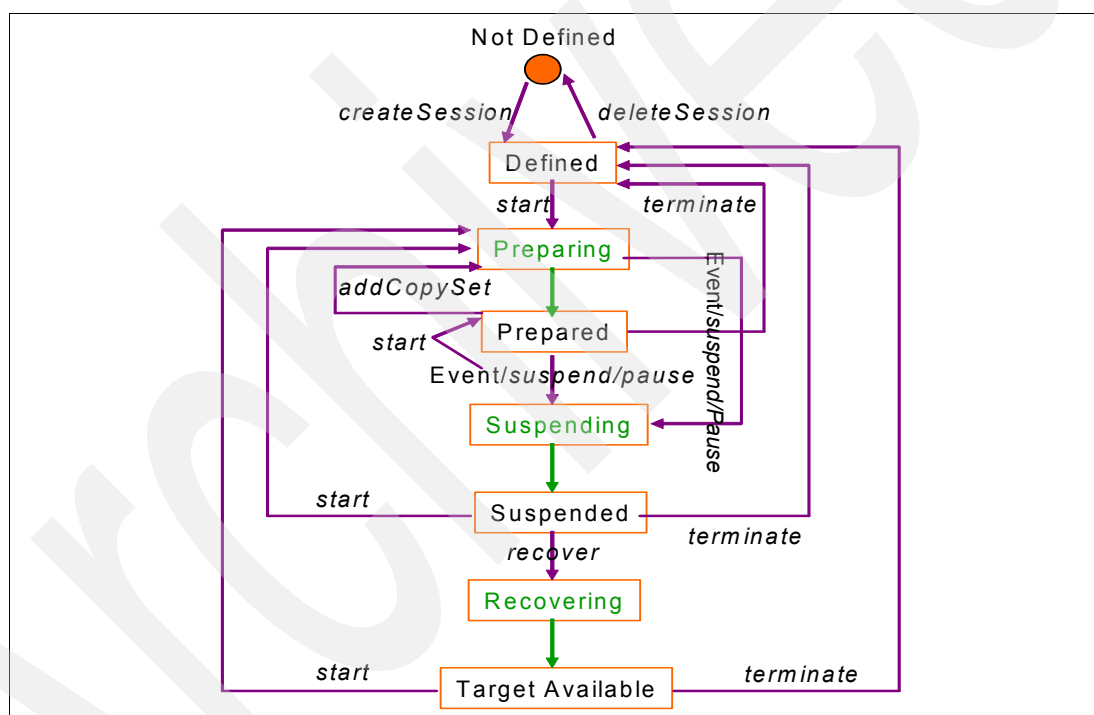


Figure 1-10 Session state transition - continuous replication

Figure 1-11 on page 10 shows the transitional relationship of these session states for a FlashCopy session.

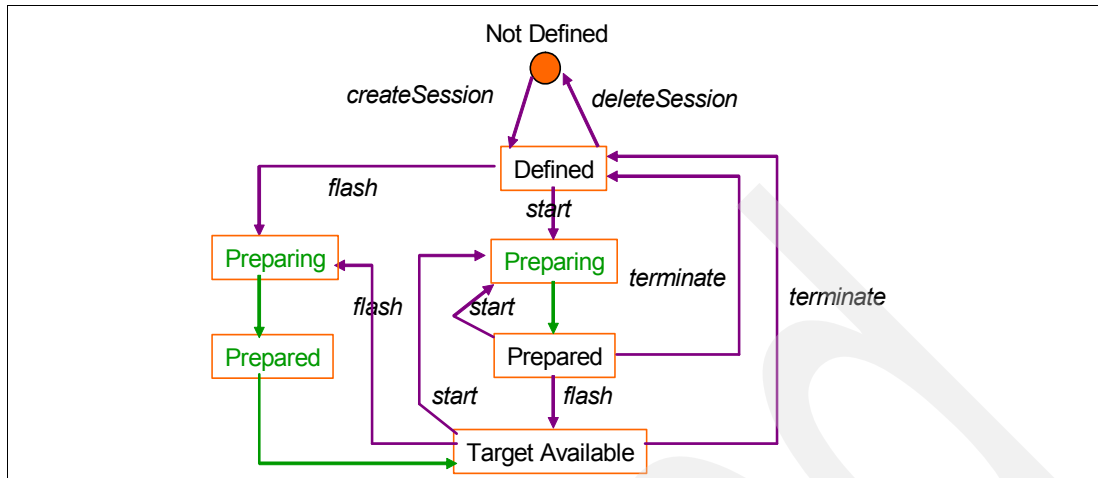


Figure 1-11 Session state transition - point in time

It is important to understand these transitions since these can and will at times determine which TotalStorage Productivity Center for Replication commands are required to move to the next state.

1.3.1 TPC for Replication session types and commands

TotalStorage Productivity Center for Replication enables you to configure a number of different sessions with different copy types as follows:

- ▶ FlashCopy
- ▶ Metro Mirror Single Direction
- ▶ Global Mirror Single Direction
- ▶ Metro Mirror Failover / Failback
- ▶ Global Mirror Failover / Failback

Session commands

The following tables show the commands which can be issued against any defined session. These commands represent the GUI interface and not the CLI command which may require specific syntax to be valid.

Table 1-1 contains the FlashCopy commands.

Table 1-1 FlashCopy commands

Command	Meaning
Flash	Perform the FlashCopy operation using the specified options.
Initiate Background Copy	Copy all tracks from the source to the target immediately, instead of waiting until the source track is written to. This command is valid only when the background copy is not already running.
Start	Perform any steps necessary to define the relationship before performing a FlashCopy operation. For ESS or DS, you do not need to issue this command. For SVC, use this command to put the session in the prepared state.

Command	Meaning
Terminate	Removes all physical copies from the hardware. This command can be issued at any point during an active session. If you want the targets to be data consistent before removing their relationship, you must issue the Initiate Background Copy command if NOCOPY was specified, and then wait for the background copy to complete by checking the copying status of the pairs.

Table 1-2 shows Metro Mirror commands.

Table 1-2 Metro Mirror commands

Command	Meaning
Recover	Issue the Recover command to suspended sessions. This command performs the steps necessary to make the target available as the new primary site. Upon completion of this command, the session becomes Target Available. This command does not apply for SVC.
Start	Establishes a single-direction session with the hardware and begins the synchronization process between the source and target volumes.
Start H1 → H2	Applies only to failover/failback BC sessions. Indicates the direction between two hosts in a Metro Mirror failover/failback session.
Start H2 → H1	Indicates direction of a failover/failback between two hosts in a Metro Mirror session. If the session has been recovered with the failover/failback function such that the production site is now H2, you can issue the Start H2-H1 command to start production on H2 and provide protection. This command is not supported for SVC.
Stop	Suspends updates to all the targets of pairs in a session. This command can be issued at any point during an active session. Note, however, that updates are not considered to be consistent.
Suspend	Causes all target volumes to remain at a data-consistent point and stops all data that is moving to the target volumes. This command can be issued at any point during a session when the data is actively being copied.
Terminate	Removes all physical copies from the hardware during an active session. If you want the targets to be data consistent before removing their relationship, you must issue the Suspend command, the Recover command, and then the Terminate command.

Table 1-3 contains the Global Mirror commands.

Table 1-3 Global Mirror

Command	Meaning
Recover	Issue the Recover command to suspended sessions. This command performs the steps necessary to make the target available as the new primary site. Upon completion of this command, the session becomes Target Available. This command does not apply for SVC.
Start	Sets up all relationships in a single-direction session and begins the process necessary to start forming consistency groups on the hardware.

Command	Meaning
Start H1 → H2	Indicates direction between two hosts in a Global Mirror failover/fallback session. Suspend Stops all consistency group formation when the data is actively being copied. This command can be issued at any point during a session when the data is actively being copied.
Start H2 → H1	Indicates direction of a failover/fallback session. If a recover has been performed on a session such that the production site is now H2, you can issue Start H2?H1 to start moving data back to Site 1. However, this start does not provide consistent protection as it copies only asynchronously back because of the long distance. An extended distance (XD) relationship is used. When you are ready to move production back to Site 1, issue a suspend to the session; this puts the relationships into a synchronized state and suspends them consistently. This command is not supported for SVC.
Terminate	Removes all physical copies from the hardware. This command can be issued at any point in an active session. If you want the targets to be data consistent before removing their relationship, you must issue the Suspend command, the Recover command, and then the Terminate command.

1.4 GUI overview

The TotalStorage Productivity Center for Replication GUI is a Web based interface which presents the user with a single point of control to configure, manage and monitor copy services. The GUI reports on the status and availability of the administration components as well as management information for the established copy operations in real-time.

The user interface consists of four main content panes:

- ▶ The masthead
- ▶ The navigation menu (labeled "My Work")
- ▶ Health Overview
 - Indicates the overall health of the system at all times
- ▶ The Work Area
 - Contains the interface elements to perform specific tasks

Figure 1-12 on page 13 shows the HTML layout of the interface

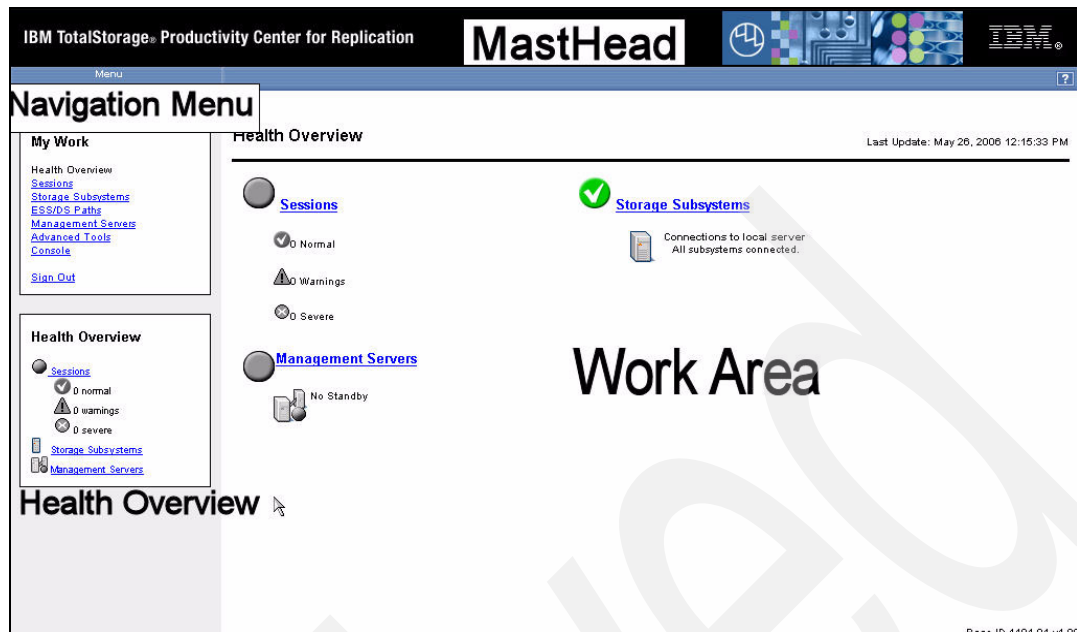


Figure 1-12 GUI Interface Layout

1.4.1 Health Overview panel

The Health Overview panel is the first panel you see after you log in. This panel provides the following information:

- ▶ Overall session status: Indicates the session status, which can be normal, warning, or severe.
- ▶ Overall storage subsystem status: Indicates the connection status of the storage subsystem.
- ▶ Management server status (applicable only if you are using the TPC for Replication BC license).










Note: With two TPC for Replication servers running and if you are logged on to the active server, this indicates the status of the standby server. If you are logged on to the standby server, this indicates the status of the active server.



Status indicators are used to simply describe the various states for defined TotalStorage Productivity Center for Replication components. In addition, various icons are used to represent the status and these are shown in Table 1-4 on page 14.

- ▶ **Green** - TPC Copy Services is in "normal" mode. The session is in Prepared state for all defined volumes and maintaining a current consistent copy of the data. Or, the session has successfully processed a Recover command and is in TargetAvailable state with all volumes consistent and no exceptions.
- ▶ **Yellow** - TPC Copy Services is not maintaining a current consistent copy at this time but is working toward that goal. In other words, sessions may have volumes that are actively being copied or pending to be copied, there are no suspended volumes and copy services is temporarily inconsistent but actions are in place to come into duplex state. No action is required to make this become Green as states will automatically, without customer interaction, change the session to Green.

- **Red** - TPC Copy Services has one or more exceptions that need to be dealt with immediately. This could be one or more suspended volumes, a down session (both planned and unplanned), or a volume that should be copying and for some reason is not.

Table 1-4 TPC Symbols

Symbol	Meaning
	The sessions are in a normal state.
	The sessions are in the warning state.
	The sessions are in an error state.
	All storage subsystems can communicate with both the active and standby servers.
	At least one storage subsystem cannot communicate with the active servers.
	No storage subsystems are defined.
	The session is in an inactive state.
	The standby server is defined and synchronized.
	No standby server is defined.

Symbol	Meaning
	The sessions are in a normal state.
	The standby server is synchronizing.

1.5 TotalStorage Productivity Center for Replication console

To assist you with diagnosis and problem determination, TotalStorage Productivity Center for Replication provides a console which is opened its own window when the Console hyperlink is selected from the main GUI left-hand panel as shown in Figure 1-13.

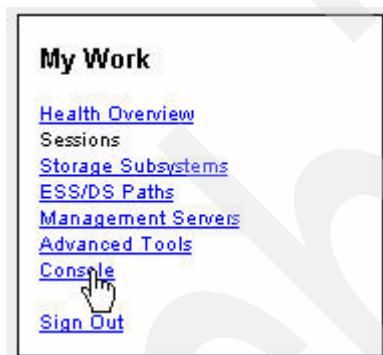


Figure 1-13 Console Selection

As you undertake various actions within TotalStorage Productivity Center for Replication you will find hyperlinks listed (such as adding Storage Subsystems) which will open the console page. In Figure 1-14 on page 16 you see a number of activities have occurred and the related messages. We can also see that the user ID being used is also displayed, in this case u703979.

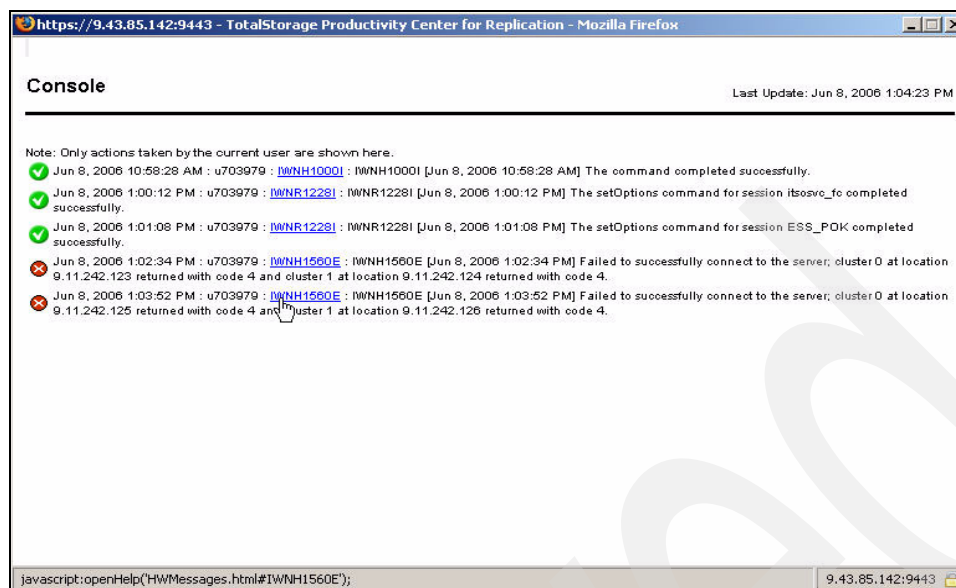


Figure 1-14 Console panel

To assist in error correction, the console lists the message ID as hyperlinks. Clicking on these hyperlinks takes you to the associated Help panels as shown in Figure 1-15.

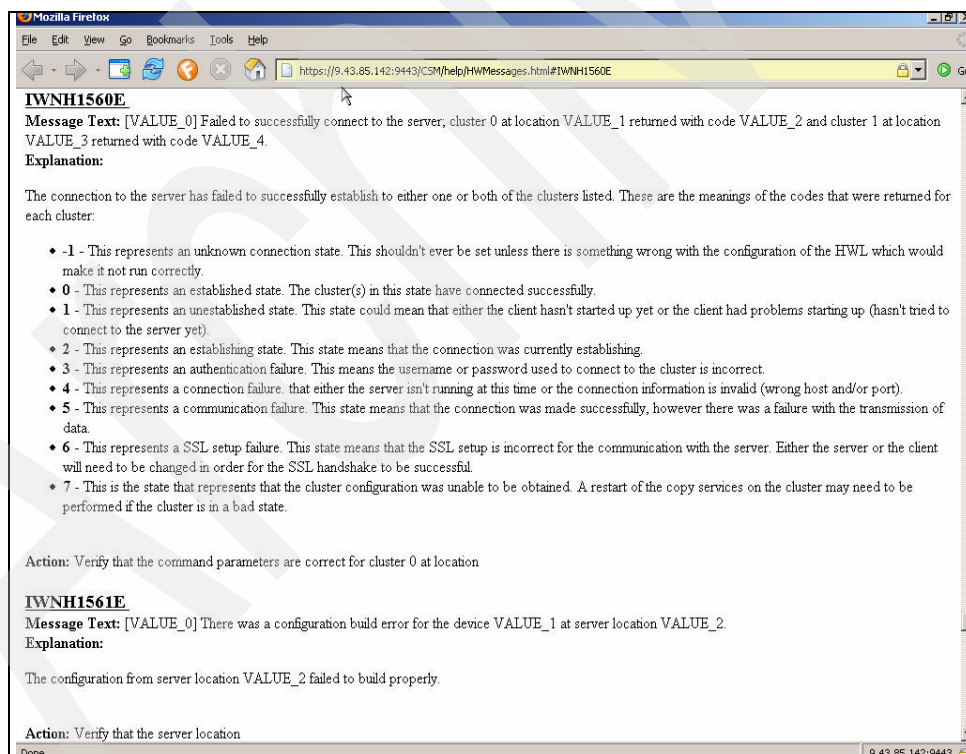


Figure 1-15 Help panel

1.5.1 Command line interface overview

In addition to the GUI interface, a command line interface (CLI) is also provided with your installation. A command-line interface command consists of one to four types of components, arranged in the following order:

- ▶ The *command name*
- ▶ One or more *flags*
- ▶ each followed by any *flag parameters* it might require
- ▶ The *command parameter*

Example 1-1 shows the CLI structure.

Example 1-1 CLI structure

```
csmdi command name -flag flag parameter -command parameter
```

The *command name* specifies the task that the command-line interface is to perform. For example, **lsess** tells the command-line interface to list sessions, and **mksess** tells the command-line interface to create a session.

Flags modify the command. They provide additional information that directs the command-line interface to perform the command task in a specific way. For example, the **-v** flag tells the command-line interface to display the command results in verbose mode. Some flags may be used with every command-line interface command. Others are specific to a command and are invalid when used with other commands. Flags are preceded by a hyphen (-), and may be followed immediately by space and a flag parameter.

Flag parameters provide information that is required to implement the command modification that is specified by a flag. If you do not provide a parameter, then a default value is assumed. For example, you can specify **-v on**, or **-v off** to turn verbose mode on or off; but if you specify **-v** only, then the flag parameter is assumed to be on.

The *command parameter* provides basic information that is necessary to perform the command task. When a command parameter is required, it is always the last component of the command; and it is not preceded by a flag. Some commands permit multiple command parameters with each parameter separated by a blank space and not a comma (unlike flag parameters that allow multiple values).

The CLI can be invoked in three different ways:

- ▶ Single-shot
 - **cli> csmdi mkcpset -ctype fc mySession**
- ▶ Script
 - **cli> csmdi -script ~/scripts/volreport**
- ▶ Interactive
 - **cli> csmdi**

Full details of the CLI can be found in the manual *IBM TotalStorage Productivity Center for Replication Command-Line Interface User's Guide*, SC32-0104.

Help can be obtained for the relevant syntax via the commands shown in Figure 1-16 on page 18. In the first command **csmdi help**, we request generic help and as a result we are presented with a list of valid commands. In the second instance we are requesting help on a specific command via the **csmdi help rmssess**.

```

C:\CSM-CLI>csmdi help
adddevice      lsdevice      lsvol      rmsess
chdevice       lshaservers   mkcpset    rmsnmp
chsess         lsiss         mklogpkg   rmstdby
cmdsess        lspair        mkpath     setasstdby
exit           lspath        mksess     setoutput
hareconnect    lsrolepairs   mksnmp     setparameter
hatakeover     lsrolescpset  quit       setstdby
help           lssess        repcli     showcpset
lsavailports   lssessactions rmcpsset   showdevice
lscpsset       lssessdetails rmdevice   showha
lscptypes      lssnmp        rmpath     showsess

C:\CSM-CLI>csmdi help rmsess
rmsess

Use the rmsess command to delete an existing session.

Syntax

>>-rmsess-- --+-----+-- --session_name--+-[...]-+-----><
              '- -quiet-'                      '- -'

-quiet
  An optional parameter that turns off the confirmation prompt for this
  command.

session_name [...] | -
  Specifies the session name to delete. Separate multiple session names
  with a white space between each name. Alternatively, use the dash (-)
  to specify that input for this parameter comes from an input stream
  (STDIN).

You can use the rmsess command to delete an existing session.

* Session session_name successfully deleted.
* Session session_name does not exist.
* Cannot delete a session currently in progress. Stop the session
  before attempting to delete it.

An invocation example:

rmsess session2

The resulting output:

Are you sure you want to delete session session2? Y/N
Y
Session session2 successfully deleted.

C:\CSM-CLI>

```

Figure 1-16 CSMCLI help

TPC for Replication planning

In this chapter we explain the necessary activities to successfully deploy TotalStorage Productivity Center for Replication within your environment.

This includes:

- ▶ Hardware and software requirements
- ▶ How to connect TPC for Replication servers to storage subsystems
- ▶ TPC for Replication licensing

Additional planning information and documents which provide information about how to plan for TPC for Replication are listed in the bibliography under, “Related publications” on page 389.

2.1 TPC for Replication installation planning

The IBM TotalStorage Productivity Center for Replication V3.1 installation is completed in two steps:

1. Installation of IBM DB2 UDB Express V8.2
2. Installation of IBM TotalStorage Productivity Center for Replication V3.1 and the optional upgrade to IBM TotalStorage Productivity Center for Replication Two Site BC.

The following sections describe the hardware and software prerequisites for a successful installation.

2.2 Hardware and software requirements

This section contains the hardware and software requirements for the TPC for Replication V3.1 servers and subsystems. Note that the hardware and software requirements for the TPC for Replication servers are the same for the back-up servers for a High Availability environment. Thus both the active and the standby servers need to meet all minimum requirements specified below.

2.2.1 Minimum hardware requirements

These requirements must be met before installation of DB2 and TPC for Replication.

For Windows and Linux:

- ▶ IBM eServer™ xSeries or other Intel® compatible Workstation with a 1.5 GHz Intel Pentium® III processor
- ▶ 2 GB RAM minimum
- ▶ 10 GB of disk space for TPC-RM code and DB2 UDB minimum
- ▶ CD-ROM drive

For AIX:

- ▶ IBM eServer pSeries® server with IBM POWER4™ or IBM POWER5™ processor, 1 GHz
- ▶ 2 GB RAM minimum
- ▶ 10 GB of free disk space for TPC-RM code and DB2 UDB minimum

2.2.2 Operating system requirements

One of the following operating systems is required for your TPC for Replication workstation or server:

- ▶ Windows 2003 Server Edition
- ▶ Windows 2003 Enterprise Edition SP1
- ▶ AIX 5.3 ML3
- ▶ Red Hat Enterprise Linux 4, RHEL 4 with Update 1
- ▶ SUSE Linux Enterprise Server 9 SP2

If you attempt to install TPC for Replication on a server that does not meet the operating system requirements, the message in Figure 2-1 on page 21 is displayed.

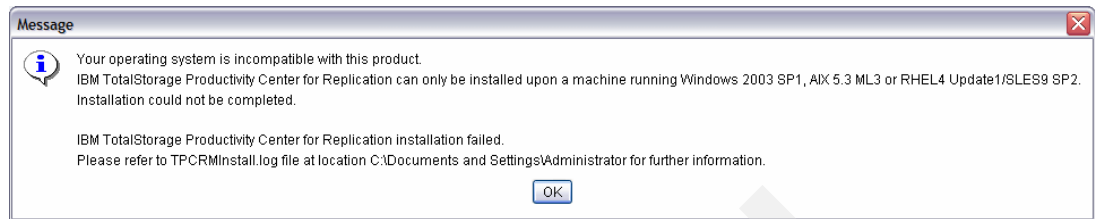


Figure 2-1 Error message for incompatible operating system

2.2.3 GUI Client software requirements

This section details the GUI Client software requirements.

Web browser requirements

The following Web browsers are supported by TPC for Replication V3.1:

- ▶ Windows Internet Explorer® Version 6.02 or greater
- ▶ Mozilla Firefox Version 1.5 or greater
- ▶ FireFox Version 1.5 or greater

Internet security settings

Note that all connections between the server, clients and hardware components are secured via Secure Sockets Layer (SSL) protocol. The default Internet Explorer security settings on Windows 2003 Server inhibit some GUI features from working properly. Therefore if you run the TPC for Replication GUI with Internet Explorer on Windows 2003 server, you need to lower your security settings.

To lower your Internet Explorer browser security settings, open your Internet Explorer browser and click **Tools** → **Internet Options**. Click the Security tab. On the security Panel click the **Custom Level** button and this will open the Security Settings panel. Then select Low in the reset custom settings drop-down menu and then click the **Reset button** (see Figure 2-2).

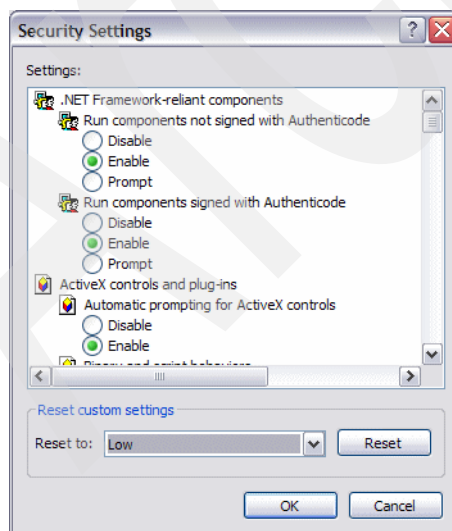


Figure 2-2 Resetting custom settings to Low

Database requirements

IBM DB2 UDB Express V8.2 is a required prerequisite for TPC for Replication.

When you install IBM TotalStorage Productivity Center for Replication a DB2 database instance is created as well.

2.2.4 Advanced Copy features and Licensed Internal Code requirements

Your IBM Storage Subsystem(s) require advanced copy feature codes to support Copy Services like FlashCopy, Metro Mirror, and Global Mirror with ESS 800, DS6000, and DS8000.

Note that Copy Services links are based on FCP only and there is no support any more for DS6000 and DS8000 with PPRC over ESCON®.

You need corresponding SVC licenses for Copy Services when utilizing a SVC configuration.

In order to support TPC for Replication the following minimum LIC levels are required:

- ▶ ESS 800 requires LIC level of 2.4.3.26 or greater
- ▶ DS6000 requires a code level 6.2.2.49 or later
- ▶ DS8000 requires a code level 6.2.200.99 or later.

DS8000 additionally requires feature codes 1801/1802/1803 for Ethernet adapter pairs to connect to TPC for Replication servers. See 2.3.6, “TPC for Replication server and DS8000 connectivity” on page 27.

2.3 Connect servers to storage subsystems

TPC for Replication is an outboard approach and its software runs on a dedicated server or on two servers for a high availability configuration.

TPC for Replication servers connect through a LAN to the storage subsystems. When connecting to SAN Volume Controllers (SVCs), TPC for Replication connects to the SVC Master Console but not directly to the actual storage subsystems which are managed by the SVC. With the ESS800, DS6000 and DS8000, TPC for Replication connects through a LAN directly to the actual storage servers, although it is a bit different for each of the three storage servers (ESS 800, DS6000, and DS8000). The following sections discuss this in more detail.

2.3.1 Physical planning and firewall considerations

Since TPC for Replication communicates down an IP path, you must ensure that your TPC for Replication Server has the necessary access to all required infrastructure.

If you will be running in a High Availability environment where you have TPC for Replication installed on two servers with one server running in active mode and the second one in standby mode, make sure that both servers can communicate with each other and that they are authenticated through all firewalls. Remember that if the firewall times out on either server, it will require re-authentication to allow communication between servers.

Also ensure that your ICAT server is authenticated to enable communication with the TPC for Replication server. The firewall may timeout and block communication, thus re-authentication is necessary to allow communication between servers.

2.3.2 TCP/IP ports used by TPC for Replication

TPC for Replication utilizes a range of ports to communicate with various aspects of the environment. In certain circumstances the TPC for Replication will spawn additional ports either locally or remotely for communication purposes. Since these ports are random, it may be necessary to establish a VPN between endpoints or put in place a firewall rule to ensure communications continue where firewalls are in the IP path.

Table 2-1 TCP/IP ports

Usage	Port	Direction
TPC to SVC CIMOM	5999	bidirectional
TPC to ESS/DS CCW	2433	bidirectional
Remote CSMCLI to TPC	5110	bidirectional
TPC to TPC (HA)	5120	bidirectional
TPC GUI - HTTPS	9443	bidirectional
TPC GUI - HTTP	9080	bidirectional
SNMP	162	bidirectional

2.3.3 SAN Volume Controller

We can see in Figure 2-3 that the communications interface between the SVC and TPC for Replication is the CIMOM installed on the SVC Master Console.

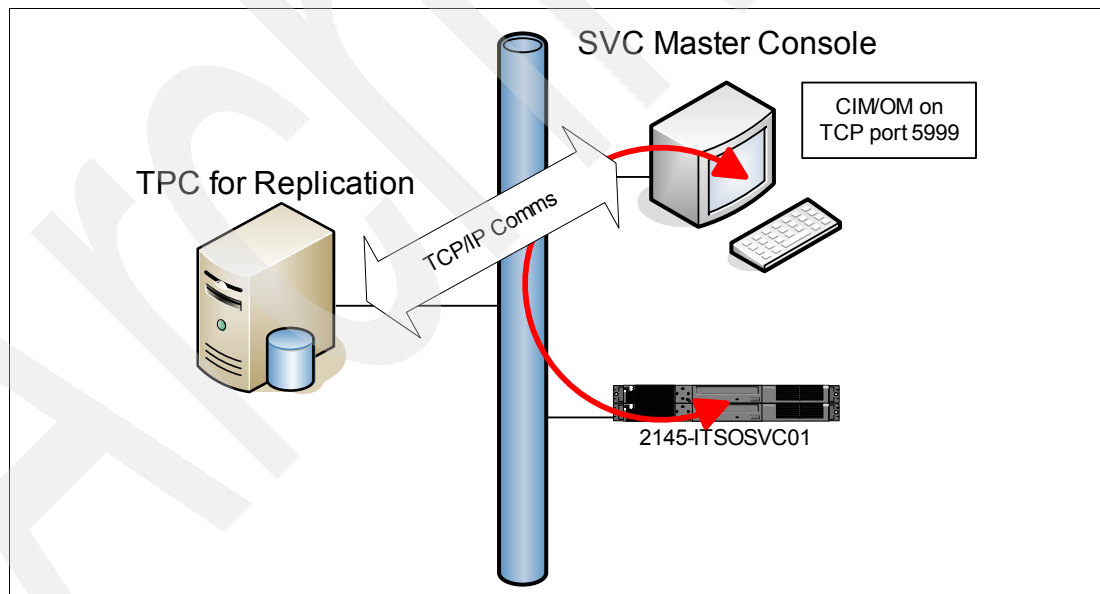


Figure 2-3 SVC communications

We can see in Figure 2-4 on page 24 that the SVC IP connections for the Master Console and individual nodes must be network accessible. No additional SVC infrastructure is required.

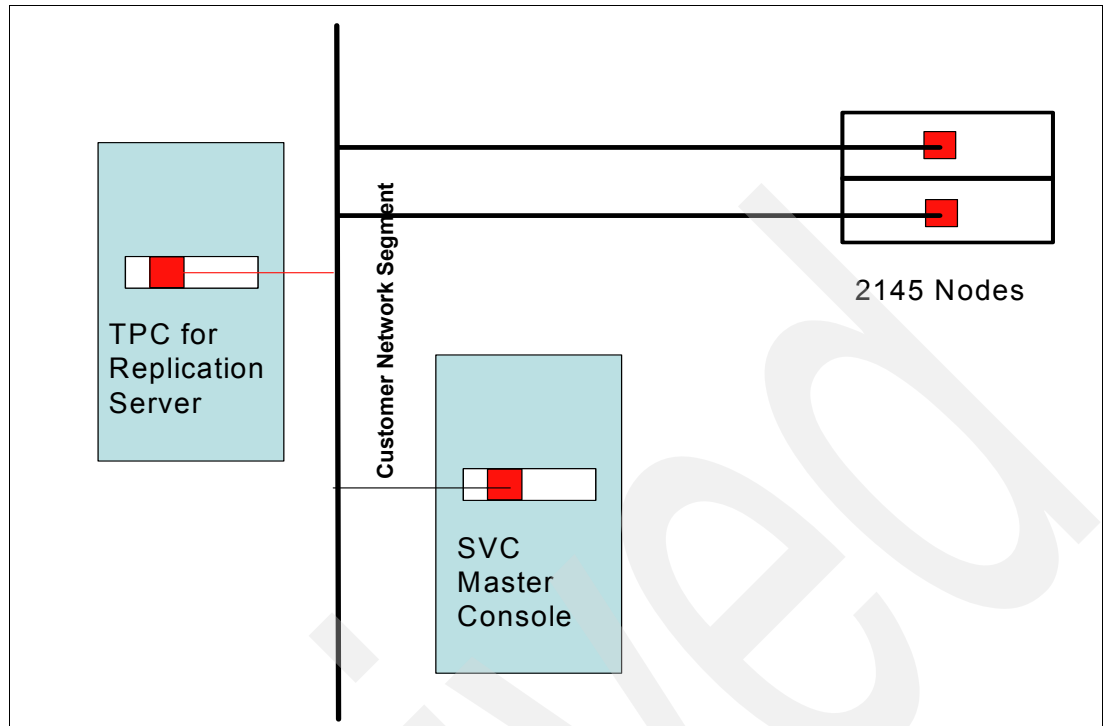


Figure 2-4 SVC cabling

2.3.4 TPC for Replication Server and ESS 800 connectivity

With the Enterprise Storage Server, ESS 800, the communications between the ESS and the TPC for Replication server is carried over a CCW interface to enable faster processing of application requests. In this case the TCP/IP port used is 2433.

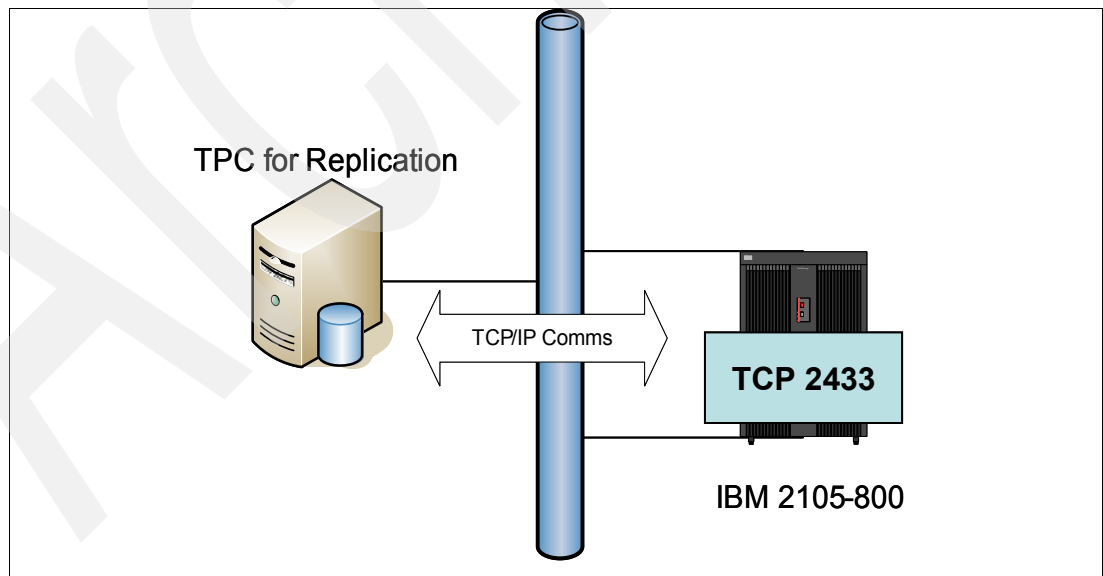


Figure 2-5 ESS communications

As with the SVC the ESS subsystem will have established IP connectivity as part of its deployment. TPC for Replication needs access to the IP network to enable the two environments to communicate.

We can once again see in Figure 2-6 the attachment schema.

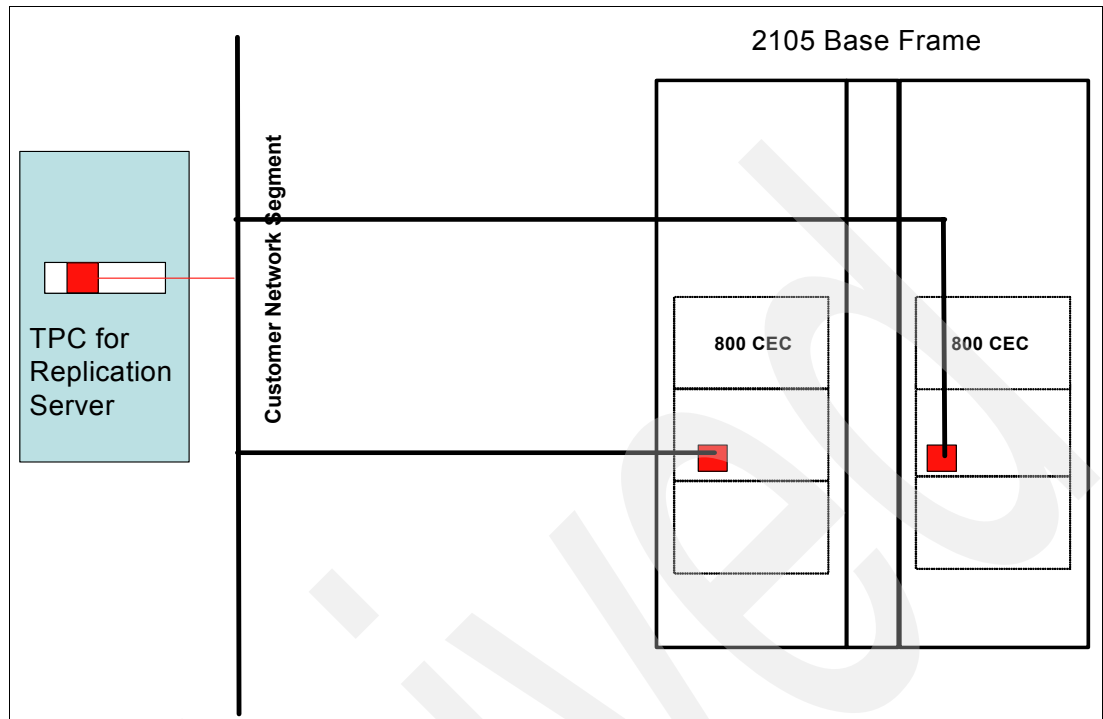


Figure 2-6 ESS connectivity

2.3.5 TPC for Replication server and DS6000 connectivity

As with the SVC and ESS 800 the DS6000 subsystem needs IP connectivity as part of its deployment. As such TPC for Replication requires access to the IP network to enable the two environments to communicate with each other. Figure 2-7 on page 26 displays the basic connectivity layout for TPC for Replication server and how to its connects to the DS6000.

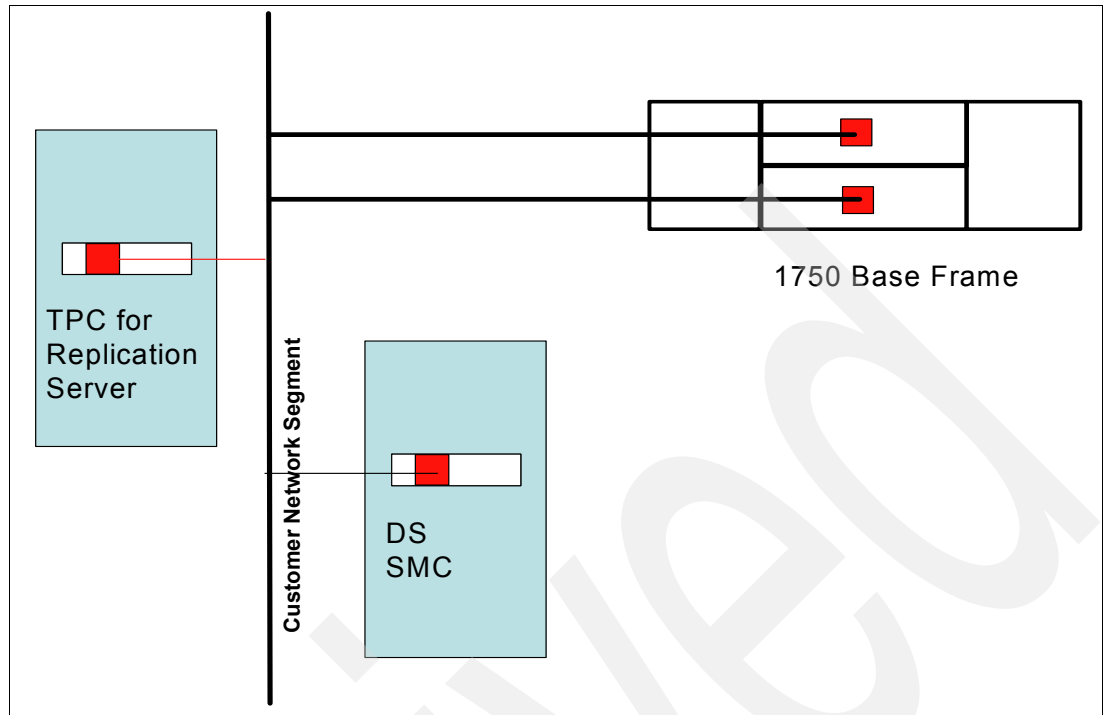


Figure 2-7 DS6000 connectivity

Note that TPC for Replication does not connect to the SMC. The SMC as an external server does provide the interface to the DS6000 and through its software stack it offers access to the DS6000 controllers through the GUI or the DSCLI. Both applications execute against the SMC.

As Figure 2-8 on page 27 shows this is different with TPC for Replication and how the server connects to the DS6000. TPC for Replication shares the same internal DS6000 network which the SMC already utilizes. But TPC for Replication communicates directly to the DS6000 servers which are server0 and server1 as shown in Figure 2-8 on page 27.

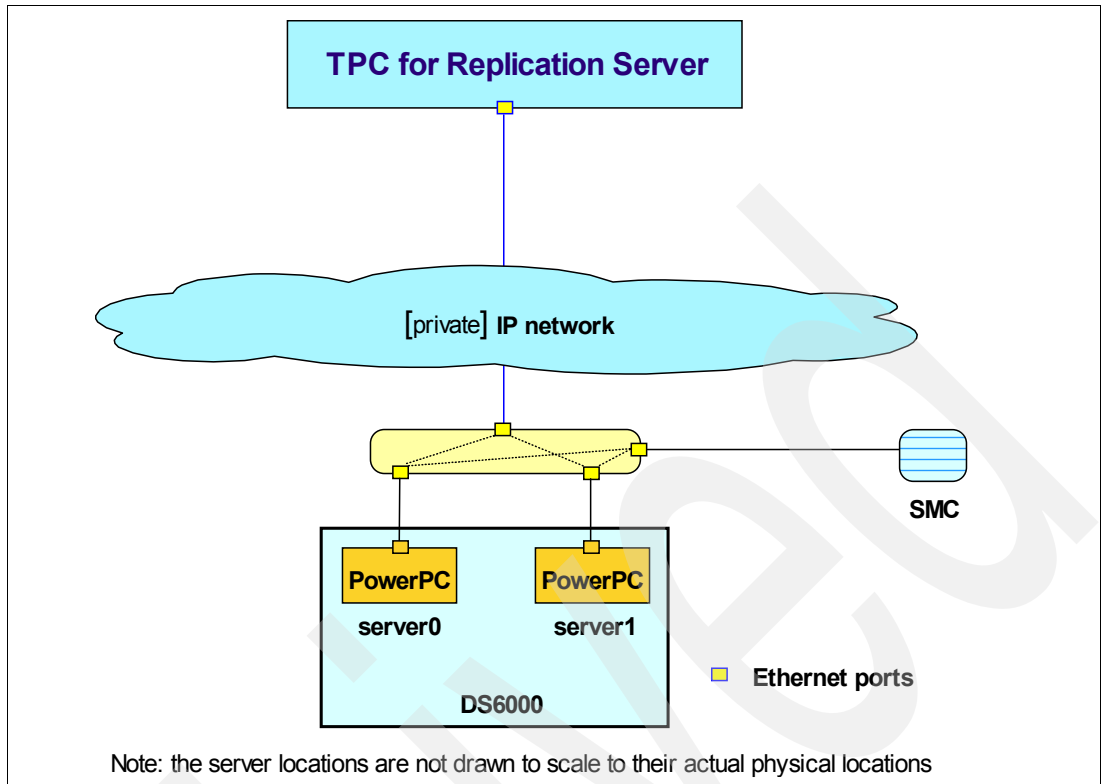


Figure 2-8 TPC for Replication server connection to DS6000

After TPC for Replication server connects to the DS6000 network, define the storage server (here the DS6000) to the TPC for Replication server. See Chapter 5, "Using TotalStorage Productivity Center for Replication on Windows 2003" on page 85 for details.

2.3.6 TPC for Replication server and DS8000 connectivity

The connectivity from a TPC for Replication server to a DS8000 is different from all other storage servers.

The actual connectivity between the TPC for Replication server and the storage servers is based on particular Ethernet ports in the Series p in the DS80000. This particular Ethernet card is a new card and slides into the first slot out of these four or five slots in the p570 in the rear of the DS8000 base frame as Figure 2-9 on page 28 shows.

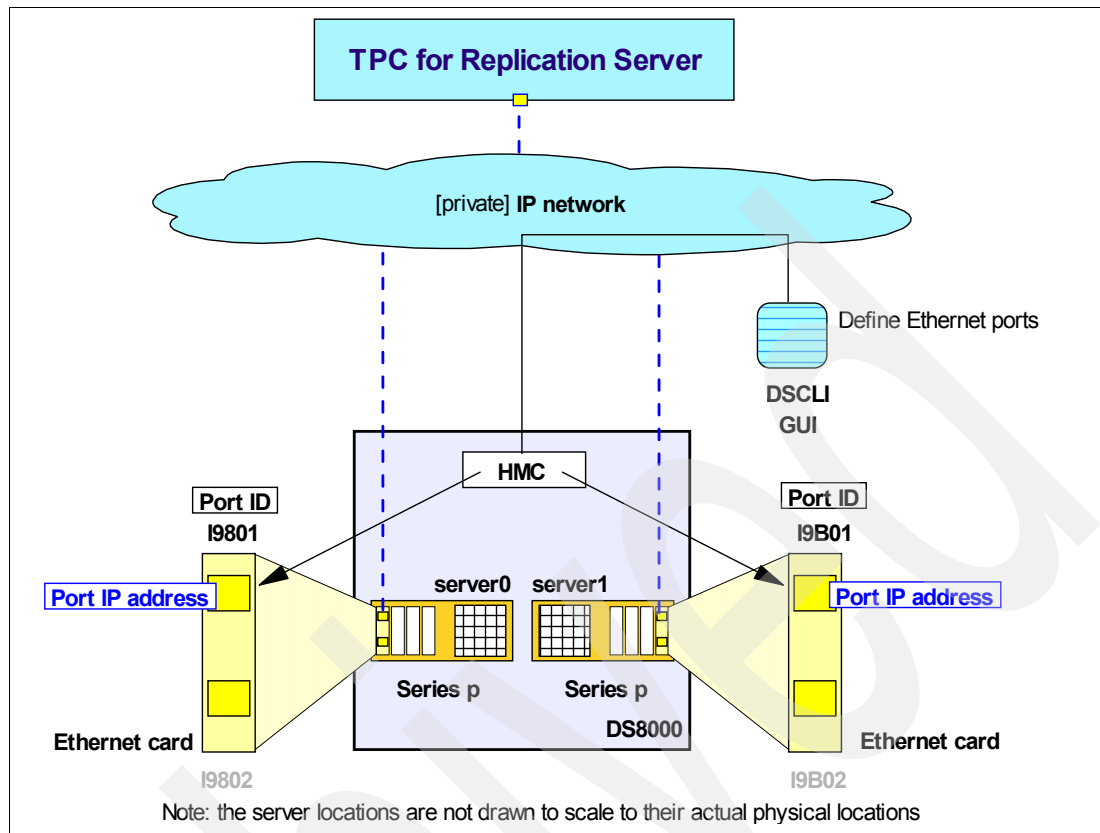


Figure 2-9 Define Ethernet ports for TPC for Replication server connectivity to DS8000

The HMC is used to configure these new Ethernet ports. This is done either through the DSCl or via the GUI. Note that this only assigns an IP address to the ports and also defines the internal DS8000 network of the DS8000 but does not actually connect the TPC for Replication server to the ports. Figure 2-9 shows that only the upper port in each Ethernet card is used and defined to which the TPC for Replication server later connects to and communicate directly to the DS8000 servers, server0 and server1.

Once the Ethernet ports are defined and have an IP address assigned to then define the DS8000 to the TPC for Replication server through a corresponding task in the TPC for Replication server. For more information, refer to 5.4, "TPC for Replication and DS8000" on page 197.

2.3.7 New DS8000 Ethernet card feature codes

This new Ethernet card is required for TPC for Replication and available for the following DS8000 models:

- ▶ 921, 922, 931, and 932 with feature code 1801 for the Ethernet adapter pair. Note that you always need a pair of cards, because one Ethernet card installs in sever0 and a second card installs in server1
- ▶ 9A2 and 9B2 with feature code 1802 for the Ethernet adapter pair for the first LPAR.
- ▶ 9A2 and 9B2 with feature code 1803 for the Ethernet adapter pair for the second LPAR.

These features are chargeable and carry a minimum monthly maintenance charge.

This new Ethernet card may come installed from the plant site or they install concurrently in the field.

To configure the Ethernet ports, refer to Chapter 4, “Post installation tasks on Windows 2003” on page 61.

2.4 TotalStorage Productivity Center for Replication licensing

IBM TotalStorage Productivity Center for Replication and IBM TotalStorage Productivity Center for Replication Two Site BC use a new capacity pricing model. The new model consists of six tiers, which are to be used cumulatively. All tiers must be used, in order, to get to the desired total amount of terabytes (TBs). This model will help ease the pricing for larger environments or as your environment grows.

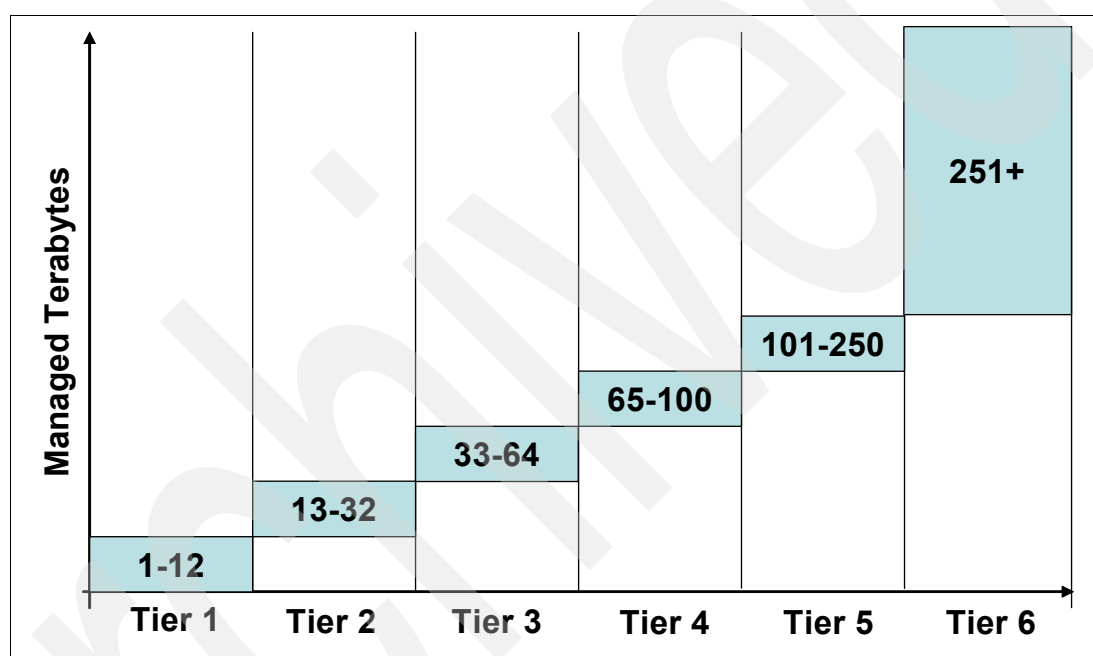


Figure 2-10 License tiering methodology

2.5 Pre-installation steps

Before you begin the installation of IBM TotalStorage Productivity Center for Replication, ensure that the system environment is set correctly and install the prerequisite applications. Complete the following steps to ensure your system environment is ready.

- ▶ Ensure you have authority to log on as a local administrator with Administrator authority for Windows systems or root authority for Linux and AIX systems.
- ▶ Ensure that you do not have any port conflicts. See “TCP/IP ports used by TPC for Replication” on page 23 to see the list of ports used by TPC for Replication. To find the port numbers used in a Windows system use the netstat command as shown in Example 2-1. This example shows that all these ports are already active which tells us this system has a TPC for Replication server installed and active.

Example 2-1 Check port assignments in the system which are going to host TPC-RM server

C:\>**netstat -a**

Active Connections

TCP	Stops:5110	Stops:0	LISTENING
TCP	Stops:5120	Stops:0	LISTENING
.....			
TCP	Stops:9080	Stops:0	LISTENING
.....			
TCP	Stops:9443	Stops:0	LISTENING
.....			
TCP	Stops:1258	9.155.51.58:2433	ESTABLISHED
TCP	Stops:1259	9.155.51.59:2433	ESTABLISHED
.....			
TCP	Stops:5110	Stops:1050	ESTABLISHED
TCP	Stops:5110	Stops:1286	ESTABLISHED
TCP	Stops:5110	Stops:1689	ESTABLISHED
.....			

C:\>

- ▶ Ensure your TPC for Replication servers meet all minimum hardware and software requirements as described in “Hardware and software requirements” on page 20.
- ▶ Ensure your server(s) are authenticated if behind a firewall and that it can communicate with your storage devices and with your secondary server if running in High Availability mode.
- ▶ Ensure your storage devices have the advanced copy feature codes and licenses installed.

You are now ready to install DB2 and IBM TotalStorage Productivity Center for Replication.

Installation on Windows 2003

This chapter guides you through the installation of TotalStorage Productivity Center for Replication on the Windows 2003 Server platform.

The TotalStorage Productivity Center for Replication (TPC for Replication) product uses DB2 as its information repository. Therefore, DB2 is an installation prerequisite for the installation of TPC for Replication.

After installing DB2 you complete the installation of TotalStorage Productivity Center for Replication in two parts:

- ▶ TotalStorage Productivity Center for Replication Basic
- ▶ TotalStorage Productivity Center for Replication Two Site BC

3.1 DB2 installation

As we stated previously, DB2 must be installed before you install TotalStorage Productivity Center for Replication. Should you attempt to install TPC for Replication without DB2 installed, you will receive the message as shown in Figure 3-1.

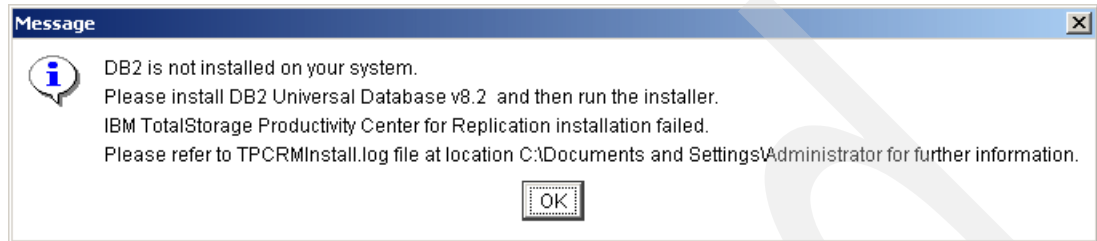


Figure 3-1 TPC for Replication - DB2 warning window

For Windows 2003 Server, you begin the installation of DB2 by running the **setup.exe** file, as shown in Figure 3-2, from the \DB28-2Express\Windows directory found within your installation package.

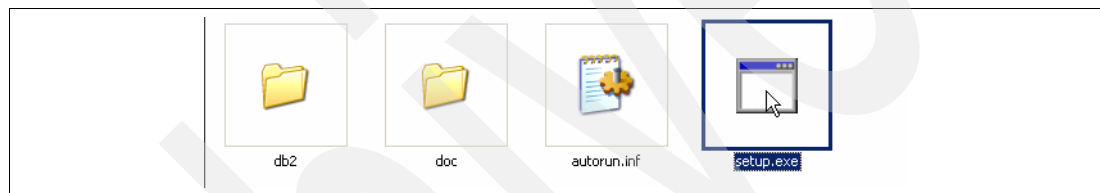


Figure 3-2 DB2 installation directory listing

The following figures contain the installation windows for the installation of DB2 UDB on to your designated TotalStorage Productivity Center for Replication Windows 2003 server. Upon start up of the setup.exe file, the DB2 launchpad window will be displayed as shown in Figure 3-3.

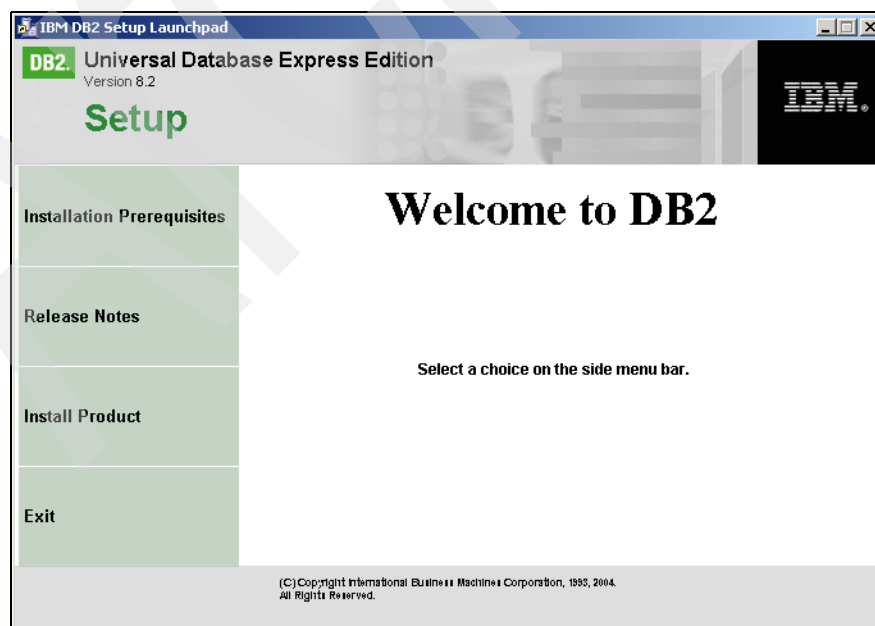


Figure 3-3 DB2 UDB Installation Welcome page

From this window, select and click the **Install Product** tab located on the left-hand side of the launchpad window as shown in Figure 3-4.

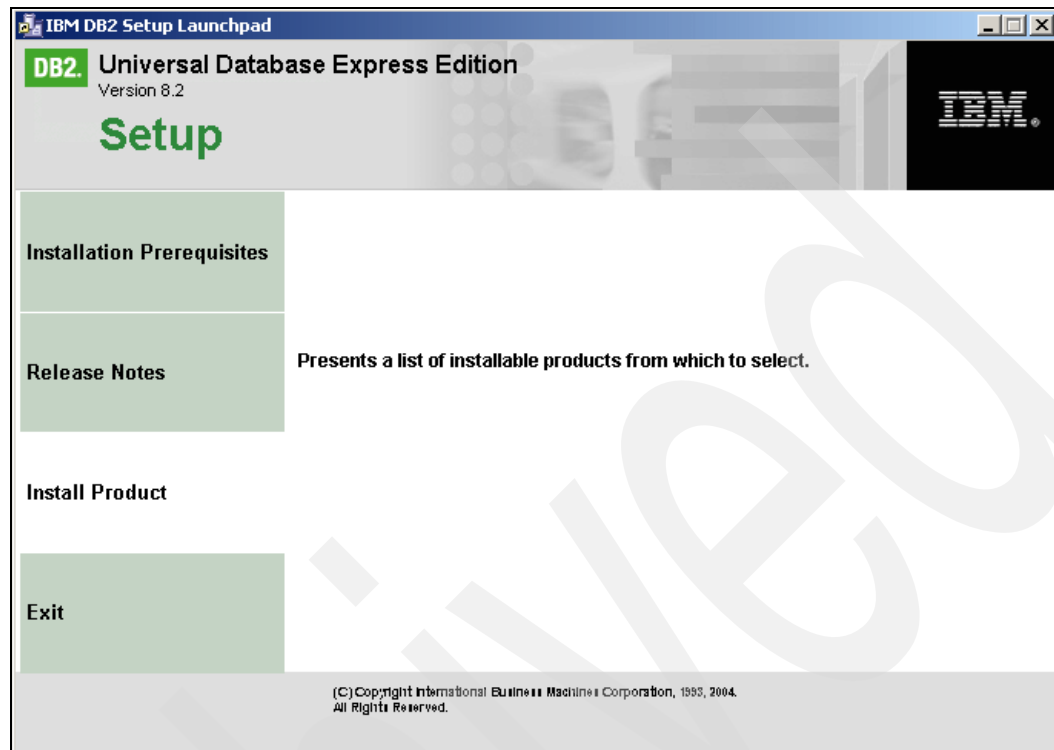


Figure 3-4 DB2 installation Product window

Upon selection of **Install Product**, this will then spawn the *DB2 UDB Express Setup* window as shown in Figure 3-5 on page 34.

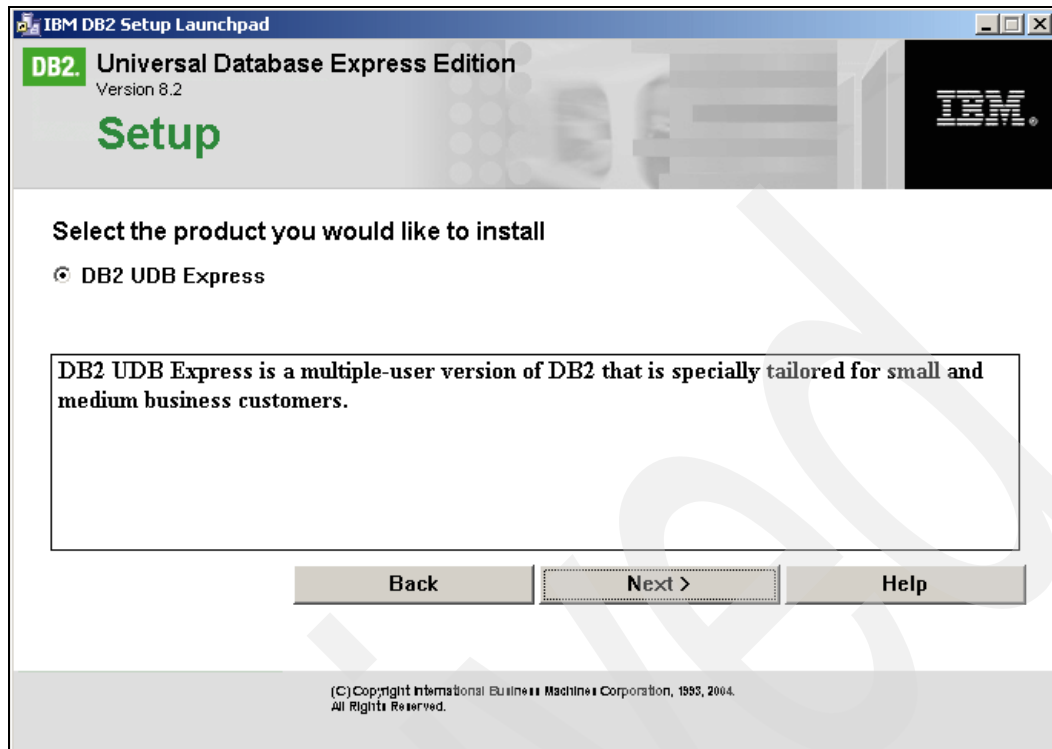


Figure 3-5 DB2 UDB installation

Choose **Next**, which will spawn the window shown in Figure 3-6.

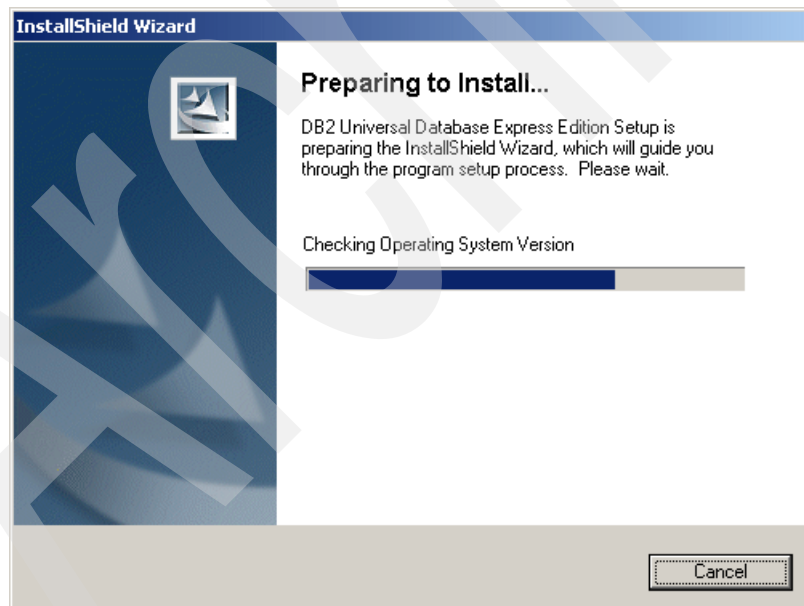


Figure 3-6 DB2 Installer preparation window

The next window is the *DB2 Setup Wizard* window shown in Figure 3-7 on page 35. Click **Next** to continue.

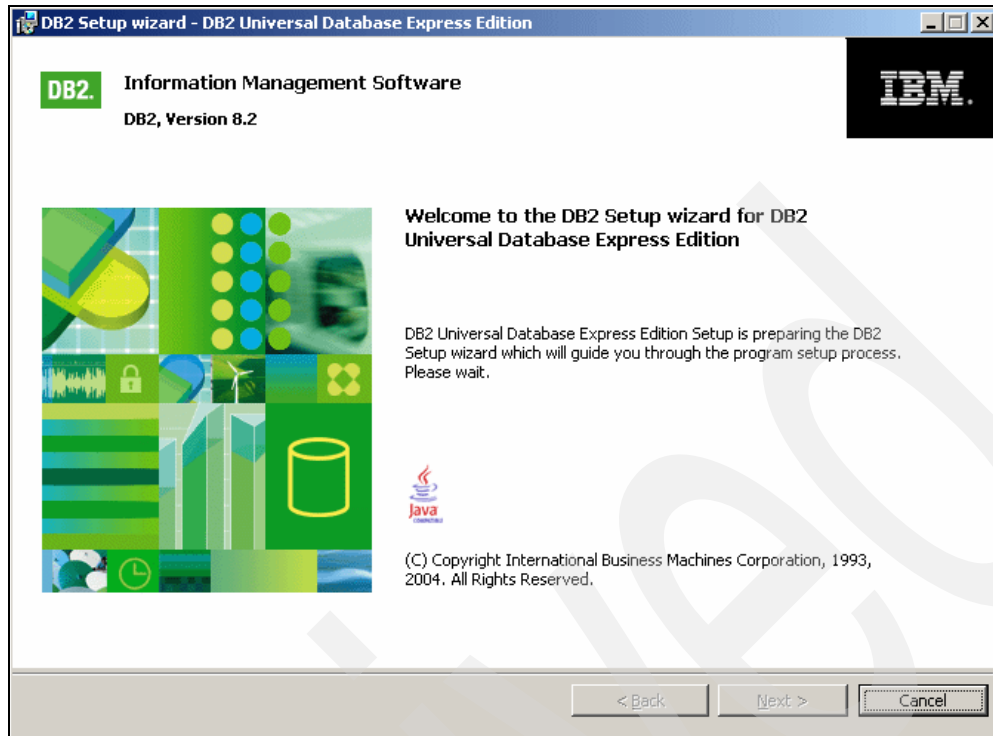


Figure 3-7 DB2 Setup Wizard preparing

Once the Setup Wizard is ready then the *Setup Wizard Welcome* window in Figure 3-8 is displayed.

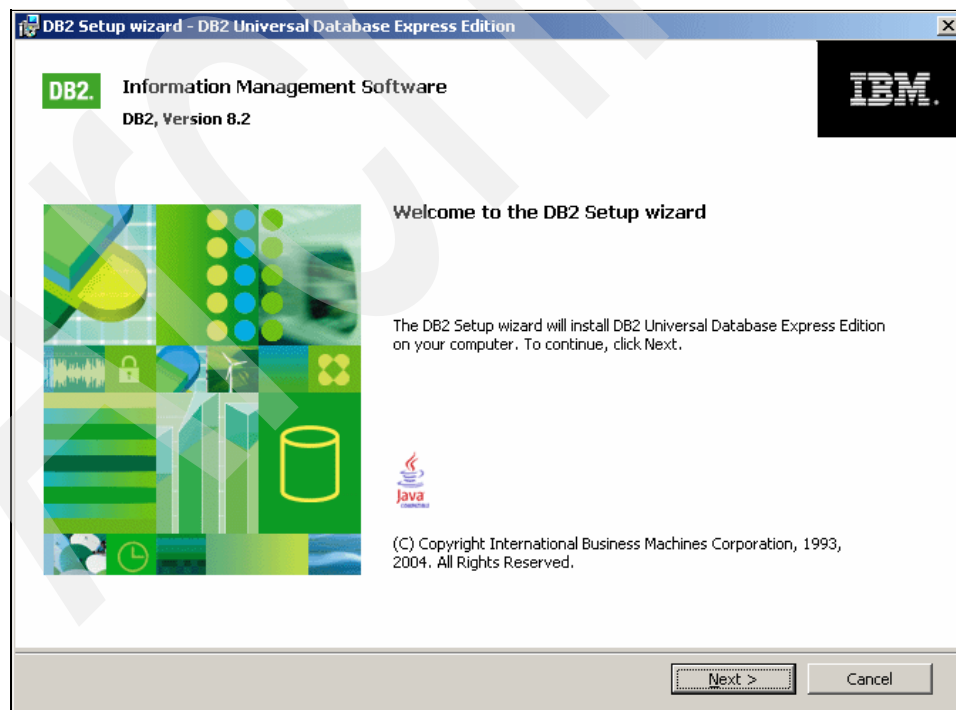


Figure 3-8 DB2 Setup Wizard - welcome

Select the **Next** button and the Licensing window is displayed as shown in Figure 3-9 on page 36.

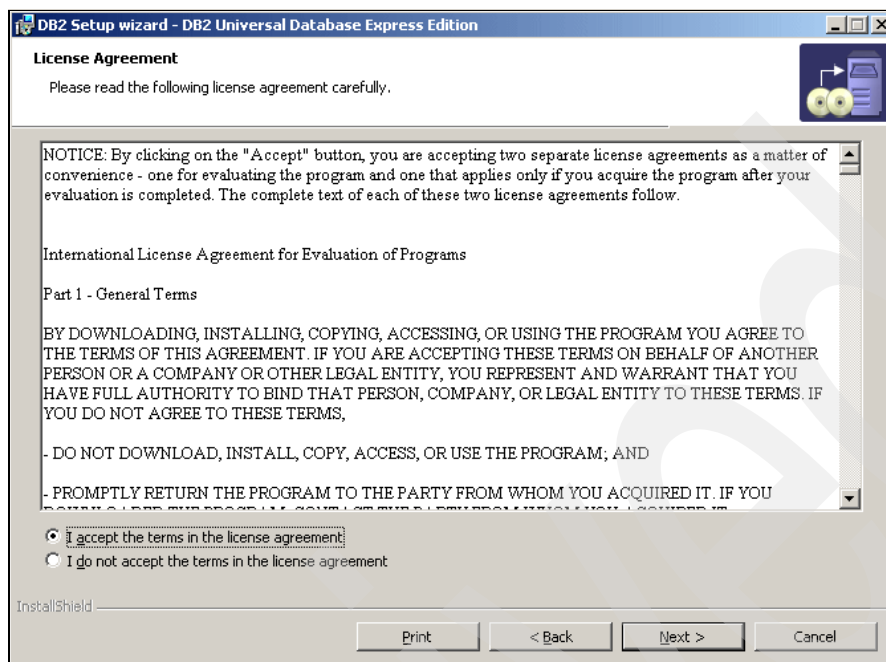


Figure 3-9 DB2 UDB installation License Agreement

Read and accept the licensing terms, then select **Next**. This will display the *Installation type* window as shown in Figure 3-10.

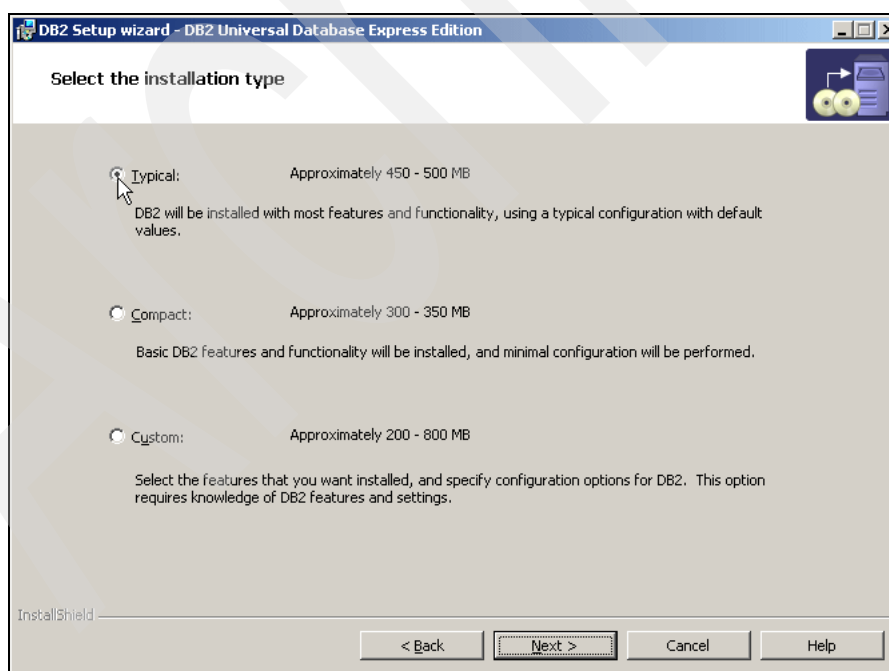


Figure 3-10 DB2 UDB installation type

We recommend that you select Typical as your installation type as this will install all the requisite components needed for your TPC for Replication Server to function. Upon selection

of Typical, click the **Next** button to display the *Installation Location* panel as shown in Figure 3-11 on page 37.

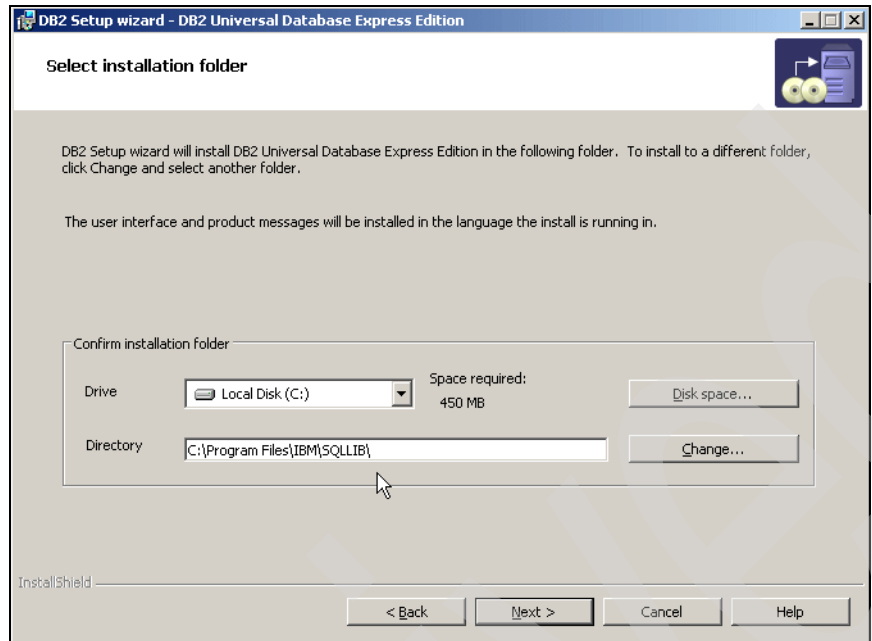


Figure 3-11 DB2 UDB installation location

Modify the locations to meet your deployment standards and click the **Next** button. This will display the window for the DB2 system user IDs and related passwords as shown in Figure 3-12.

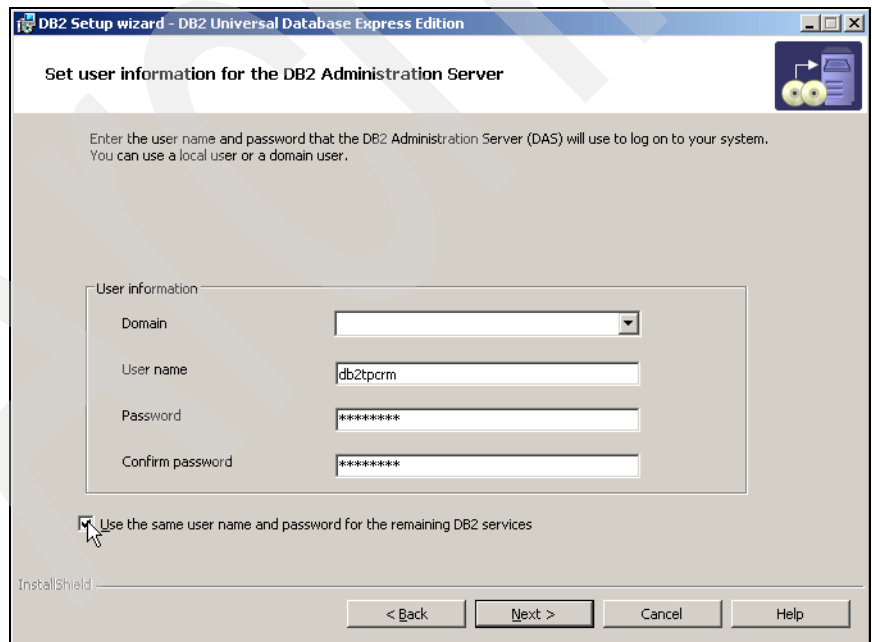


Figure 3-12 DB2 UDB Installation user ID and password

Setup your DB2 administration user ID and password and ensure that the check box for Use the same username and password for the remaining DB2 services is selected. Click the

Next button to display the *Configure DB2 Instances* panels as shown in Figure 3-13 on page 38.

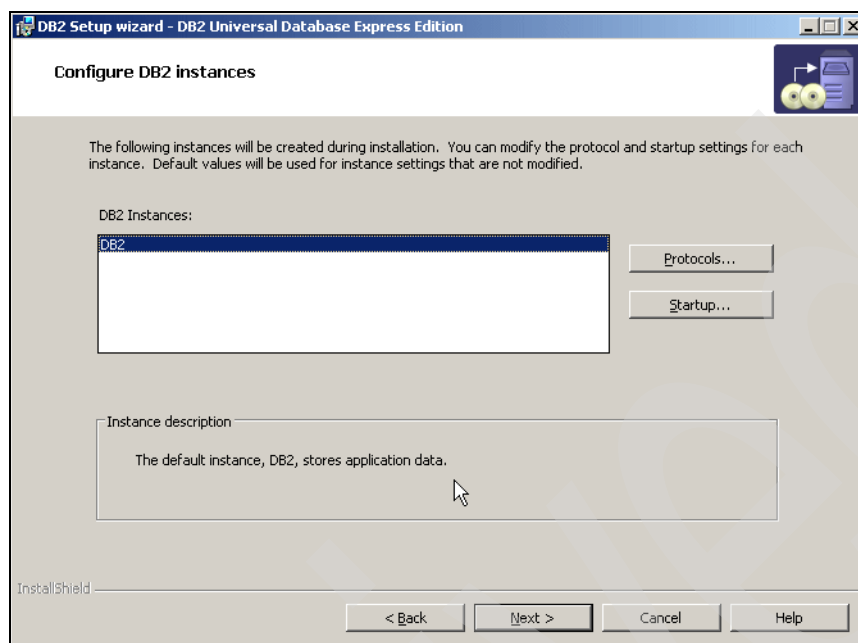


Figure 3-13 DB2 Configuration

Select **Next** to accept the default DB2 instance configuration as shown in Figure 3-14.

Note: If you want to change the TCP/IP configuration, then select the protocols button. This is not recommended. This will then display the window as shown in Figure 3-14.

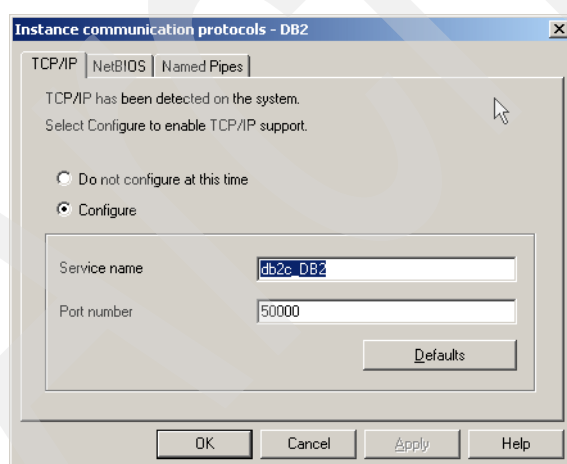


Figure 3-14 DB2 Protocols window

Upon selection of the DB2 Instances, the final configuration window prior to actual software installation is display as in Figure 3-15 on page 39. Should you want to change anything specific, now is your last chance. If you are happy with the options and configurations which you have supplied previously, select the **Install** button to proceed with the DB2 install.

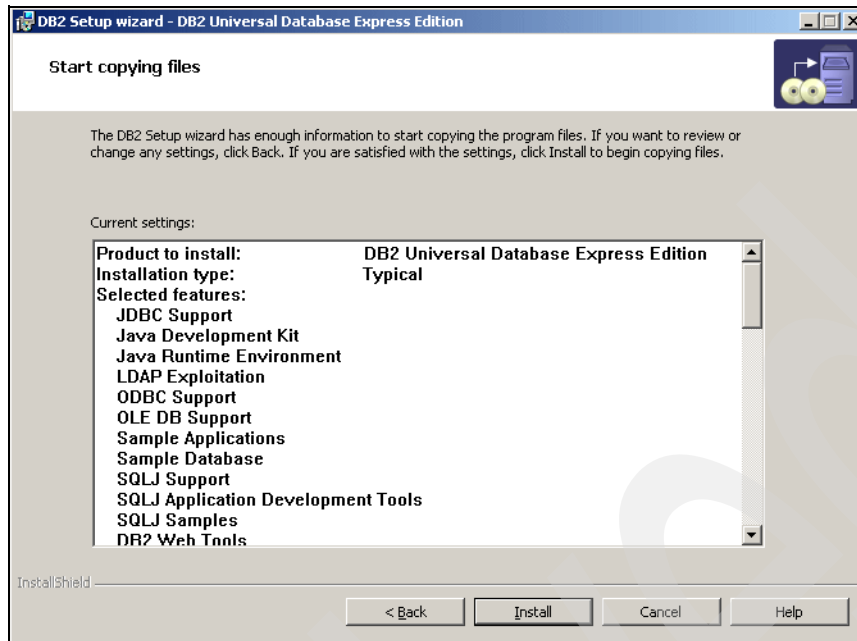


Figure 3-15 DB2 Installation and configuration review

You will see installation progress windows, similar to the one shown in Figure 3-16.

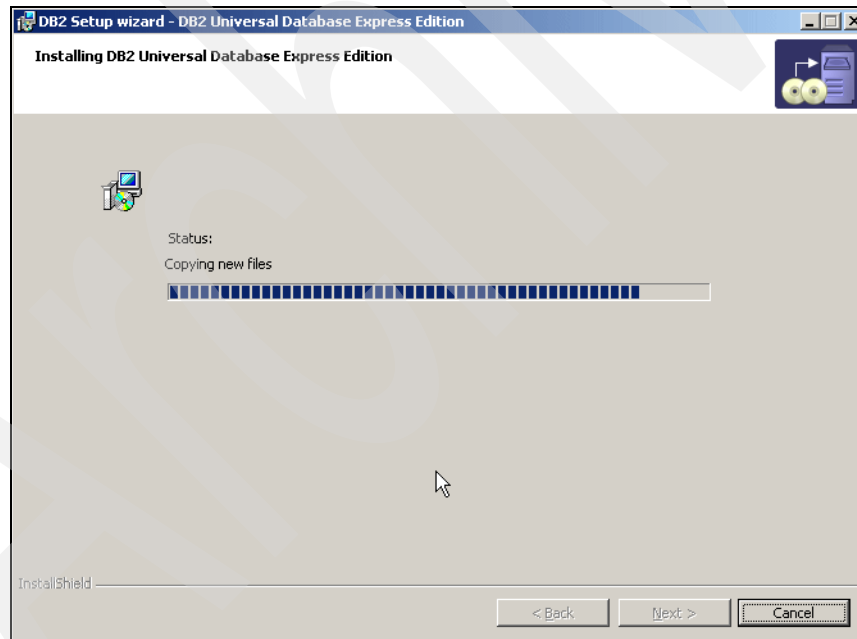


Figure 3-16 Installation progress

Once all the files are installed, the next panel is the Setup Complete as shown in Figure 3-17 on page 40. Click the **Finish** button to continue.

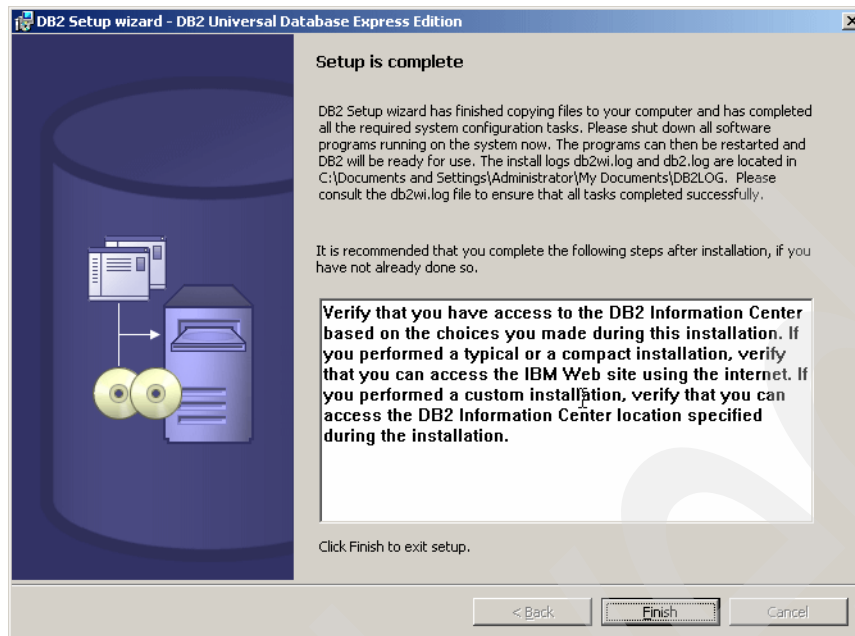


Figure 3-17 DB2 UDB installation complete

This will return you to the *DB2 Launchpad* window as displayed in Figure 3-18.

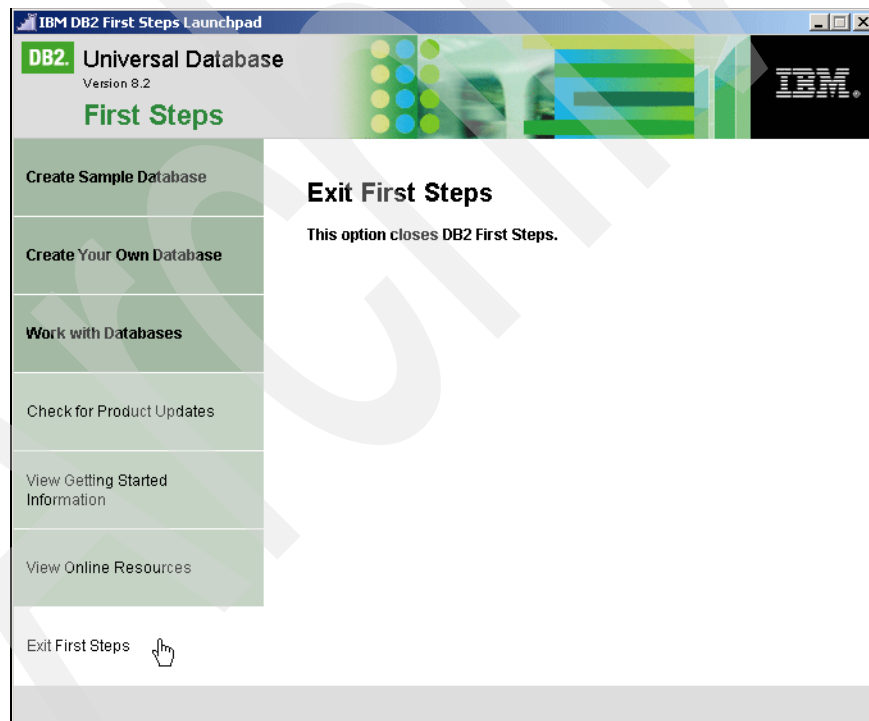


Figure 3-18 DB2 Launchpad

You have now completed the prerequisite DB2 installation and are now ready to install the IBM TotalStorage Productivity Center for Replication software. Click the Exit First Steps tab. The next section describes the TPC for Replication install.

3.2 TPC for Replication installation

There are two TotalStorage Productivity Center for Replication V3.1 products as described in 1.2, “TotalStorage Productivity Center product set” on page 4. You must install the TotalStorage Productivity Center for Replication Basic package before installing the TotalStorage Productivity Center for Replication Two Site BC or Advanced Edition. If you attempt to install TotalStorage Productivity Center for Replication Two Site BC first you get the error message shown in Figure 3-19.



Figure 3-19 Failed TotalStorage Productivity Center for Replication installation

To start the Windows 2003 installation of TPC for Replication v3.1, run the **setupwin32.exe** found in the source installation directory as shown in Figure 3-20.

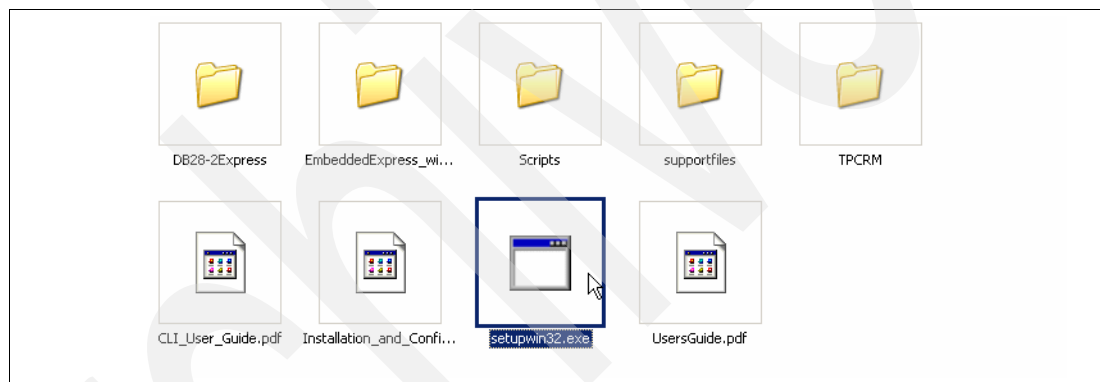


Figure 3-20 TPC for Replication source installation directory

This will start the Java installer and display the InstallShield window as shown in Figure 3-21.

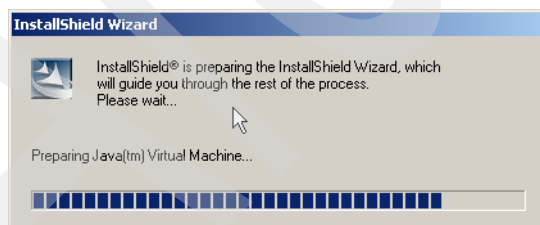


Figure 3-21 InstallShield Wizard

The next window you see is the Welcome to the InstallShield Wizard as shown in Figure 3-22 on page 42. Click **Next** to continue.

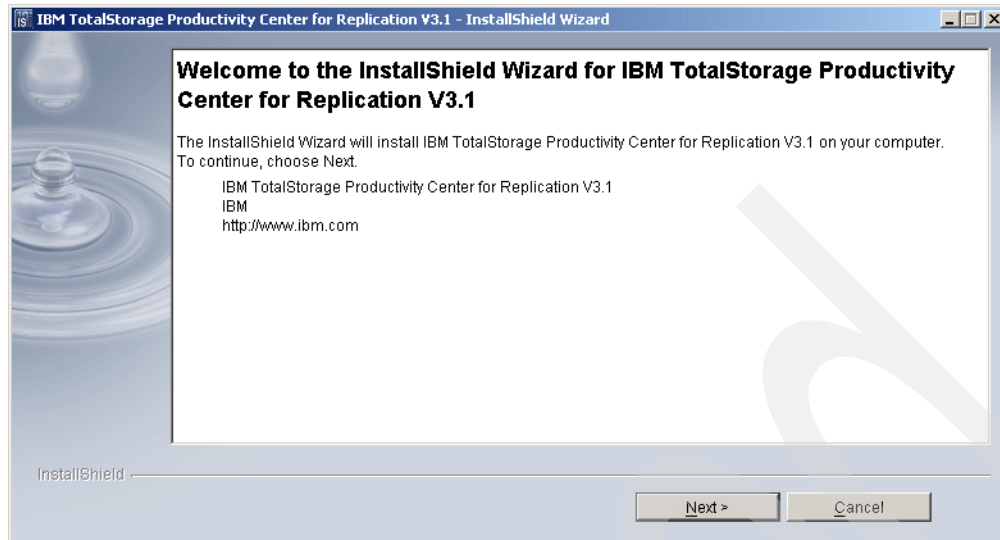


Figure 3-22 TPC for Replication Installation Welcome

The system performs a system prerequisite check to ensure you are running a supported operating system at the required level as shown in Figure 3-23. Click **Next** to continue.

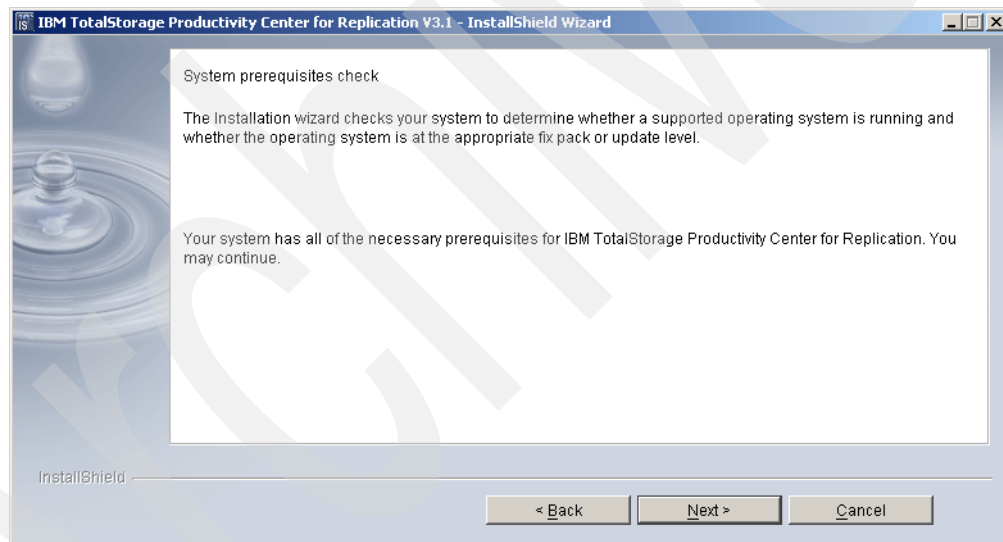


Figure 3-23 Installation prerequisite check

Read and accept the licensing terms as shown in Figure 3-24 on page 43. Click **Next** to continue.

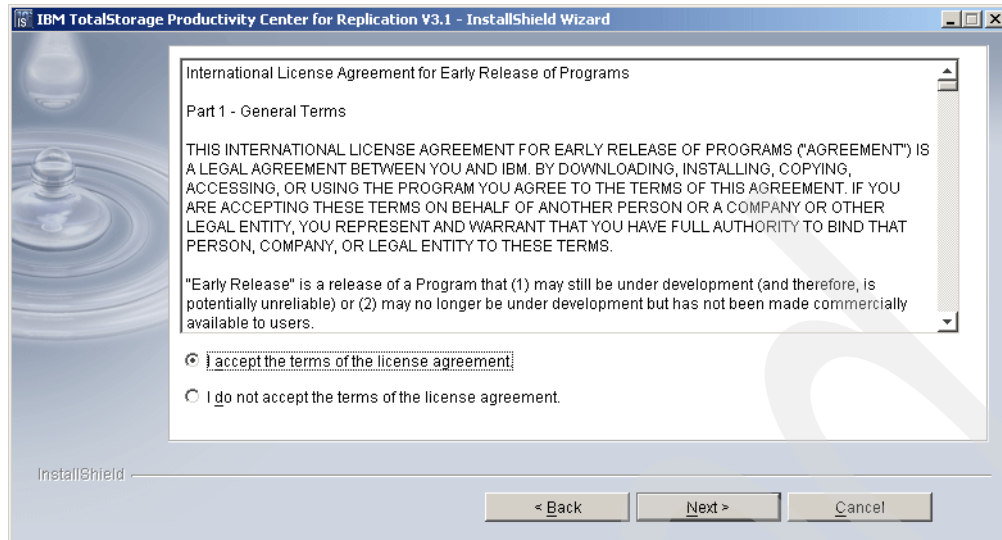


Figure 3-24 Installation license agreement

Next, a check for the correct version and level of DB2 is performed. If the correct version of DB2 is detected you will see the window shown in Figure 3-25. Click **Next** to continue.

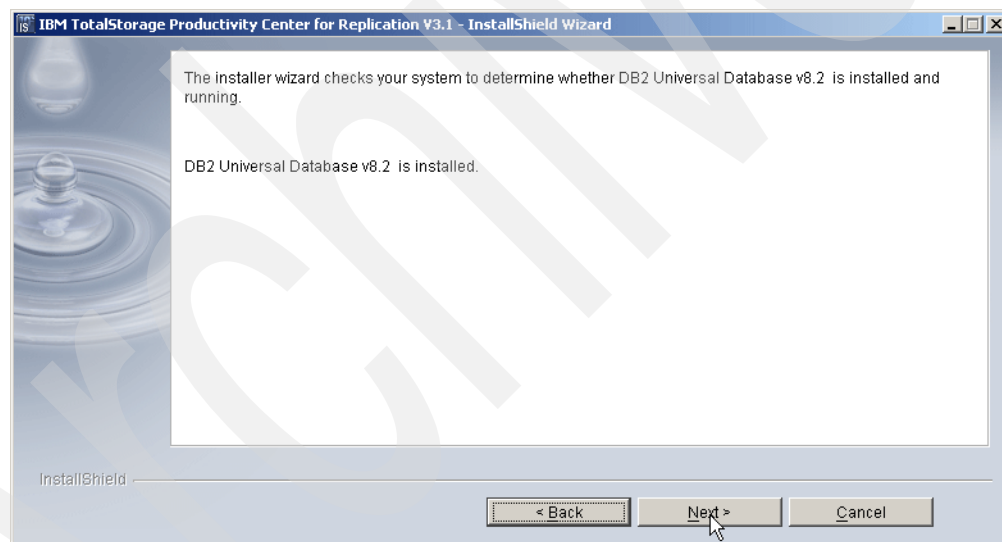


Figure 3-25 DB2 installation verification

The next window asks you to specify the directory where the TPC for Replication code will be installed as shown in Figure 3-26 on page 44. We suggest you accept the default. Click **Next** to continue.

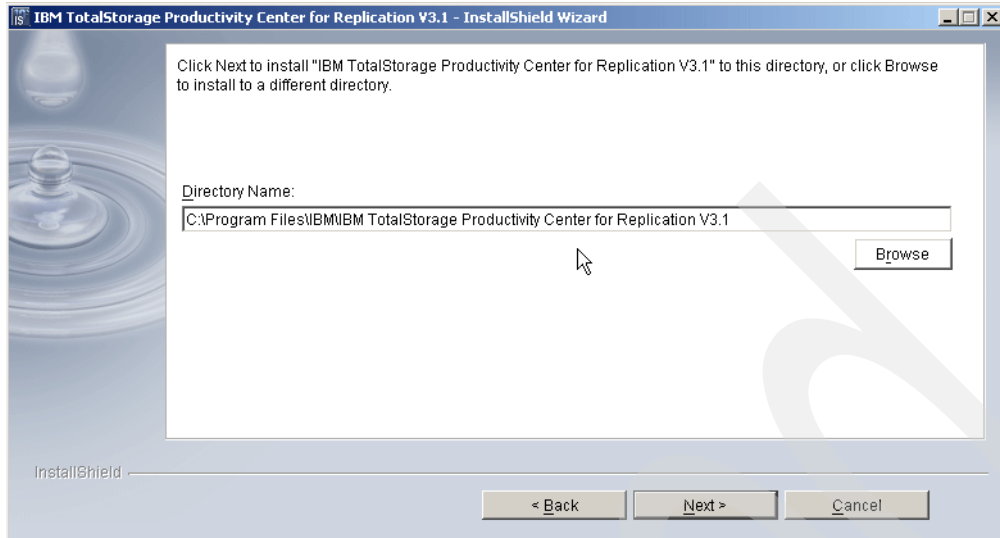


Figure 3-26 Installation location

Next you setup the TPC for Replication to DB2 interface by specifying the DB2 administration user ID and password as shown in Figure 3-27. This is the user ID and password you specified in the DB2 Installation (refer to Figure 3-12 on page 37). Click **Next** to continue.

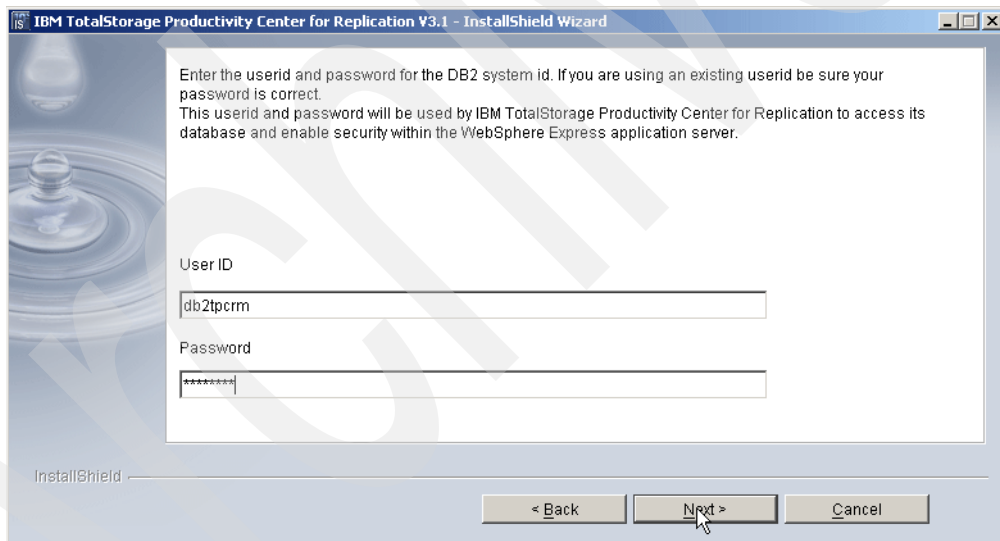


Figure 3-27 DB2 User ID and password

Next enter the required TCP/IP ports which will be used to communicate with the TPC for Replication WebSphere application. We recommend that you use the defaults as specified in Figure 3-28 on page 45, where these do not conflict with other registered ports.

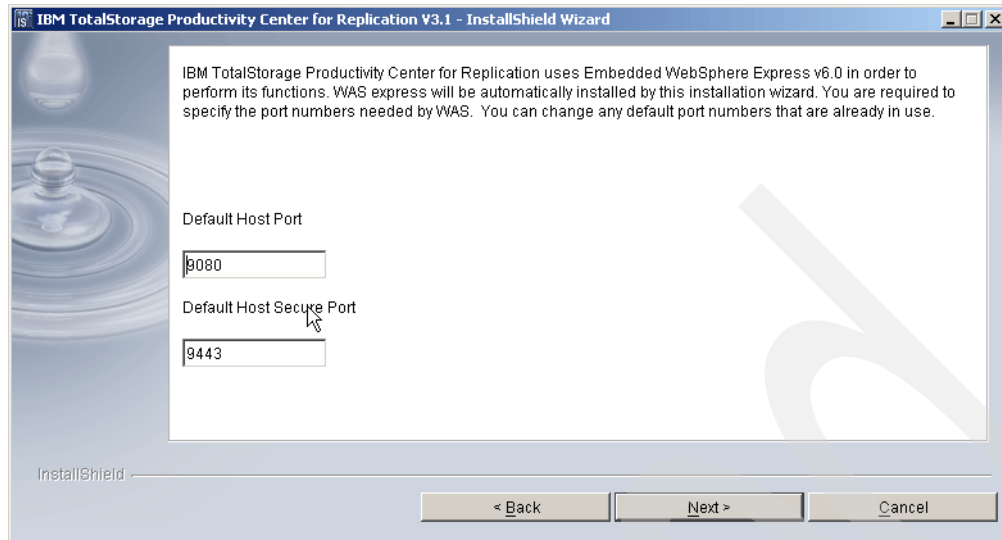


Figure 3-28 Define TCP/IP ports

On the next window as shown in Figure 3-29 you setup the TPC for Replication Database. The default is TPCRM. Enter your chosen name to create the DB2 database for TPC for Replication. Click **Next** to continue.

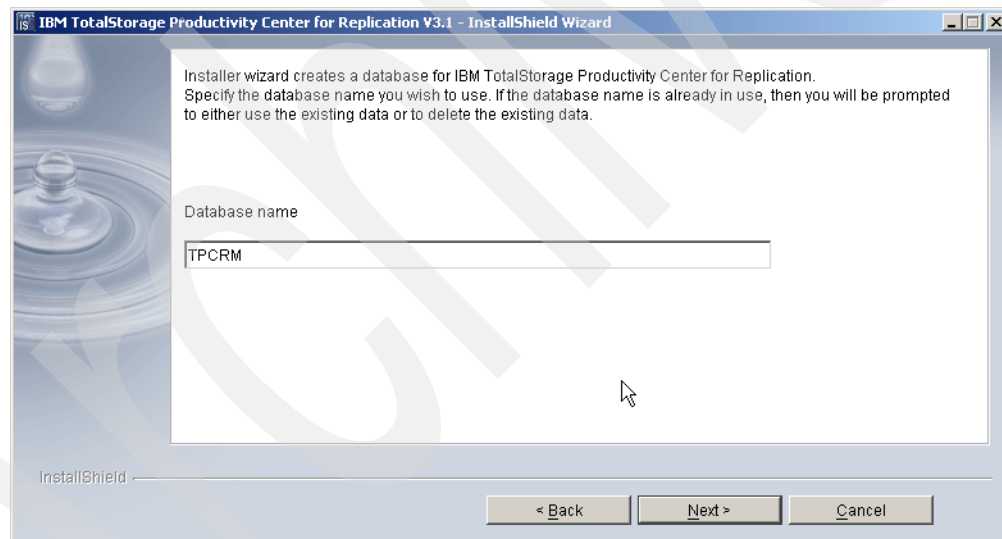


Figure 3-29 Database creation

Next you specify the TotalStorage Productivity Center for Replication CSM user as shown in Figure 3-30 on page 46. This is the user ID and password used to login to the TotalStorage Productivity Center for Replication Web GUI interface. Click **Next** to continue.

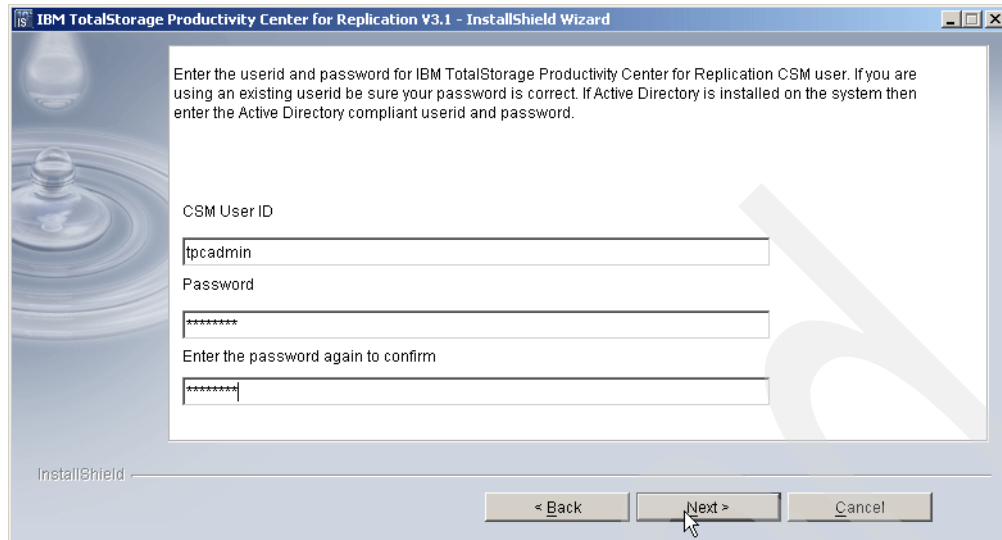


Figure 3-30 TPC for Replication user ID

Next you specify the TotalStorage Productivity Center for Replication local operating system user ID group name. The default is rmgroup as shown in Figure 3-31. If the group name does not exist it will be created. Click **Next** to continue.

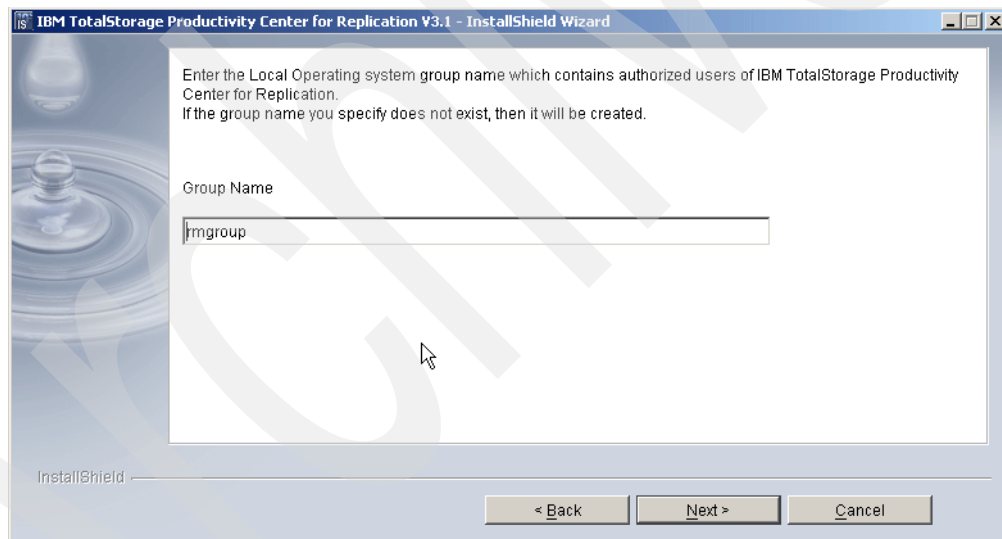


Figure 3-31 Windows user Group creation

The installer will present you with the information it has gathered and is ready to begin the installation as shown in Figure 3-32 on page 47. Review the information. If you need to change anything click the **Back** button to the correct panel. If you are satisfied with the information you provided click **Install** to continue.

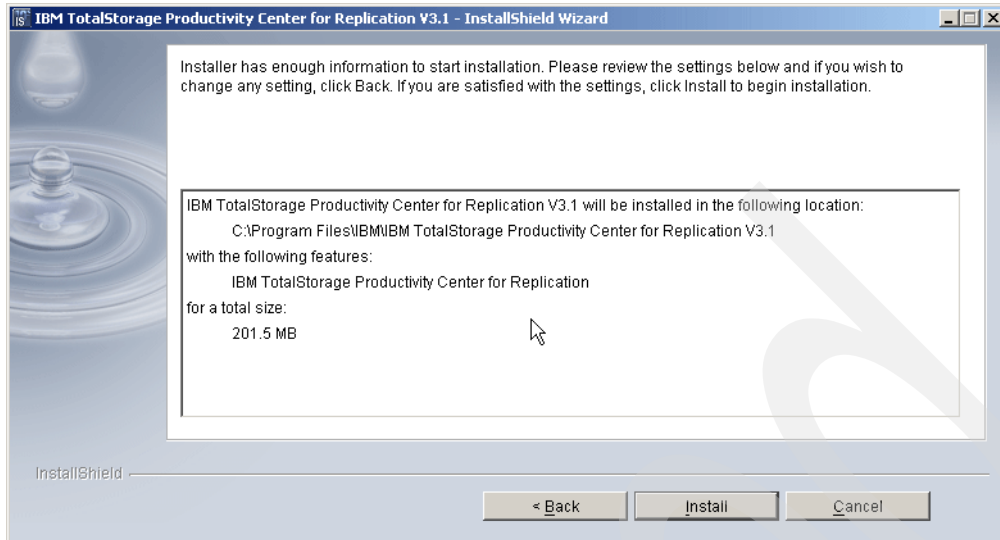


Figure 3-32 Installation ready

The installer must update the database configuration parameters for performance reasons. We recommend you allow this update and click **Yes** to continue (see Figure 3-33).

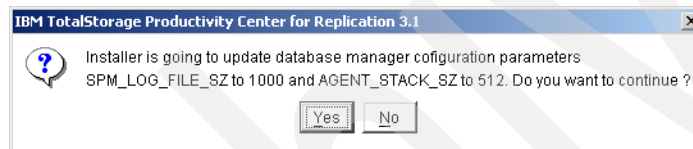


Figure 3-33 Database reconfiguration window

The next panel informs you that the updates have been made (see Figure 3-34). Click **OK** to continue.



Figure 3-34 DB2 reconfiguration confirmation

You will see several panels during the installation showing you the progress. Figure 3-35 on page 48 shows the DB2 installation progress. You will also see WebSphere progress installation panels.

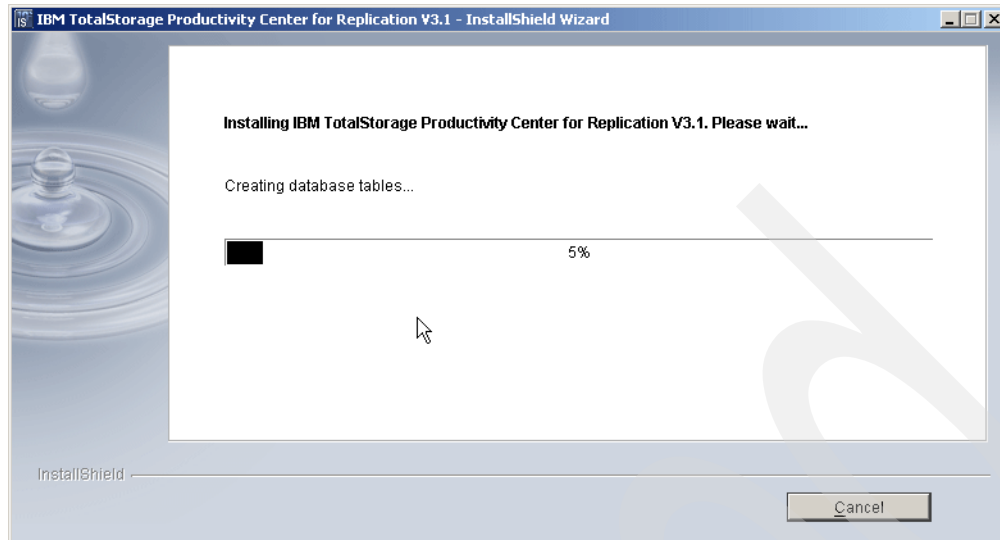


Figure 3-35 Installation progress

The final panel in Figure 3-36 informs you that the installation of TotalStorage Productivity Center for Replication is complete. Click **Finish** to exit the installer.

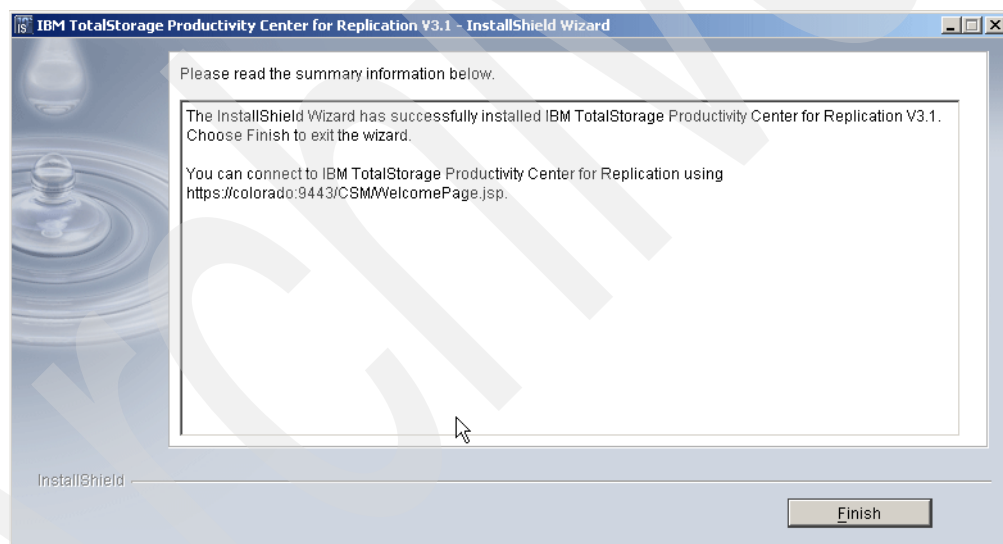


Figure 3-36 Installation completion

3.2.1 Verify the installation

You can check if the installation was successful by pointing your Web browser to the following address <https://hostname:9443/CSM/WelcomePage.jsp> where *hostname* is the name or IP of the server where TPC for Replication was installed. After doing that you should see a window similar to Figure 3-37 on page 49.

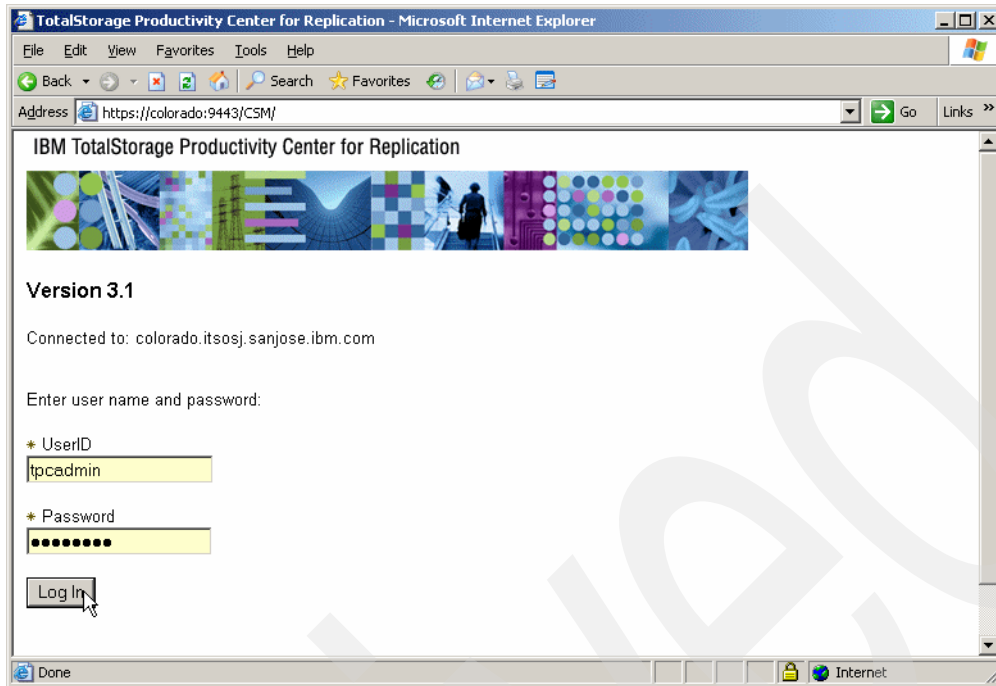


Figure 3-37 Verify the installation

3.3 Two Site BC installation

After successfully installing the basic TotalStorage Productivity Center for Replication you can upgrade to TotalStorage Productivity Center for Replication Two Site BC or Advanced Edition. This section takes you through that process.

To start the Windows 2003 installation of TPC for Replication V3.1 Two Site BC, run the **setupwin32.exe** found in the source installation directory. This will start the java installer and display the InstallShield window as shown in Figure 3-38.

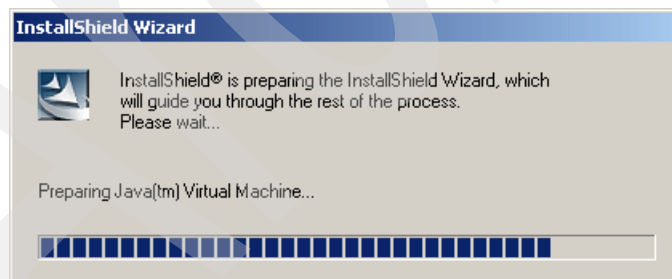


Figure 3-38 InstallShield wizard preparing

The InstallShield Wizard Welcome panel is displayed. Note that the window shown in Figure 3-39 on page 50 indicates that you are installing Advanced Edition. Click **Next** to continue.

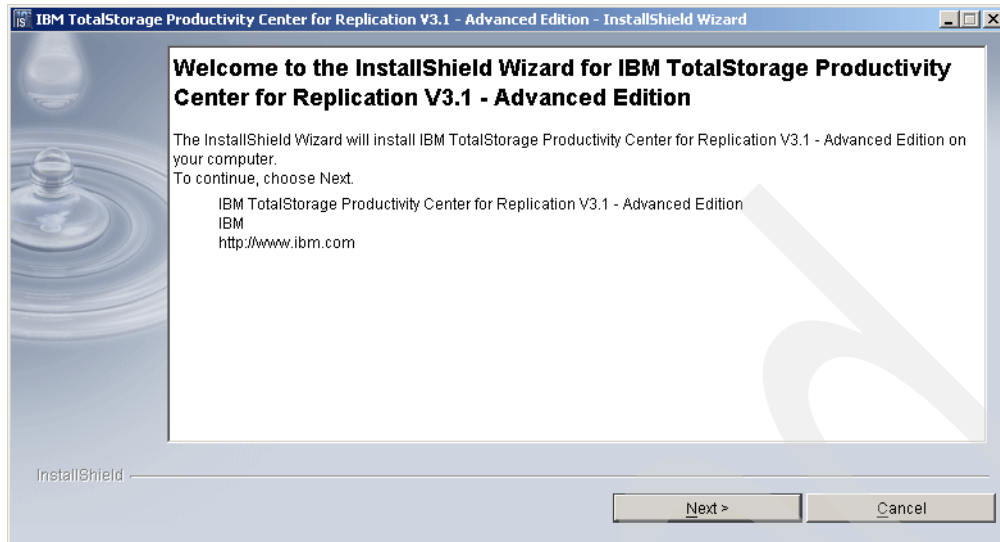


Figure 3-39 InstallShield Welcome panel for Advanced Edition

The installer performs a system prerequisite check to ensure you have TPC for Replication already installed on your server. If the prerequisite check is passed the window is updated to indicate you may continue the installation as shown in Figure 3-40. Click **Next** to continue.

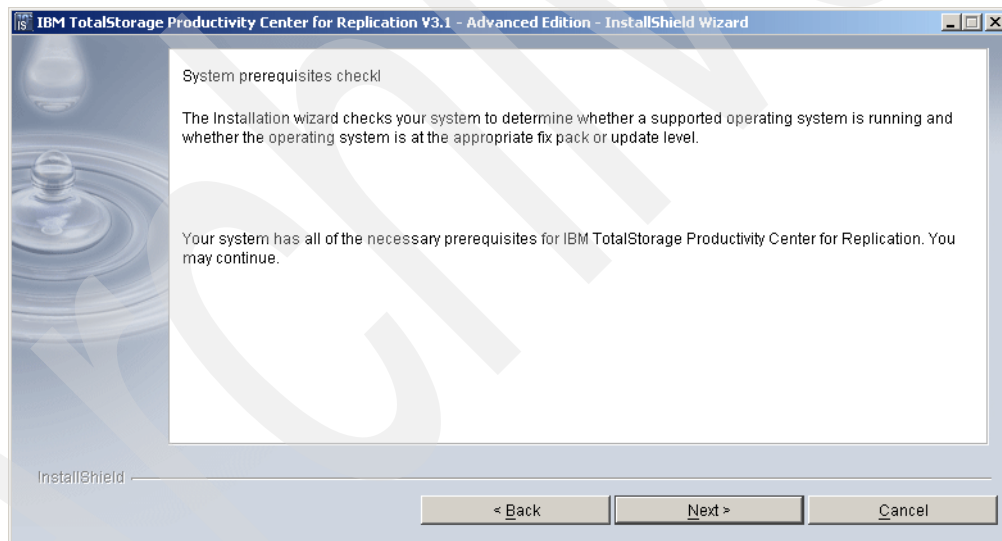


Figure 3-40 System prerequisite check

The license agreement panel is displayed. Click I accept the terms of the license agreement as shown in Figure 3-41 on page 51 to continue.

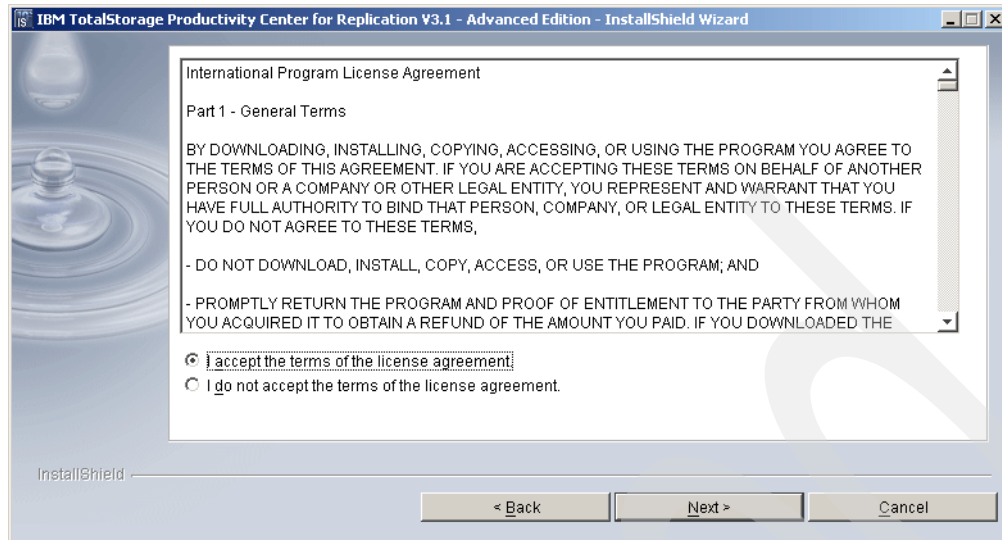


Figure 3-41 License agreement

In the next window you specify the directory path where TotalStorage Productivity Center for Replication is installed (see Figure 3-42). Review the information in the panel and update if necessary. Click **Next** to continue.

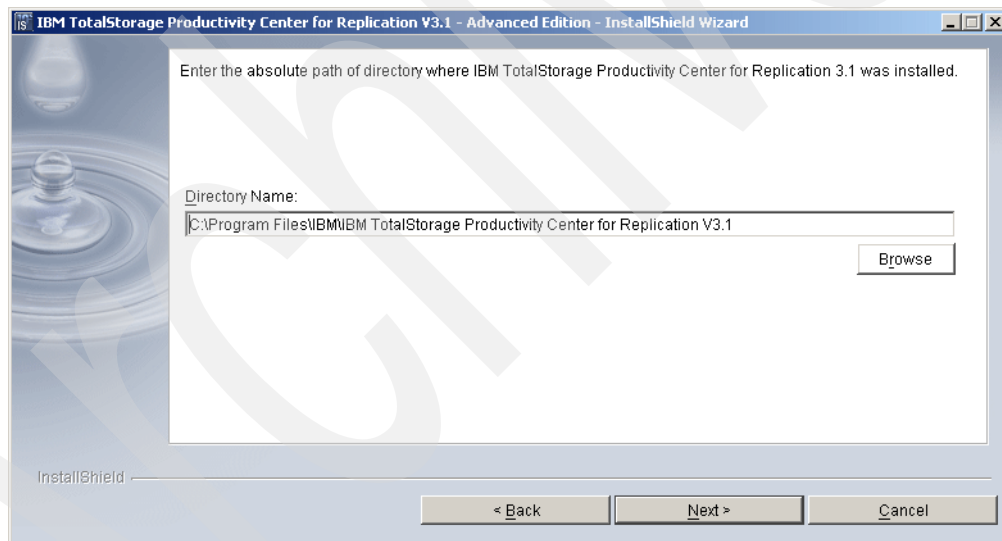


Figure 3-42 Installation path

The information that has been gathered and that will be used for the installation is presented in Figure 3-43 on page 52. Review the information and click **Install** to start the installation.

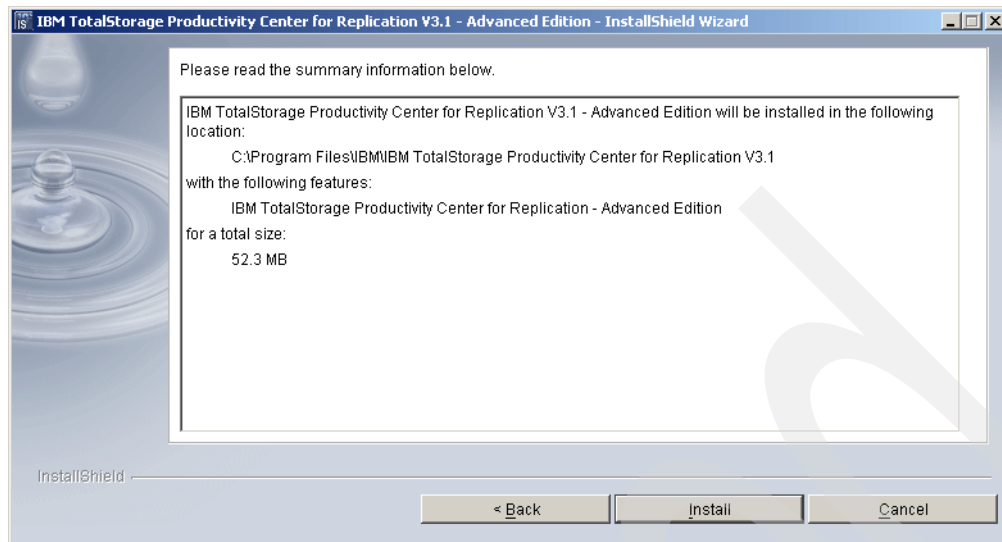


Figure 3-43 Summary of information required to begin the installation

You will be presented with a bar showing the installation progress, which is the license key deployment (see Figure 3-44).

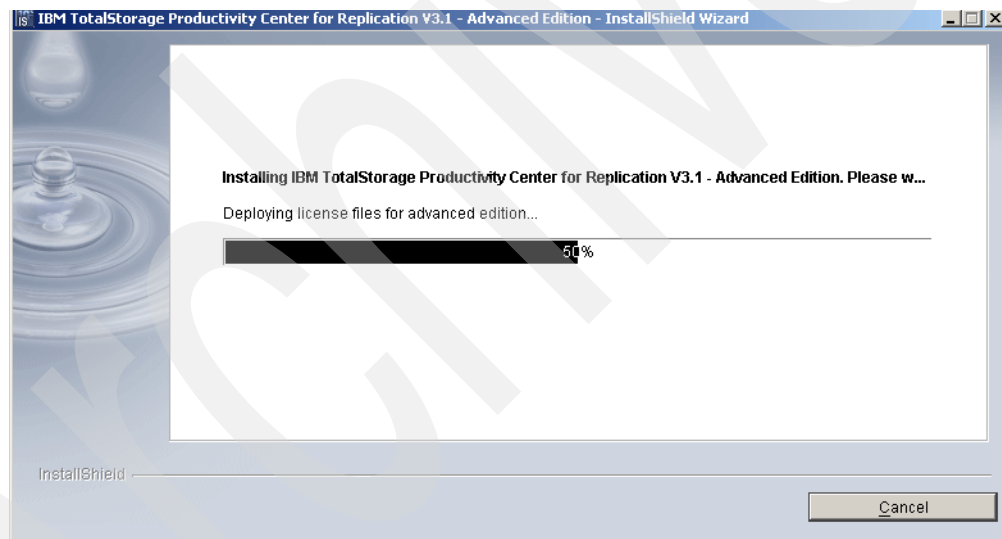


Figure 3-44 Advanced Edition installation progress

Once the installation is complete you will be presented with a window indicating the Advanced Edition has been successfully installed (see Figure 3-45 on page 53). Click **Finish** to exit the installer.

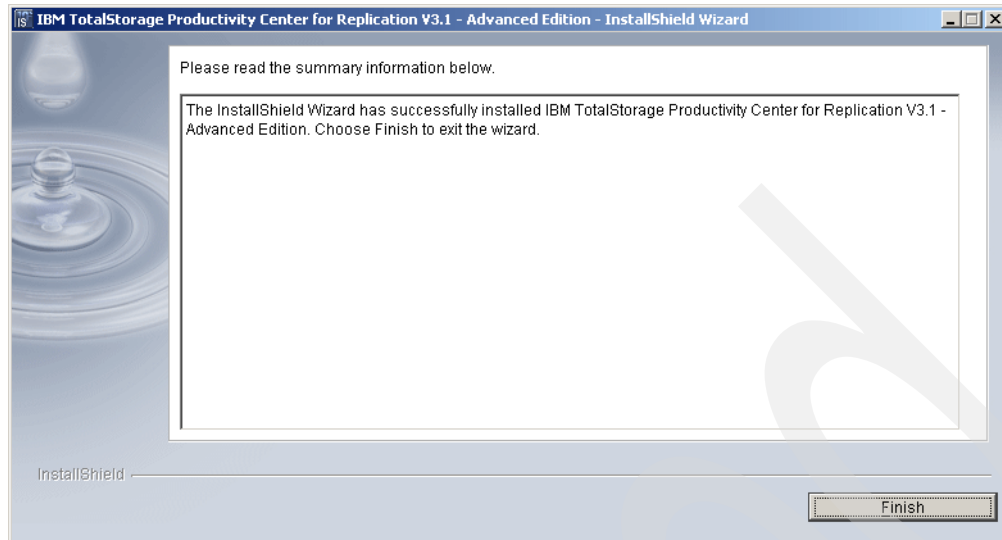


Figure 3-45 Successful installation of TPC for Replication Advanced Edition

Congratulations. You have now completed the TPC for Replication Advanced Edition install.

3.4 Upgrading to TPC for Replication 3.1.1

The major new enhancement for TotalStorage Productivity Center for Replication 3.1.1 is that TotalStorage Productivity Center and TotalStorage Productivity Center for Replication can now coexist on the same server.

The upgrade is only intended for servers with TotalStorage Productivity Center for Replication 3.1 already installed. If TPC V3.1.1 is installed on a server that does not have the requisite version 3.1 installed, the following message appears (Figure 3-46).

Cannot locate the install files for Embedded WebSphere Express v6.0. Look at the log file (InstallRoot) TPCRMInstall.log for details.

Figure 3-46 Prerequisite TPC version not installed error message

Therefore, if you see this message, you need to first install TPC for Replication V3.1 and then upgrade to Version 3.1.1.

We recommend that you manually stop TPC for Replication V3.1 before starting the installation of TPC for Replication 3.1.1. To stop TPC for Replication V3.1 simply right-click **My Computer**, click **Manage** and the Computer Management window will appear. Expand Services and Applications and click **Services** as shown in Figure 3-47 on page 54.

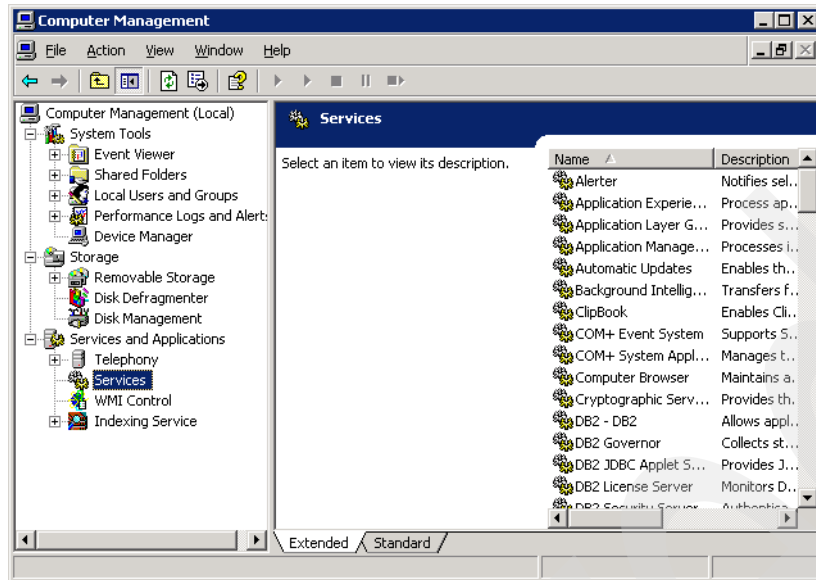


Figure 3-47 Computer Management

You will see the list of services on your system. Scroll down until you see the IBM WebSphere Application Server V6-CSM service. Right-click it and select **Properties**. The CSM Properties window will appear. Change the Startup type by clicking the drop-down menu and selecting **Manual** as seen in Figure 3-48. Click **OK** to apply and close.

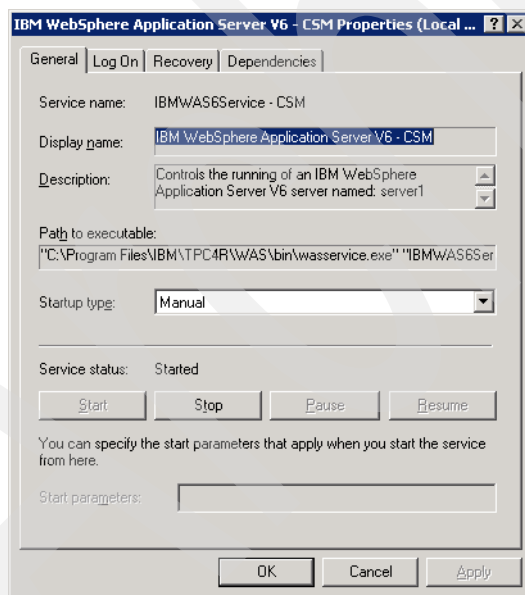


Figure 3-48 IBM WebSphere Application Server v6 - CSM Properties

Restart your server and when it comes back up, you are now ready to start the Windows 2003 installation of TPC for Replication 3.1.1. To start the upgrade, run the **setupwin32.exe** located in the source installation directory as seen in Figure 3-49 on page 55.

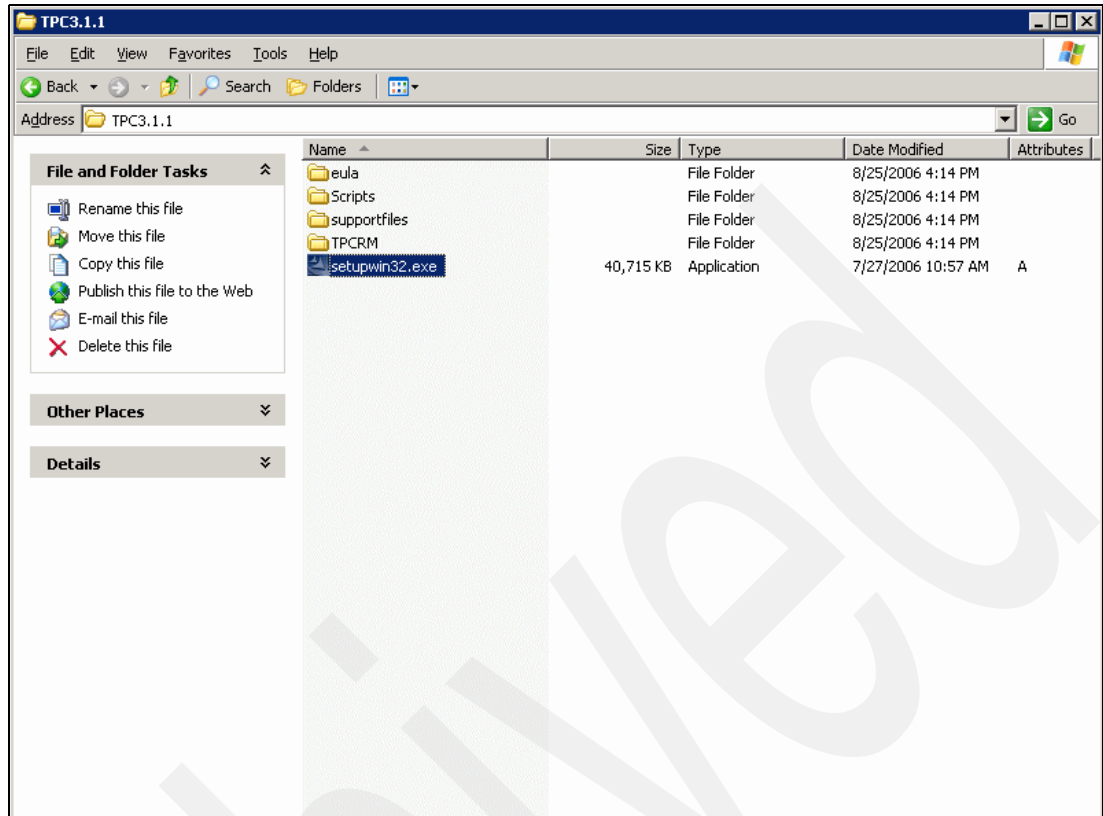


Figure 3-49 TPC for Replication source installation directory

This will start the Java installer and display the InstallShield window as shown in Figure 3-50.

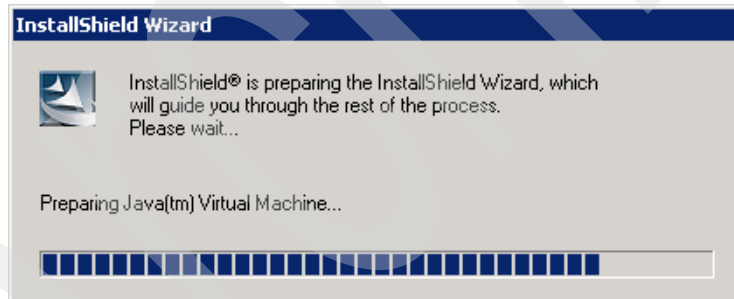


Figure 3-50 InstallShield Wizard

The next window is the Welcome to the InstallShield Wizard as shown in Figure 3-51 on page 56. Click **Next** to continue.

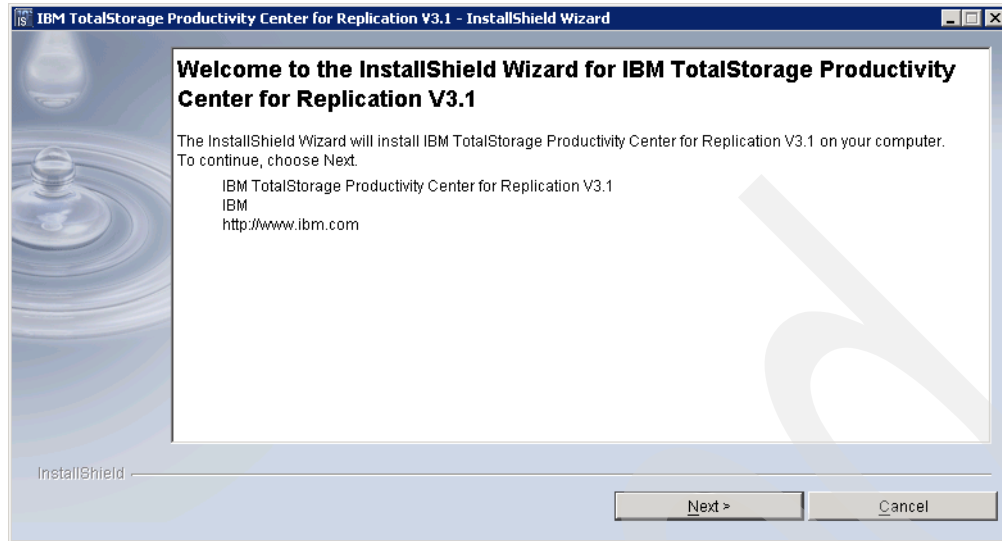


Figure 3-51 TPC for Replication Installation Welcome

Note: When you install the product, the installation wizard panels display "V3.1." even though you are installing "V3.1.1."

The system performs a system prerequisite check to confirm you are running a supported operating system at the required level as shown in Figure 3-52. Click **Next** to continue.

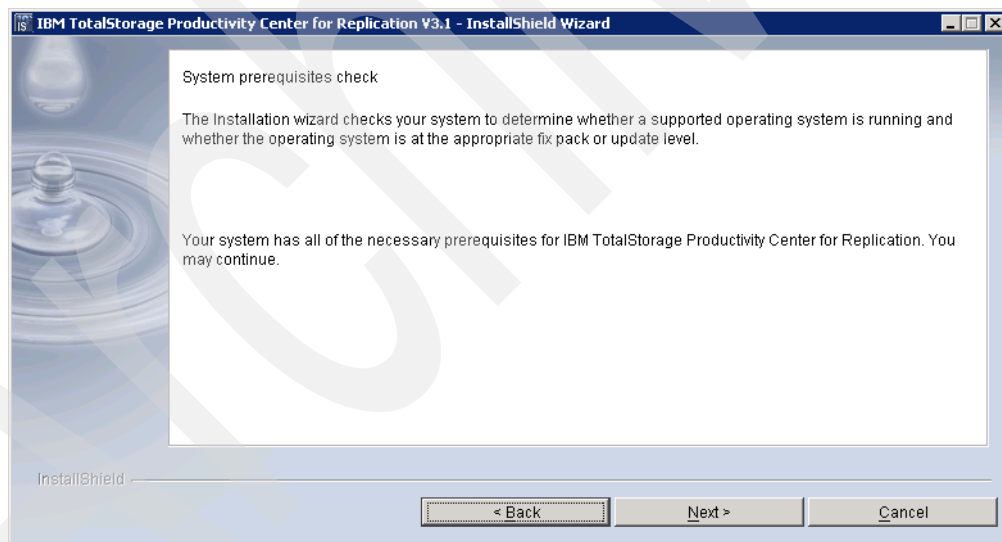


Figure 3-52 Installation pre-requisite check

The Licensing panel will now appear as seen in Figure 3-53 on page 57. Read and accept the licensing terms and then click **Next**.

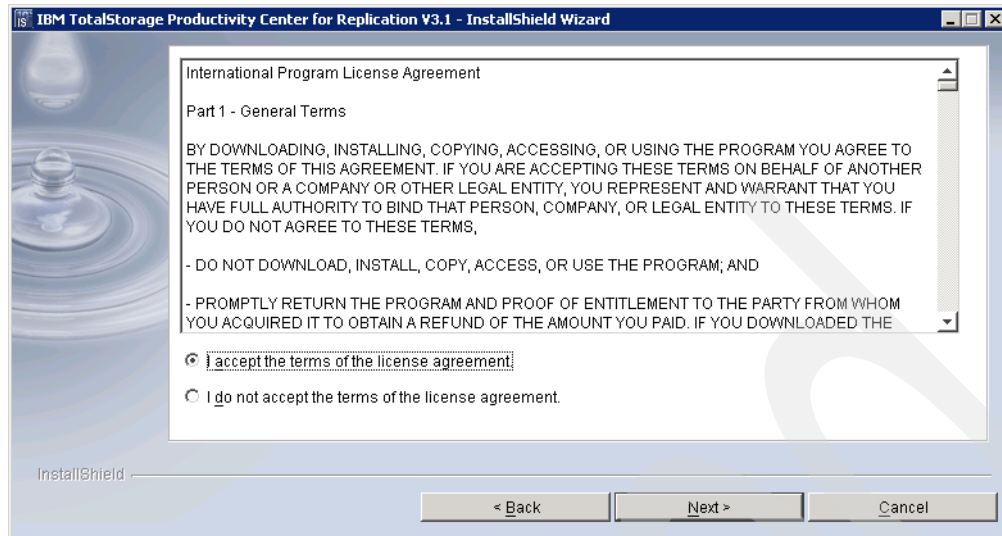


Figure 3-53 Installation License Agreement

The installer will now verify that the correct version of DB2 is installed and running as seen in Figure 3-54. Click **Next** to continue.

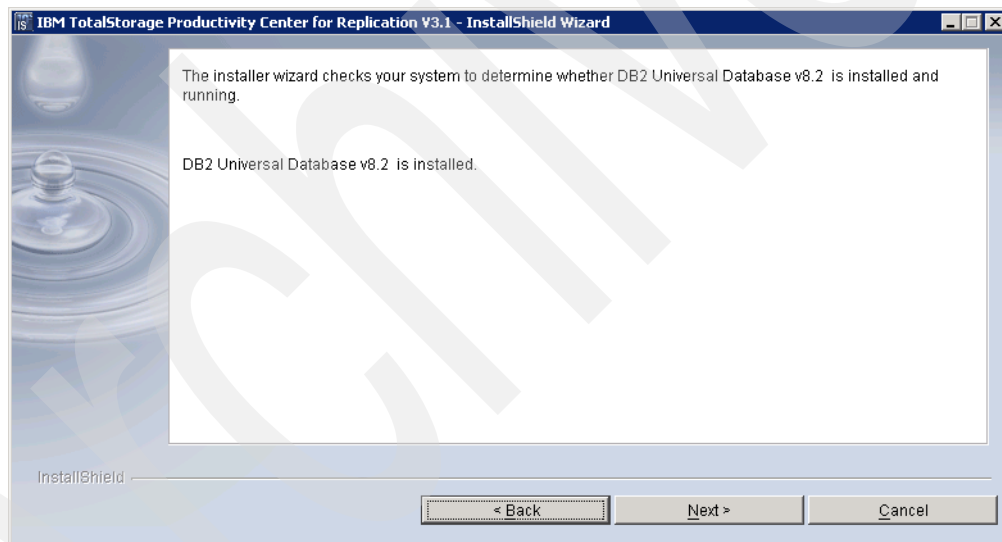


Figure 3-54 DB2 installation verification

The next window will ask you to specify the installation directory as shown in Figure 3-55 on page 58. Leaving the default directory is recommended. After choosing an installation directory, click **Next** to continue.

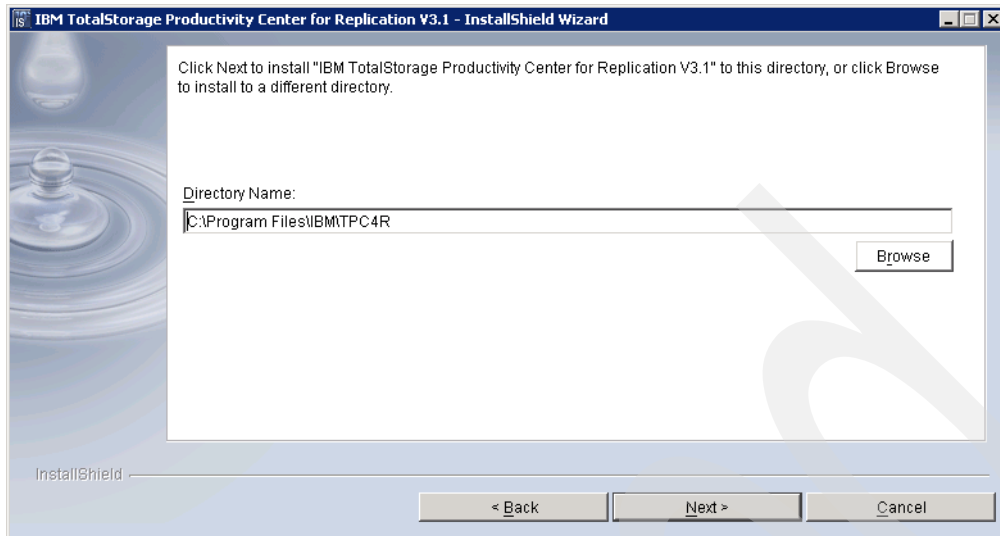


Figure 3-55 Installation location

The installation wizard will automatically detect the TotalStorage Productivity Center for Replication user and the DB2 user when V3.1 is present on the server. On the next window (see Figure 3-56), you need to enter the DB2 user ID and password which you specified in the DB2 installation and in the TotalStorage Productivity Center for Replication V3.1 Installation. Click **Next** to continue.

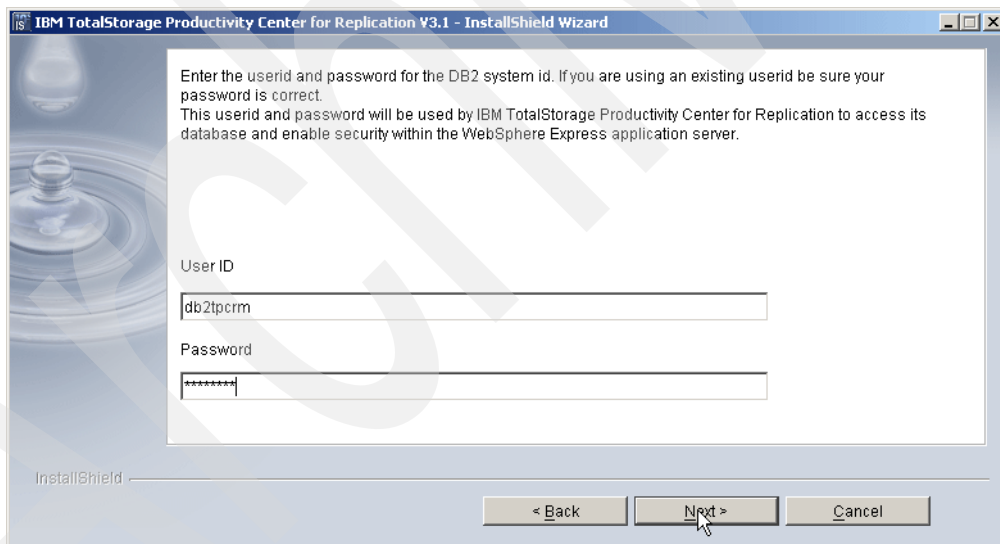


Figure 3-56 DB2 user ID and password

In the following window, the installation wizard will check if TotalStorage Productivity Center for Replication is running as seen in Figure 3-57 on page 59.

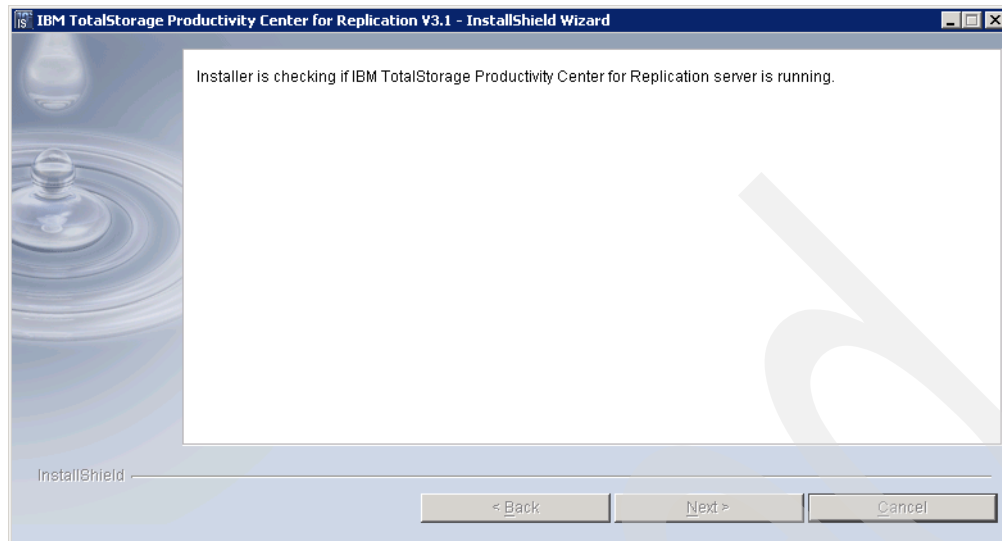


Figure 3-57 TPC for Replication check

Since you previously stopped TPC for Replication manually, the following message will appear. Click **OK** to continue (Figure 3-58).

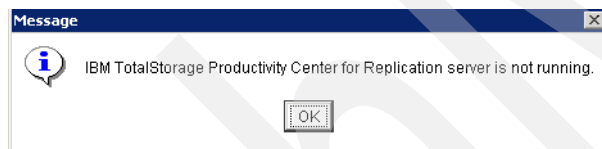


Figure 3-58 TPC for RM not running message

The installer will then display the settings for the installation as shown on Figure 3-59. Review the information and if you need to make any changes, click the **Back** button, otherwise, click **Install** to proceed with the installation.

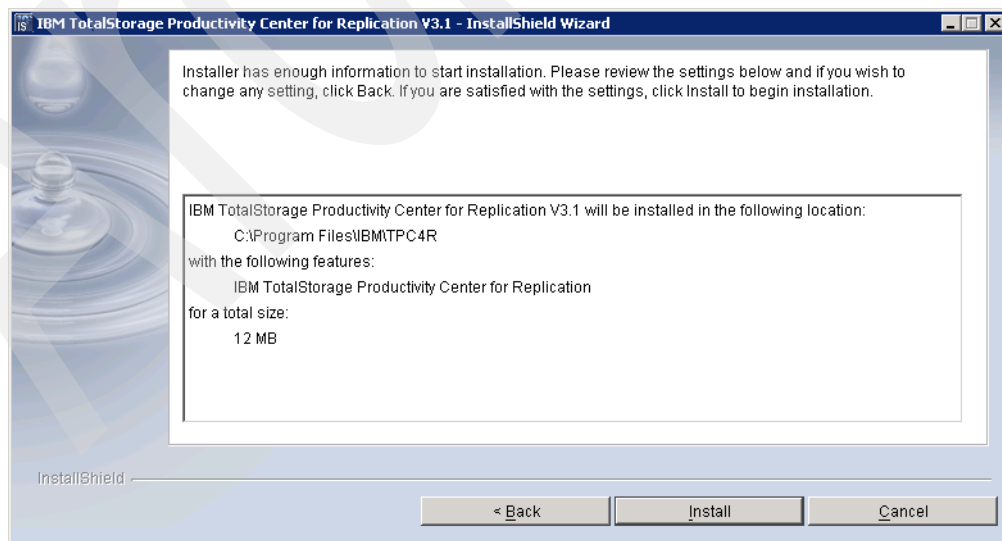


Figure 3-59 Summary of information required to begin installation

As shown in Figure 3-60, you can see the progress of the installation and the current installation task that is being executed.

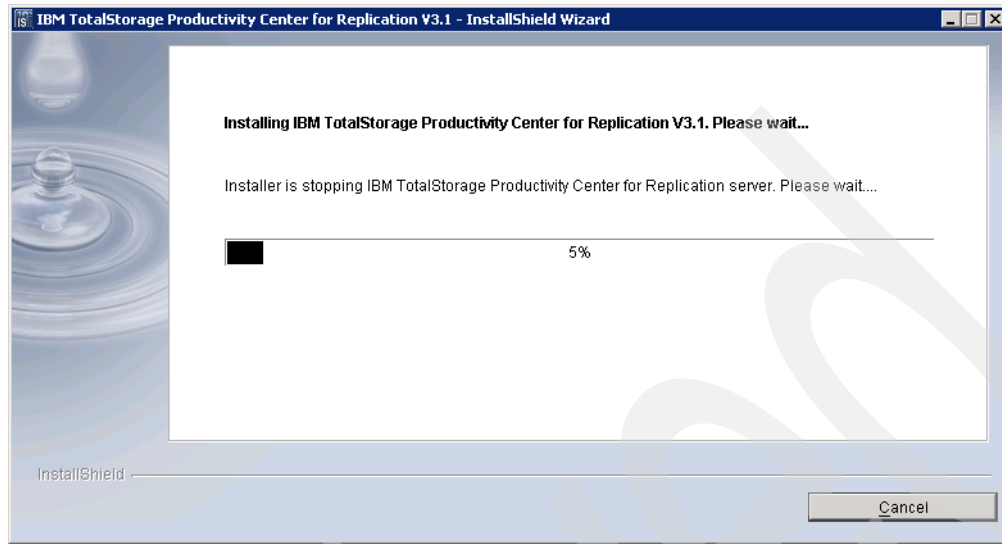


Figure 3-60 Installation progress

The final panel in Figure 3-61 informs you that the installation is complete.

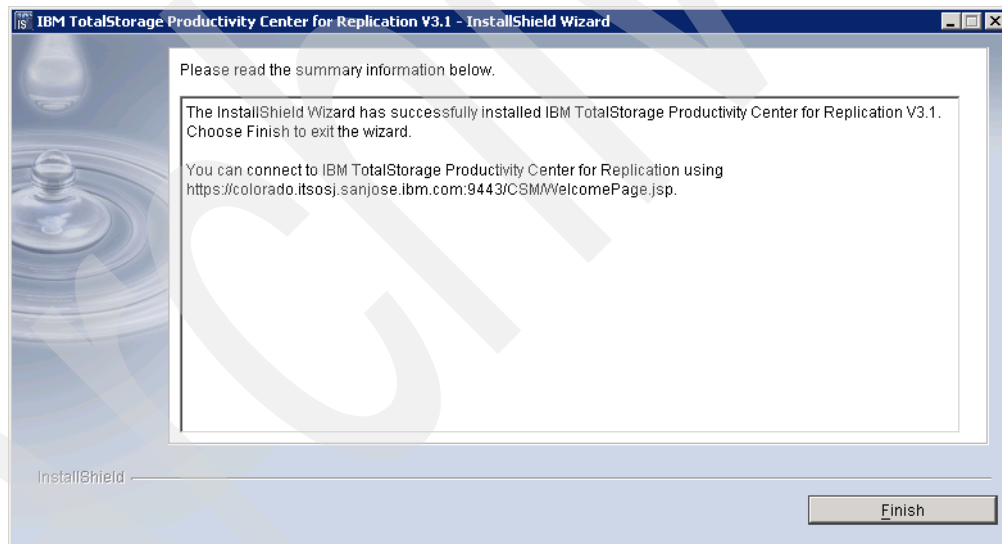


Figure 3-61 Successful installation of TPC for Replication V3.1.1

Post installation tasks on Windows 2003

After you have successfully installed the TotalStorage Productivity Center for Replication server there are configuration tasks that need to be completed before you can start using the function. This chapter provides the basics for configuring your replication environment and getting started using the function. These tasks include:

- ▶ Define the Ethernet ports which are unique to the DS8000 setup for TPC for Replication server connectivity. This applies to the DS8000 only and is independent from the server platform on which the TPC for Replication code performs.
- ▶ Set up user accounts on the TotalStorage Productivity Center for Replication server and the subsystems
- ▶ Remote installation and customizing of the CLI
- ▶ Logging on to the TotalStorage Productivity Center for Replication server

4.1 DS8000 Ethernet card configuration

As outlined in 2.3.6, “TPC for Replication server and DS8000 connectivity” on page 27 you need to plan and install Ethernet cards in pairs for the DS8000 in order to connect to the TPC for Replication servers. Note you can perform the definition of the Ethernet ports at any time when these ports are installed and ready to be configured. TPC for Replication cannot connect to the DS8000 if these ports are not properly configured.

These Ethernet cards are not required for other supported storage servers such as SVC, ESS 800, and DS6000. The TPC for Replication server connects to the existing internal network to the storage servers.

This new Ethernet card may come already installed from the plant site or they install concurrently in the field.

To configure the Ethernet ports Release 2 Licensed Internal Code is required for the DS8000. This is a code bundle which starts with 6.2.xxx.xx.

Port numbers on the first card are I9801 and I9802. This is the card which installs in server0. Port numbers on the second card are I9B01 and I9B02. This is the card which installs in server1. Note that only the first port on each card is currently being used.

Communication through these ports uses static IP addresses. DHCP is not supported.

You may configure these new ports either through the GUI or the DSCLI. Note this is not done through the TPC for Replication server but through the management means provided through the DS8000 HMC.

4.1.1 Use GUI to define Ethernet ports

The GUI provides a new panel to configure the required IP addresses. Under the *Manage hardware* application select *Storage Image*. Under *Storage Image* is a new *Configure Network Port* panel.

Figure 4-1 on page 63 shows the Manage hardware application under which you select *Storage images*.

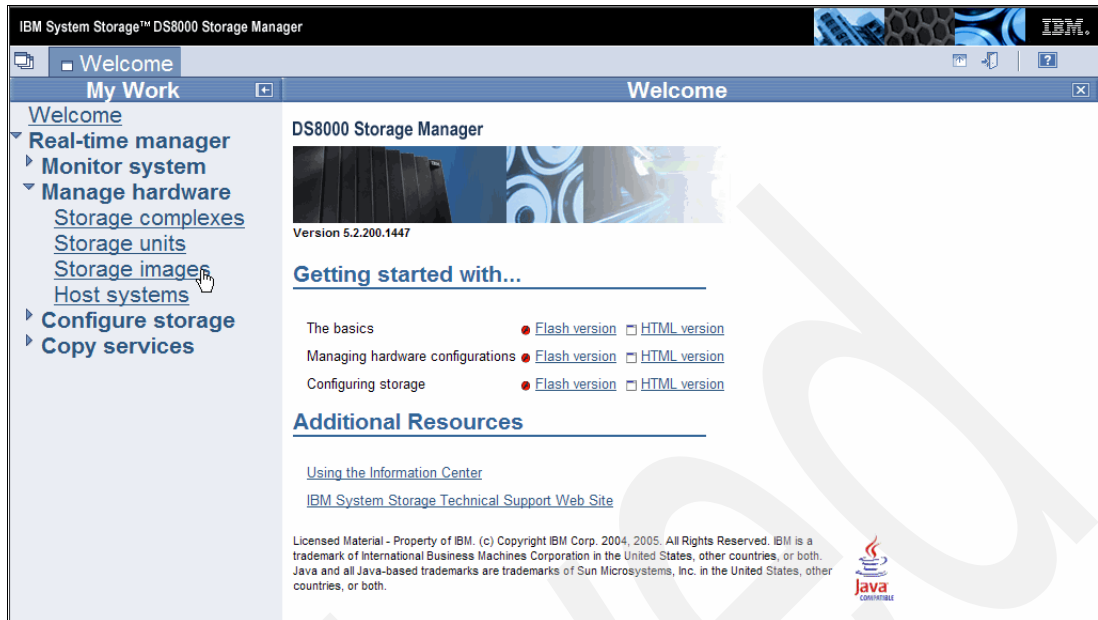


Figure 4-1 Select Storage images to get to the network configuration panel

Figure 4-2 displays the next panel where you select the storage image before you open the Select Action window.

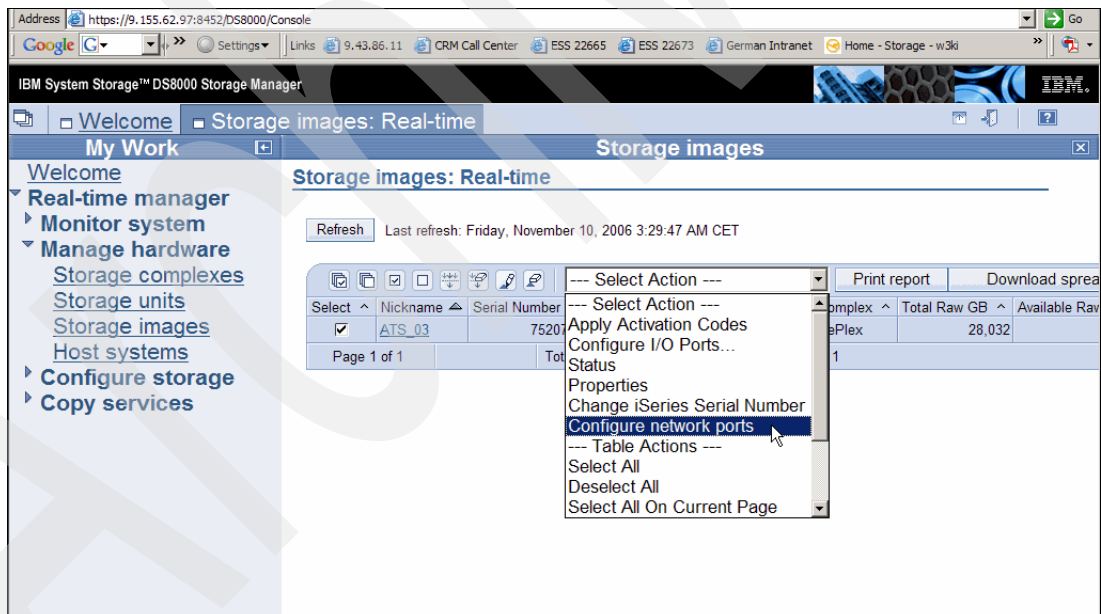


Figure 4-2 Select Configure network ports

Have the following information available to fill in the next panel as shown in Figure 4-3 on page 64.

- ▶ IP address which is assigned to the Ethernet card port for each server
- ▶ Internal DS8000 gateway IP address and subnet mask
- ▶ Optionally the IP addresses of primary DNS and secondary DNS.

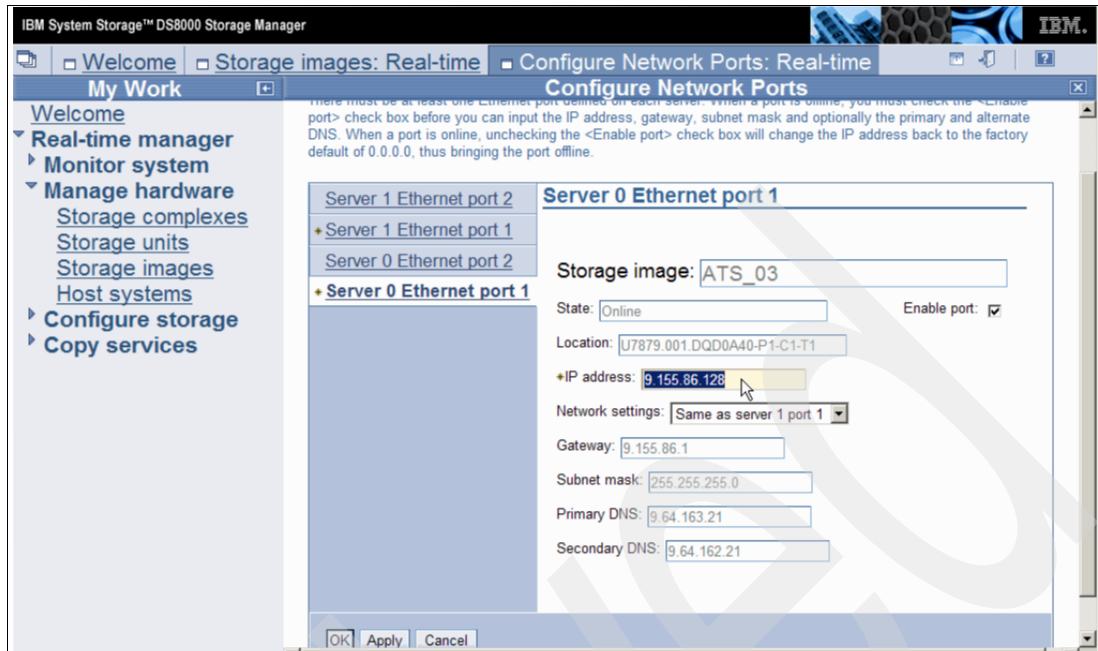


Figure 4-3 Ethernet port setup through the GUI

Click **OK** and this will complete the GUI walk through about how to define an Ethernet port to get ready for TPC-RM server connection to the DS8000. Repeat this sequence of panels in the same fashion for the second Ethernet port for the other server.

4.1.2 Use DSCLI to define Ethernet ports

The DSCLI provides the following commands to manage these new network ports. Again these commands are DS6000 and DS8000 DSCLI commands and are not available through the TPC for Replication CLI, CSMCLI.

- ▶ **lsnetworkport -l**
This command shows the server associations, physical port location, and all IP address setting for all ports on the queried Storage Image Facility. An example is shown in Example 4-2 on page 65.
- ▶ **shownetworkport**
This command shows the server association, physical location, and IP addresses for a particular port on the Ethernet card. An example is shown in Example 4-3 on page 66
- ▶ **setnetworkport**
This command configures the network ports. Example 4-1 on page 65 displays a command example and configures the first port on the Ethernet card in server0.

Figure 4-4 on page 65 provides an overview of the setnetworkport command (refer to Example 4-1 on page 65).

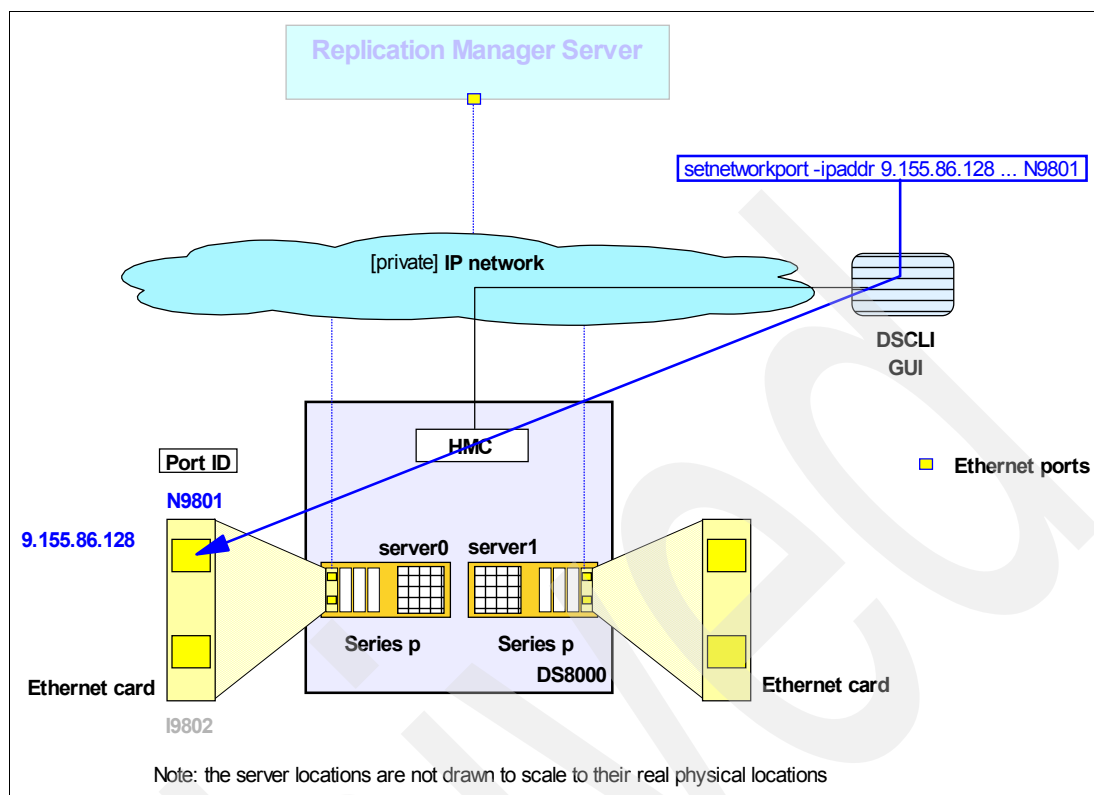


Figure 4-4 Define Ethernet port attached to server 0 in DS8000

Remember to perform a second DCLI command to define the first Ethernet port in the second Ethernet card attached to server 1.

Example 4-1 setnetworkport command example

```
dscli> setnetworkport -dev IBM.2107-7520781 -ipaddr 9.155.86.128 -gateway
9.155.86.1 -subnet 255.255.255.0
-primary 9.64.163.21 -secondary 9.64.162.21 N9801
```

Example 4-2 shows sample output of the **lsnetworkport** which provides an overview of all available Ethernet ports on the concerned storage image facility.

Example 4-2 Output of lsnetworkport command

```
dscli> lsnetworkport
Date/Time: 10 November 2006 03:03:32 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
ID      IP Address   Subnet Mask   Gateway       Primary DNS   Secondary DNS  State
=====
I9801 9.155.86.128 255.255.255.0 9.155.86.1    9.64.163.21  9.64.162.21   Online
I9802 0.0.0.0      255.0.0.0     0.0.0.0       9.64.163.21  9.64.162.21   Offline
I9B01 9.155.86.129 255.255.255.0 9.155.86.1    9.64.163.21  9.64.162.21   Online
I9B02 0.0.0.0      255.0.0.0     0.0.0.0       9.64.163.21  9.64.162.21   Offline
```

Example 4-3 on page 66 shows sample output example of **shownetworkport** which provides an overview of all settings for a particular Ethernet port.

Example 4-3 Output of shownetworkport command for a particular Ethernet port

```
dsccli> shownetworkport i9801
Date/Time: 10 November 2006 03:08:06 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
ID                I9801
IP Address        9.155.86.128
Subnet Mask       255.255.255.0
Gateway           9.155.86.1
Primary DNS       9.64.163.21
Secondary DNS     9.64.162.21
State             Online
Server            00
Speed             1 Gb/sec
Type              Ethernet-Copper
Location          U7879.001.DQD0A40-P1-C1-T1
```

Example 4-4 shows the **shownetwork** command output of an unused and not explicitly configured Ethernet port.

Example 4-4 shownetworkport output of an inactive and not configured Ethernet port

```
dsccli> shownetworkport i9802
Date/Time: 10 November 2006 03:11:40 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
ID                I9802
IP Address        0.0.0.0
Subnet Mask       255.0.0.0
Gateway           0.0.0.0
Primary DNS       9.64.163.21
Secondary DNS     9.64.162.21
State             Offline
Server            00
Speed             1 Gb/sec
Type              Ethernet-Copper
Location          U7879.001.DQD0A40-P1-C1-T2
```

This definition process is only required once for each DS8000 which will be connected to a TPC for Replication server. At this point we have not connected the TPC for Replication server, but it should be ready at this point. The details follow in Chapter 5, “Using TotalStorage Productivity Center for Replication on Windows 2003” on page 85.

4.2 Storage Subsystem setup

Before you can use TotalStorage Productivity Center for Replication to manage your storage subsystems you need to define accounts to be used by the TotalStorage Productivity Center for Replication server to access them. You can use existing accounts, but it is recommended to create separate accounts for TotalStorage Productivity Center for Replication server usage. These accounts are used when you define storage subsystems in TotalStorage Productivity Center for Replication server.

4.2.1 Post installation tasks for SAN Volume Controller

To define account for TotalStorage Productivity Center for Replication server for your SAN Volume Controller (SVC) you need to start the SVC Master Console by pointing your Web browser to the following address:

http://hostname:9080/ica/Login

Where, **hostname** is the name or IP address of your SVC Master Console or another server where the SVC Console code is installed. You will see a window similar to Figure 4-5.

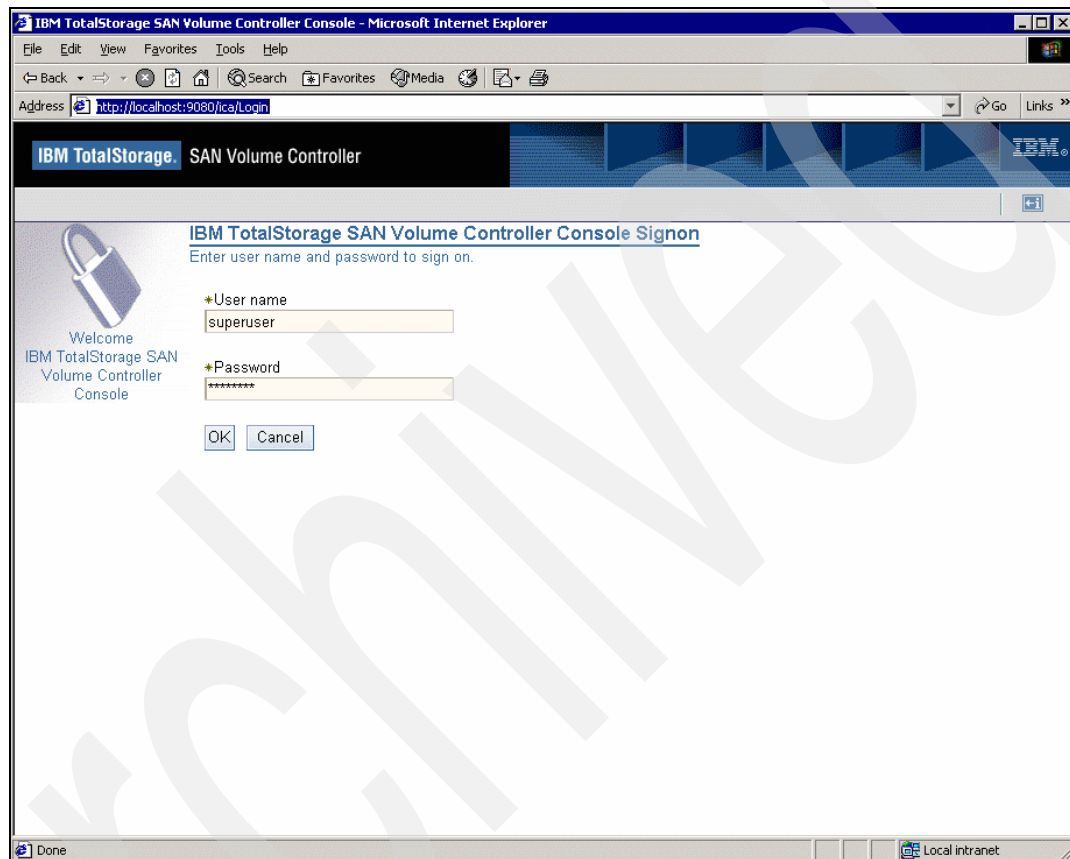


Figure 4-5 SAN Volume Controller Console login window

Logon with the superuser ID which leads you to the next window similar to the one in Figure 4-6 on page 68.

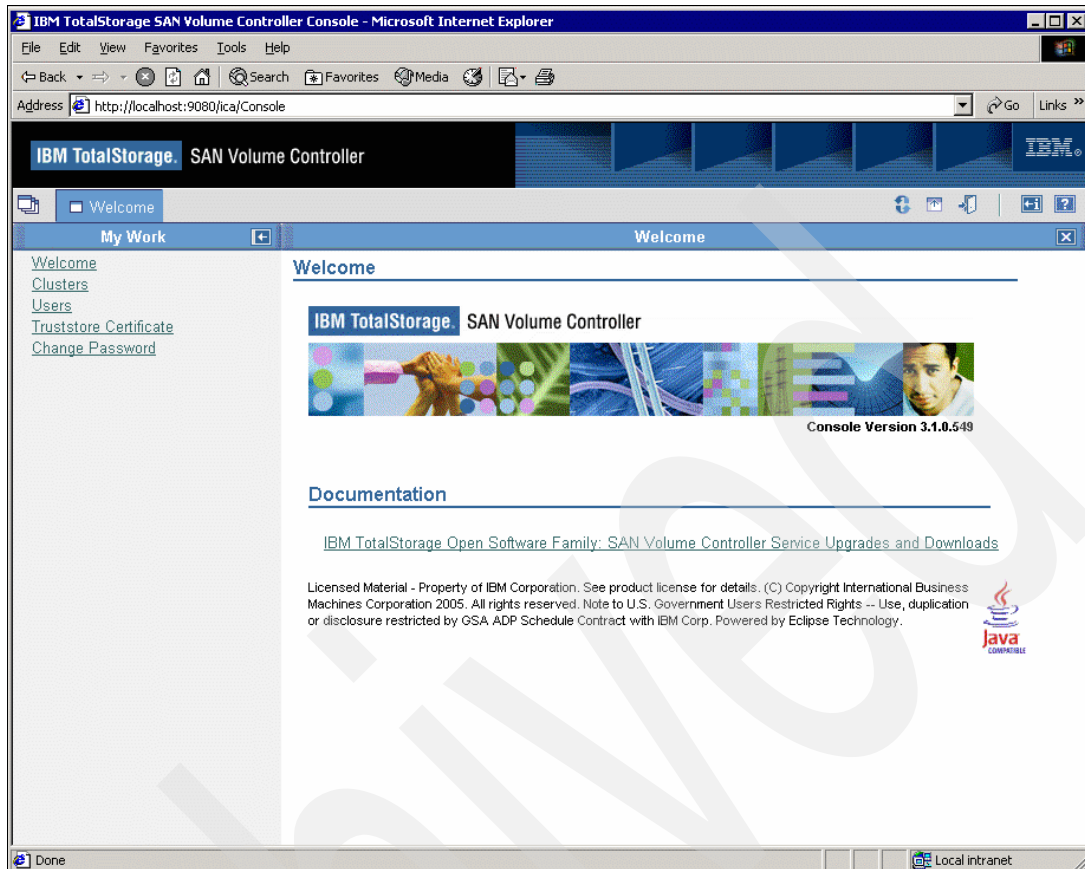


Figure 4-6 SAN Volume Controller Console

Select the link **Users** which brings you the next window similar to the one in Figure 4-7 on page 69.

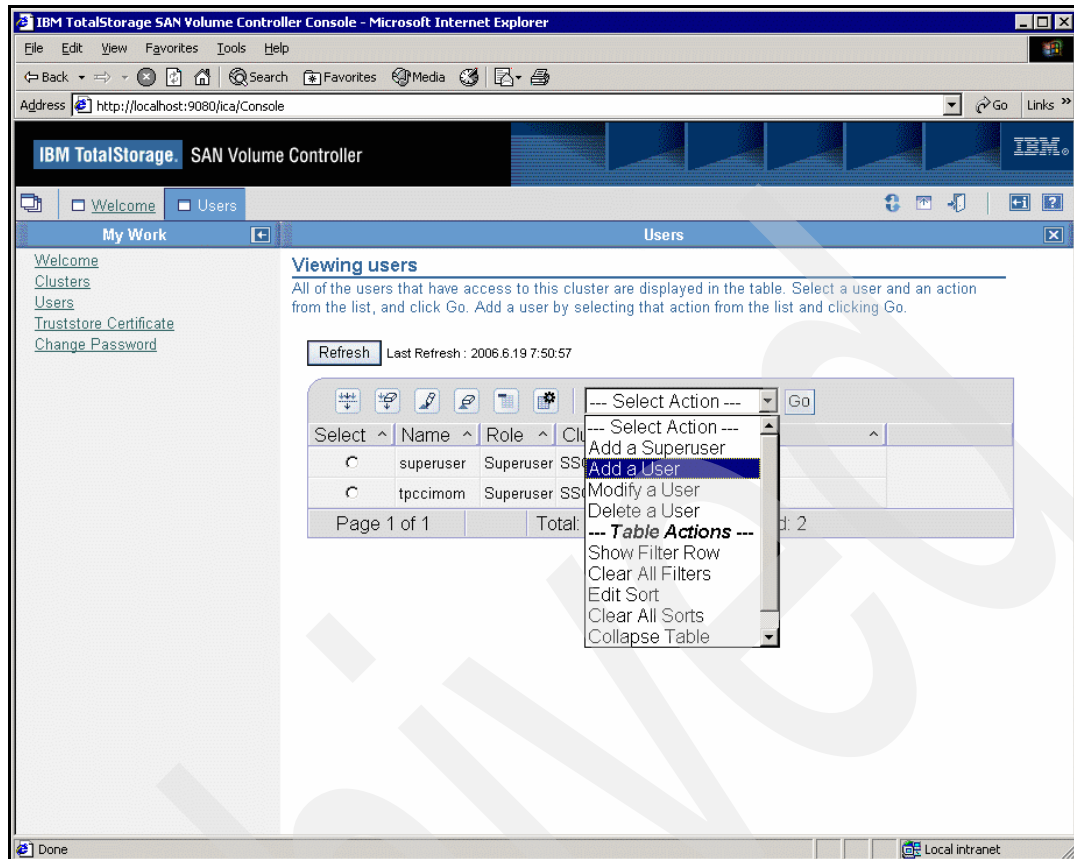


Figure 4-7 SAN Volume Controller Console Users

To add a user select action **Add a User** and click **Go**. Then a similar window as in Figure 4-8 on page 70 will display.

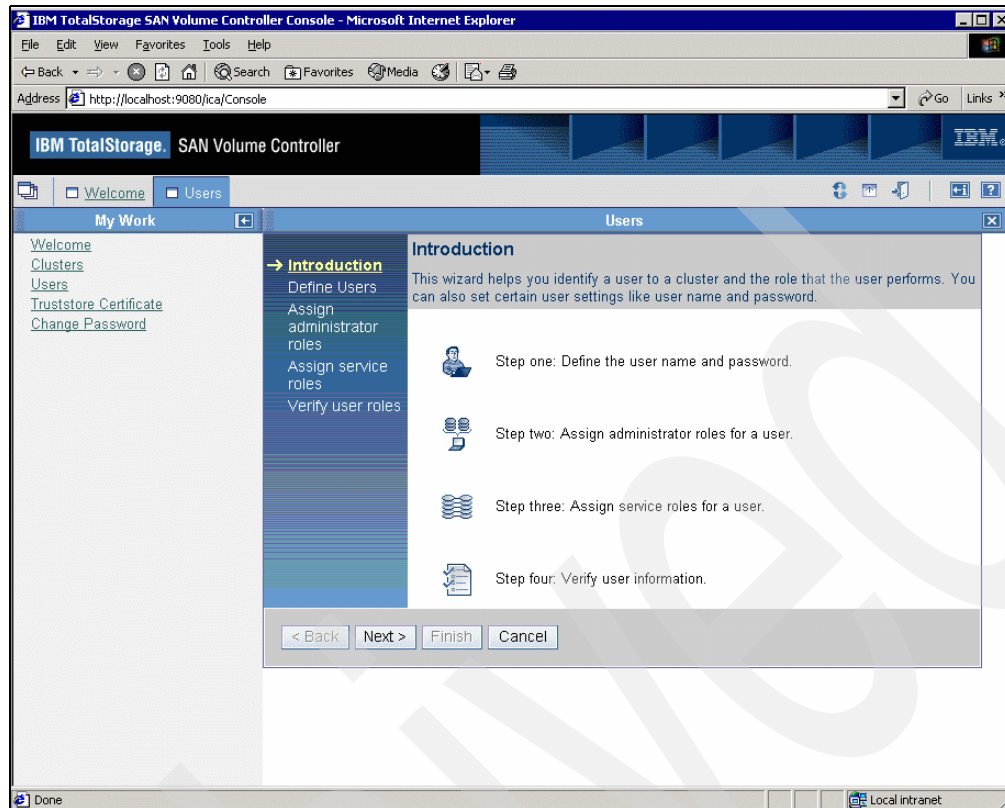


Figure 4-8 SAN Volume Controller Console Add User

Click **Next** to continue which brings you to the Define Users window as shown in Figure 4-9 on page 71.

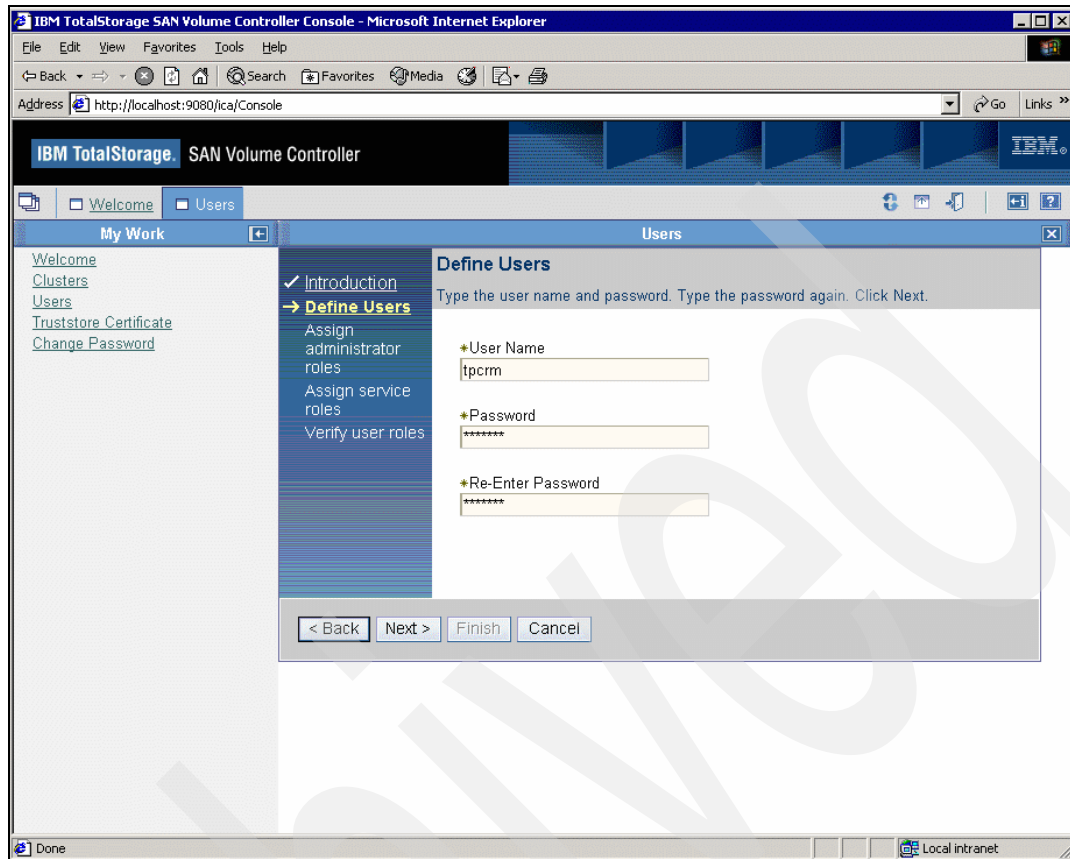


Figure 4-9 SAN Volume Controller Console New User

Type in a new **User Name** and **Password**. Click **Next** to continue. The Assign administrator roles window similar to the one in Figure 4-10 on page 72 will display.

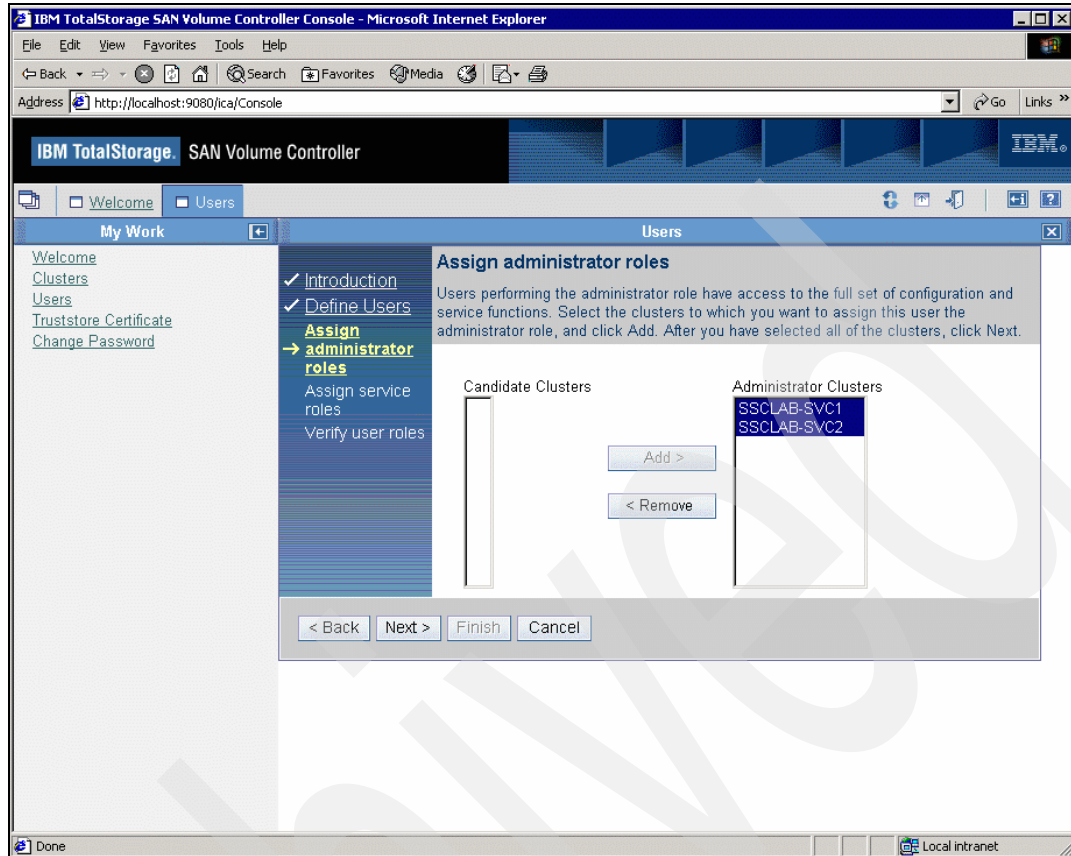


Figure 4-10 SAN Volume Controller Console Administrator Roles

Under Candidate Clusters, select the SAN Volume Controller cluster this user will be able to manage with Administrative role and click **Add** to add them to Administrator Clusters. In our example we selected two clusters named **SSCLAB-SVC1** and **SSCLAB-SVC2**. Click **Next** to continue which brings you to the Assign service roles window similar to the one in Figure 4-11 on page 73.

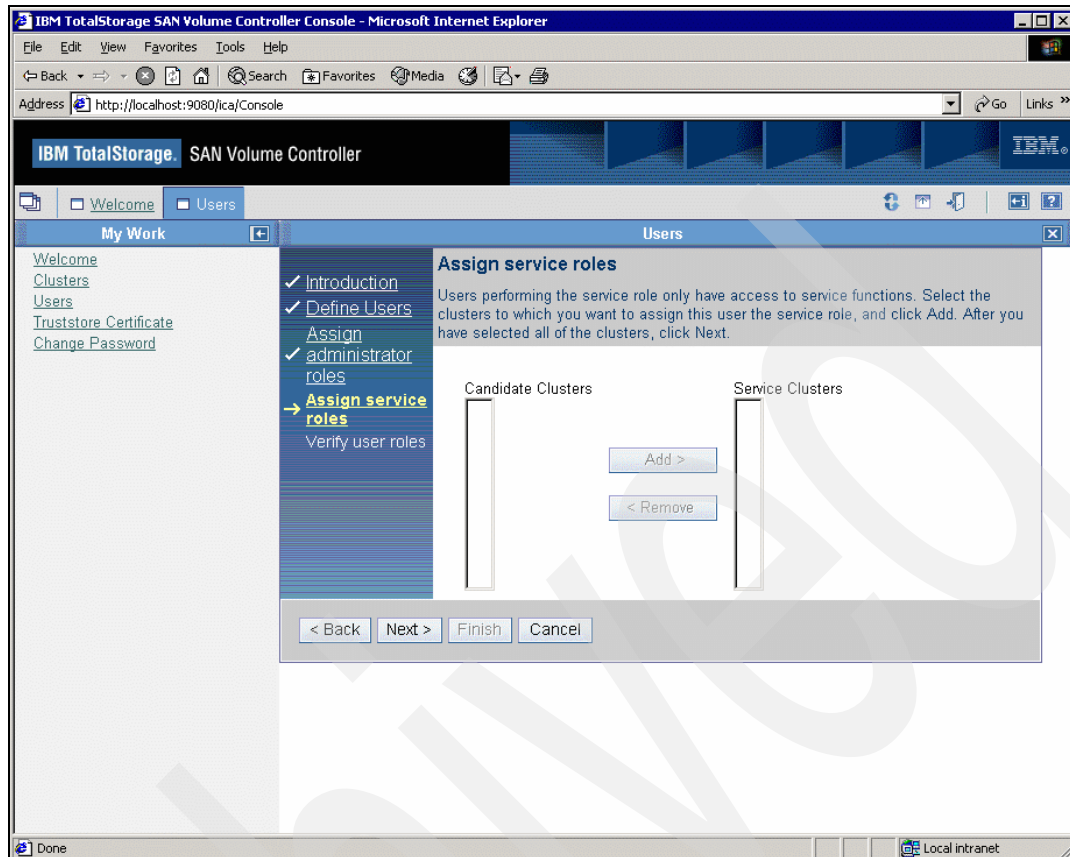


Figure 4-11 SAN Volume Controller Console Service Roles

For TotalStorage Productivity Center for Replication server you do not need to define any Service role. Click **Next** to continue to the Verify user roles window similar to Figure 4-12 on page 74.

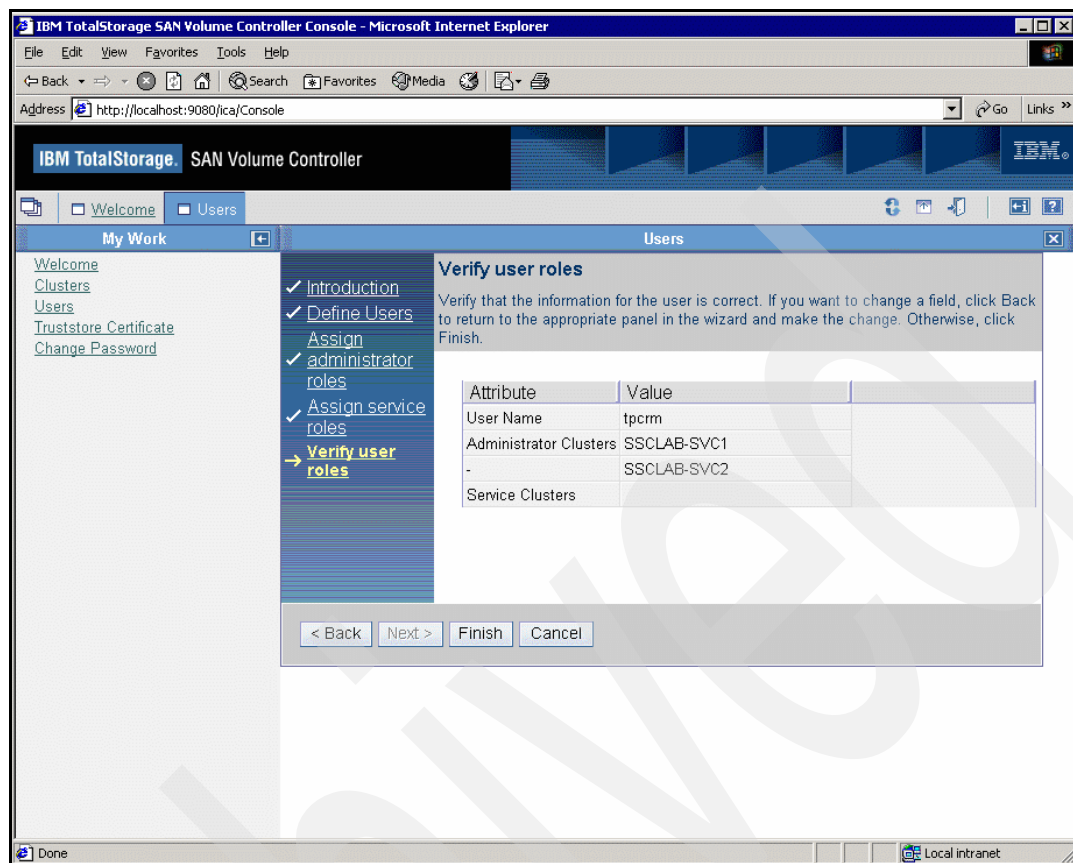


Figure 4-12 SAN Volume Controller Console Verify user roles

Should you want to change anything specific, now is your last chance.

If you are happy with the user and its associated options which you have supplied before then click the **Finish** to save the user. The Viewing users window in Figure 4-13 on page 75 will then display.

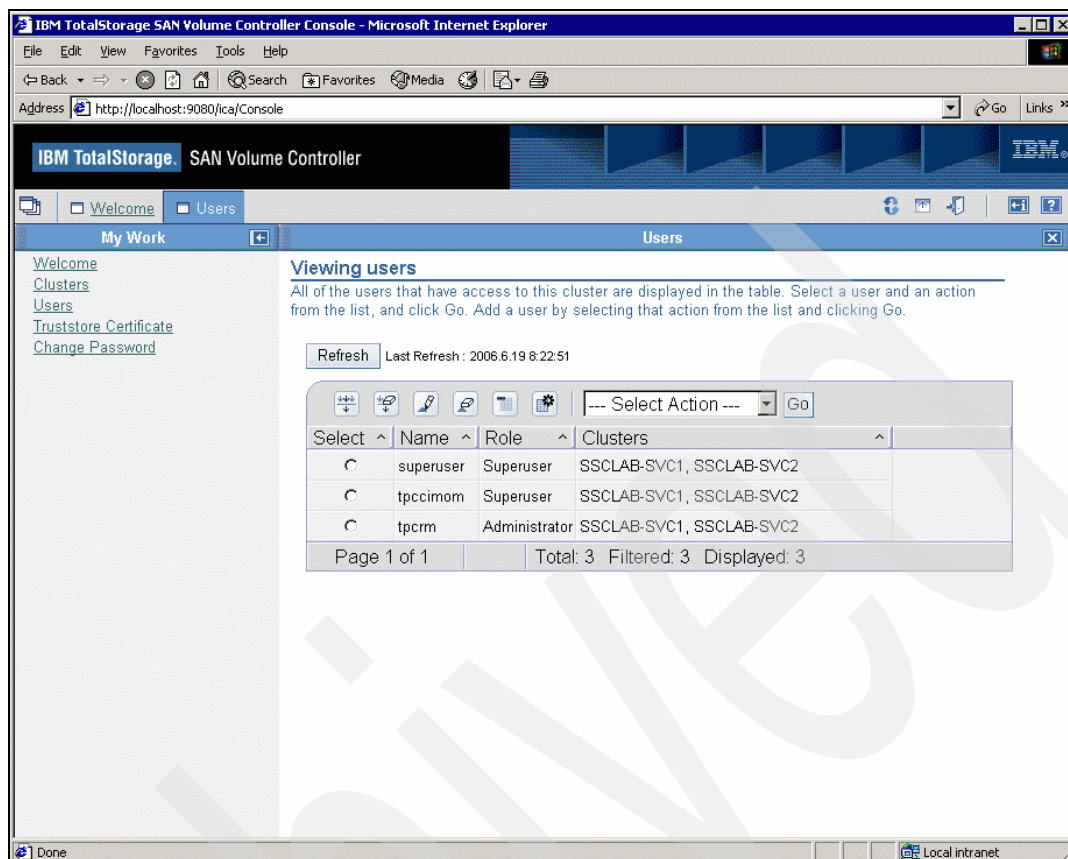


Figure 4-13 SAN Volume Controller Console new user defined

This new user, in our example **tpcrm**, can be used in the TotalStorage Productivity Center for Replication server when defining the SVC storage subsystem.

4.2.2 User Management in Windows server

As part of the TotalStorage Productivity Center for Replication installation only a single user ID and a single group enables access to the application. Figure 4-14 on page 76 shows this group, **rmgroup**.

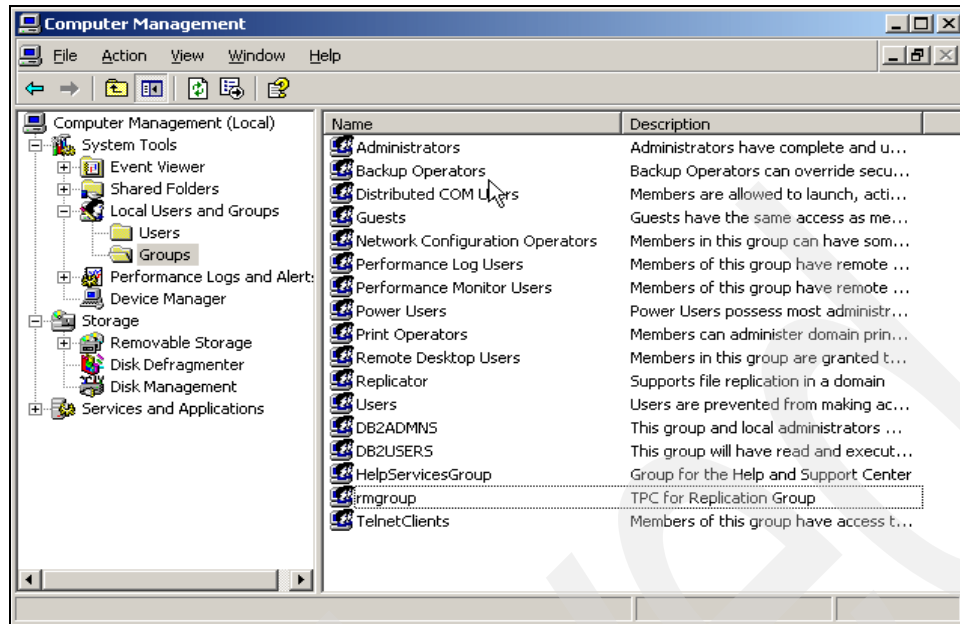


Figure 4-14 Windows Computer Management

Figure 4-15 displays the user **tpcadmin** as a member of the **rmgroup**.

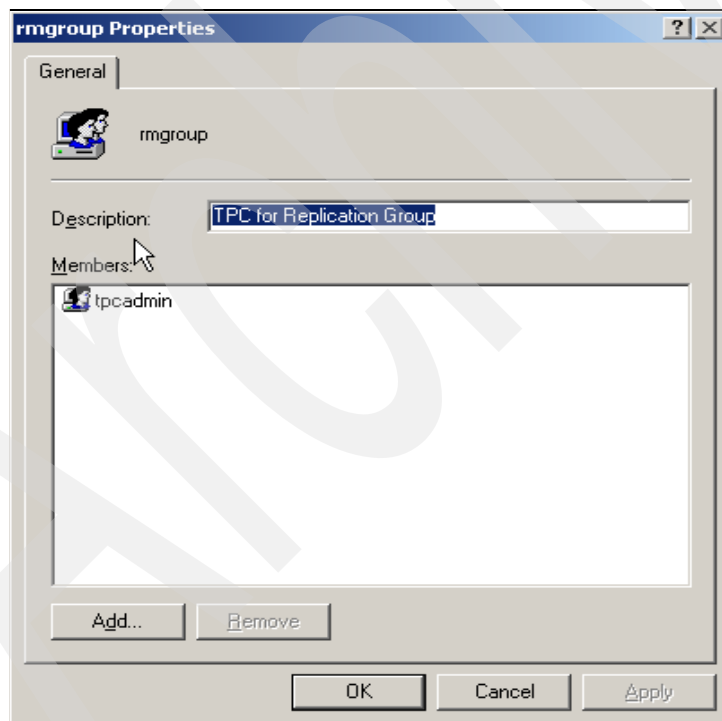


Figure 4-15 RMGROUP

If you want to create additional user IDs for your environment, it is simply a case of creating new users on the TPC for Replication Server and assigning them to the group you created, which is **rmgroup**. Note you may define another group name during the TPC-RM installation.

In Figure 4-16 on page 77 we create another user ID, **tpcrmuser**.

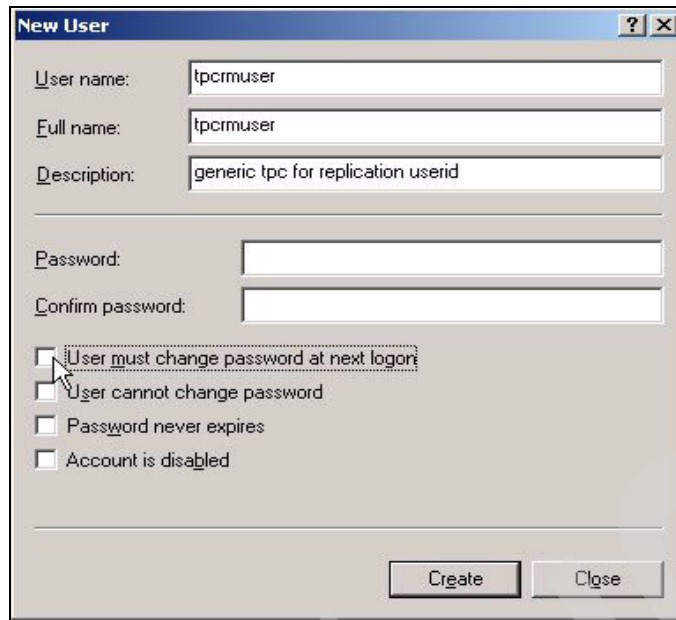


Figure 4-16 Define new User

The next step is to add this new user to the existing group **rmgroup**. This is what Figure 4-17 shows.

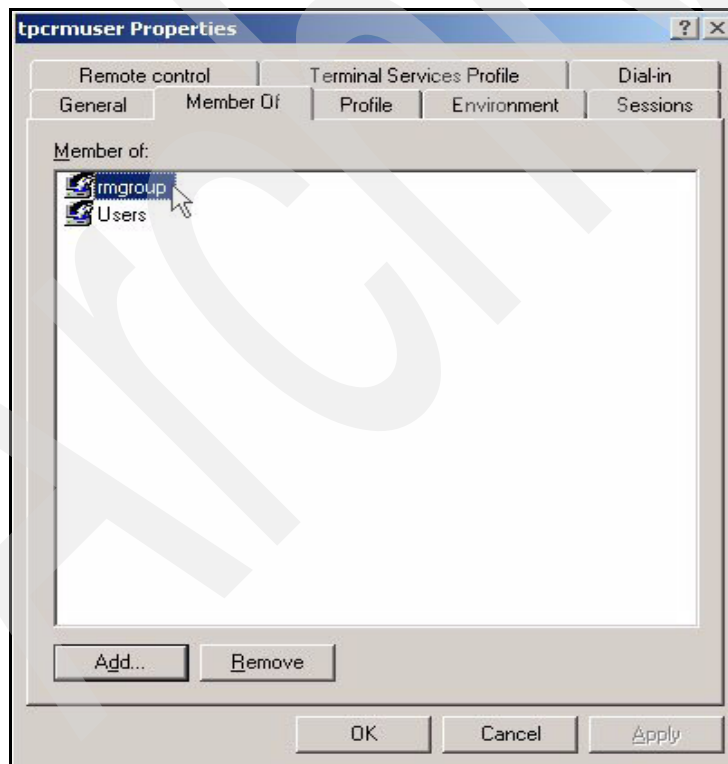


Figure 4-17 tpcrmuser

That is all of what is required to create a new user in Windows. This user ID is now ready to sign on to TPC-RM through the GUI as shown in Figure 4-18 on page 78.

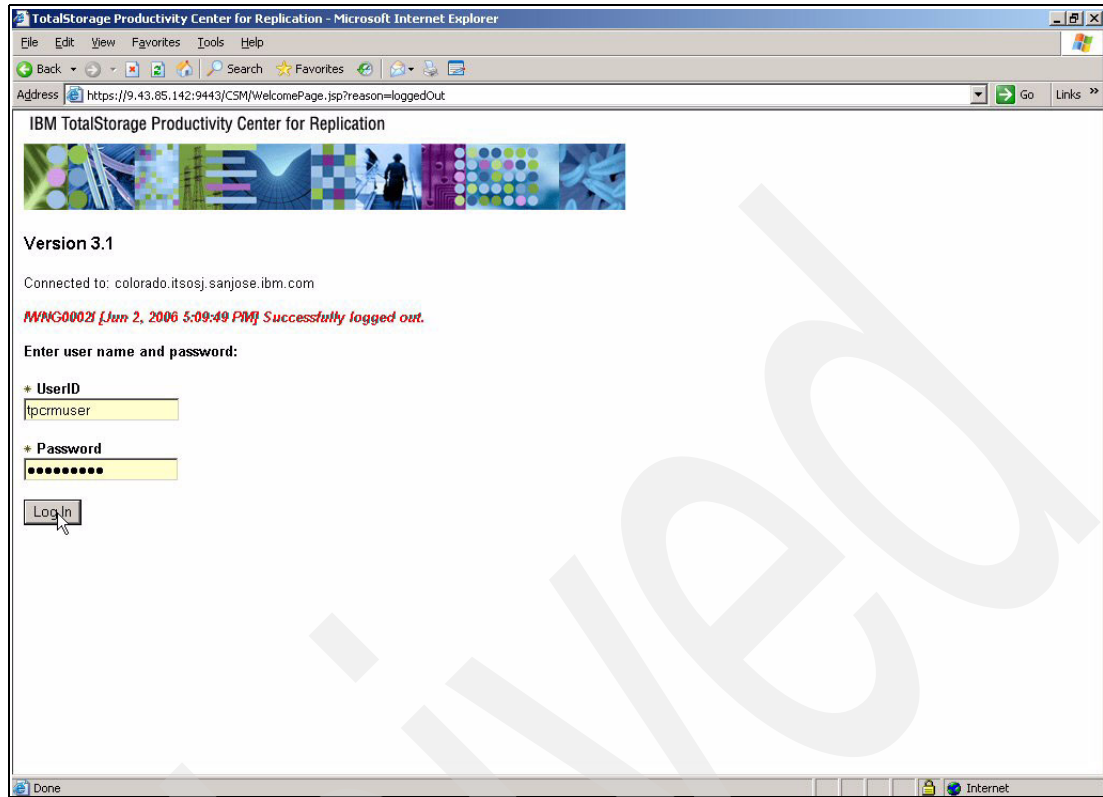


Figure 4-18 Log in to TPC for Replication with newly created user ID

4.3 How to login to TPC for Replication through the GUI

There are essentially three ways to sign in to your TPC for Replication server. At the end you always access the GUI through a Web browser.

- ▶ Locally at the server
- ▶ Remotely via a network attached computer
- ▶ Remotely and securely via a network attached computer

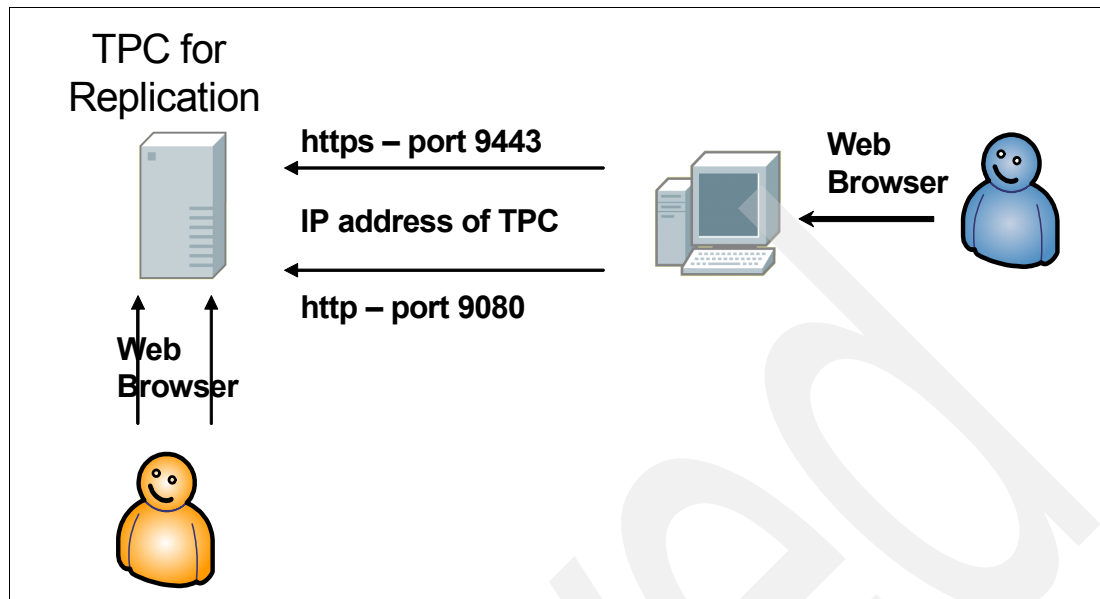


Figure 4-19 TPC for Replication sign in

In all of the following examples we use CSM as the WebSphere application name. Note that CSM is case sensitive and must be in capital letters.

Figure 4-20 shows a sign in via the local host attachment.

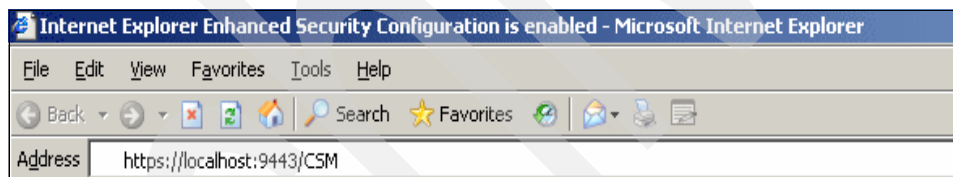


Figure 4-20 Local host

In Figure 4-21 we use the DNS entry for the TPC for Replication server along with the secure TCP/IP port.

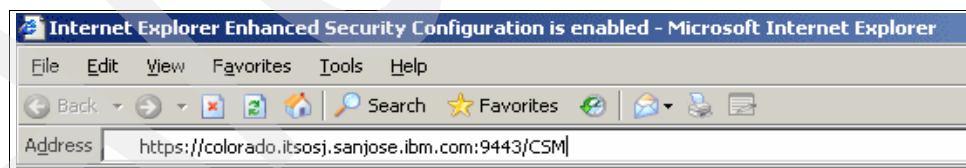


Figure 4-21 Use computer name

In Figure 4-22 we show the third example where we use an IP address to sign-in to the TPC for Replication application.

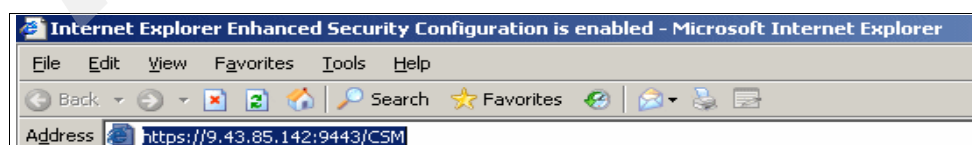


Figure 4-22 Using IP address

Figure 4-23 displays the certificate for a secure session establishment which you have to accept to successfully connect to the TPC-RM server application.



Figure 4-23 Session certificate

4.4 Remote CSMCLI installation

To install the CSMCLI code on workstations other than your TPC for Replication Server follow these steps:

- ▶ Create a CLI folder on your workstation. In our case we selected CSMCLI.
- ▶ Copy the entire CLI program subfolder, as shown in Figure 4-24 on page 81, including all sub-directories into your local CSMCLI directory from your TPC for Replication server.

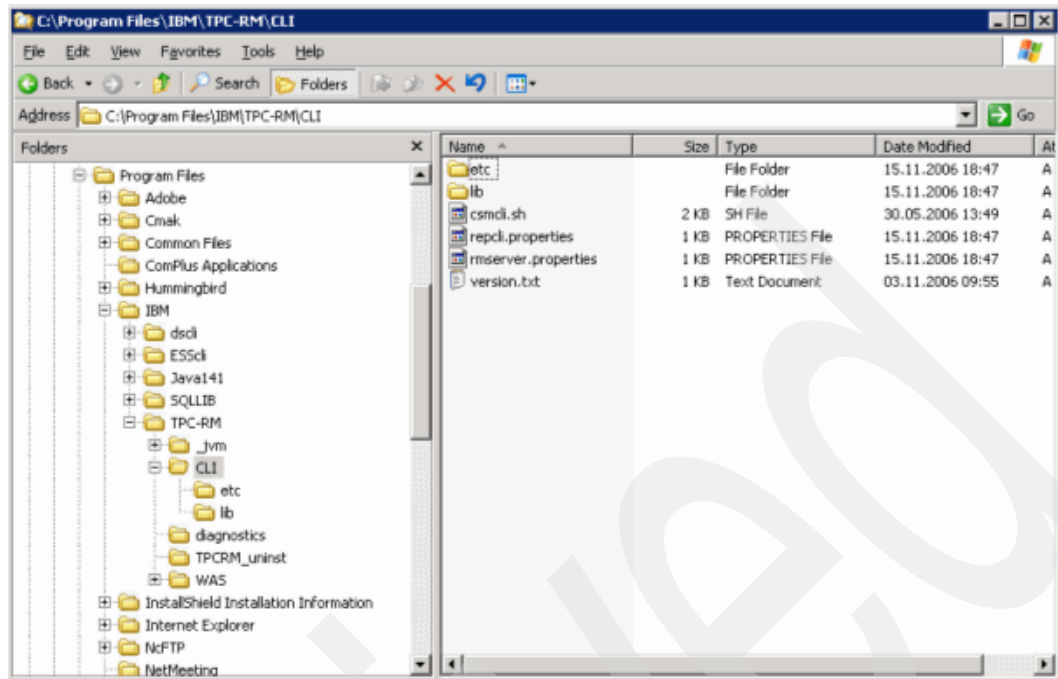


Figure 4-24 CLI directory to copy to your workstation

- Copy the **csmcli.bat** into your local CSMCLI directory (see Figure 4-25).

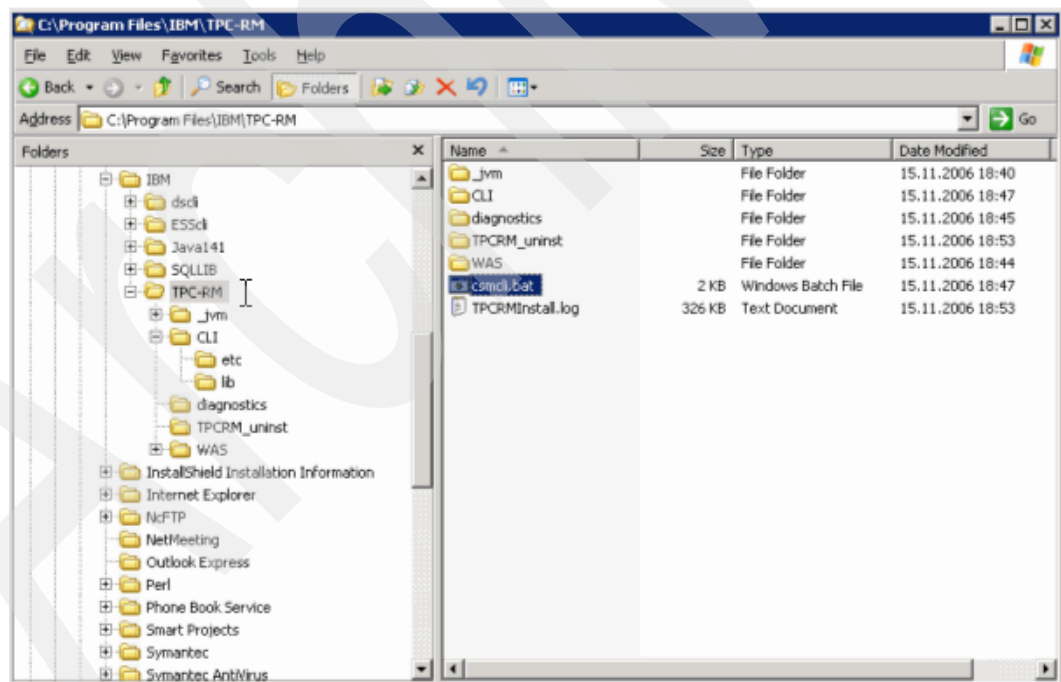


Figure 4-25 Find **csmcli.bat** and modify this file

- Edit the CSMJDK and CSMCLI location lines in **csmcli.bat** to meet your local directory structure. See Example 4-5 on page 82.

Example 4-5 CSMCLI.bat

```
@echo off
TITLE IBM Replication Manager CLI
@setlocal
set CSMCLI_HOME="C:\Program Files\IBM\CSMCLI\CLI"

REM *****
REM Set up the environment for this specific configuration. Both
REM JAVA_HOME and CSMCLI_HOME must be defined in environment variables.
REM *****
set CSMJDK="%JAVA_HOME%"
if "%CSMJDK%"==" " GOTO ERROR_JAVA
set CSMCLI="%CSMCLI_HOME%"
if "%CSMCLI%"==" " GOTO ERROR_CLI
set PATH="%CSMCLI%\lib;%PATH%"
set
CSMCP=.;lib\csmcli.jar;lib\clicommon.jar;lib\csmclient.jar;lib\essClientApi.jar;
set CSMCP=%CSMCP%;lib\ibmCIMClient.jar;lib\jlog.jar;lib\jsse.jar;lib\xerces.jar;
set
CSMCP=%CSMCP%;lib\rmessages.jar;lib\snmp.jar;lib\ssgclihelp.jar;lib\ssgfrmwk.jar;

REM *****
REM Execute the CSMCLI program.
REM *****
cd /d "%CSMCLI%"
"%CSMJDK%\bin\java" -classpath %CSMCP% com.ibm.storage.mdm.cli.rm.RmCli %*
GOTO END

REM *****
REM The Java interpreter home environment variable, JAVA_HOME, is not set
REM *****
:ERROR_JAVA
echo The JAVA_HOME environment variable is not set. Please see documentation.
GOTO END

REM *****
REM The CSM CLI home environment variable, CSMCLI_HOME, is not set
REM *****
:ERROR_CLI
echo The CSMCLI_HOME environment variable is not set. Please see documentation.

:END
@endlocal
```

- Edit the **repcli.properties** file to include your username and password as shown Example 4-6. The server name must be the fully qualified DNS entry or the actual IP address of the TPC for Replication server. The port must not be changed as this is a system setting and used to communicate with the TPC for Replication Server.

Example 4-6 repcli.properties file

```
username=csmuser
password=csmuser
server=169.155.49.131
```

port=5110

- ▶ Update the shell file **csmdi.sh**
- ▶ Verify that CSMCLI works by starting it through a command prompt or click the **csmdi.bat** file as shown in Figure 4-26.

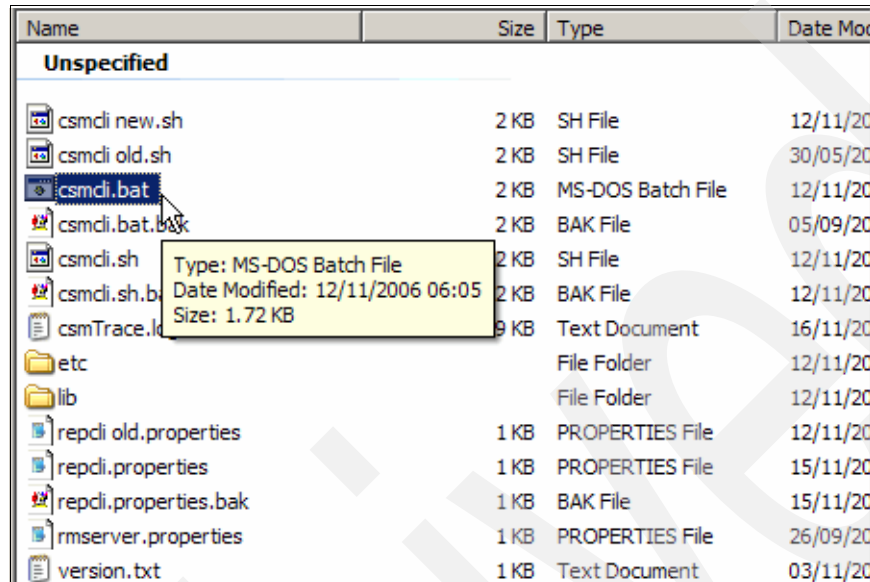


Figure 4-26 Start CSMCLI through **csmdi.bat**

CSMCLI uses Java Keystores to provide authentication to the session. The CSMCLI establishes a SSL link for the term of the session as shown in Figure 4-27.

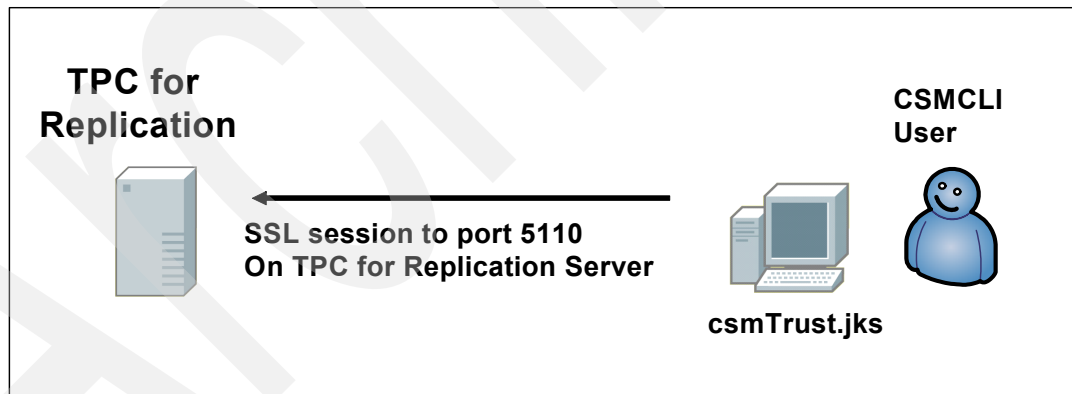


Figure 4-27 CSMCLI communications

When you start a CSMCLI session a communication session is established between a local random port and the remote port 5110 on the TPC for Replication Server. Example 4-7 shows the output of the `netstat -n` command which displays a number of local addresses and port combinations and also the TPC for Replication server with its destination address 9.155.49.131:5110.

Example 4-7 CSM ports

```
C:\>netstat -n
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	9.145.174.43:80	9.1.225.121:42553	TIME_WAIT
TCP	9.145.174.43:1124	9.155.49.131:3389	ESTABLISHED
TCP	9.145.174.43:1137	9.155.49.131:445	ESTABLISHED
TCP	9.145.174.43:2319	9.17.136.76:1533	ESTABLISHED
.....			
TCP	9.145.174.43:2483	9.155.49.131:5110	ESTABLISHED
.....			
TCP	9.145.174.43:2487	9.155.49.131:9443	ESTABLISHED

4.5 SNMP setup

TPC for Replication servers can send Simple Network Management Protocol (SNMP) traps to registered SNMP managers when various events occur. These general events include:

- ▶ Session state change
- ▶ Configuration change
- ▶ Suspending-event notification
- ▶ Communication failure
- ▶ High-availability state change

You can use the **mksnmp** CLI command to add a specified manager to the list of servers to which SNMP alerts are sent to. Details of the **mksnmp** command can be found in the *TPC for Replication Command Line Interface - User's Guide*, SC32-0104.

You can see the SNMP traps in the **CsmTrace.log** file. Figure 4-28 shows a fragment of the **CsmTrace.log** file. Here you see the details of the trap being captured and prepared.

```
[2006-06-23 16:16:12.828-07:00] Work-2 RepMgr D
com.ibm.csm.server.session.snmp.SnmpNotification sendMsg TRACE: Message:
version=1 communityString=public
errorStatus=Success
operation=V2 TRAP requestId=0 correlator=0      (
1.3.6.1.2.1.1.3:17270546,
1.3.6.1.6.3.1.1.4.1:1.3.6.1.4.1.2.6.204.2.1.3,
1.3.6.1.6.3.1.1.4.3:1.3.6.1.4.1.2,
1.3.6.1.4.1.2.6.204.3.1:ess_gmsd_cli,
1.3.6.1.4.1.2.6.204.3.2:Preparing,
1.3.6.1.4.1.2.6.204.3.3:Prepared,
1.3.6.1.4.1.2.6.204.3.4:H1)
```

Figure 4-28 CsmTrace.log fragment

Additionally the TPC for Replication Server can be set up to receive SNMP traps from the IBM ESS 800, DS6000 or DS8000. While not being required the use of the SNMP alert may reduce the latency between the time when a freeze event occurs and the time that TPC for Replication recognizes that this event is occurring. With or without the SNMP alert function, however, TotalStorage Productivity Center for Replication maintains data consistency of its sessions during the freeze event. The SNMP trap destination can be setup on your ESS via the ESS Specialist or the **set snmp** command. Through the respective GUI panels for the DS6000 or DS8000 or the DSCLI command **chsp** you set SNMP trap destinations for DS6000 and DS8000.

Using TotalStorage Productivity Center for Replication on Windows 2003

At this point you have successfully installed the TotalStorage Productivity Center for Replication. In this chapter we show you how to set up replication sessions and manage these sessions. We also show you how to setup Management Servers for High Availability.

The chapter contains a section for each supported storage subsystem. At the time of writing this includes:

- ▶ SAN Volume Controller (SVC)
- ▶ ESS 800
- ▶ DS6000 and DS8000

The following scenarios are included and document the work we completed in our lab environment:

- ▶ GUI based configuration
- ▶ CSMCLI based configuration
- ▶ Flashcopy
- ▶ Metro Mirror
- ▶ Global Mirror

But first we briefly cover how to setup and define a standby TPC for Replication Server as well as how to take over from one server to the other server.

5.1 Setup and define a standby TPC for Replication server

How to setup a TPC for Replication server as a standby server does not affect the storage subsystems which TPC for Replication is going to manage. This relates to how a standby server is configured, defined, and connected to the active TPC for Replication server.

5.1.1 Define standby server

In order to provide a more resilient TPC for Replication server environment define a second server as a standby server. Figure 5-1 shows a high availability environment with a standby TPC for Replication server installed and configured.

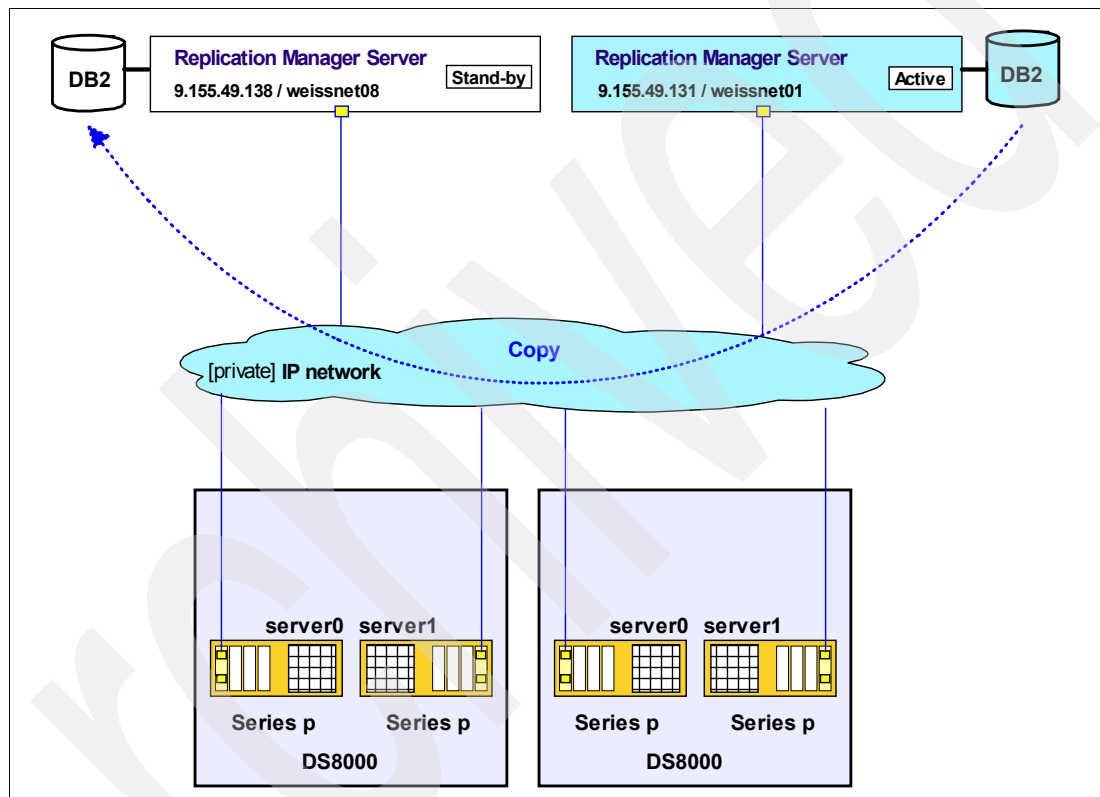


Figure 5-1 Active and standby TPC for Replication servers

As Figure 5-1 shows, two servers connect through a common IP network with each other. Although only one server is active this server replicates all changes to its local database to the database of the standby server.

After you logged in to the TPC-RM GUI through your browser select from My Work the Managed Servers hyper link as shown in Figure 5-2 on page 87.

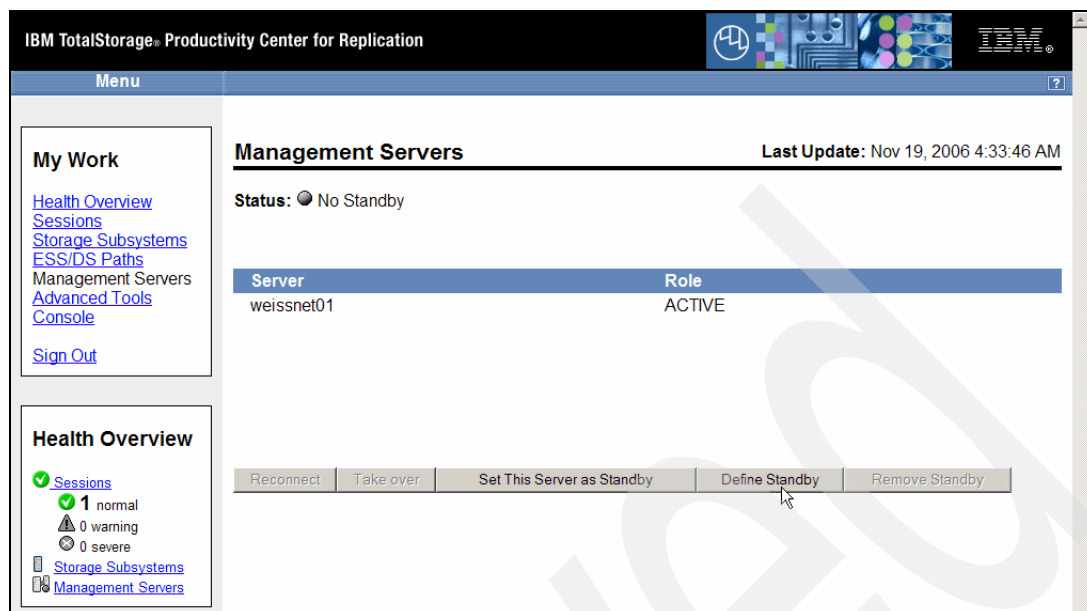


Figure 5-2 Define Standby server from active server

On the bottom of the Management Servers panel shown in Figure 5-2 select the button *Define Standby* which brings you to the Define Standby panel shown in Figure 5-3. Note that this is the Define Standby panel on the active server. It is also possible to log in into the potential standby server and initiate a copy by defining this server as standby.

In the Define Standby panel in which you specify the IP address of the potential standby server. *Username* and *password* are the login formation when you login into the standby server itself. For Windows this is usually the **Administrator** username and its associated password. For an AIX based server this is usually the root user and its associated password. In this example the standby server is an AIX based server.

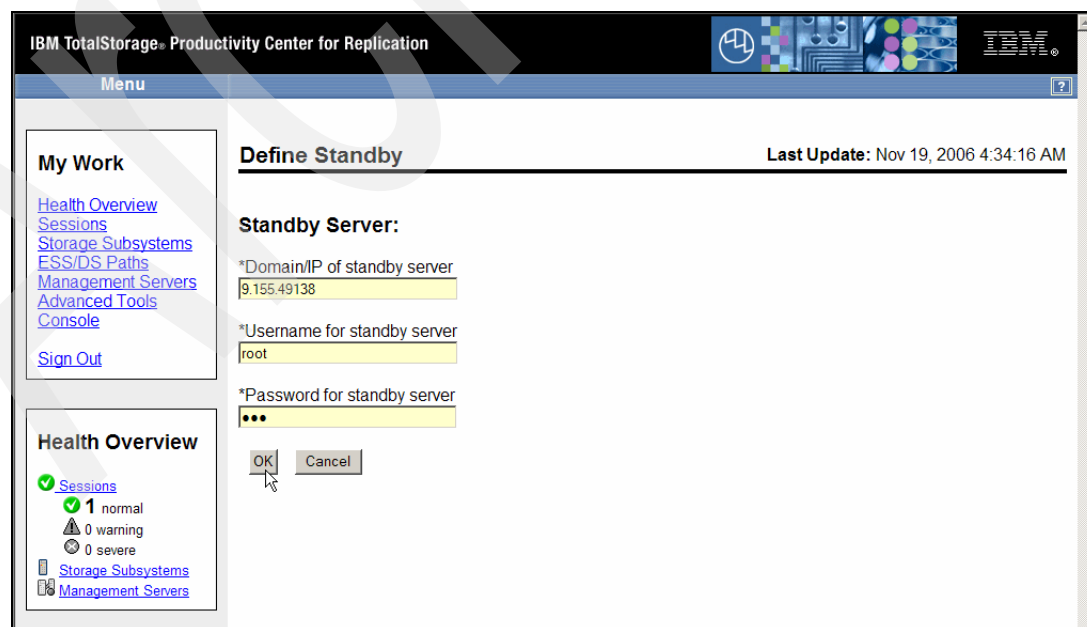


Figure 5-3 Define Standby server through IP address of potential standby server

Remember It is also possible to log in into the potential standby server and initiate a copy by defining the server as standby. Figure 5-4 shows this alternative. Here we logged in into the potential standby server and provide in this panel the IP address of the currently active TPC for Replication server.

This then starts a copy process as indicated in Figure 5-1 on page 86 to copy the database content from the active server to the database of the standby server. Note that not everything is copied one-to-one. For example the usernames and passwords from the active server's database are not copied to the standby server's database. This makes sense because you would define corresponding usernames in the standby server independent from the active server.



Figure 5-4 Define standby server through standby server

Figure 5-5 is the window which follows after you press the **OK** button in Figure 5-4 or in Figure 5-3 on page 87. This window indicates the copy process between both servers TPC for Replication database. Note the status indicates Synchronization Pending.

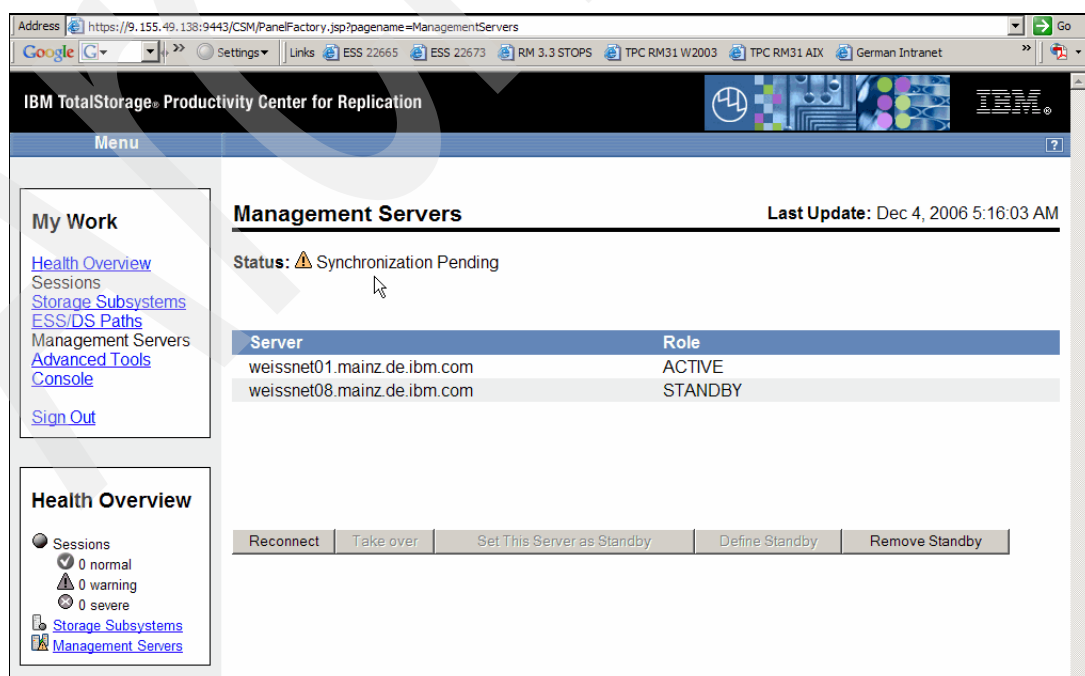


Figure 5-5 Synchronizing between both servers

Eventually the copy process is finished and through the refresh function of the panel in Figure 5-5 on page 88 it changes to what Figure 5-6 displays with the server status of *Synchronized*.

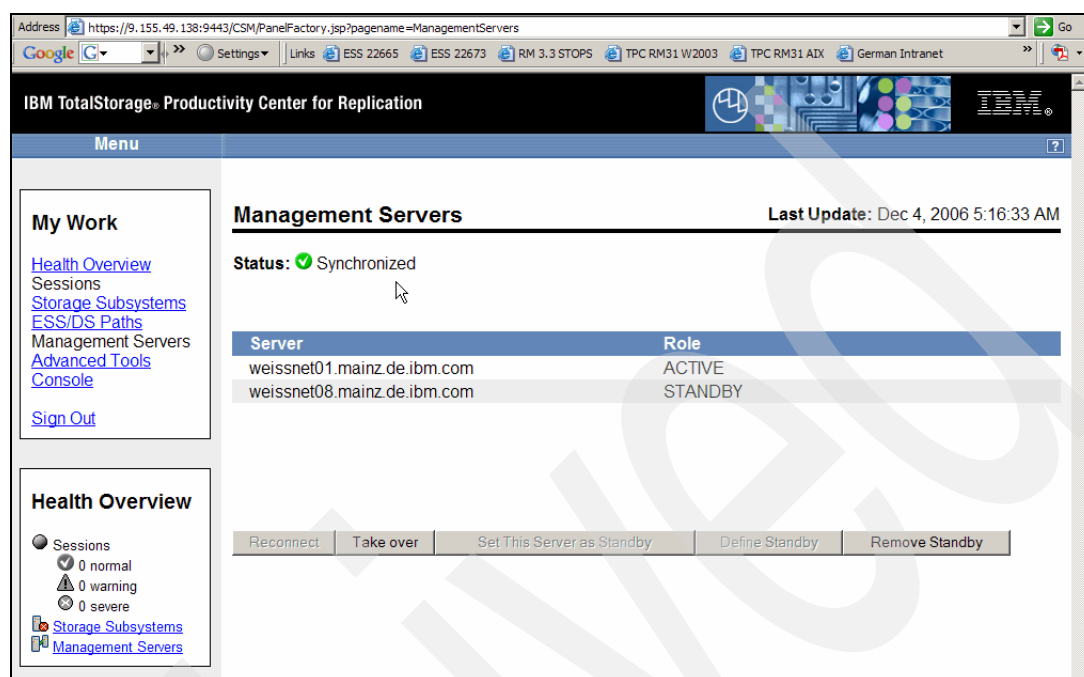


Figure 5-6 Database of both servers are synchronized

Logging in into the active server it displays the same status of Synchronized as we observed already with the standby server in Figure 5-6.

Figure 5-7 on page 90 displays this view from the active server.

To review, you may create an active - standby server configuration either from the active server or from the potential standby server. The result is in either case the same. After a certain time of synchronization both servers are in sync and all future updates to the active server will be replicated through the LAN to the standby server.

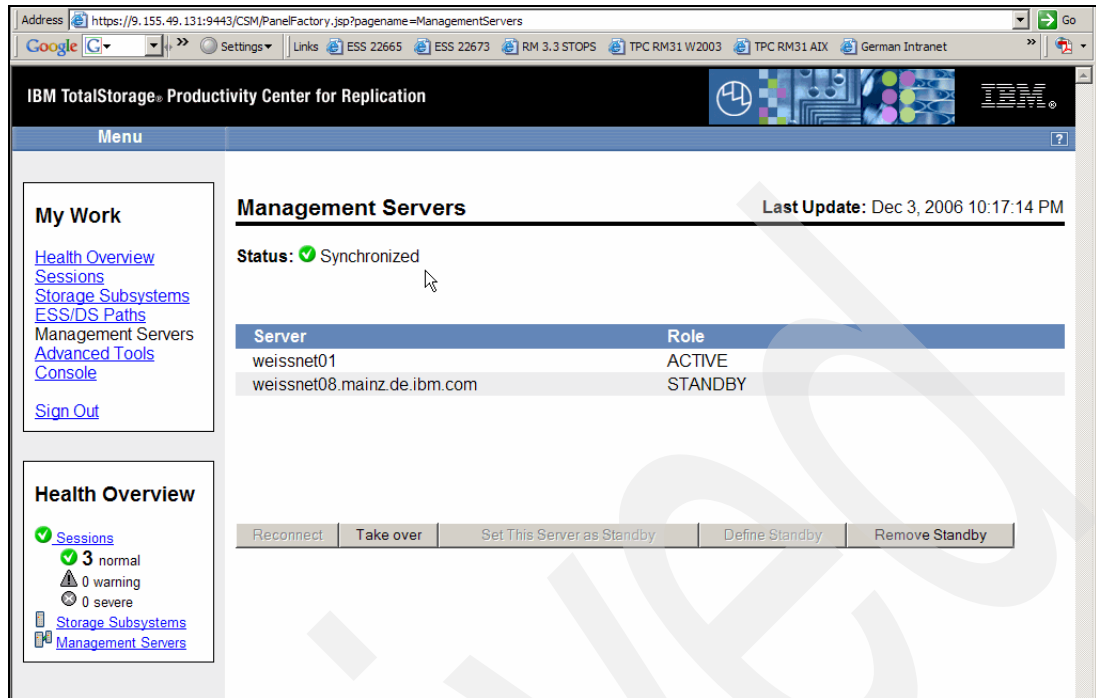


Figure 5-7 View from active server

Figure 5-8 is a portion from the console server log which confirms that an active - standby server configuration is successfully established.

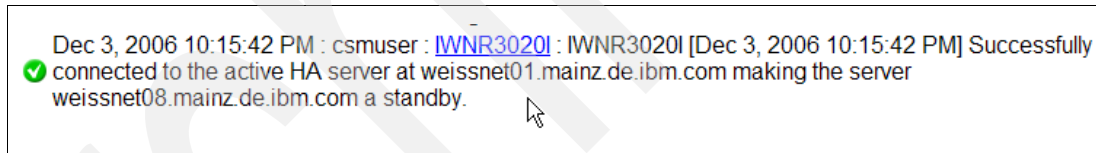


Figure 5-8 Console log protocol confirms the new active - standby server configuration

As Figure 5-7 indicates you may either remove the standby server simply by clicking on the **Remove Standby** button. To switch the active server function from the currently active server to the standby server you simply click the **Take over** button.

5.1.2 Take over from standby TPC for Replication server

Assume that the active server is no longer available. Then you need to login into the standby server as shown in Figure 5-9 on page 91. Note that there is no real high server availability function with an automated failover capability. You need to login into the standby server.

After you logged in into the standby server it reflects the database content of the standby server. Note that the sessions are greyed out and cannot be manipulated through the standby server.

Select the Management Servers function under My Work and click the **Take over** button as shown in Figure 5-9 on page 91.

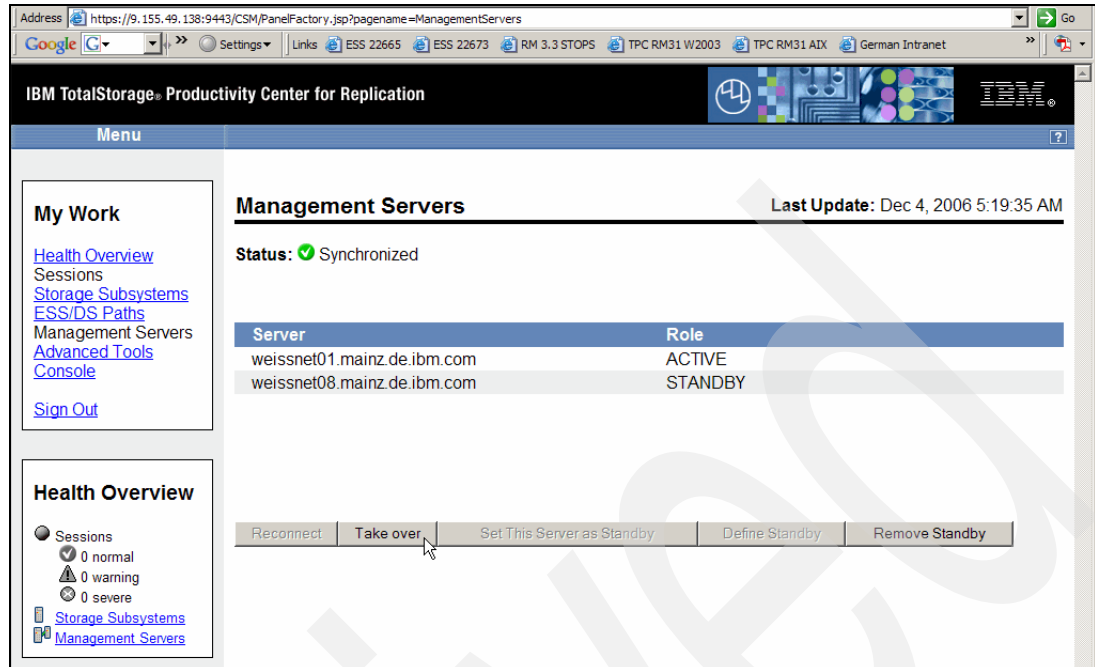


Figure 5-9 Active - Standby configuration view from standby server

Shortly after clicking on the Take over button, the panel which Figure 5-10 displays is presented. Note that the sessions are grayed out but the standby server already has the Role of ACTIVE.

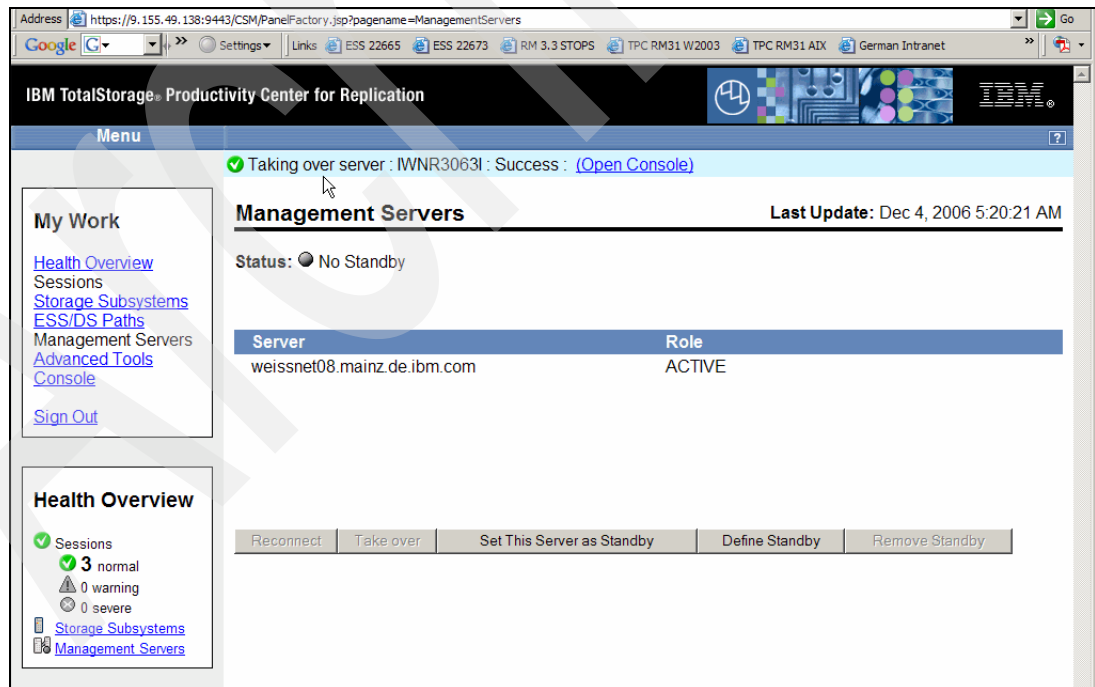


Figure 5-10 Standby server becomes the active server

A few seconds later and another panel refresh cycle Figure 5-11 on page 92 displays the sessions hyperlink under My work as being active. Now you may issue any TPC for

Replication action against any session and it is recorded only in the database of the newly active server.

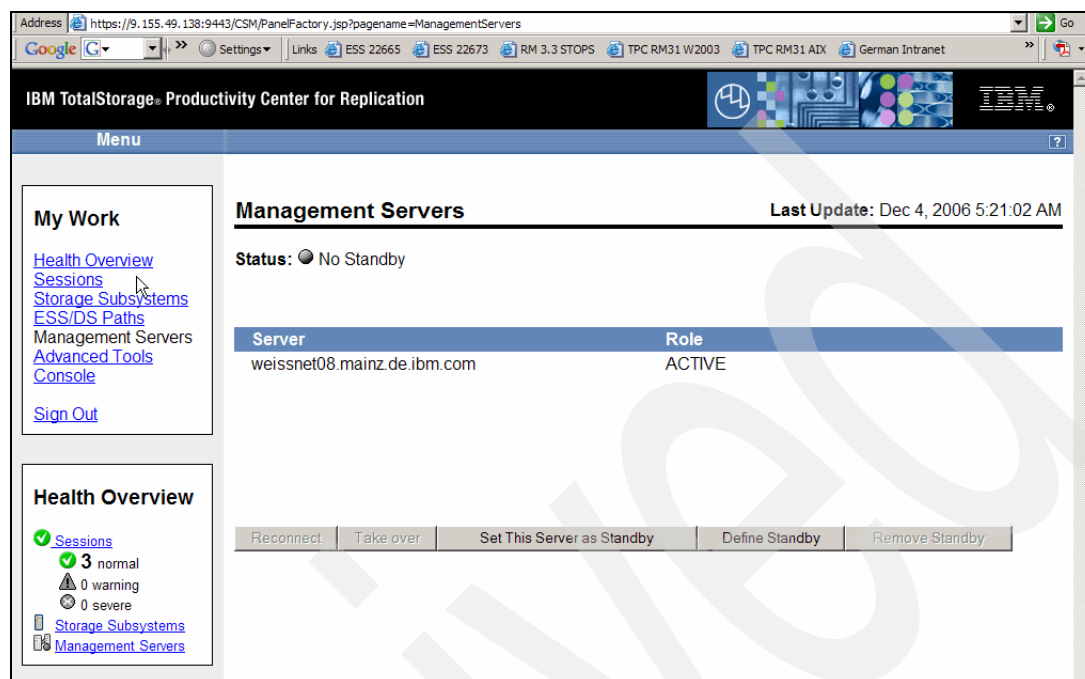


Figure 5-11 New active server

Note when the previously active server is still up and running you can still issue also any TPC for Replication actions against the old active server. But there is no replication action occurring between both servers. This has the potential to damage your entire TPC for Replication configuration. Therefore we recommend when you fail over to the standby server and the previously active server is still up and running that you at least stop the WebSphere services in the previously active server. This will prevent any changes to the database of the previously active server.

Right-click **My Computer** and select the **manage** token. Select **Services** and click **IBM WebSphere Application Server** to stop this server as Figure 5-12 on page 93 displays through the Stop the service hyperlink.

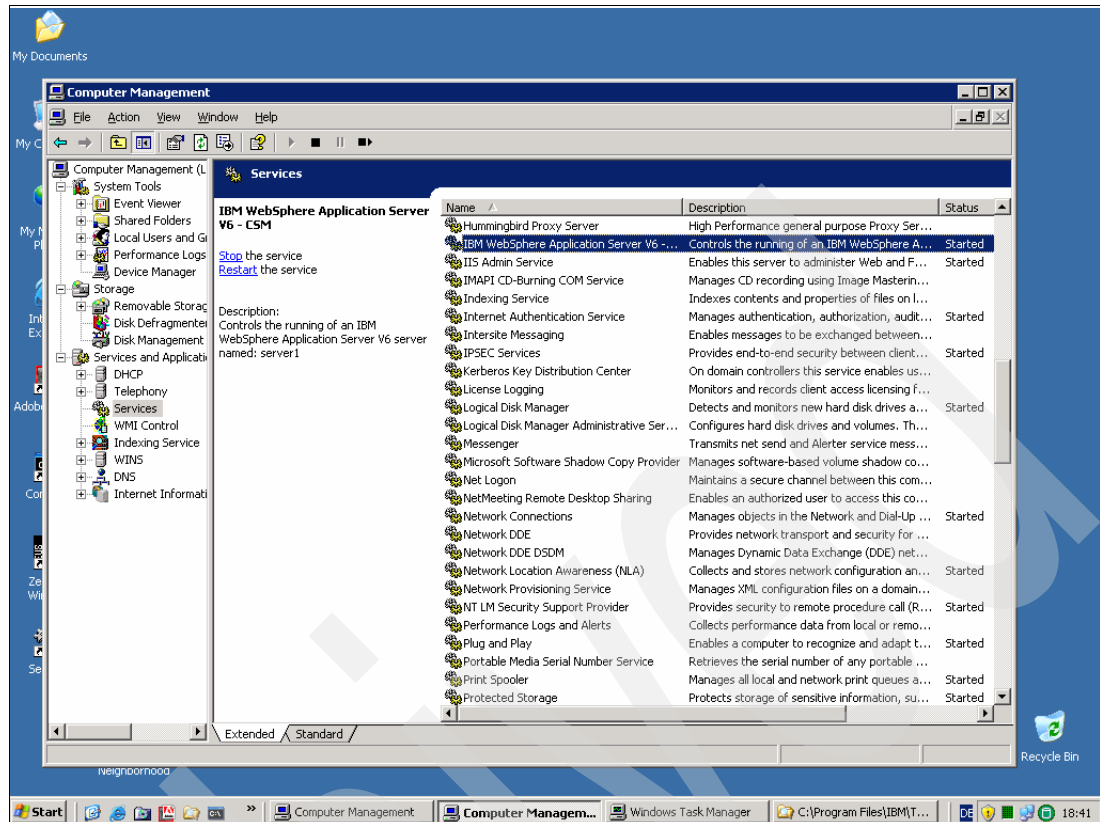


Figure 5-12 Stop WebSphere server to prevent further updates to database

When you upgrade the server software you may fail over to the standby server in order to upgrade the active server software. Once the software upgrade is completed you may fail back to the old active server and remove the standby server. Then you upgrade the standby server software before you re-established the original active - standby server configuration.

5.2 TPC for Replication and SAN Volume Controller

In this section we take you through the steps to use TotalStorage Productivity Center for Replication with the SAN Volume Controller.

As we have seen in the planning section the TPC for Replication tool communicates with the SAN Volume Controller (SVC) CIMOM loaded within the SVC Master Console as shown in Figure 5-13 on page 94.

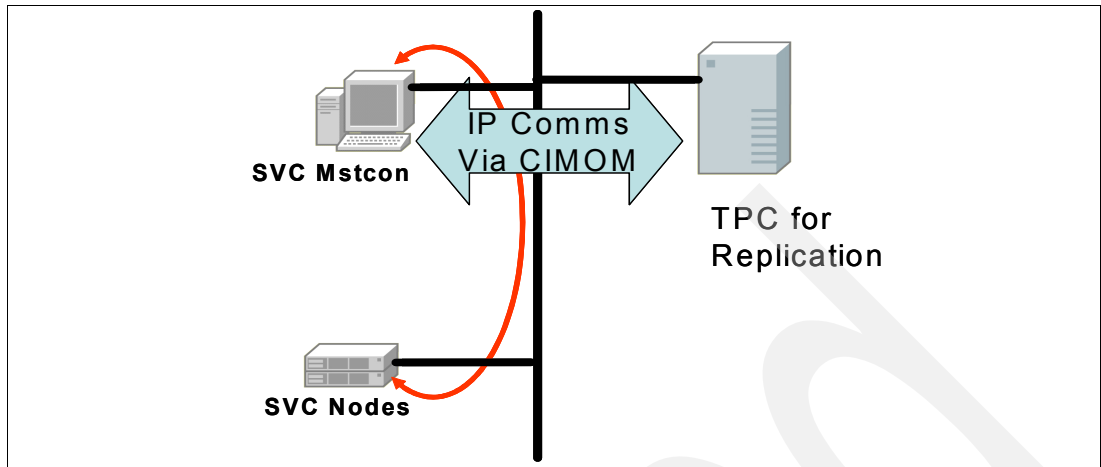


Figure 5-13 IP connectivity for TPC for Replication and SVC

Within this chapter we will show you how to perform the following using both the GUI and CLI interfaces:

- ▶ Add an SVC to your TPC for Replication environment
- ▶ Create and delete SVC sessions
- ▶ Create and delete SVC Copy Sets
- ▶ Manipulate the created sessions

Our ITSO lab setup can be seen in Figure 5-14.

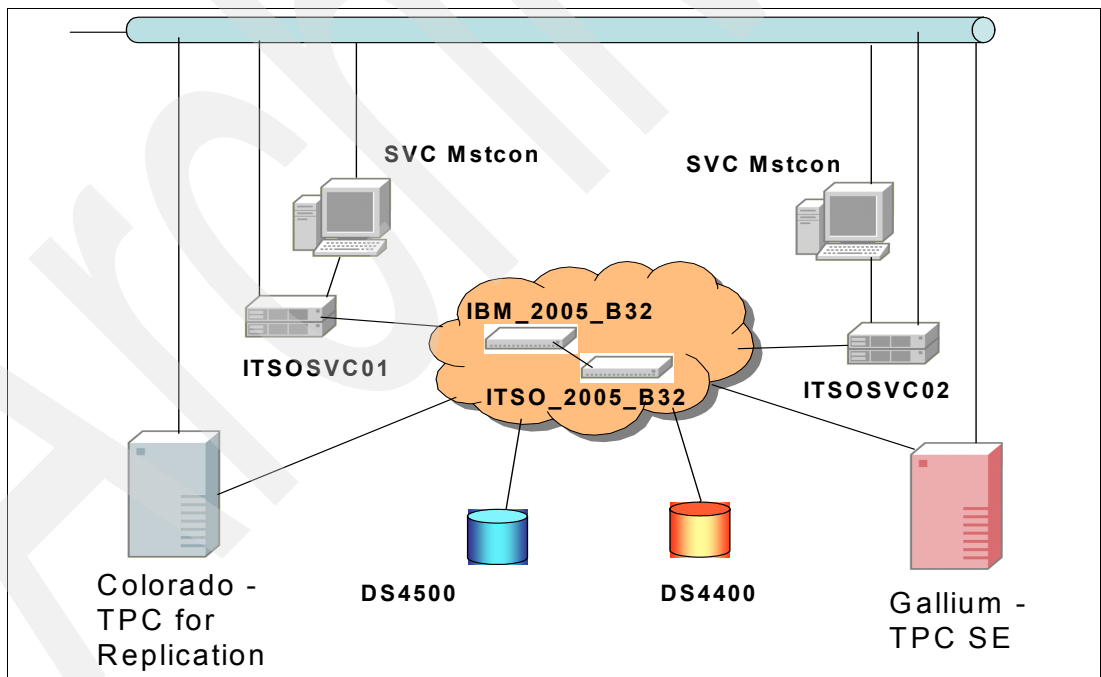


Figure 5-14 ITSO lab setup

5.2.1 Adding the SAN Volume Controller

In this section we describe adding the SVC to the TPC for Replication environment.

Windows GUI

Start your Web browser and sign on to the TPC for Replication server. Once you are signed on, select the Storage Subsystems from either the Navigation Menu or the Work Area as shown in Figure 5-15.

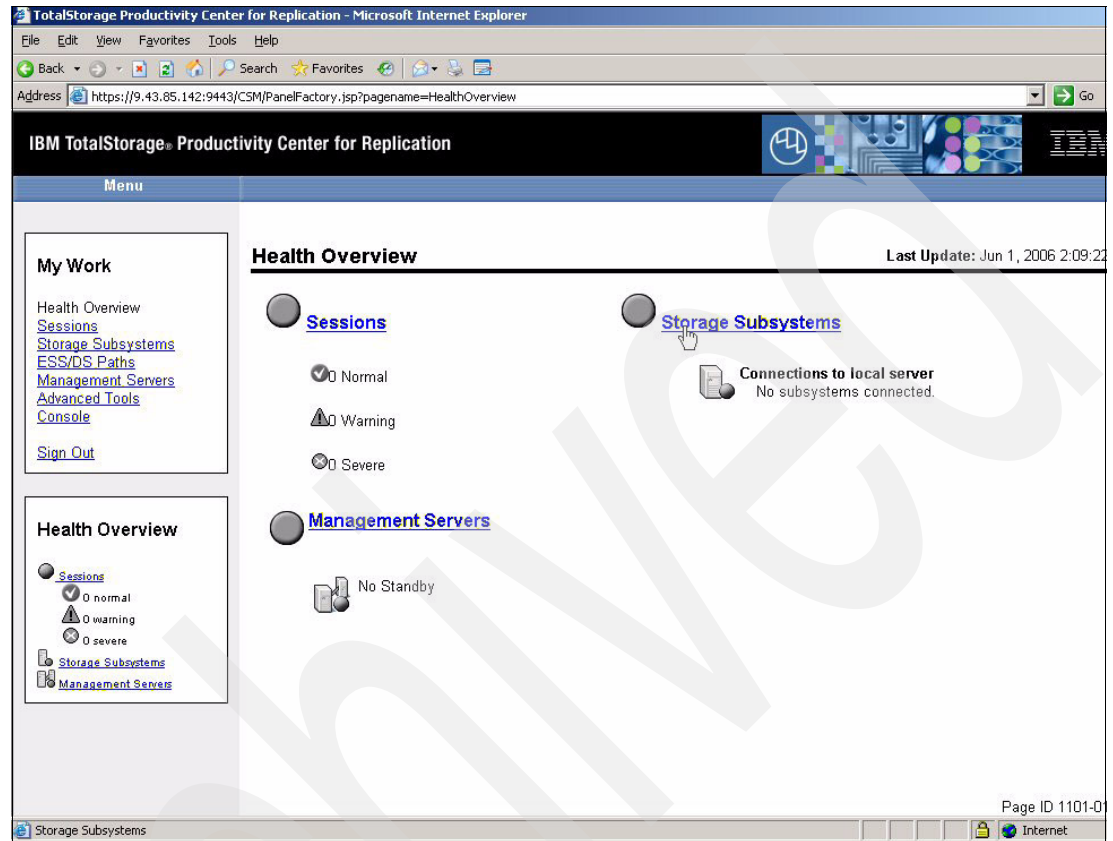


Figure 5-15 Add Storage Subsystem

Click the **Add Subsystem** button as in Figure 5-16 on page 96.

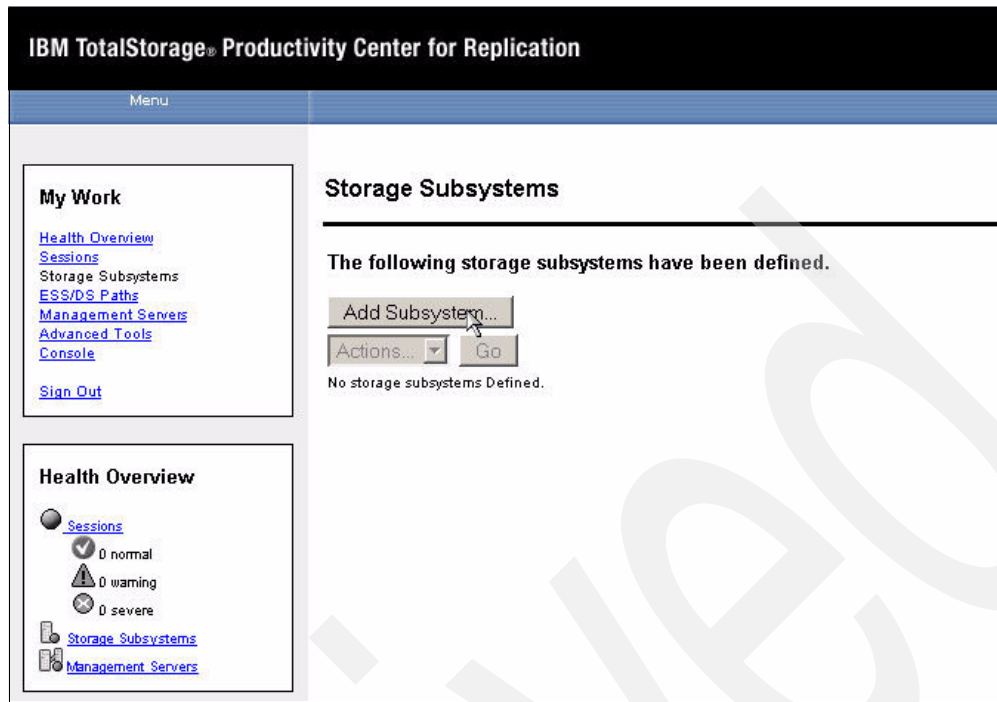


Figure 5-16 Add Storage Subsystem

Next choose the SVC radio button and click **OK** as in Figure 5-17.

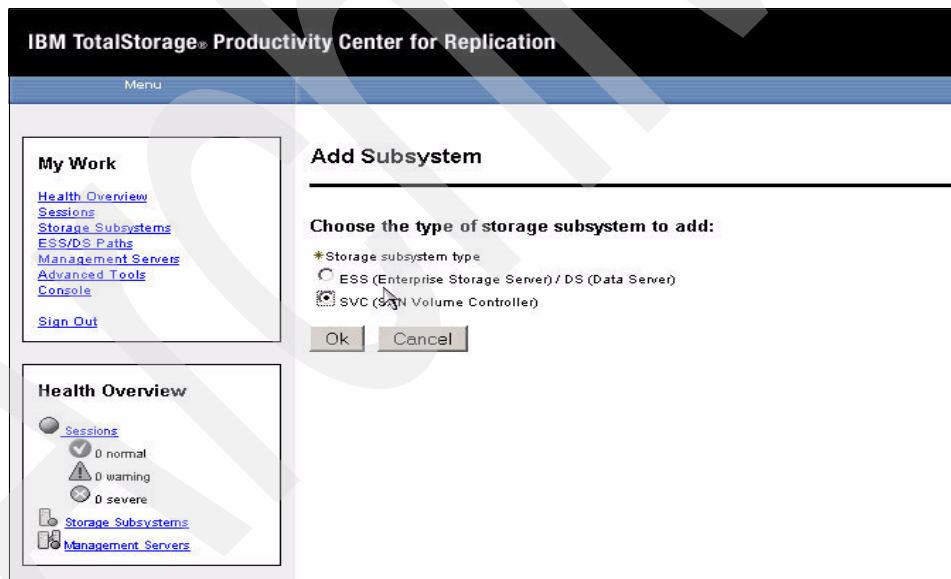


Figure 5-17 Add SVC subsystem

Now in Figure 5-18 on page 97, we enter the IP address (or the fully qualified name) of the SVC Master Console as well as the defined user account and password for TPC for Replication's use.

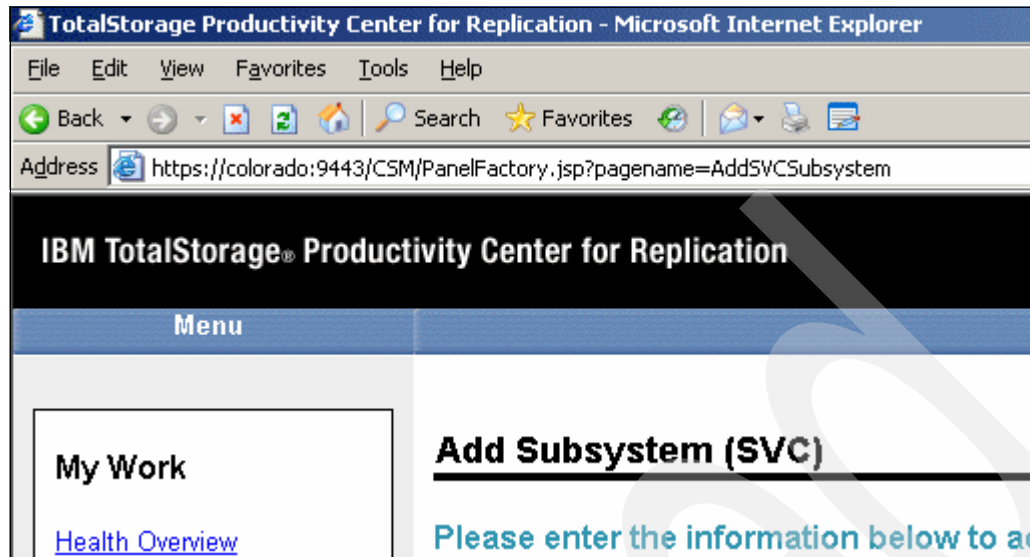


Figure 5-18 Enter SVC attributes

Once complete, the TPC for Replication will show the window as in Figure 5-19 indicating the storage subsystem has been defined.

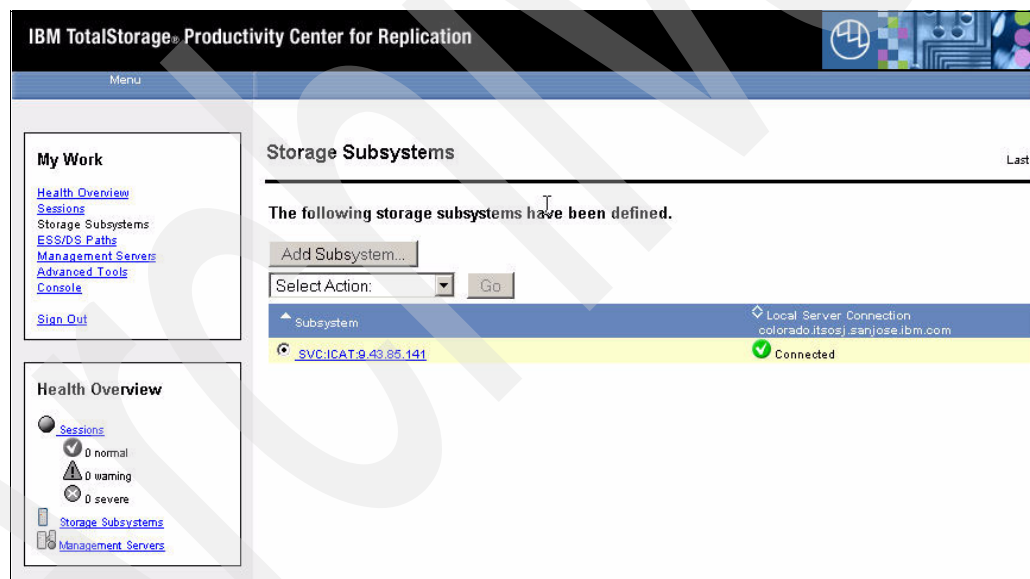


Figure 5-19 SVC Subsystem added

5.2.2 Windows CLI

Using the command line interface, we can achieve the same result. For this effort we have created a script file which can be seen in Figure 5-20 on page 98.

```
#
# This is a script file
# Using commands to interrogate TPC 4 Replication
#
setoutput -fmt delim -v on
adddevice -devtype SVC -ip 9.43.85.141 -username superuser -port 5999
lsdevice -devtype svc
```

Figure 5-20 Add Subsystem script

While we can set up a script to perform adding a subsystem to TPC for Replication, because the **adddevice** command requires a password, it must be added interactively as can be seen in Figure 5-21.

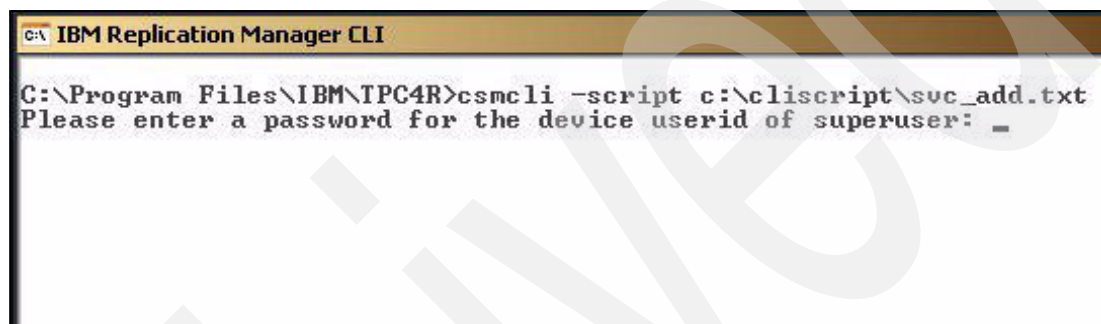


Figure 5-21 Add Subsystem script

Once the password is entered correctly we see the result as shown in Figure 5-22.



Figure 5-22 CLI result

5.2.3 Adding a session

A session construct may be created with the GUI running as a browser application through Windows Internet Explorer or with the CSMCLI.

Using RM browser based GUI

Now that we have a subsystem to use we create a session as a first step to build up a copy services configuration. Remember that a Session is a token under which you manage volume copy sets. As such it represents a consistency group for all copy sets defined within this session.

In this instance we will create a FlashCopy Session as Figure 5-23 on page 99 displays.

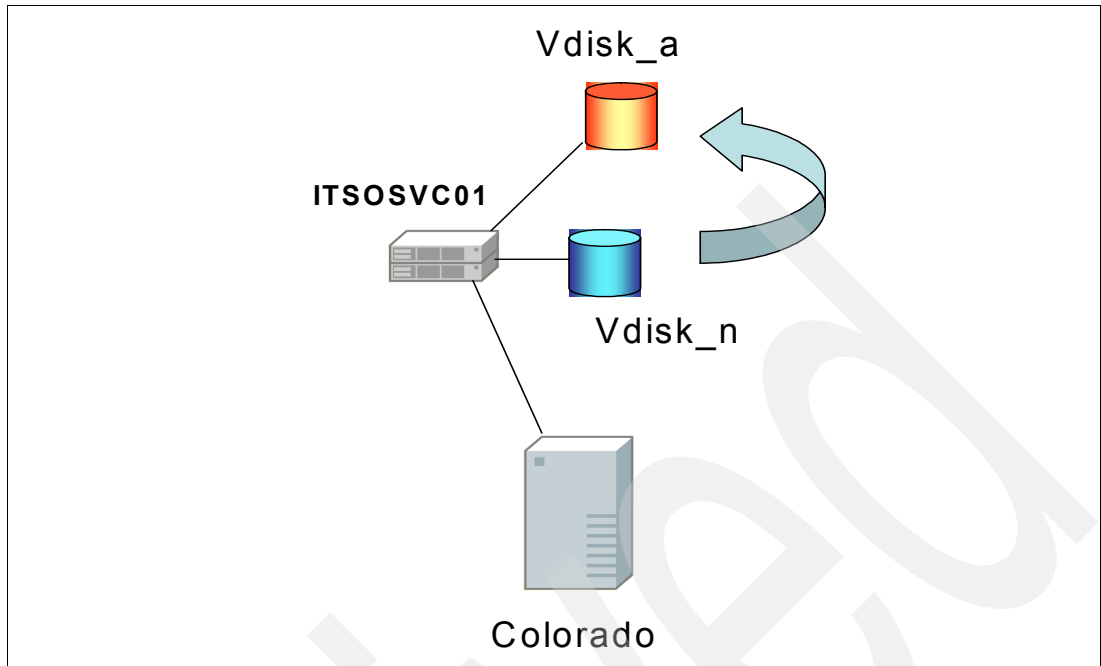


Figure 5-23 Flashcopy ITSO lab setup

The first step is to select the **Create Session** button from the Sessions panel as Figure 5-24 shows.



Figure 5-24 Create a Session

This will open a new window where you can add session details such as *copy type* as Figure 5-25 on page 100 shows. Because we want to create a FlashCopy session, we select the appropriate *copy type* from the Choose Session Type drop-down list and click the **Next** button.

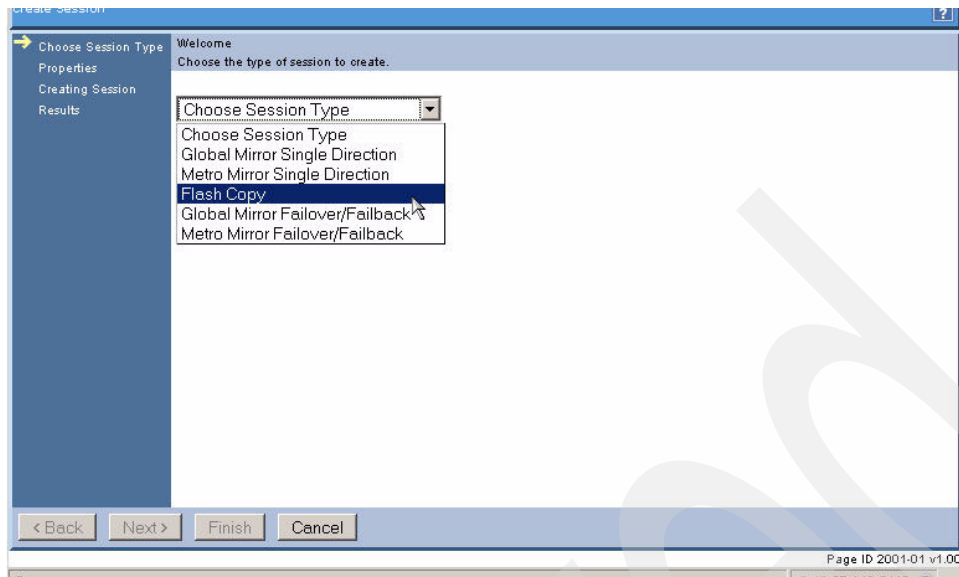


Figure 5-25 Select Session type

Choose a meaningful name for the session in the *Sessionname* box which identifies what this session is for as well as a meaningful description for the session in the Description name box. Then click **Next** as in Figure 5-26 to continue.

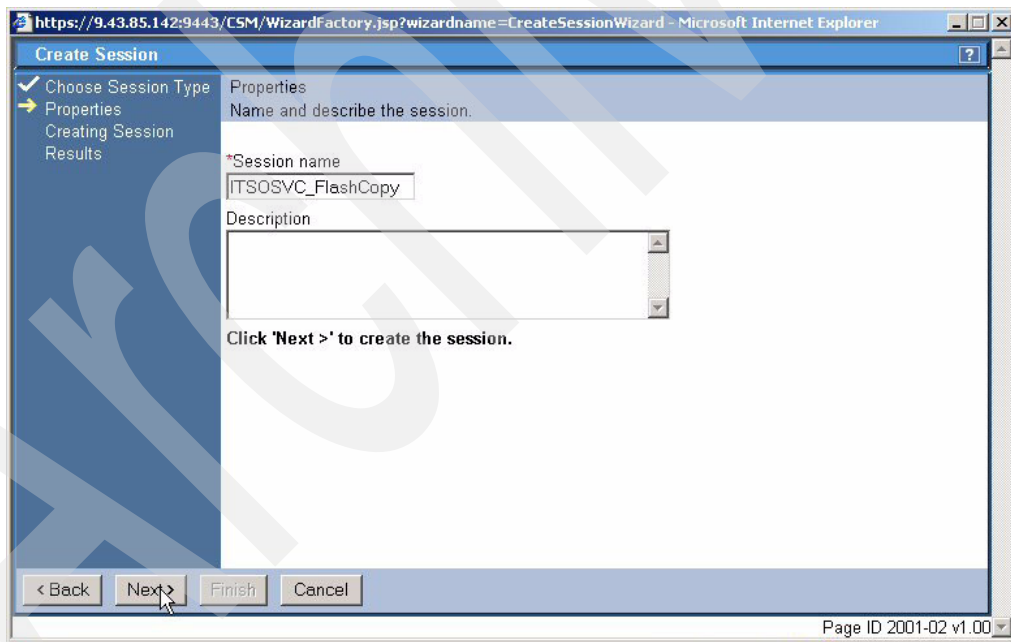


Figure 5-26 Create session name

The session will be created and a window similar to Figure 5-27 on page 101 will be displayed indicating success. Click the **Finish** button to complete the session creation process.

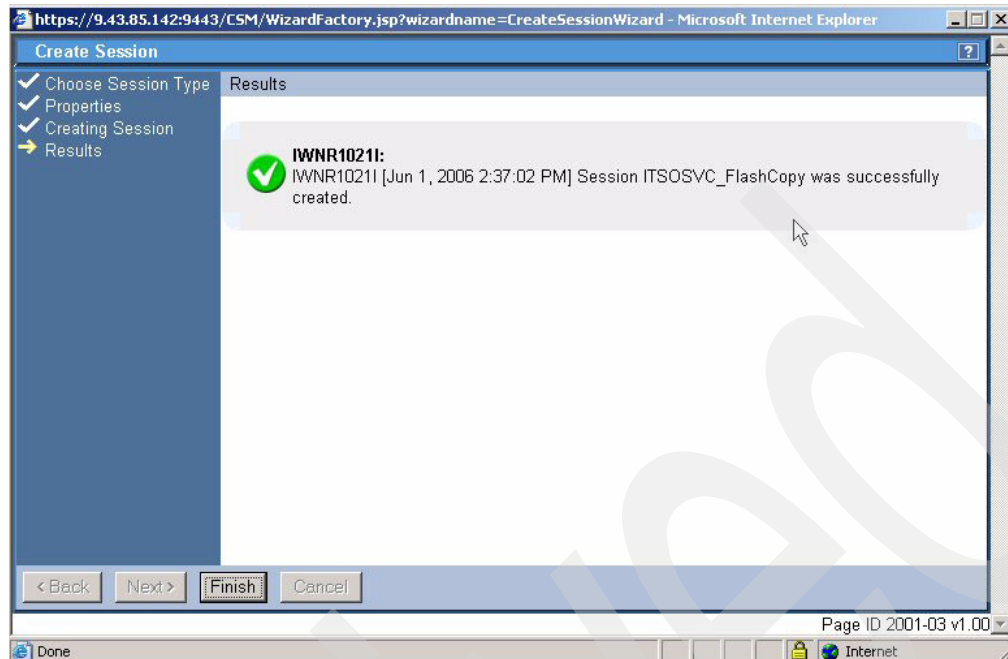


Figure 5-27 Session created

Using Windows based CSMCLI

With the command line interface we can achieve the same result. For this approach we created another script file which Figure 5-28 shows. The script file uses the **mkssess** command. Note that we have added a list session command **lssess -l** to display the defined sessions.

```
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype fc -desc itsosvc_fc itsosvc_fc
lssess -l
```

Figure 5-28 Script file to add a Session

The result of the execution of this script is shown in Figure 5-29.

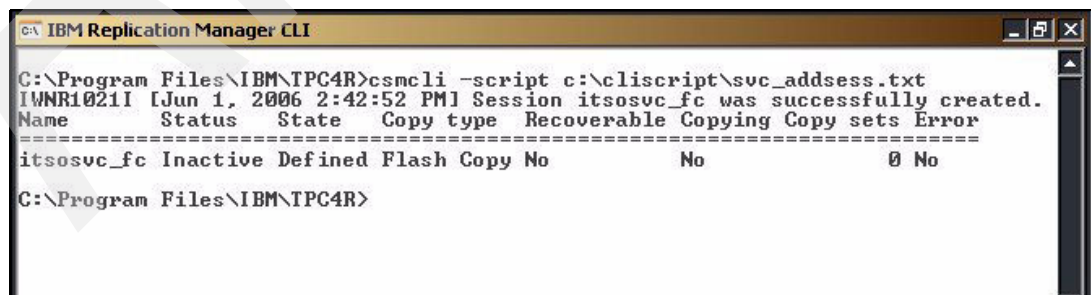


Figure 5-29 CSMCLI script result

5.2.4 Add Copy Sets

The next step is to populate a session with copy sets.

Use GUI to add Copy Sets

Now that we have a session created we can begin to create copy sets within the session. From the Sessions panel we select the *Add Copy Sets* option from the drop-down menu as Figure 5-30 shows. Then click the **Go** button.

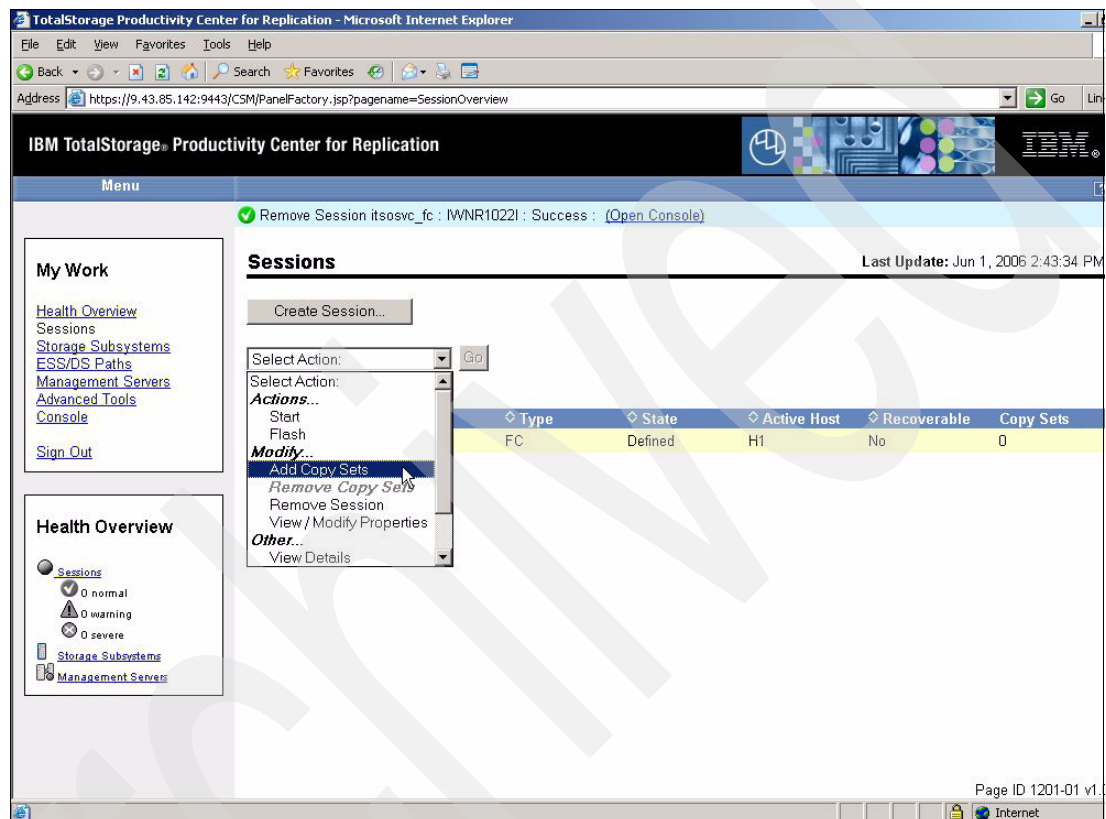


Figure 5-30 Add Copy Sets

This will open a new window where we define the copy sets as Figure 5-31 on page 103 shows. In this window we define the source subsystems via the first drop-down menu.

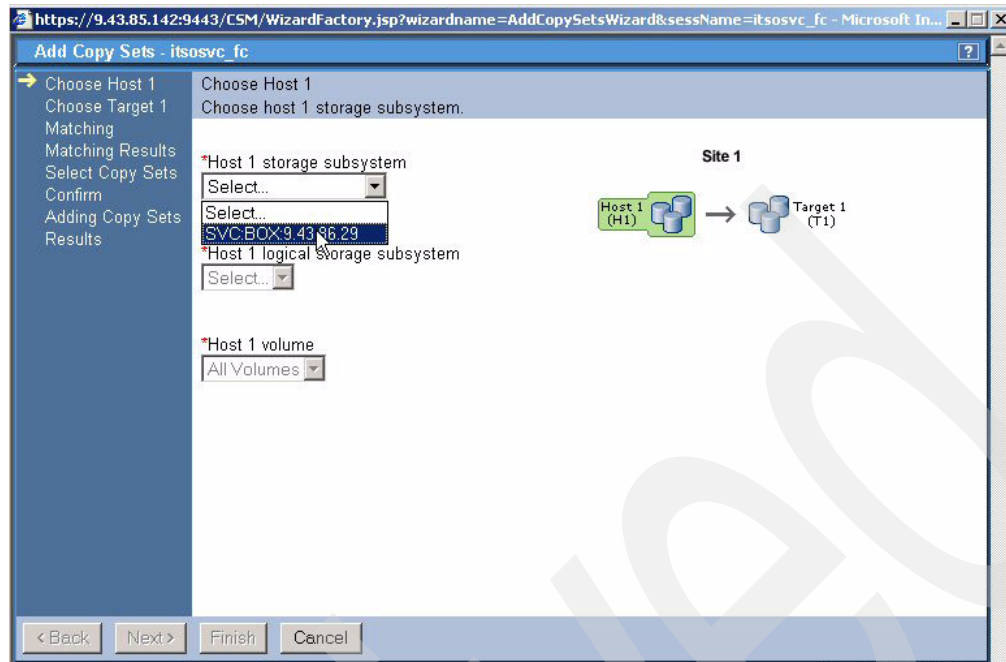


Figure 5-31 Copy Sets window

Next we define the source *IO group* as shown in Figure 5-32.

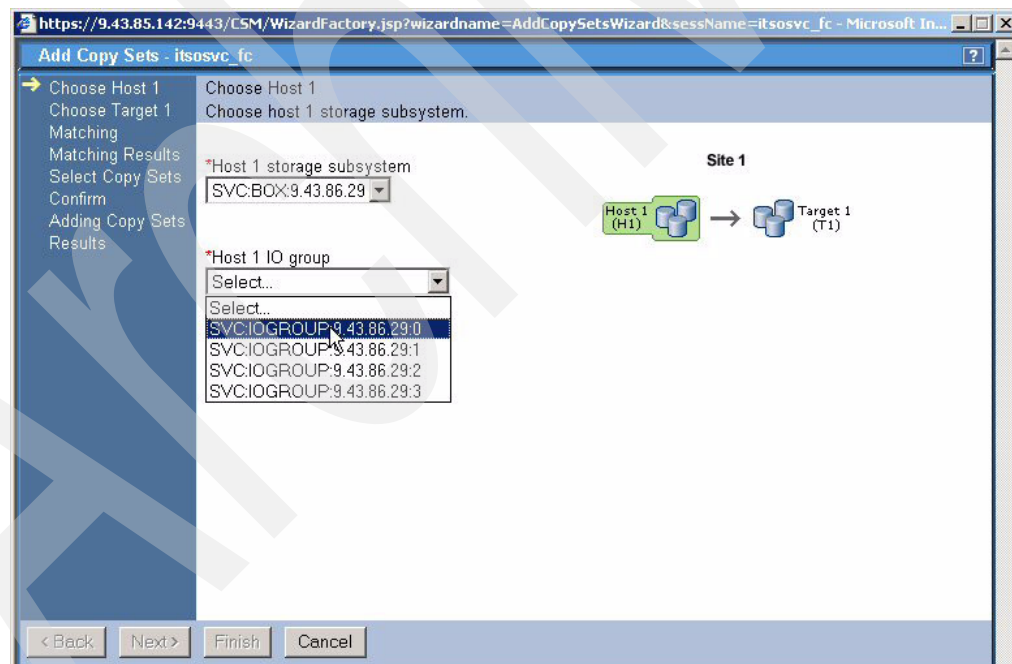


Figure 5-32 Select IO group

Then we define the source volumes as Figure 5-33 on page 104 shows.

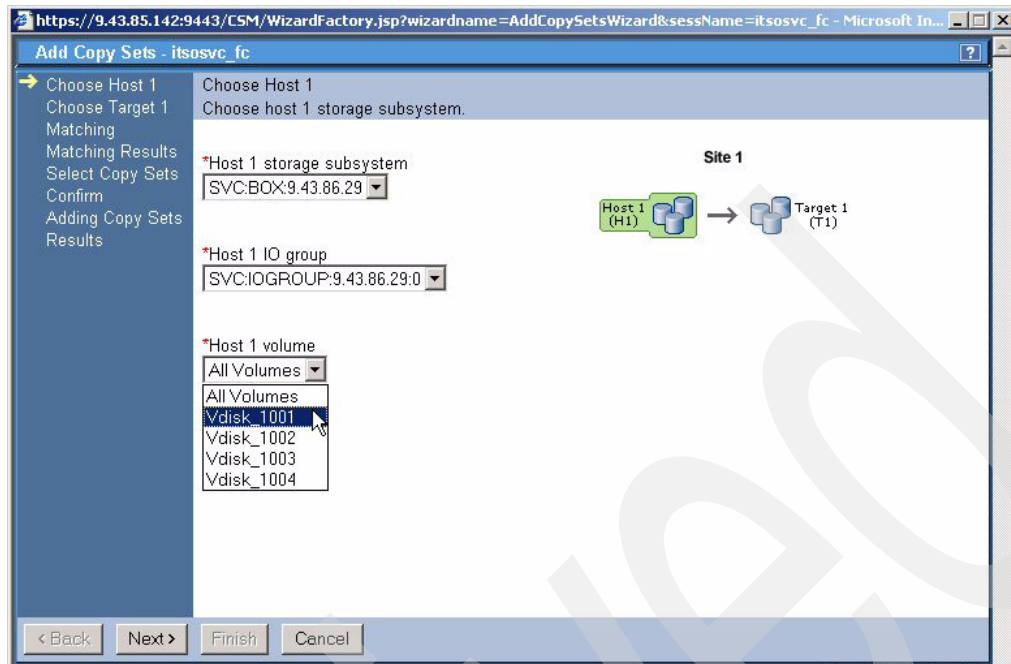


Figure 5-33 Select volumes

Once the source volume is selected we click the **Next** button to proceed to the Target definitions as shown in Figure 5-34.

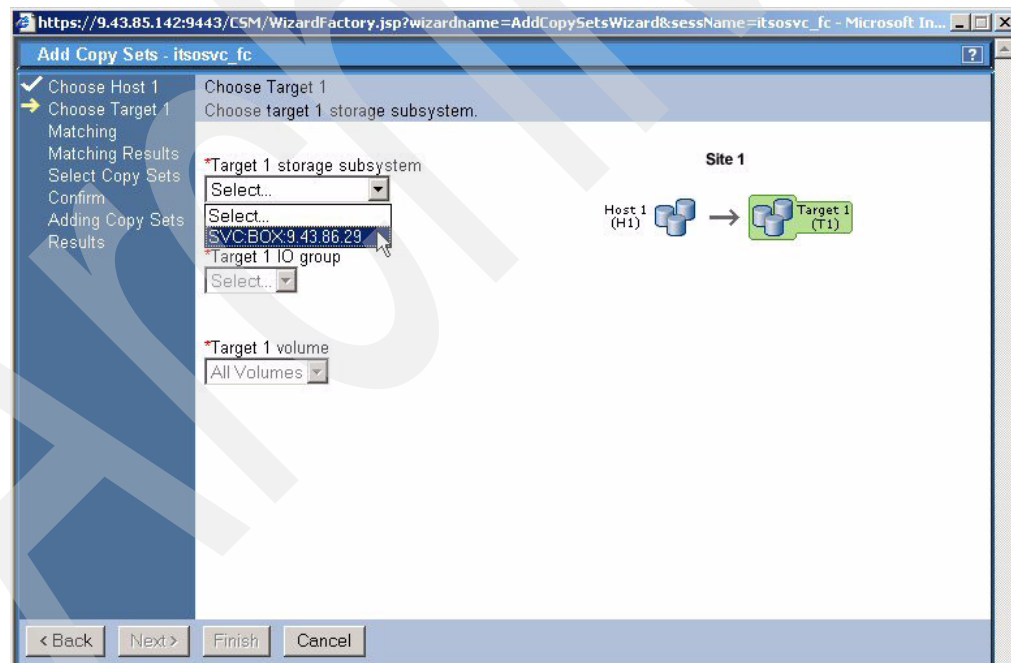


Figure 5-34 Select target subsystem

Then select the target IO group and volume as Figure 5-35 on page 105 displays. Then click the **Next** button to proceed.

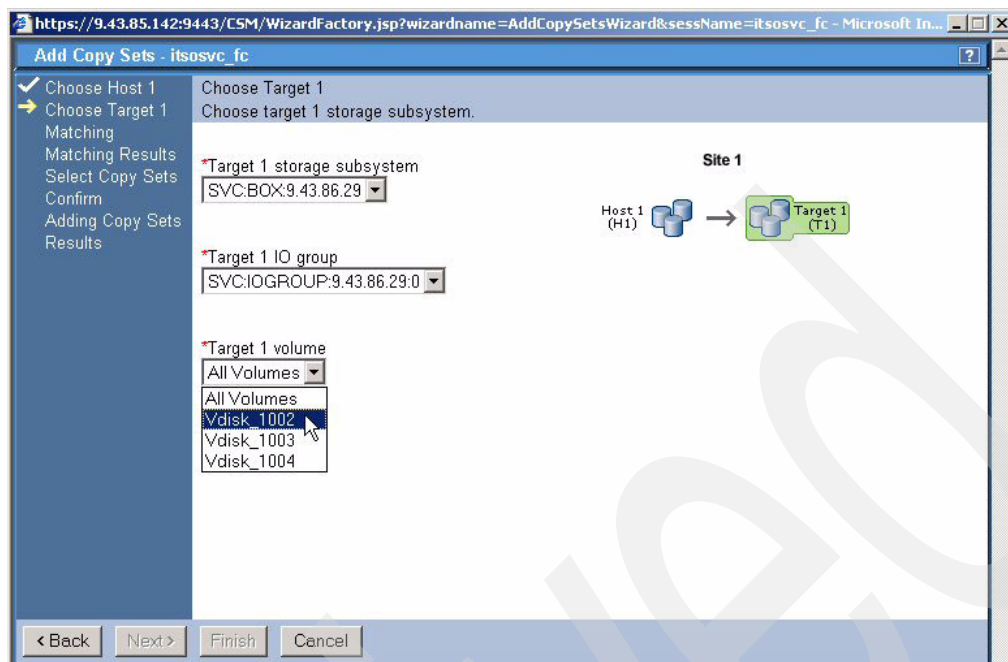


Figure 5-35 Target volume selection

TPC for Replication will now perform a check to confirm that the volume attributes match. Figure 5-36 indicates this checking process. We can see that TPC for Replication has matched the volumes and we can proceed by clicking the **Next** button.

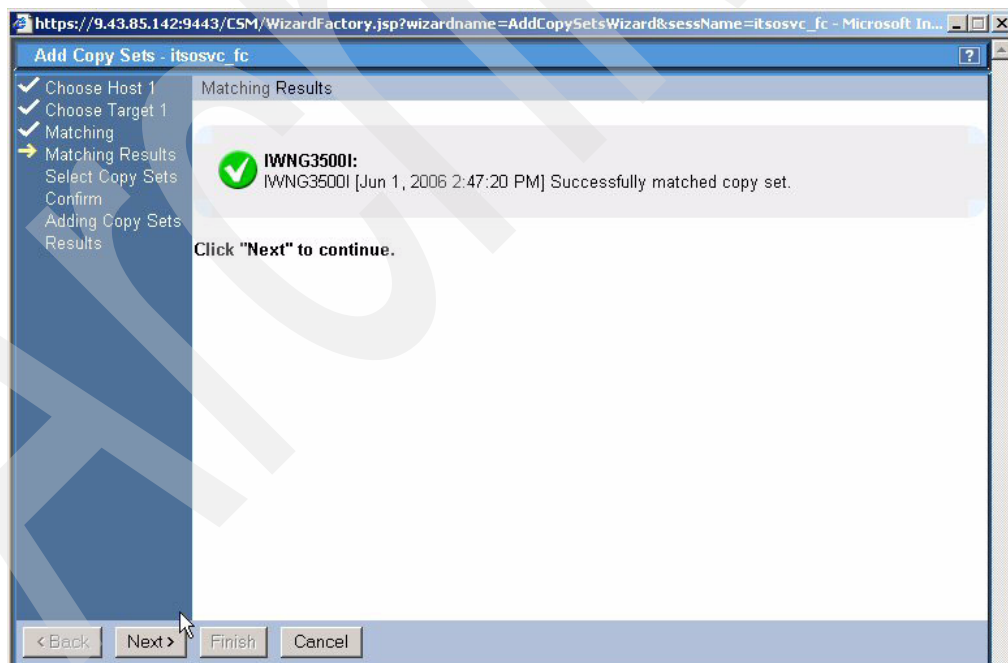


Figure 5-36 Volume match is OK

In the next panel shown in Figure 5-37 on page 106 you select the copy set to add to the session and click **Next** to continue.

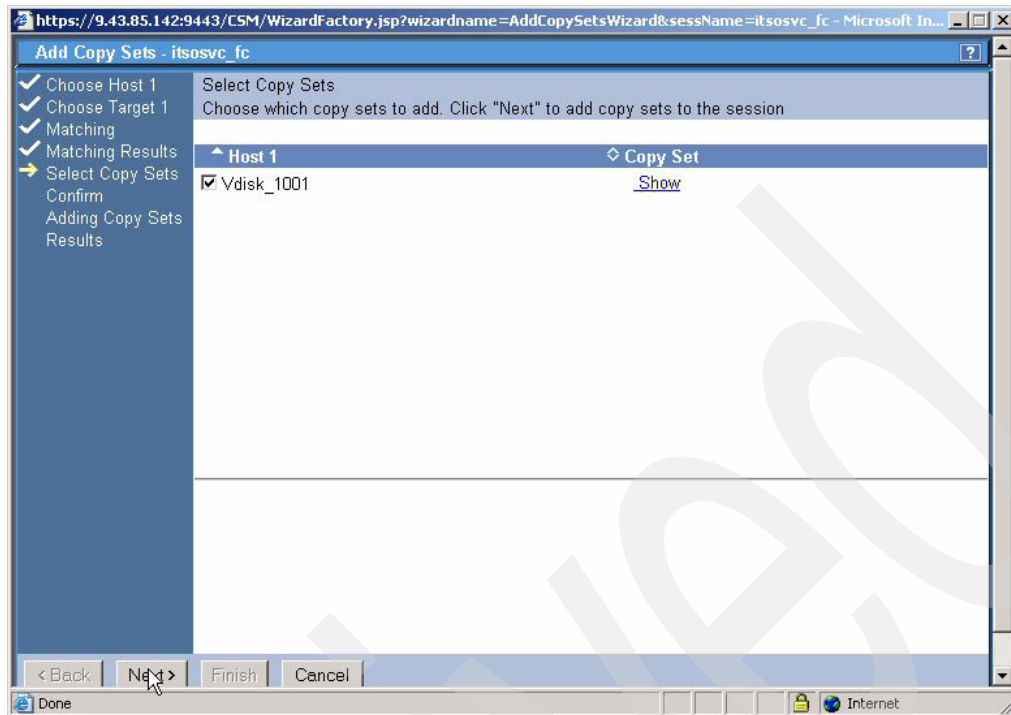


Figure 5-37 Select Copy Set

TPC for Replication then requires you to confirm your configuration as Figure 5-38 shows. From here just click the **Next** button.

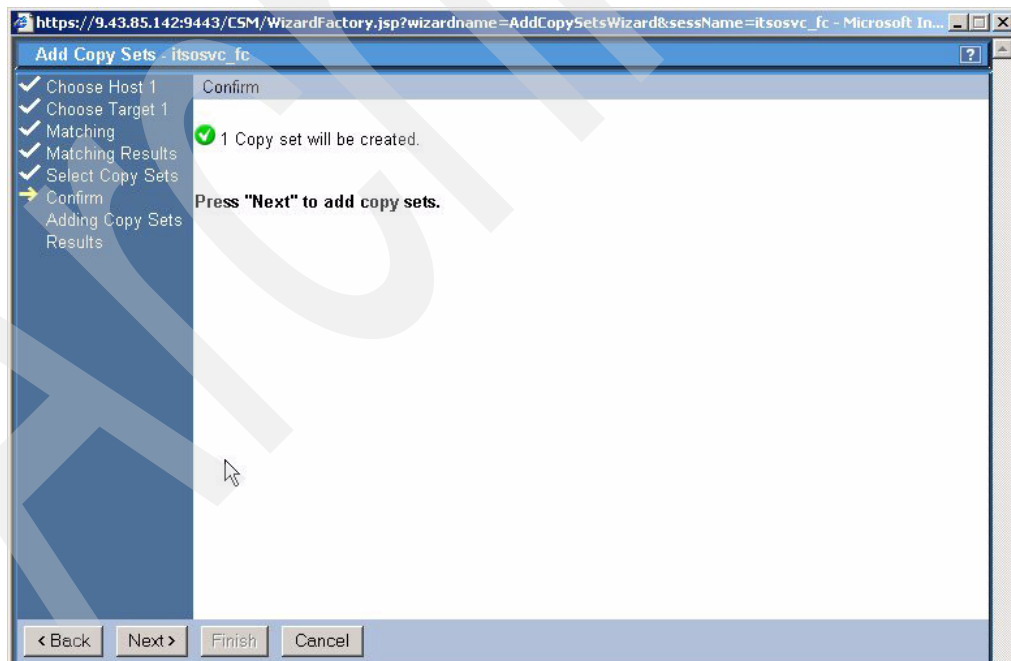


Figure 5-38 Copy set confirm

Finally, when the Copy Set has been successfully added, click the **Finish** button as shown in Figure 5-39 on page 107.

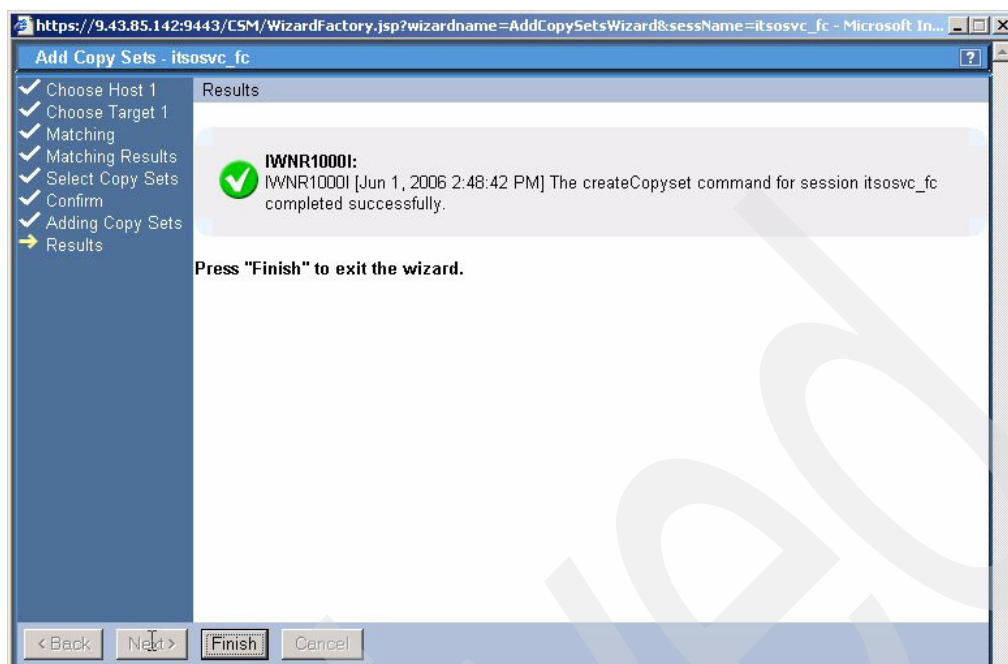


Figure 5-39 Finish adding copy sets

This concludes the steps through the GUI to add Copy Sets to a session.

Use CSMCLI to add Copy Sets

In this scenario we will create a session, add the copy sets, and list the session attributes as part of a single script.

As we can see in Figure 5-40 the script file contains multiple commands to setup the session and the volume pairs as part of the copy set. In this case we have pre-determined the volume pairs and captured these as part of the **mkcpsset** command.

```
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mkssess -cptype fc -desc itsosvc_fccli itsosvc_fccli
lssess -l
lsvol -l -devtype svc
mkcpset -h1 svc:vol:9.43.86.29:0:3 -t1 svc:vol:9.43.86.29:0:2 itsosvc_fccli
mkcpset -h1 svc:vol:9.43.86.29:0:0 -t1 svc:vol:9.43.86.29:0:1 itsosvc_fccli
lscpsset -l itsosvc_fccli
```

Figure 5-40 SVC FC script

In Example 5-1 we can see the result of the execution of this script. Note that we have formatted the output to fit the window.

Example 5-1 SVC_FC script output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\svc_fc.txt
IWNR1019E [Jun 13, 2006 5:21:09 PM] Session itsosvc_fccli was successfully created.
```

```

Name          Status  State  Copy type          Recoverable Copying Copy sets Error
=====
ESS_POK       Inactive Defined Flash Copy          No          No          0 No
itsovc_fccli  Inactive Defined Flash Copy          No          No          0 No
itsovc_mmcli  Inactive Defined Metro Mirror Single Direction No          No          5 No
itsovc_fc     Inactive Defined Flash Copy          No          No          1 No
itsovc_mm     Inactive Defined Flash Copy          No          No          0 No
itsovc_mm_sd1 Inactive Defined Metro Mirror Single Direction No          No          0 No
Name          ID          Dev          Dev Type Vol format LSS/IO Group Vol Type Size  Size Unit
=====
Vdisk2009 SVC:VOL:9.43.86.40:0:9 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2008 SVC:VOL:9.43.86.40:0:8 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2007 SVC:VOL:9.43.86.40:0:7 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2006 SVC:VOL:9.43.86.40:0:6 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2005 SVC:VOL:9.43.86.40:0:5 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2001 SVC:VOL:9.43.86.40:0:4 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2002 SVC:VOL:9.43.86.40:0:3 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2003 SVC:VOL:9.43.86.40:0:2 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
new1 SVC:VOL:9.43.86.40:0:14 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
new2 SVC:VOL:9.43.86.40:0:13 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
new3 SVC:VOL:9.43.86.40:0:12 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
new4 SVC:VOL:9.43.86.40:0:11 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
new5 SVC:VOL:9.43.86.40:0:10 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk2004 SVC:VOL:9.43.86.40:0:1 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk20010 SVC:VOL:9.43.86.40:0:0 2145-9.43.86.40-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk1001 SVC:VOL:9.43.86.29:0:9 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 5.000 GB
Vdisk_1005 SVC:VOL:9.43.86.29:0:8 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1009 SVC:VOL:9.43.86.29:0:7 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1008 SVC:VOL:9.43.86.29:0:6 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1007 SVC:VOL:9.43.86.29:0:5 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1006 SVC:VOL:9.43.86.29:0:4 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1004 SVC:VOL:9.43.86.29:0:3 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1003 SVC:VOL:9.43.86.29:0:2 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk1002 SVC:VOL:9.43.86.29:0:10 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 5.000 GB
Vdisk_1002 SVC:VOL:9.43.86.29:0:1 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
Vdisk_1001 SVC:VOL:9.43.86.29:0:0 2145-9.43.86.29-IBM SVC FIXEDBLK 0 FB 10.000 GB
IWN2001I [Jun 13, 2006 5:21:10 PM] The pair was successfully created in session
itsovc_fccli for copy set SVC:VOL:9.43.86.29:0:3 with source SVC:VOL:9.43.86.2
9:0:3(Vdisk_1004) and target SVC:VOL:9.43.86.29:0:2(Vdisk_1003).
IWN2001I [Jun 13, 2006 5:21:11 PM] The pair was successfully created in session
itsovc_fccli for copy set SVC:VOL:9.43.86.29:0:0 with source SVC:VOL:9.43.86.2
9:0:0(Vdisk_1001) and target SVC:VOL:9.43.86.29:0:1(Vdisk_1002).
H1 Volume          Session          Volumes
=====
SVC:VOL:9.43.86.29:0:0 itsovc_fccli 2
SVC:VOL:9.43.86.29:0:3 itsovc_fccli 2
C:\CSM-CLI>

```

5.2.5 Metro Mirror setup

In this scenario we will set up an SVC based Metro Mirror Failover/Failback session with a single volume pair as can be seen in Figure 5-41 on page 109.

As a review, Metro Mirror (MM) is a synchronous data replication mechanism and was previously called Peer-to-Peer Remote copy or PPRC. I/O completion is signaled when the data is secured on both the local storage server and the remote storage server. Metro Mirror is popular for two site disaster recovery solutions. Metro mirror is available in any combination between DS6000, DS8000 and ESS800. Synchronous data replication is also available on the DS4000™ family and with the SVC, but again not directly compatible with Metro Mirror on the DS6000, DS8000 and ESS 800.

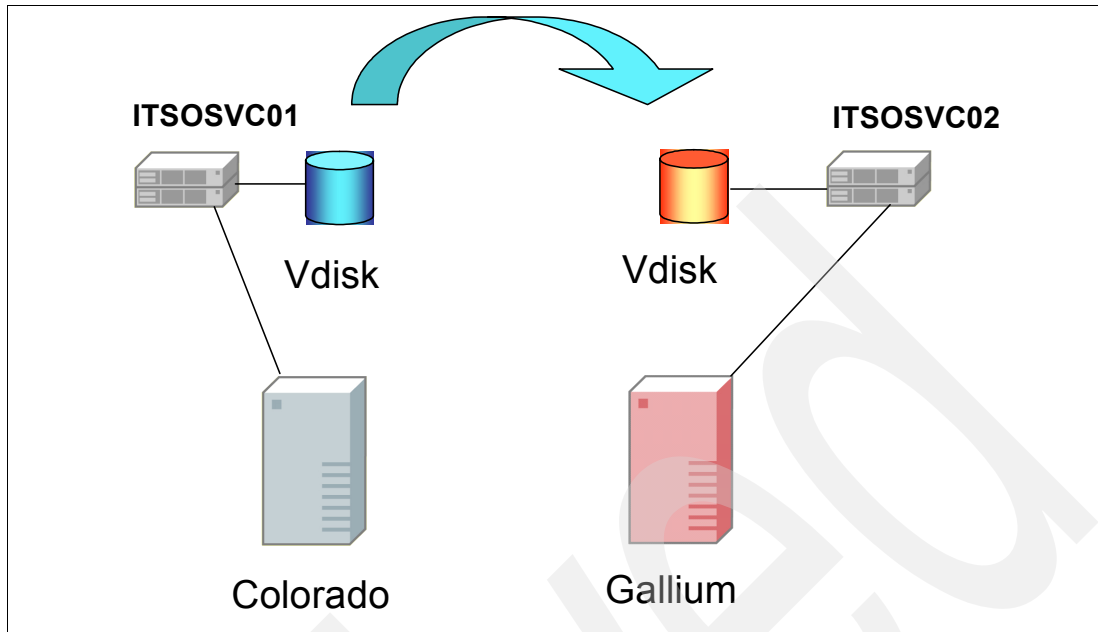


Figure 5-41 SVC based Metro Mirror setup

Use CSMCLI to manage Metro Mirror session

In this instance we will create a session, add the copy sets and list the session attributes as part of a single script.

As we can see in Figure 5-42, the script file contains multiple commands to setup the session and the volume pairs as part of the copy set. In this case we have pre-determined the volume pairs and captured these as part of the **mkcpsset** command. We have also specified that the Metro Mirror session type is **mmsd** or Metro Mirror Single Direction.

```
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mksess -cptype mmsd -desc itsosvc_mmcli itsosvc_mmcli
lsess -l
lsvol -l -devtype svc
mkcpset -h1 svc:vol:9.43.86.29:0:8 -h2 svc:vol:9.43.86.40:0:5 itsosvc_mmcli
mkcpset -h1 svc:vol:9.43.86.29:0:4 -h2 svc:vol:9.43.86.40:0:6 itsosvc_mmcli
mkcpset -h1 svc:vol:9.43.86.29:0:5 -h2 svc:vol:9.43.86.40:0:7 itsosvc_mmcli
mkcpset -h1 svc:vol:9.43.86.29:0:6 -h2 svc:vol:9.43.86.40:0:8 itsosvc_mmcli
mkcpset -h1 svc:vol:9.43.86.29:0:7 -h2 svc:vol:9.43.86.40:0:9 itsosvc_mmcli
lscpsset -l itsosvc_mmcli
```

Figure 5-42 SVC Metro Mirror Setup

Invocation of this script results in the output as shown in Example 5-2.

Example 5-2 SVC_metro script result

```
C:\CSM-CLI>csmcli -script c:\csm-cli\svc_metro.txt
IWNRI021I [Jun 13, 2006 5:13:26 PM] Session itsosvc_mmcli was successfully creat
ed.
Name          Status   State   Copy type          Recoverable Copying Copy sets Error
```



```

=====
ESS_POK          Inactive Defined Flash Copy                      No          No          0 No
itsosvc_mmcli    Inactive Defined Metro Mirror Single Direction No          No          0 No
itsosvc_fc       Inactive Defined Flash Copy                      No          No          1 No
itsosvc_mm       Inactive Defined Flash Copy                      No          No          0 No
itsosvc_mm_sd1   Inactive Defined Metro Mirror Single Direction No          No          0 No
Name            ID              Dev              Dev Type Vol format LSS/IO Group Vol Type Size  Size Unit
=====
Vdisk2009      SVC:VOL:9.43.86.40:0:9  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2008      SVC:VOL:9.43.86.40:0:8  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2007      SVC:VOL:9.43.86.40:0:7  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2006      SVC:VOL:9.43.86.40:0:6  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2005      SVC:VOL:9.43.86.40:0:5  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2001      SVC:VOL:9.43.86.40:0:4  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2002      SVC:VOL:9.43.86.40:0:3  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2003      SVC:VOL:9.43.86.40:0:2  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
new1           SVC:VOL:9.43.86.40:0:14 2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
new2           SVC:VOL:9.43.86.40:0:13 2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
new3           SVC:VOL:9.43.86.40:0:12 2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
new4           SVC:VOL:9.43.86.40:0:11 2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
new5           SVC:VOL:9.43.86.40:0:10 2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk2004      SVC:VOL:9.43.86.40:0:1  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk20010     SVC:VOL:9.43.86.40:0:0  2145-9.43.86.40-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk1001      SVC:VOL:9.43.86.29:0:9  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      5.000 GB
Vdisk_1005     SVC:VOL:9.43.86.29:0:8  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1009     SVC:VOL:9.43.86.29:0:7  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1008     SVC:VOL:9.43.86.29:0:6  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1007     SVC:VOL:9.43.86.29:0:5  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1006     SVC:VOL:9.43.86.29:0:4  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1004     SVC:VOL:9.43.86.29:0:3  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1003     SVC:VOL:9.43.86.29:0:2  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk1002     SVC:VOL:9.43.86.29:0:10 2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      5.000 GB
Vdisk_1002     SVC:VOL:9.43.86.29:0:1  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
Vdisk_1001     SVC:VOL:9.43.86.29:0:0  2145-9.43.86.29-IBM SVC      FIXEDBLK 0          FB      10.000 GB
IWNR2001I [Jun 13, 2006 5:13:30 PM] The pair was successfully created in session
itsosvc_mmcli for copy set SVC:VOL:9.43.86.29:0:8 with source SVC:VOL:9.43.86.2
9:0:8(Vdisk_1005) and target SVC:VOL:9.43.86.40:0:5(Vdisk2005).
IWNR2001I [Jun 13, 2006 5:13:33 PM] The pair was successfully created in session
itsosvc_mmcli for copy set SVC:VOL:9.43.86.29:0:4 with source SVC:VOL:9.43.86.2
9:0:4(Vdisk_1006) and target SVC:VOL:9.43.86.40:0:6(Vdisk2006).
IWNR2001I [Jun 13, 2006 5:13:39 PM] The pair was successfully created in session
itsosvc_mmcli for copy set SVC:VOL:9.43.86.29:0:5 with source SVC:VOL:9.43.86.2
9:0:5(Vdisk_1007) and target SVC:VOL:9.43.86.40:0:7(Vdisk2007).
IWNR2001I [Jun 13, 2006 5:13:42 PM] The pair was successfully created in session
itsosvc_mmcli for copy set SVC:VOL:9.43.86.29:0:6 with source SVC:VOL:9.43.86.2
9:0:6(Vdisk_1008) and target SVC:VOL:9.43.86.40:0:8(Vdisk2008).
IWNR2001I [Jun 13, 2006 5:13:45 PM] The pair was successfully created in session
itsosvc_mmcli for copy set SVC:VOL:9.43.86.29:0:7 with source SVC:VOL:9.43.86.2
9:0:7(Vdisk_1009) and target SVC:VOL:9.43.86.40:0:9(Vdisk2009).
H1 Volume              Session              Volumes
=====
SVC:VOL:9.43.86.29:0:4 itsosvc_mmcli        2
SVC:VOL:9.43.86.29:0:5 itsosvc_mmcli        2
SVC:VOL:9.43.86.29:0:6 itsosvc_mmcli        2
SVC:VOL:9.43.86.29:0:7 itsosvc_mmcli        2
SVC:VOL:9.43.86.29:0:8 itsosvc_mmcli        2
C:\CSM-CLI>

```

Now that we have a session with valid copy sets, all that is required is for us to start the session. From the CSMCLI interface we can interrogate the session via the **showsess** command as shown in Figure 5-43 on page 111.


```

C:\CSM-CLI>csmcli
csmcli> showsess itsosvc_mmcli
Name           itsosvc_mmcli
Type           Metro Mirror Single Direction
State          Defined
Status         Inactive
Copy sets      5
Copying        No
Recoverable    No
Error count    0
Description    itsosvc_mmcli

IWNR1500I [Jun 13, 2006 5:42:41 PM] The getSessionInfo command for session
itsosvc_mmcli completed successfully.
csmcli>

```

Figure 5-43 The showsess command

Now that we have established the session status, we can start it via the **cmdsess** command as shown in Figure 5-44. You can see that we have had to reply **y** to the prompt to confirm our desire to start the session. To turn this function off, you would need to utilize the **-quiet** parameter as part of the command.

```

csmcli> cmdsess -action start itsosvc_mmcli
Are you sure you want to start session itsosvc_mmcli? [y/n]:y
IWNR1026I [Jun 13, 2006 5:45:48 PM] The runCommand for command Start in session
itsosvc_mmcli completed successfully.
csmcli>

```

Figure 5-44 Start session

When we can then check the session status again as shown in Figure 5-45, we discover a **warning** status. This is due to the fact that the volumes are not yet synchronized.

```

C:\CSM-CLI>csmcli
csmcli> showsess itsosvc_mmcli
Name           itsosvc_mmcli
Type           Metro Mirror Single Direction
State          Preparing
Status         Warning
Copy sets      5
Copying        Yes
Recoverable    No
Error count    0
Description    itsosvc_mmcli

IWNR1500I [Jun 13, 2006 5:48:54 PM] The getSessionInfo command for session
itsosvc_mmcli completed successfully.
csmcli>

```

Figure 5-45 Show session after start

Since the synchronization process can take time, you could sign into the SVC to check the progress. As we can see in Figure 5-46, the copy is progressing.

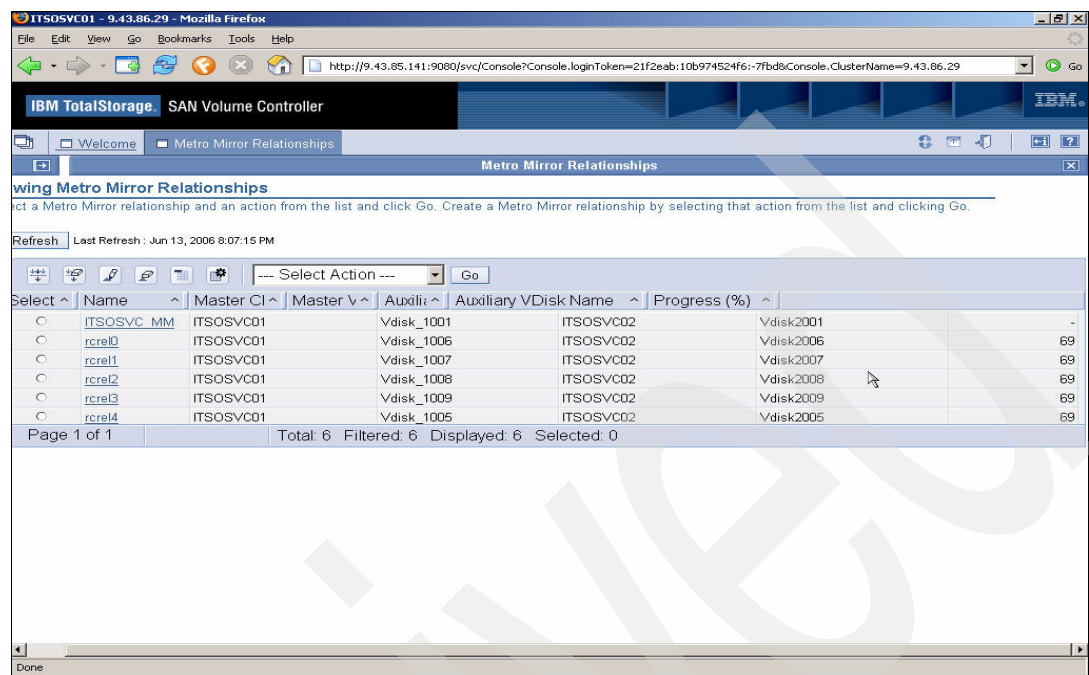


Figure 5-46 SVC copy progress

Once the copy is complete we can re-issue the showsess command and find the following results as shown in Figure 5-47.



Figure 5-47 Session established and synchronized

5.3 TPC for Replication and ESS 800

In this section we take you through the steps to set up and use TotalStorage Productivity Center for Replication with the ESS 800 storage subsystem.

5.3.1 Add an ESS subsystem through the GUI

To add a subsystem select the *Storage Subsystems* hyperlink from the My Work menu on the left-hand side of the page. Once this window has been displayed as shown in Figure 5-48, just click the **Add Subsystem** button to begin the add process.

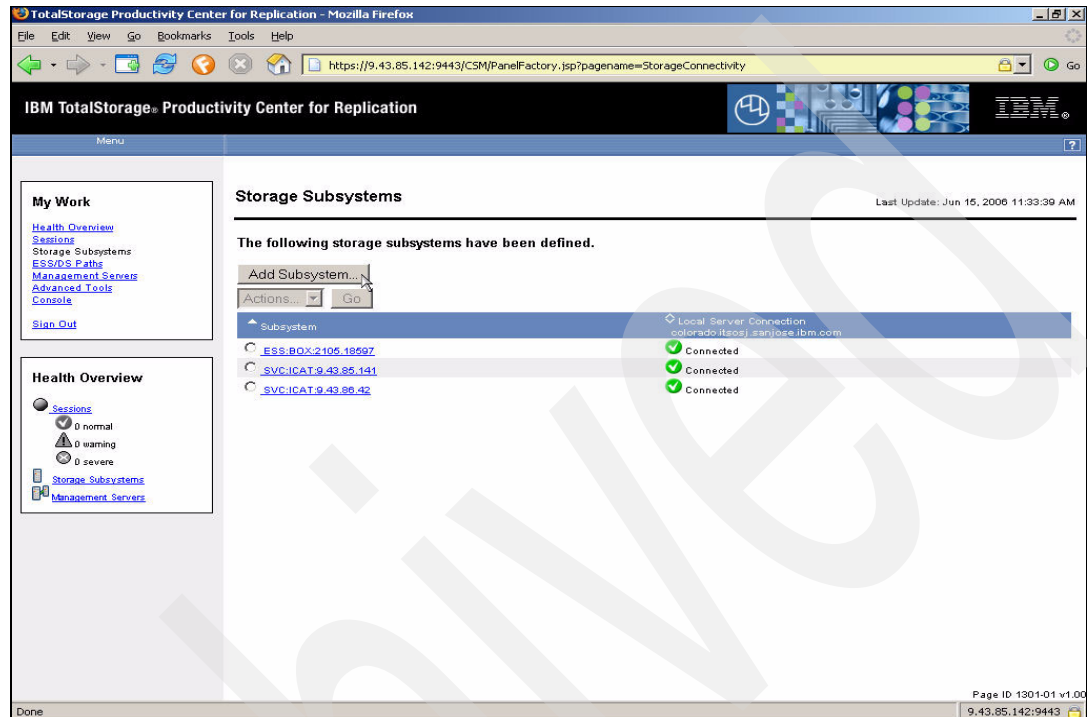


Figure 5-48 Add Subsystem

The next window is shown in Figure 5-49 on page 114. It enables you to select the type of subsystem (either SVC or ESS/DS). In this case select the ESS/DS radio button and then click **OK** to continue.

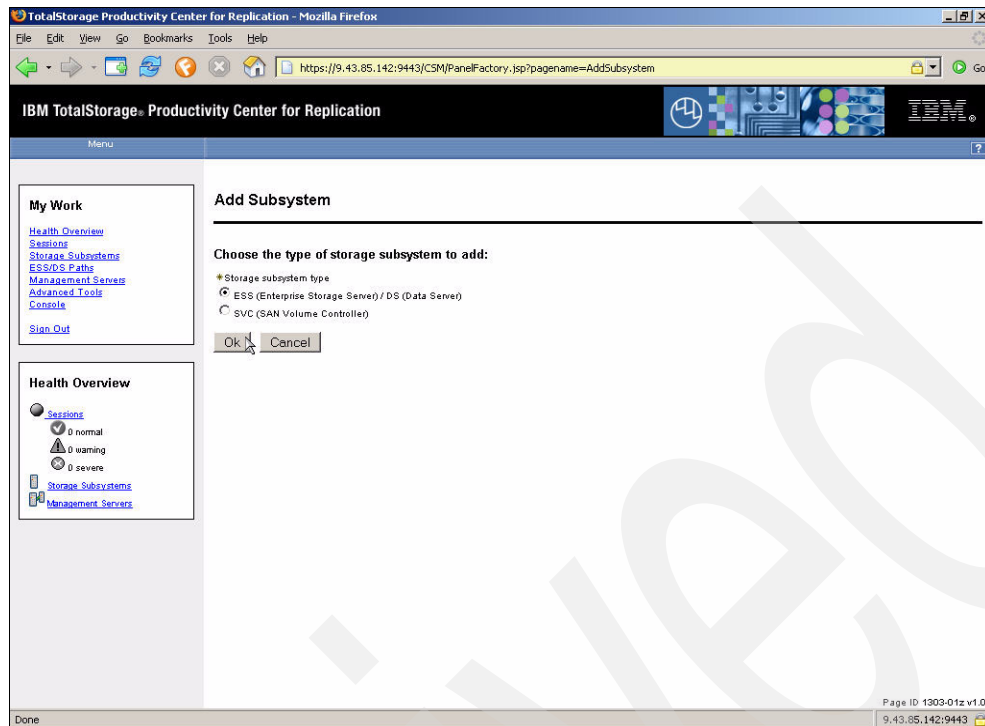


Figure 5-49 Subsystem selection

After clicking the **OK** button, the TPC for Replication application will display the window as shown in Figure 5-50. This is where you enter:

- ▶ The actual destination addresses of your ESS subsystem
- ▶ The port ID of the CCW interface on the ESS subsystem
- ▶ The user ID and password

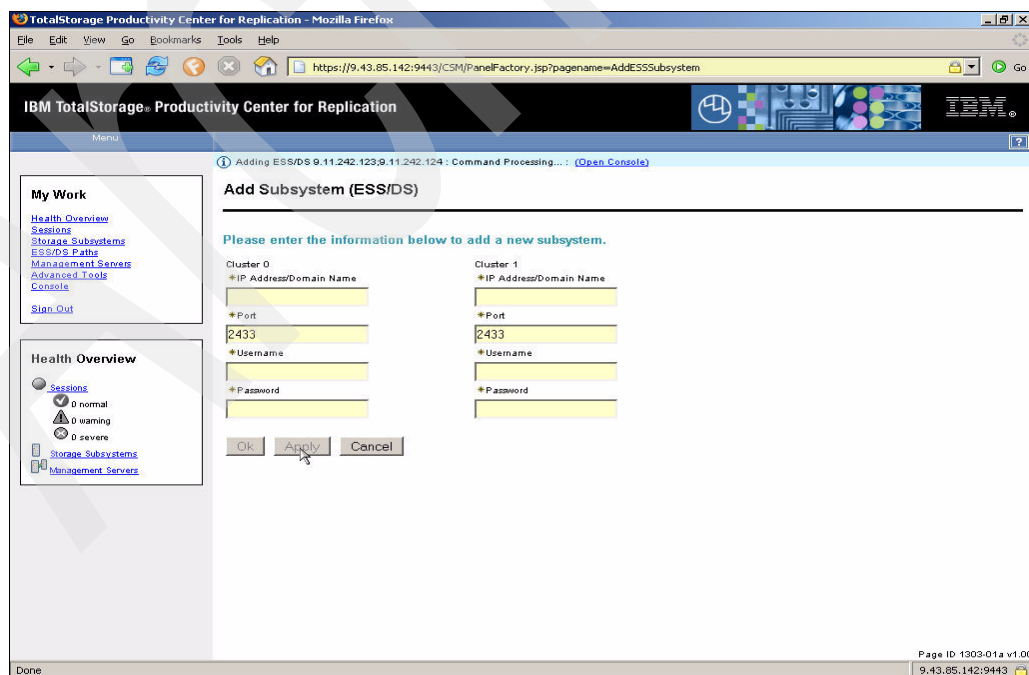


Figure 5-50 ESS attributes specification

After you entered in the relevant details you can click either the **OK** button (if you are adding a single ESS) or the **Apply** button (if you are adding multiple ESS subsystems).

Figure 5-51 shows the window returned after you clicked the **OK** button. You can see that the TPC for Replication server shows a *Warning* indicator (the yellow triangle). In this case the TPC for Replication server is in the process of establishing communications with the ESS subsystem that we added. The time it takes will be dependent on the latency aspects of your IP network.

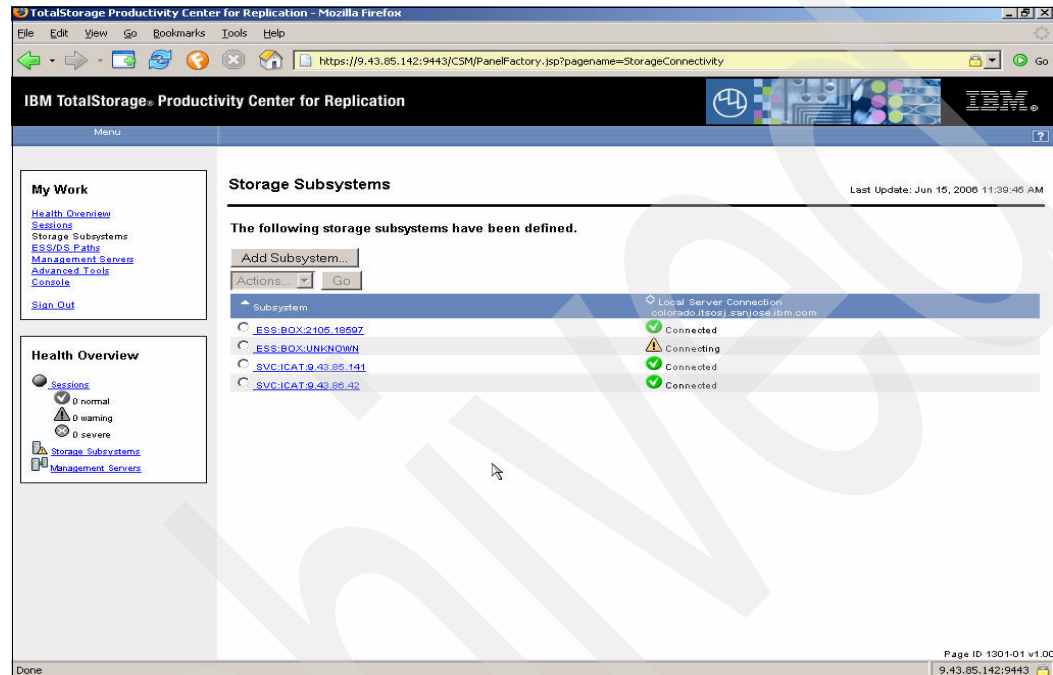


Figure 5-51 ESS connecting

Once the communications between the TPC for Replication server and your ESS are established, the status will be updated to reflect the active status indicated by the green circle with the white check mark as shown in Figure 5-52 on page 116.

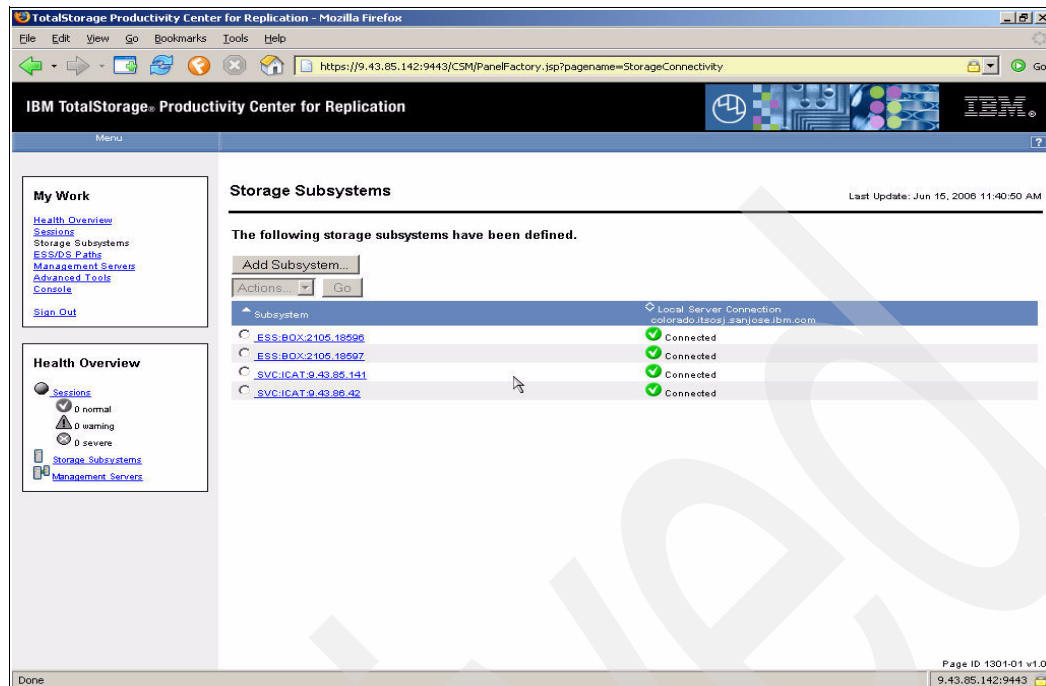


Figure 5-52 ESS connected

5.3.2 Add an ESS subsystem through the CSMCLI

For this CLI test we will add the new ESS subsystem and include both of the clusters as part of the attributes. We can see in Figure 5-53, that this script shows the separation of each cluster's attributes by a semi colon (;).

```
#
# This is a script file
# Using List commands to interrogate TPC 4 R
#
setoutput -fmt delim -v on
adddevice -devtype ESS -ip 9.11.242.123;9.11.242.124 -username
storwatch;storwatch -port 2433;2433
lsdevice -devtype ess
```

Figure 5-53 ess_add script

We can see output of the script command in Example 5-3. Note that we were prompted to enter the password for each cluster of the ESS that we are adding. Additionally, you can see that the lsdevice command issued as part of the script has returned the new ESS in an UNKNOWN status. This is due to the delay in establishing the I/O communications path. In this instance, when we entered the lsdevice command again we can see that the new ESS subsystem has been successfully added to the TPC for Replication environment.

Example 5-3 ess_add script output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\ess_add.txt
Please enter a password for the device userid of storwatch:
Please enter a password for the device userid of storwatch:
IWNH1000I [Jun 15, 2006 1:48:50 PM] The command completed successfully.
```

```

Device ID,Device type
=====
ESS:BOX:UNKNOWN,ESS
ESS:BOX:2105.18597,ESS

C:\CSM-CLI>csmcli lsdevice -devtype ess
Device ID          Device type
=====
ESS:BOX:2105.18596 ESS
ESS:BOX:2105.18597 ESS

C:\CSM-CLI>

```

5.3.3 Set up a session through the GUI

In this example we will create a Metro Mirror session using the Web browser interface. From the main panel, select the Sessions hyperlink as shown in Figure 5-54.

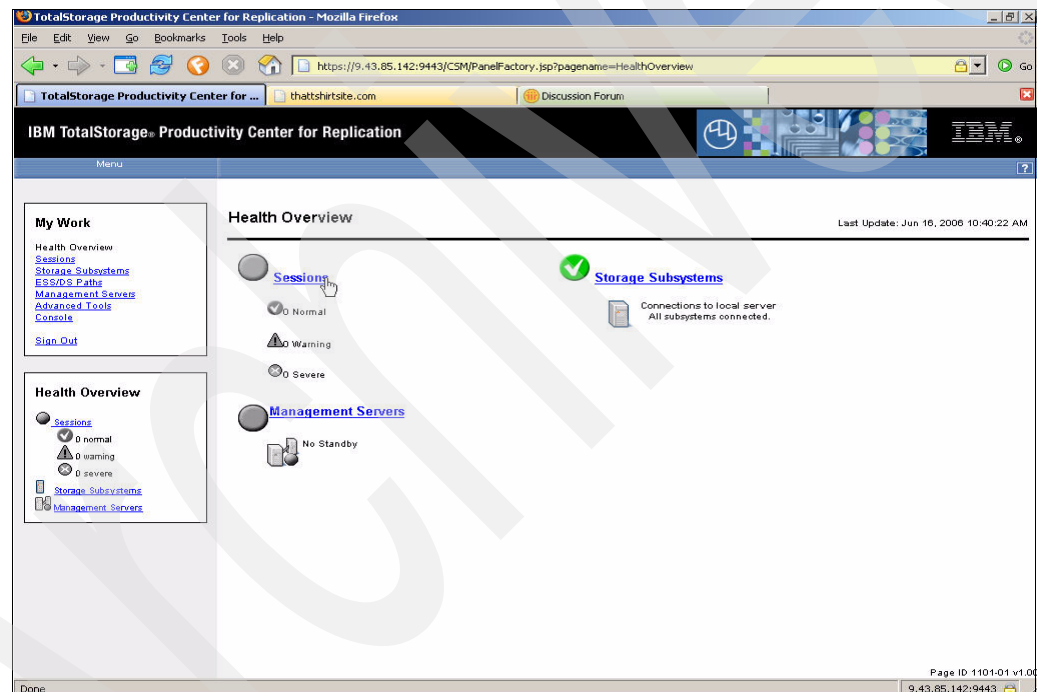


Figure 5-54 Main Panel

This will take you the Session display as shown in Figure 5-55 on page 118. Click the **Create Session** button to start the process.

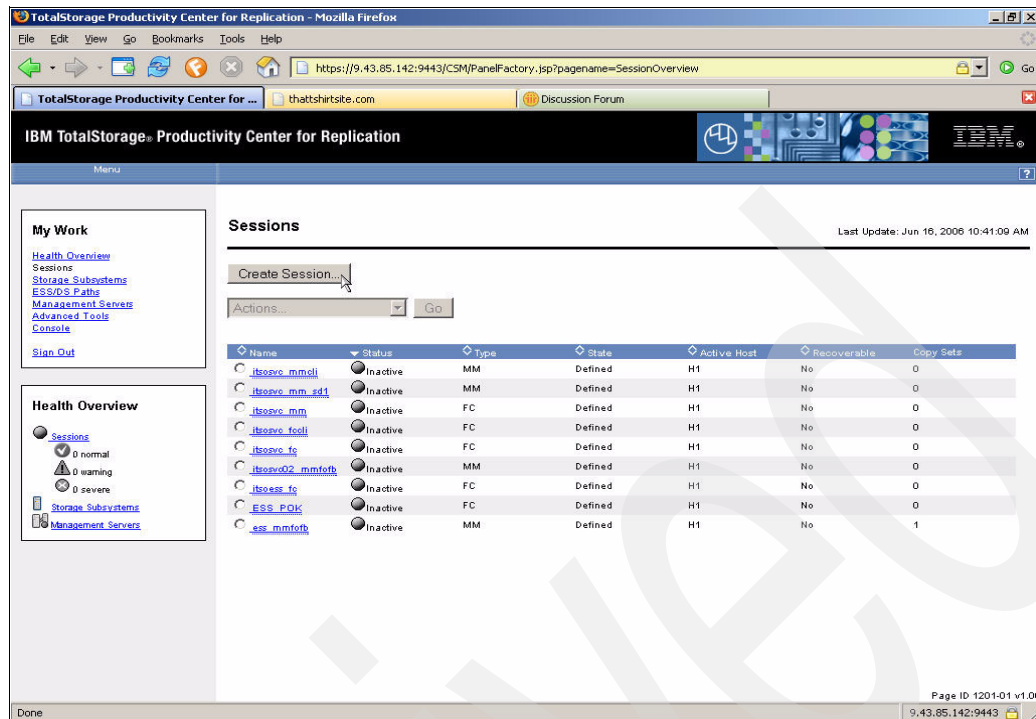


Figure 5-55 Sessions panel

Once you have clicked the Create Session button the *Create Session* window will be displayed as shown in Figure 5-56. From here, select the copy type from the drop-down menu.

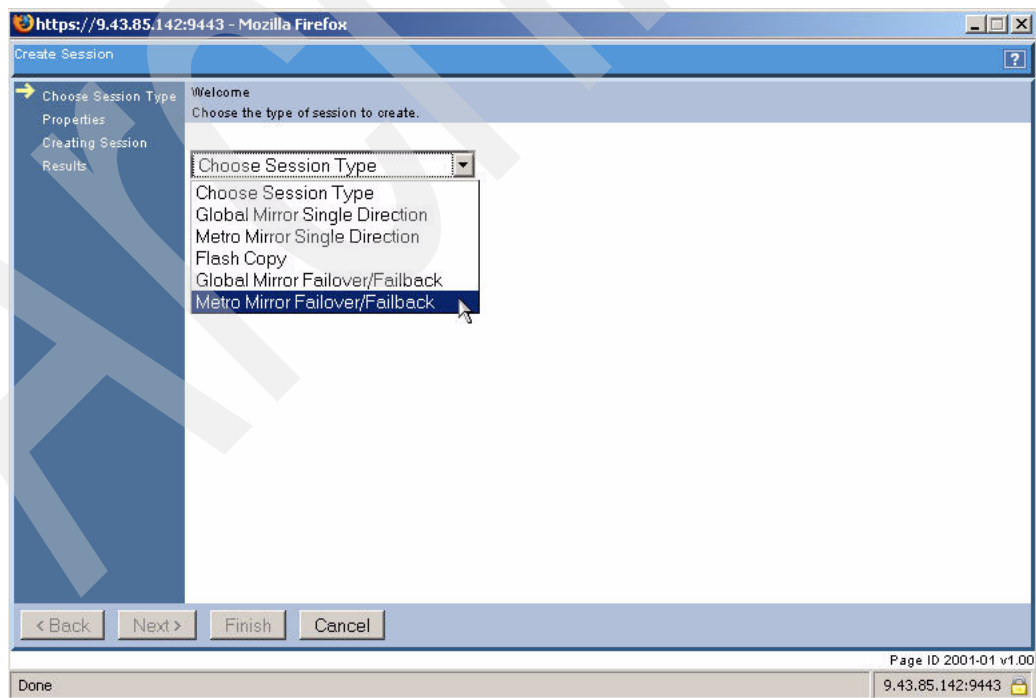


Figure 5-56 Create Session window

After selecting the copy type, click the **Next** button (see Figure 5-57).

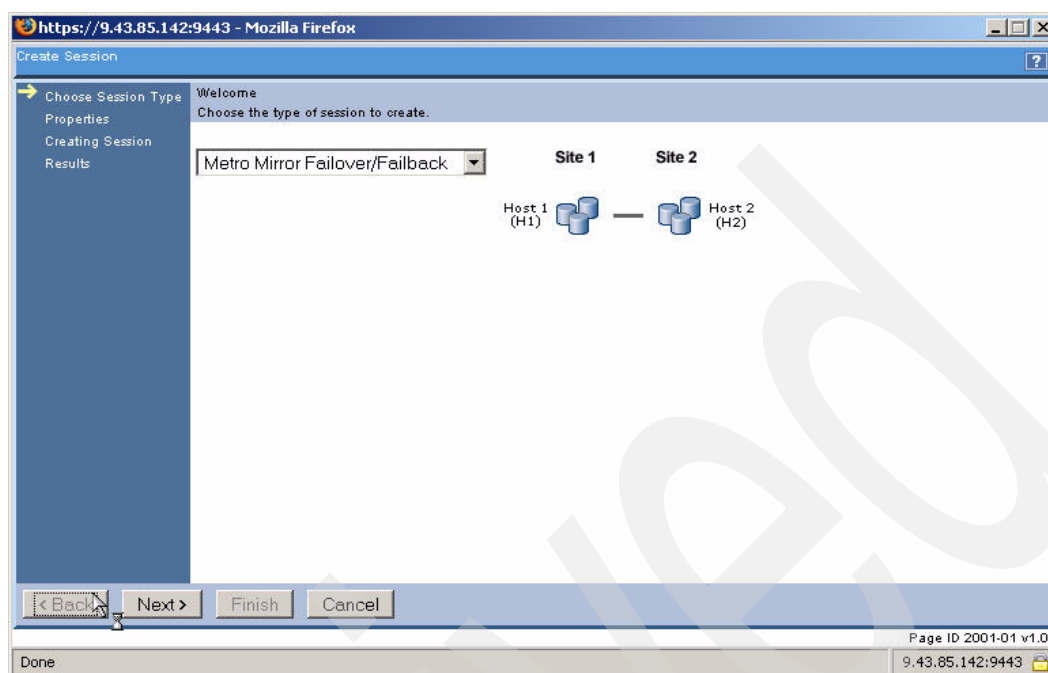


Figure 5-57 Metro Mirror session

Next enter in the appropriate fields the session name and a short description as shown in Figure 5-58. We recommend that you deploy meaningful names for your sessions to make them immediately recognizable. Once your details are entered, click the **Next** button.

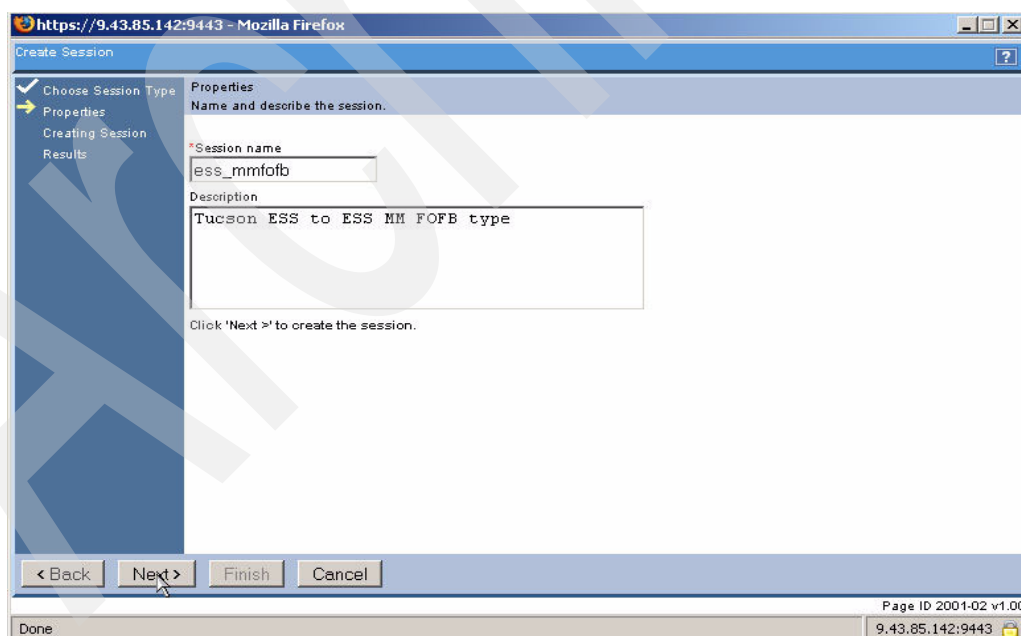


Figure 5-58 Session name and description

Now the TPC for Replication application will begin to create the session. While it is updating, the window shown in Figure 5-59 on page 120 is displayed. Note the panel on the left side shows where you are in the Create Session process.

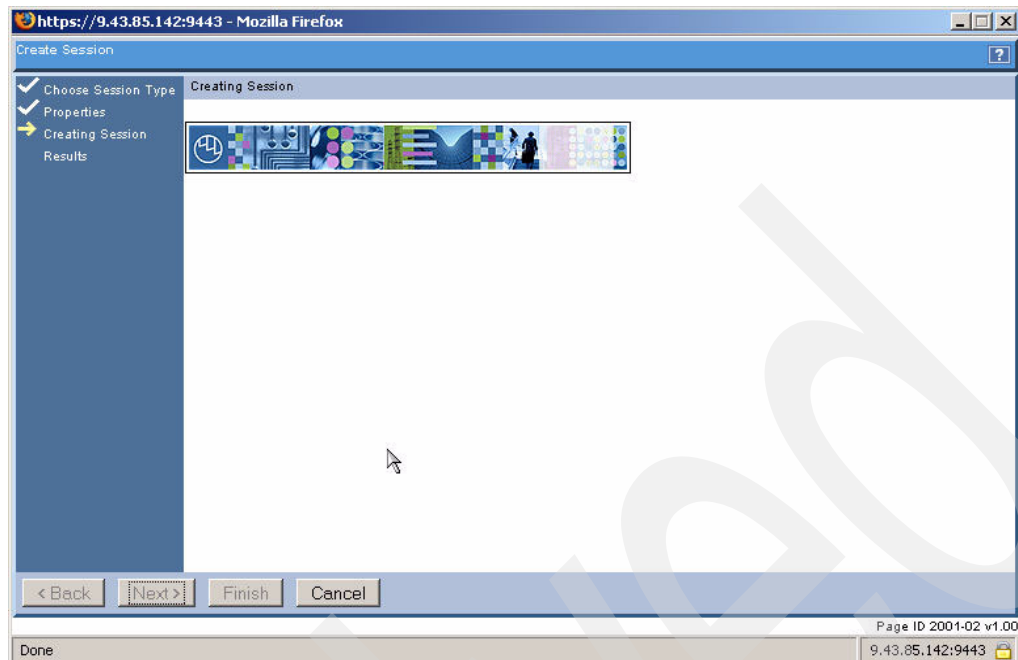


Figure 5-59 Creating Session

Click the **Finish** button to complete the session creation process.

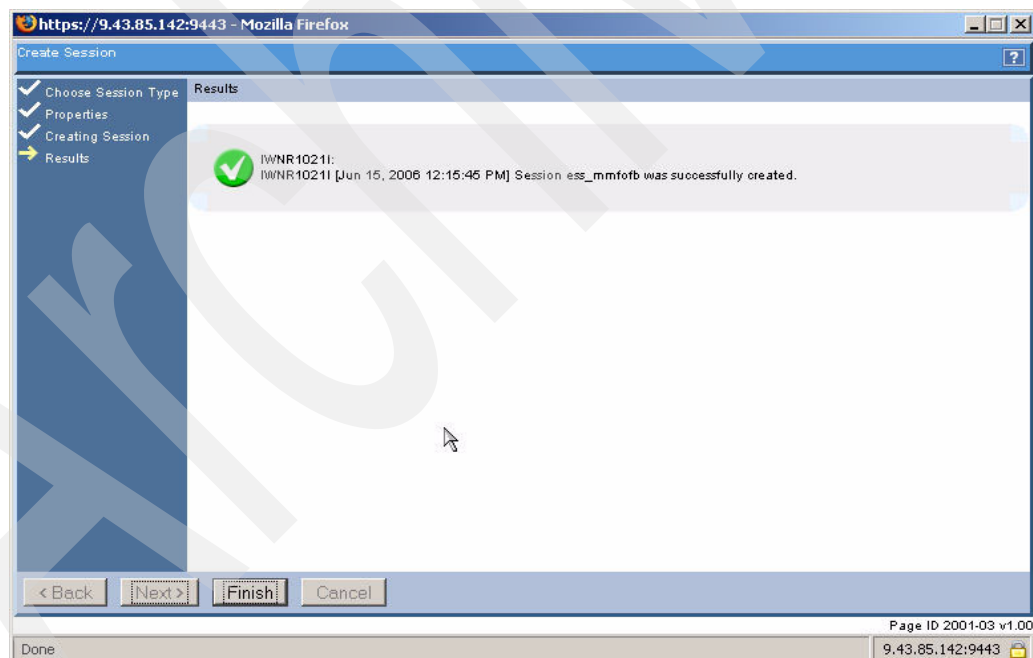


Figure 5-60 Session creation complete

5.3.4 Setup a session through the CSMCLI

For this CLI test we will add a new FlashCopy session. We can see in Figure 5-61 on page 121 the script to create this session.

```
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype fc -desc tucsoness_fc itsoess_fc
lssess -l
```

Figure 5-61 The ess add session script

The resulting output can be seen in Example 5-4. Note that we have reformatted the output to fit the page.

Example 5-4 Script output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\ess_addsess.txt
IWNRI021I [Jun 15, 2006 5:38:28 PM] Session itsoess_fc was successfully created.
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
itsovc_mm_sd1	Inactive	Defined	Metro Mirror Single Direction	No	No	0	No
itsovc_mm	Inactive	Defined	Flash Copy	No	No	0	No
itsovc02_mmfofb	Inactive	Defined	Metro Mirror Failover/Failback	No	No	0	No
ESS_POK	Inactive	Defined	Flash Copy	No	No	0	No
itsovc_mmcli	Inactive	Defined	Metro Mirror Single Direction	No	No	0	No
itsoess_fc	Inactive	Defined	Flash Copy	No	No	0	No
itsovc_fccli	Inactive	Defined	Flash Copy	No	No	0	No
itsovc_fc	Inactive	Defined	Flash Copy	No	No	0	No
ess_mmfofb	Inactive	Defined	Metro Mirror Failover/Failback	No	No	1	No

```
C:\CSM-CLI>
```

5.3.5 Managing paths using the GUI

To enable a copy session to occur between two storage subsystems, Fibre Channel paths must be established between the primary and secondary LSSs (logical subsystems) to carry the necessary traffic. All communications related to the session is carried down these paths during any cross subsystem copy services activities. This section contains details of how to establish these paths between two ESS 800 boxes. As we can see in Figure 5-62 we will be using LSS 14 in both storage servers.

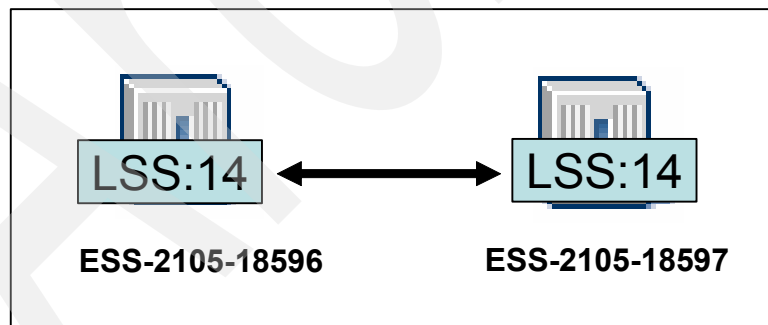


Figure 5-62 ESS configuration

Note: It is important to remember that the standard ESS pathing rules apply to this process. You can find further details on ESS path limitations in the Redbooks publication *IBM TotalStorage Enterprise Storage Server Implementing ESS Copy Services in Open Systems Environments*, SG24-5757.

To start the process, you click the ESS/DS Paths hyperlink under My Work as shown in Figure 5-63.



Figure 5-63 Menu

This will display the ESS/DS paths panel as shown in Figure 5-64. Click the **Manage Paths** button to begin the process.

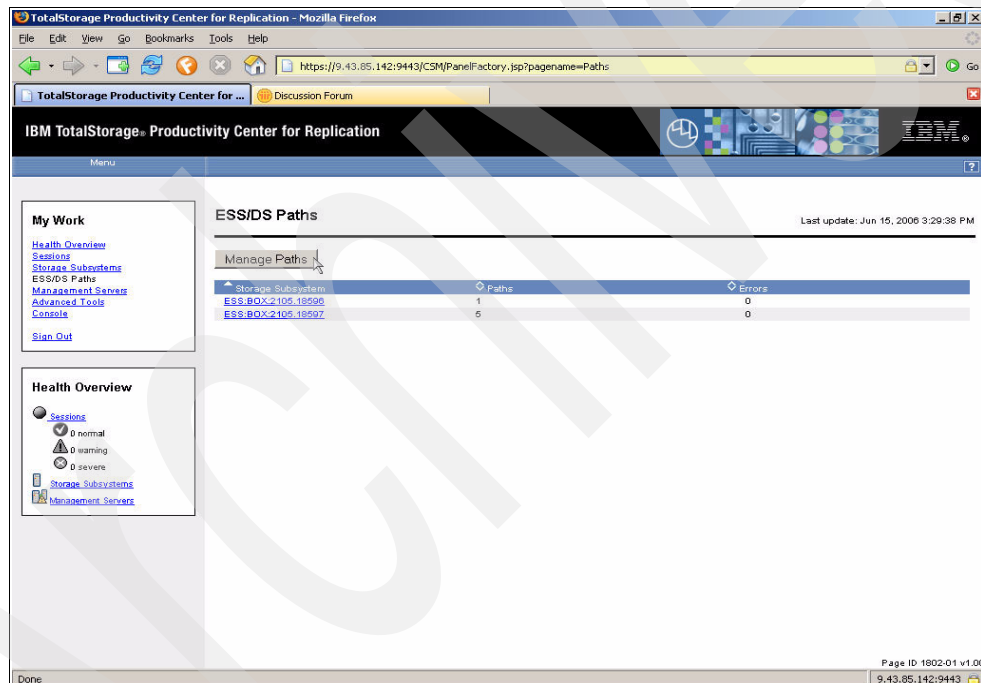


Figure 5-64 ESS/DS Paths panel

This will open the Path management window as shown in Figure 5-65 on page 123.

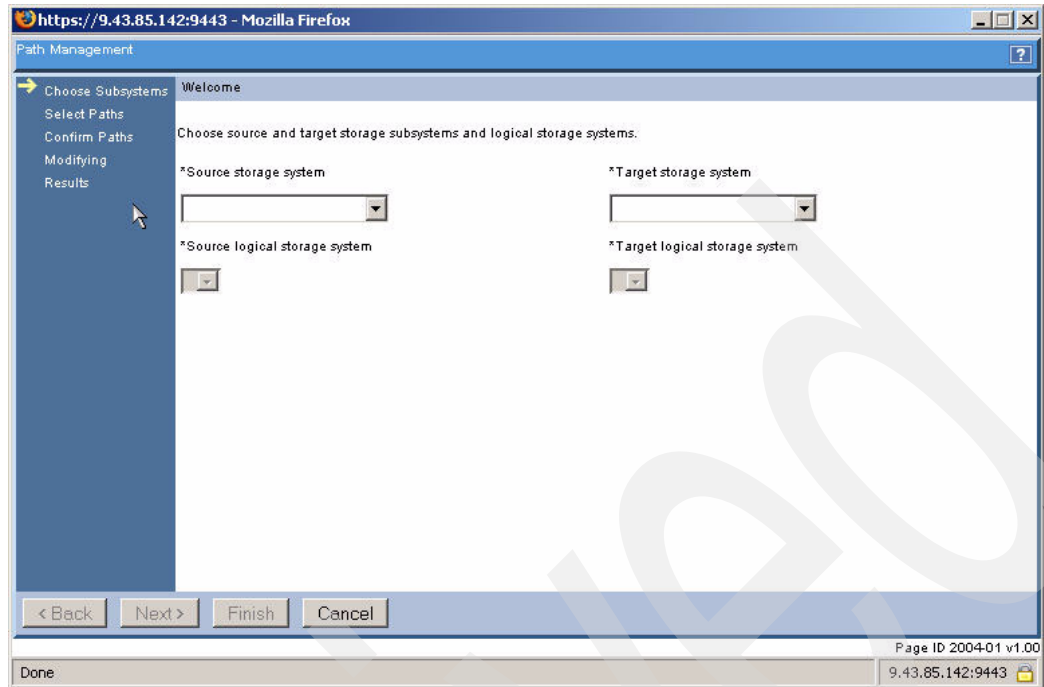


Figure 5-65 Subsystem selection for path management

As shown in Figure 5-66, select the appropriate source and target attributes (namely storage system and LSS). Then click the **Next** button to continue.

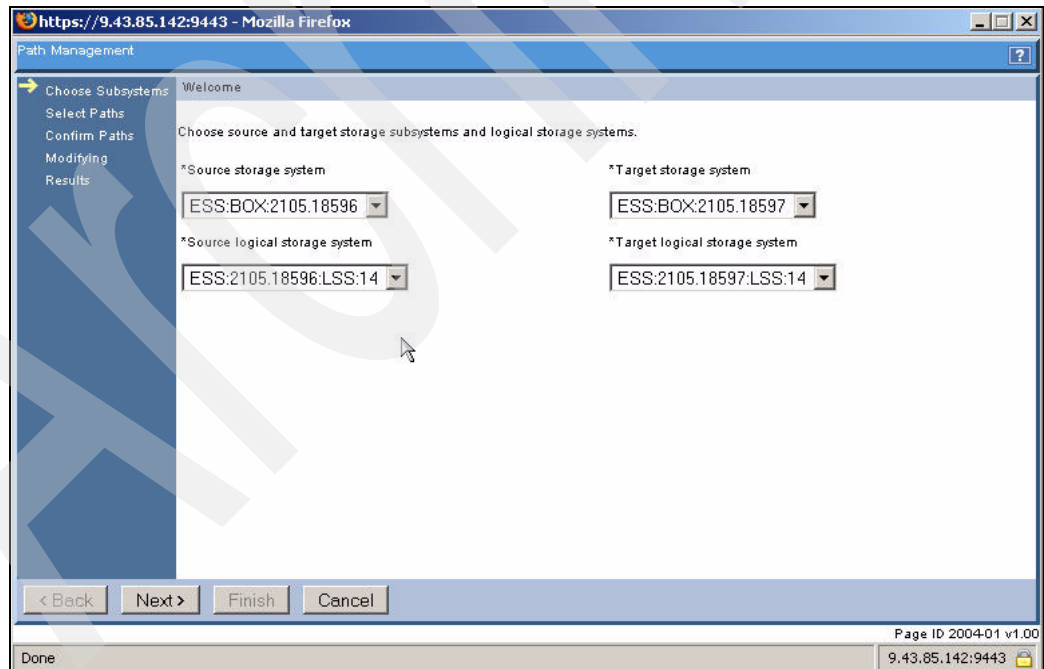


Figure 5-66 LSS selected

The next Path Management step is to select the required port pairings as shown in Figure 5-67 on page 124. Select the source and target ports from the drop-down menus and click the **Add** button. Note that at this stage there are no defined ports.

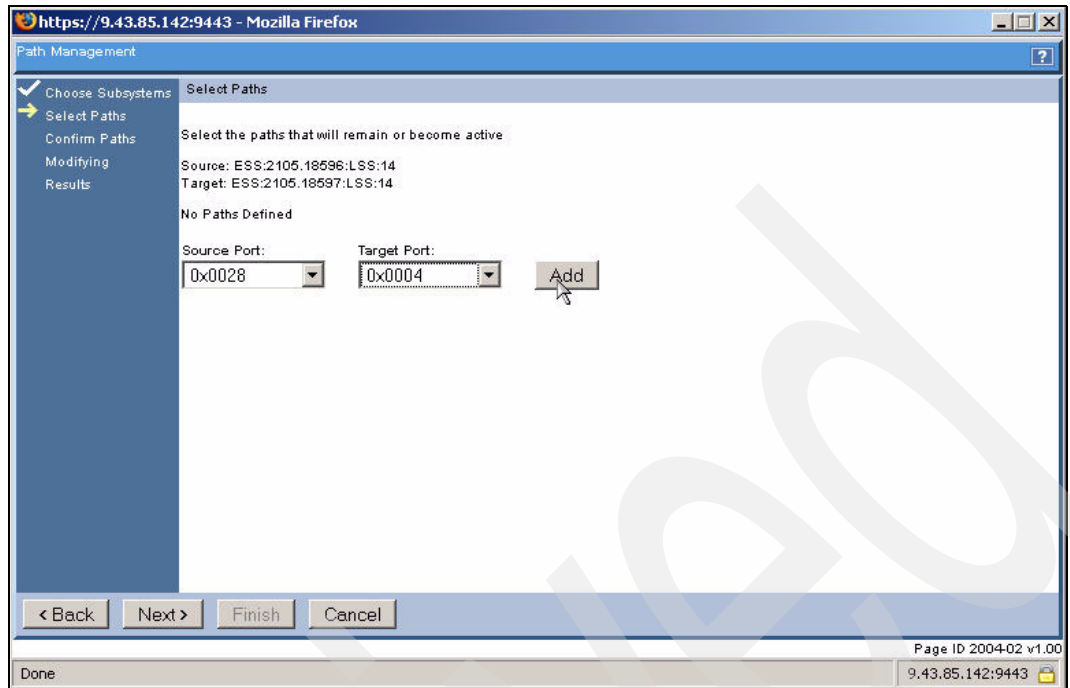


Figure 5-67 Port definitions

After defining an initial port, you can continue to define ports as required by once again selecting the source and targets from the drop-down menus and clicking the **Add** button as shown in Figure 5-68. Once you have finished click the **Next** button to proceed.

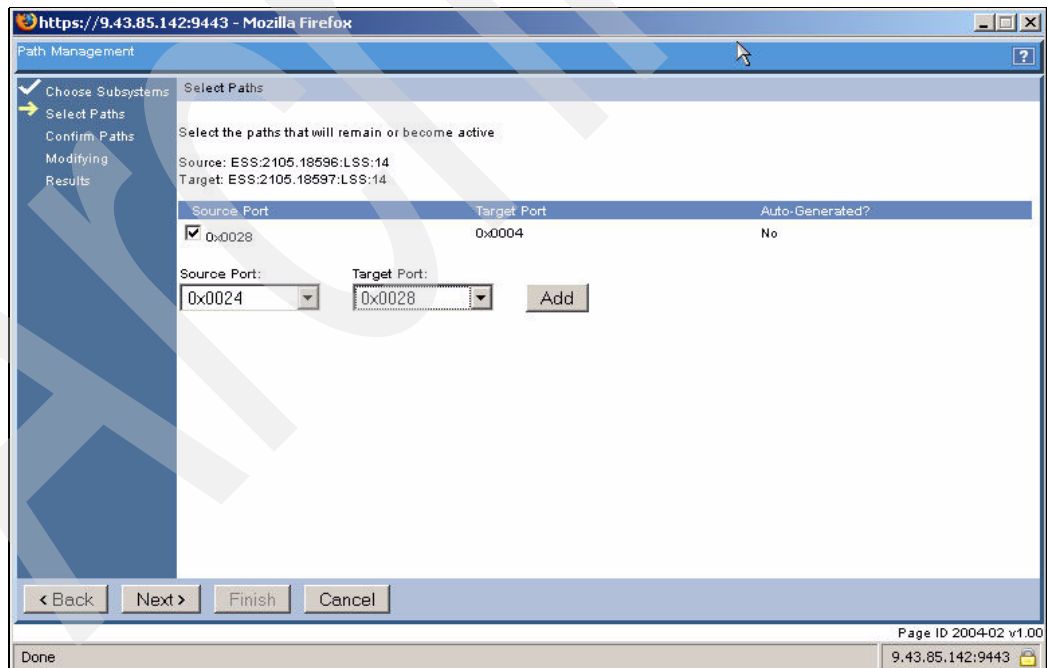


Figure 5-68 Ports added

The next window (as shown in Figure 5-69 on page 125) provides the opportunity to review and confirm the definitions you previously selected. To make changes click the **Back** button, to request TPC for Replication to create these paths, click the **Next** button.

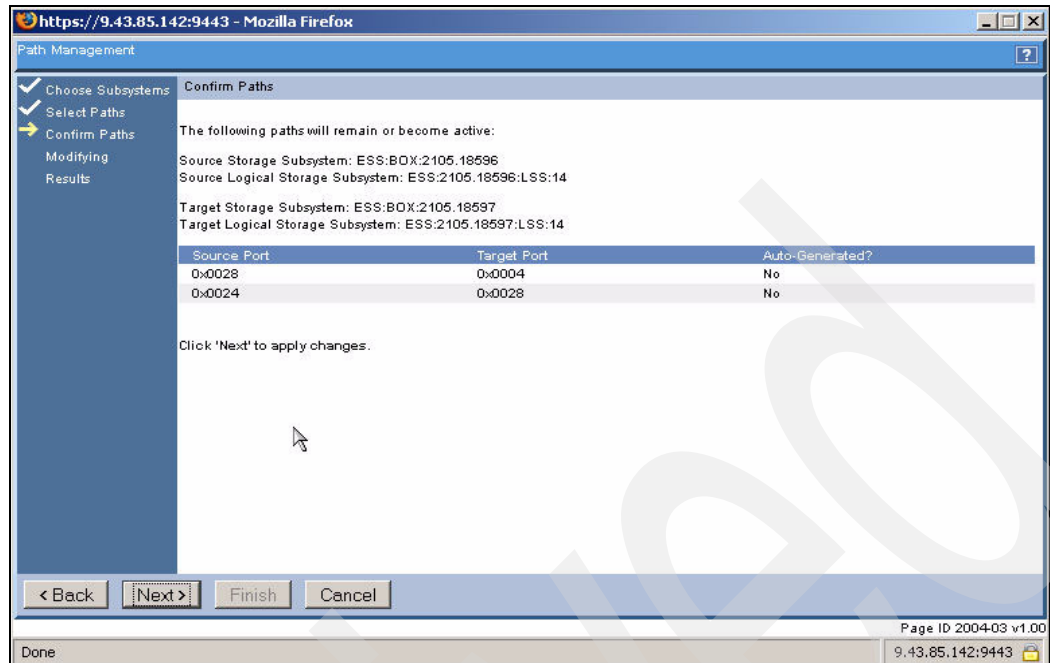


Figure 5-69 Paths defined

After clicking the next button TPC for Replication now starts to define the paths you have specified. During this process the window shown in Figure 5-70 is displayed.

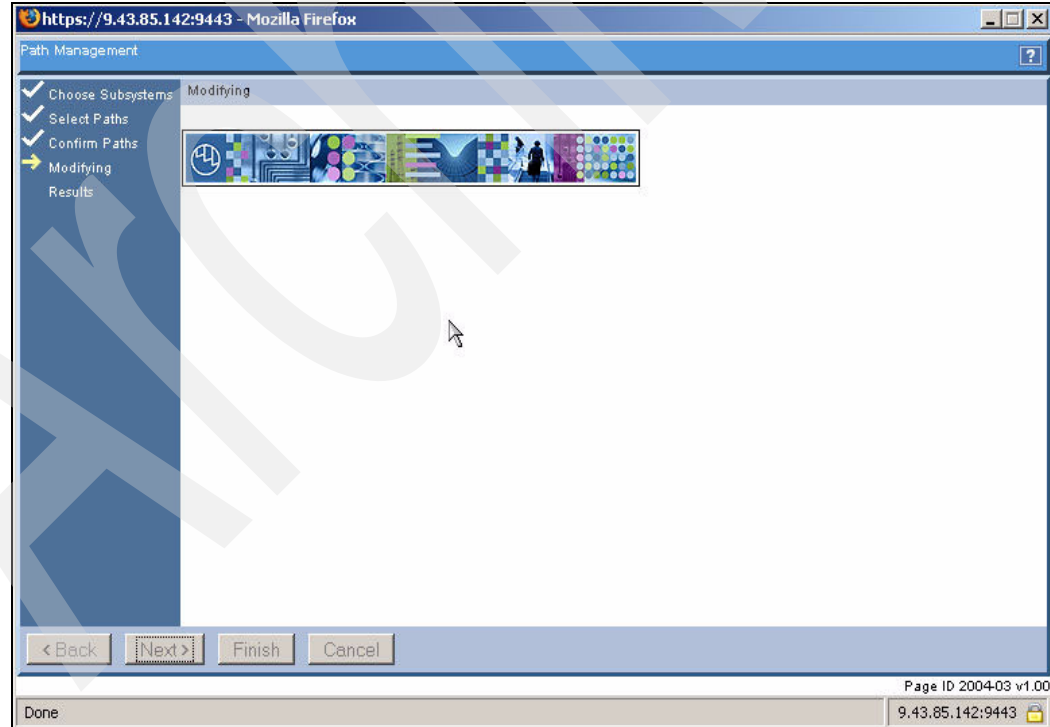


Figure 5-70 Path progress

Once the paths are defined and established you will be presented with the window shown in Figure 5-71 on page 126. Click the **Finish** button to complete this action.

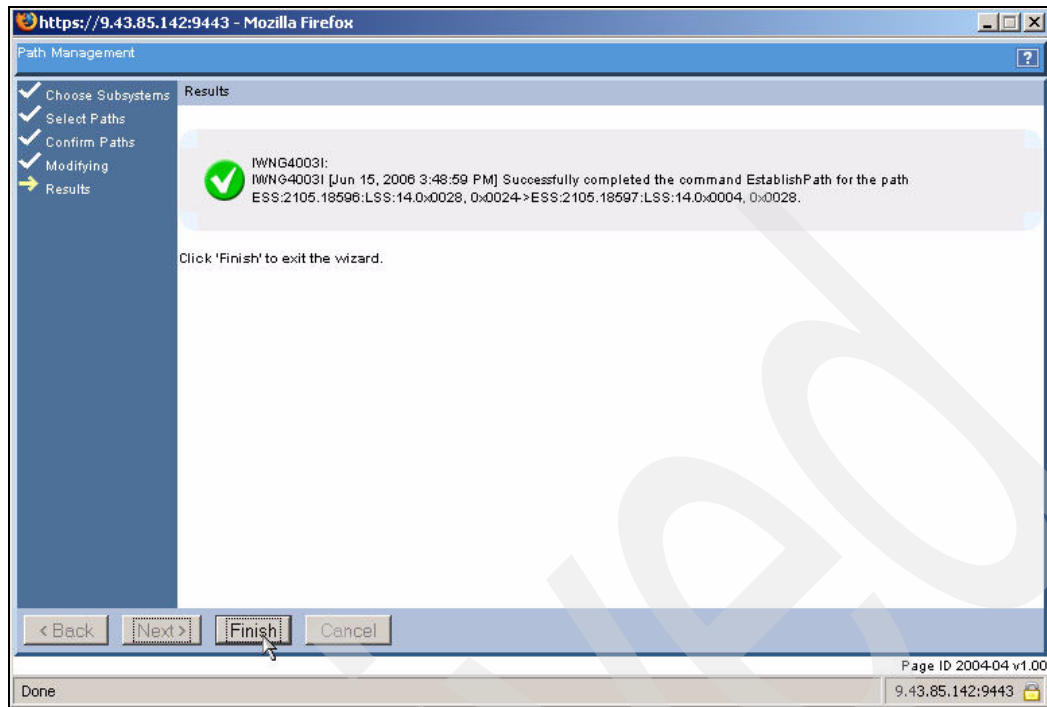


Figure 5-71 Path Management complete

Now upon returning to the Manage Paths window, we can now see (as shown in Figure 5-72) the paths are in place and active.

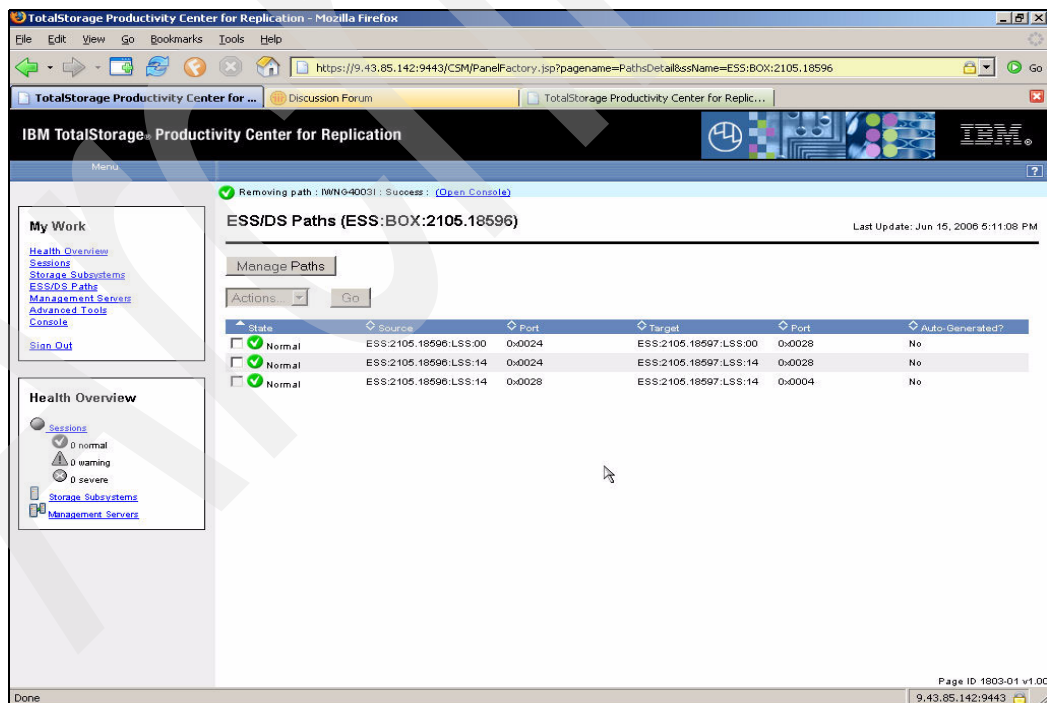


Figure 5-72 Manage Paths

You could now sign into the ESS Copy Services server to check the paths assigned as we can see in Figure 5-73 on page 127.

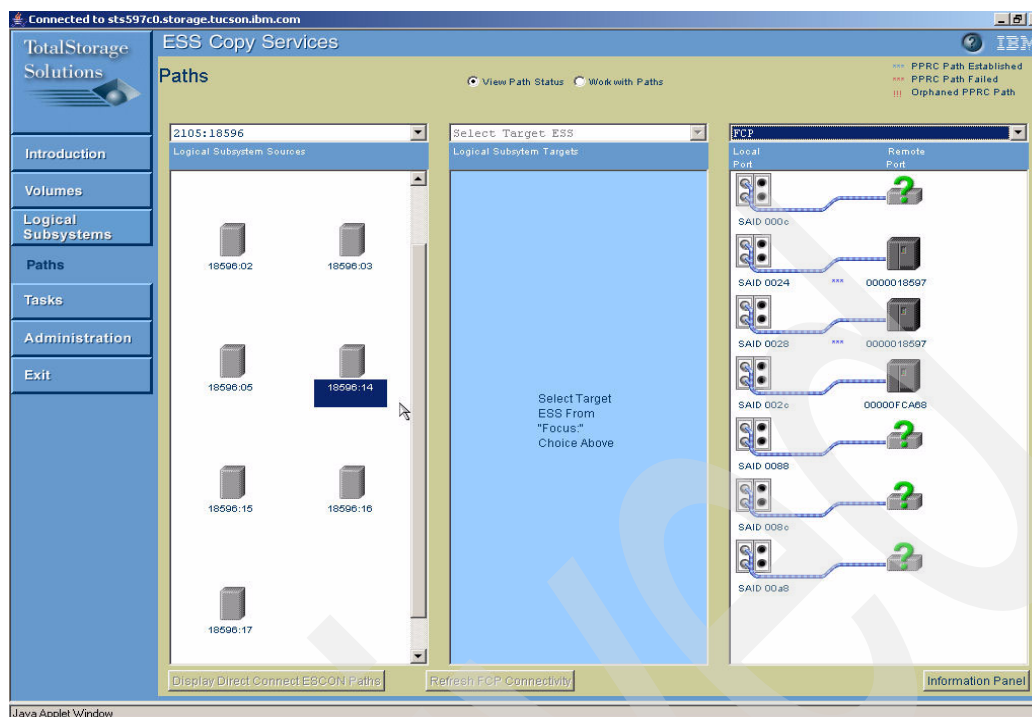


Figure 5-73 ESS Copy Services

5.3.6 Managing a path using the CSMCLI

For this exercise we have created a new script containing a number of commands. The **mkpath** command is used to define the required path. The ESS attributes of command are broken down as follows:

devtype:devid(model.serialnumber):LSS:lssid.portid

```
#
# This is a script file
# Using List commands to interrogate TPC 4 R
#
#
lsavailports -src ess:2105.18596:LSS:14 -tgt ess:2105.18597:lss:14
mkpath -src ess:2105.18596:LSS:14.0028 -tgt ess:2105.18597:lss:14.0004
lspath -src ess:2105.18596:LSS:14 -tgt ess:2105.18597:lss:14
```

Figure 5-74 The *mkpath* command ESS script

The result of this script is shown in Example 5-5. Note the differences in the two list commands we have used. The first command **lsavailport** shows the type as Fibre Channel. The second command **lspath**, shows the type as ESS.

Example 5-5 Script output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\ess_lsavailports.txt
```

Source	Target	Type
ESS:2105.18596:LSS:14.0x0028	ESS:2105.18597:LSS:14.0x0004	Fibre Channel

```

ESS:2105.18596:LSS:14.0x0024 ESS:2105.18597:LSS:14.0x0028 Fibre Channel
IWNH1000I [Jun 15, 2006 5:06:50 PM] The command completed successfully.
Source                                Target                                Type Status Auto-Generated
=====
ESS:2105.18596:LSS:14.0x0024 ESS:2105.18597:LSS:14.0x0028 ESS Normal No
ESS:2105.18596:LSS:14.0x0028 ESS:2105.18597:LSS:14.0x0004 ESS Normal No
C:\CSM-CLI>

```

5.3.7 Add Copy Sets using the GUI

Now that we have a session created, we can begin to create copy sets within the session. Remember that your session represents your consistency group and any action against that session will be applied to all the volumes contained within this session.

From the Sessions panel, we select the *Add Copy Sets* option from the drop-down menu as shown in Figure 5-75, then click the **Go** button.

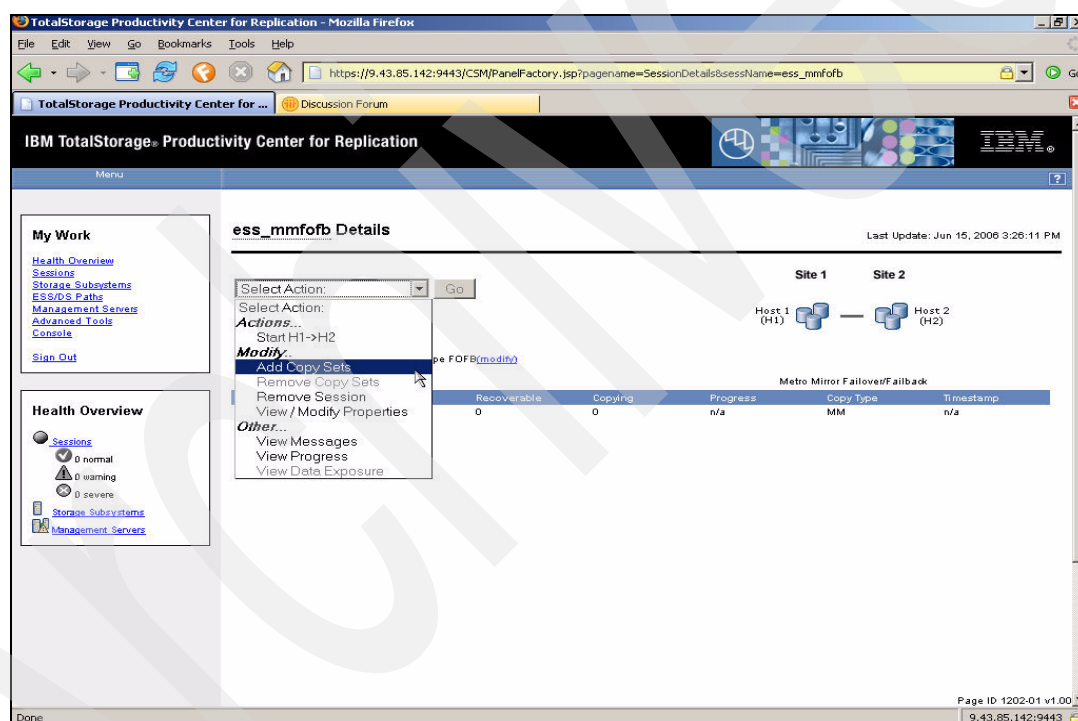


Figure 5-75 Add Copy Sets

After clicking the Go button the window shown in Figure 5-76 on page 129 will be shown. From the drop-down menus, select the Host 1 (or source) Copy Set attributes starting with the Host 1 storage subsystem.

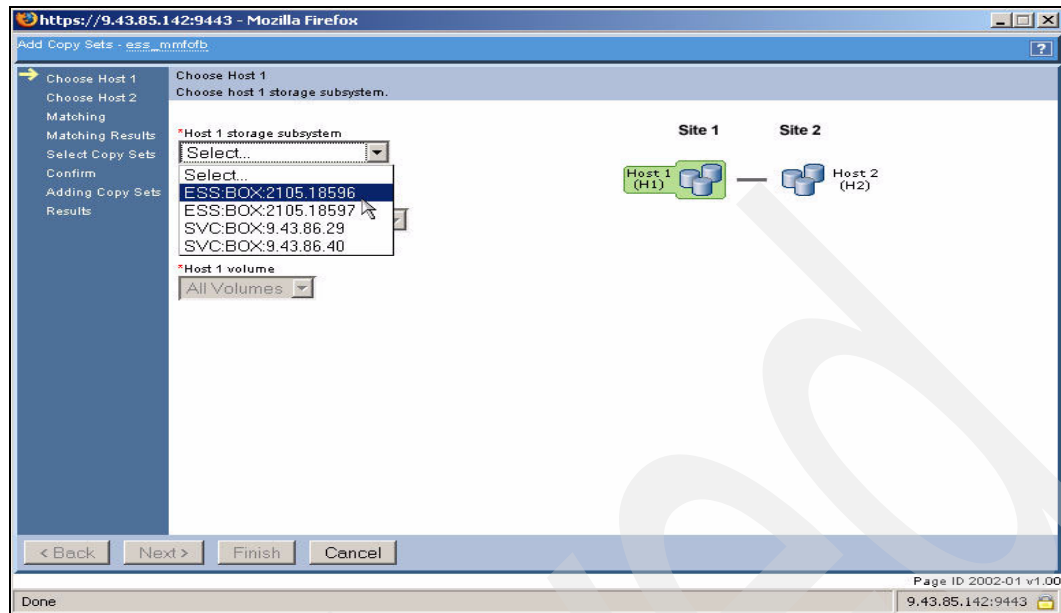


Figure 5-76 Drop-down menu

Next select the Host 1 logical subsystem as shown in Figure 5-77.

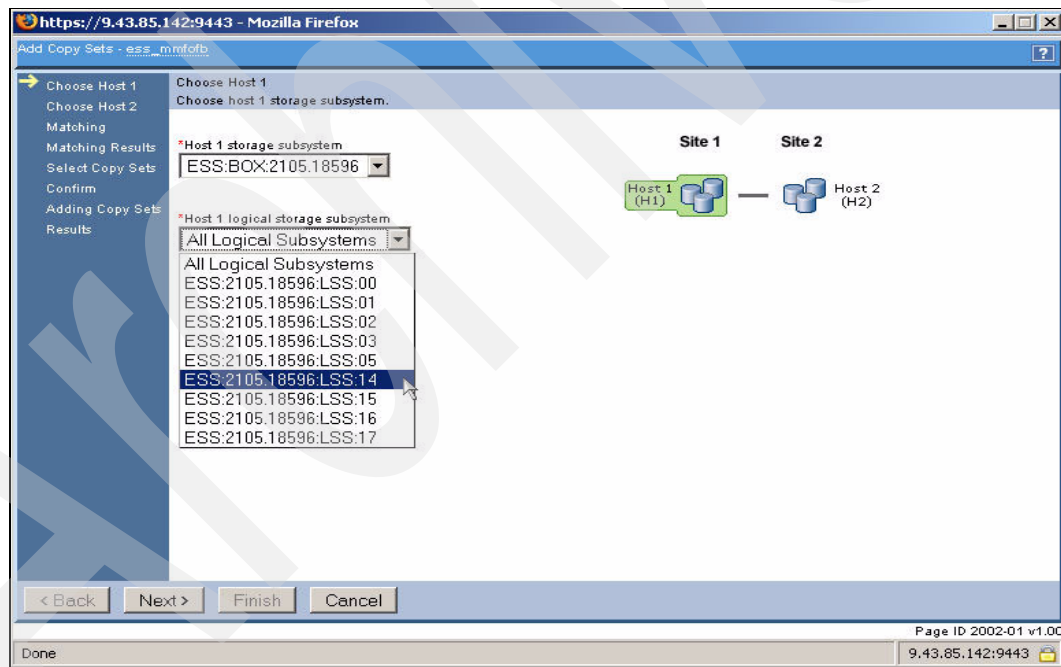


Figure 5-77 Host 1 LSS selection

Finally for Host 1, select the volume as shown in Figure 5-78 on page 130. Once complete click the Next button.

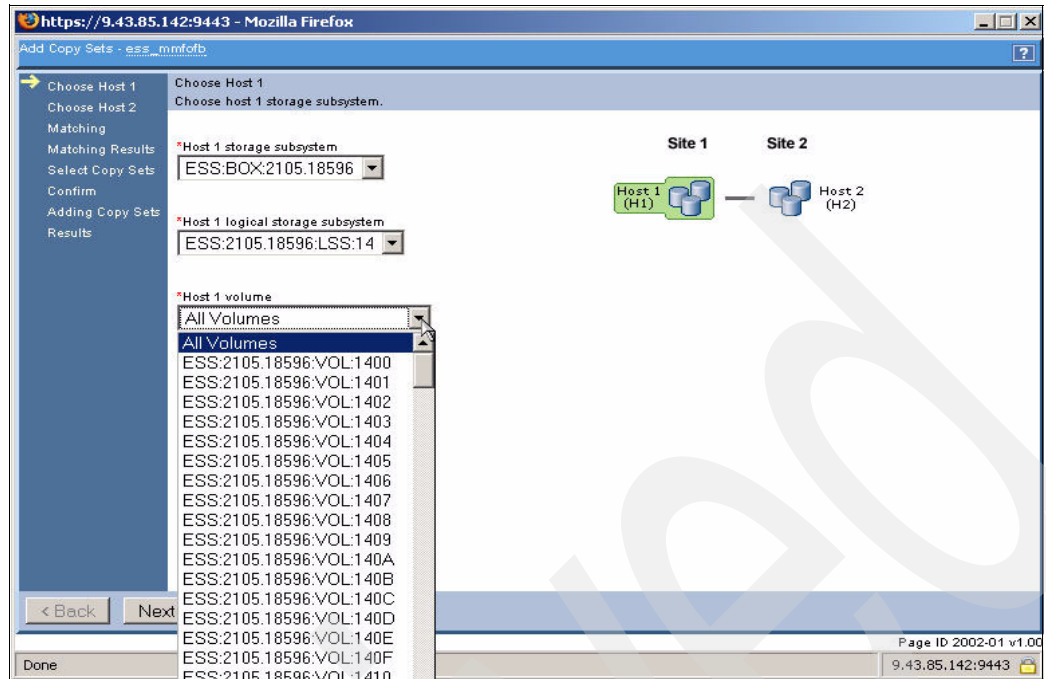


Figure 5-78 Host 1 volume selection

Now repeat the process, this time for the Host 2 attributes as shown in Figure 5-79. Once complete, click the **Next** button.

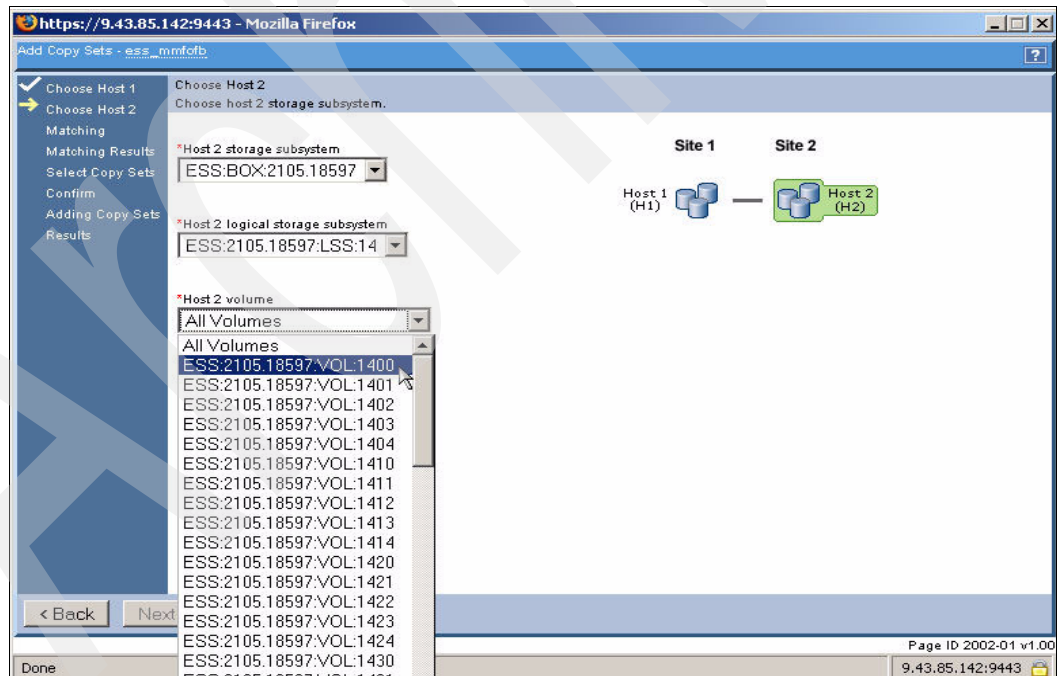


Figure 5-79 Host 2 selection

Once the Host 1 and Host 2 selections have been made the TPC for Replication application then performs a matching process to ensure that both volumes have the same attributes. Figure 5-80 on page 131 shows the window displayed after the matching has been successfully completed. Click the **Next** button to continue the process.

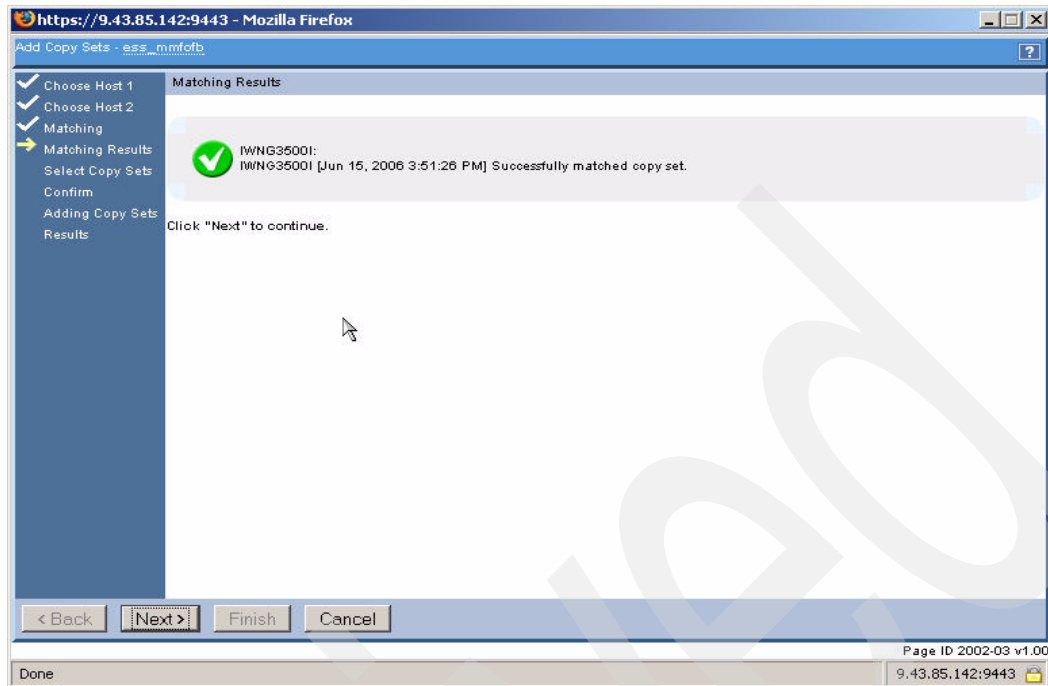


Figure 5-80 Volume matching

Next, TPC for Replication undertakes a confirmation process to ensure that you agree with the definitions you have specified. Figure 5-81 shows the first window displayed as part of this process.

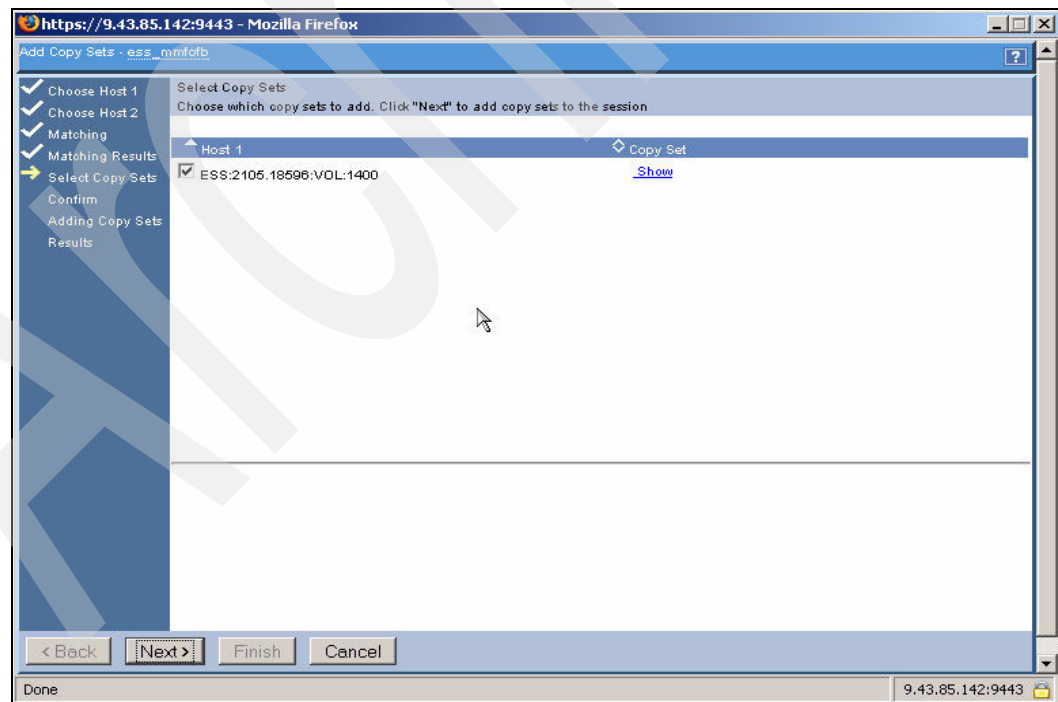


Figure 5-81 Copy Set selection

Clicking on the **Show** hyperlink as Figure 5-82 shows will display the relevant details of the pairing at the bottom of the window. If you are happy with the pairing click the **Next** button to continue.

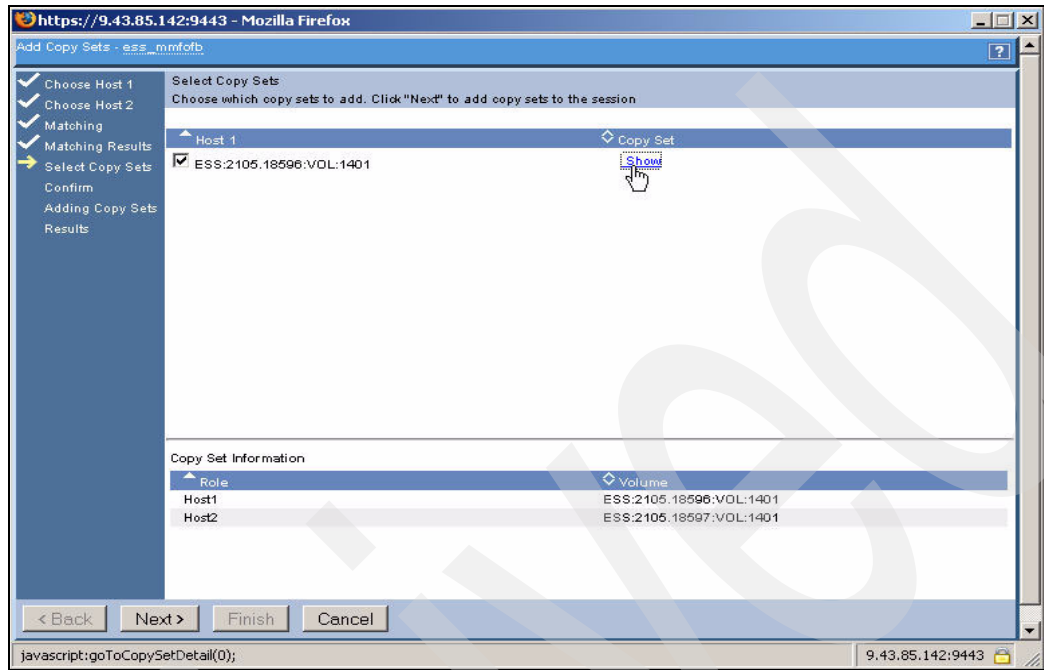


Figure 5-82 Show Hyperlink

The next window to be displayed is shown in Figure 5-83. This is the final confirmation window. Clicking the **Next** button will then add the Copy Sets to your session.

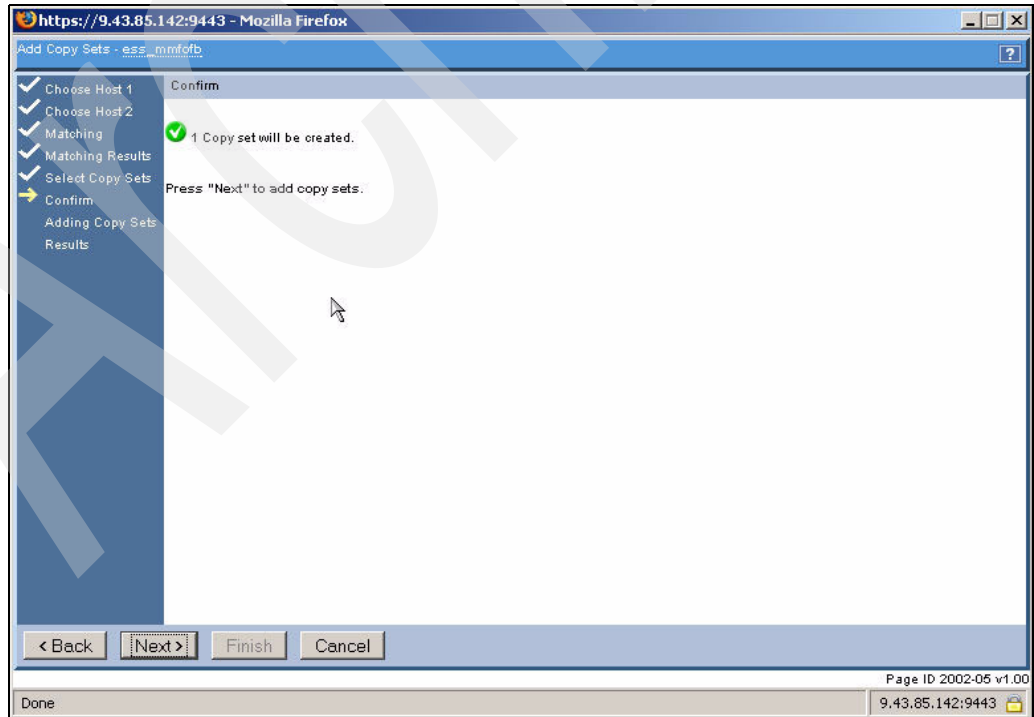


Figure 5-83 Confirmation

To complete the process click the **Finish** button as shown in Figure 5-84.

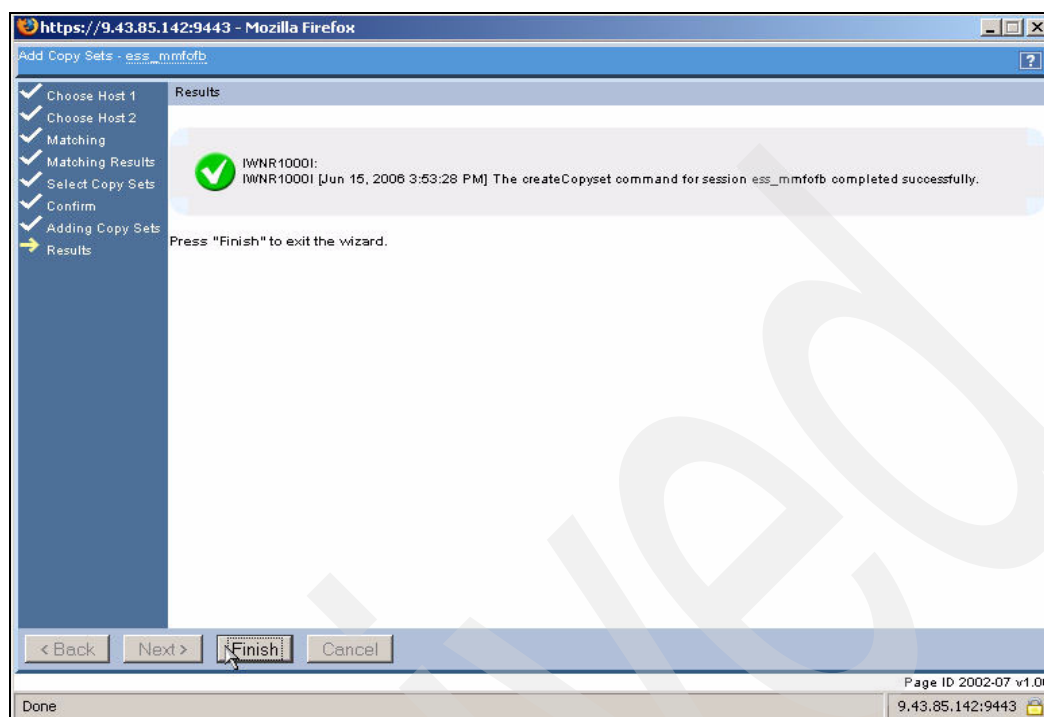


Figure 5-84 Finish

5.3.8 Add Copy Sets to a session using the CSMCLI

In this scenario we have created a script file to create a session and then add a number of copy sets to the session. Figure 5-85 shows the content of the script file.

```
setoutput -v on
mkssess -cptype mmsd -desc tucsoness_mm itsoess_mmsd_cli
lssess -l
mkcpset -h1 ESS:2105.18596:VOL:1402 -h2 ESS:2105.18597:VOL:1402 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1403 -h2 ESS:2105.18597:VOL:1403 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1404 -h2 ESS:2105.18597:VOL:1404 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1405 -h2 ESS:2105.18597:VOL:1405 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1406 -h2 ESS:2105.18597:VOL:1406 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1407 -h2 ESS:2105.18597:VOL:1407 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1408 -h2 ESS:2105.18597:VOL:1408 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1409 -h2 ESS:2105.18597:VOL:1409 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1410 -h2 ESS:2105.18597:VOL:1410 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1411 -h2 ESS:2105.18597:VOL:1411 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1412 -h2 ESS:2105.18597:VOL:1412 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1413 -h2 ESS:2105.18597:VOL:1413 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1414 -h2 ESS:2105.18597:VOL:1414 itsoess_mmsd_cli
lscpset itsoess_mmsd_cli
```

Figure 5-85 The ess_addcopy script

Next we open the CSMCLI interface and invoke the script as in Example 5-6 on page 134. Once again we have formatted the window to reflect our example.

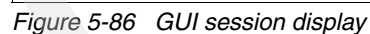
Example 5-6 Script output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\ess_addcopy.txt
IWNRR1021I [Jun 16, 2006 1:40:25 PM] Session itsoess_mmsd_cli was successfully created.
Name                Status  State  Copy type                Recoverable Copying Copy sets Error
=====
itsoess_mmsd_cli    Inactive Defined Metro Mirror Single Direction No        No        0 No
itsoesvc_mm_sdl     Inactive Defined Metro Mirror Single Direction No        No        0 No
itsoesvc_mm         Inactive Defined Flash Copy No        No        0 No
itsoesvc02_mmfofb   Inactive Defined Metro Mirror Failover/Failback No        No        0 No
ESS_POK            Inactive Defined Flash Copy No        No        0 No
itsoesvc_mmcli      Inactive Defined Metro Mirror Single Direction No        No        0 No
itsoess_fc          Inactive Defined Flash Copy No        No        0 No
itsoesvc_fccli      Inactive Defined Flash Copy No        No        0 No
itsoesvc_fc         Inactive Defined Flash Copy No        No        0 No
ess_mmfofb          Inactive Defined Metro Mirror Failover/Failback No        No        1 No
IWNRR2001I [Jun 16, 2006 1:40:26 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1402 with source ESS:2105.1859
6:VOL:1402 and target ESS:2105.18597:VOL:1402.
IWNRR2001I [Jun 16, 2006 1:40:27 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1403 with source ESS:2105.1859
6:VOL:1403 and target ESS:2105.18597:VOL:1403.
IWNRR2001I [Jun 16, 2006 1:40:28 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1404 with source ESS:2105.1859
6:VOL:1404 and target ESS:2105.18597:VOL:1404.
IWNRR2001I [Jun 16, 2006 1:40:28 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1405 with source ESS:2105.1859
6:VOL:1405 and target ESS:2105.18597:VOL:1405.
IWNRR2001I [Jun 16, 2006 1:40:29 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1406 with source ESS:2105.1859
6:VOL:1406 and target ESS:2105.18597:VOL:1406.
IWNRR2001I [Jun 16, 2006 1:40:30 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1407 with source ESS:2105.1859
6:VOL:1407 and target ESS:2105.18597:VOL:1407.
IWNRR2001I [Jun 16, 2006 1:40:31 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1408 with source ESS:2105.1859
6:VOL:1408 and target ESS:2105.18597:VOL:1408.
IWNRR2001I [Jun 16, 2006 1:40:32 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1409 with source ESS:2105.1859
6:VOL:1409 and target ESS:2105.18597:VOL:1409.
IWNRR2001I [Jun 16, 2006 1:40:33 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1410 with source ESS:2105.1859
6:VOL:1410 and target ESS:2105.18597:VOL:1410.
IWNRR2001I [Jun 16, 2006 1:40:33 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1411 with source ESS:2105.1859
6:VOL:1411 and target ESS:2105.18597:VOL:1411.
IWNRR2001I [Jun 16, 2006 1:40:34 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1412 with source ESS:2105.1859
6:VOL:1412 and target ESS:2105.18597:VOL:1412.
IWNRR2001I [Jun 16, 2006 1:40:35 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1413 with source ESS:2105.1859
6:VOL:1413 and target ESS:2105.18597:VOL:1413.
IWNRR2001I [Jun 16, 2006 1:40:36 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1414 with source ESS:2105.1859
6:VOL:1414 and target ESS:2105.18597:VOL:1414.
H1 Volume                Session                Volumes
=====
ESS:2105.18596:VOL:1402 itsoess_mmsd_cli                2
ESS:2105.18596:VOL:1403 itsoess_mmsd_cli                2
ESS:2105.18596:VOL:1404 itsoess_mmsd_cli                2
ESS:2105.18596:VOL:1405 itsoess_mmsd_cli                2
```


C:\CSM-CLI>

Now that we have created a number of sessions and have valid copy sets defined to them, we can begin to interact with these sessions. This section will show several activities related to the a number of sessions. In this section we perform the following activities:

- We can see in Figure 5-86 and Figure 5-87 on page 136 the available sessions for further exercises.



```

C:\CSM-CLI>csmcli lssess -fmt stanza
Name      itsoess_mmsd_cli
Status    Inactive
State     Defined
Copy type Metro Mirror Single Direction

Name      itsosvc_mm_sd1
Status    Inactive
State     Defined
Copy type Metro Mirror Single Direction

Name      itsosvc_mm
Status    Inactive
State     Defined
Copy type Flash Copy

Name      itsosvc02_mmfofb
Status    Inactive
State     Defined
Copy type Metro Mirror Failover/Failback

Name      ESS_POK
Status    Inactive
State     Defined
Copy type Flash Copy

Name      itsosvc_mmcli
Status    Inactive
State     Defined
Copy type Metro Mirror Single Direction

Name      itsoess_fc
Status    Inactive
State     Defined
Copy type Flash Copy

Name      itsosvc_fccli
Status    Inactive
State     Defined
Copy type Flash Copy

Name      itsosvc_fc
Status    Inactive
State     Defined
Copy type Flash Copy

Name      ess_mmfofb
Status    Inactive
State     Defined
Copy type Metro Mirror Failover/Failback

C:\CSM-CLI>

```

Figure 5-87 CLI session display in stanza format

5.3.10 Managing a FlashCopy session through the GUI

In this section we will complete a number of actions against a FlashCopy session. It is important to remember that the process for FlashCopy is slightly different for an ESS / DS storage subsystem as opposed to the SAN Volume Controller (SVC). With the SVC you will issue the **Start** command prior to the **Flash** command to tell the SVC to perform the Prepare function. With the ESS and DS subsystems only the **Flash** command is needed to start the copy process.

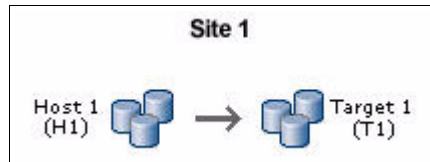


Figure 5-88 FlashCopy

In this exercise we will use the session *itssoess_fc* as Figure 5-89 displays. To open the session details window click the session name which functions as a hyper link to the session itself.

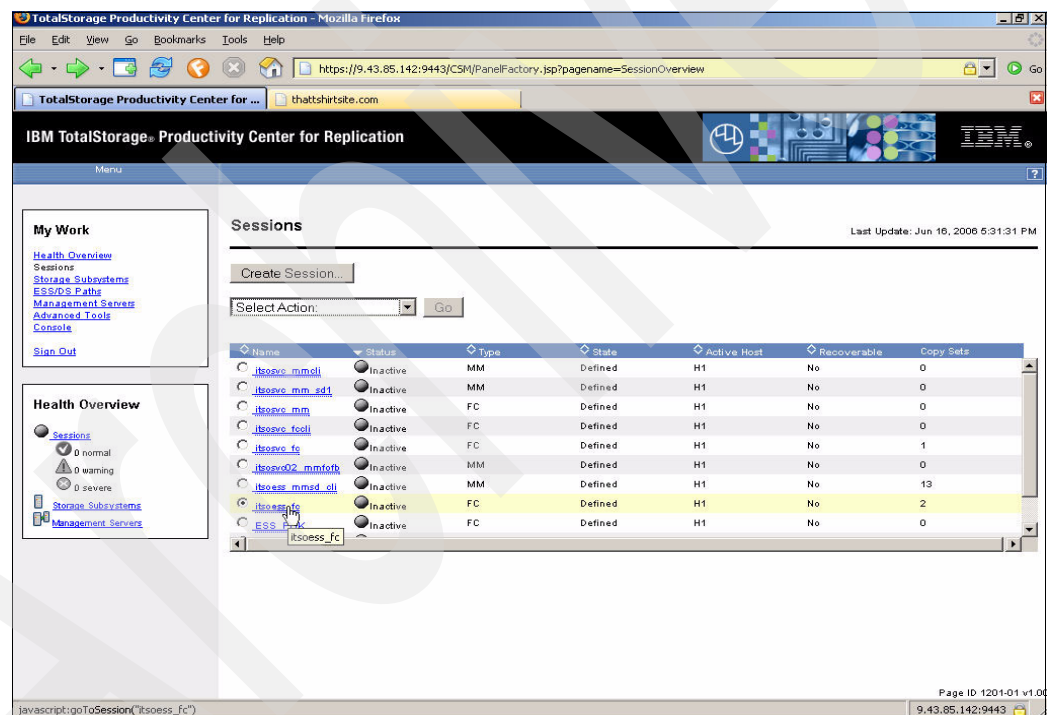


Figure 5-89 Session selection

Next from the drop-down menu select *Flash* as indicated in Figure 5-90 on page 138 and then click the **Go** button.

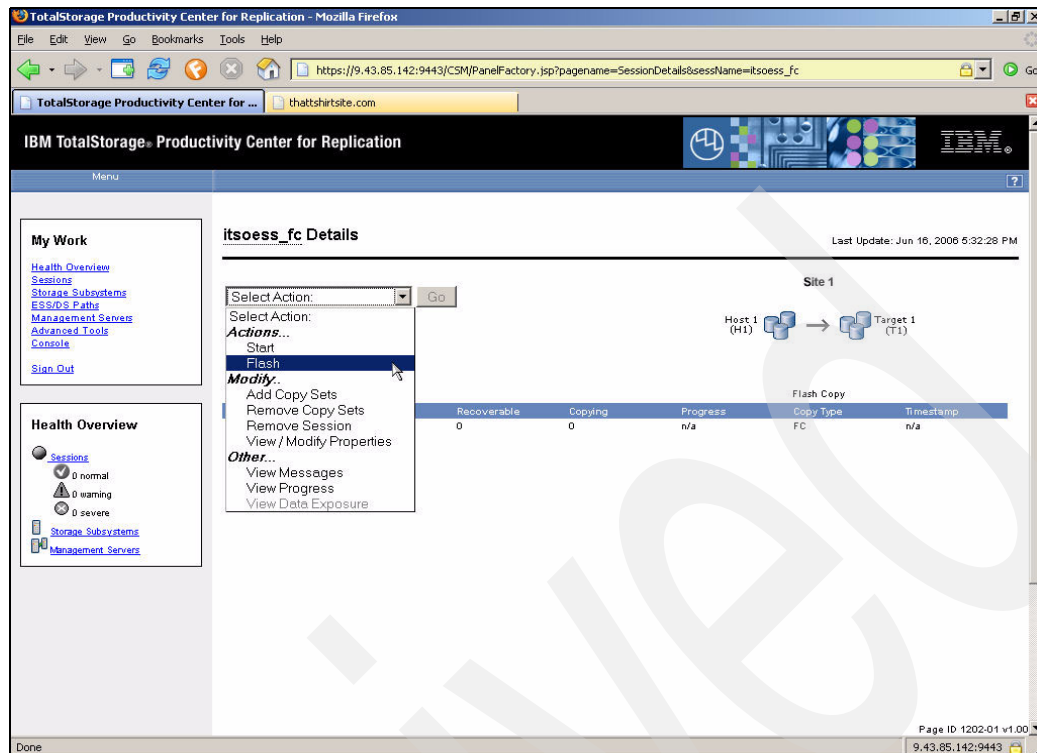


Figure 5-90 Start session

As we can see in Figure 5-91 the Flash command has been successfully processed.

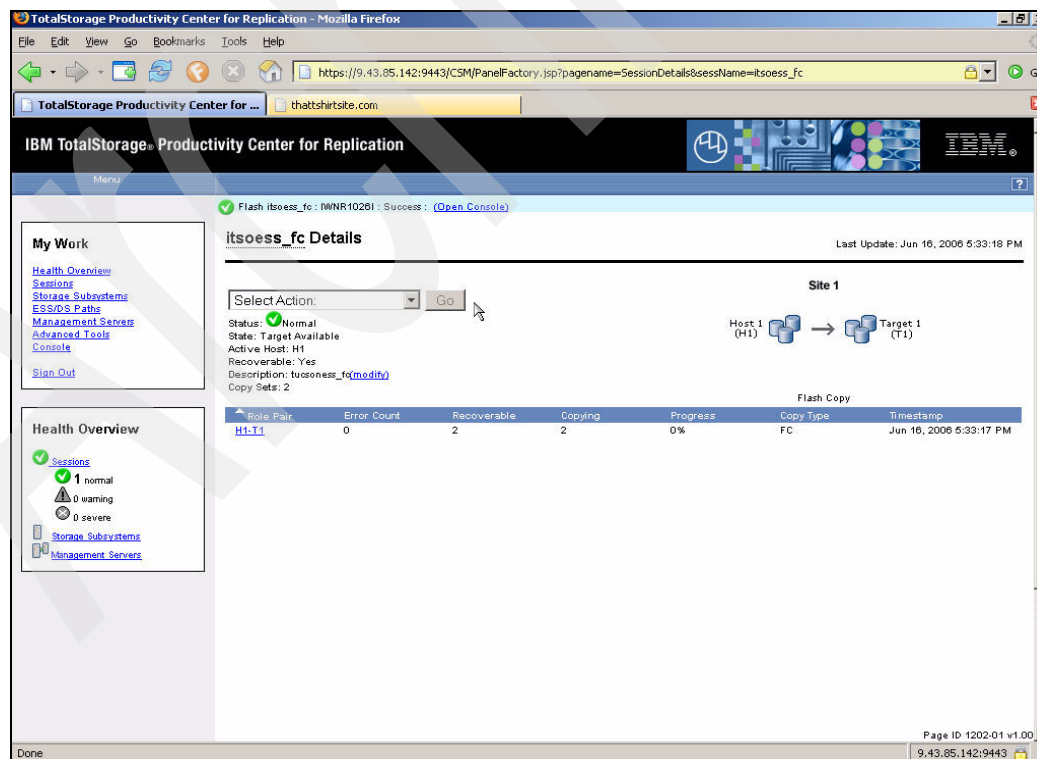


Figure 5-91 Flash session started

As we can see in Figure 5-92 the columns *Recoverable* and *Copying* in the center of the window now show a count of 2. This represents the target volumes which are about to be available.

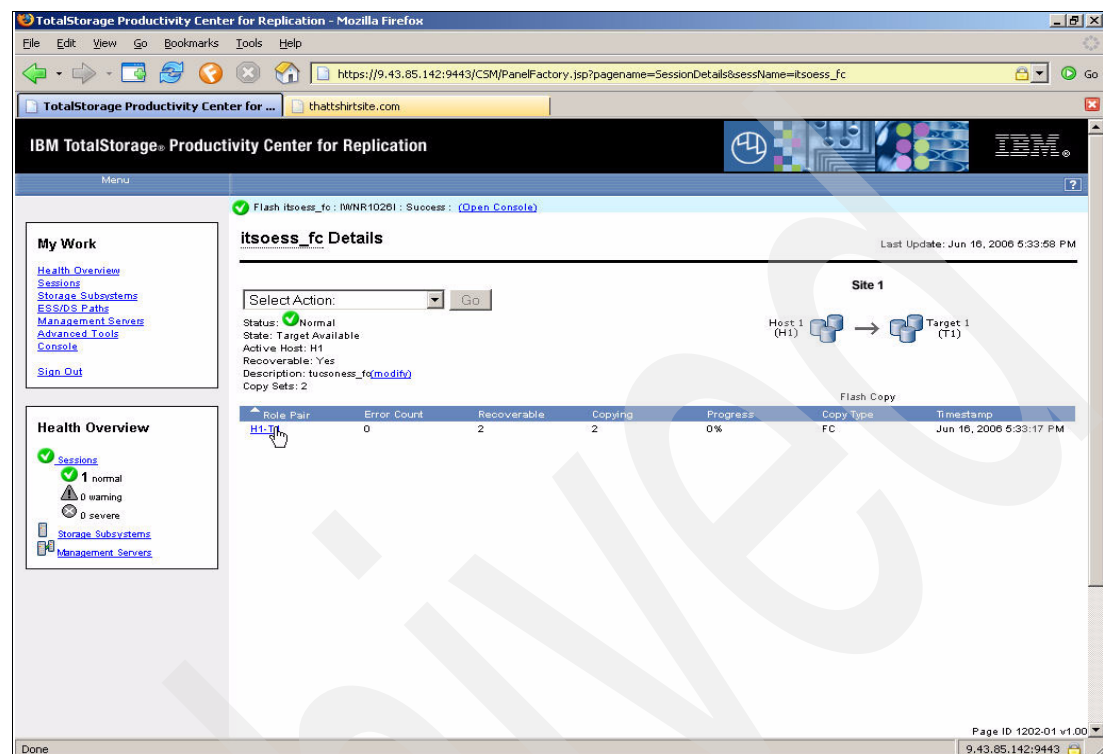


Figure 5-92 Flash invocation

To check on the progress of the copy select the *View Progress* option from the drop-down menu as shown in Figure 5-93 on page 140. Click the **Go** button to continue.

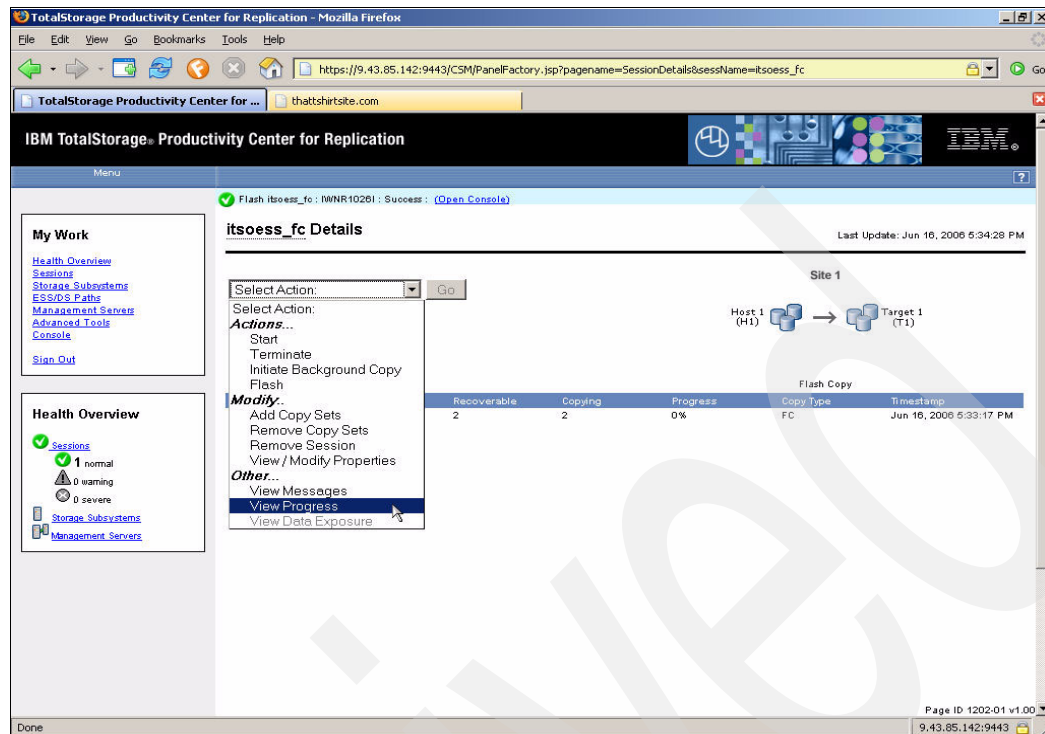


Figure 5-93 View Progress status

Figure 5-94 on page 141 shows the status as still being 0%. This does not represent the progress about how many tracks are already copied, but rather on the number of FlashCopy volume pairs which are completely copied and in sync. Zero indicates that no FlashCopy volume pair finished background copy yet.

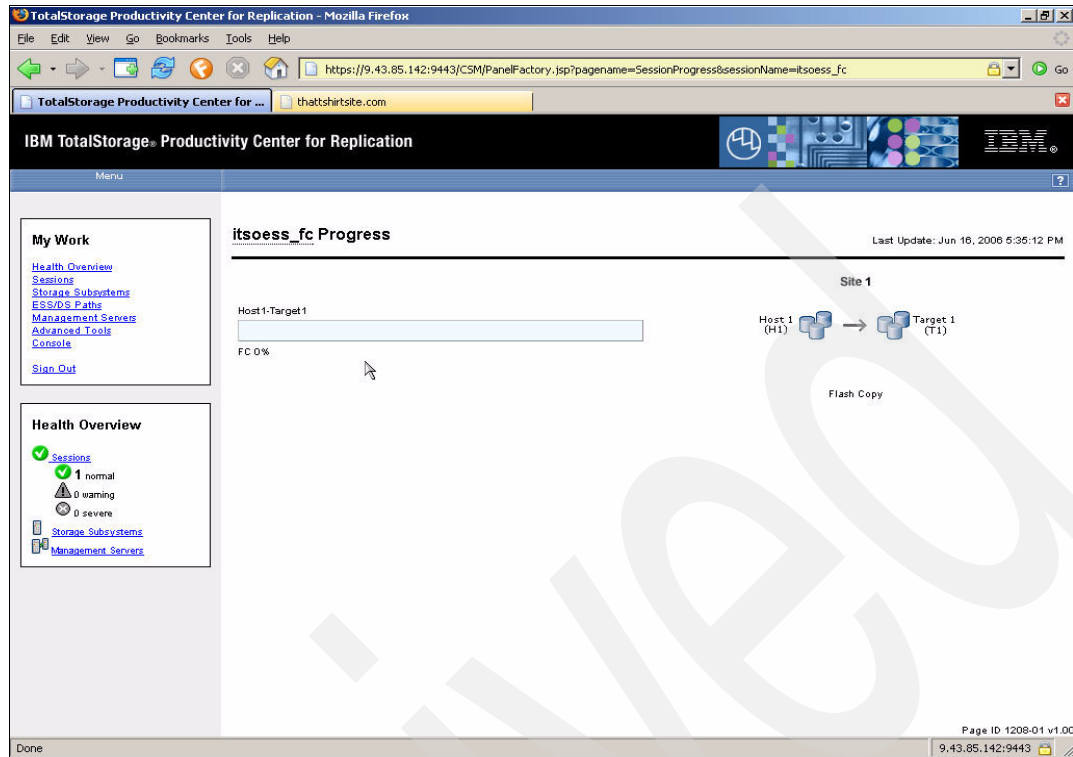


Figure 5-94 FlashCopy progress

You may modify the FlashCopy relationship and issue another action against the FlashCopy session which applies to all FlashCopy pairs in the concerned session.

We select *Initiate Background Copy* from the drop-down menu as shown in Figure 5-95 on page 142. Click the **Ok** button to continue.

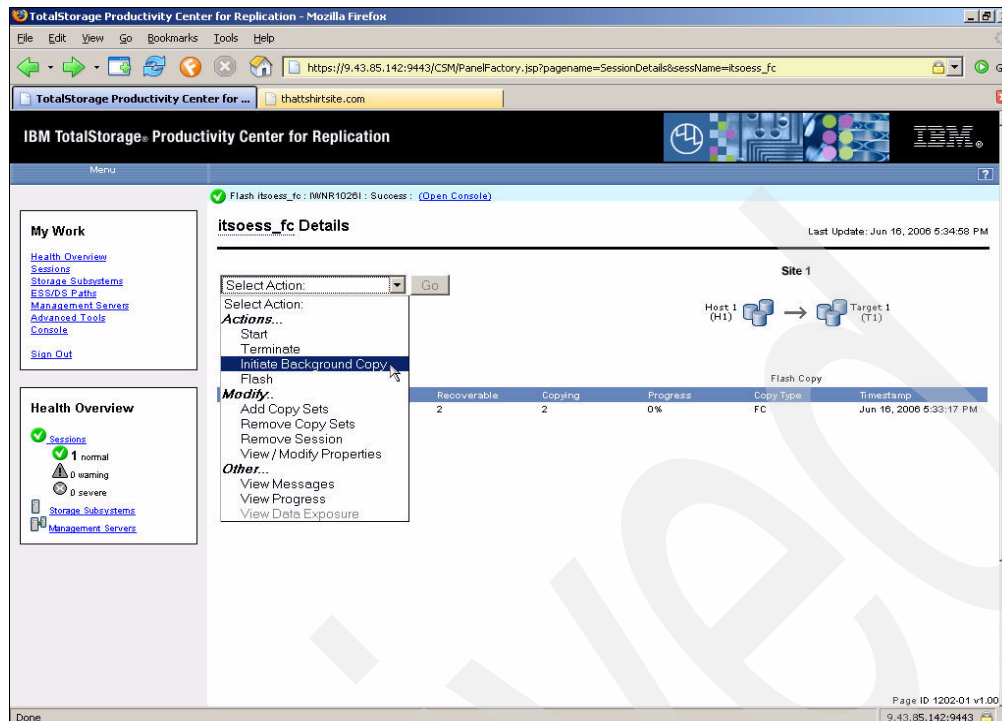


Figure 5-95 Initiate Background Copy menu

The result of the command invocation can be seen in Figure 5-96.

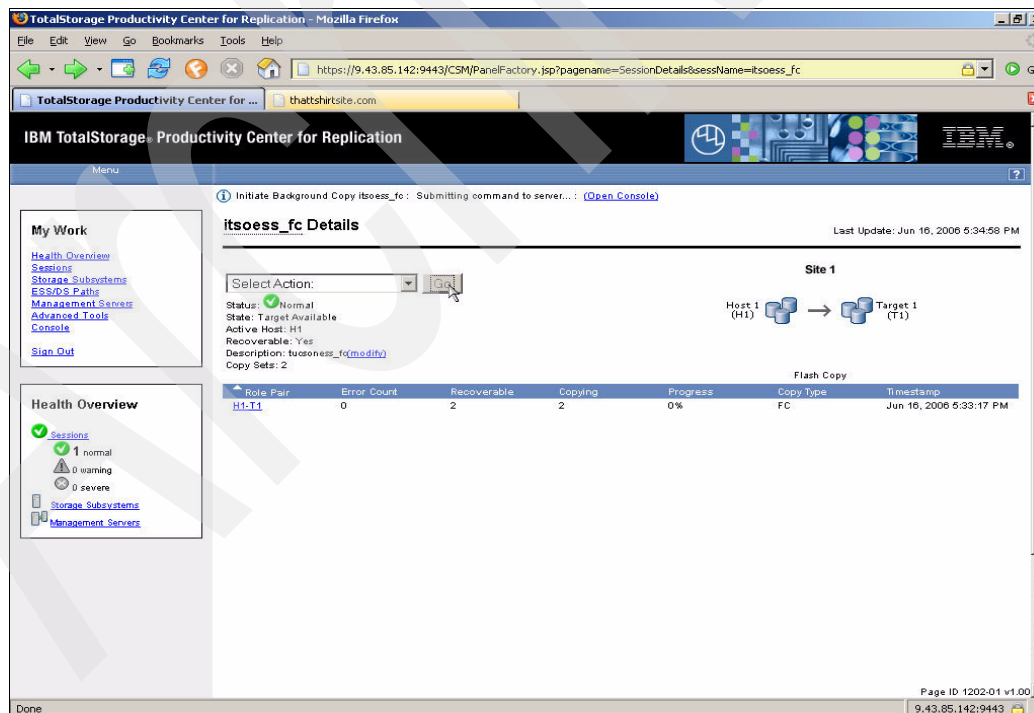


Figure 5-96 Initiate Background copy

After a brief moment we can once again check on the FlashCopy progress. Select the View Progress from the drop-down menu. In Figure 5-97 on page 143 we can see that the copy is complete.

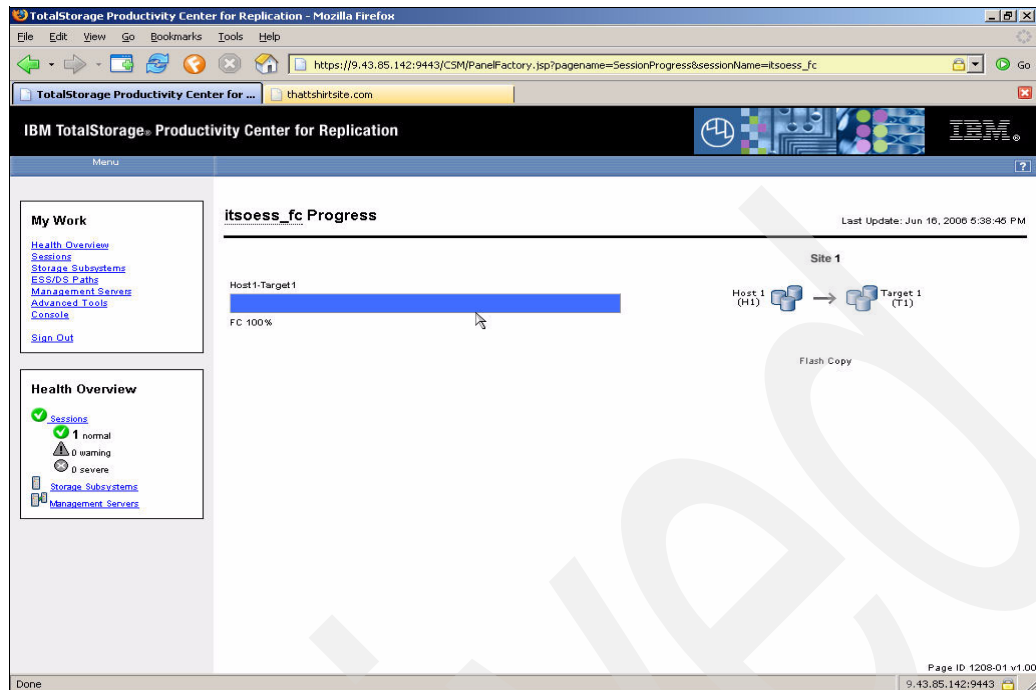


Figure 5-97 FlashCopy progress complete

Upon returning to the Sessions panel we can see that we now have *Target Available* displayed in the *State* column related to our session. This is shown in Figure 5-98.

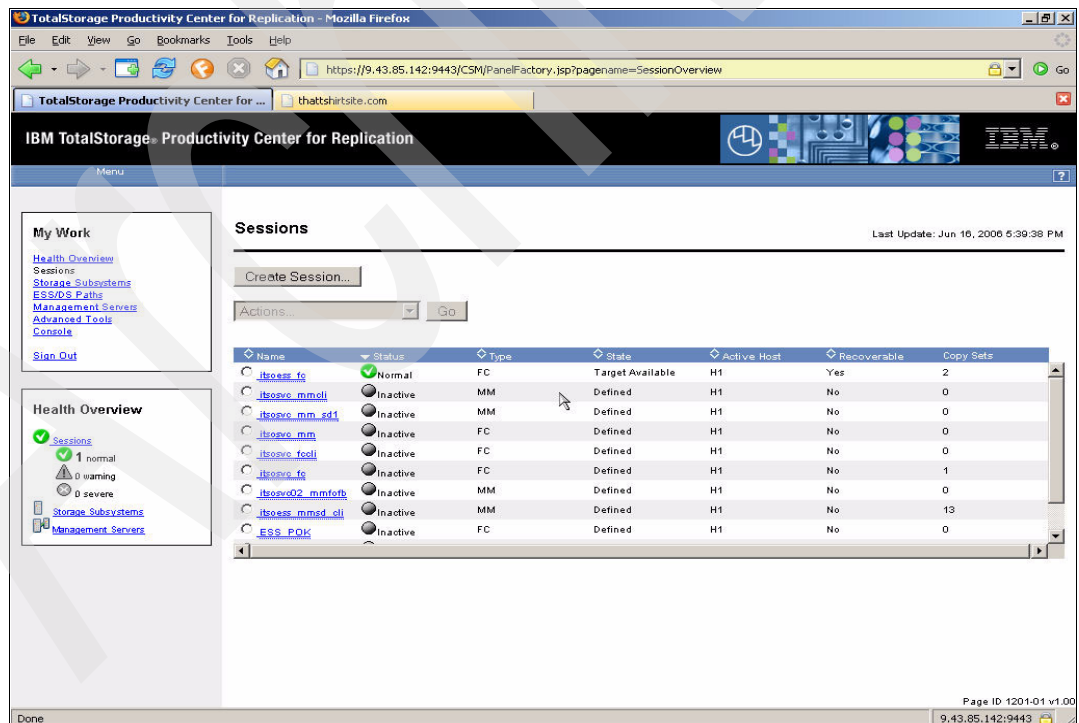


Figure 5-98 FlashCopy Target Available

If after defining a FlashCopy session for an ESS you want to change some of the attributes you simply click the modify hyperlink as Figure 5-99 on page 144 displays.

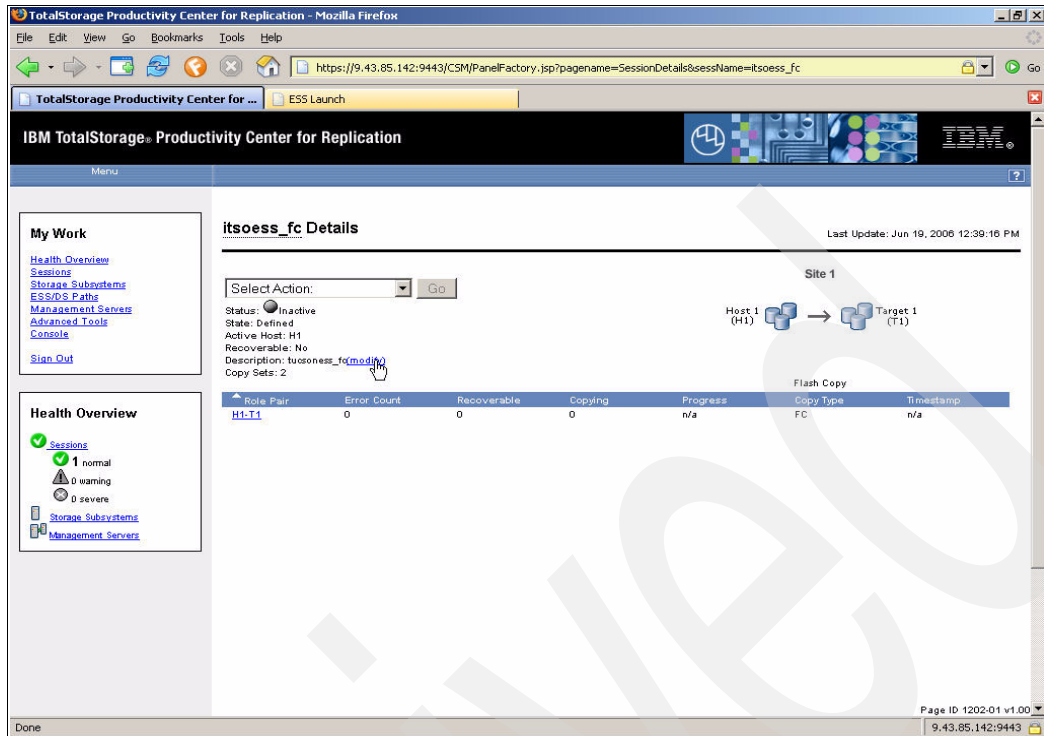


Figure 5-99 Modify FlashCopy session attributes

Figure 5-100 displays the modify properties panel where we modify several attributes.

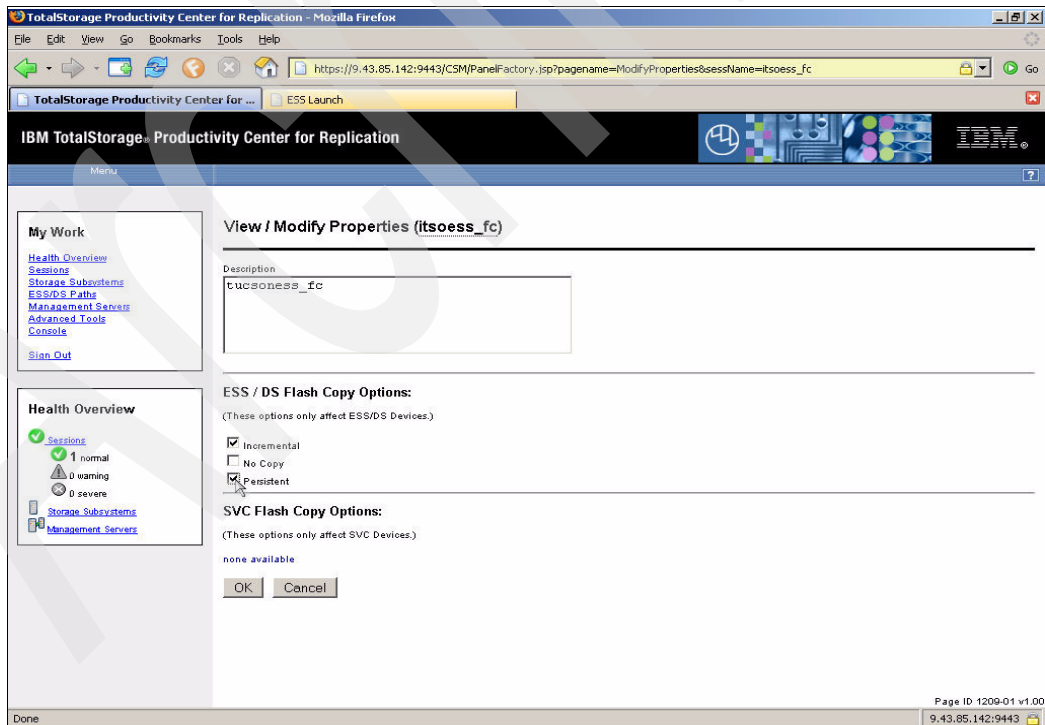


Figure 5-100 Modify FlashCopy session attributes

5.3.11 Managing a FlashCopy session through the CSMCLI

We will use a CSMCLI script to create a FlashCopy session and then add a single copy set to this session. Figure 5-101 contains the script. We have also added a **lspair** command to show the pair attributes.

```
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mksess -ctype fc -desc tucsoness_mm ess_fc_cli
lsess -l
mkcpset -h1 ESS:2105.18596:VOL:140A -t1 ESS:2105.18596:VOL:140B ess_fc_cli
mkcpset -h1 ESS:2105.18596:VOL:140C -t1 ESS:2105.18596:VOL:140D ess_fc_cli
lscpsess ess_fc_cli
lspair -l -rolepair h1-t1 ess_fc_cli
```

Figure 5-101 The *ess_fc* script

The output produced from the execution of the script is shown in Example 5-7.

Example 5-7 *ess_fc* script output

```
C:\CSM-CLI>csmdi -script c:\csm-cli\ess_fc.txt
IWNR1021I [Jun 20, 2006 3:34:46 PM] Session ess_fc_cli was successfully created.
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
itsoess_mmsd_cli	Inactive	Defined	Metro Mirror Single Direction	No	No	13	No
itsovc_mm_sd1	Inactive	Defined	Metro Mirror Single Direction	No	No	0	No
itsovc_mm	Inactive	Defined	Flash Copy	No	No	0	No
ess_fc_cli	Inactive	Defined	Flash Copy	No	No	0	No
itsovc02_mmfb	Inactive	Defined	Metro Mirror Failover/Failback	No	No	1	No
ESS_POK	Inactive	Defined	Flash Copy	No	No	0	No
itsovc_mmccli	Inactive	Defined	Metro Mirror Single Direction	No	No	0	No
itsoess_fc	Inactive	Defined	Flash Copy	No	No	0	No
itsovc_fccli	Inactive	Defined	Flash Copy	No	No	0	No
ess_gmfb	Inactive	Defined	Global Mirror Failover/Failback	No	No	3	No
itsovc_fc	Inactive	Defined	Flash Copy	No	No	1	No
ess_mmfb	Inactive	Defined	Metro Mirror Failover/Failback	No	No	6	No

```
IWNR2001I [Jun 20, 2006 3:34:47 PM] The pair was successfully created in session
ess_fc_cli for copy set ESS:2105.18596:VOL:140A with source ESS:2105.18596:VOL:
140A and target ESS:2105.18596:VOL:140B.
IWNR2001I [Jun 20, 2006 3:34:48 PM] The pair was successfully created in session
ess_fc_cli for copy set ESS:2105.18596:VOL:140C with source ESS:2105.18596:VOL:
140C and target ESS:2105.18596:VOL:140D.
H1 Volume          Session      Volumes
=====
ESS:2105.18596:VOL:140A ess_fc_cli      2
ESS:2105.18596:VOL:140C ess_fc_cli      2
Source volume      Target volume      RolePair State   Recoverable Copying New Copy set
Timestamp Last result
=====
ESS:2105.18596:VOL:140A ESS:2105.18596:VOL:140B H1-T1   Defined No       No   Yes ESS:2105.18596:VOL:140A n/a
IWNR2001I
ESS:2105.18596:VOL:140C ESS:2105.18596:VOL:140D H1-T1   Defined No       No   Yes ESS:2105.18596:VOL:140C n/a
IWNR2001I
C:\CSM-CLI>
```

Figure 5-102 on page 146 displays a brief script which issues the FlashCopy command to start the actual FlashCopies.

```
#
# This is a CSMCLI script file
# Using List commands to interrogate TPC 4 R
#
setoutput -fmt stanza -v on
cmdsess -quiet -action flash ess_fc_cli
lsess -fmt stanza ess_fc_cli
```

Figure 5-102 Session start

Example 5-8 displays the results from executing the script in Figure 5-102.

Example 5-8 FlashCopy Script output

```
C:\CSM-CLI>csmdi -script c:\csm-cli\startsess.txt
IWNRI026I [Jun 20, 2006 3:44:45 PM] The runCommand for command Flash in session
ess_fc_cli completed successfully.
Name      ess_fc_cli
Status    Normal
State     Target Available
Copy type Flash Copy

C:\CSM-CLI>
```

After some time we check the session again. Example 5-9 shows that the FlashCopy target volumes are now ready for use.

Example 5-9 FC status

```
C:\CSM-CLI>csmdi lsess -l -fmt stanza ess_fc_cli
Name      ess_fc_cli
Status    Normal
State     Target Available
Copy type Flash Copy
Recoverable Yes
Copying   No
Copy sets 2
Error     No

C:\CSM-CLI>
```

Example 5-10 shows an example of how to terminate the FlashCopy relationships.

Example 5-10 Terminate FlashCopy relationships

```
C:\CSM-CLI>csmdi cmdsess -quiet -action terminate ess_fc_cli
IWNRI026I [Jun 20, 2006 4:11:47 PM] The runCommand for command Terminate in session
ess_fc_cli completed successfully.

C:\CSM-CLI>csmdi lsess -l -fmt stanza ess_fc_cli
Name      ess_fc_cli
Status    Inactive
State     Defined
Copy type Flash Copy
Recoverable No
Copying   No
Copy sets 2
Error     No
```

5.3.12 Managing a Metro Mirror session through the GUI

In this scenario we will run through a number of actions against a defined Metro Mirror session. In this case we will use the previously defined session *ess_mmfofb*. This session is defined as a Metro Mirror Failover / Failback copy type. The nature of this copy type is cyclical as Figure 5-103 displays.

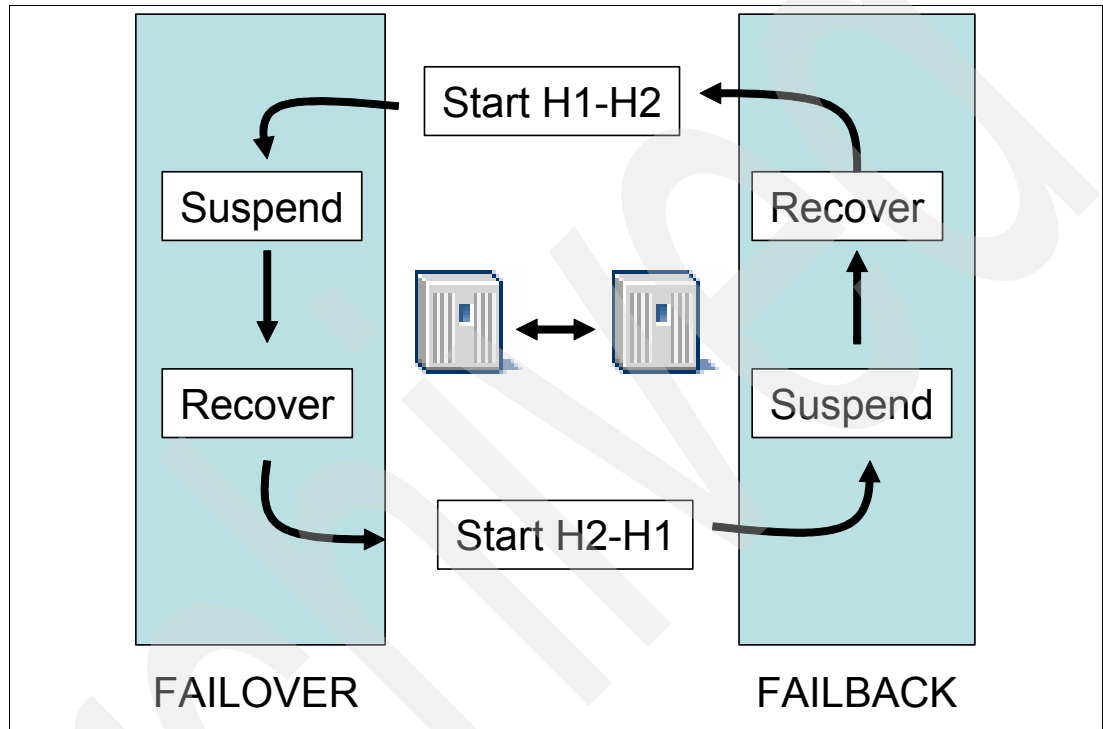


Figure 5-103 Command cycle

As shown in Figure 5-104 on page 148, click the hyperlink of the session name. This will open the properties of the selected session.

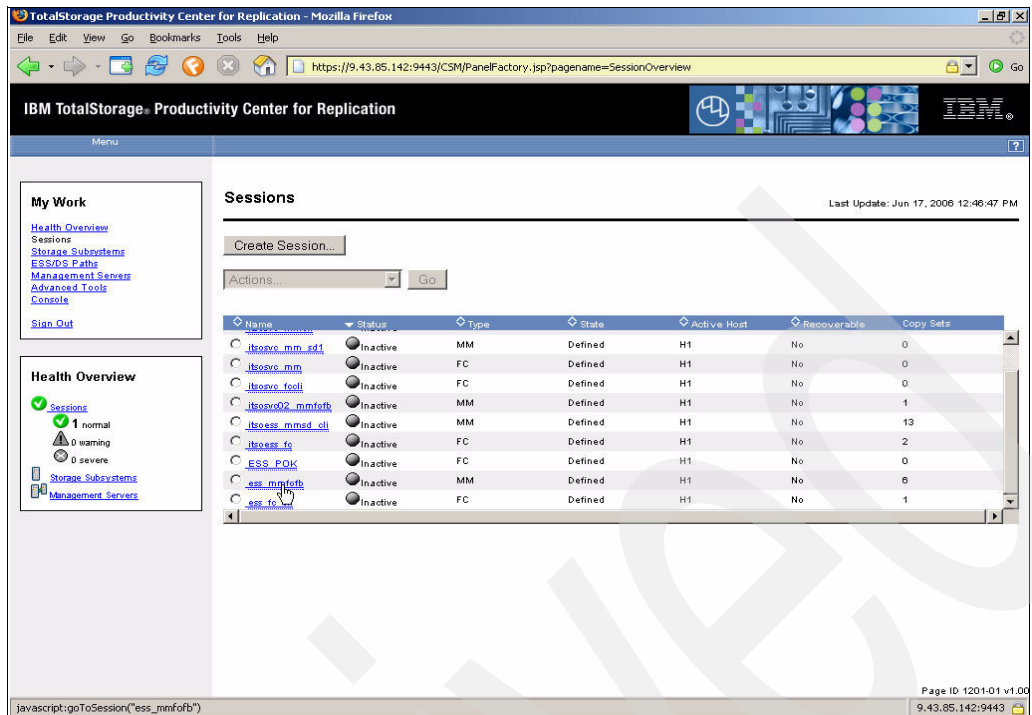


Figure 5-104 Select Metro Mirror session

Figure 5-105 shows a panel which displays the properties of the selected session. Use the drop-down menu to start the session by selecting the **Start H1 - H2** command and then clicking on the **Go** button.

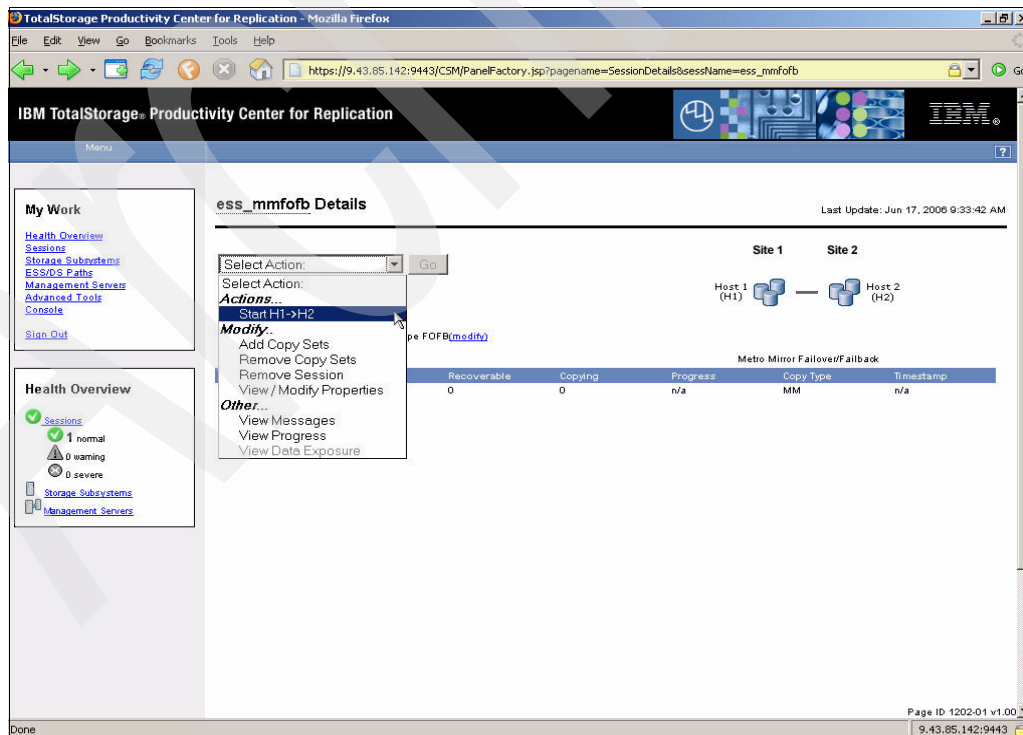


Figure 5-105 Start Metro Mirror Session H1 - H2

Figure 5-106 shows the window which displays shortly after the start command has been issued.

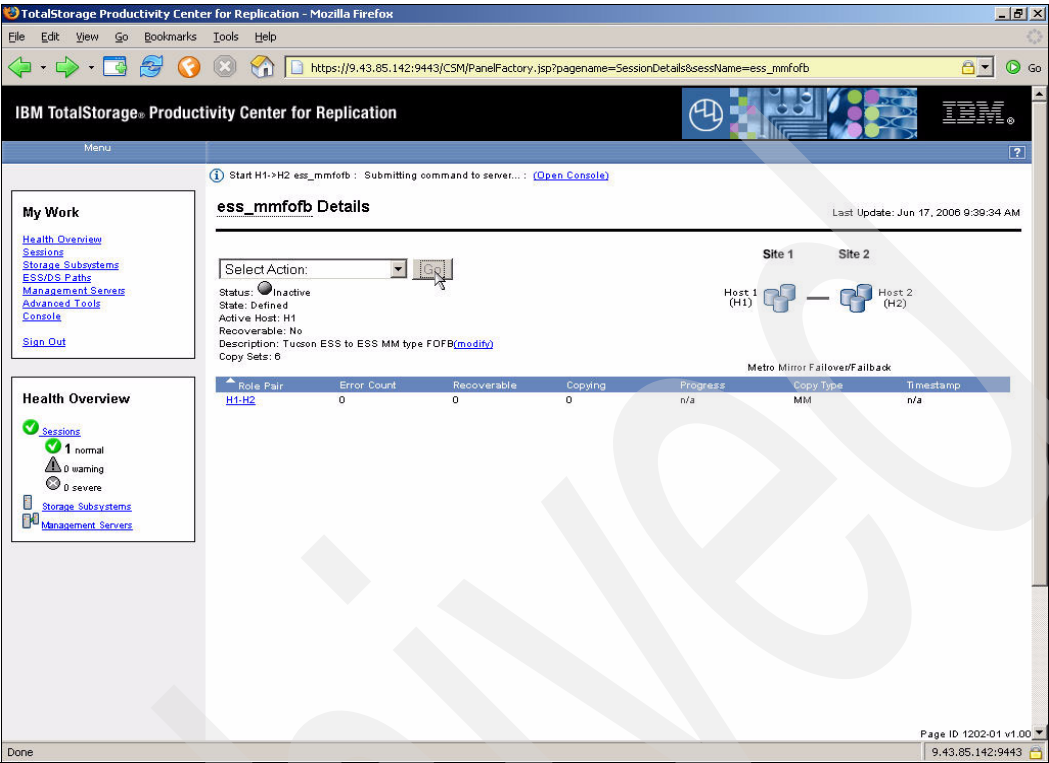


Figure 5-106 Start issued

Figure 5-107 on page 150 shows that the session went into *Warning* state. This is because the copy sets are in the process of synchronization and perform an initial full copy.

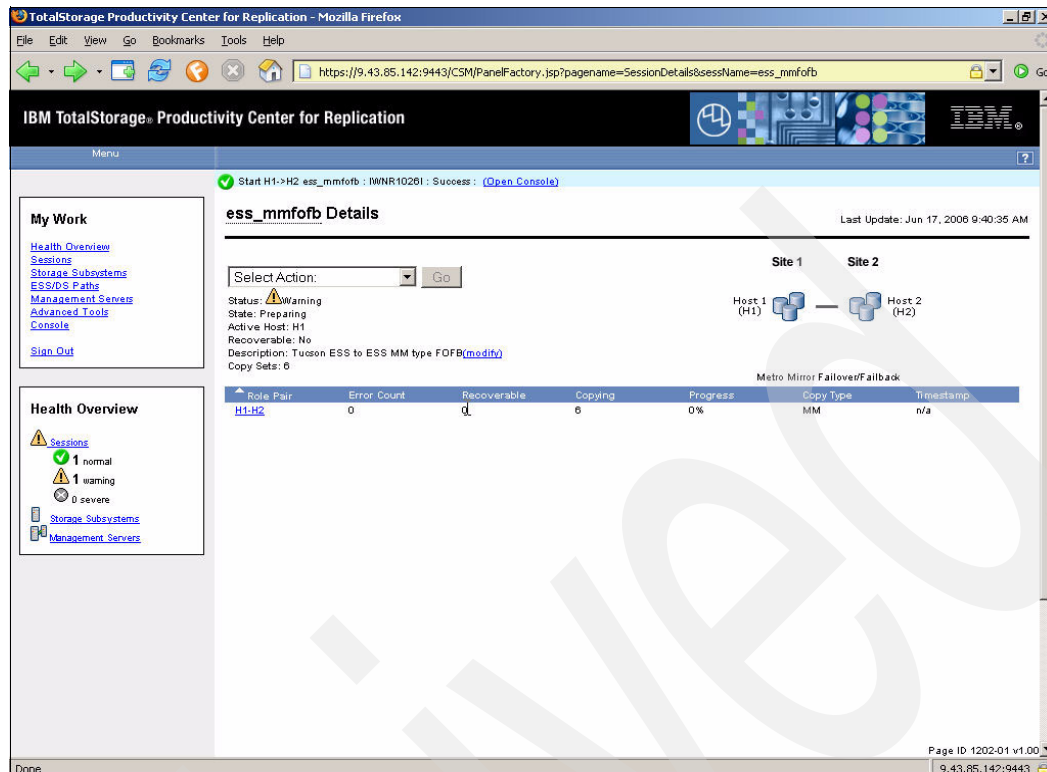


Figure 5-107 Started accepted

We can check on the progress of the synchronization via the **View Progress** command in the panel. Figure 5-108 shows the progress of the initial full copy process.

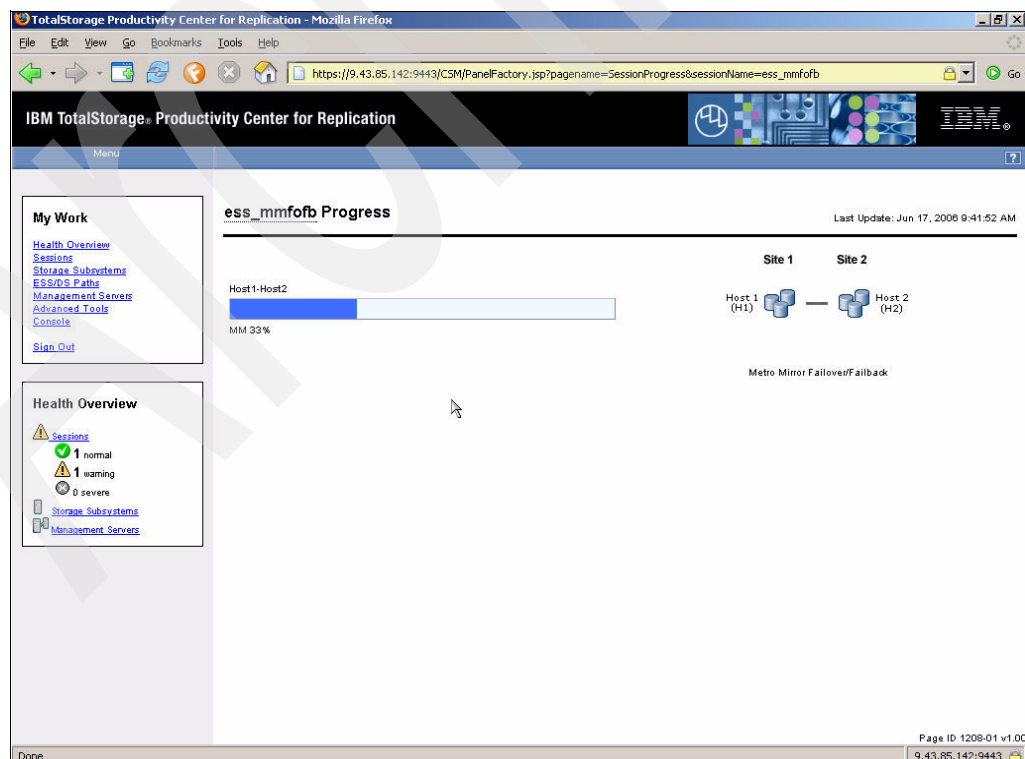


Figure 5-108 Metro Mirror session full initial copy progress

Once all volumes are consistent and synchronized the status will change to green as shown in Figure 5-109.

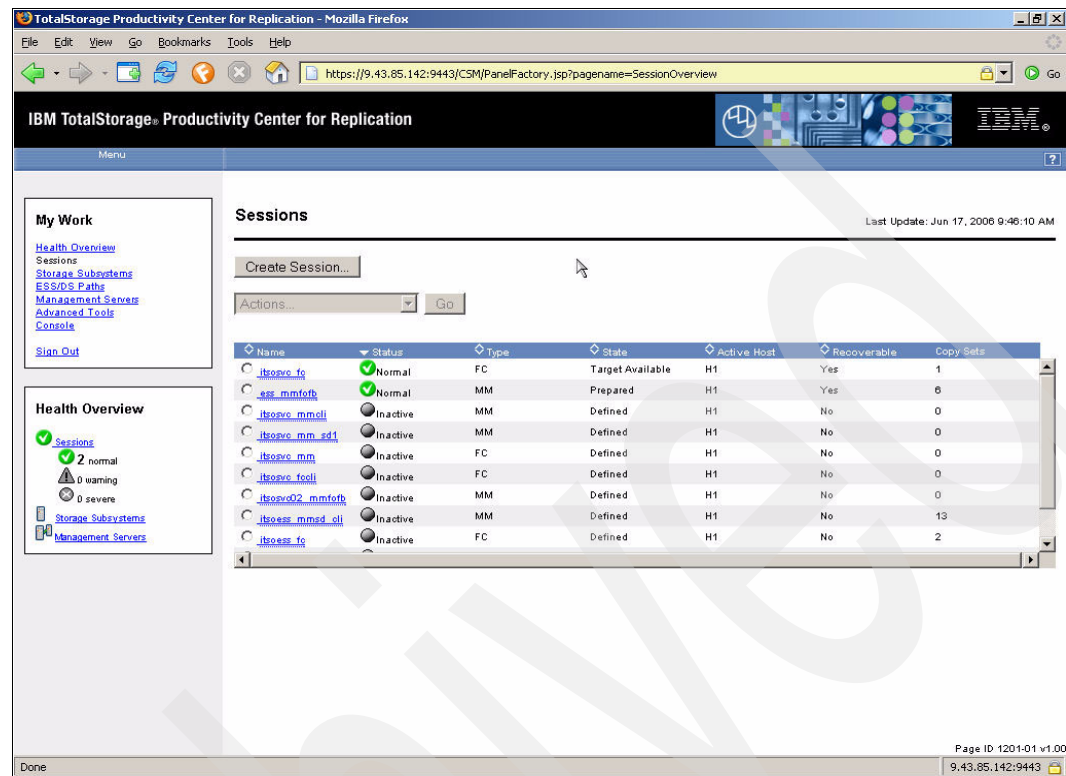


Figure 5-109 Session overview panel

Now that the volumes of the copy sets are synchronized the next command entered is a **suspend** command to begin the failover process. Remember that once the **Suspend** command is issued all host I/O is temporarily halted.

Select the **Suspend** command from the drop-down menu and click the **Go** button as shown in Figure 5-110 on page 152.

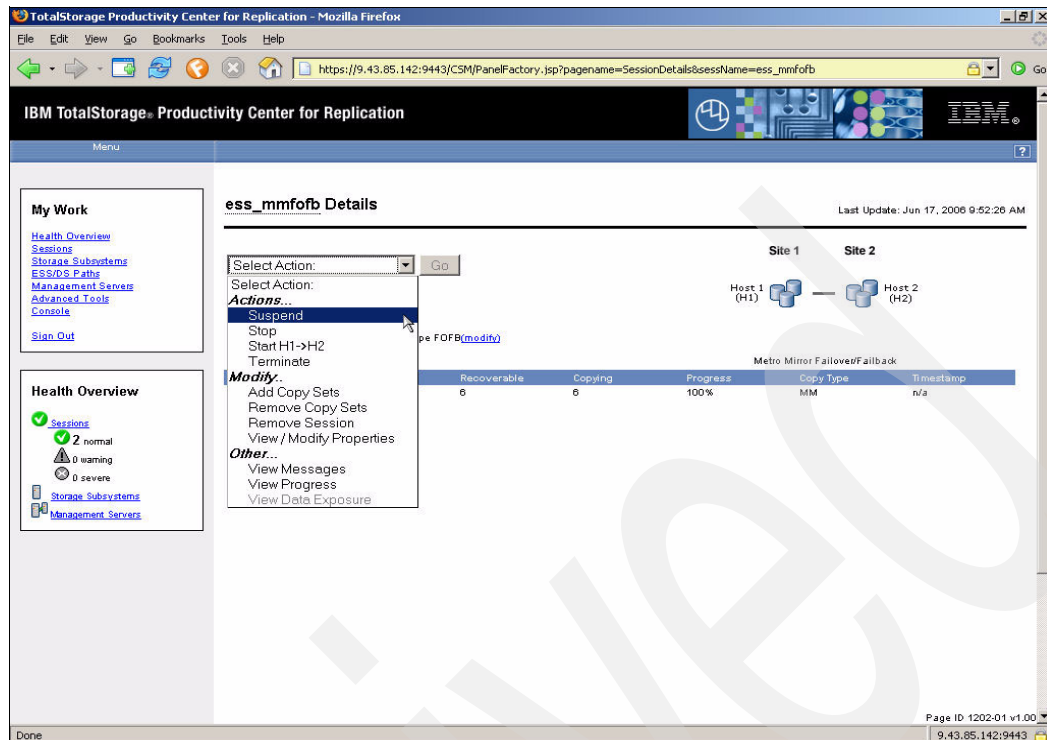


Figure 5-110 Issue Suspend command

Figure 5-111 shows the response to the Suspend command.

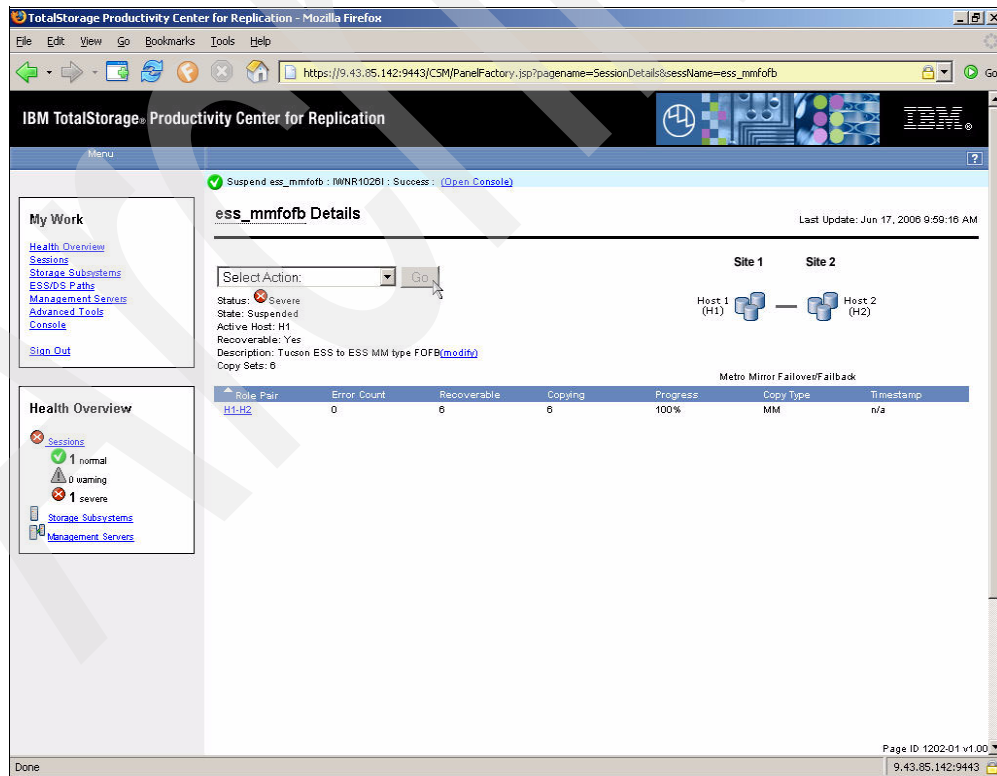


Figure 5-111 Response of Suspend command

By clicking on the Open Console link TPC for Replication will open the console log as shown in Figure 5-112.

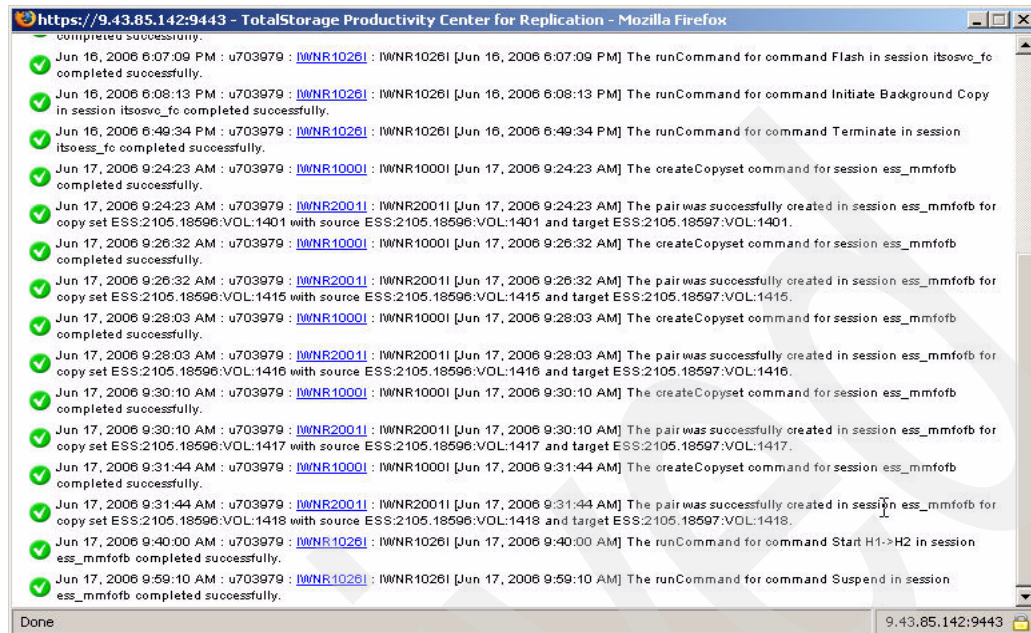


Figure 5-112 Console log displays suspend activities

Once the Suspend command completes successfully and the session is in Suspend state, you need to issue the **recover** command to make the volumes in the copy set available. Select the Recover command from the drop-down menu as shown in Figure 5-113.

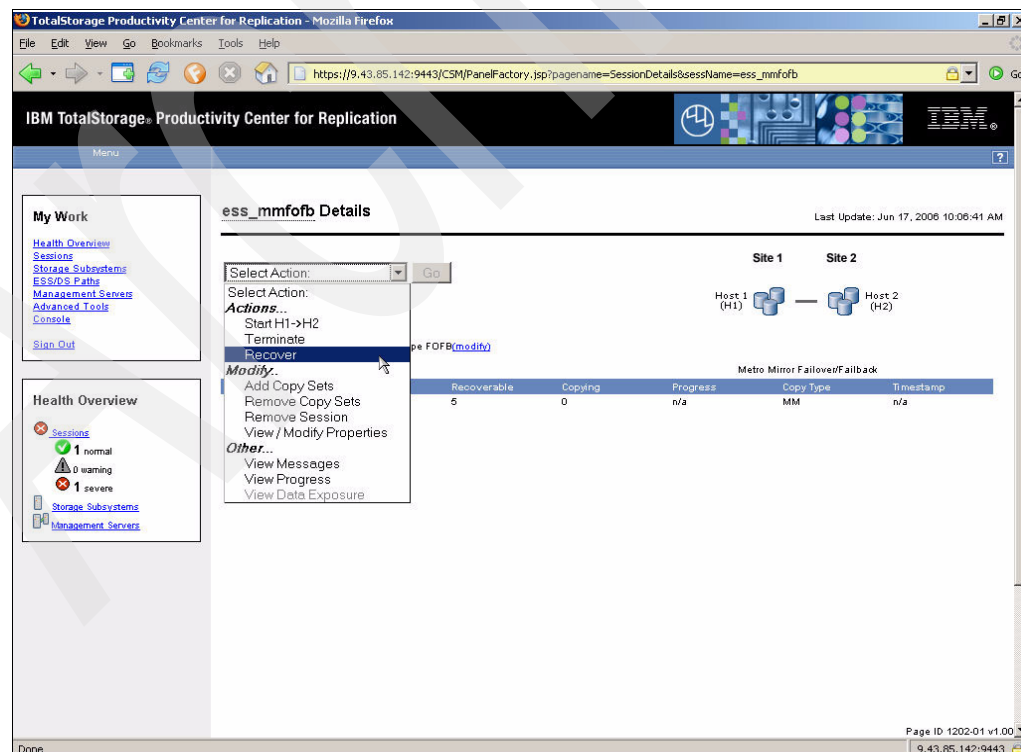


Figure 5-113 Select recover command

The result of the Recover command sets the session status initially to *severe* while the volumes in the copy set are prepared and moved to *Target Available* status. This status (shown in Figure 5-114) will remain until such time as some action is taken to correct the status (for example, restart the session to continue the copy process).

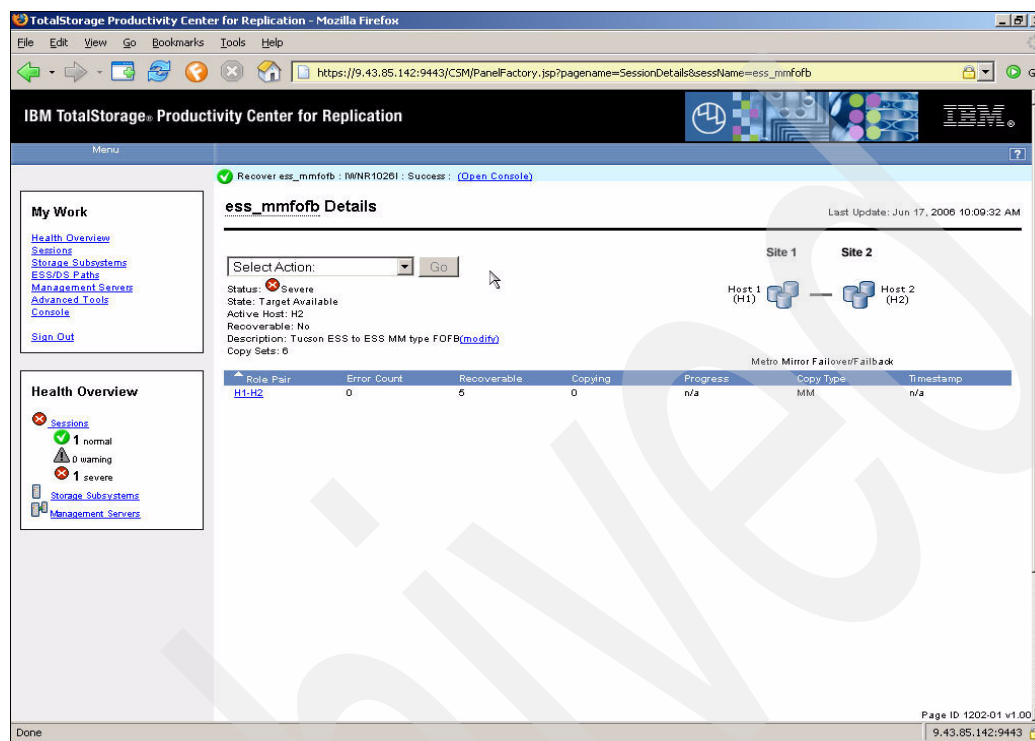


Figure 5-114 Recover status

Figure 5-115 highlights the section from the session panel. We can see that the state is shown as *Target Available*. Either the H1 or the H2 volumes could now be used by a server at this point.

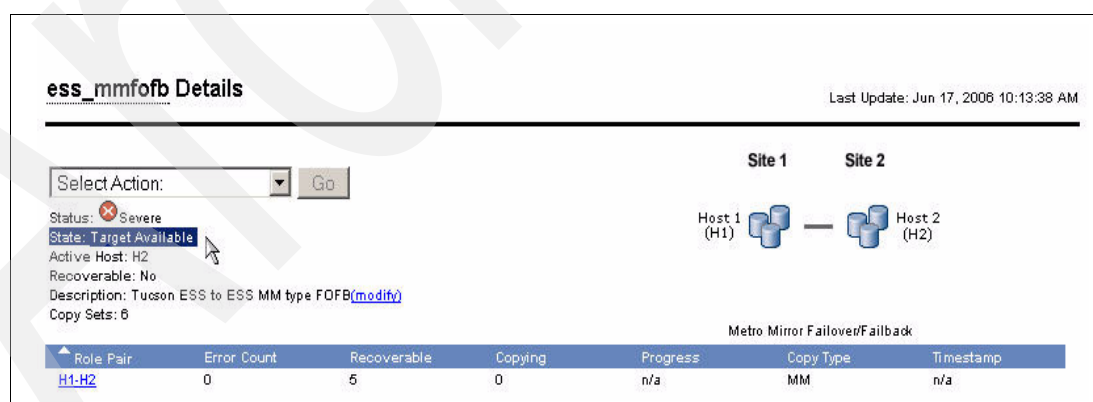


Figure 5-115 Target Available

Now we can start with the Failback scenario. In the real world some period of time has elapsed since the failover so there could be significant differences between the H1 and H2 volumes in the copy set. Because of this, the time to complete the re-synchronization could take longer than in our scenario. The failback is started by using the **Start H2-H1** command shown in Figure 5-116 on page 155.

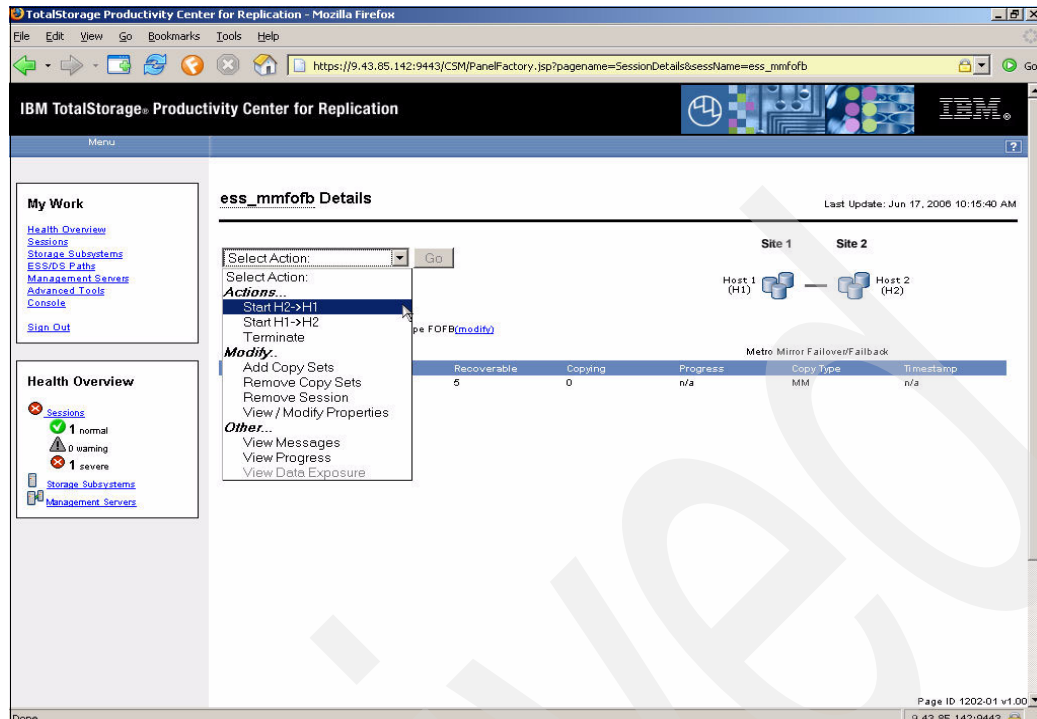


Figure 5-116 Failback scenario

We can see in Figure 5-117 that after issuing the **Start H2-H1** command the copy state changes to *Preparing* and the status to *Warning* as indicated by a yellow triangle.

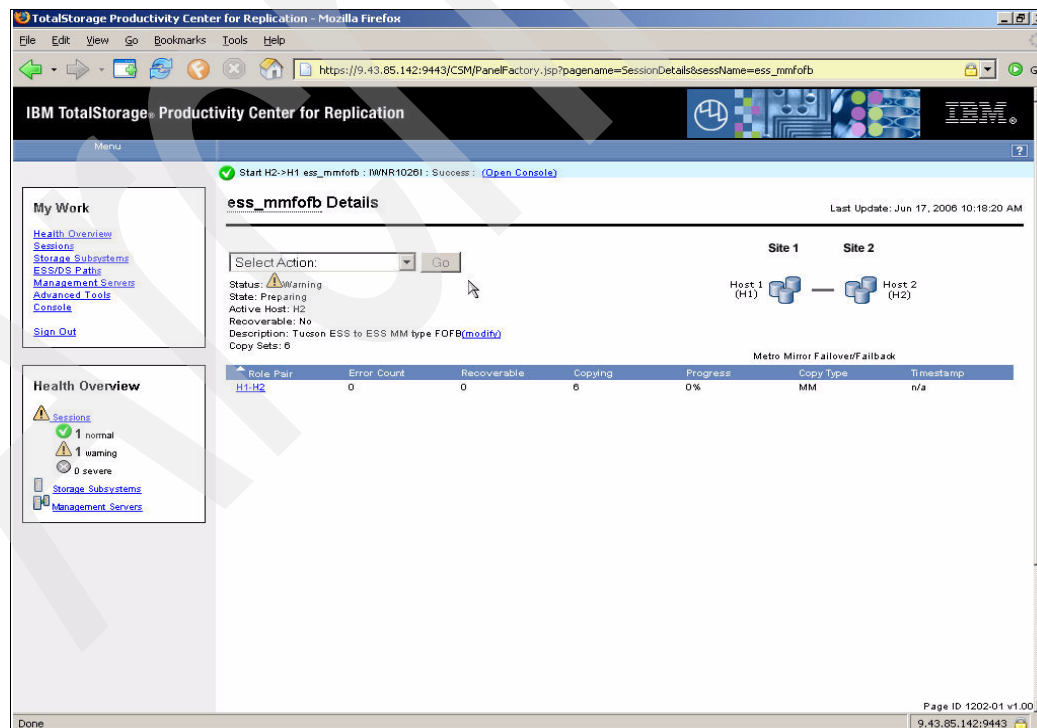


Figure 5-117 Failback status

After some time the data on the volumes within the copy set should be synchronized and the state will change to *Prepared* as shown in Figure 5-118.

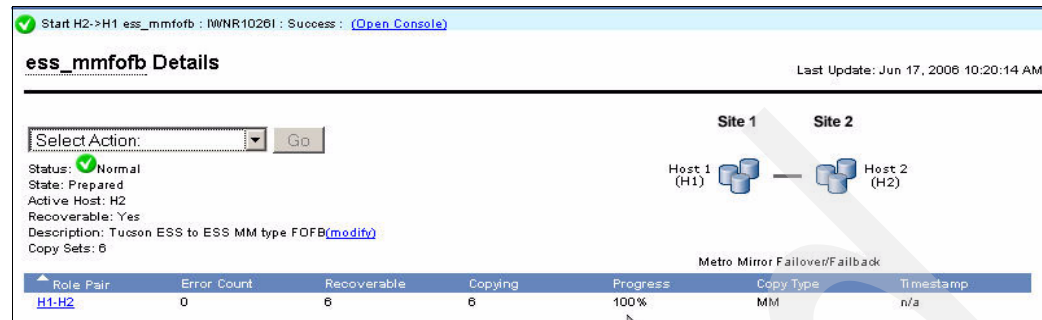


Figure 5-118 Volumes Prepared again

Since the data is now in a consistent state on the source and target volumes you can suspend the copy set by issuing the **Suspend** command as shown in Figure 5-119.

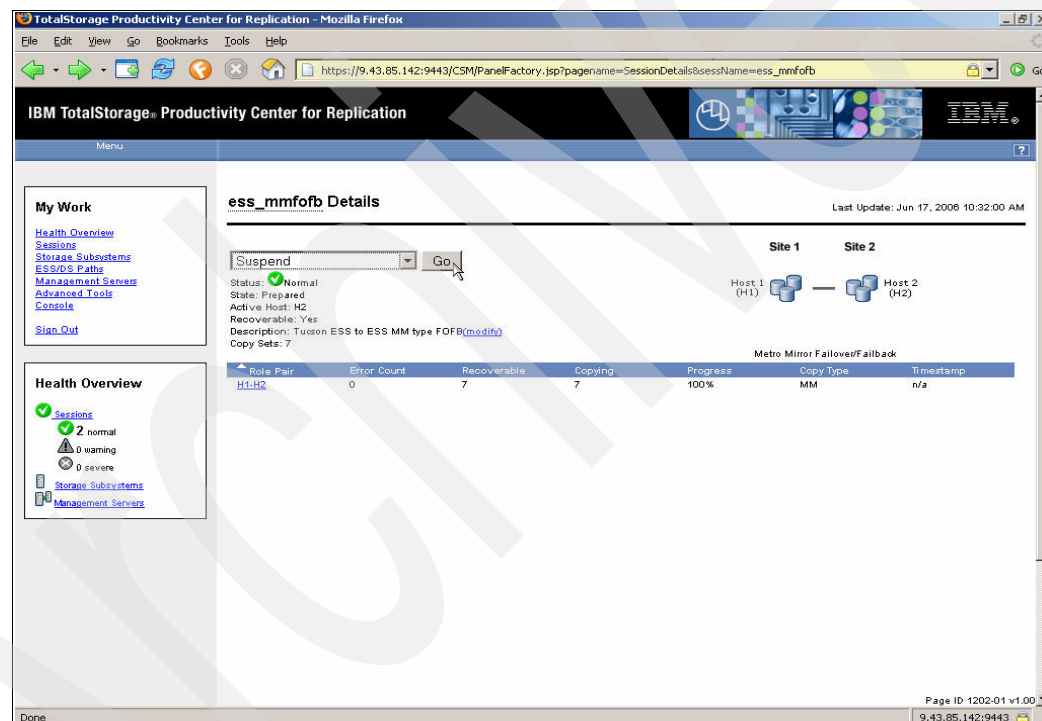


Figure 5-119 Failover Suspend

Once the session and its associated copy sets have been suspended the status once again changes to *Severe* as indicated by a red circle with a white cross. This is shown in Figure 5-120 on page 157.

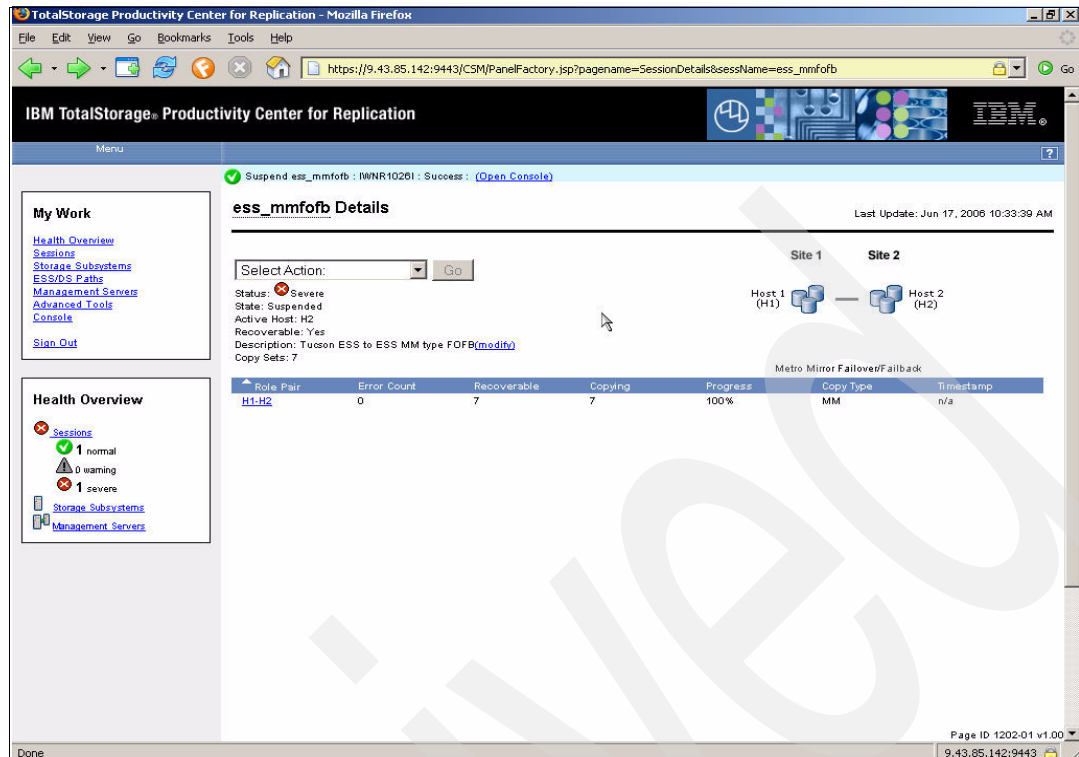


Figure 5-120 Suspend status

Next we can issue the **Recover** command. The window in Figure 5-121 shows the initial command result.

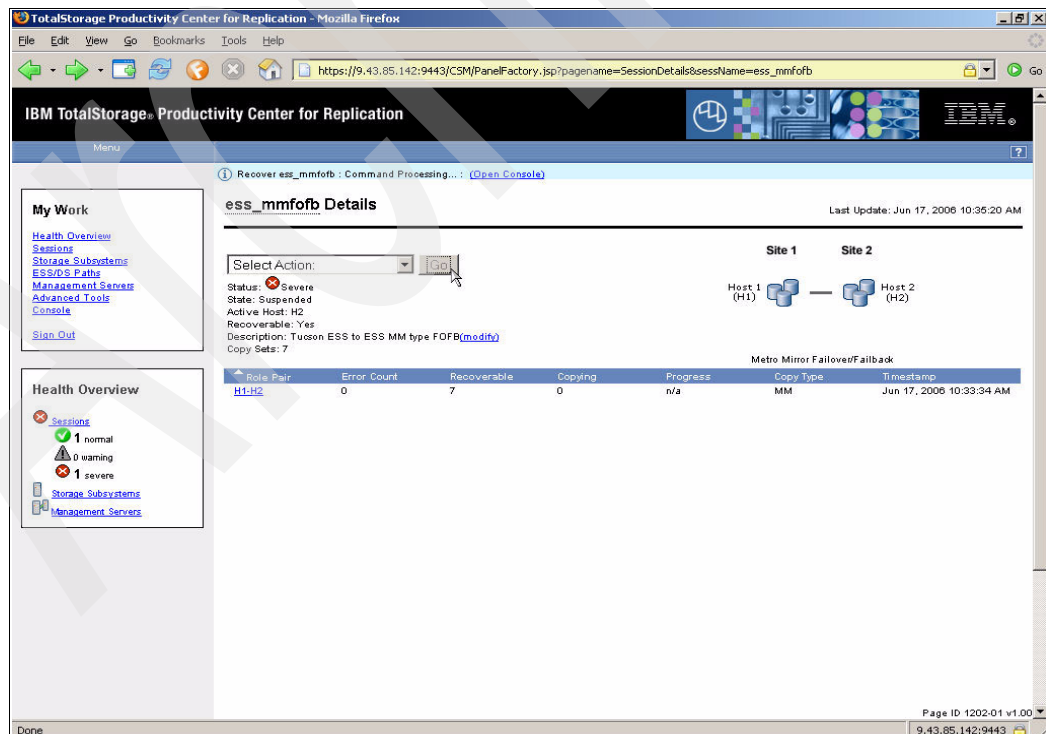


Figure 5-121 Recover status

Some time later the volumes in the copy set are ready and the session status changes to Normal. At this point the Failback action is complete. We can now restart the session in the original direction as shown in Figure 5-122.

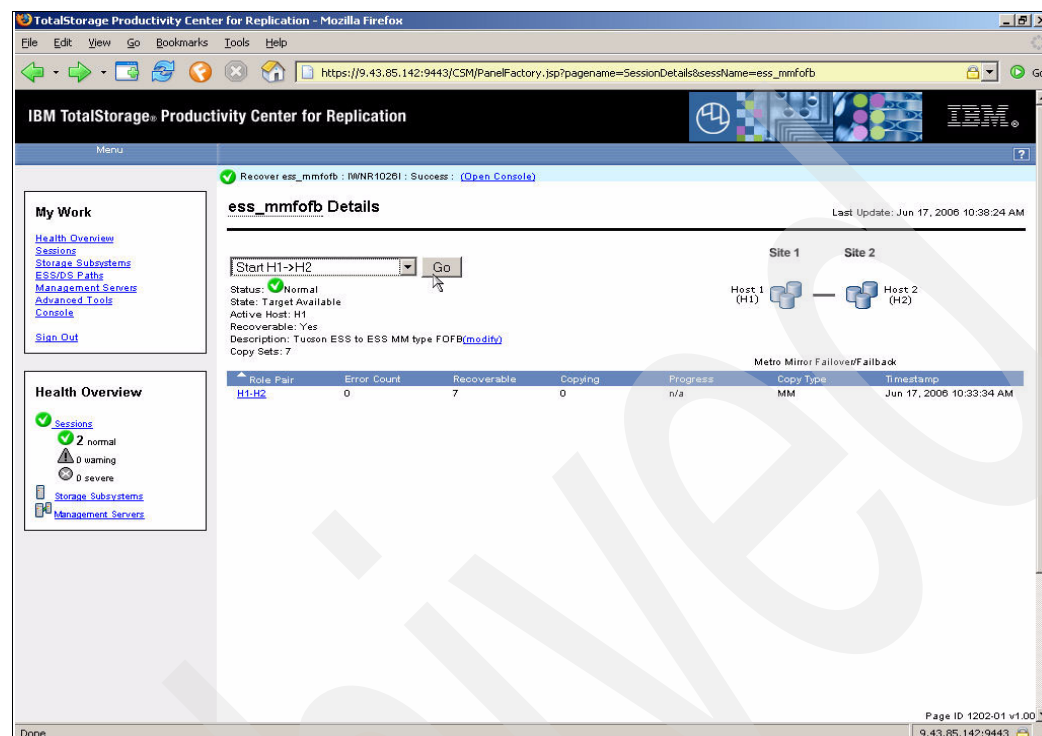


Figure 5-122 Recover complete

Figure 5-123 on page 159 shows the result of the successful Start command. Note that the session status shows *Normal* and the copy set state is *Prepared*.

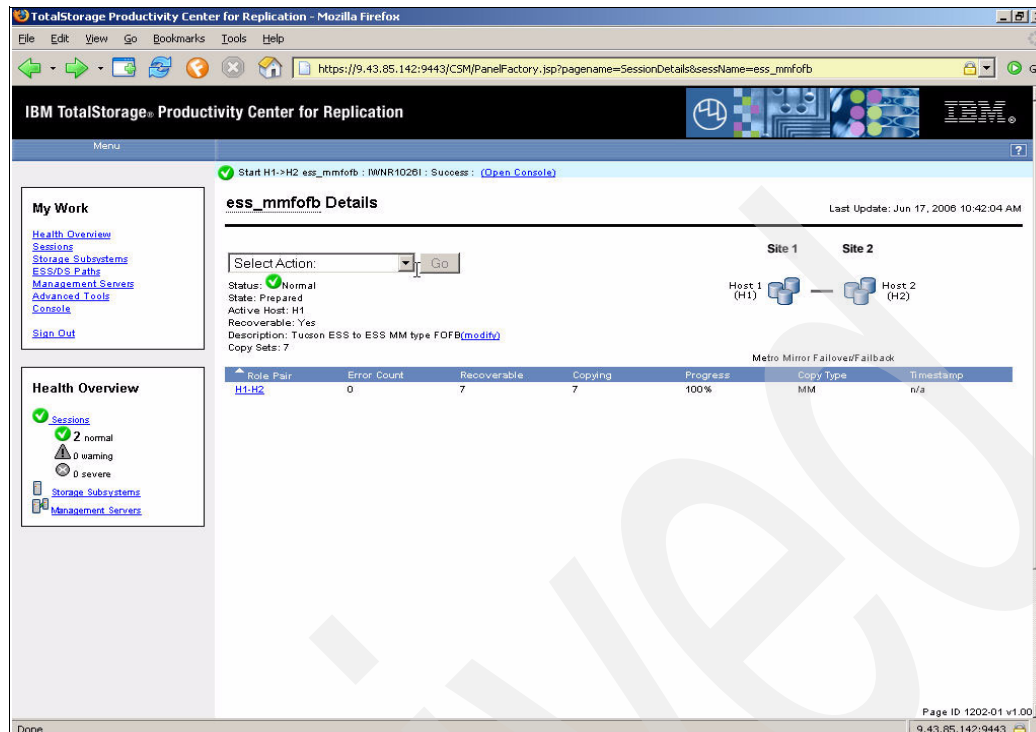


Figure 5-123 Start H1 - H2

Next we go through the process of stopping the session as part of clean up activities. Figure 5-124 shows the selection of the **Stop** command from the drop-down menu.

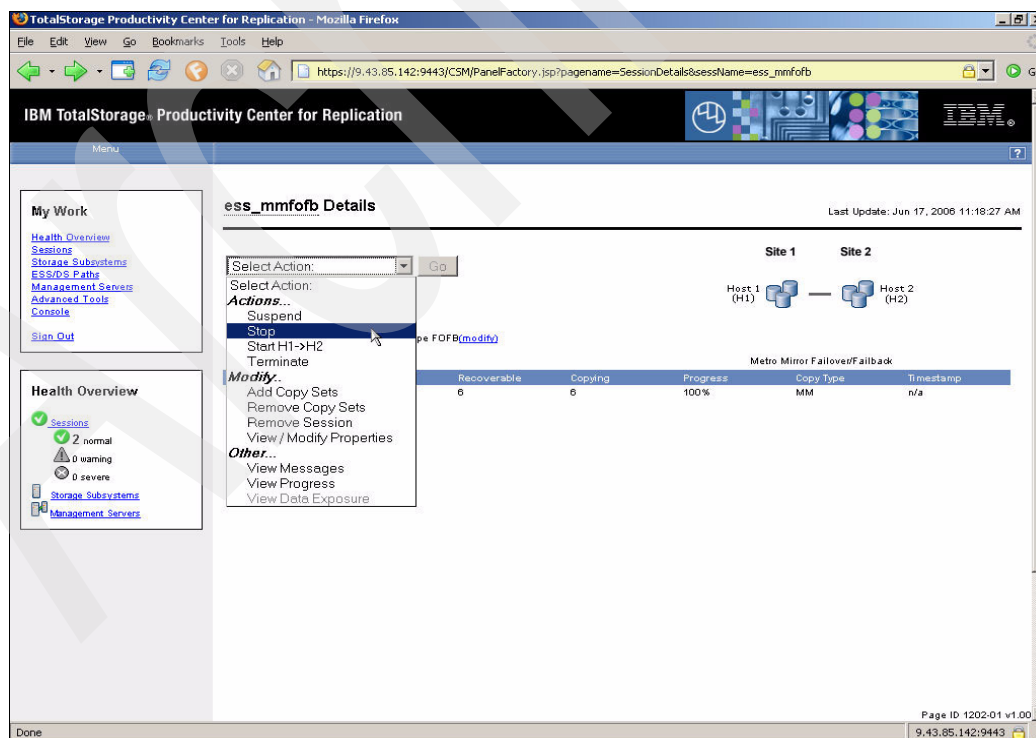


Figure 5-124 Stop Session selection

The Stop command suspends the session but does not do it in a data consistent manner. We can see in Figure 5-125 that the copy set state is suspended.

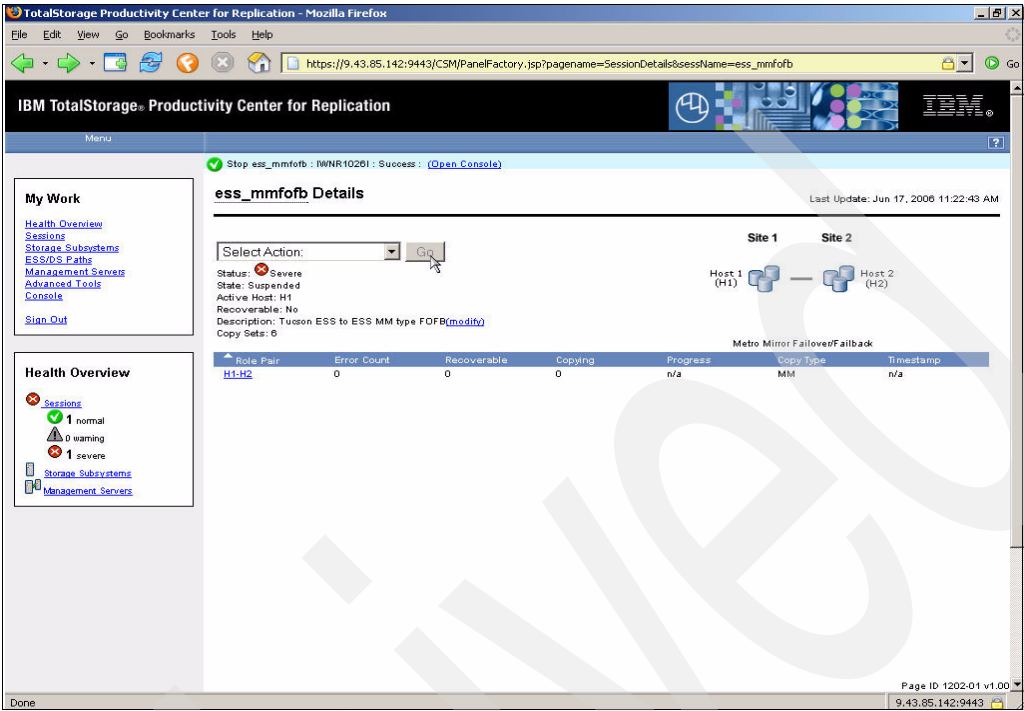


Figure 5-125 Stop Status

Next we use the **Terminate** command as Figure 5-126 shows to remove the session from the ESS. Remember that at the completion of this action only the source or H1 volumes in the copy set are in a usable state.

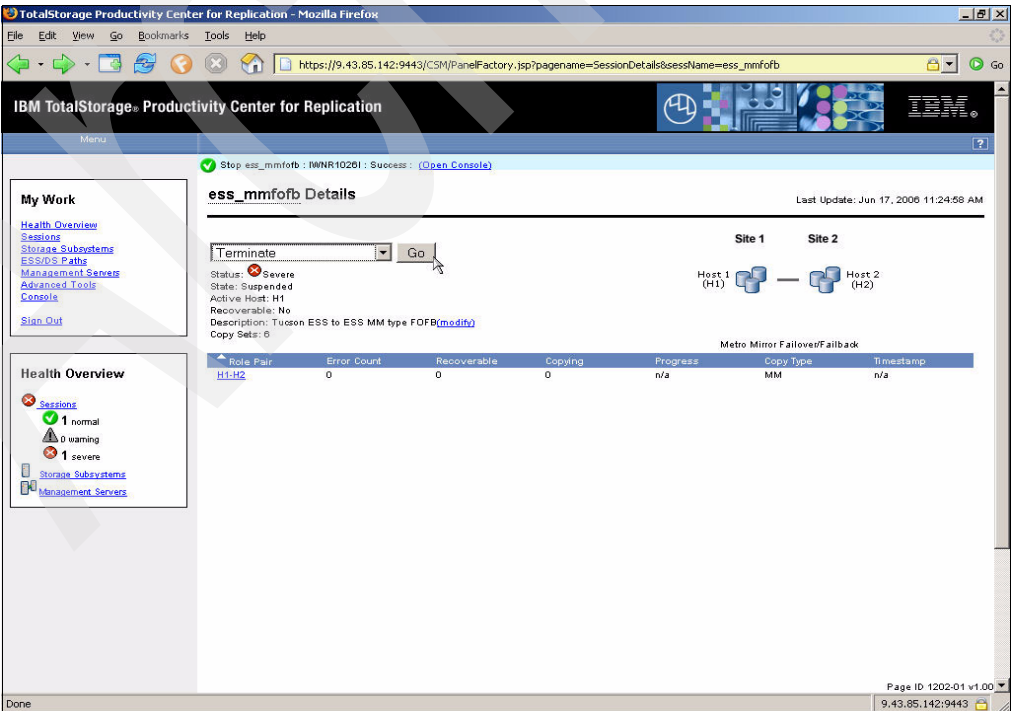


Figure 5-126 Stop complete

Once the clean up has been completed between TPC for Replication and the ESS devices the session will change to *Inactive* as we can see in Figure 5-127.

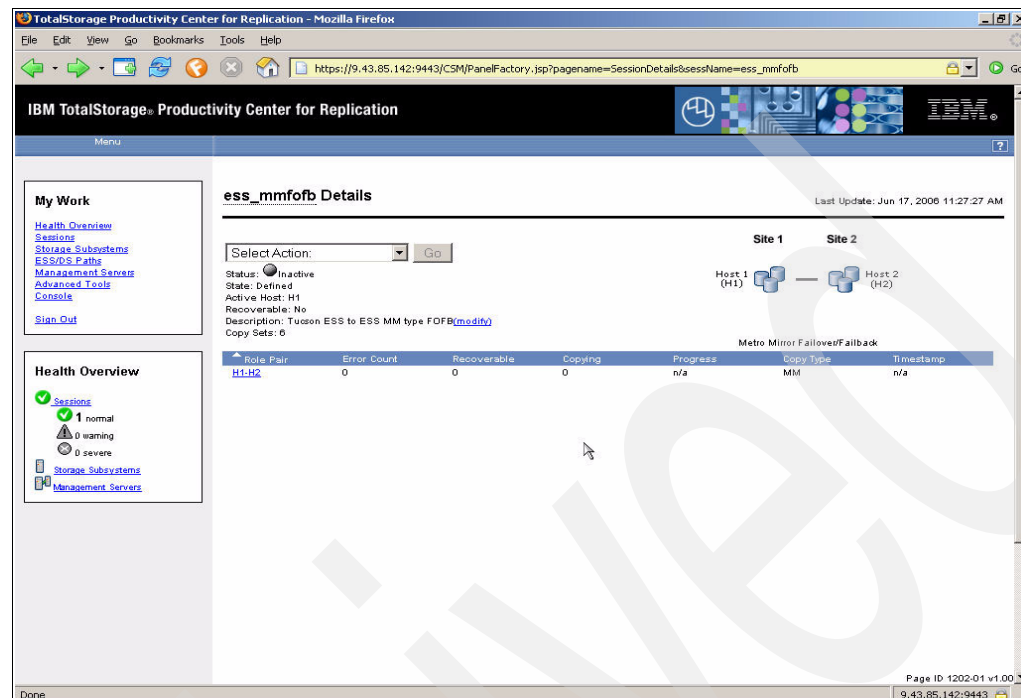


Figure 5-127 Session status Inactive

Next we can remove the copy sets from the session. Select Remove Copy Sets from the drop-down menu and then click the Go button as shown in Figure 5-128.

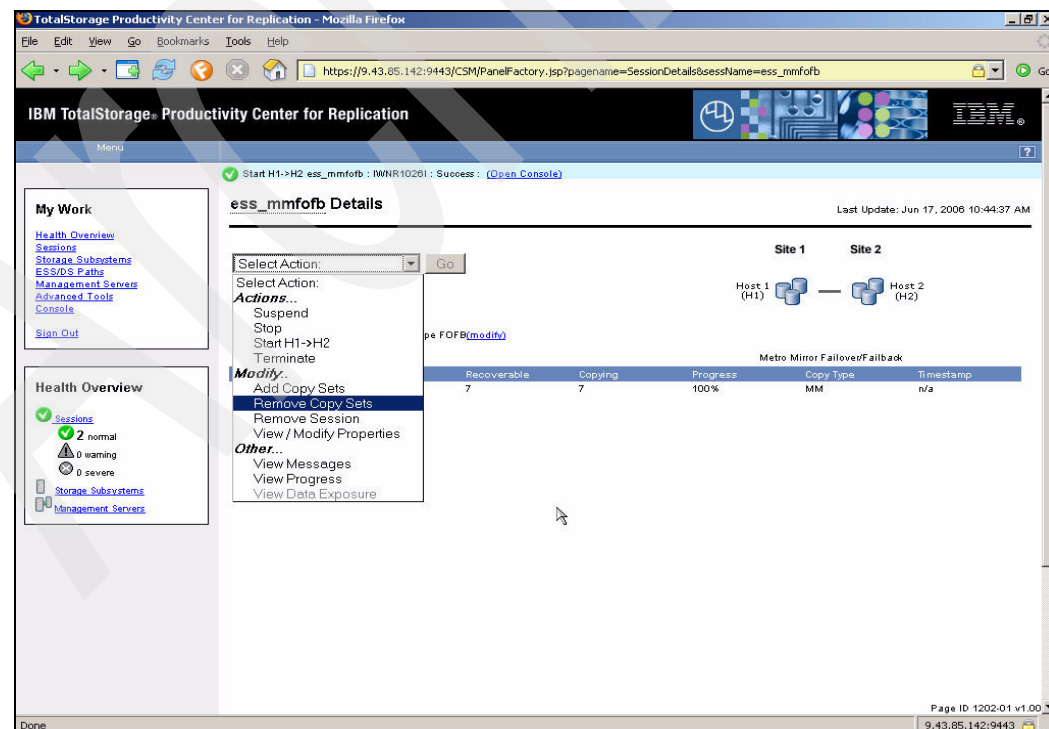


Figure 5-128 Remove Copy set

The Remove Copy Set command will spawn an additional window where the actual volumes to be removed can be selected as shown in Figure 5-129. Select the required storage subsystem, LSS and volume id and click the **Next** button.

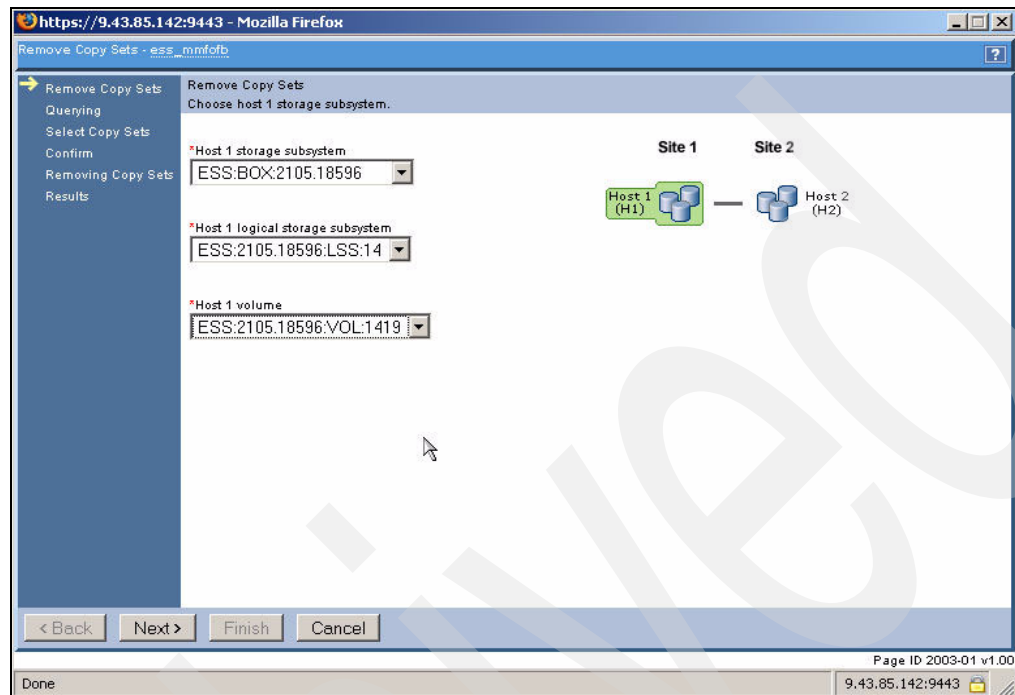


Figure 5-129 Remove Copy set window

The next window presented is shown in Figure 5-130. At this point TPC for Replication is obtaining the relevant information from its database.

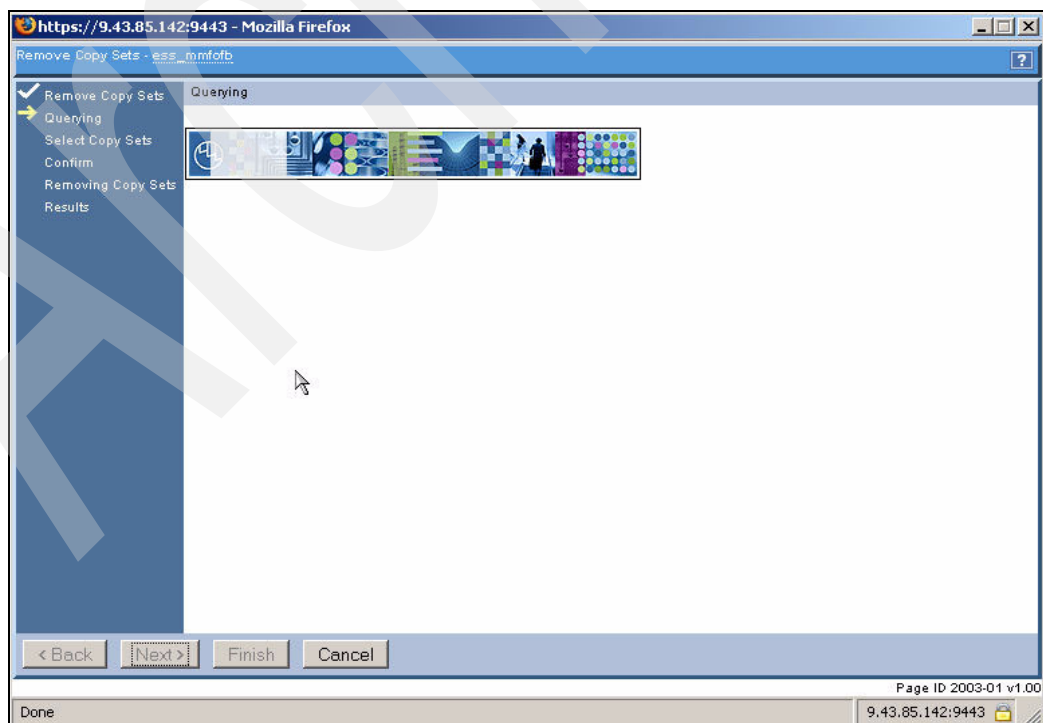


Figure 5-130 Remove Query

In Figure 5-131 we see the volumes participating in the copy set. It is at this point that you confirm the removal of this copy set. Click the **Next** button to continue.

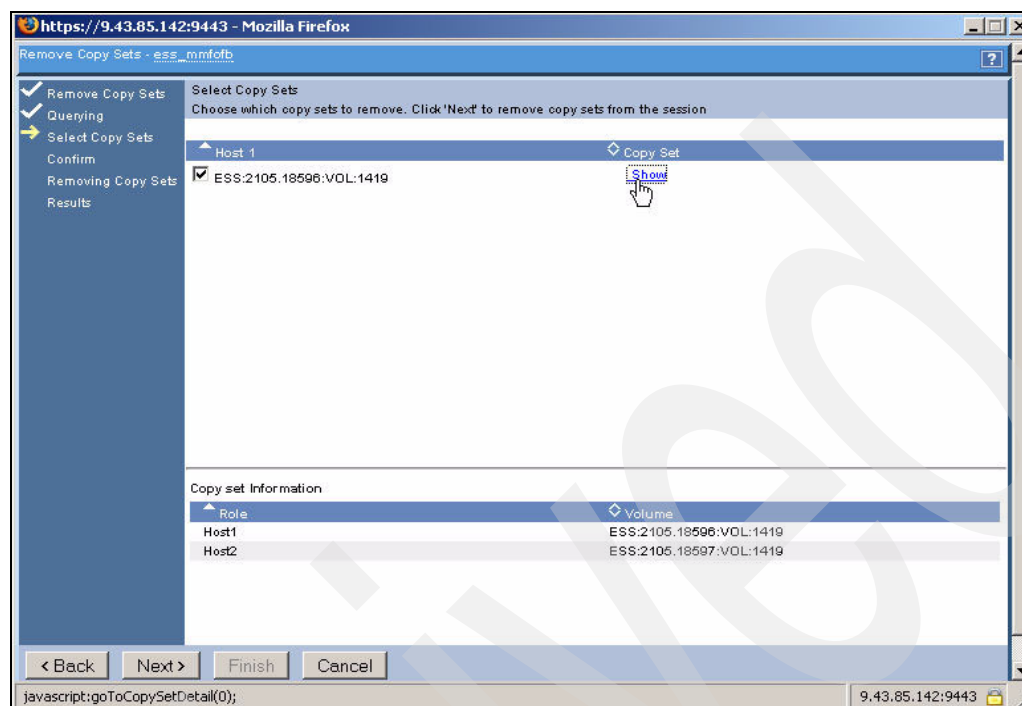


Figure 5-131 Copy Set check

As a next step in this process you have to decide about how to remove the copy sets. Figure 5-132 on page 164 displays the Force option to remove the copy set or remove the copy sets without Force.

Use the Force option as a last resort since it does not clean up the volume pairings in the copy set at the hardware layer. It just removes the copy set from the TPC for Replication database. Select the **No** radio button and click the **Next** button to continue.

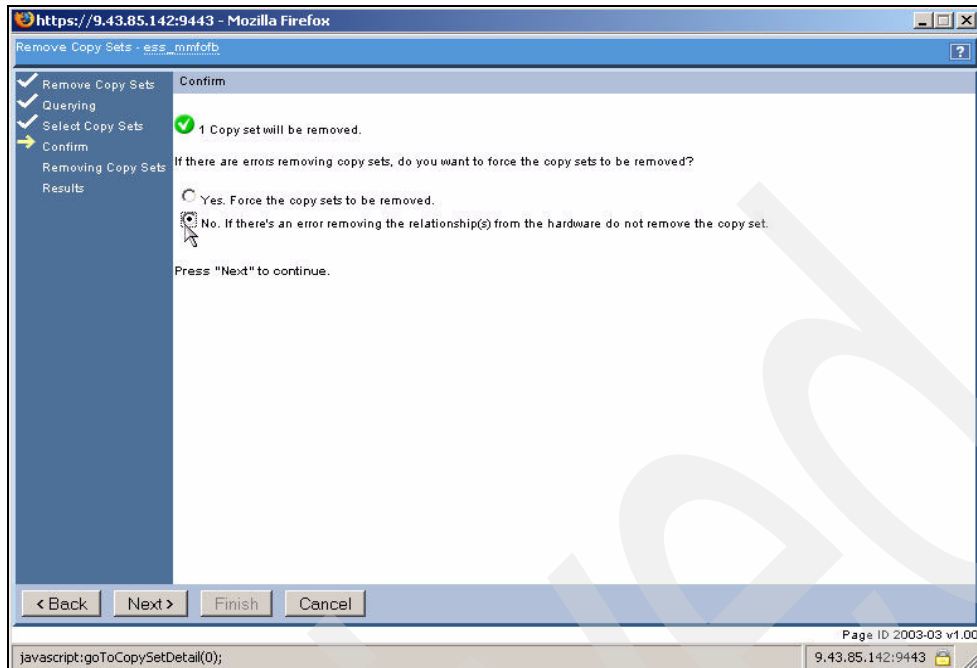


Figure 5-132 Force option

Figure 5-133 shows the removal progress. This is displayed until the copy set removal is complete.

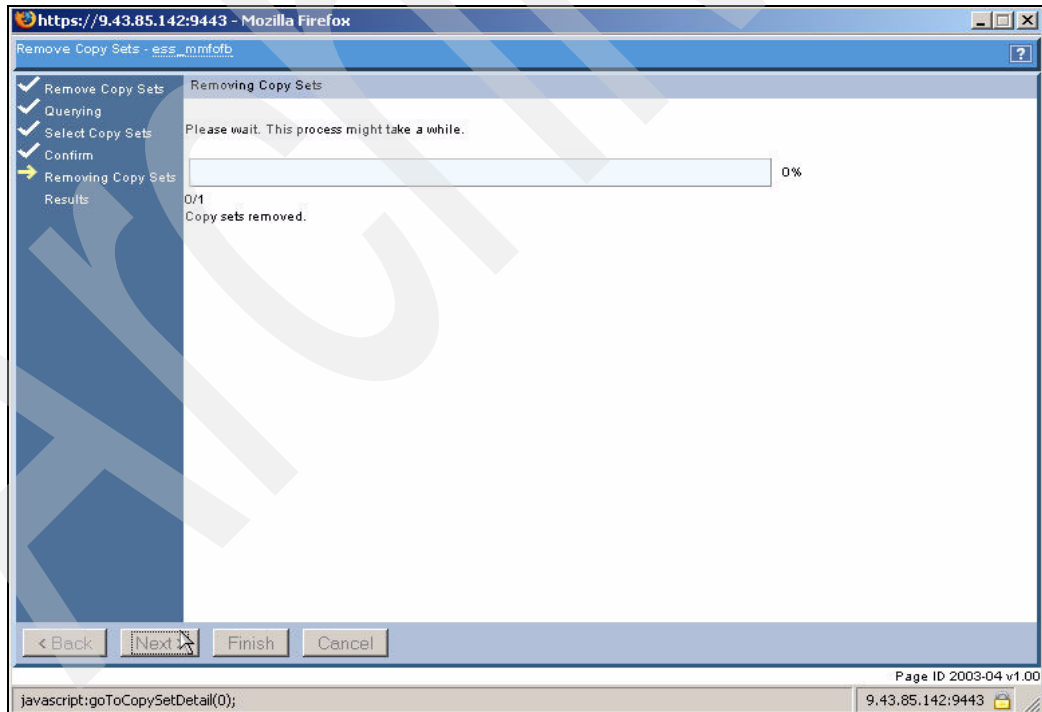


Figure 5-133 Removal progress

Figure 5-134 on page 165 shows the final window in this sequence. Click the **Finish** button to complete the removal.

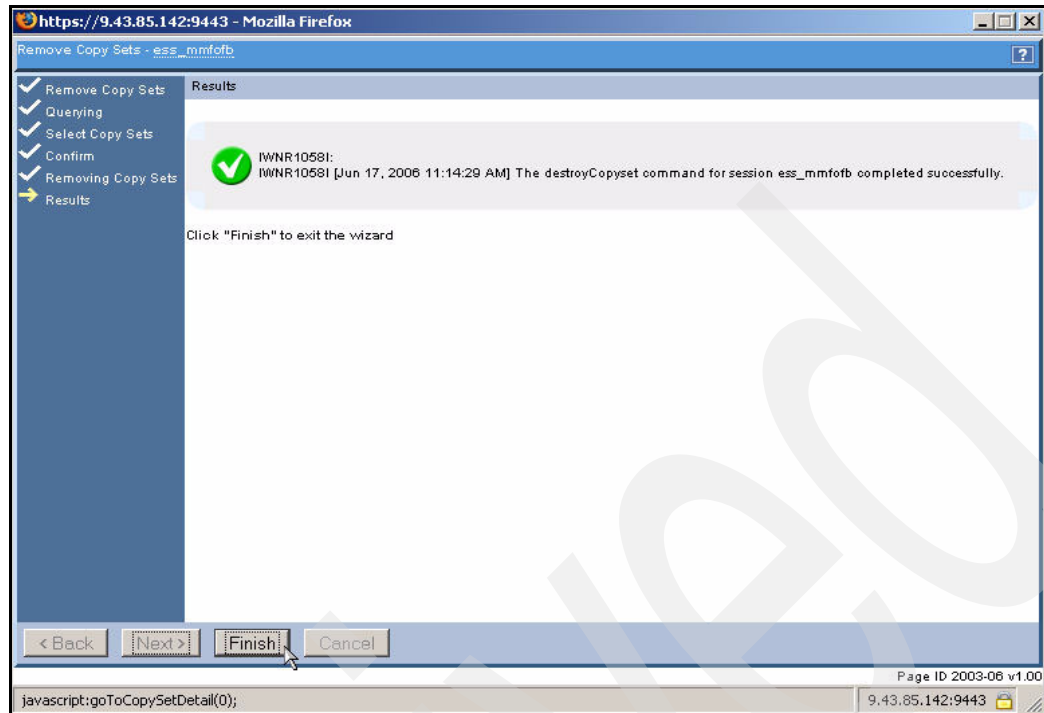


Figure 5-134 Finish to remove copy sets from session

5.3.13 Managing a Metro Mirror session using the CCMCLI

In this scenario we will add a single direction Metro Mirror session and add a number of copy sets to the session prior to start the session. The script file is shown in Figure 5-135.

```
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype mmsd -desc tucsoness_mm itsoess_mmsd_cli
lsess -l
mkcpset -h1 ESS:2105.18596:VOL:1402 -h2 ESS:2105.18597:VOL:1402 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1403 -h2 ESS:2105.18597:VOL:1403 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1404 -h2 ESS:2105.18597:VOL:1404 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1405 -h2 ESS:2105.18597:VOL:1405 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1406 -h2 ESS:2105.18597:VOL:1406 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1407 -h2 ESS:2105.18597:VOL:1407 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1408 -h2 ESS:2105.18597:VOL:1408 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1409 -h2 ESS:2105.18597:VOL:1409 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1410 -h2 ESS:2105.18597:VOL:1410 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1411 -h2 ESS:2105.18597:VOL:1411 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1412 -h2 ESS:2105.18597:VOL:1412 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1413 -h2 ESS:2105.18597:VOL:1413 itsoess_mmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1414 -h2 ESS:2105.18597:VOL:1414 itsoess_mmsd_cli
lscpset itsoess_mmsd_cli
```

Figure 5-135 ess_addcopy script

Example 5-11 on page 166 shows about how to invoke the script and the result from running the script.

Example 5-11 *ess_addcopy* script output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\ess_addcopy.txt
IWNR1021I [Jun 16, 2006 1:40:25 PM] Session itsoess_mmsd_cli was successfully created.
Name                Status State Copy type Recoverable Copying Copy sets Error
=====
itsoess_mmsd_cli    Inactive Defined Metro Mirror Single Direction No No 0 No
itsovc_mm_sd1       Inactive Defined Metro Mirror Single Direction No No 0 No
itsovc_mm           Inactive Defined Flash Copy No No 0 No
itsovc02_mmfb       Inactive Defined Metro Mirror Failover/Failback No No 0 No
ESS_POK            Inactive Defined Flash Copy No No 0 No
itsovc_mmccli       Inactive Defined Metro Mirror Single Direction No No 0 No
itsoess_fc          Inactive Defined Flash Copy No No 0 No
itsovc_fccli        Inactive Defined Flash Copy No No 0 No
itsovc_fc           Inactive Defined Flash Copy No No 0 No
ess_mmfb           Inactive Defined Metro Mirror Failover/Failback No No 1 No

IWNR2001I [Jun 16, 2006 1:40:26 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1402 with source ESS:2105.1859
6:VOL:1402 and target ESS:2105.18597:VOL:1402.
IWNR2001I [Jun 16, 2006 1:40:27 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1403 with source ESS:2105.1859
6:VOL:1403 and target ESS:2105.18597:VOL:1403.
IWNR2001I [Jun 16, 2006 1:40:28 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1404 with source ESS:2105.1859
6:VOL:1404 and target ESS:2105.18597:VOL:1404.
IWNR2001I [Jun 16, 2006 1:40:28 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1405 with source ESS:2105.1859
6:VOL:1405 and target ESS:2105.18597:VOL:1405.
IWNR2001I [Jun 16, 2006 1:40:29 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1406 with source ESS:2105.1859
6:VOL:1406 and target ESS:2105.18597:VOL:1406.
IWNR2001I [Jun 16, 2006 1:40:30 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1407 with source ESS:2105.1859
6:VOL:1407 and target ESS:2105.18597:VOL:1407.
IWNR2001I [Jun 16, 2006 1:40:31 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1408 with source ESS:2105.1859
6:VOL:1408 and target ESS:2105.18597:VOL:1408.
IWNR2001I [Jun 16, 2006 1:40:32 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1409 with source ESS:2105.1859
6:VOL:1409 and target ESS:2105.18597:VOL:1409.
IWNR2001I [Jun 16, 2006 1:40:33 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1410 with source ESS:2105.1859
6:VOL:1410 and target ESS:2105.18597:VOL:1410.
IWNR2001I [Jun 16, 2006 1:40:33 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1411 with source ESS:2105.1859
6:VOL:1411 and target ESS:2105.18597:VOL:1411.
IWNR2001I [Jun 16, 2006 1:40:34 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1412 with source ESS:2105.1859
6:VOL:1412 and target ESS:2105.18597:VOL:1412.
IWNR2001I [Jun 16, 2006 1:40:35 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1413 with source ESS:2105.1859
6:VOL:1413 and target ESS:2105.18597:VOL:1413.
IWNR2001I [Jun 16, 2006 1:40:36 PM] The pair was successfully created in session
itsoess_mmsd_cli for copy set ESS:2105.18596:VOL:1414 with source ESS:2105.1859
6:VOL:1414 and target ESS:2105.18597:VOL:1414.
H1 Volume                Session Volumes
=====
ESS:2105.18596:VOL:1402 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1403 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1404 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1405 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1406 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1407 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1408 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1409 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1410 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1411 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1412 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1413 itsoess_mmsd_cli 2
ESS:2105.18596:VOL:1414 itsoess_mmsd_cli 2

C:\CSM-CLI>
```

Now that the session is created and has valid copy sets we may start the session. Figure 5-136 on page 167 shows the *start* script.


```
#
# This is a CSMCLI script file
# Using List commands to interrogate TPC 4 R
#
setoutput -fmt stanza -v on
cmdsess -quiet -action start itsoess_mmsd_cli
lsess -fmt stanza itsoess_mmsd_cli
```

Figure 5-136 Start Metro Mirror session script

The script execution and the result of executing this script is shown in Example 5-12. You can see the session status is *Warning* and that the copy sets are in *Preparing* state.

Example 5-12 Script to start session

```
C:\CSM-CLI>csmdi -script c:\csm-cli\startsess.txt
IWNRI026I [Jun 17, 2006 1:11:01 PM] The runCommand for command Start in session
itsoess_mmsd_cli completed successfully.
Name      itsoess_mmsd_cli
Status    Warning
State     Preparing
Copy type Metro Mirror Single Direction

C:\CSM-CLI>
```

After issuing the Start command, during full initial copy, enter the **lsess** command again to determine if the status has changed as shown in Example 5-13.

Example 5-13 List session status

```
C:\CSM-CLI>csmdi lsess -fmt stanza itsoess_mmsd_cli
Name      itsoess_mmsd_cli
Status    Warning
State     Preparing
Copy type Metro Mirror Single Direction

C:\CSM-CLI>csmdi lsess -fmt stanza itsoess_mmsd_cli
Name      itsoess_mmsd_cli
Status    Warning
State     Preparing
Copy type Metro Mirror Single Direction

C:\CSM-CLI>csmdi lsess -fmt stanza itsoess_mmsd_cli
Name      itsoess_mmsd_cli
Status    Normal
State     Prepared
Copy type Metro Mirror Single Direction

C:\CSM-CLI>
```

Eventually the copy sets are synchronized. The next step is to suspend the copy sets. Once again we have created a simple script to perform this function as Figure 5-137 on page 168 displays. You will note that we have also add a **lspar** command to obtain more information.

```
#
# This is a CSMCLI script file
# Using List commands to interrogate TPC 4 R
#
setoutput -fmt stanza -v on
cmdsess -quiet -action suspend itsoess_mmsd_cli
lssess -fmt stanza itsoess_mmsd_cli
lspair -l -rolepair h1-h2 itsoess_mmsd_cli
```

Figure 5-137 Suspend script

Example 5-14 shows the script execution and the output which this script generates. Note that after the suspend the list command returns a copy set status of both Suspended and Prepared. This is simply a delay in processing the output of the copy sets between the TPC for Replication server and the hosting subsystem and does not represent a data exposure.

Example 5-14 Suspend script execution and its output

```
C:\CSM-CLI>csmdi -script c:\csm-cli\suspend_sess.txt
IWNRI026I [Jun 17, 2006 1:39:07 PM] The runCommand for command Suspend in session
n itsoess_mmsd_cli completed successfully.
```

```
Name      itsoess_mmsd_cli
Status    Severe
State     Suspended
Copy type Metro Mirror Single Direction
Source volume ESS:2105.18596:VOL:1402
Target volume ESS:2105.18597:VOL:1402
RolePair   H1-H2
State      Suspended
Recoverable Yes
Copying    No
New        No
Copy set   ESS:2105.18596:VOL:1402
Timestamp  Jun 17, 2006 1:39:40 PM
Last result IWNRI2014I
```

```
Source volume ESS:2105.18596:VOL:1403
Target volume ESS:2105.18597:VOL:1403
RolePair   H1-H2
State      Suspended
Recoverable Yes
Copying    No
New        No
Copy set   ESS:2105.18596:VOL:1403
Timestamp  Jun 17, 2006 1:39:40 PM
Last result IWNRI2014I
```

```
Source volume ESS:2105.18596:VOL:1404
Target volume ESS:2105.18597:VOL:1404
RolePair   H1-H2
State      Suspended
Recoverable Yes
Copying    No
New        No
Copy set   ESS:2105.18596:VOL:1404
Timestamp  Jun 17, 2006 1:39:40 PM
Last result IWNRI2014I
```

Source volume ESS:2105.18596:VOL:1405
Target volume ESS:2105.18597:VOL:1405
RolePair H1-H2
State **Suspended**
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1405
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2014I

Source volume ESS:2105.18596:VOL:1406
Target volume ESS:2105.18597:VOL:1406
RolePair H1-H2
State **Suspended**
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1406
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2014I

Source volume ESS:2105.18596:VOL:1407
Target volume ESS:2105.18597:VOL:1407
RolePair H1-H2
State **Prepared**
Recoverable Yes
Copying Yes
New No
Copy set ESS:2105.18596:VOL:1407
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2014I

Source volume ESS:2105.18596:VOL:1408
Target volume ESS:2105.18597:VOL:1408
RolePair H1-H2
State **Prepared**
Recoverable Yes
Copying Yes
New No
Copy set ESS:2105.18596:VOL:1408
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2014I

Source volume ESS:2105.18596:VOL:1409
Target volume ESS:2105.18597:VOL:1409
RolePair H1-H2
State **Prepared**
Recoverable Yes
Copying Yes
New No
Copy set ESS:2105.18596:VOL:1409
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2014I

Source volume ESS:2105.18596:VOL:1410
Target volume ESS:2105.18597:VOL:1410
RolePair H1-H2
State **Prepared**
Recoverable Yes

```

Copying      Yes
New          No
Copy set     ESS:2105.18596:VOL:1410
Timestamp    Jun 17, 2006 1:39:40 PM
Last result  IWNR2014I

```

```

Source volume ESS:2105.18596:VOL:1411
Target volume ESS:2105.18597:VOL:1411
RolePair      H1-H2
State        Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      ESS:2105.18596:VOL:1411
Timestamp     Jun 17, 2006 1:39:40 PM
Last result   IWNR2014I

```

```

Source volume ESS:2105.18596:VOL:1412
Target volume ESS:2105.18597:VOL:1412
RolePair      H1-H2
State        Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      ESS:2105.18596:VOL:1412
Timestamp     Jun 17, 2006 1:39:40 PM
Last result   IWNR2014I

```

```

Source volume ESS:2105.18596:VOL:1413
Target volume ESS:2105.18597:VOL:1413
RolePair      H1-H2
State        Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      ESS:2105.18596:VOL:1413
Timestamp     Jun 17, 2006 1:39:40 PM
Last result   IWNR2014I

```

```

Source volume ESS:2105.18596:VOL:1414
Target volume ESS:2105.18597:VOL:1414
RolePair      H1-H2
State        Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      ESS:2105.18596:VOL:1414
Timestamp     Jun 17, 2006 1:39:40 PM
Last result   IWNR2014I

```

C:\CSM-CLI>

A moment later we reissue the **lspair** command. Example 5-15 shows the output of the **lspair** command. All the volumes are now reported as *Suspended*.

Example 5-15 lspair command output

```

C:\CSM-CLI>csmcli lspair -l -rolepair h1-h2 itsoess_mmsd_cli
Source volume      Target volume      RolePair State      Recoverable Copying New Copy set
Timestamp          Last result

```

```

=====
ESS:2105.18596:VOL:1402 ESS:2105.18597:VOL:1402 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1402
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1403 ESS:2105.18597:VOL:1403 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1403
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1404 ESS:2105.18597:VOL:1404 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1404
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1405 ESS:2105.18597:VOL:1405 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1405
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1406 ESS:2105.18597:VOL:1406 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1406
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1407 ESS:2105.18597:VOL:1407 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1407
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1408 ESS:2105.18597:VOL:1408 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1408
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1409 ESS:2105.18597:VOL:1409 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1409
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1410 ESS:2105.18597:VOL:1410 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1410
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1411 ESS:2105.18597:VOL:1411 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1411
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1412 ESS:2105.18597:VOL:1412 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1412
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1413 ESS:2105.18597:VOL:1413 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1413
Jun 17, 2006 1:39:40 PM IWNR2014I
ESS:2105.18596:VOL:1414 ESS:2105.18597:VOL:1414 H1-H2    Suspended Yes      No      No  ESS:2105.18596:VOL:1414
Jun 17, 2006 1:39:40 PM IWNR2014I
C:\CSM-CLI>

```

The next step is to make the volumes usable at either location using the **Recover** command. Example 5-16 shows the Recover command and its output when entered directly into the CSMCLI.

Example 5-16 Issue recover command

```

C:\CSM-CLI>csmcli cmdsess -quiet -action recover itsoess_mmsd_cli
IWNR1026I [Jun 17, 2006 1:42:07 PM] The runCommand for command Recover in session
n itsoess_mmsd_cli completed successfully.

```

```

C:\CSM-CLI>csmcli lspair -l -fmt stanza -rolepair h1-h2 itsoess_mmsd_cli
Source volume ESS:2105.18596:VOL:1402
Target volume ESS:2105.18597:VOL:1402
RolePair      H1-H2
State         Target Available
Recoverable   Yes
Copying       No
New           No
Copy set      ESS:2105.18596:VOL:1402
Timestamp     Jun 17, 2006 1:39:40 PM
Last result   IWNR2026I

```

```

Source volume ESS:2105.18596:VOL:1403
Target volume ESS:2105.18597:VOL:1403
RolePair      H1-H2
State         Target Available
Recoverable   Yes
Copying       No
New           No
Copy set      ESS:2105.18596:VOL:1403
Timestamp     Jun 17, 2006 1:39:40 PM
Last result   IWNR2026I

```

```

Source volume ESS:2105.18596:VOL:1404
Target volume ESS:2105.18597:VOL:1404
RolePair      H1-H2
State         Target Available

```

Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1404
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1405
Target volume ESS:2105.18597:VOL:1405
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1405
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1406
Target volume ESS:2105.18597:VOL:1406
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1406
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1407
Target volume ESS:2105.18597:VOL:1407
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1407
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1408
Target volume ESS:2105.18597:VOL:1408
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1408
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1409
Target volume ESS:2105.18597:VOL:1409
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1409
Timestamp Jun 17, 2006 1:39:40 PM

Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1410
Target volume ESS:2105.18597:VOL:1410
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1410
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1411
Target volume ESS:2105.18597:VOL:1411
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1411
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1412
Target volume ESS:2105.18597:VOL:1412
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1412
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1413
Target volume ESS:2105.18597:VOL:1413
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1413
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

Source volume ESS:2105.18596:VOL:1414
Target volume ESS:2105.18597:VOL:1414
RolePair H1-H2
State Target Available
Recoverable Yes
Copying No
New No
Copy set ESS:2105.18596:VOL:1414
Timestamp Jun 17, 2006 1:39:40 PM
Last result IWNR2026I

C:\CSM-CLI>

Now that we have the targets available we can terminate the session and decide which volumes to use. Note that we can use either of the volume sets. Example 5-17 shows the output of the terminate command sent to TPC for Replication via the CSMCLI interface.

Example 5-17 Terminate command and its output

```
C:\CSM-CLI>csmdi cmdsess -quiet -action terminate itsoess_mmsd_cli
IWNRI026I [Jun 17, 2006 1:56:45 PM] The runCommand for command Terminate in sess
ion itsoess_mmsd_cli completed successfully.
```

```
C:\CSM-CLI>csmdi lssess -l -fmt stanza itsoess_mmsd_cli
Name          itsoess_mmsd_cli
Status        Inactive
State         Defined
Copy type     Metro Mirror Single Direction
Recoverable   No
Copying       No
Copy sets     13
Error         No
```

```
C:\CSM-CLI>
```

5.3.14 Using the GUI to manage a Global Mirror session

For Global Mirror the primary disk subsystems provides functionality to co-ordinate the formation of consistency groups across all involved devices. Any consistency group information is held in bitmaps rather than requiring the updates to be maintained in cache. The consistency groups are sent to the secondary location using Global Copy - previously known as PPRC-XD. Using Global Copy means that duplicate updates within the consistency group are not sent and that if the data sent is still in the cache on the primary disk subsystems then only the necessary changed blocks are sent. Once the consistency group has been sent to the secondary location this consistent image of the primary data is saved using FlashCopy. This ensures that there is always a consistent image of the primary data at the secondary location. Within TPC for Replication the session setup is represented by the image icons which Figure 5-138 displays.

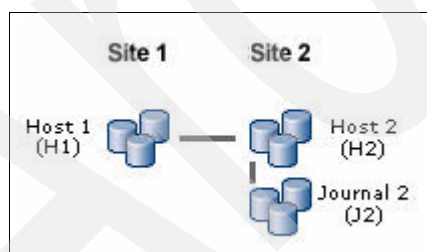


Figure 5-138 Global Mirror

As previously stated in setting up a session you click the **Create Session** button from the Sessions panel. This will open a window as shown in Figure 5-139 on page 175. In this window define the Global Mirror Failover / Failback copy type and then click the **Next** button.

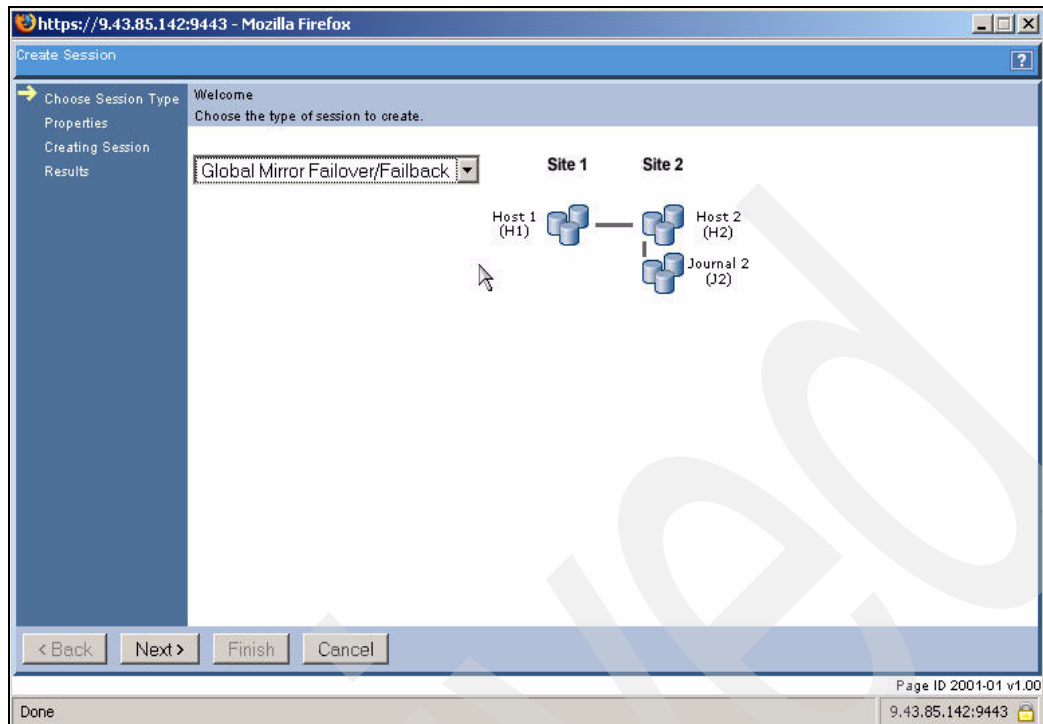


Figure 5-139 Create Global Mirror Session

Specify the session name and a brief description of the session as shown in Figure 5-140. Then click the **Next** button to continue.

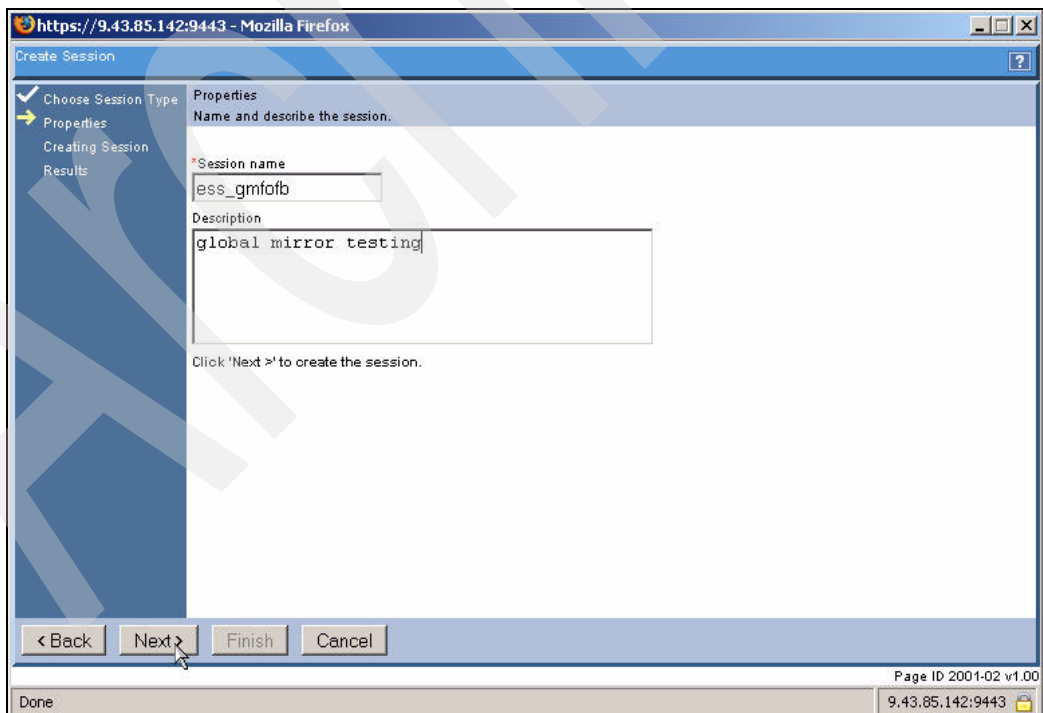


Figure 5-140 Global Mirror session description

TPC for Replication will now create the session and display the window shown in Figure 5-141. Click the **Finish** button to complete the session creation process.

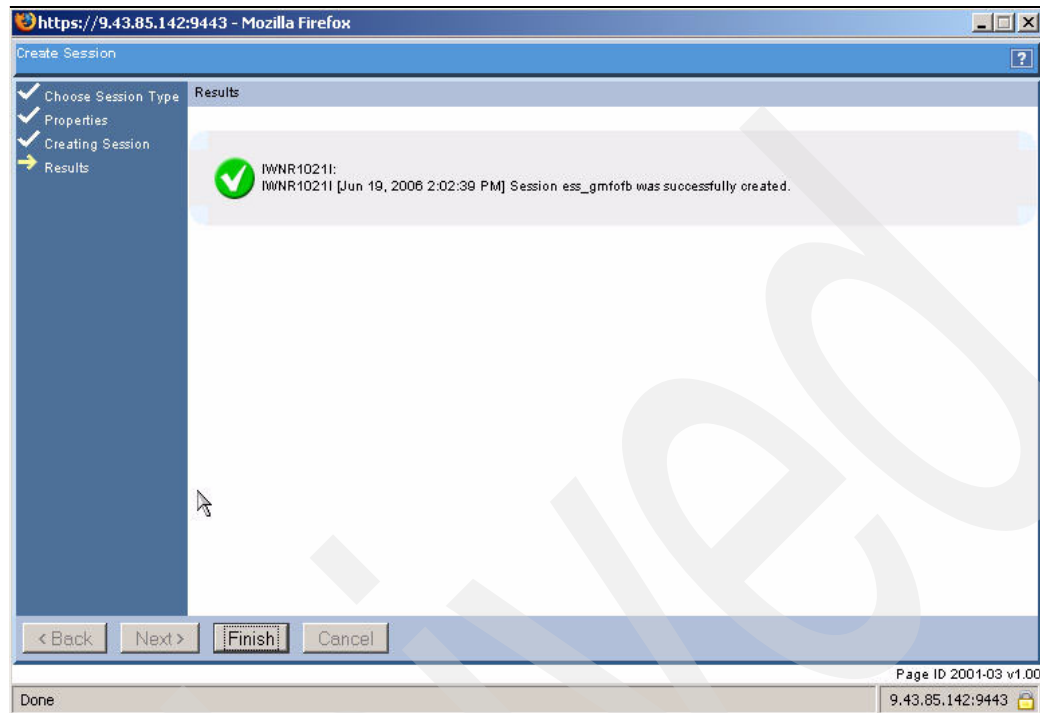


Figure 5-141 Global Mirror session created

Now return to the Sessions overview panel which Figure 5-142 on page 177 displays. To open the Global Mirror session just click the session name hyperlink as indicated.

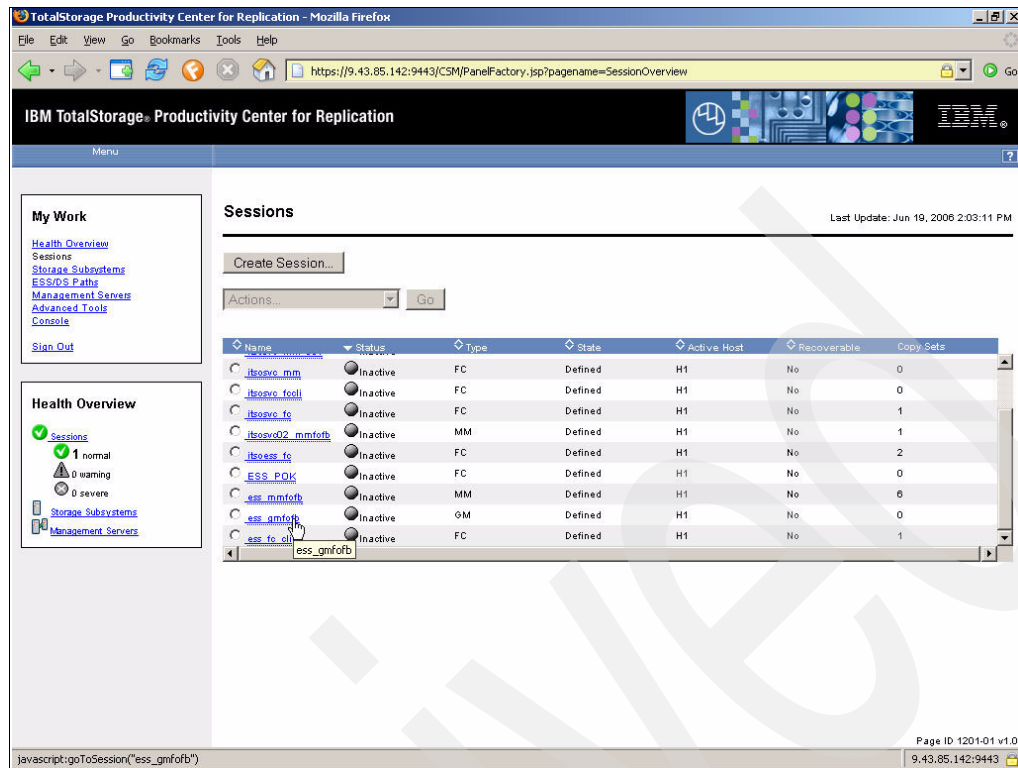


Figure 5-142 Session overview panel

Now we can begin to Add Copy Sets as shown in Figure 5-143. Click the **Go** button to continue.

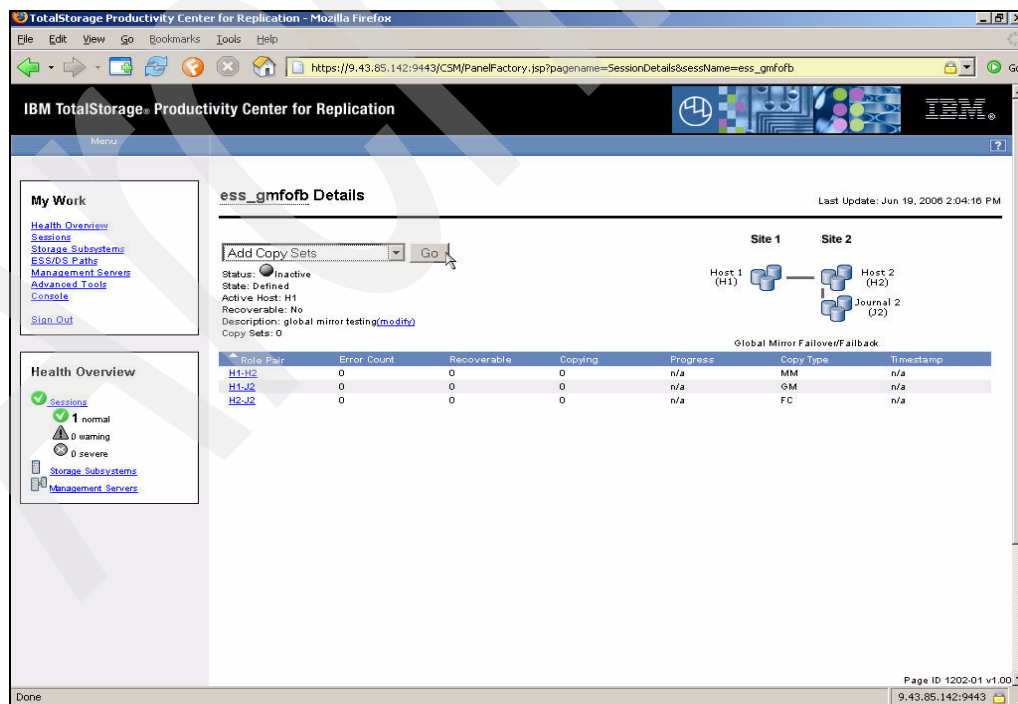


Figure 5-143 Add Copy Sets to Global Mirror session

This will open the Add Copy Sets window. From here add the chosen Host 1 volume as shown in Figure 5-144 and then click the **Next** button.

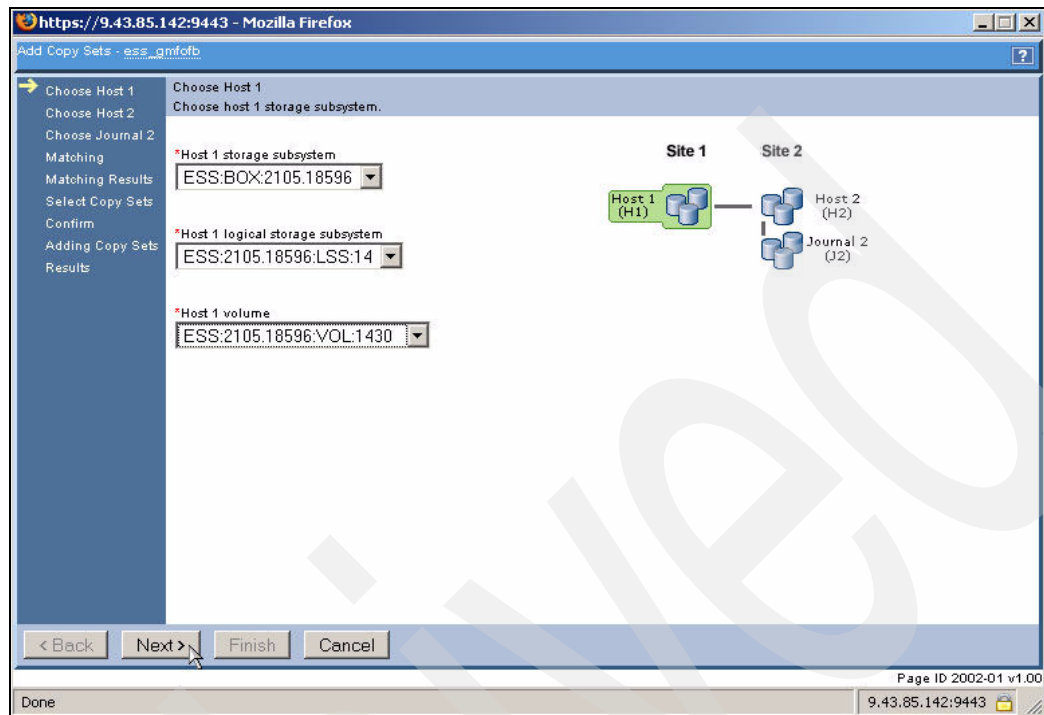


Figure 5-144 Host 1 volumes

Next add the chosen Host 2 volume as shown in Figure 5-145 and then click the **Next** button.

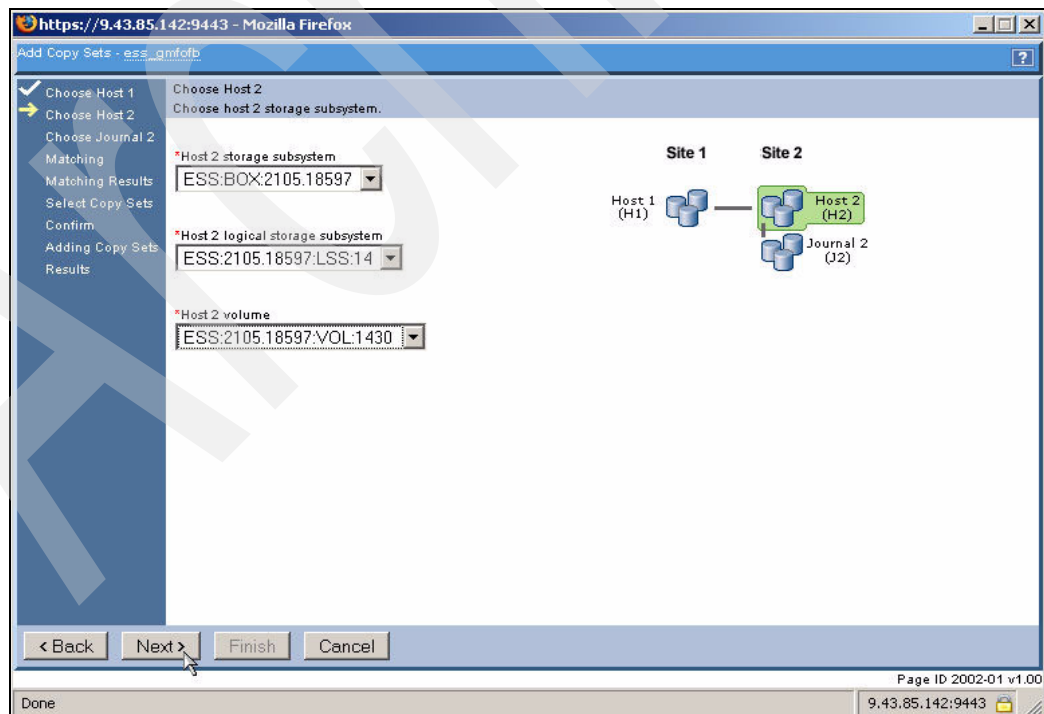


Figure 5-145 Host 2 volumes

Next add the chosen Journal 2 volume as shown in Figure 5-146 and then click the **Next** button.

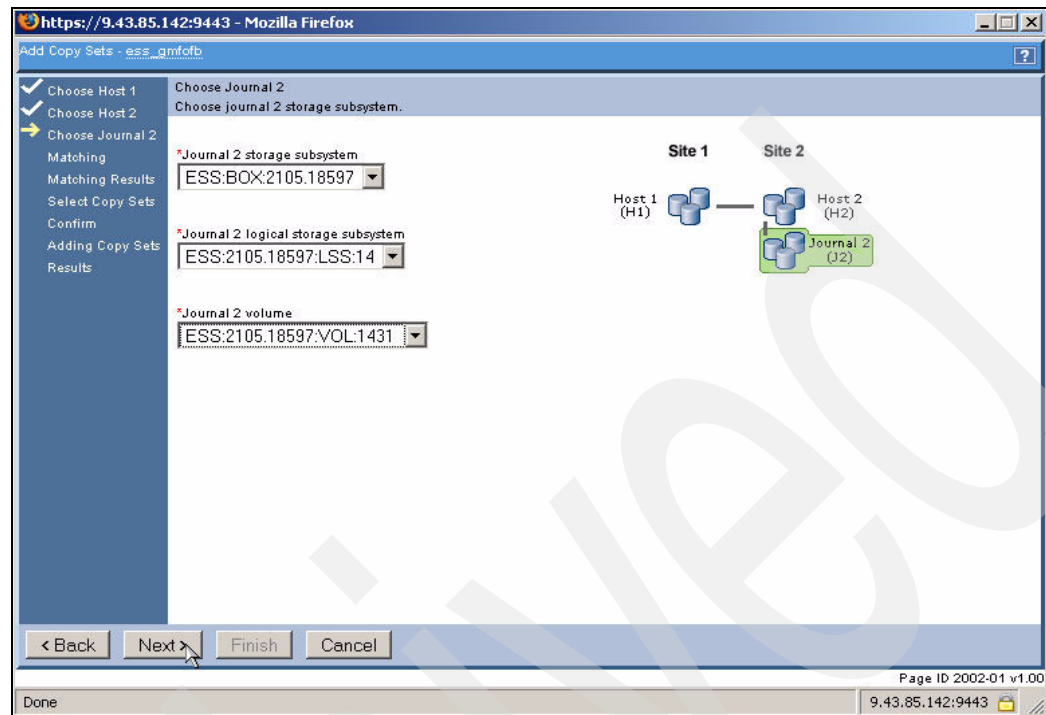


Figure 5-146 Journal 2 volumes

TPC for Replication will then perform the volume matching as shown in Figure 5-147.

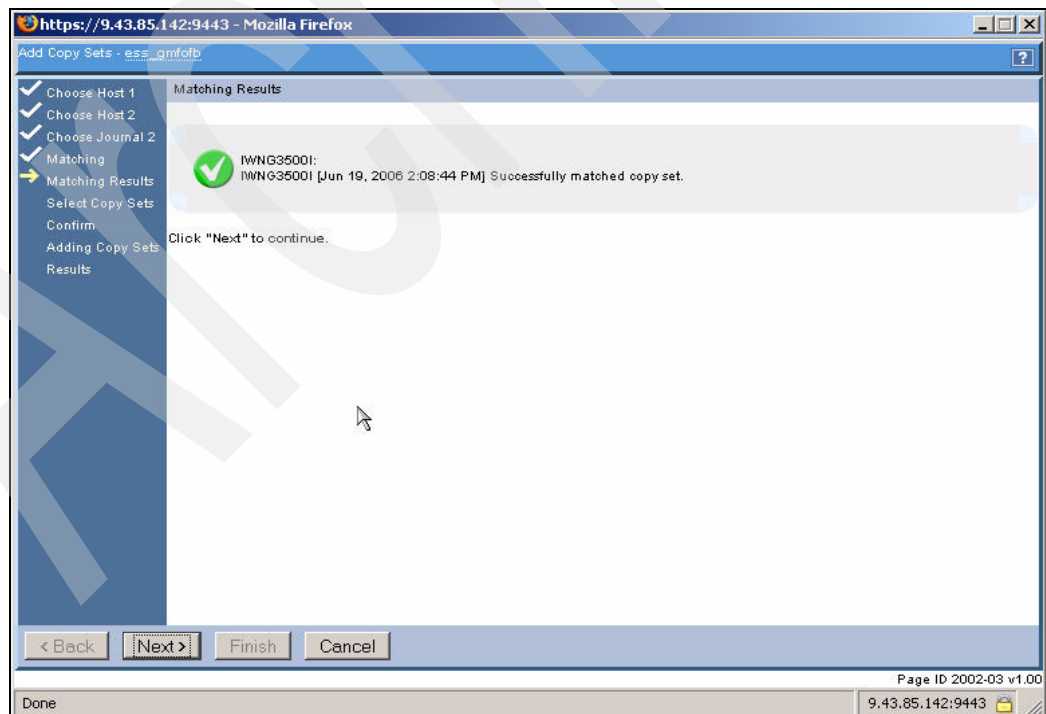


Figure 5-147 Matched Copy Sets

Validated your volume selections and click the **Next** button to continue.

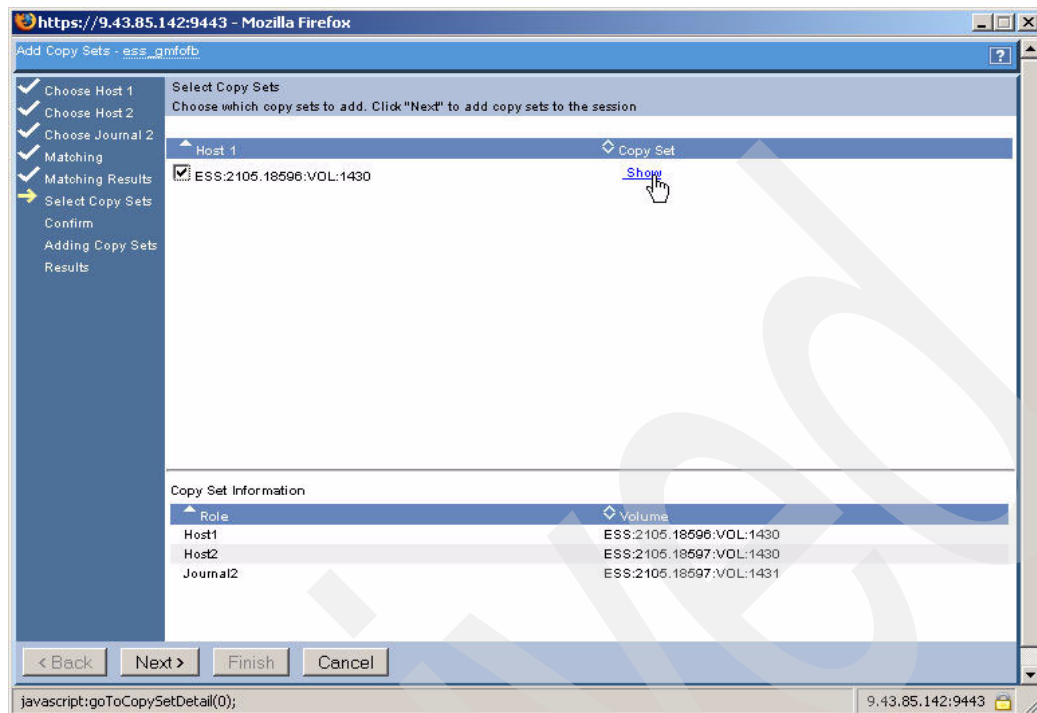


Figure 5-148 Global Mirror Copy Set

Confirm your selection by clicking the **Next** button as shown in Figure 5-149.

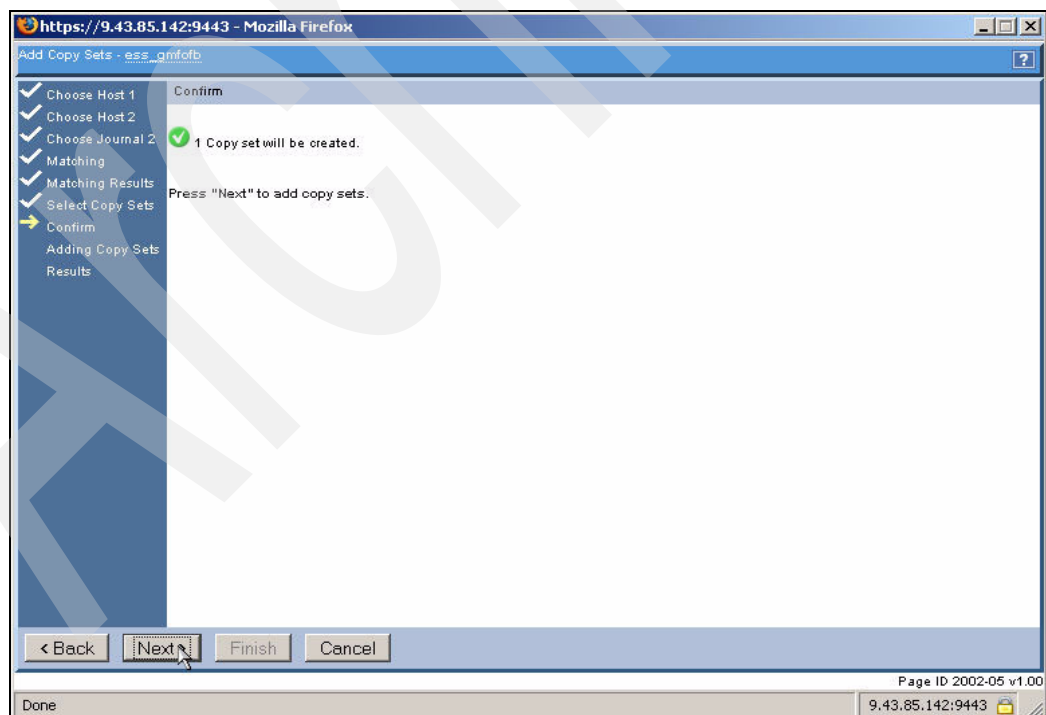


Figure 5-149 Confirmation panel

TPC for Replication will now add the copy sets as shown in Figure 5-150. Then click the **Finish** button when ready. This will close the window and return you to the session details window.

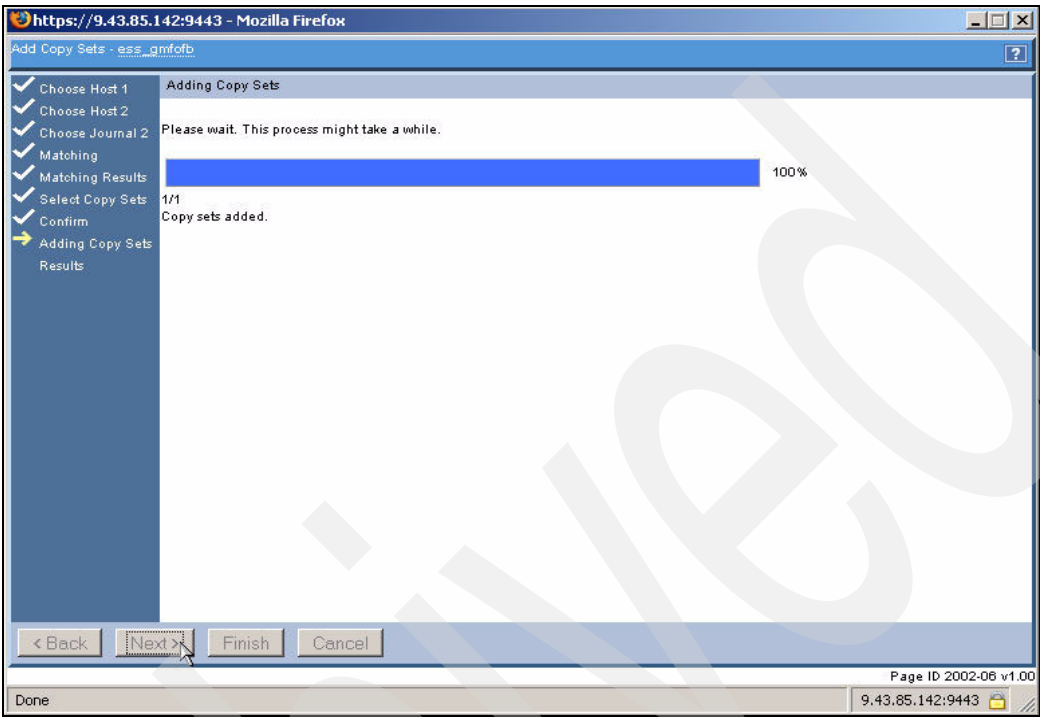


Figure 5-150 Copy set added to Global Mirror session

You can now start your session as Figure 5-151 shows. In this case and because this is a Failover / Failback session type we select **Start H1-H2** from the drop-down menu and then click **Go**.

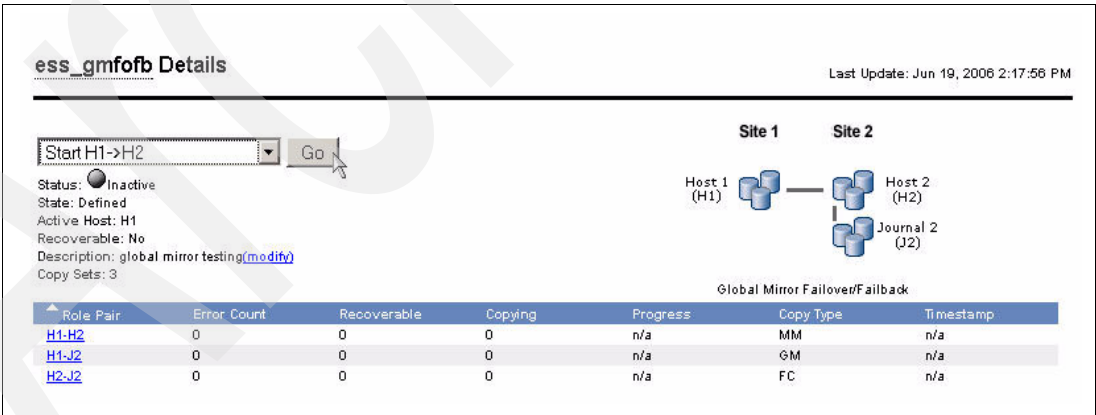


Figure 5-151 Start H1 - H2

Figure 5-152 on page 182 displays the result once the session is started. We see that the state is *Prepared* and the status is *Normal*.

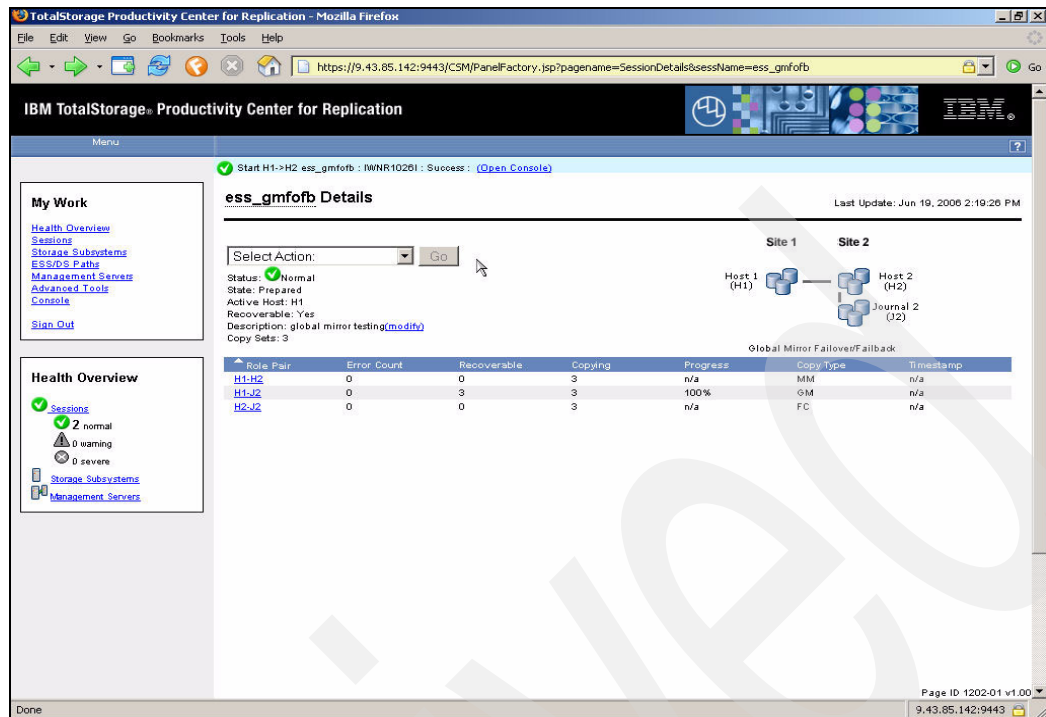


Figure 5-152 Start command result

Once the session is started we can check on exposure and on the level of synchronization of the session.

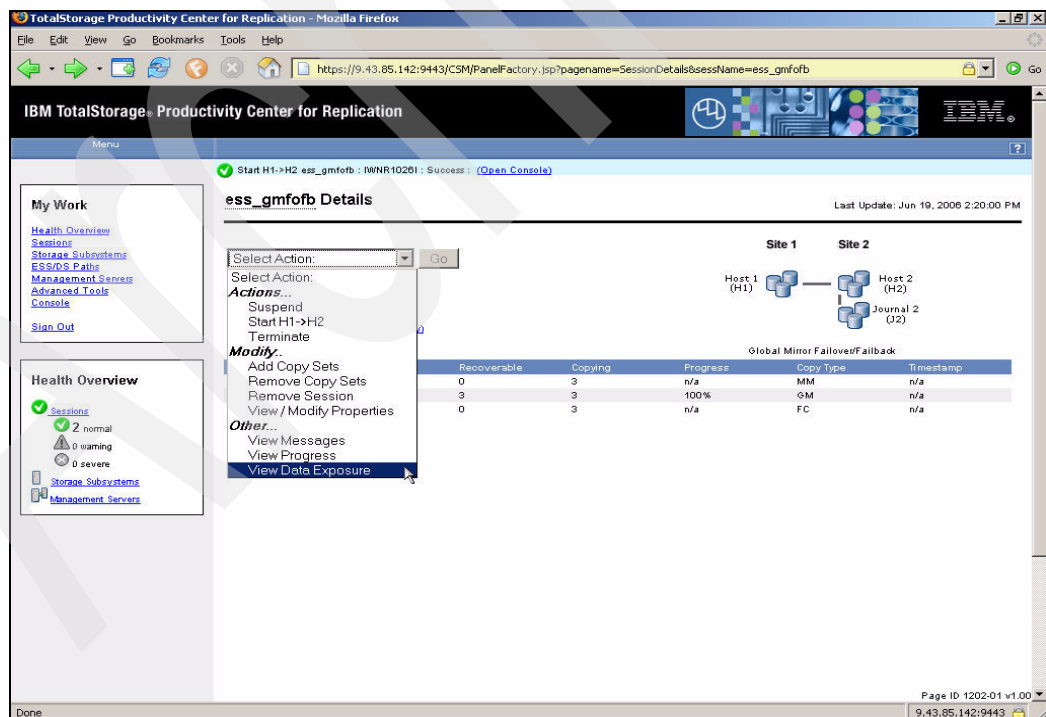


Figure 5-153 Global Mirror Data Exposure

In Figure 5-154 on page 183 we break out the information contained in the panel. This shows:

- ▶ The time difference between the source and target volumes in the copy set.
- ▶ The requested consistency time interval.
- ▶ The number of consistency groups created successfully.
- ▶ The number of consistency groups which failed to be created.

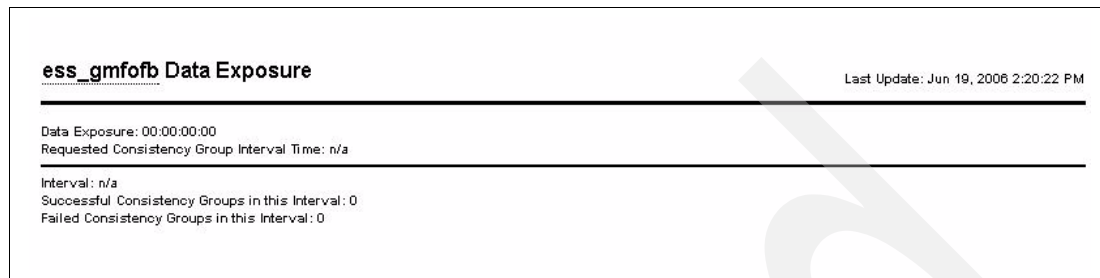


Figure 5-154 Global Mirror data exposure panel

To change any session settings select the View/Modify Properties action. To do this select the View/Modify Properties command from the drop-down menu and click the **Go** button as shown in Figure 5-155.

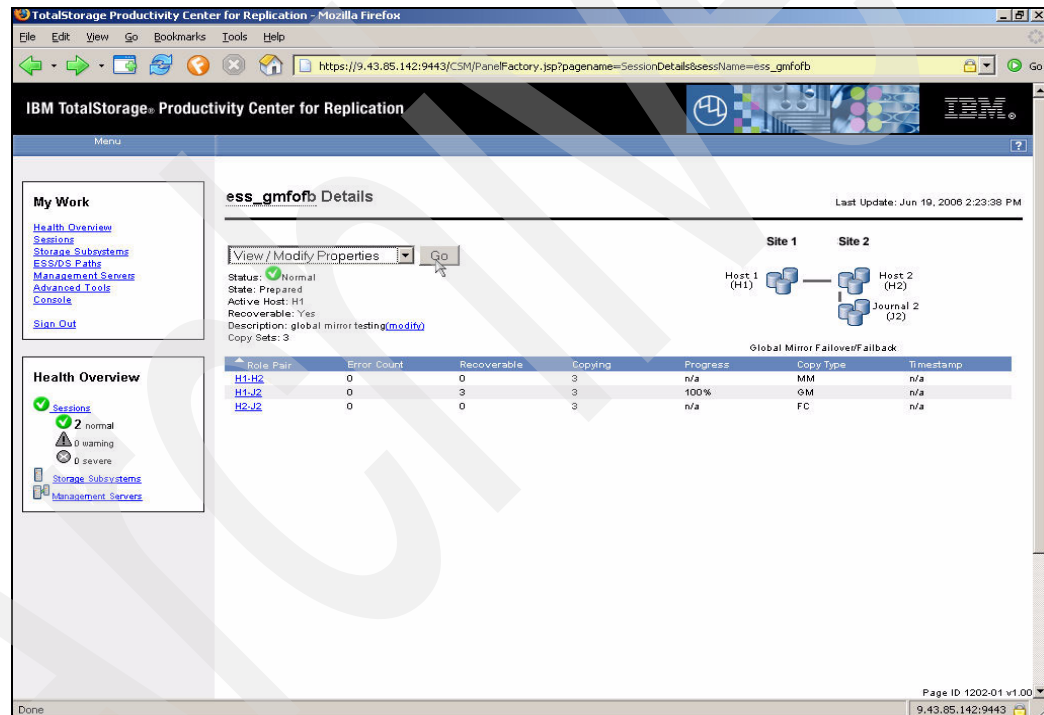


Figure 5-155 Modify Global Mirror session properties

Figure 5-156 on page 184 shows what can be altered within the Properties panel. This includes the Consistency Group Interval which is the time between consistency group creation. A value of zero tells the storage subsystem to continuously create consistency groups.

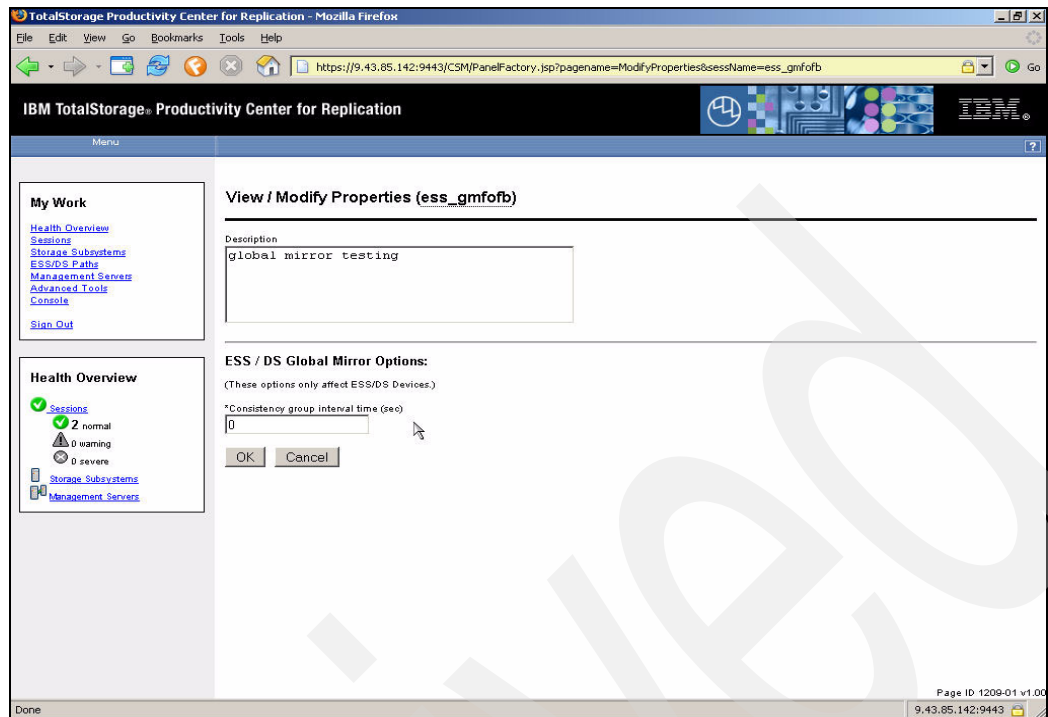


Figure 5-156 Consistency group setting

We can also use the ESS Copy Services server to check the status of the copy sets as the Figure 5-157 shows.

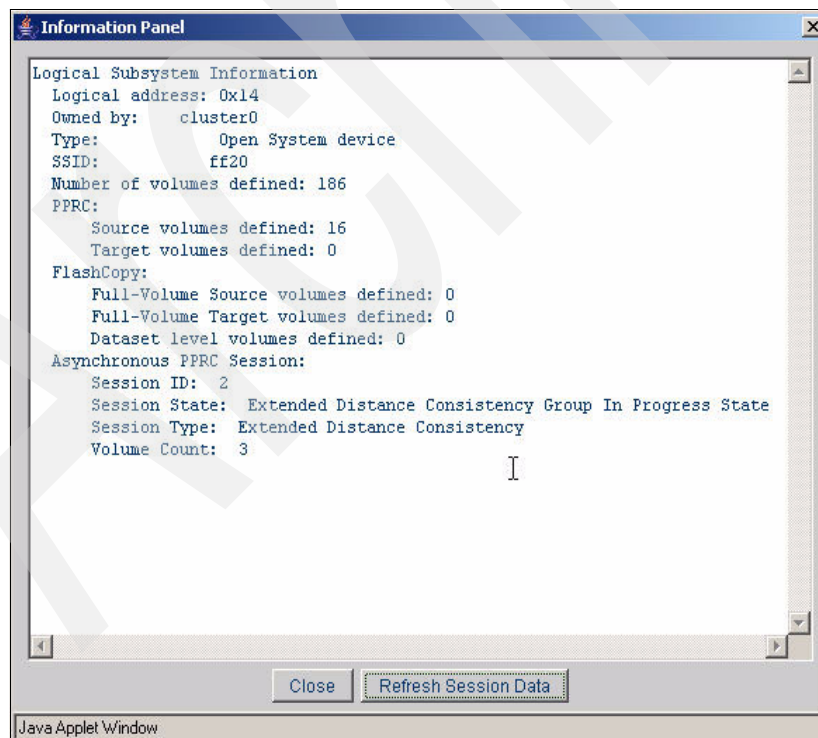


Figure 5-157 ESS Copy Services panel

Now that the session is established and we have a consistent set of volumes we can suspend and then recover the session copy sets to enable the H2 based volumes to be made available. Figure 5-158 shows that the suspend command has been issued and the status has changed to *severe*.

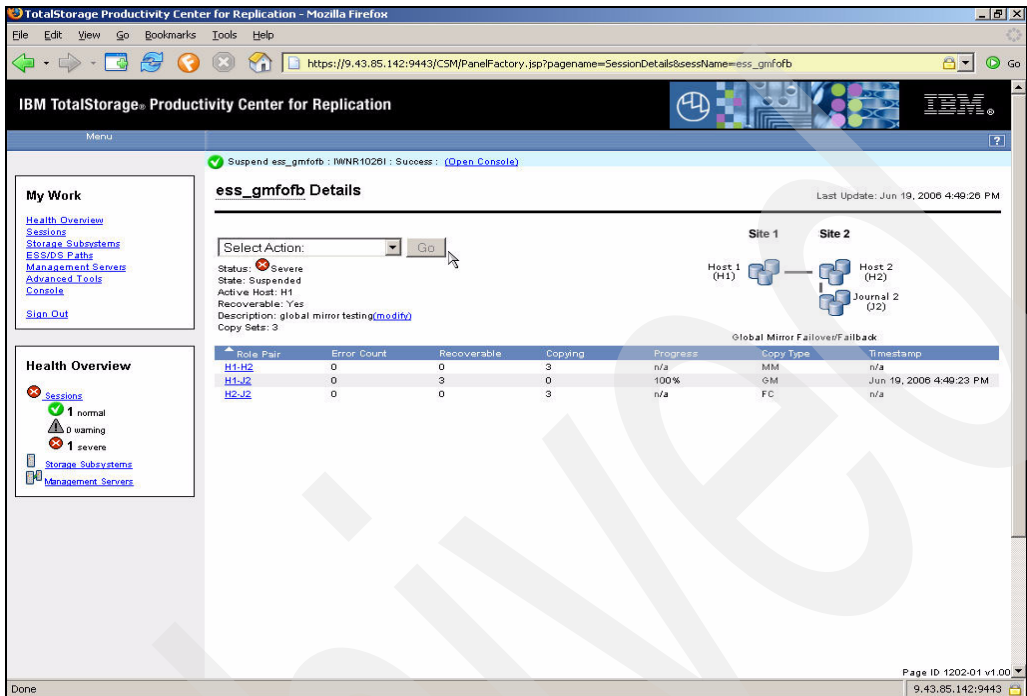


Figure 5-158 Suspend status

Once the copy sets are in the suspended state we can issue the **Recover** command to make the volumes in the copy sets available at the H2 site. This displays Figure 5-159.

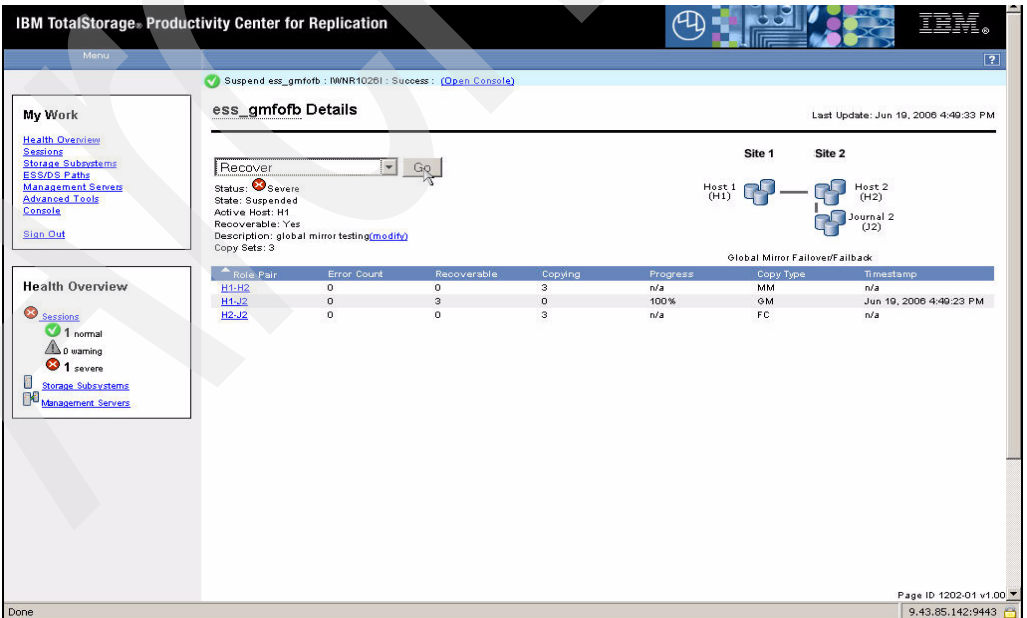


Figure 5-159 Recover Global Mirror H2 volumes

You can see in Figure 5-160 that after the recover action has been completed the H1 to J2 copy set is marked with a timestamp. This represents the time at which the last consistency group was created. This is in essence your recovery point.

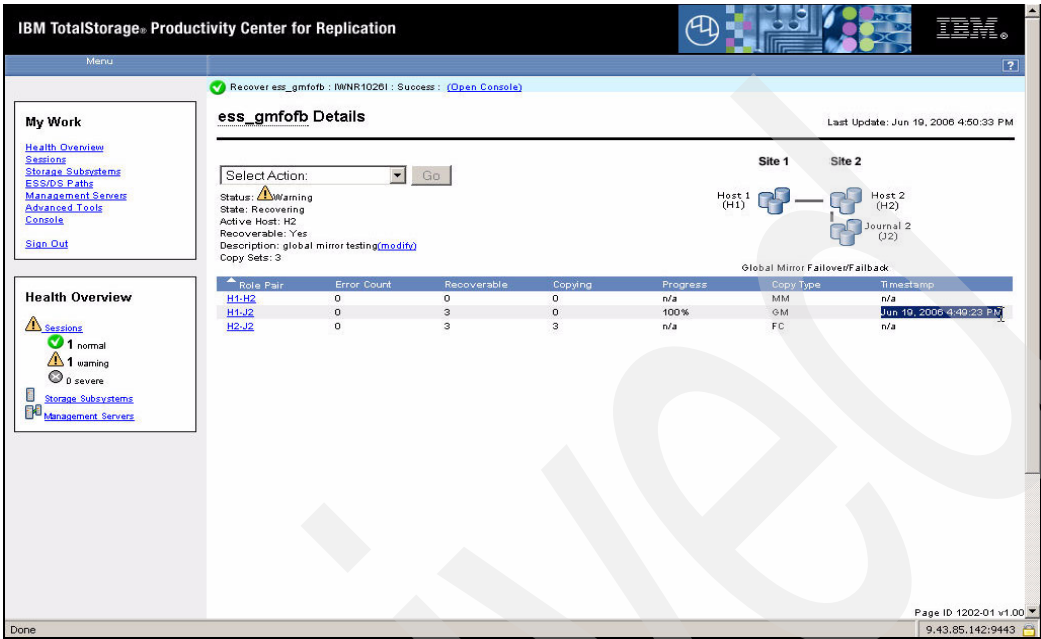


Figure 5-160 Timestamp at Global Mirror session suspend

Figure 5-161 displays that the volumes in the copy set become *Target Available*. This is the point at which all the J2 volumes may be attached to your secondary hosts to enable your recovery to be achieved.

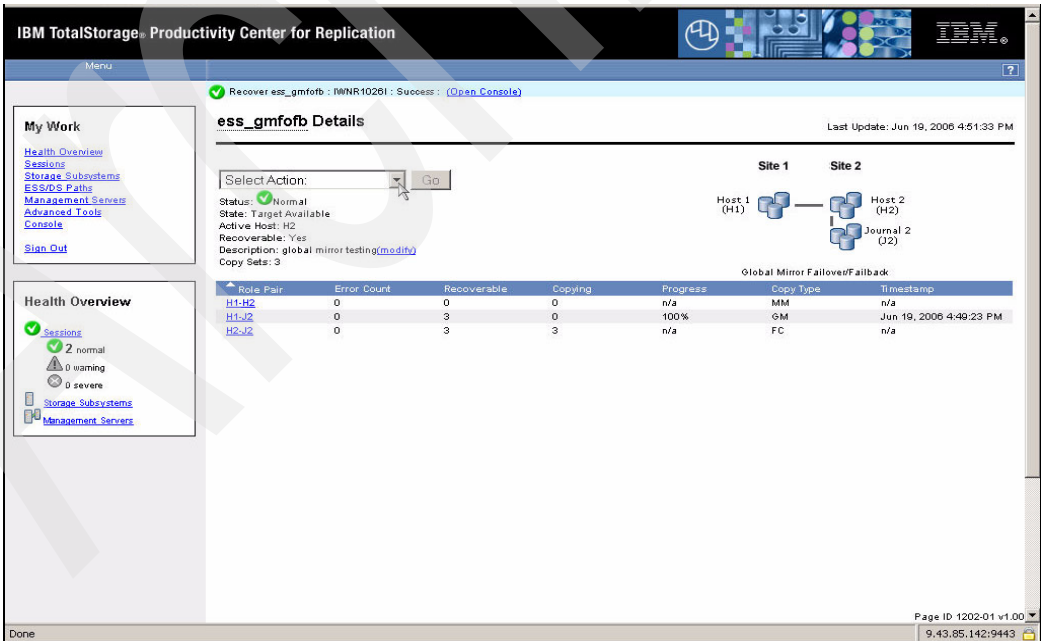


Figure 5-161 Global Mirror Target volumes available

Since this is a Failover / Failback scenario we may issue the Start H2-H1 to restart the copy process in the reverse direction thus invoking a Failback copy. We can see in Figure 5-162 the selection of the command from the drop-down menu.

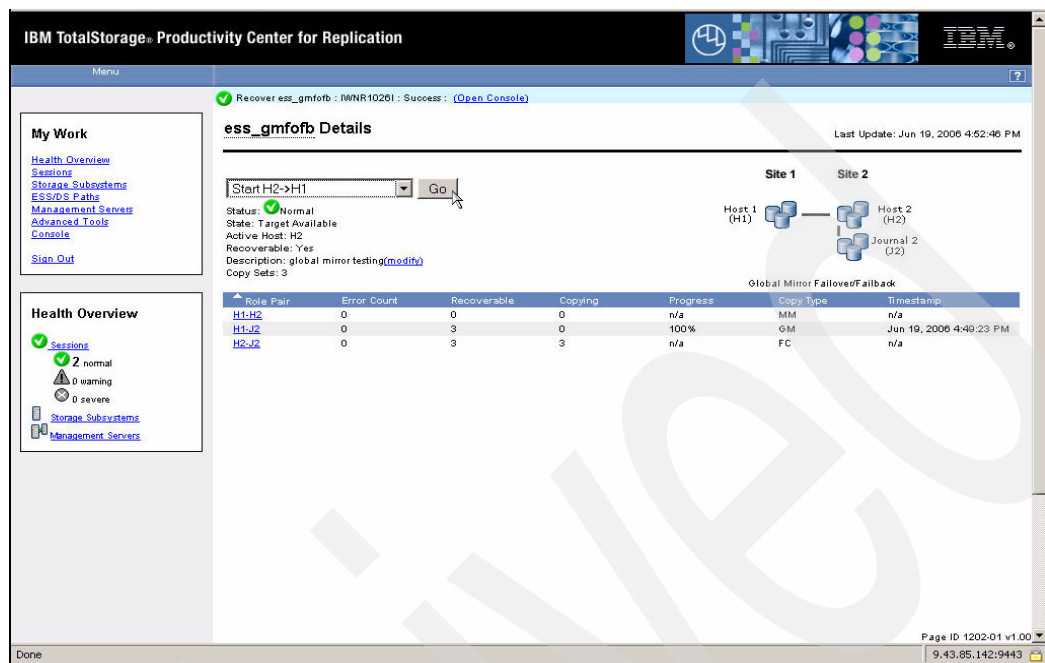


Figure 5-162 Start H2 - H1

As we can see in Figure 5-163 the Start H2 - H1 command has been issued and the copy sets are now preparing.

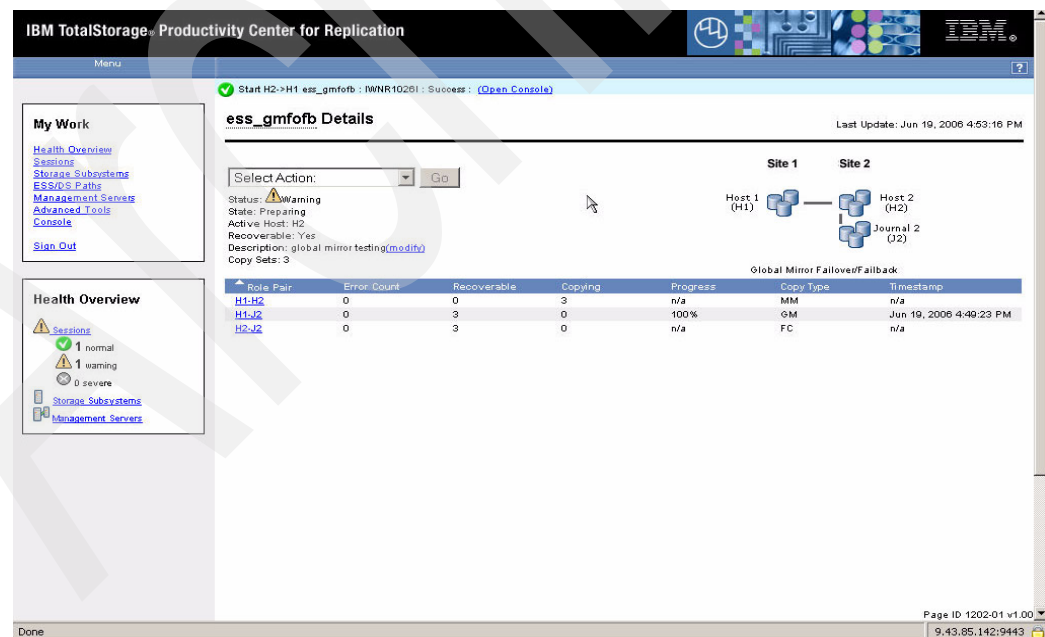


Figure 5-163 Start result

In Figure 5-164 on page 188 we show the copy sets for the H1-H2 definitions. We see that the status is also *Preparing*. Unlike the initial copy H1-H2 where the volumes moved to a *Prepared* state the H2-H1 copy will always stay in a *Preparing* state.

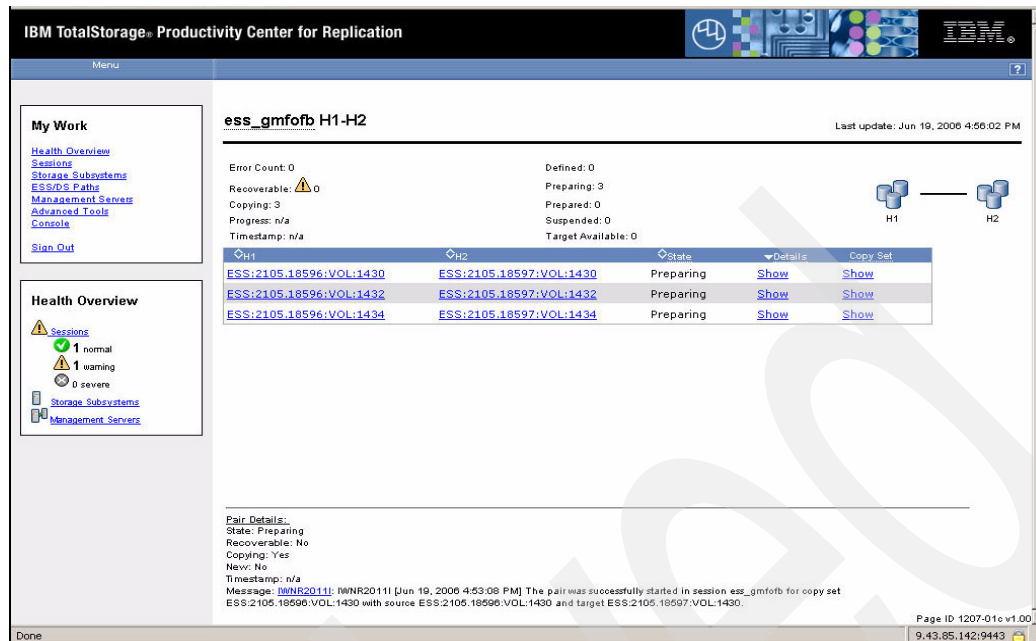


Figure 5-164 Copy sets

In Figure 5-165 we could once again check on the data exposure via the selection of the **View Data Exposure** command from the drop-down menu.

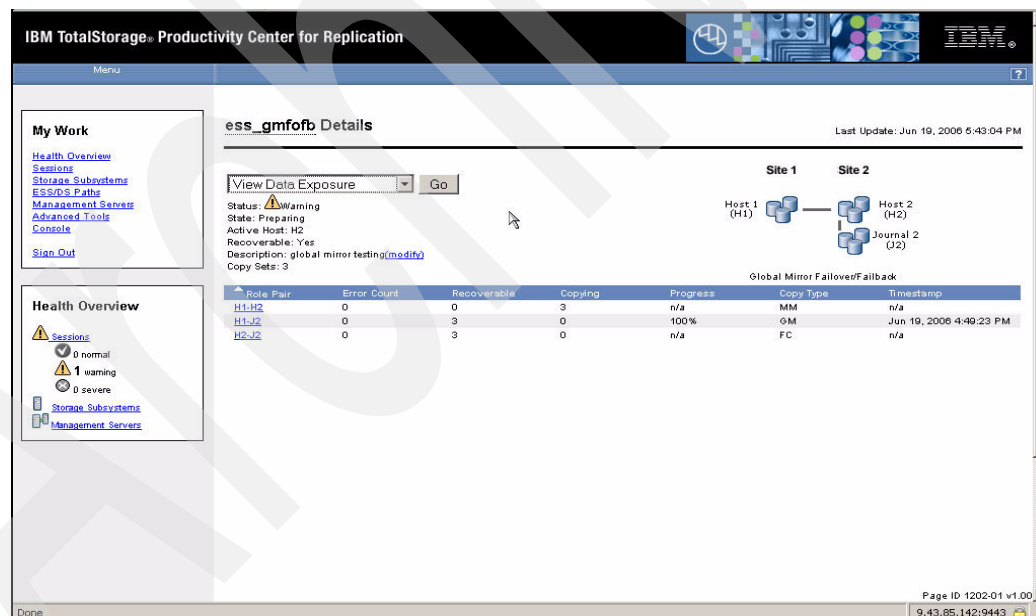


Figure 5-165 Data Exposure

After some time you may want to complete the Failback of the site. This requires you to issue the **Suspend** command again as we show in Figure 5-166 on page 189. The goal here is to return processing to the primary site or H1 site.

Prior to the **Suspend** command you need to quiesce the server application I/O. This may be through a server shut down or at least to shut down any applications using the server.

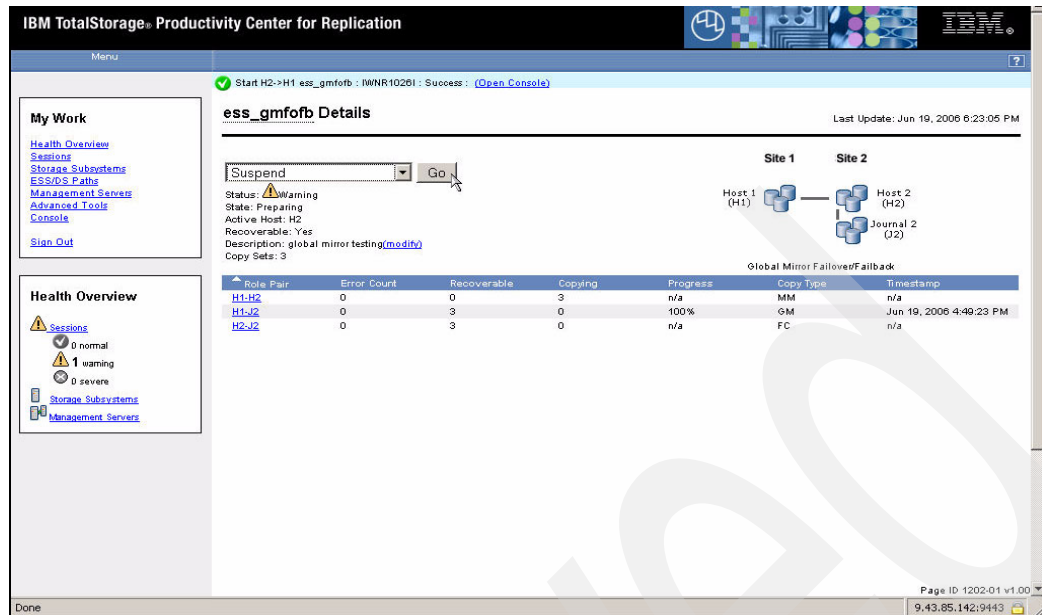


Figure 5-166 Suspend

As Figure 5-167 displays the session status has once again changed to *Severe* and the state of the copy set is *Suspended*.

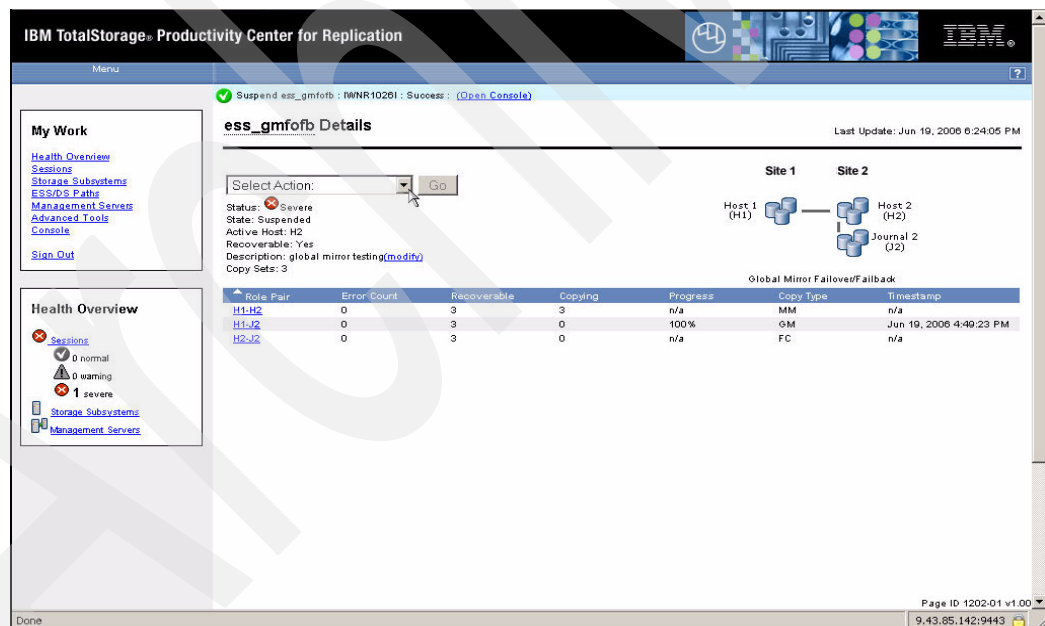


Figure 5-167 Suspended session

Now that the copy sets in the session are in the suspended state we issue the Recover command again as shown in Figure 5-168 on page 190. On the right-hand side under the Timestamp column the H1-H2 role pair now has a time stamp.

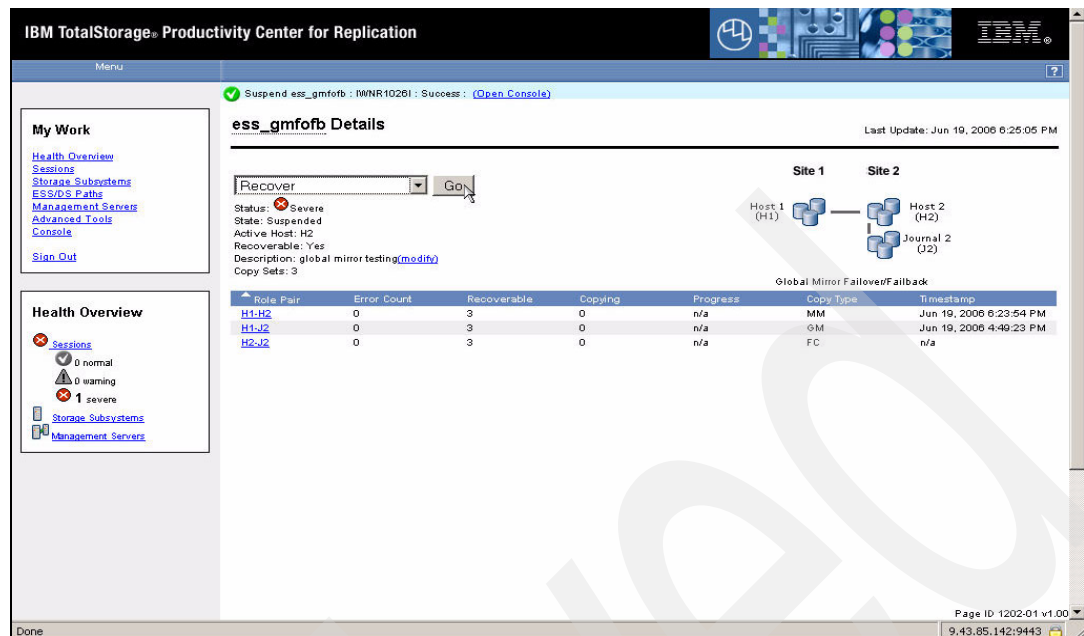


Figure 5-168 Recover

Once the status changes to *Normal* and the state to *Target Available* as we can see in Figure 5-169 the volumes in the H1- H2 copy set are now in a data consistent state. As such the Failback process is now essentially complete.

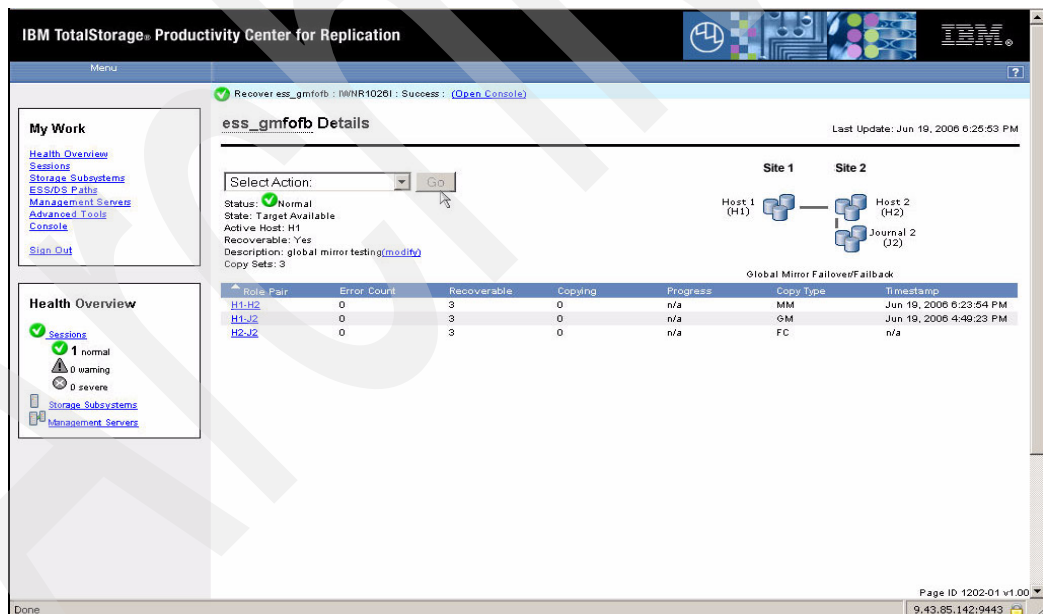


Figure 5-169 Recover result

Next we can Terminate the session as we see in Figure 5-170 on page 191. Select the **Terminate** command and then click the **Go** button.

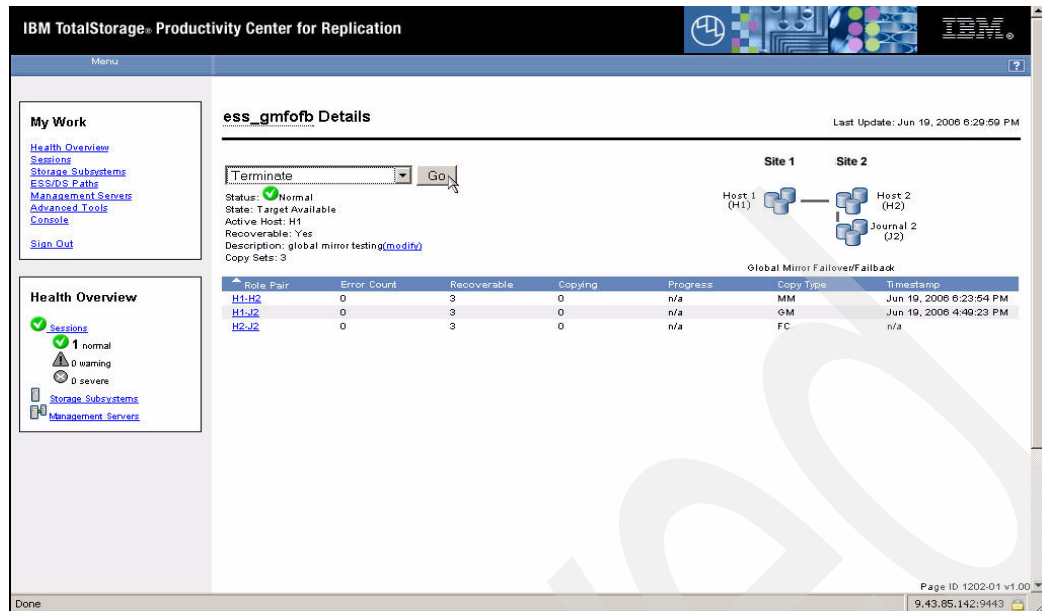


Figure 5-170 Terminate the Global Mirror session

The result of the Terminate command is shown in Figure 5-171. As we can see the session is now *Inactive* as indicated by the grey dot.

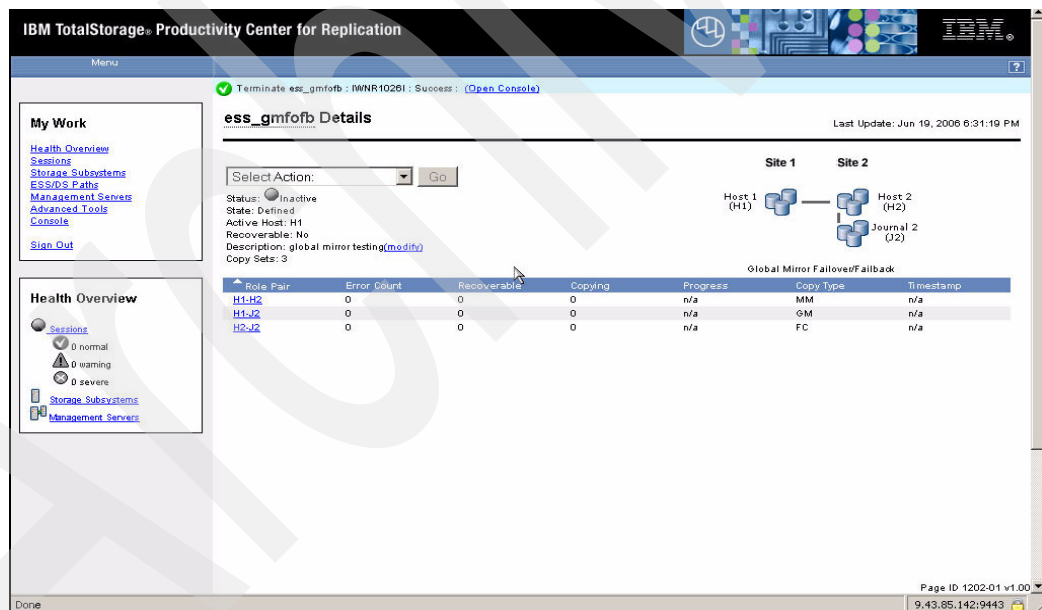


Figure 5-171 Terminate result

To check out the cleanup you can connect to the Copy Services Server on the ESS and use the LSS information panel to list whether sessions are still active as shown in Figure 5-172 on page 192.

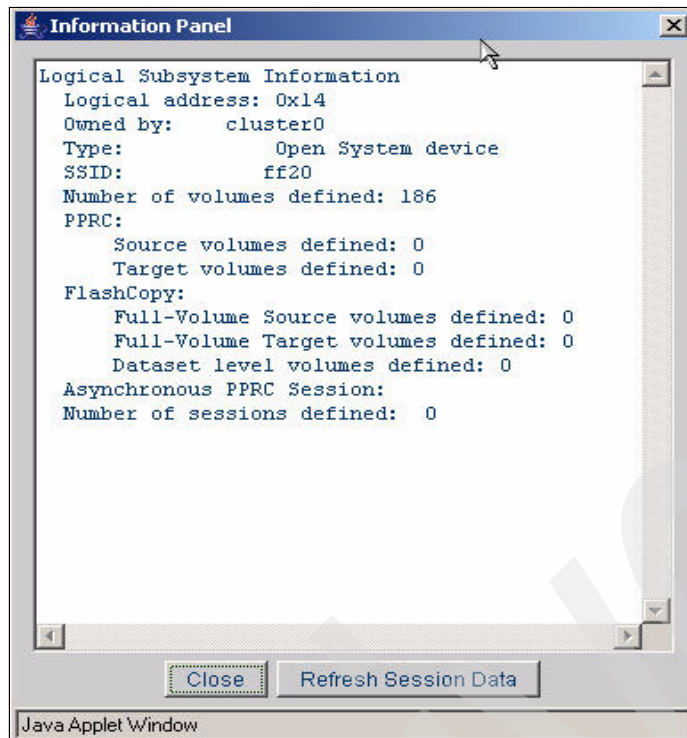


Figure 5-172 ESS 800 Copy Services Server Information Panel

5.3.15 Managing a Global Mirror session using the CSMCLI

In this scenario we have developed a script to:

- ▶ Add a session
- ▶ Add the copy sets
- ▶ List the copy sets

We see the script in Figure 5-173. Note that we now need three volumes for each copy set, H1, H2 and J2 to enable the Global Mirror session. We can also see that the session is defined as a single direction Global Mirror copy type.

```
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype gmsd -desc tucsoness_gm ess_gmsd_cli
lssess -l
mkcpset -h1 ESS:2105.18596:VOL:1402 -h2 ESS:2105.18597:VOL:1402 -j2
ESS:2105.18597:VOL:1403 ess_gmsd_cli
mkcpset -h1 ESS:2105.18596:VOL:1405 -h2 ESS:2105.18597:VOL:1405 -j2
ESS:2105.18597:VOL:1406 ess_gmsd_cli
lscpset ess_gmsd_cli
```

Figure 5-173 GM session script

The output of this script shows Example 5-18 on page 193.

Example 5-18 Add GM session output

```
C:\CSM-CLI>csmcli -script c:\csm-cli\ess_addgm.txt
IWNRI021I [Jun 23, 2006 3:29:42 PM] Session ess_gmsd_cli was successfully created.
Name          Status  State  Copy type          Recoverable Copying Copy sets Error
=====
itsovc_mm_sd1 Inactive Defined Metro Mirror Single Direction No      No      0 No
itsovc_mm      Inactive Defined Flash Copy      No      No      0 No
ess_fc_cli     Inactive Defined Flash Copy      No      No      2 No
itsovc02_mmfofb Inactive Defined Metro Mirror Failover/Failback No      No      4 No
ess_gmsd_cli   Inactive Defined Global Mirror Single Direction No      No      0 No
itsovc_mmcli   Inactive Defined Metro Mirror Single Direction No      No      0 No
itsoess_fc     Inactive Defined Flash Copy      No      No      0 No
itsovc_fccli   Inactive Defined Flash Copy      No      No      0 No
ess_gmfofb     Inactive Defined Global Mirror Failover/Failback No      No      2 No
itsovc_fc      Inactive Defined Flash Copy      No      No      1 No
IWNRI020II [Jun 23, 2006 3:29:43 PM] The pair was successfully created in session
ess_gmsd_cli for copy set ESS:2105.18596:VOL:1402 with source ESS:2105.18597:VOL:
L:1402 and target ESS:2105.18597:VOL:1403.
IWNRI020II [Jun 23, 2006 3:29:43 PM] The pair was successfully created in session
ess_gmsd_cli for copy set ESS:2105.18596:VOL:1402 with source ESS:2105.18596:VOL:
L:1402 and target ESS:2105.18597:VOL:1402.
IWNRI020II [Jun 23, 2006 3:29:43 PM] The pair was successfully created in session
ess_gmsd_cli for copy set ESS:2105.18596:VOL:1402 with source ESS:2105.18596:VOL:
L:1402 and target ESS:2105.18597:VOL:1403.
IWNRI020II [Jun 23, 2006 3:29:44 PM] The pair was successfully created in session
ess_gmsd_cli for copy set ESS:2105.18596:VOL:1405 with source ESS:2105.18597:VOL:
L:1405 and target ESS:2105.18597:VOL:1406.
IWNRI020II [Jun 23, 2006 3:29:44 PM] The pair was successfully created in session
ess_gmsd_cli for copy set ESS:2105.18596:VOL:1405 with source ESS:2105.18596:VOL:
L:1405 and target ESS:2105.18597:VOL:1405.
IWNRI020II [Jun 23, 2006 3:29:44 PM] The pair was successfully created in session
ess_gmsd_cli for copy set ESS:2105.18596:VOL:1405 with source ESS:2105.18596:VOL:
L:1405 and target ESS:2105.18597:VOL:1406.
H1 Volume          Session          Volumes
=====
ESS:2105.18596:VOL:1402 ess_gmsd_cli      3
ESS:2105.18596:VOL:1405 ess_gmsd_cli      3

C:\CSM-CLI>
```

Now that the session is defined we can once again issue the Start command. Note this is not a Start H1 - H2 as this is only available with a Failover / Failback session type. In Example 5-19 we submit the command straight to the TPC for Replication server. We have also added a number of other commands to list the status of the session and of the role pairs as well.

Example 5-19 Start GM session

```
C:\CSM-CLI>csmcli cmdsess -quiet -action start ess_gmsd_cli
IWNRI026I [Jun 23, 2006 3:30:31 PM] The runCommand for command Start in session
ess_gmsd_cli completed successfully.

C:\CSM-CLI>csmcli lssess -l -fmt stanza ess_gmsd_cli
Name          ess_gmsd_cli
Status        Normal
State         Prepared
Copy type     Global Mirror Single Direction
Recoverable   Yes
Copying       Yes
Copy sets     2
Error         No

C:\CSM-CLI>csmcli lspair -l -fmt stanza -rolepair h1-j2 ess_gmsd_cli
Source volume  ESS:2105.18596:VOL:1402
Target volume  ESS:2105.18597:VOL:1403
RolePair       H1-J2
State          Prepared
Recoverable    Yes
Copying        Yes
New            No
Copy set       ESS:2105.18596:VOL:1402
```

```
Timestamp      n/a
Last result    IWNR2011I

Source volume  ESS:2105.18596:VOL:1405
Target volume  ESS:2105.18597:VOL:1406
RolePair       H1-J2
State          Prepared
Recoverable    Yes
Copying        Yes
New            No
Copy set       ESS:2105.18596:VOL:1405
Timestamp      n/a
Last result    IWNR2011I
```

```
C:\CSM-CLI>
```

Next we can change the Global Mirror session parameters via the commands shown in Example 5-20.

Example 5-20 Sync change

```
C:\CSM-CLI>csmdi chsess -quiet -coordint 60 -rpo 60 ess_gmsd_cli
IWNRI228I [Jun 23, 2006 4:03:36 PM] The setOptions command for session ess_gmsd_
cli completed successfully.
```

```
C:\CSM-CLI>csmdi lssessdetails -l -fmt stanza ess_gmsd_cli
```

```
Option name coordint
Value      60
Descripton NONE
```

```
Option name maxdrain
Value      30
Descripton NONE
```

```
Option name rpo
Value      60
Descripton NONE
```

```
C:\CSM-CLI>
```

Using the ESS Copy Services server we display the volumes as Figure 5-174 on page 195 shows. You can use the legend to interpret the display.

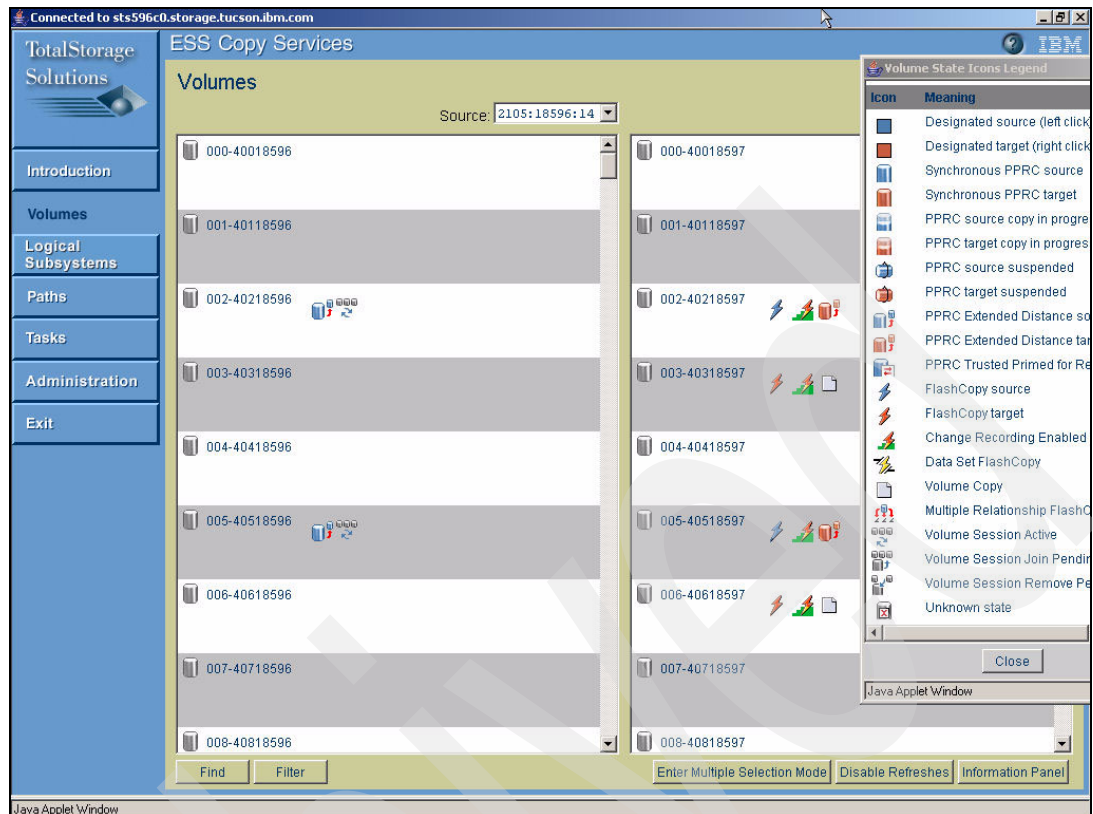


Figure 5-174 ESS Copy Services server GUI

Finally we can run a script to shutdown the session cleanly and make the volumes at both sites available via Suspend / Recover commands. Figure 5-175 shows the script we used to perform this task. Note that it does have a number of list commands as well, which enable us to determine more detail about the copy sets and their various states.

```
#
# This is a CSMCLI script file
# Using List commands to interrogate TPC 4 R
#
cmdsess -quiet -action suspend ess_gmsd_cli
lsess -l -fmt stanza ess_gmsd_cli
lspair -l -rolepair h1-h2 ess_gmsd_cli
lspair -l -rolepair h1-j2 ess_gmsd_cli
lspair -l -rolepair h2-j2 ess_gmsd_cli
cmdsess -quiet -action recover ess_gmsd_cli
lsess -l -fmt stanza ess_gmsd_cli
lspair -l -rolepair h1-h2 ess_gmsd_cli
lspair -l -rolepair h1-j2 ess_gmsd_cli
lspair -l -rolepair h2-j2 ess_gmsd_cli
```

Figure 5-175 Suspend/Recover script

The result of the script execution is shown in Example 5-21.

Example 5-21 Suspend output

```
C:\CSM-CLI>csmdi -script c:\csm-cli\suspend_sess.txt
```

IWNR1026I [Jun 23, 2006 4:44:13 PM] The runCommand for command Suspend in session n ess_gmsd_cli completed successfully.

```

Name          ess_gmsd_cli
Status        Severe
State         Suspended
Copy type     Global Mirror Single Direction
Recoverable   Yes
Copying       Yes
Copy sets     2
Error         No
Source volume      Target volume      RolePair State      Recoverable Copying New
Copy set          Timestamp Last result
=====
ESS:2105.18596:VOL:1402 ESS:2105.18597:VOL:1402 H1-H2    Preparing No          Yes    No
ESS:2105.18596:VOL:1402 n/a          IWNR2011I
ESS:2105.18596:VOL:1405 ESS:2105.18597:VOL:1405 H1-H2    Preparing No          Yes    No
ESS:2105.18596:VOL:1405 n/a          IWNR2011I
Source volume      Target volume      RolePair State      Recoverable Copying New
Copy set          Timestamp Last result
=====
ESS:2105.18596:VOL:1402 ESS:2105.18597:VOL:1403 H1-J2    Suspended Yes        No     No
ESS:2105.18596:VOL:1402 Jun 23, 2006 4:44:48 PM IWNR2027I
ESS:2105.18596:VOL:1405 ESS:2105.18597:VOL:1406 H1-J2    Suspended Yes        No     No
ESS:2105.18596:VOL:1405 Jun 23, 2006 4:44:48 PM IWNR2027I
Source volume      Target volume      RolePair State      Recoverable
Copying New Copy set          Timestamp Last result
=====
ESS:2105.18597:VOL:1402 ESS:2105.18597:VOL:1403 H2-J2    Target Available No      Yes
No ESS:2105.18596:VOL:1402 n/a          IWNR2016I
ESS:2105.18597:VOL:1405 ESS:2105.18597:VOL:1406 H2-J2    Target Available No      Yes
No ESS:2105.18596:VOL:1405 n/a          IWNR2016I

```

IWNR1026I [Jun 23, 2006 4:44:24 PM] The runCommand for command Recover in session ess_gmsd_cli completed successfully.

```

Name          ess_gmsd_cli
Status        Warning
State         Recovering
Copy type     Global Mirror Single Direction
Recoverable   Yes
Copying       Yes
Copy sets     2
Error         No
Source volume      Target volume      RolePair State      Recoverable
Copying New Copy set          Timestamp Last result
=====
ESS:2105.18596:VOL:1402 ESS:2105.18597:VOL:1402 H1-H2    Target Available No      No
No ESS:2105.18596:VOL:1402 n/a          IWNR2021I
ESS:2105.18596:VOL:1405 ESS:2105.18597:VOL:1405 H1-H2    Target Available No      No
No ESS:2105.18596:VOL:1405 n/a          IWNR2021I
Source volume      Target volume      RolePair State      RecoverableCopying New
Copy set          Timestamp Last result
=====
ESS:2105.18596:VOL:1402 ESS:2105.18597:VOL:1403 H1-J2    Recovering Yes No      No
ESS:2105.18596:VOL:1402 Jun 23, 2006 4:44:48 PM IWNR2724I
ESS:2105.18596:VOL:1405 ESS:2105.18597:VOL:1406 H1-J2    Recovering Yes No      No
ESS:2105.18596:VOL:1405 Jun 23, 2006 4:44:48 PM IWNR2724I

```

Source volume Copy set	Target volume Timestamp Last result	RolePair State	Recoverable	Copying	New
ESS:2105.18597:VOL:1402	ESS:2105.18597:VOL:1403	H2-J2 Restoring	Yes	Yes	No
ESS:2105.18596:VOL:1402	n/a IWNR2018I				
ESS:2105.18597:VOL:1405	ESS:2105.18597:VOL:1406	H2-J2 Restoring	Yes	Yes	No
ESS:2105.18596:VOL:1405	n/a IWNR2018I				

C:\CSM-CLI>

Once complete we can issue the Terminate command straight in the CSMCLI interface. We can see the result in Example 5-22.

Example 5-22 Terminate

```
C:\CSM-CLI>csmcli cmdsess -quiet -action terminate ess_gmsd_cli
IWNR1026I [Jun 23, 2006 4:49:17 PM] The runCommand for command Terminate in sess
ion ess_gmsd_cli completed successfully.

C:\CSM-CLI>csmcli lssess -l -fmt stanza ess_gmsd_cli
Name          ess_gmsd_cli
Status        Inactive
State         Defined
Copy type     Global Mirror Single Direction
Recoverable   No
Copying       No
Copy sets     2
Error         No

C:\CSM-CLI>
```

This completes the section about how to manage Copy Services tasks in a ESS 800 environment through TPC for Replication.

5.4 TPC for Replication and DS8000

In this section we discuss various Copy Services tasks and how they are carried out with TPC for Replication in a DS8000 environment. For a DS6000 there is no difference compared to the DS8000. If you have gone through 5.3, “TPC for Replication and ESS 800” on page 112 you will notice that there is almost no difference compared to what follows in this section for the DS8000. A major design goal for TPC for Replication is to provide the same look and feel to all functions in TPC for Replication independent on the application server platform and the storage volumes. TPC for Replication manages all volume types in the same consistent manner.

What is different between the DS8000 and the DS6000 in the TPC for Replication environment is the way each storage subsystem is defined to the TPC for Replication server. We will discuss how to define each storage subsystem using the GUI and the CSMCLI.

5.4.1 Adding a DS8000 / DS6000 storage server to TPC-RM using the GUI

Before we go through the steps about how to define a DS8000 to TPC for replication you need to understand the connectivity requirements between the TPC for Replication server

and the DS8000 storage server which is going to be defined to the TPC for Replication server.

Connectivity between TPC-RM servers and DS6000 / DS8000

Figure 5-176 is a brief repetition on what was already discussed in Chapter 2, “TPC for Replication planning” on page 19

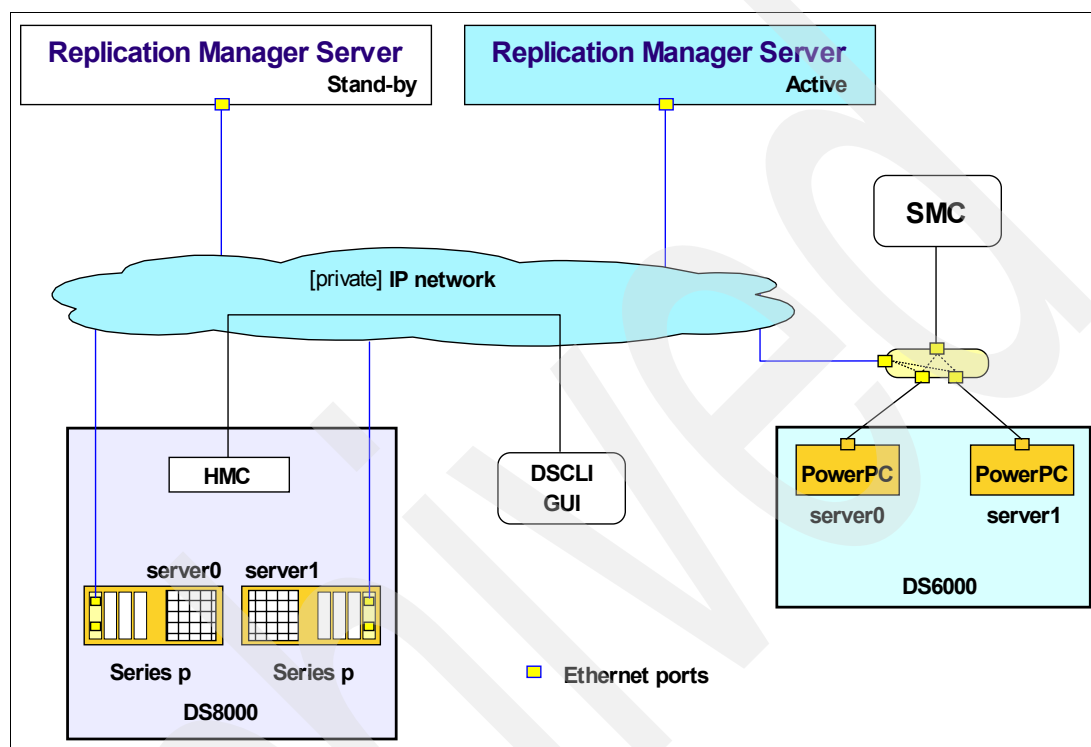


Figure 5-176 Connectivity structure between TPC for Replication server and DS storage servers

Figure 5-176 shows that a LAN is required between the Replication Manager server(s) and the DS6000s and the DS8000s which are going to be connected to the Replication Manager servers before we can start to manage Copy Services tasks with these DS storage servers. To connect the DS6000 connect the network in which the TPC-RM server resides to the internal network of the DS6000 which is already used by the SMC server.

It is different for the DS8000. Here the TPC-RM server does not connect to the internal or external HMCs of the DS8000 but rather to newly installed and dedicated Ethernet ports. These ports have to be defined before you can connect to these ports with the TPC-RM server. See 4.1, “DS8000 Ethernet card configuration” on page 62.

Configuration details for DS6000 / DS8000 connectivity to TPC-RM

Before we define a DS6000 or a DS8000 to TPC for Replication server it is important to understand the difference about how TPC for Replication servers connect to a DS6000 and how they connect to a DS8000.

Figure 5-177 on page 199 displays the IP address structure about how TPC for Replication connects to a DS8000. It requires a dedicated and new Ethernet card which installs directly into the Series p based servers in the DS8000. In each server are four or five empty slots available. This new Ethernet card installs in the first slot of each Series p server.

Note that each Ethernet card contains two Ethernet ports which are currently based on a 1 Gbit technology.

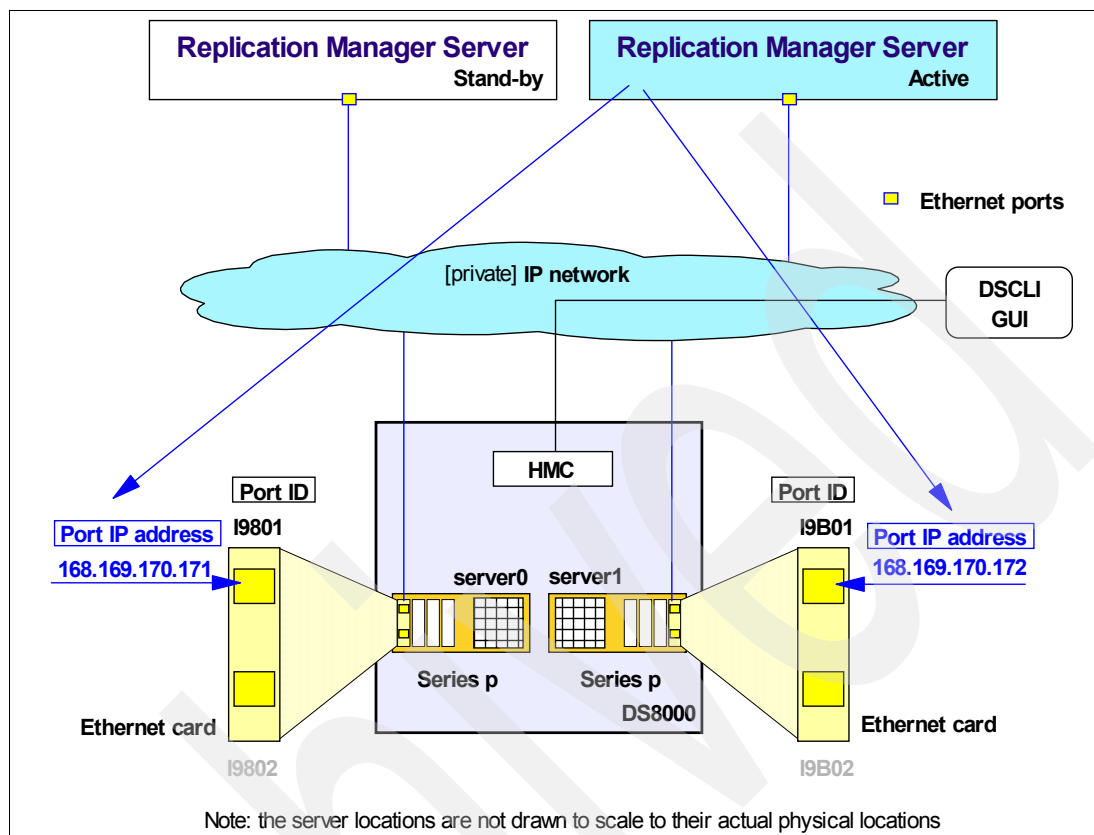


Figure 5-177 LAN connectivity between DS8000 and TPC for Replication server

A DS8000 is defined to a TPC for Replication server through the IP address of the first port in each Ethernet card in each Series p server. It is not the IP address of the Series p server nor is it the IP address of the internal or external HMC.

These Ethernet ports are additionally identified by their port ID. This is:

- Port ID I9801 for the first port in the card in server 0 and
- Port ID I9B01 in the first port in the card in server 1.

There are new feature codes for these Ethernet cards for the DS8000. See 2.3.7, "New DS8000 Ethernet card feature codes" on page 28.

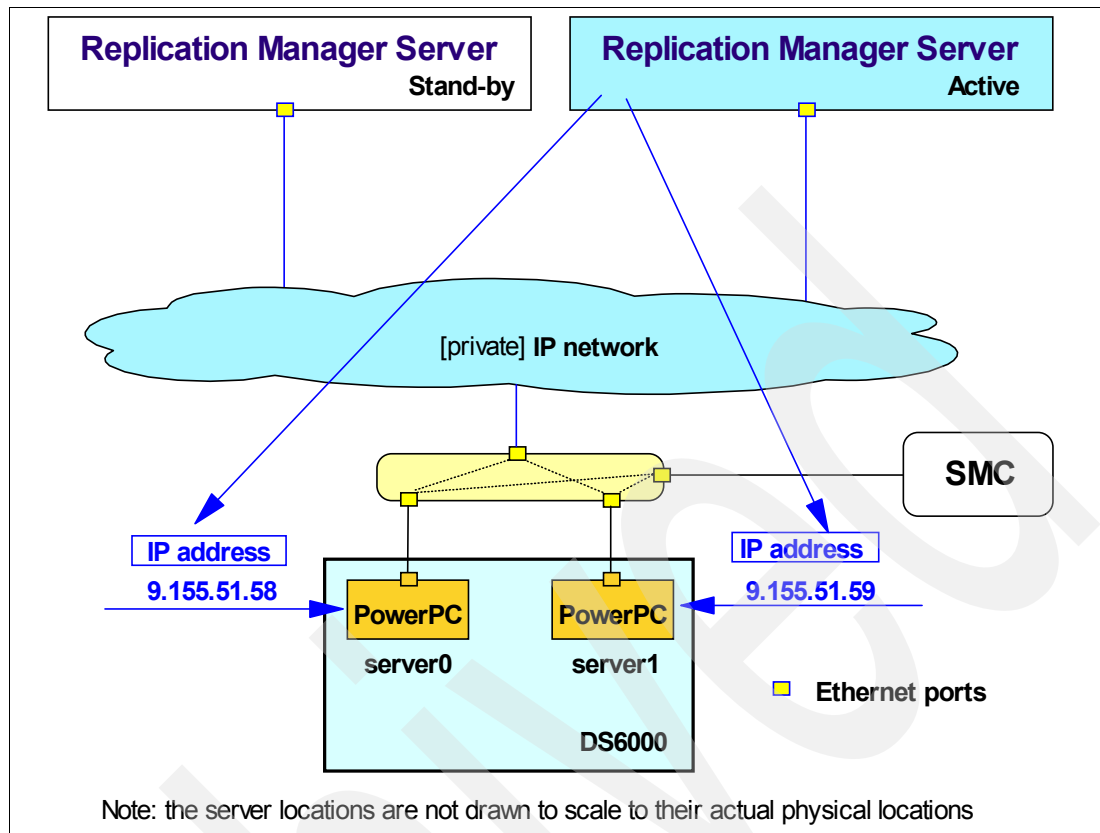


Figure 5-178 LAN connectivity between DS6000 and TPC for Replication server

In contrast to the way a DS8000 connects to the TPC for Replication server, the DS6000 does not require an additional Ethernet card. The TPC for Replication server just connects to the same network that the external Storage Management Console (SMC) belongs to. For that reason the IP address of each PowerPC® based server is defined in the TPC for Replication server. So it is not the IP address of the external SMC but rather the IP addresses of the internal servers in the DS6000.

Define a DS6000 to TPC-RM through the GUI

The following GUI sequence shows the steps which are needed to define a DS6000 to the TPC for Replication server.

These screen captures look very similar to the screens which describe how to define an ESS 800 or a SVC to the TPC for Replication server.

Figure 5-179 on page 201 shows the screen to start with. After logging in to the TPC-RM server through the GUI the Storage Subsystems overview displays four subsystems which are already defined to this TPC-RM server.

To add another subsystem click the Add Subsystem button.

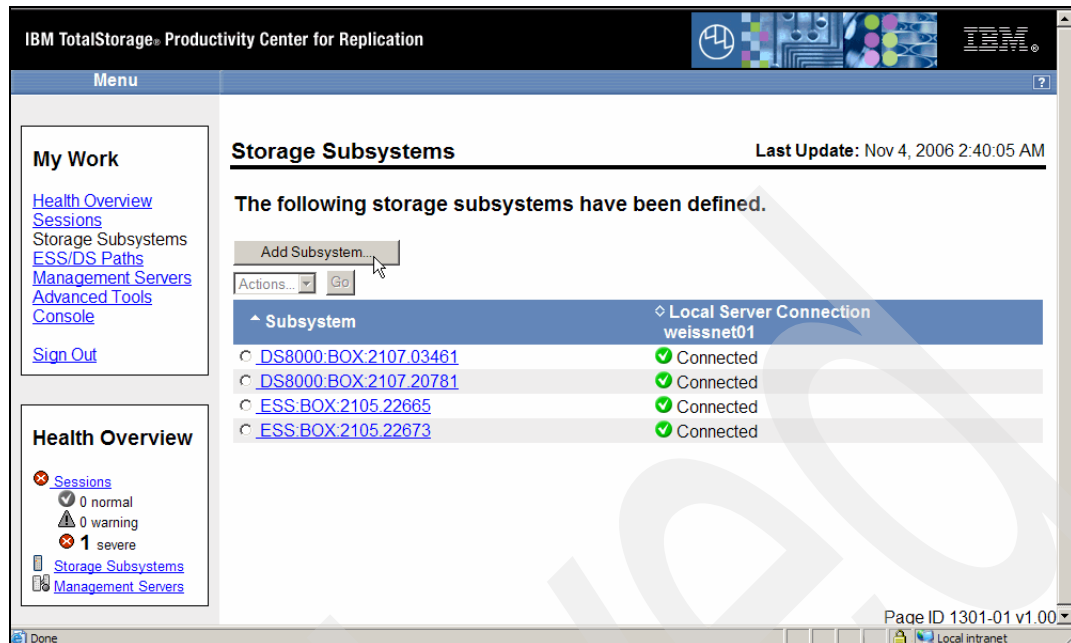


Figure 5-179 Add Storage Subsystem to RM server - start with Storage Subsystems in My Work

Figure 5-180 is the next window which details the type of storage subsystem to add to TPC-RM. Because we plan to add a DS6000 we select the radio button for ESS or DS storage subsystems and click **OK** to continue.

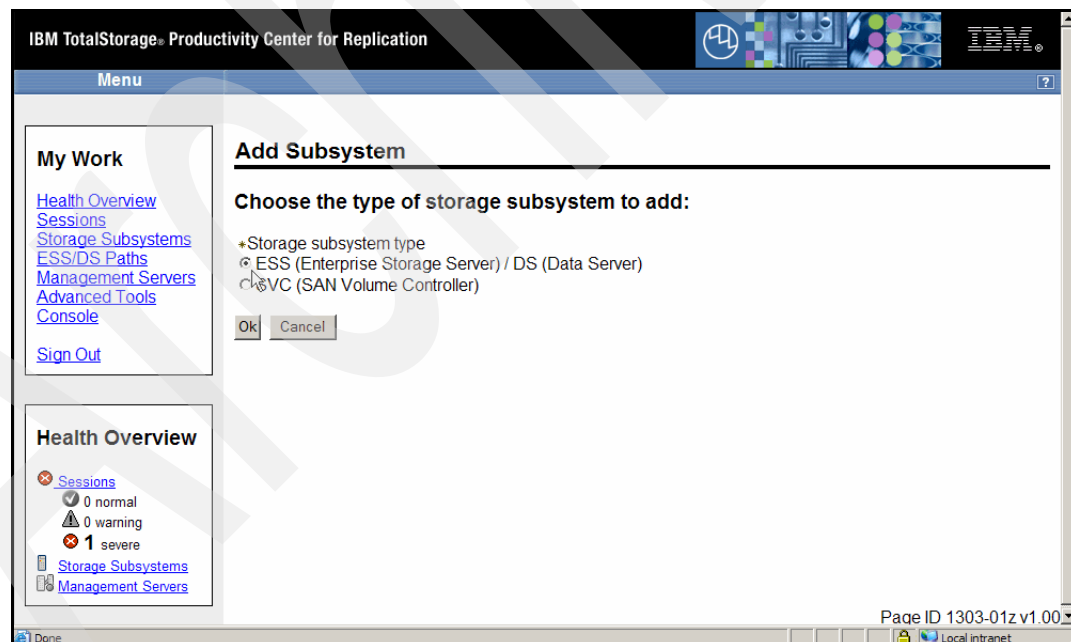


Figure 5-180 Add Storage Subsystem to RM server - Select ESS / DS radio button

Figure 5-181 on page 202 displays the most important panel in this sequence of panels. Here you specify the connectivity details to define the DS6000, or a DS8000, to this TPC-RM server.

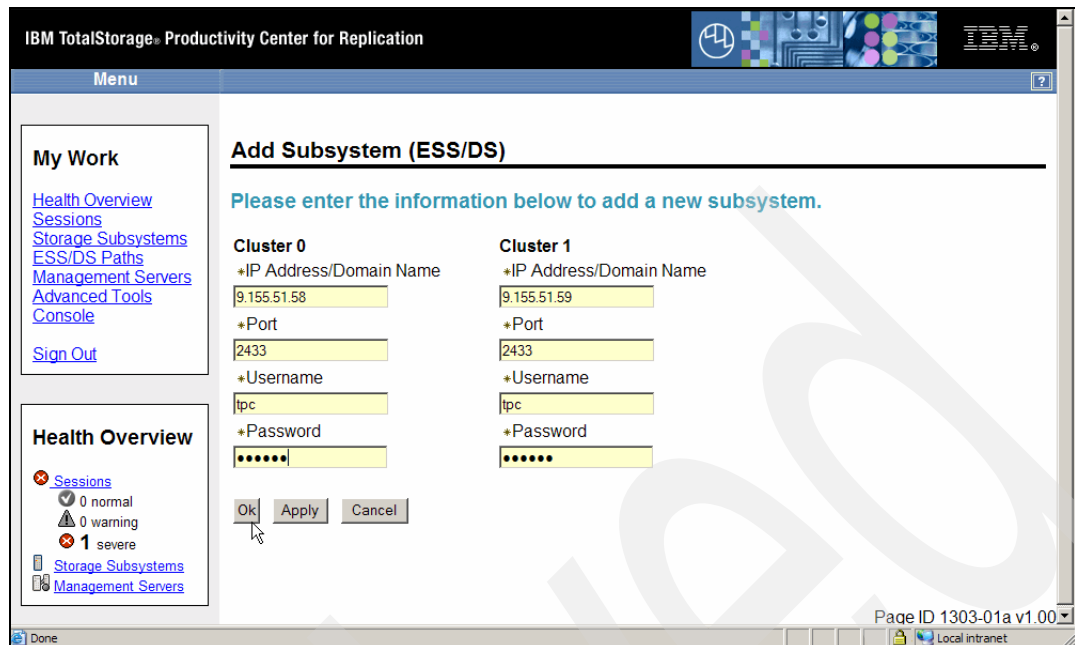


Figure 5-181 Add Storage Subsystem to RM server - Details to connect RM server to DS6000

Note that the IP addresses you specify here are the IP addresses of the internal DS6000 servers as Figure 5-178 on page 200 displays. The panel in Figure 5-181 calls these servers *Cluster 0* and *Cluster 1*.

The port in Figure 5-181 is predefined and you do not change this number.

The *Username* and *Password* have the following rules:

- ▶ During installation and setup of the DS6000, or when TPC-RM is going to be implemented, the IBM CE defines through root level access to the Linux system in the DS6800 a file named `/persost/etc/fccwUsers` with two lines.
 - a. The first line must contain the digit 1 in position 1
 - b. The second line contains the <Username> and <Password> which go into the panel as Figure 5-181 displays. Note that there is only a single space between Username and Password and not a tab or any other separator character.

A certain permission activates this setting which the IBM CE performs. Remember that this file has to go to both controllers.

Example 5-23 shows an example of the DS6800 based username and password file.

Example 5-23 DS6800 based file which contains username and password

```
1
tpc passw0rd
```

In Figure 5-181 you click **OK** when this is the only storage subsystem to connect for now or you click **Apply** when you have to define another storage subsystem to this TPC for Replication server. In our scenario we click **OK**. The next window is shown in Figure 5-182 on page 203. It shows the new box with a warning mark and in the process of *Connecting*.

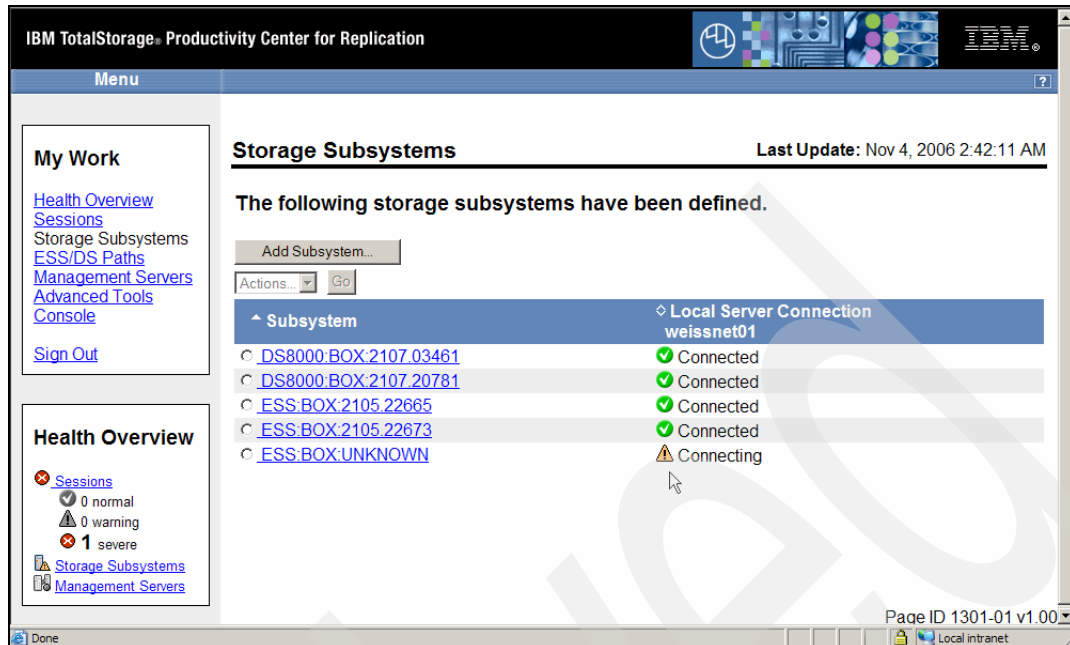


Figure 5-182 Add Storage Subsystem to RM server - RM server is about to connect to DS6000

After a brief period Figure 5-183 displays the final results. The newly added storage subsystem jumps to the top of the list and is now the fifth storage subsystem defined to this TPC for Replication server. Note that the UNKNOWN BOX changed to DS6000 storage server.

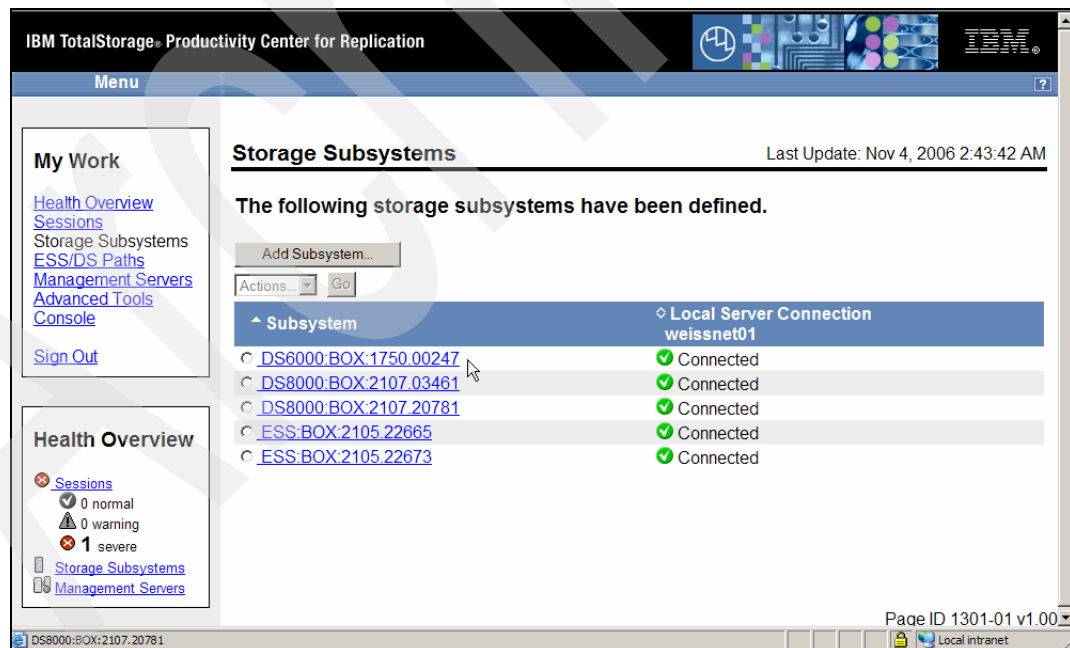


Figure 5-183 Add Storage Subsystem to RM server - completed

This completes the process to define a new storage subsystem, here a DS6000, to the STPC for Replication server.

Define a DS8000 to TPC-RM through the GUI

You define a DS8000 in exactly the same manner to the TPC for Replication server as the previously defined DS6000.

As Figure 5-181 on page 202 shows you need a pair of IP addresses. In the case of a DS8000 this is not the internal servers IP address of the DS8000 but the IP address of the Ethernet ports which have been installed before. See 4.1, “DS8000 Ethernet card configuration” on page 62.

The only actual difference between DS6000 and DS8000 is the *Username* and *password* which you need to define a DS8000 to TPC for Replication servers. It is not a file as for the DS6000 but it is rather a static solution and follows these rules:

- ▶ *Username* is just a constant and the default *username* is **tpcruser**. Note the **r** between **tpc** and **user**.
- ▶ *Password* is the serial number of the storage facility image (SFI). Note that it is not the unit number. For example the unit number is **27550**. Then the SFI is **27551**. The SFI number is preceded by the code of the manufacturing site which is usually **75** for the European manufacturing site or a **13** when the DS8000 has been built in San Jose. The corresponding password in this case is then **7527551**. This would go in Figure 5-181 on page 202 for *username* and *password* when you define a DS8000 to the TPC for Replication server.

When you want to change the default username and password contact the IBM CE.

With Release 2.4 of the DS8000 microcode you may alter the password without the help of an IBM CE. Release 2.4 provides a new DSCLI command to alter the *password* and Example 5-24 shows this new command.

Example 5-24 New DSCLI command to alter the password

```
setrm pw -dev sfi_image_id -server 0 | 1 | both -rmpw new_rm_password
```

It is useful to specify **both** to create the same password for both DS8000 servers.

Note that the *username* remains as **tpcruser**.

Before discussing how to add a DS6000 or a DS8000 to a TPC for Replication server through the CSMCLI we briefly cover first some basics about the CSMCLI.

5.4.2 Invoke CSMCLI

CSMCLI commands are usually invoked interactively or through scripts.

We start first the scripts approach scripts which you may consider in a more automated or semi-automated way to manage a Copy Services environment. In the following examples we invoke the CSMCLI with the **-script** parameter which points to a file which contains the actual TPC-RM CSMCLI commands.

Example 5-25 on page 205 contains the actual script file with two commands. The **setoutput** command in this example causes the output to format with a delimiter, which is a comma by default. The actual command which provides output is a **lsdevice** command which lists all DS6000 and DS8000 which are currently defined to the TPC-RM server.

Example 5-25 Script file [lsdevice.txt](#) with delimiter separator request for output

```
#
# list device
# -----
setoutput -fmt delim

lsdevice -l -devtype ds
# ----- end of script -----
```

Example 5-26 displays the actual output which is not very readable and rather suited for later processing by another program reading it out of a file. The comma is then a helpful separator character when automatically processing the command output.

Example 5-26 Output of script file [lsdevice.txt](#) with delimiter separated output

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script lsdevice.txt
Device ID,Device type,Device IP address
=====
DS8000:BOX:2107.20781,DS8000,9.155.86.128;9.155.86.129
DS8000:BOX:2107.03461,DS8000,9.155.50.53;9.155.50.54
```

Example 5-27 is the actual script file again with two commands. The **setoutput** command now requires a different output format for the following **lsdevice** command to list all DS6000 and DS8000 which are currently defined to this TPC-RM server.

Example 5-27 Script file [lsdevice.txt](#) with stanza format output request

```
#
# list device
# -----
# setoutput -fmt delim
setoutput -fmt stanza

lsdevice -l -devtype ds
# ----- end of script -----
```

Example 5-28 displays the output of this **lsdevice** command and formats the output in stanza format. This stanza format is often better to read than a line formatted output which may overflow the line length which in turn makes it harder to read. In this particular case the stanza format separates each storage subsystem by a blank line which provides a clearer output structure to read.

Example 5-28 Output of script file [lsdevice.txt](#) with stanza format output

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script lsdevice.txt
Device ID      DS8000:BOX:2107.20781
Device type    DS8000
Device IP address 9.155.86.128;9.155.86.129

Device ID      DS8000:BOX:2107.03461
Device type    DS8000
Device IP address 9.155.50.53;9.155.50.54
```

Example 5-29 is again the script file with the **lsdevice** command. The default output format is a tabular or line format which may often overflow the line length and this makes it hard to read the output on the screen.

*Example 5-29 Script file **lsdevice.txt** without the **setoutput** statement*

```
#
# list device
# -----

lsdevice -l -devtype ds

# ----- end of script -----
```

As long as the output does not overflow lines the output is presented in this tabular form. Example 5-30 displays the very same **lsdevice** command output from the previous scripts.

*Example 5-30 Output of **lsdevice.txt** script file*

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script lsdevice.txt
Device ID          Device type Device IP address
=====
DS8000:BOX:2107.20781 DS8000      9.155.86.128;9.155.86.129
DS8000:BOX:2107.03461 DS8000      9.155.50.53;9.155.50.54
```

To see the difference of various output formats and to decide which output format is appropriate we use another simple script which issues the same command to list all defined paths between two LSSs three times. But each output is presented in a different way. Example 5-31 displays the source of the brief script which is a file **lspath.txt** in the same directory that the **csmcli.bat** file resides in.

*Example 5-31 Compare different output formats with **lspath** command*

```
#
# list path(s) 20781/90 -> 03461/A0
# -----
# default output format
lspath -l -src DS8000:2107.20781:LSS:90 -tgt DS8000:2107.03461:LSS:A0
#
setoutput -fmt delim -v on
lspath -l -src DS8000:2107.20781:LSS:90 -tgt DS8000:2107.03461:LSS:A0
#
setoutput -fmt stanza
lspath -l -src DS8000:2107.20781:LSS:90 -tgt DS8000:2107.03461:LSS:A0
# ----- end of script -----
```

Example 5-32 displays the output of this little script and shows again the difference on various output format settings.

Example 5-32 Different output format settings

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script lspath.txt
Source          Target          Type Status Auto-Generated
=====
DS8000:2107.20781:LSS:90.0x0001 DS8000:2107.03461:LSS:a0.0x0031 ESS Normal No
DS8000:2107.20781:LSS:90.0x0400 DS8000:2107.03461:LSS:a0.0x0140 ESS Normal No
DS8000:2107.20781:LSS:90.0x0402 DS8000:2107.03461:LSS:a0.0x0143 ESS Normal No
DS8000:2107.20781:LSS:90.0x0501 DS8000:2107.03461:LSS:a0.0x0101 ESS Normal No
```

Source ,Target,Type,Status,Auto-Generated

=====

DS8000:2107.20781:LSS:90.0x0001,DS8000:2107.03461:LSS:a0.0x0031,ESS,Normal,No
DS8000:2107.20781:LSS:90.0x0400,DS8000:2107.03461:LSS:a0.0x0140,ESS,Normal,No
DS8000:2107.20781:LSS:90.0x0402,DS8000:2107.03461:LSS:a0.0x0143,ESS,Normal,No
DS8000:2107.20781:LSS:90.0x0501,DS8000:2107.03461:LSS:a0.0x0101,ESS,Normal,No

Source DS8000:2107.20781:LSS:90.0x0001
Target DS8000:2107.03461:LSS:a0.0x0031
Type ESS
Status Normal
Auto-Generated No

Source DS8000:2107.20781:LSS:90.0x0400
Target DS8000:2107.03461:LSS:a0.0x0140
Type ESS
Status Normal
Auto-Generated No

Source DS8000:2107.20781:LSS:90.0x0402
Target DS8000:2107.03461:LSS:a0.0x0143
Type ESS
Status Normal
Auto-Generated No

Source DS8000:2107.20781:LSS:90.0x0501
Target DS8000:2107.03461:LSS:a0.0x0101
Type ESS
Status Normal
Auto-Generated No

C:\Program Files\IBM\CSMCLI\CLI>

The results in Example 5-32 on page 206 suggest using the stanza format when you invoke CSMCLI commands and read the output on the screen. When the output does not overflow the line length you may use the default output format. Figure 5-184 on page 208 gives you a hint about how to adjust the DOS box line length.

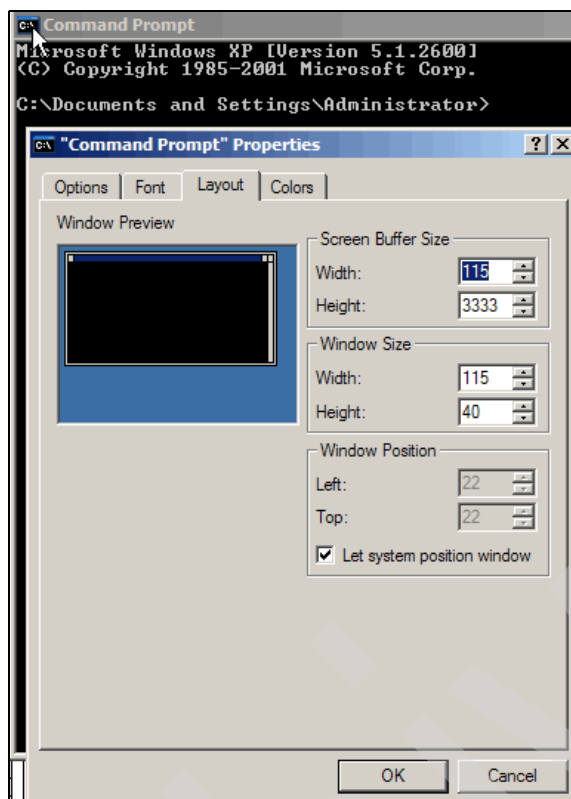


Figure 5-184 Adjust line length in DOS box before executing CSMCLI commands

Right-click the top left corner of the command prompt. Select Properties and then the Layout tab where you may change the actual line length.

If you use a different directory structure for the script files from the directory where the **csmdi.bat** file resides in then you define the fully qualified directory structure where the script file resides. Example 5-33 displays the invocation of a script file with a fully qualified directory structure.

Example 5-33 Invoke script file with fully qualified directory structure

C:\Program Files\IBM\CSMCLI\CLI>**csmdi -script "c:\Program Files\IBM\CSMCLI\CLI\lspath.txt"**

Source	Target	Type	Status	Auto-Generated
DS8000:2107.20781:LSS:90.0x0001	DS8000:2107.03461:LSS:a0.0x0031	ESS	Normal	No
DS8000:2107.20781:LSS:90.0x0400	DS8000:2107.03461:LSS:a0.0x0140	ESS	Normal	No
DS8000:2107.20781:LSS:90.0x0402	DS8000:2107.03461:LSS:a0.0x0143	ESS	Normal	No
DS8000:2107.20781:LSS:90.0x0501	DS8000:2107.03461:LSS:a0.0x0101	ESS	Normal	No

Source ,Target,Type,Status,Auto-Generated

DS8000:2107.20781:LSS:90.0x0001,DS8000:2107.03461:LSS:a0.0x0031,ESS,Normal,No
 DS8000:2107.20781:LSS:90.0x0400,DS8000:2107.03461:LSS:a0.0x0140,ESS,Normal,No
 DS8000:2107.20781:LSS:90.0x0402,DS8000:2107.03461:LSS:a0.0x0143,ESS,Normal,No
 DS8000:2107.20781:LSS:90.0x0501,DS8000:2107.03461:LSS:a0.0x0101,ESS,Normal,No

Source	DS8000:2107.20781:LSS:90.0x0001
Target	DS8000:2107.03461:LSS:a0.0x0031
Type	ESS
Status	Normal
Auto-Generated	No

Source DS8000:2107.20781:LSS:90.0x0400
 Target DS8000:2107.03461:LSS:a0.0x0140
 Type ESS
 Status Normal
 Auto-Generated No

Source DS8000:2107.20781:LSS:90.0x0402
 Target DS8000:2107.03461:LSS:a0.0x0143
 Type ESS
 Status Normal
 Auto-Generated No

Source DS8000:2107.20781:LSS:90.0x0501
 Target DS8000:2107.03461:LSS:a0.0x0101
 Type ESS
 Status Normal
 Auto-Generated No

C:\Program Files\IBM\CSMCLI\CLI>

You start the **csmdi.bat** to get into the interactive CSMCLI mode.

Figure 5-185 displays the location of the **csmdi.bat** file. Click this file to start the interactive CSMCLI mode.

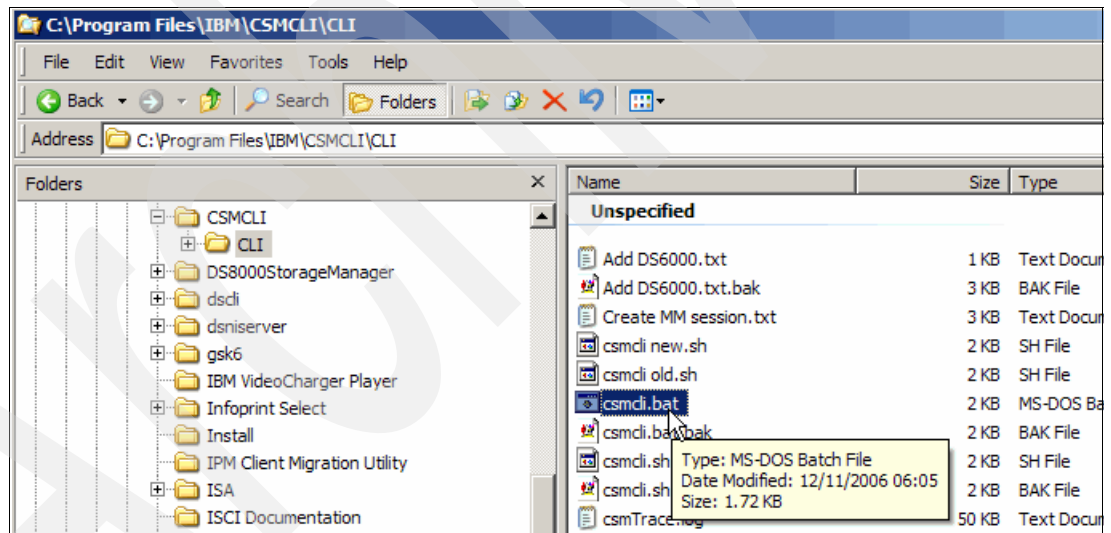


Figure 5-185 Invoke CSMCLI in interactive mode

Example 5-34 displays the content of this **csmdi.bat** file. Make sure you update the file to reflect other files which are required to invoke the CSMCLI in interactive or script mode.

Example 5-34 Content of csmcli.bat

```
@echo off
TITLE IBM Replication Manager CLI
@setlocal
set CSMCLI_HOME="C:\Program Files\IBM\CSMCLI\CLI"

REM *****
```

```

REM Set up the environment for this specific configuration.  Both
REM JAVA_HOME and CSMCLI_HOME must be defined in environment variables.
REM *****
set CSMJDK="%JAVA_HOME%"
if "%CSMJDK%"==" " GOTO ERROR_JAVA
set CSMCLI="%CSMCLI_HOME%"
if "%CSMCLI%"==" " GOTO ERROR_CLI
set PATH="%CSMCLI%\lib;%PATH%"
set
CSMCP=.;lib\csmcli.jar;lib\clicommon.jar;lib\csmclient.jar;lib\essClientApi.jar;
set CSMCP=%CSMCP%;lib\ibmCIMClient.jar;lib\jlog.jar;lib\jsse.jar;lib\xerces.jar;
set
CSMCP=%CSMCP%;lib\rmessages.jar;lib\snmp.jar;lib\ssgclihelp.jar;lib\ssgfrmwk.jar;

REM *****
REM Execute the CSMCLI program.
REM *****
cd /d "%CSMCLI%"
"%CSMJDK%\bin\java" -classpath %CSMCP% com.ibm.storage.mdm.cli.rm.RmCli %*
GOTO END

REM *****
REM The Java interpreter home environment variable, JAVA_HOME, is not set
REM *****
:ERROR_JAVA
echo The JAVA_HOME environment variable is not set. Please see documentation.
GOTO END

REM *****
REM The CSM CLI home environment variable, CSMCLI_HOME, is not set
REM *****
:ERROR_CLI
echo The CSMCLI_HOME environment variable is not set. Please see documentation.

:END
@endlocal

```

See also 4.4, "Remote CSMCLI installation" on page 80 for CSMCLI setup tasks.

5.4.3 Add a DS6000 to TPC-RM via CSMCLI

Although it is very convenient to define a DS6000 or a DS8000 through the Replication Manager GUI you may choose to use the CSMCLI instead.

The script in Example 5-35 contains two **lsdevice** commands before the actual **adddevice** command and two **lsdevice** commands after the **adddevice** command.

The **adddevice** command actually adds a DS6000 to the TPC for Replication server. Note that you do not specify the *password* in the script file itself but you will be prompted when you execute the script.

Example 5-35 Script to add a DS6000 to the TPC for Replication server

```

#
# Add DS6000 00819

```

```
# -----
lsdevice    -devtype ds
#
lsdevice -l -devtype ds
#
adddevice  -ip 9.155.66.171;9.155.66.173 -username abc -port 2433;2433 -devtype
DS
#
lsdevice    -devtype ds
#
lsdevice -l -devtype ds
# ----- end of script -----
```

Example 5-36 shows the script invocation and the output which the scripts provides.

Example 5-36 Script invocation and output of add-ds6000.txt script

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script add-ds6000.txt
Device ID          Device type
=====
DS8000:BOX:2107.20781 DS8000
DS8000:BOX:2107.03461 DS8000
Device ID          Device type Device IP address
=====
DS8000:BOX:2107.20781 DS8000      9.155.86.128;9.155.86.129
DS8000:BOX:2107.03461 DS8000      9.155.50.53;9.155.50.54
Please enter a password for the device userid of abc:

IWNH1000I [Nov 18, 2006 12:32:03 AM] The command completed successfully.
Device ID          Device type
=====
DS8000:BOX:2107.20781 DS8000
DS8000:BOX:2107.03461 DS8000
Device ID          Device type Device IP address
=====
DS8000:BOX:2107.20781 DS8000      9.155.86.128;9.155.86.129
DS8000:BOX:2107.03461 DS8000      9.155.50.53;9.155.50.54
```

After the first two list commands the **adddevice** command executes. This leads to a prompt for the proper password for the *username abc*. Note that you specify the *username* and *password* in a file within the DS6800 Linux system for the DS6000. Note that we add here a DS6000.

The subsequent list commands follow too quickly to catch the newly defined DS6000. Example 5-37 shows a one line script with lists all DS storage subsystems in the TPC for Replication database.

Example 5-37 Simple lsdevice script file

```
#
# list device
# -----
lsdevice -l -devtype ds
# ----- end of script -----
```

Example 5-38 contains the output of this simple script with just a single **lsdevice** command. This script executed shortly after the script in Example 5-35 on page 210.

Example 5-38 lsdevice script

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script lsdevice.txt
Device ID          Device type Device IP address
=====
DS6000:BOX:1750.00819 DS6000      9.155.66.171;9.155.66.173
DS8000:BOX:2107.20781 DS8000      9.155.86.128;9.155.86.129
DS8000:BOX:2107.03461 DS8000      9.155.50.53;9.155.50.54

C:\Program Files\IBM\CSMCLI\CLI>
```

Example 5-38 now displays the newly added DS6000 to the Replication Manager database. Note that the DS6000 registers also as a 1750 device in contrast to 2107 for the DS8000. Note also that the IP address indirectly provides the serial number of the DS6000 which is part of the device ID.

Going back to the TPC for Replication GUI shows also the newly added DS6000 (see Figure 5-186).

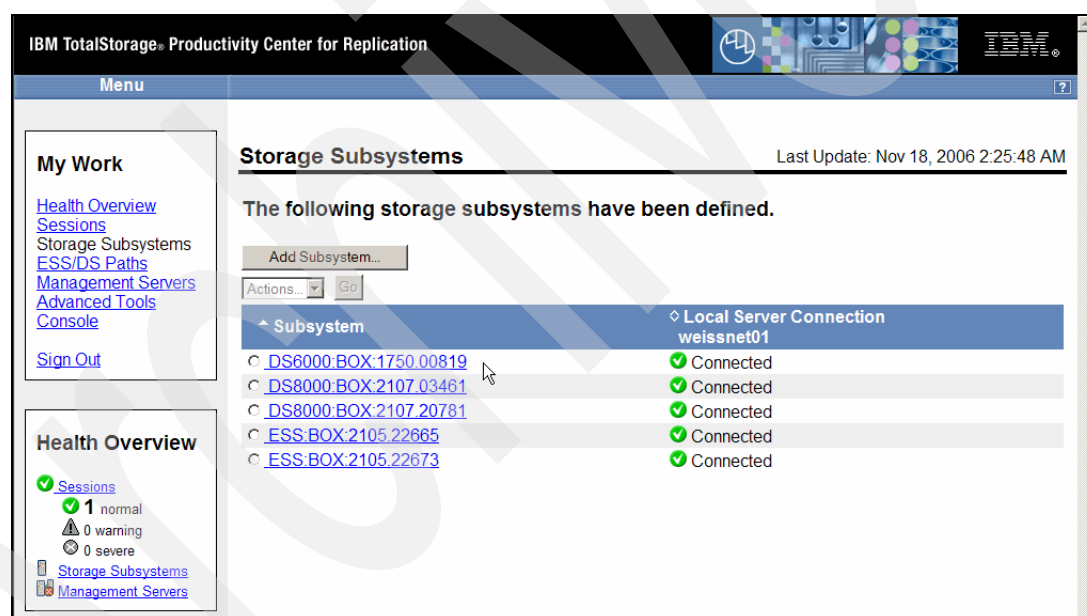


Figure 5-186 Newly added DS6000 through CSMCLI appears in Storage Subsystems overview

Note that two DS8000 and two ESS were previously defined. But the previous list commands shown in Example 5-36 on page 211 listed only the DS storage servers and did not include the two ESS. This is because the **lsdevice** command has a **-devtype** parameter to distinguish between ESS, DS, and SVC. In previous examples we selected DS only.

The GUI does not make a distinction here and lists **all** defined storage servers. This is not possible with the CSMCLI based on a single **lsdevice** command invocation.

Following the different **lsdevice** commands in Example 5-39 on page 213 shows that you can only list a particular device type per command invocation. Although the current *CLI User's Guide*, SC32-0104 outlines the **-devtype** as an optional parameter in the **lsdevice** command

a **lsdevice** command without any parameters does not display all defined storage servers as you may anticipate and the command fails.

Example 5-39 List all defined storage subsystems defined to TPC for Replication server

```

csmcli> lsdevice -l -devtype ds
Device ID          Device type Device IP address
=====
DS6000:BOX:1750.00819 DS6000      9.155.66.171;9.155.66.173
DS8000:BOX:2107.20781 DS8000      9.155.86.128;9.155.86.129
DS8000:BOX:2107.03461 DS8000      9.155.50.53;9.155.50.54

csmcli> lsdevice -l -devtype ess
Device ID          Device type Device IP address
=====
ESS:BOX:2105.22665 ESS          9.155.51.203;9.155.51.204
ESS:BOX:2105.22673 ESS          9.155.51.201;9.155.51.202

csmcli> lsdevice -l -devtype svc
IWNC1901W [Dec 22, 2006 11:28:19 AM] No devices matched the input criteria.

csmcli> lsdevice -l
CMCCI9022E Missing required parameter: -devtype.
Usage: lsdevice [ { -help|-h|-? } ] [ { -l (long)|-s (short) } ]
[-fmt default|xml|delim|stanza]
[-p on|off] [-delim char]
[-hdr on|off]
[-r #] [-v on|off]
-devtype ess|svc|ds [id ... | -]
Tip: Enter "help lsdevice" for more information.

```

Figure 5-187 displays the details when you click the respective subsystem name as in Figure 5-186 on page 212.

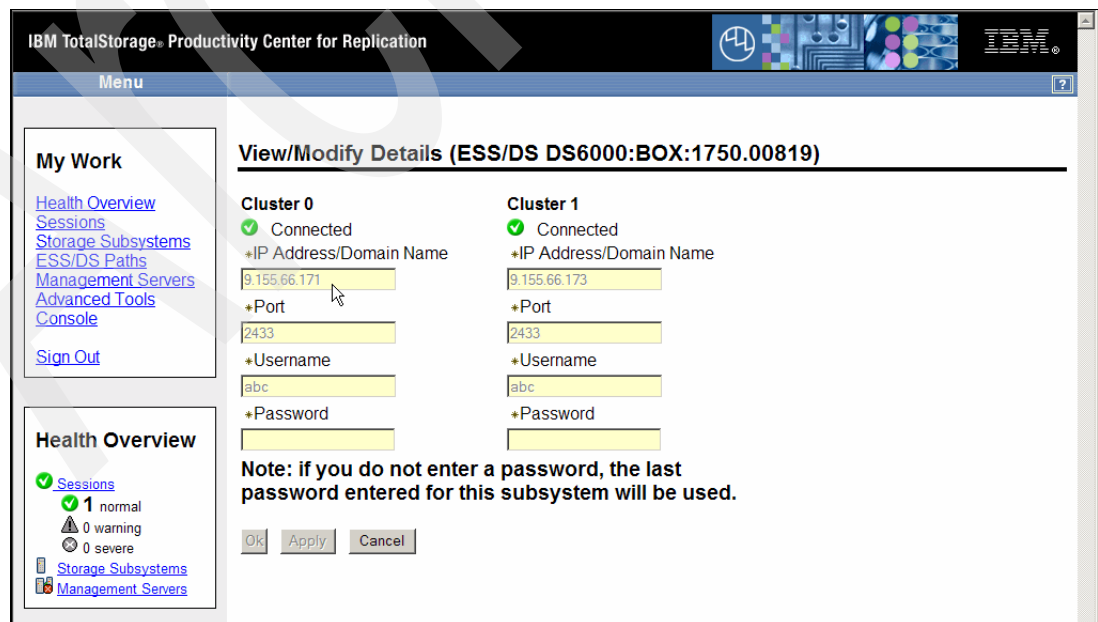


Figure 5-187 Newly added DS6000 and its connectivity details

5.4.4 Create a session using the GUI

You may create a session at any time after the server code is installed and up and running. A session is again only a token with a name and certain attributes assigned to this session. This is always the same approach independent on the session type. At this point It does not require that any storage server is defined to the TPC for Replication server.

Figure 5-188 shows that you always start from *My Work* and click the hyper link *Sessions*. This provides you with an overview of all defined sessions. At this point there are no defined sessions.

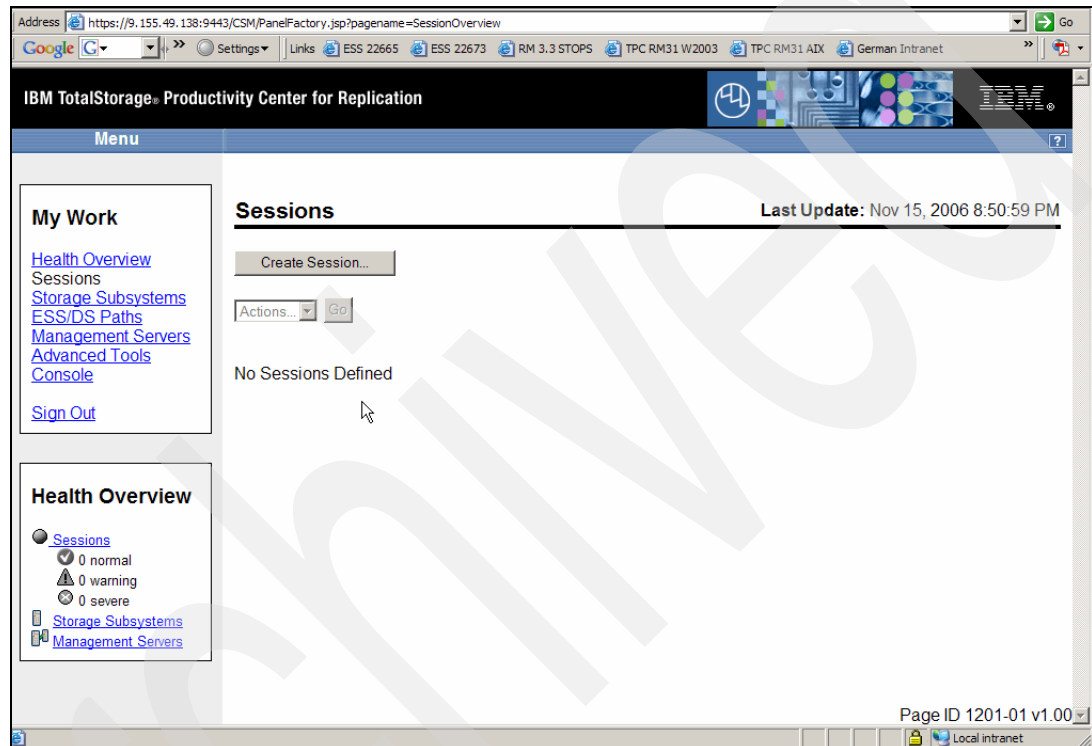


Figure 5-188 Query session through the Session hyperlink in My Work

To define the first session through the GUI approach you click Create Session as Figure 5-189 on page 215 displays and follow the panel sequence which we will show in this section. This is a very simple and straight forward approach and it is hard to do it wrong.

Note the box in the lower right panel in Figure 5-189 on page 215. This is the Health Overview for all sessions as well as for the connected storage servers and a potential standby server.

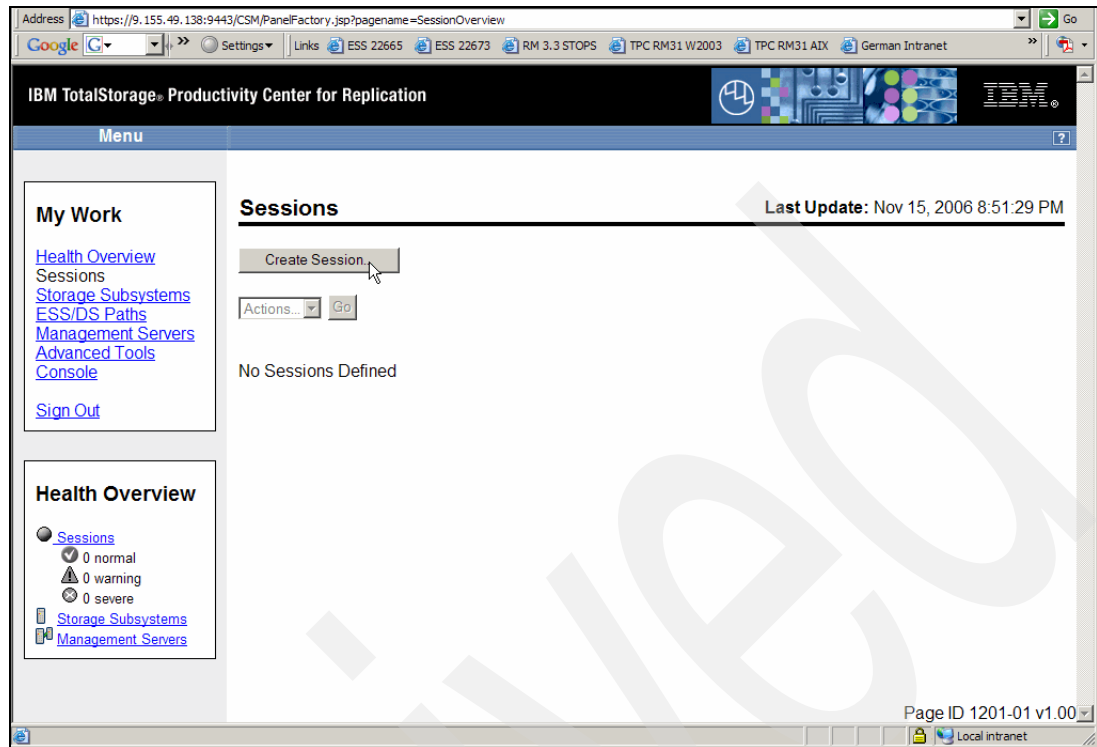


Figure 5-189 Define the first session through the Create Session button

After you clicked on Create Session the next panel appears where you are going to choose a session type. This shows Figure 5-190.

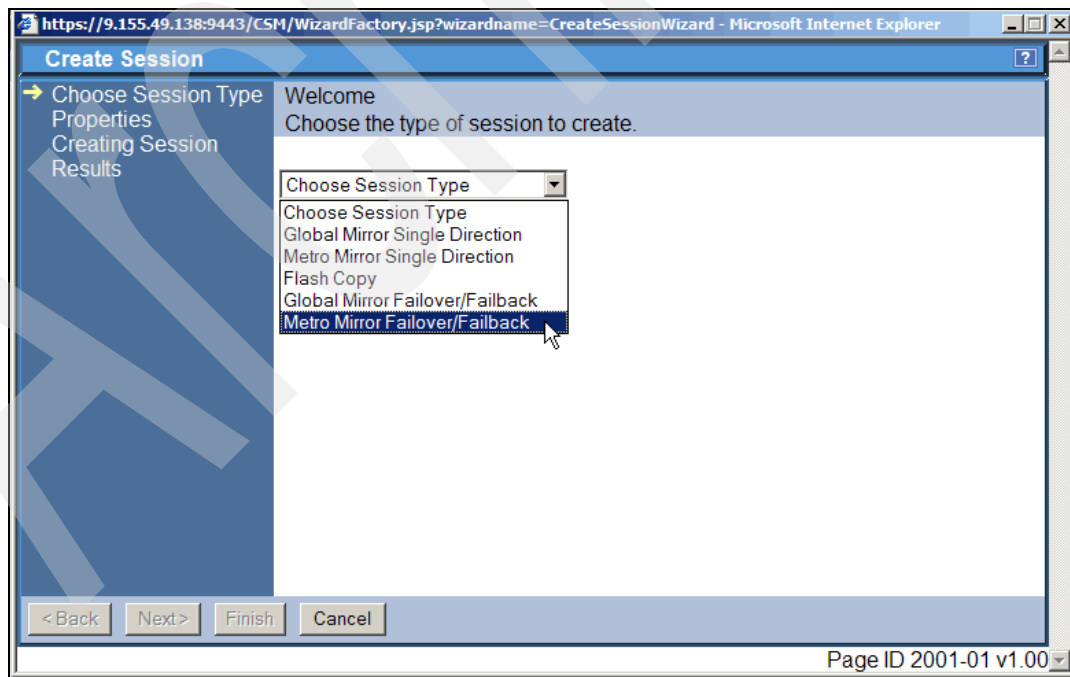


Figure 5-190 Choose session type

Session type translates to the remote copy type you want to use this session for. Note that only a certain remote copy type is associated with a single session. In the example in

Figure 5-190 on page 215 we choose a Metro Mirror session type to be associated to this session. It is not a single direction Metro Mirror type but a Metro Mirror approach which allows to swap sites through Failover / Failback and replicate in either direction. Note that this requires a TPC for Replication server code for Two Site BC.

Figure 5-191 displays that we decided on the session type. Continue by clicking **Next**.

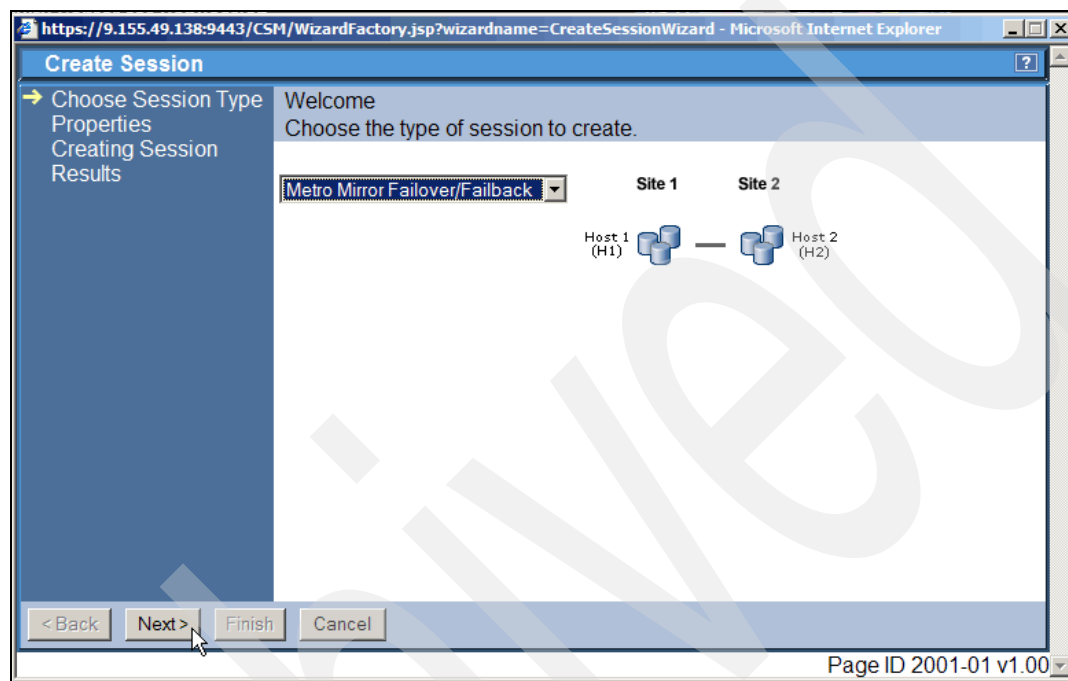


Figure 5-191 Session type decided

This leads us to the session Properties panel as Figure 5-192 on page 217 shows.

Note that after you selected a certain session type a pictograph symbolizes the involved sites and their volume types. Here with Metro Mirror the Site 1 shows with H1 volumes and Site 2 shows with H2 volumes. When you define Copy Sets this pictograph helps you to orient and understand where you define the Copy Sets.

The *Properties* panel is also important because it requires that you specify at least a name for the session which is about to be created. An optional *Description* is recommended to understand the purpose of the session because the session name may not reveal what this session is intended for. Figure 5-192 on page 217 comments on the storage servers involved in this session. You may add a location of each storage server and a date when the session is created or changed.

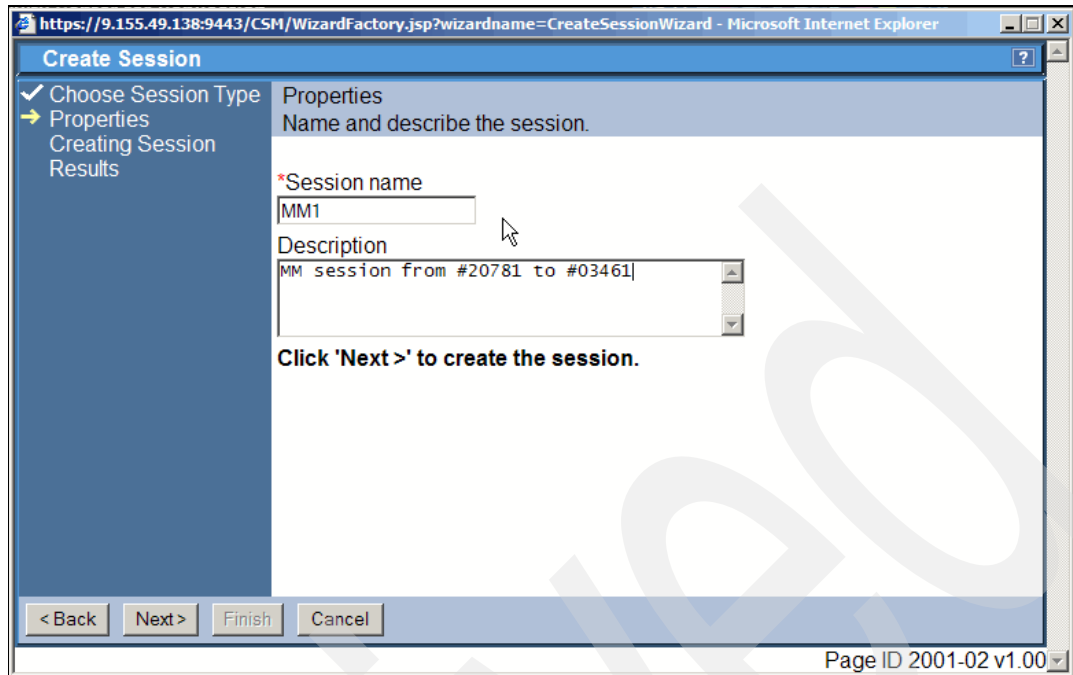


Figure 5-192 Define session properties

Figure 5-193 shows the *Results* panel which contains the message that the session MM1 was successfully created. When you click the **Finish** button this sequence of panels to create a new session ends.

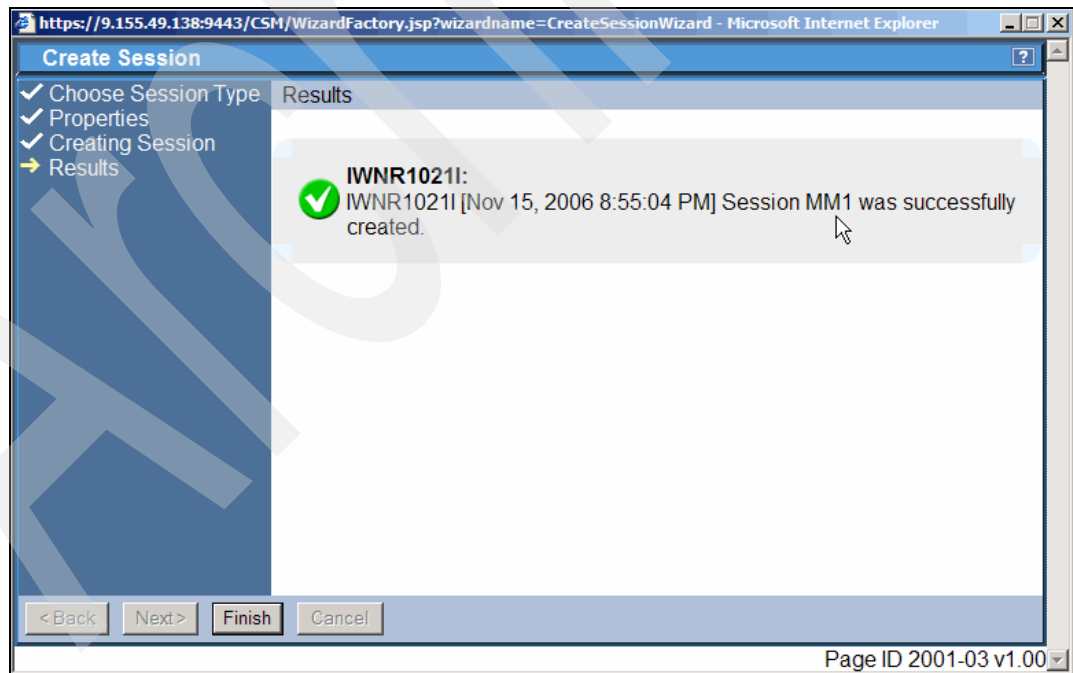


Figure 5-193 Session results window and Finish define session process

After clicking on Finish the application jumps back to the session overview panel. Figure 5-194 on page 218 now displays the session which we just successfully created.

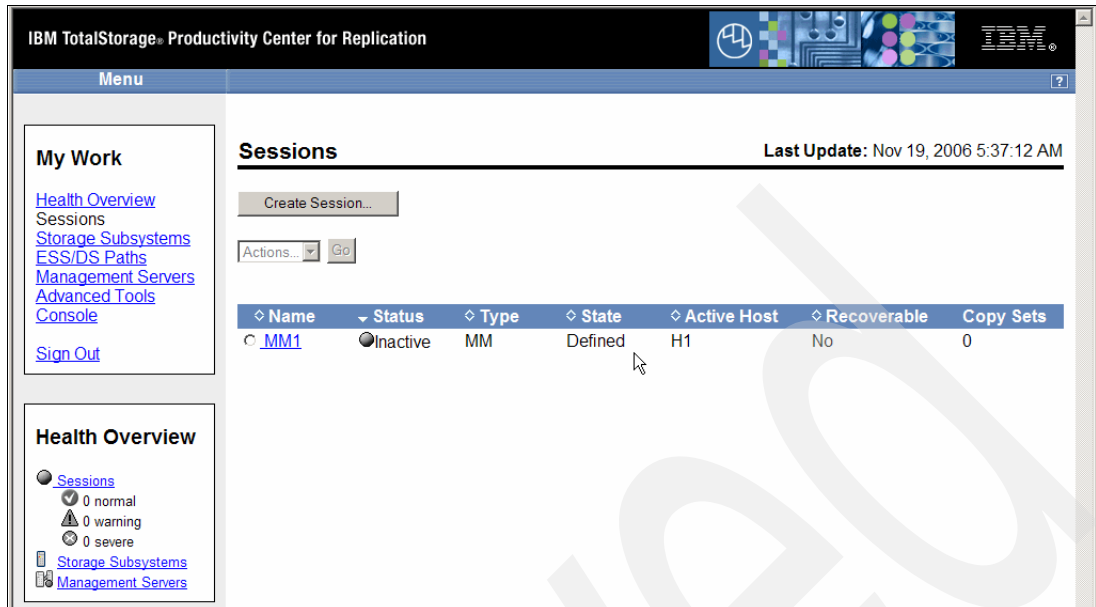


Figure 5-194 Session defined

Again note that this session with its name is just a token and represents a certain Copy Services type. There is no storage server nor any volumes associated with this session MM1. All session which you are going to create as new sessions follow this panel pattern.

In the next section we create a session using the CSMCLI interface to TPC for Replication.

5.4.5 Create a session using the CSMCLI

As outlined in 5.4.2, "Invoke CSMCLI" on page 204 you may issue CSMCLI commands either through an interactive mode in a CSMCLI environment or you may execute a prepared script file which contains a set of CSMCLI commands.

As an example approach we use the scripted command approach to define a session.

Example 5-40 is the source of a brief script with three CSMCLI commands. First we query all existing sessions. Next command actually creates a session with the session type of FlashCopy. The last and third command is another query of all existing sessions.

Example 5-40 Script to create a FlashCopy session

```
#
# Create FlashCopy session in 20781 from LSS 92 to LSS 90
# -----

lsess -l

mkssess -cptype fc -desc "create FlashCopy session FC1" FC1

lsess -l
# ----- end of script -----
```

Example 5-41 on page 219 displays the invocation of the script in Example 5-40 as well as the results from this script.

Example 5-41 Result of create session script

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script mkfclsess.txt
Name Status State Copy type Recoverable Copying Copy sets Error
=====
MM1 Inactive Defined Metro Mirror Failover/Failback No No 0 No
IWNRI021I [Dec 22, 2006 2:42:39 PM] Session FC1 was successfully created.
Name Status State Copy type Recoverable Copying Copy sets Error
=====
FC1 Inactive Defined Flash Copy No No 0 No
MM1 Inactive Defined Metro Mirror Failover/Failback No No 0 No
```

The first list commands displays the Metro Mirror session MM1 which we defined in 5.4.4, “Create a session using the GUI” on page 214. A message acknowledges that the FlashCopy session FC1 was created. A subsequent list of all sessions now includes the newly defined FlashCopy FC1 session.

What Example 5-41 shows is a hard to read formatted output. A prefixed format command in the script as Example 5-42 shows changes to the output formatting to a more readable approach. We removed the FC1 session before invoking the script `mkfclsess.txt` again - but this time with a corresponding `setoutput` format command.

Example 5-42 Script with output format command

```
#
# Create FlashCopy session in 20781 from LSS 92 to LSS 90
# -----
setoutput -fmt stanza
lsess -l

mkssess -cptype fc -desc "create FlashCopy session FC1" FC1

lsess -l
# ----- end of script -----
```

Example 5-43 contains the same information as Example 5-41, but it is easier to read and understand.

Example 5-43 Script invocation and readable output format

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script mkfclsess.txt
Name MM1
Status Inactive
State Defined
Copy type Metro Mirror Failover/Failback
Recoverable No
Copying No
Copy sets 0
Error No
IWNRI021I [Dec 22, 2006 2:45:49 PM] Session FC1 was successfully created.
Name FC1
Status Inactive
State Defined
Copy type Flash Copy
Recoverable No
Copying No
```

Copy sets 0
Error No

Name MM1
Status Inactive
State Defined
Copy type Metro Mirror Failover/Failback
Recoverable No
Copying No
Copy sets 0
Error No

C:\Program Files\IBM\CSMCLI\CLI>

At this point we have defined two sessions:

1. A Metro Mirror session MM1 through the GUI
2. A FlashCopy session FC1 through the script approach with CSMCLI commands.

The TPC for Replication GUI shows both sessions as shown in Figure 5-195.

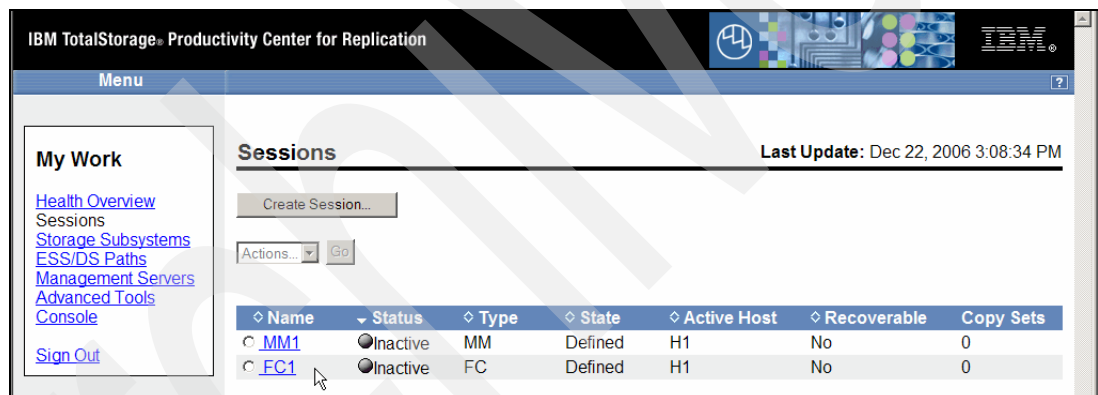


Figure 5-195 GUI also displays two sessions

5.4.6 Add Copy Sets to a session using the GUI and automatic pair matching

After we defined the Metro Mirror session MM1 (which is nothing more than a kind of token with certain attributes) we populate this session in the next step with Copy Sets. Copy Sets are Copy Service volume pairs or Copy Services volume triplets depending on Metro Mirror or Global Mirror.

Figure 5-196 on page 221 shows the session overview panel with the session MM1 which we defined in the previous paragraph through the GUI. The next logical action which you perform on session MM1 is to add volume pairs or Copy Sets to it.

Note that Figure 5-196 on page 221 shows the Metro Mirror session MM1 and does not contain the FlashCopy session FC1. This is because we defined copy sets to this MM1 session before we created the FlashCopy session FC1.

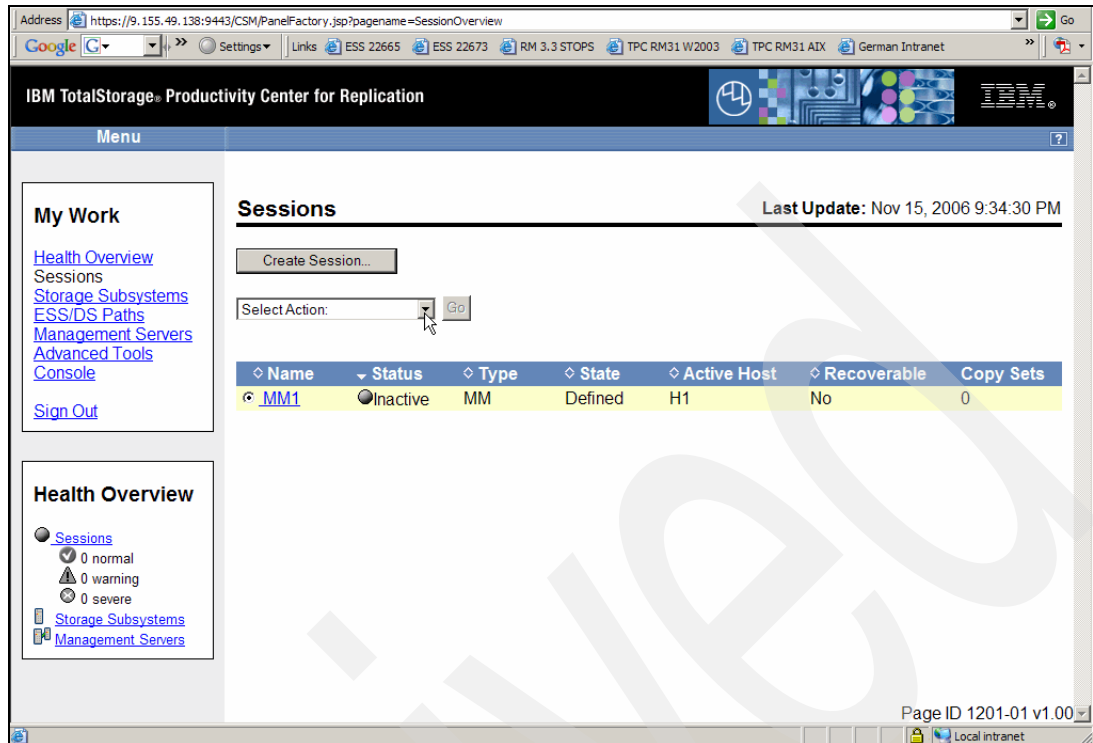


Figure 5-196 Sessions panel at which to start to add Copy Sets

In order to populate the session MM1 with volume pairs and add Copy Sets we select Add Copy Sets after selecting the MM1 session as Figure 5-197 shows. This will lead you through a panel sequence which is very straight forward.

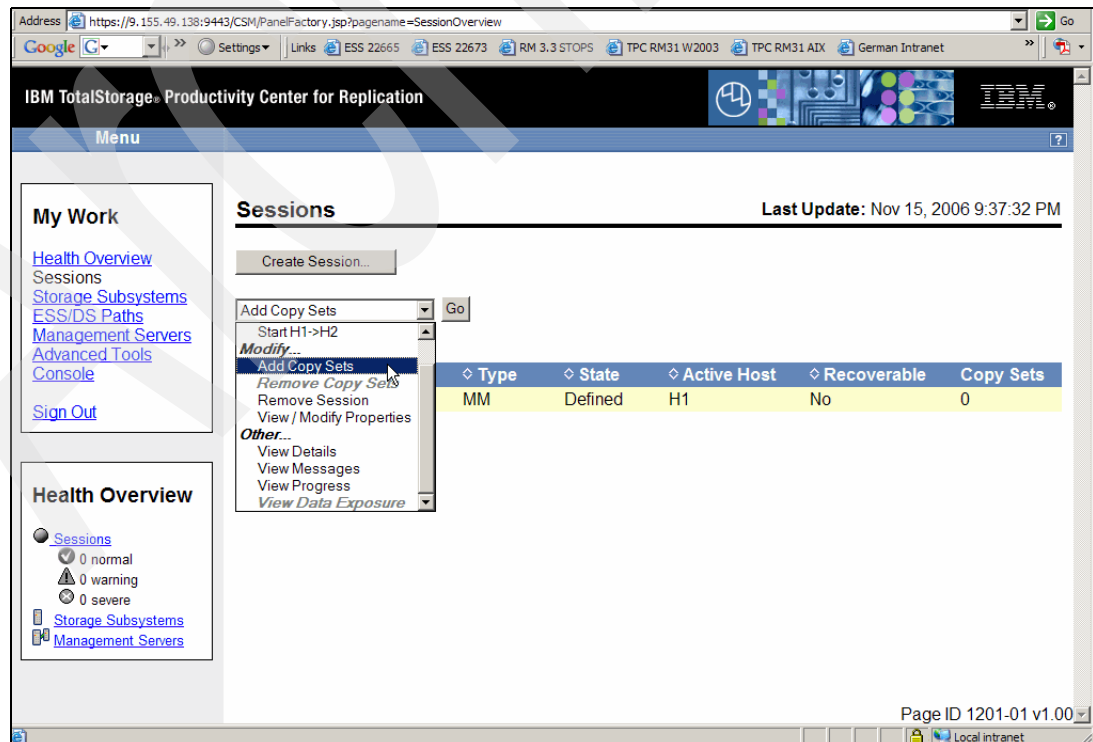


Figure 5-197 Select action to Add Copy Sets

Note that over time various terminology is introduced for the same thing. Peer-to-Peer Remote Copy or PPRC started out with primary volumes and secondary volumes. This terminology was fine for a 2-site solution. With the arrival of switching sites from an application viewpoint as well as for the storage subsystem used, TPC for Replication introduced a different terminology for these PPRC volumes and their association to a certain site. Host 1 or Site 1 refers to the primary volumes as a starting point. This may also be the local site or application site. It may always be considered as the customers primary site. But it has the potential to change. A customer may want to switch application sites from host 1 to host 2 in site 2 and also switch at the same time the Copy Services role of the associated storage subsystems. This led to host 1, site 1 volumes and host 2, site 2 volumes terminology being used in TPC for Replication.

As another remark the volume roles within FlashCopy used to be source and target in contrast to PPRC primary and secondary. So it is and was possible to distinguish also whether you are talking about PPRC volumes or FlashCopy volumes. Again the matter got slightly more complicated with switching sites and the advent of 3-site solutions.

Figure 5-198 displays the panel which provides details on the primary volumes or local volumes which are called Host 1 volumes relating to the fact that these volumes reside in the site 1 or application site or local site. These are all synonyms and refer to the same environment.

First we choose the storage in Site 1 as Figure 5-198 shows. This includes selecting a Host 1 storage subsystem, perhaps a Host 1 logical storage subsystem or LSS, and also optional a set of selected volumes within the selected LSS.

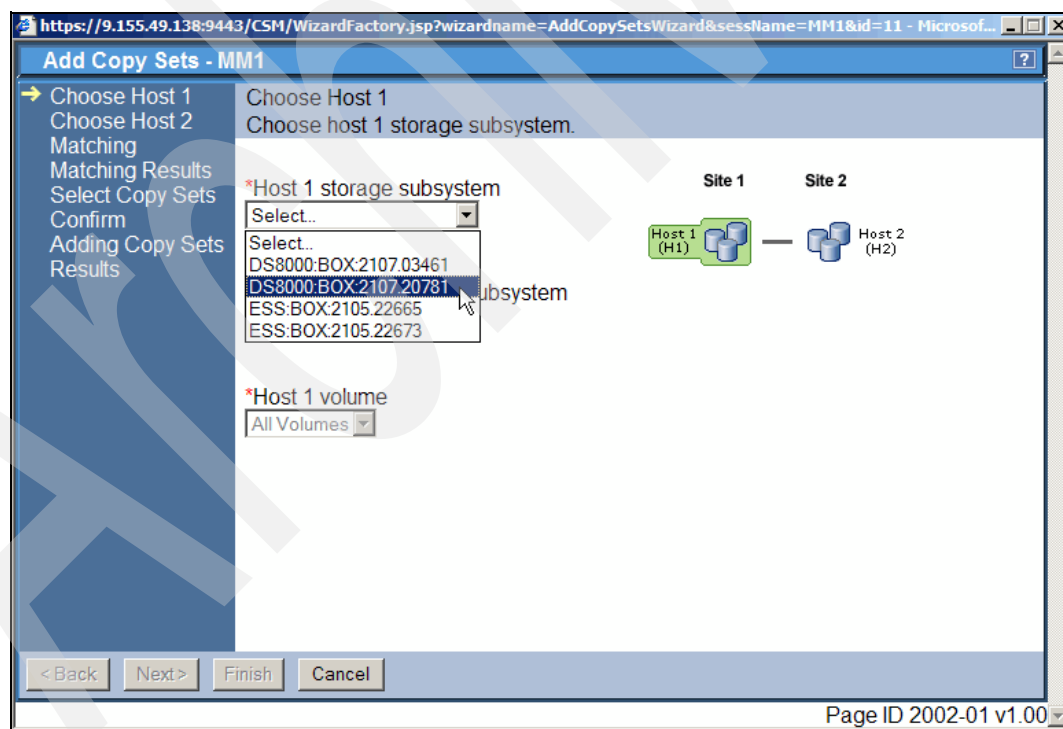


Figure 5-198 Select Host1 environment and start with the storage subsystem

After we decided on the storage subsystem we select LSS 90 as Figure 5-199 on page 223 shows. After clicking on the Next button we may decide on certain or all volumes within the selected LSS.

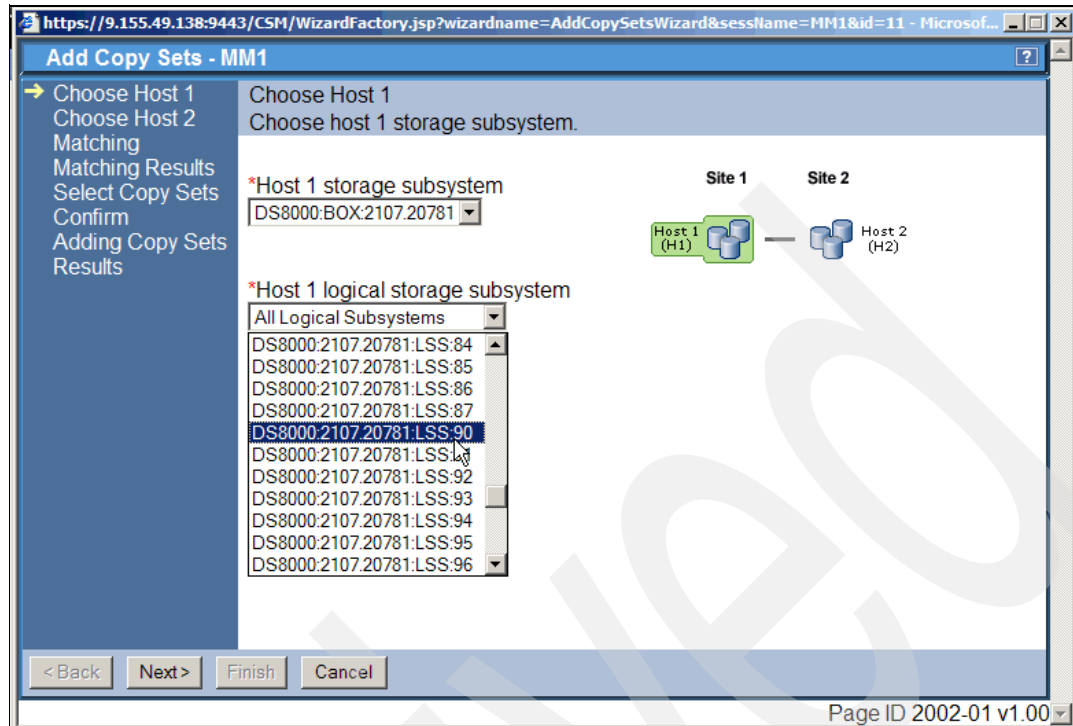


Figure 5-199 Select involved LSS with the host 1 storage subsystem

In Figure 5-200 we decide to select all volumes within LSS 90 and click Next to continue.

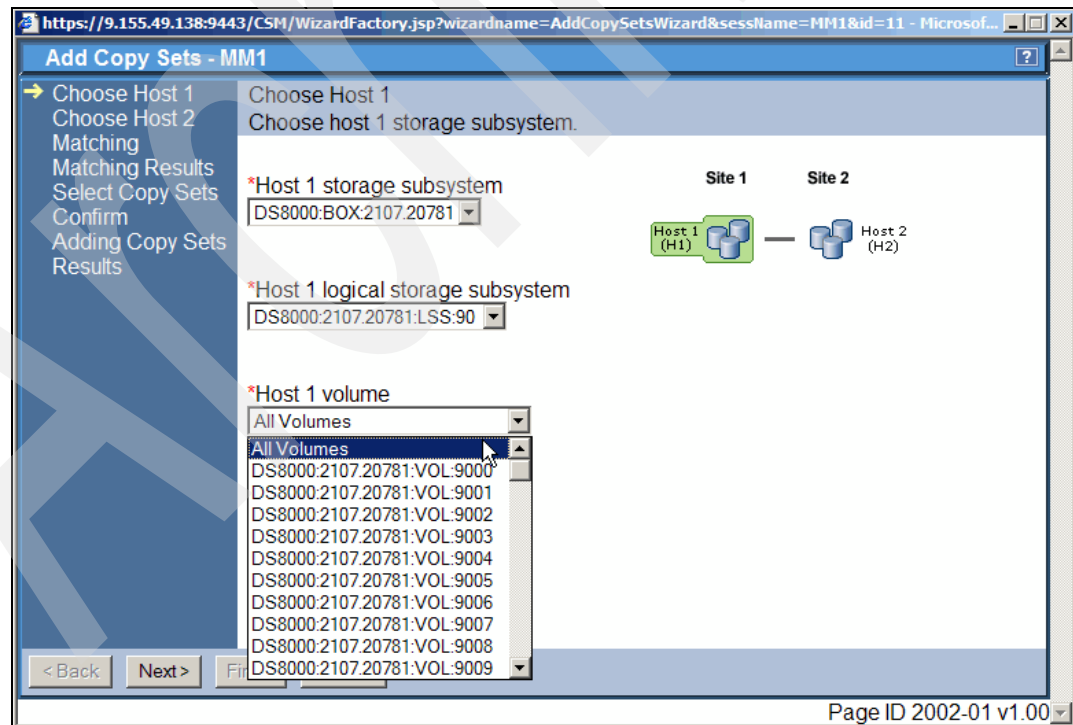


Figure 5-200 Select all volumes within the Host 1 selected LSS

The next panel in Figure 5-201 on page 224 displays. This concludes the selection process for Site 1.

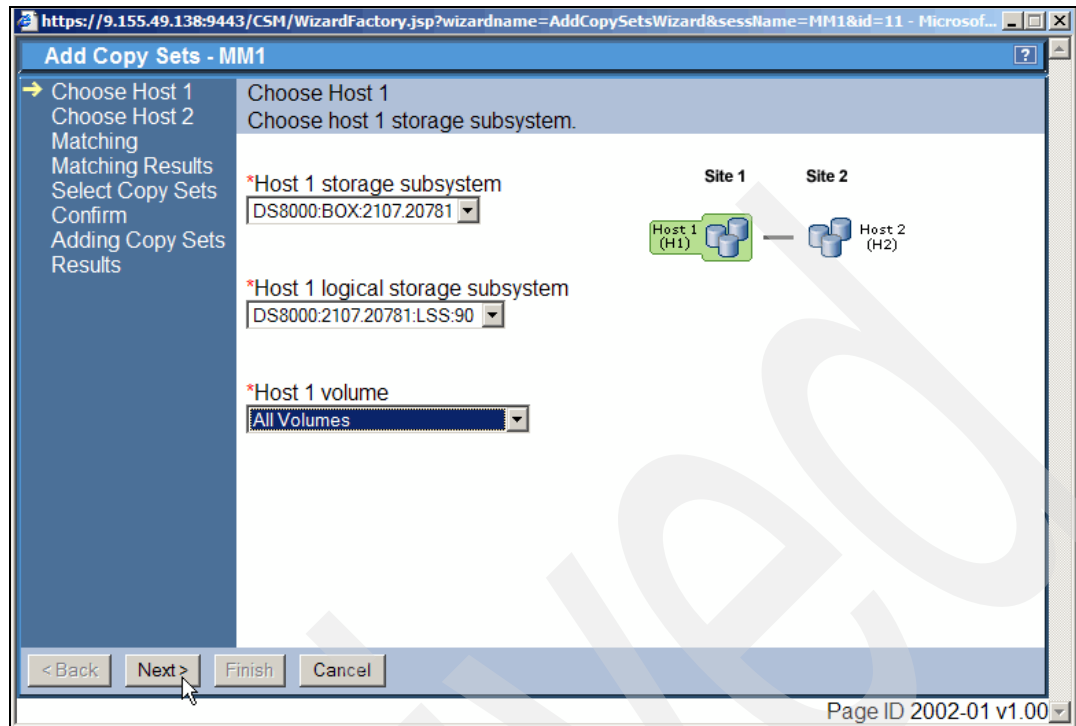


Figure 5-201 Host 1 selection is complete

The next steps are going to focus on Site 2 and the corresponding volumes which eventually will form Copy Sets with the volumes in Site 1. Figure 5-202 displays the storage subsystems and we select the other DS8000 which is then considered to be a storage subsystem in Site 2.

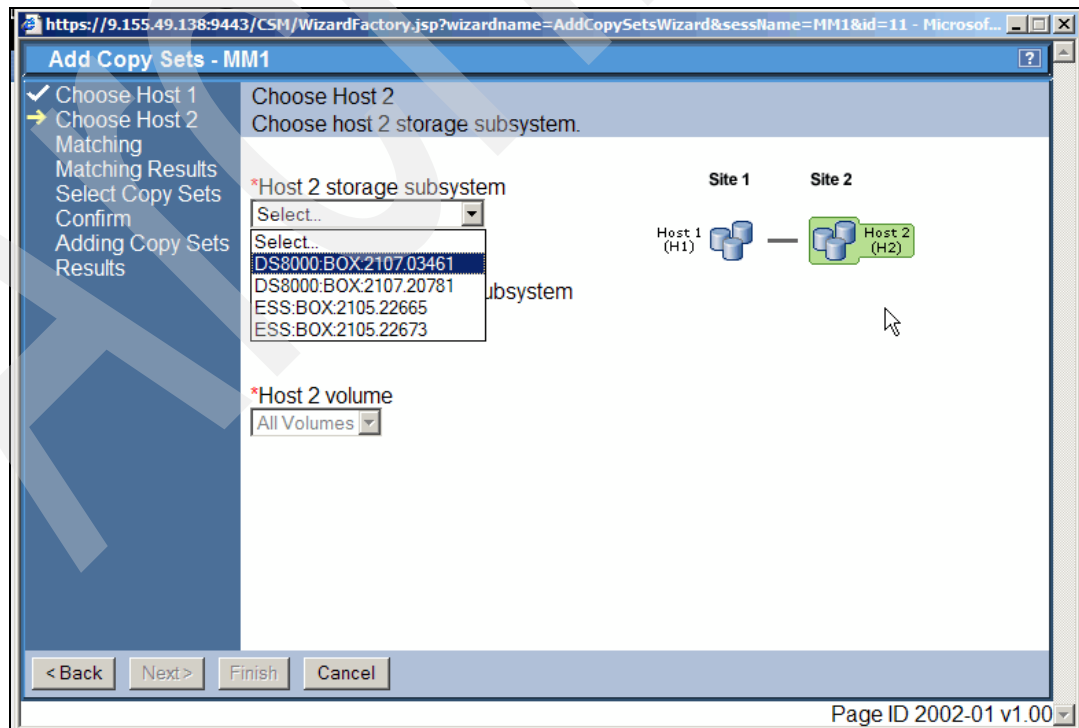


Figure 5-202 Select Host 2 environment and start with storage subsystem

Note the visual help through the pictograph that helps to orient at which site you are. Figure 5-202 on page 224 points out that we are working on volumes in Site 2.

After we selected the partner storage subsystem we continue and identify a LSS at Site 2 which is going to contain the Metro Mirror secondary volumes. As Figure 5-203 shows we select LSS A0 to be the corresponding LSS to LSS 90 in the Site 1 LSS.

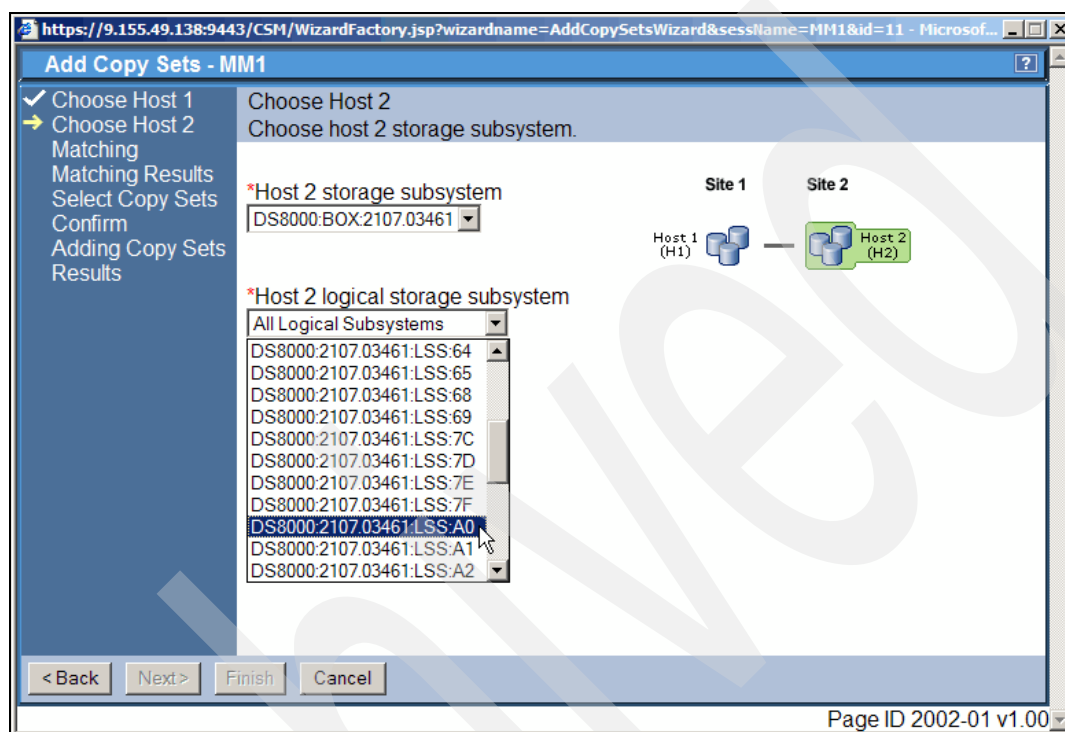


Figure 5-203 Select LSS in storage subsystem in Host 2 environment

Because we chose all volumes in LSS 90 in Site 1 there is no Host 2 volume selection possible as Figure 5-204 on page 226 points out. This is because this approach does an auto-matching between LSS 90 and LSS A0 to find a corresponding secondary volume for each primary volume. This does not require that the number of volumes are equal in both involved LSSs. When there are more volumes in the Site 2 LSS, TPC for Replication will map the Host 1 volumes from top down according to the device numbers. So device 00 in Site 1 maps to the first available device in Site 2 LSS, for example this may also be device 00. The unused devices in Site 2 will stay unchanged. When there are more devices in Site 1 LSS than the Site 2 LSS contains, TPC for Replication only matches as many copy sets as devices that are available in Site 2 LSS. Corresponding messages make you aware of any mismatches.

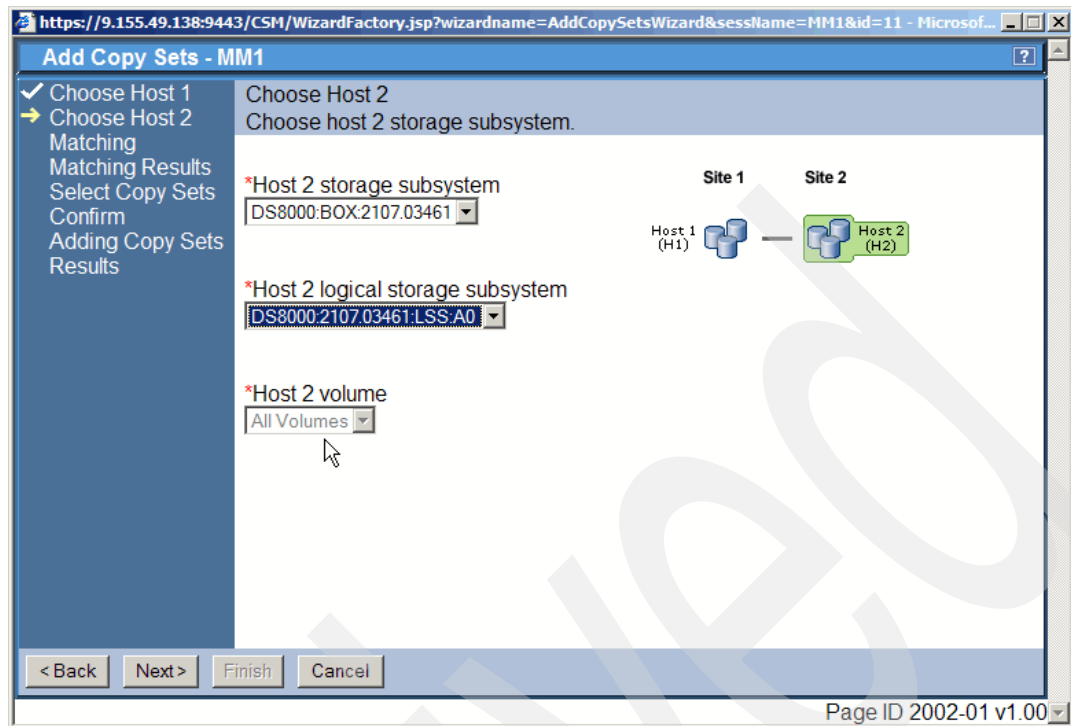


Figure 5-204 Host 2 selection - volumes selection is greyed out

Figure 5-204 again shows that Host 2 volumes are not applicable when selecting all volumes in Site 1 as Figure 5-201 on page 224 shows.

Clicking *Next* brings you to the panel in Figure 5-205 on page 227 with the matching results. When all Site 1 volumes found a match in Site 2 then this reports successful matches. Otherwise you see error messages in this panel which actually do not fail the process of Copy Sets creation.

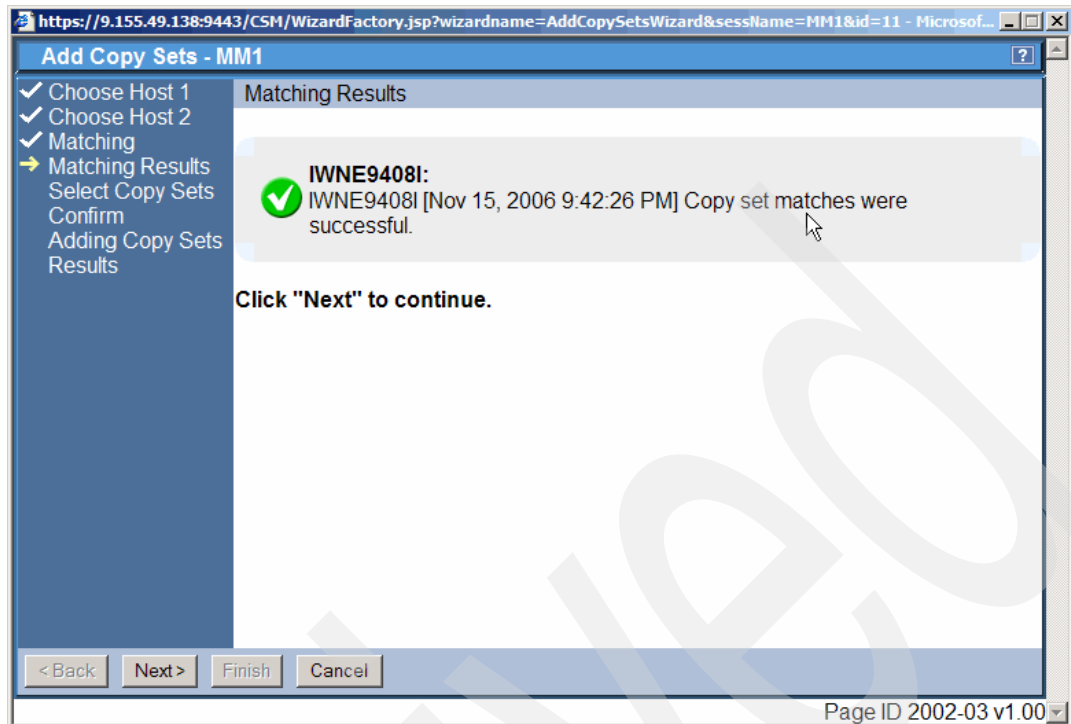


Figure 5-205 Matching results

The next panel shown in Figure 5-206 displays all Host 1 volumes and in the column *Copy Sets* the *Show* hyper link provides Copy Set information with the matching volume set information.

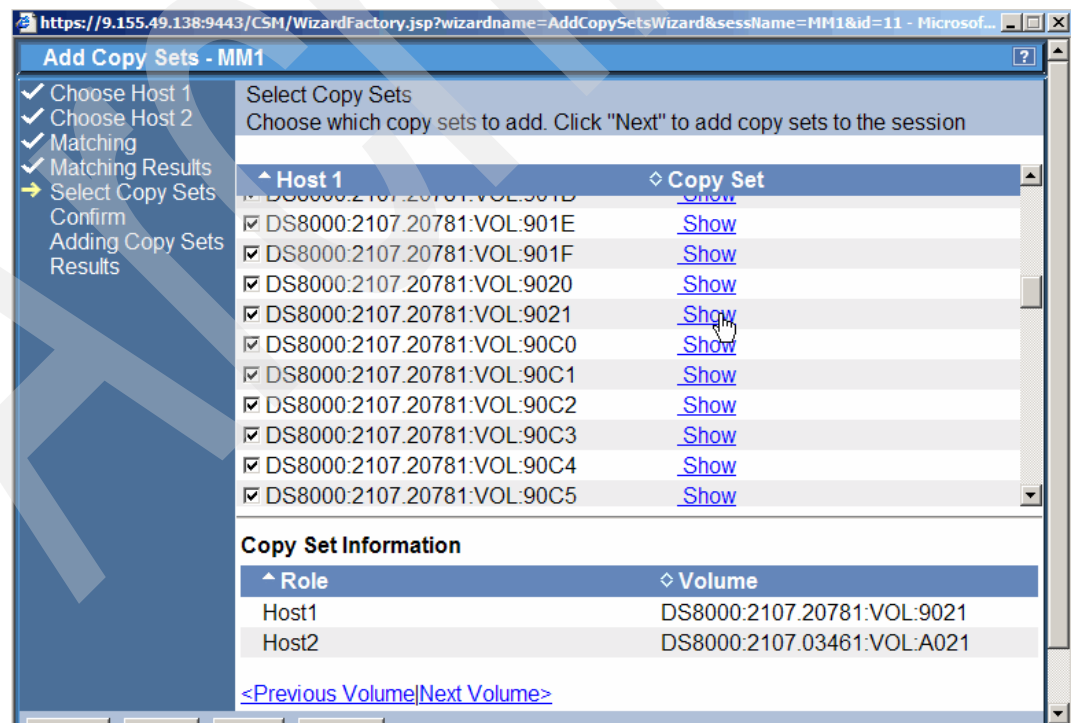


Figure 5-206 Show individual Copy Sets from Host 1 volume list

Selecting Next leads to accepting the proposed Copy Sets as shown in Figure 5-207.

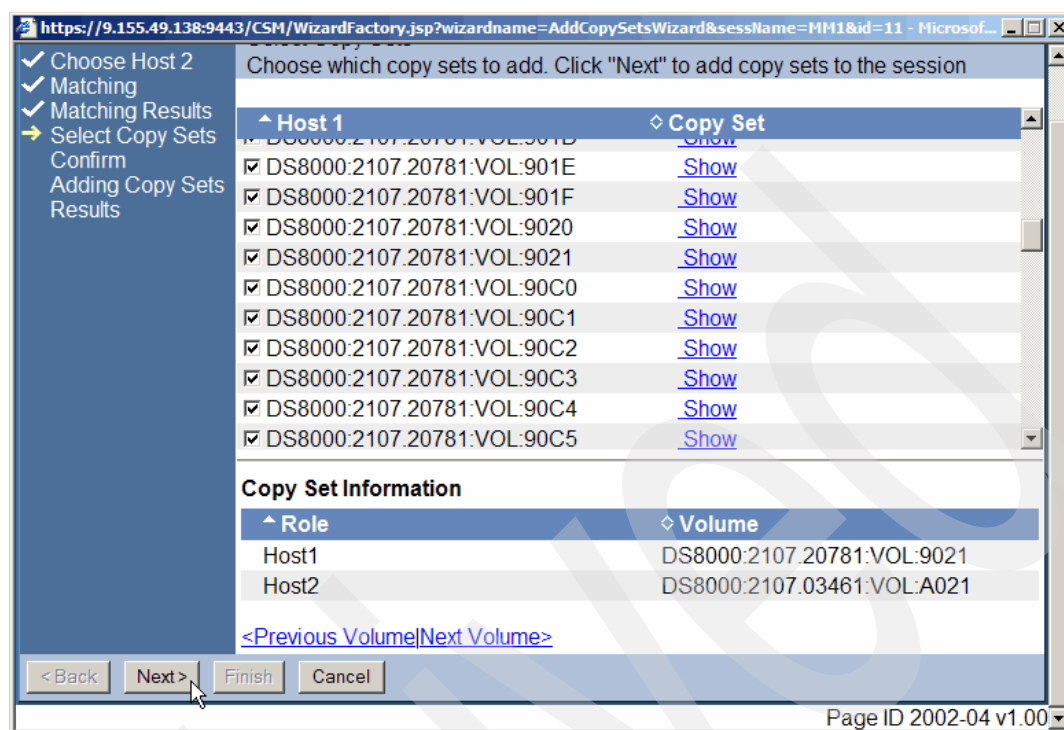


Figure 5-207 Accept all Copy Sets and continue

The confirmation panel in Figure 5-208 displays the number of copy sets which are going to be created.

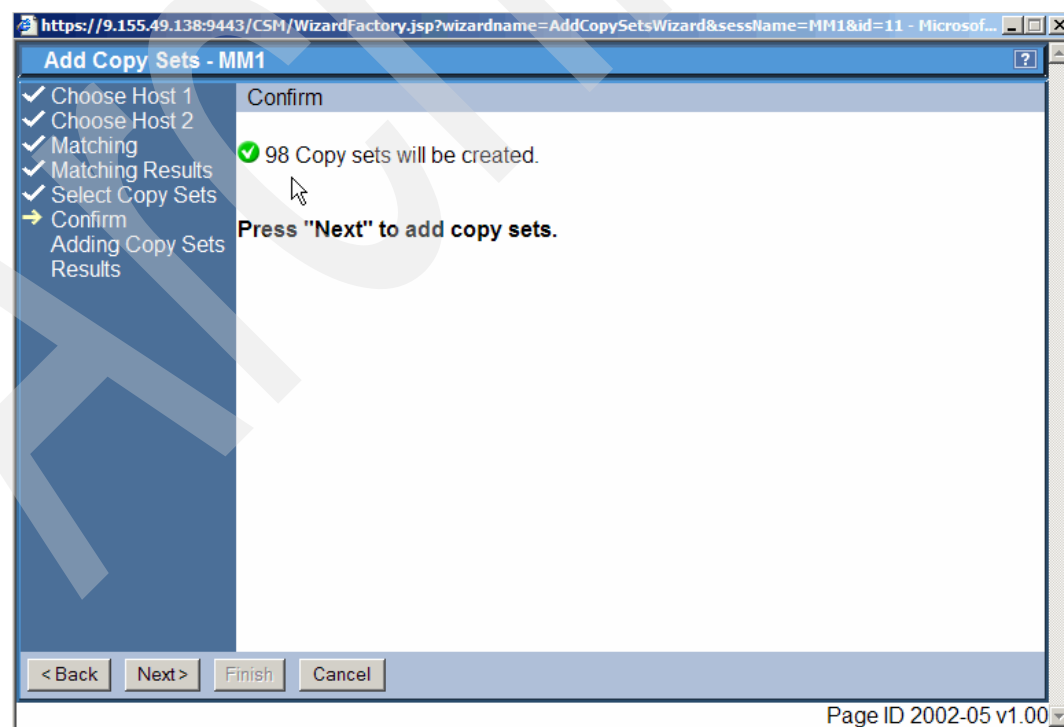


Figure 5-208 Confirm all Copy Sets which should be added to the session

After clicking on the Next button TPC for Replication internally adds these 98 copy sets to its database. Figure 5-209 displays a progress panel which reports the number of copy sets added to the DB2 database by TPC for Replication. Note this does not start to establish PPRC copy pairs. It is just an TPC for Replication internal process to add these copy sets to the local TPC for Replication database.

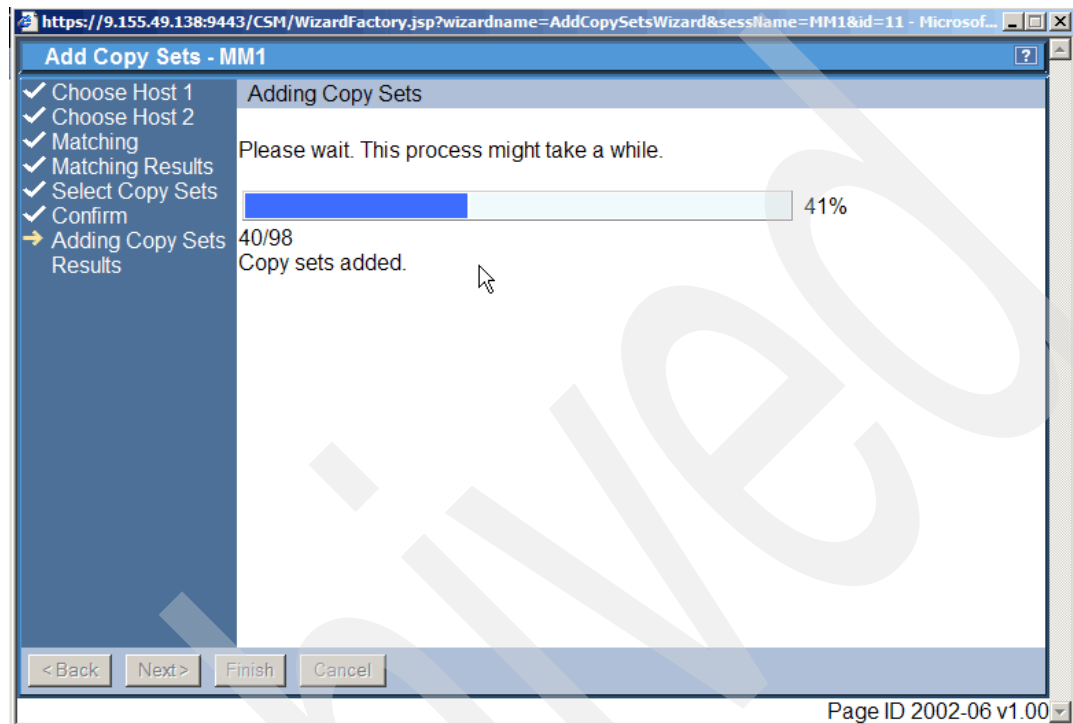


Figure 5-209 Adding Copy sets progress panel

After a few seconds the progress panel reaches 100% and leaves the *Adding Copy Sets* panel and progress to the next panel shown in Figure 5-210 on page 230.

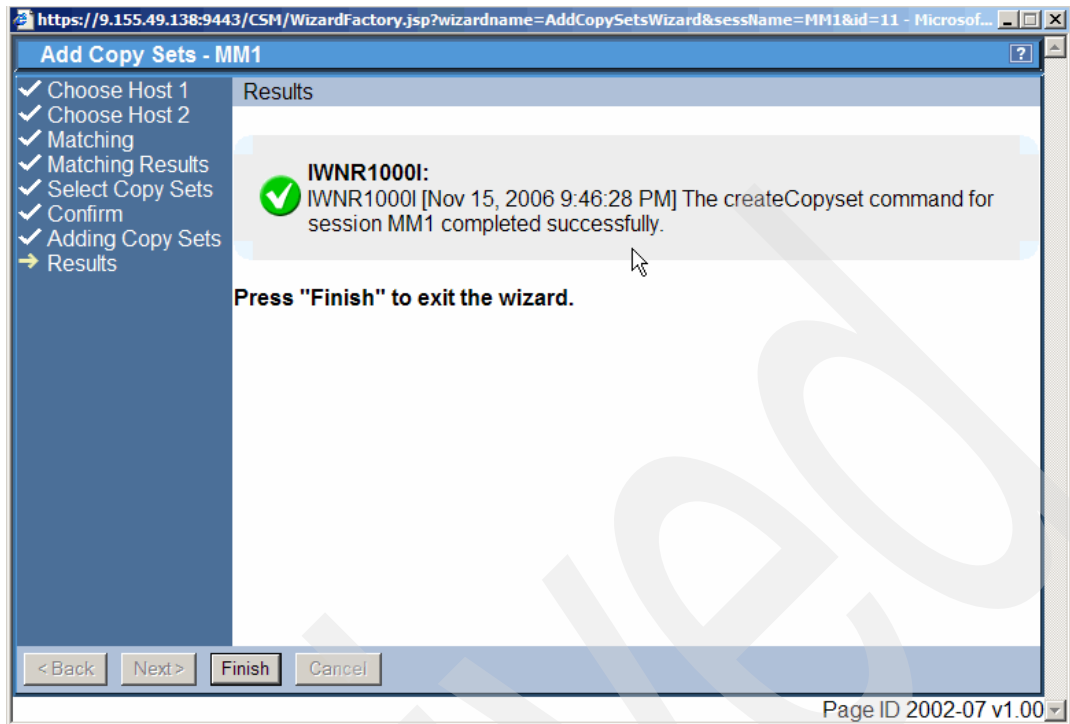


Figure 5-210 All Copy Sets are successfully added to the TPC-RM database

Figure 5-211 confirms that all copy sets are successfully added to the session MM1 and the database is successfully updated. The session status is still Inactive.

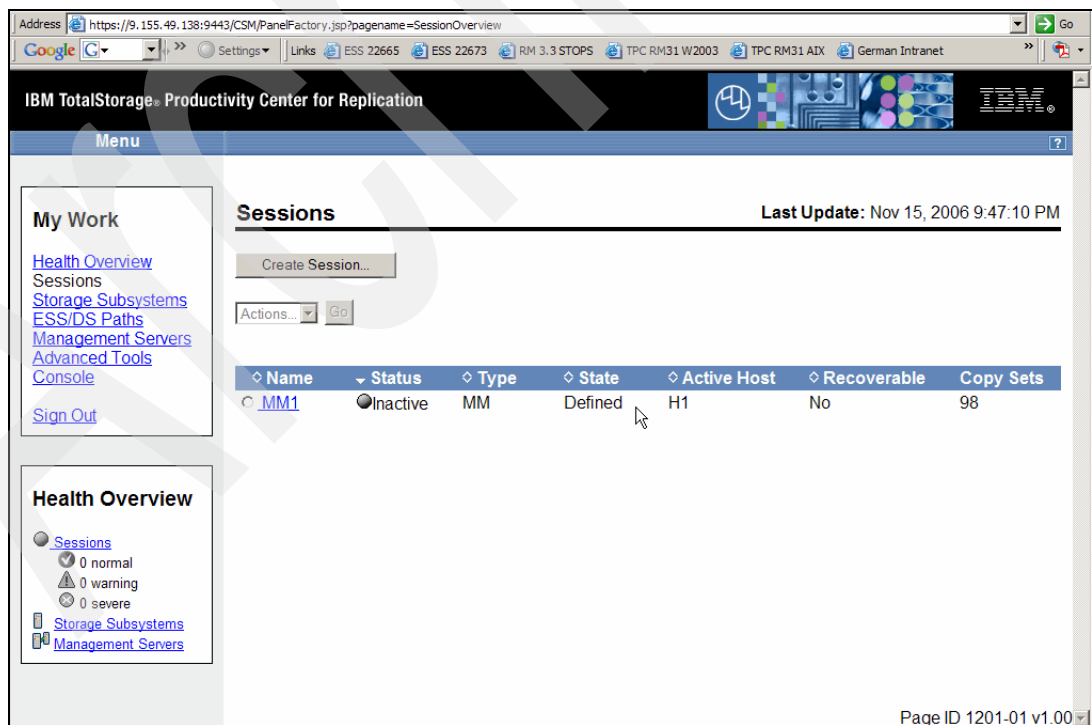


Figure 5-211 Add Copy Sets is completed

This concludes the steps through the GUI when you add copy sets to a Metro Mirror session. This is a similar panel sequence when you add copy sets to other session types like Global Mirror sessions or FlashCopy sessions.

TPC for Replication is going to be enhanced concerning volume selection which go into Copy Sets to protect certain volumes which should never become a member of a Copy Set.

Note that Parallel Access Volumes, PAV, are not maintained in the TPC for Replication database.

5.4.7 Add certain volumes to copy sets through the GUI

In order to keep it simple we built a test environment between two DS8000s and utilized only a few volumes to show the principles of operations when working with TPC for Replication.

The idea is to replicate two volumes with Metro Mirror. Then create a FlashCopy relationship between the Metro Mirror secondary volumes as FlashCopy source volumes and FlashCopy target volumes in a different LSS. The FlashCopy may serve to create point-in-time FlashCopies. This requires you to briefly freeze the Metro Mirror relationship in order to achieve a consistent set of FlashCopy target volumes.

Figure 5-212 first shows the Metro Mirror test setup which we use for the Metro Mirror example discussed here.

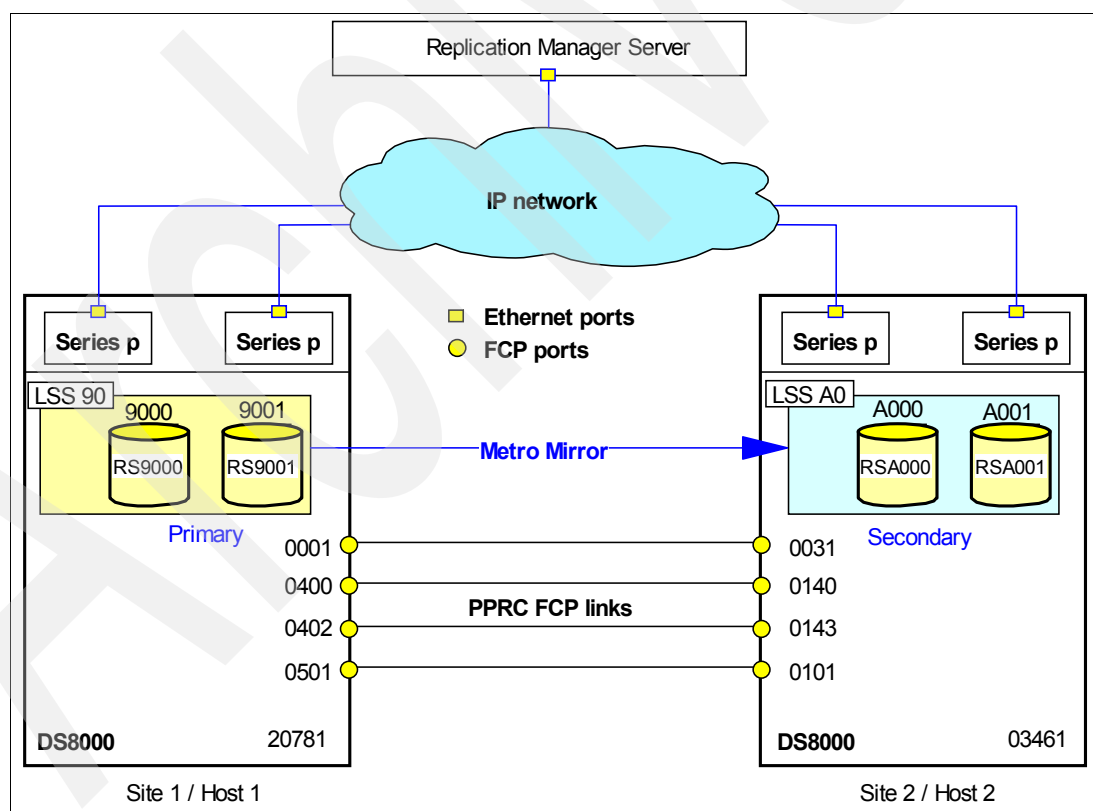


Figure 5-212 Metro Mirror volumes for session MM1

We created the MM1 session in 5.4.4, "Create a session using the GUI" on page 214. We intend to use devices 00 and 01 in LSS 90 in DS8000 with serial number 20781 as Site 1 volumes and at Site 2 another DS8000, 03461, which holds the corresponding devices with

device number 00 and 01 in LSS A0. This is also what is reflected in Figure 5-212 on page 231.

Figure 5-213 shows where to start when adding Copy Sets to session MM1. We click the session hyper link which provides the session overview. The next step is to select an appropriate action.

Opening the Action window starts an easy step-by-step approach to select the volumes which are going to be defined to the session MM1.

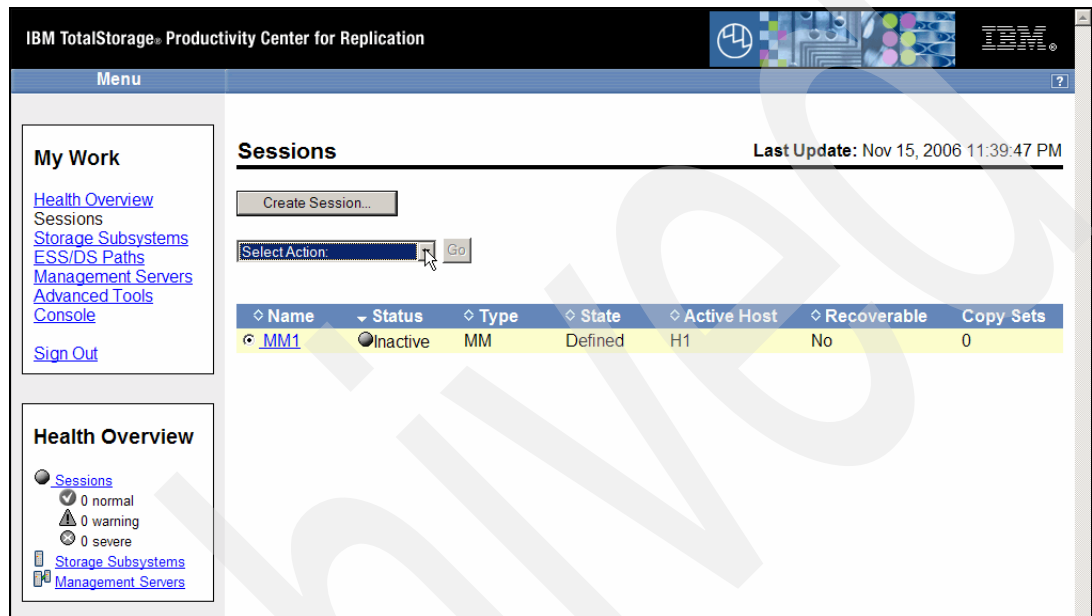


Figure 5-213 Point to start to add Copy Sets to MM1 session

As Figure 5-214 shows we select Add Copy Sets which brings us to the next panel which Figure 5-215 on page 233 displays.

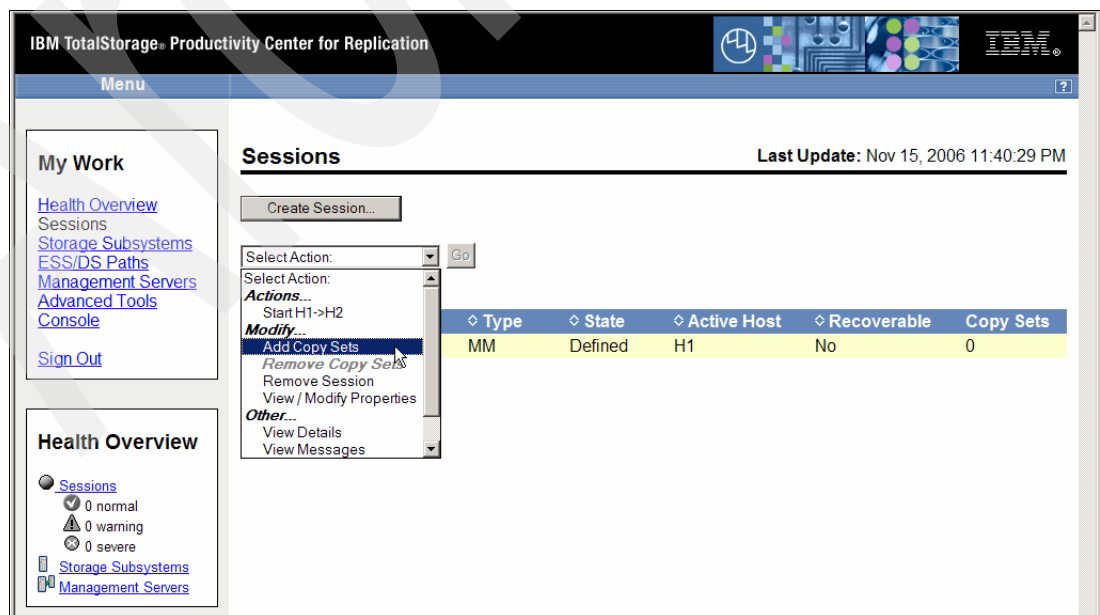


Figure 5-214 Select action for concerned session MM1

In Figure 5-215 we define the Host 1 volumes. We select the Host 1 storage subsystem which is the 20781 box. Within this box we select LSS 90 and then all volumes. Clicking Next brings us to the next panel which Figure 5-216 on page 234 shows.

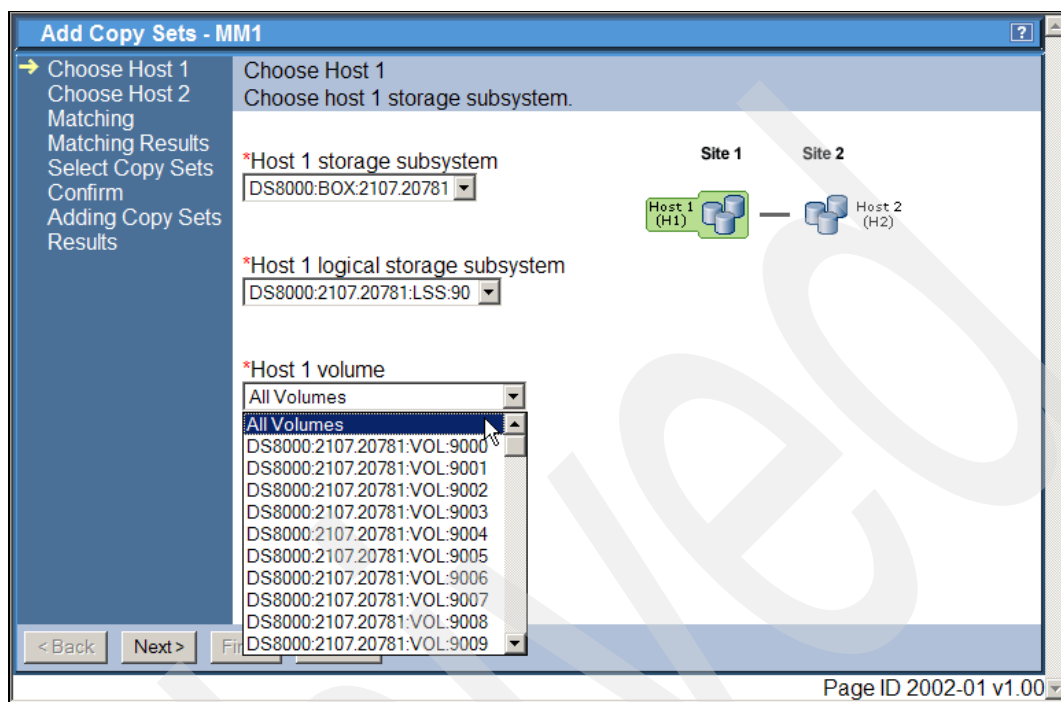


Figure 5-215 Choose Host 1 environment

In Figure 5-216 on page 234 we select the volume in Site 2. This is the Box 03461. As Figure 5-212 on page 231 explains we want LSS A0 to hold the Metro Mirror secondary volumes. Therefore, we select LSS A0 from the list. Host 2 volumes allows only all volumes due to the previous selection for H1 volumes. Clicking Next displays all the matching copy sets as Figure 5-217 on page 235 shows.

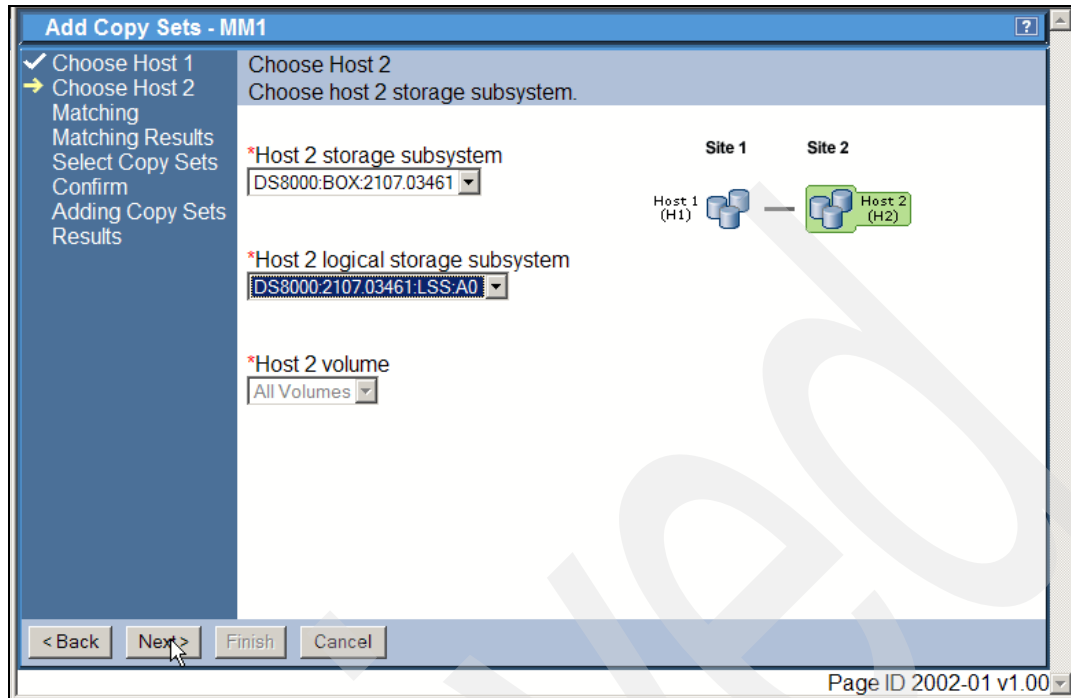


Figure 5-216 Choose Host 2 environment for session MM1

Actually Figure 5-217 on page 235 first displays all Copy Sets with a check mark indicating that these Copy Sets are selected to be added to the TPC for Replication database. Currently there is no *un-select all button* which would make it easy to un-select all Copy Sets first and then just manually select the first two volumes which we want to be added to the Copy Set MM1. In this particular case we removed the check mark from all Host 1 volumes except for volume 00 and 01 respectively 9000 and 9001 which we intend to include in the session MM1. This is what Figure 5-217 on page 235 finally shows.

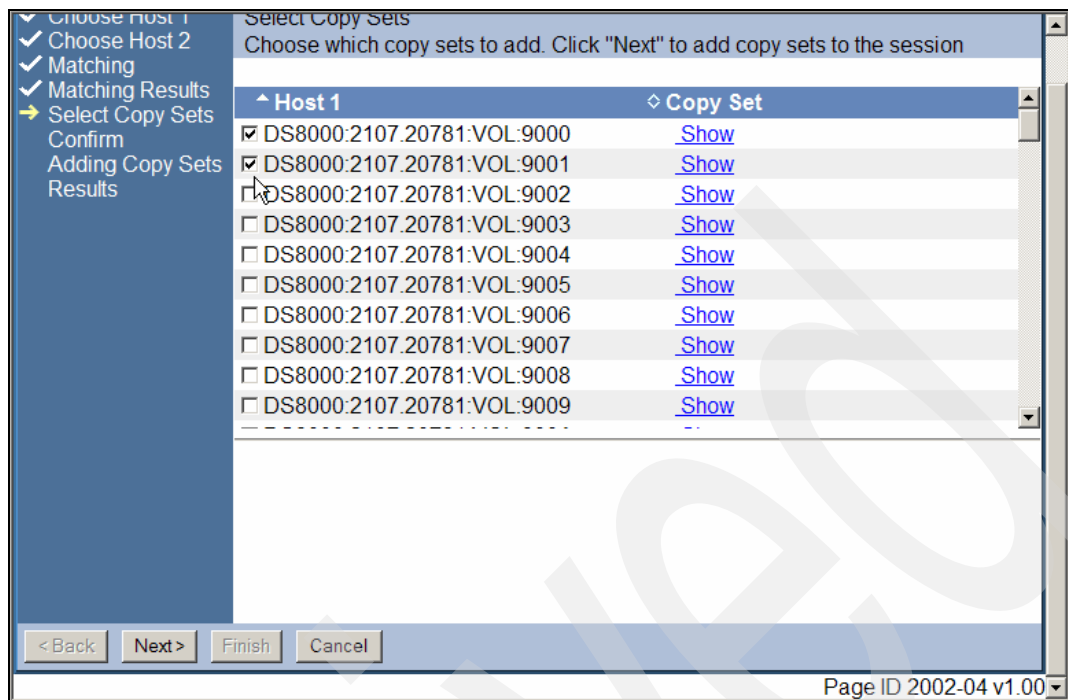


Figure 5-217 Select Copy Sets

Clicking on Next brings you to the confirmation panel. Figure 5-218 displays there are just two copy sets created and the potentially other 96 copy sets will not form copy sets because we selected only two potential secondary volumes.

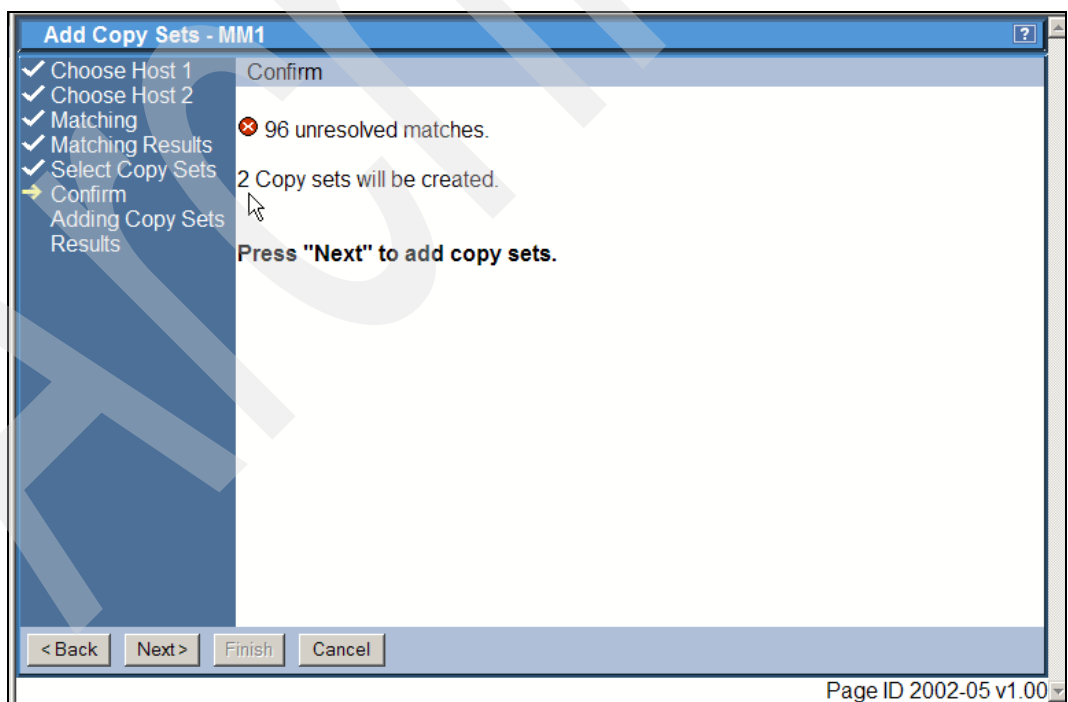


Figure 5-218 Confirm customized Copy Sets for session MM1

Clicking on Next in the panel which Figure 5-218 shows brings us back to the sessions overview panel which Figure 5-219 on page 236 displays.

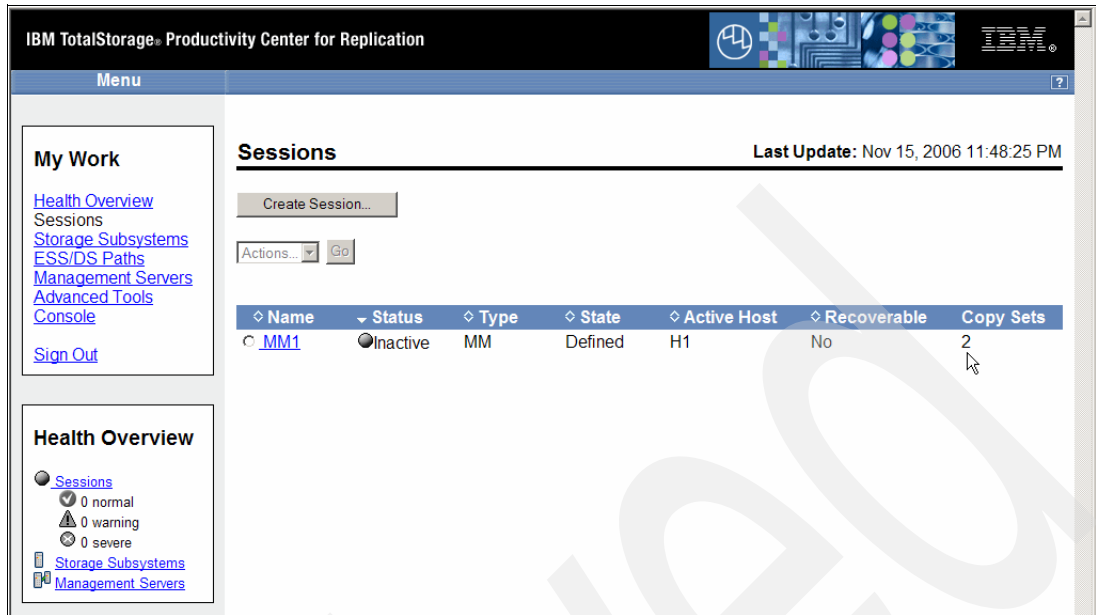


Figure 5-219 Define Copy Sets process completes successfully for session MM1

The session overview panel in Figure 5-219 displays session MM1 now with two Copy Sets defined. Note these Copy Sets are just database entries in the TPC for Replication database. Although these are just database entries TPC for Replication verifies that all volumes are available and ready to become active members in the session.

Note that we could have also selected these first two volumes in the Site 1 box. Currently the volume selection allows selection of just one volume after another. When you intend to add only some volumes but not all out of a Site 1 LSS then it requires you to add one volume after another. In our case to add these two volumes in Site 1 we have to go through the Add Copy Set process twice.

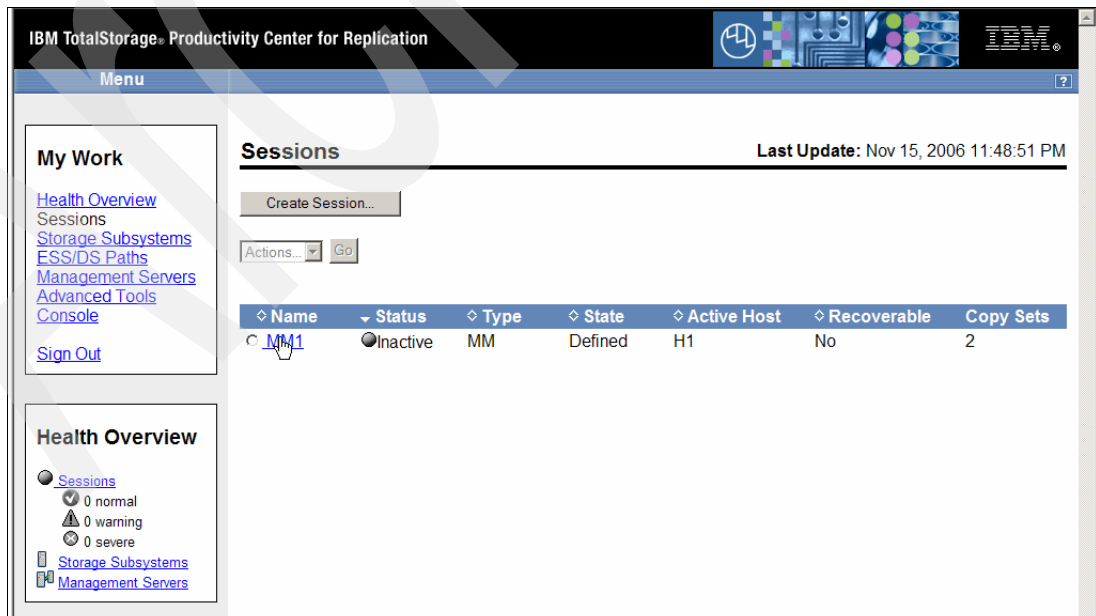


Figure 5-220 Use Hyperlinks to show Copy Set details for session MM1

When you now click the session name in the sessions overview panel as Figure 5-220 on page 236 shows then a details panel opens which displays session details of session MM1. The panel in Figure 5-221 is displayed.

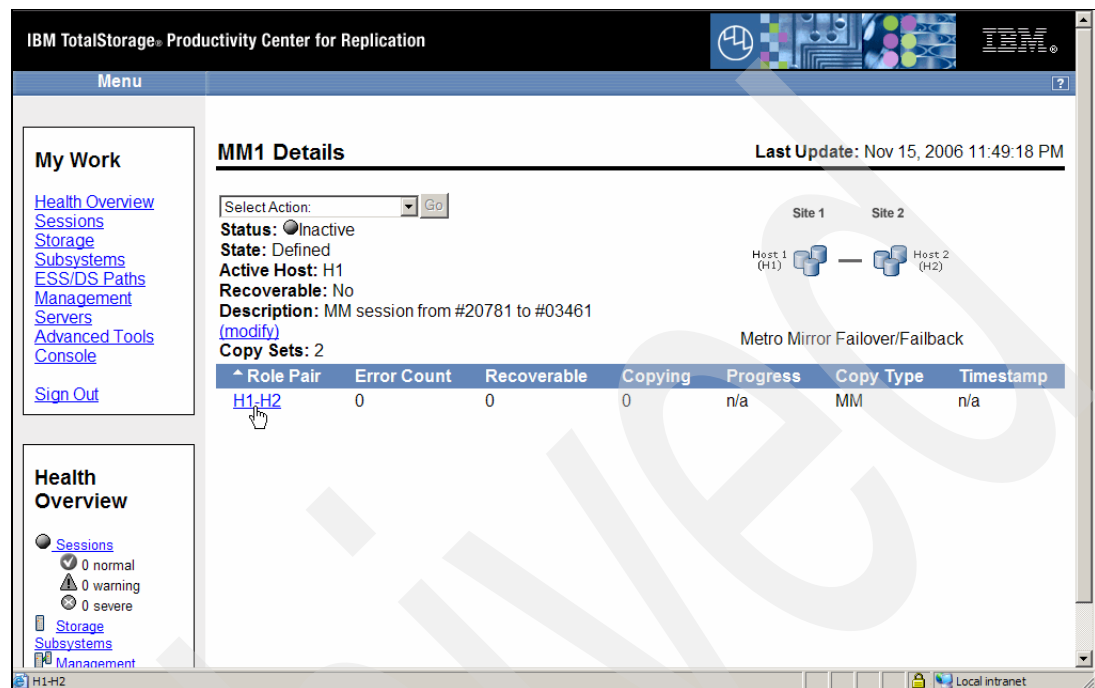


Figure 5-221 Details on session MM1

In Figure 5-221 you find another hyper link in the *Role Pair* column. When you click the H1-H2 hyper link a panel like the one in Figure 5-222 opens.

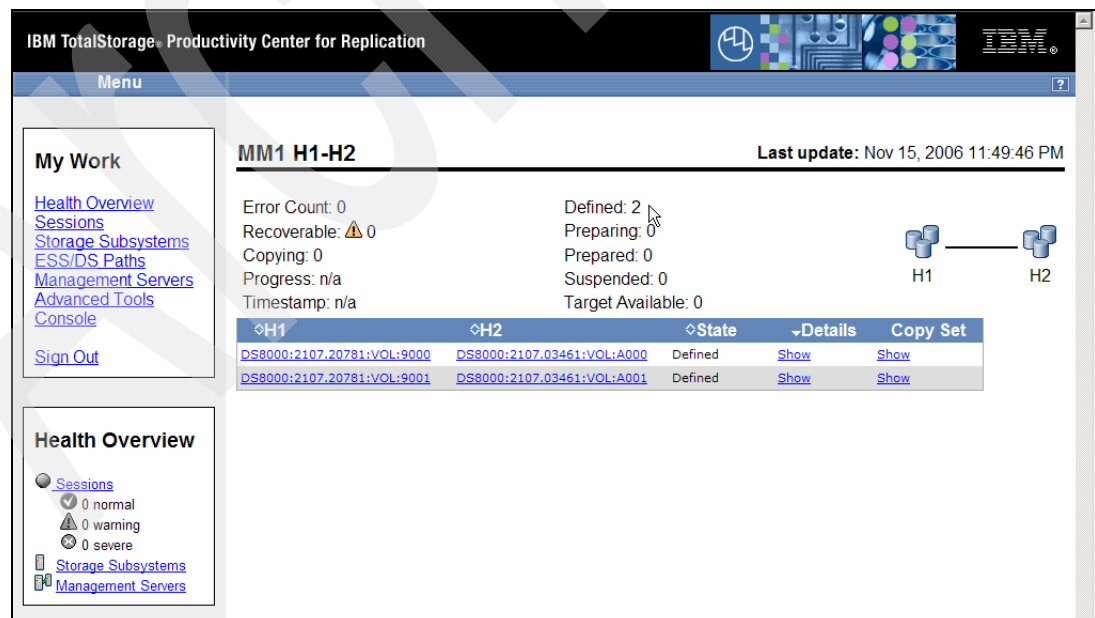


Figure 5-222 Host 1 - Host 2 Copy Sets overview for session MM1

Figure 5-222 on page 237 shows a list of all Copy Sets in session MM1. You may dig even deeper into the Copy Set details through the hyper links in the *Details* and *Copy Set* columns.

5.4.8 Add Copy Sets to a session using the CSMCLI

We removed the Copy Sets which we defined in 5.4.7, “Add certain volumes to copy sets through the GUI” on page 231 and added the Copy Sets again to the session MM1 but this time we are going to use the CSMCLI approach.

When you intend to add only a certain set of volumes out of an Site 1 LSS it is more convenient to use the CSMCLI instead going through all the GUI panels.

As Figure 5-212 on page 231 shows we intend to add Copy Sets with H1 volumes in box number 20781 and H2 volumes in box number 03461. With two Copy Sets a potential script may look like Example 5-44.

Example 5-44 Add Copy Sets to Metro Mirror session MM1

```
#
# Add copy sets to Metro Mirror session MM1
# -----
setoutput -fmt stanza
lsess      -l

mkcpset    -h1 ds8000:2107.20781:vol:9000 -h2 ds8000:2107.03461:vol:A000    MM1
mkcpset    -h1 ds8000:2107.20781:vol:9001 -h2 ds8000:2107.03461:vol:A001    MM1

lspair      -l -cpset ds8000:2107.20781:vol:9000                                MM1
lspair      -l -cpset ds8000:2107.20781:vol:9001                                MM1

lsess      -l
# ----- end of script -----
```

Note the particular notation to specify -h1 and -h2 volumes especially that there is a dot between 2107 and the DS8000 serial number.

For a more readable formatting we chose again the **setoutput** command. A list command displays all defined sessions. Then create the actual copy sets by the **mkcpset** CSMCLI command. After we created the copy sets we immediately list these Copy Sets. Another **lsess** command closes the script as Example 5-44 shows.

The result of the script in Example 5-44 is shown in Example 5-45.

Example 5-45 Output of previous CSMCLI script

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script mkcpsetMM1.txt
Name           MM1
Status         Inactive
State          Defined
Copy type      Metro Mirror Failover/Failback
Recoverable    No
Copying        No
Copy sets     0
Error          No
```

```
IWNR2001I [Dec 23, 2006 3:24:40 PM] The pair was successfully created in session
MM1 for copy set DS8000:2107.20781
```



```
:VOL:9000 with source DS8000:2107.20781:VOL:9000 and target
DS8000:2107.03461:VOL:A000.
IWRN2001I [Dec 23, 2006 3:24:42 PM] The pair was successfully created in session
MM1 for copy set DS8000:2107.20781
:VOL:9001 with source DS8000:2107.20781:VOL:9001 and target
DS8000:2107.03461:VOL:A001.
```

```
Source volume DS8000:2107.20781:VOL:9000
Target volume DS8000:2107.03461:VOL:A000
RolePair      H1-H2
State         Defined
Recoverable   No
Copying       No
New           Yes
Copy set      DS8000:2107.20781:VOL:9000
Timestamp     n/a
Last result   IWRN2001I
```

```
Source volume DS8000:2107.20781:VOL:9001
Target volume DS8000:2107.03461:VOL:A001
RolePair      H1-H2
State         Defined
Recoverable   No
Copying       No
New           Yes
Copy set      DS8000:2107.20781:VOL:9001
Timestamp     n/a
Last result   IWRN2001I
```

```
Name          MM1
Status        Inactive
State         Defined
Copy type      Metro Mirror Failover/Failback
Recoverable   No
Copying       No
Copy sets     2
Error         No
```

```
C:\Program Files\IBM\CSMCLI\CLI>
```

As Example 5-45 on page 238 shows the successful creation of both Copy Sets. Listing the sessions also indicates the two Copy Sets in session MM1.

The Copy Set listing shows the state of each Copy Set as *Defined*. Each Copy Set pair does not yet replicate from source to target volume and, therefore, is not recoverable at this point. This changes after you start the session MM1.

We turn now to the GUI to point something particular out concerning the *User Name* and the *Full Name* which is not obvious through the CSMCLI list commands.

Figure 5-223 on page 240 is the panel you reach when you click the session name in the session overview panel.

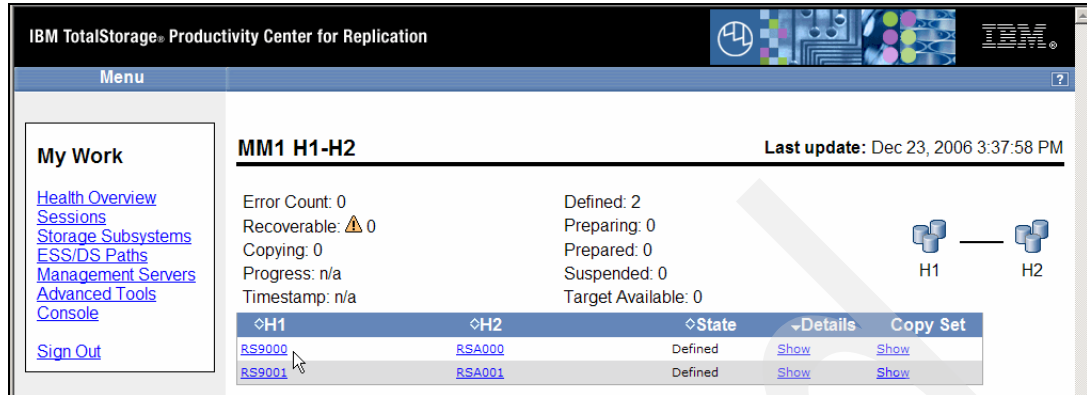


Figure 5-223 Display copy set details through the GUI concerning CKD volumes

Figure 5-223 displays different volume names in the H1 and H2 column for CKD volumes then for FB volumes.

With CKD volumes we see the volume label or volume serial number, VOLSER for the actual label of the CKD volumes. This is different with FB volumes which show a similar structure as the Example 5-45 on page 238 displays for the volume names. Figure 5-224 provides an example of how the H1 and H2 volume names look for FB volumes

^ H1	◇ H2	◇ State	◇ Details	◇ Copy Set
DS8000:2107.03461:VOL:5000	DS8000:2107.20781:VOL:5000	Prepared	Show	Show
DS8000:2107.03461:VOL:5001	DS8000:2107.20781:VOL:5001	Prepared	Show	Show
DS8000:2107.03461:VOL:5002	DS8000:2107.20781:VOL:5002	Prepared	Show	Show
DS8000:2107.03461:VOL:5003	DS8000:2107.20781:VOL:5003	Prepared	Show	Show
DS8000:2107.03461:VOL:5004	DS8000:2107.20781:VOL:5004	Prepared	Show	Show
DS8000:2107.03461:VOL:5005	DS8000:2107.20781:VOL:5005	Prepared	Show	Show
DS8000:2107.03461:VOL:5006	DS8000:2107.20781:VOL:5006	Prepared	Show	Show

Figure 5-224 Display copy set details for FB volumes

When you click the H1 volume name in Figure 5-223 you see the volume details like *User Name* and *Full Name*. Figure 5-225 on page 241 displays the result on what shows up when you click the H1 volumes as indicated in Figure 5-223.

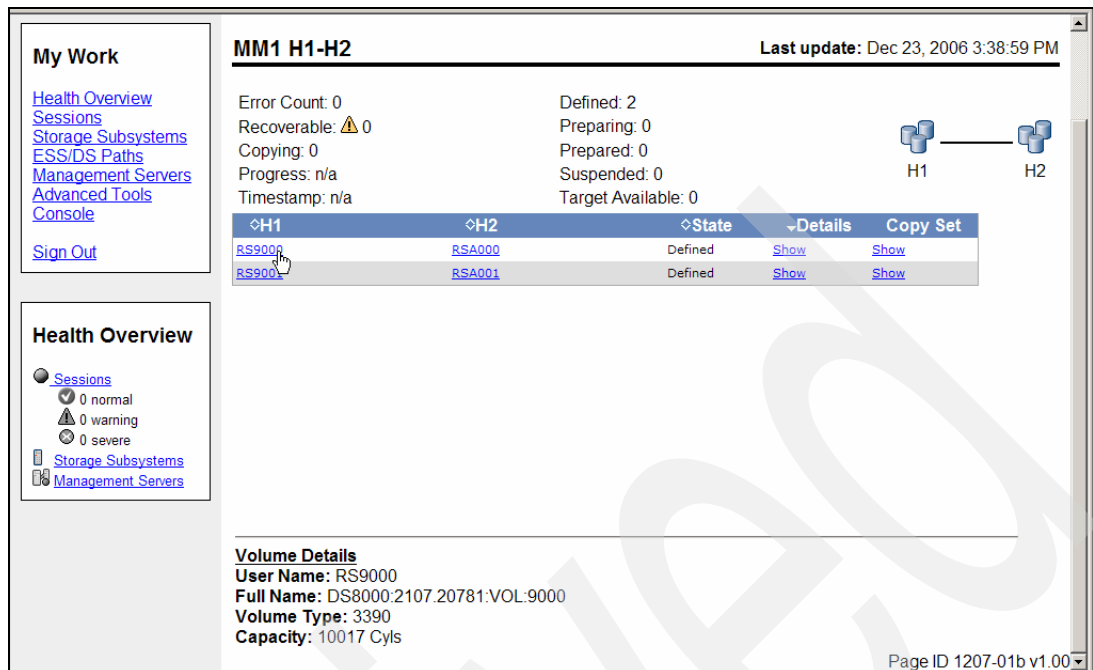


Figure 5-225 User Name and Full Name in GUI panel for CKD volume

Again we see as the *User Name* the CKD volume label or VOLSER. The *Full Name* shows the DS8000 name type. Note that TPC for Replication displays **3390** as Volume Type and not **CKD**. In contrast to fixed blocked or FB volumes which show **FIXEDBLK** as Volume Type (see Figure 5-226 on page 242).

Clicking on the first FB volume in the H1 column in Figure 5-224 on page 240 leads to the panel in Figure 5-226 on page 242. Here the *User Name* is the same as what shows under *Full Name*.

^ H1	◇ H2	◇ State	◇ Details	◇ Copy Set
DS8000:2107.03461:VOL:5000	DS8000:2107.20781:VOL:5000	Prepared	Show	Show
DS8000:2107.03461:VOL:5001	DS8000:2107.20781:VOL:5001	Prepared	Show	Show
DS8000:2107.03461:VOL:5002	DS8000:2107.20781:VOL:5002	Prepared	Show	Show
DS8000:2107.03461:VOL:5003	DS8000:2107.20781:VOL:5003	Prepared	Show	Show
DS8000:2107.03461:VOL:5004	DS8000:2107.20781:VOL:5004	Prepared	Show	Show
DS8000:2107.03461:VOL:5005	DS8000:2107.20781:VOL:5005	Prepared	Show	Show
DS8000:2107.03461:VOL:5006	DS8000:2107.20781:VOL:5006	Prepared	Show	Show
DS8000:2107.03461:VOL:5007	DS8000:2107.20781:VOL:5007	Prepared	Show	Show
DS8000:2107.03461:VOL:5008	DS8000:2107.20781:VOL:5008	Prepared	Show	Show
DS8000:2107.03461:VOL:5009	DS8000:2107.20781:VOL:5009	Prepared	Show	Show

Volume Details
User Name: DS8000:2107.03461:VOL:5000
Full Name: DS8000:2107.03461:VOL:5000
Volume Type: FIXEDBLK
Capacity: 4,191 GB
Protected: No

Figure 5-226 User Name and Full Name in GUI panel for FB volume

This concludes the steps about how you might add Copy Sets to a session.

5.4.9 Managing paths using the GUI

Before you can start a copy session you need to define PPRC paths over a Fibre Channel connection between primary and secondary storage servers.

Note that a PPRC path is a logical entity and is defined over a physical connectivity which is called a PPRC link or FCP link. You need to define a PPRC path between a primary LSS and a corresponding secondary LSS. Multiple PPRC paths connecting different LSS pairs may share the very same physical PPRC FCP link. The usual pathing rules apply and you will find more details in the manuals:

- ▶ *IBM System Storage DS8000 Copy Services with IBM System z*, SG24-6787
- ▶ *IBM System Storage DS8000 Series: Copy Services in Open Environments*, SG24-6788

As Figure 5-227 on page 243 displays we need PPRC paths between LSS 90 in 20781 and LSS A0 in 04361. The intention here is to define four PPRC paths and each PPRC path maps on a different PPRC FCP link connection.

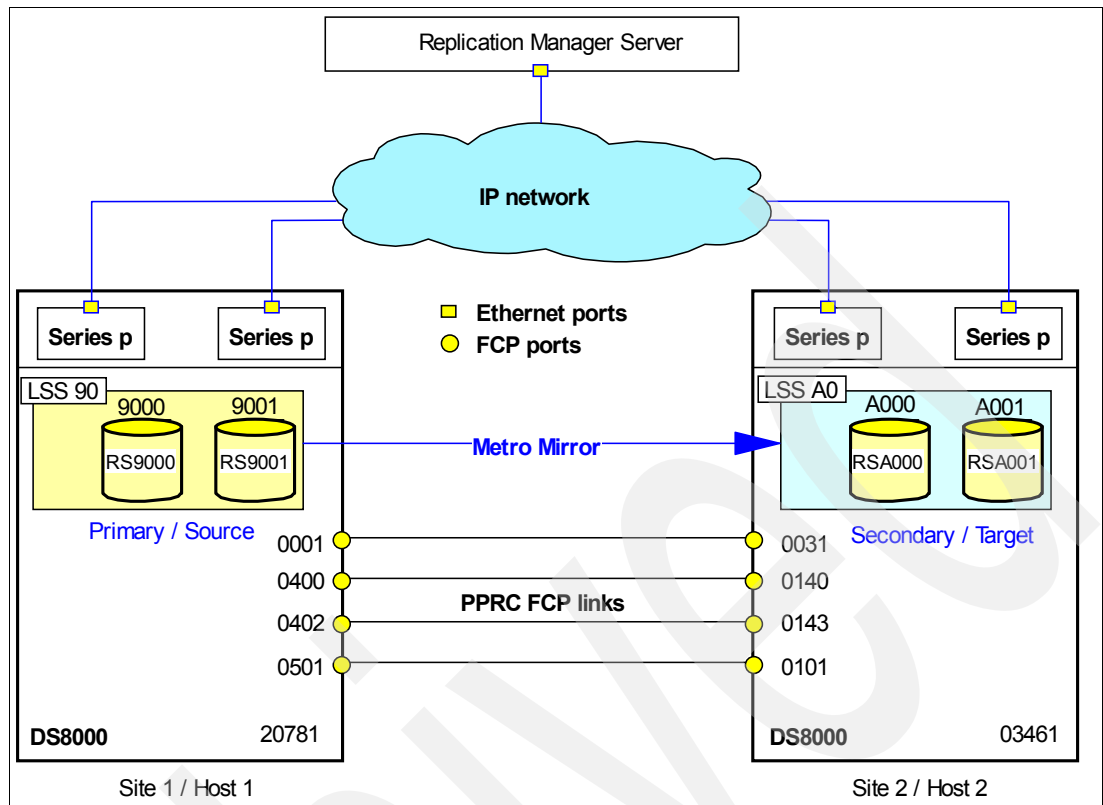


Figure 5-227 PPRC paths between Site 1 and Site 2 storage servers

We start to select *ESS/DS Paths* under *My work*. This brings you to the panel shown in Figure 5-228 on page 244.

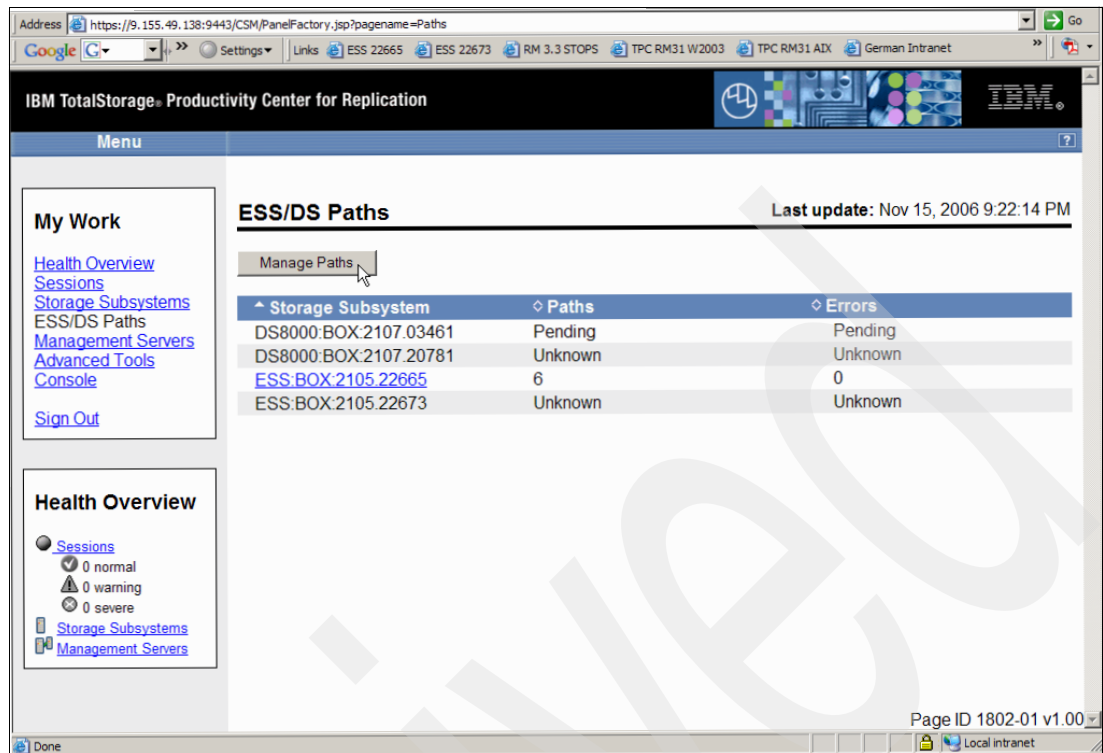


Figure 5-228 Select ESS/DS Paths application

From here you select *Manage Paths* which guides you through a set of panels to create the desired PPRC paths. The TPC for Replication GUI approach assists you to determine which PPRC links actually exists between the selected storage servers and guides you through an easy to understand panel sequence.

Figure 5-229 on page 245 displays the first panel in the path management application. Here you first select the primary or source storage server. As the overview in Figure 5-227 on page 243 displays we chose the box 20781 as the primary or source storage server.

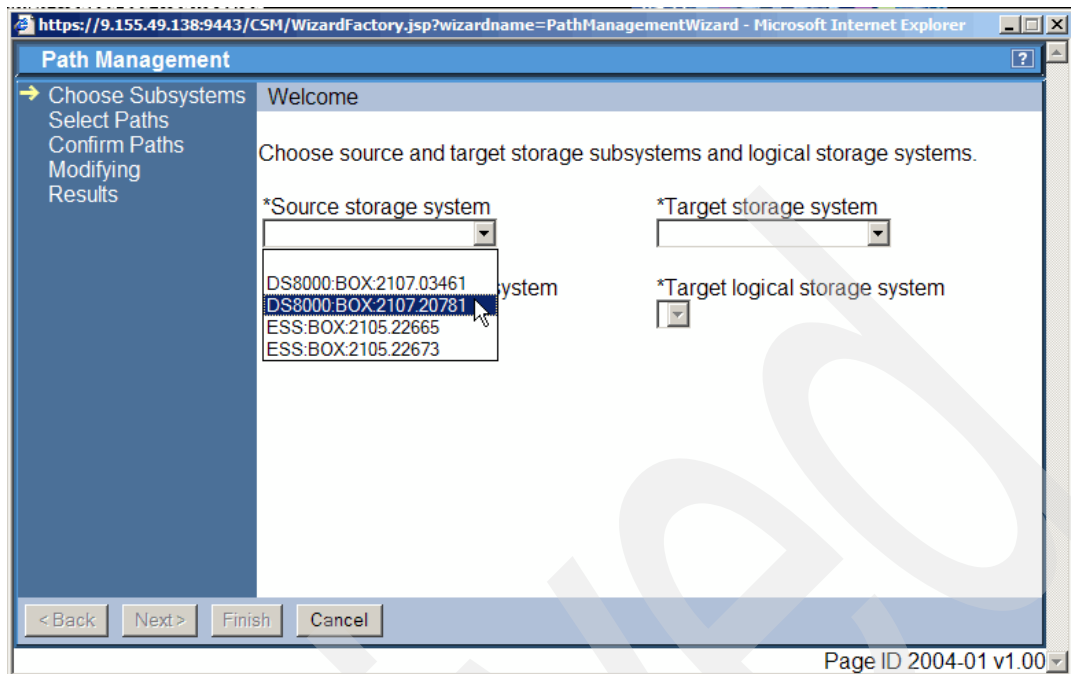


Figure 5-229 Select primary storage system

Figure 5-230 displays the next level you need to decide on and select the primary or source LSS. We need to select LSS 90.

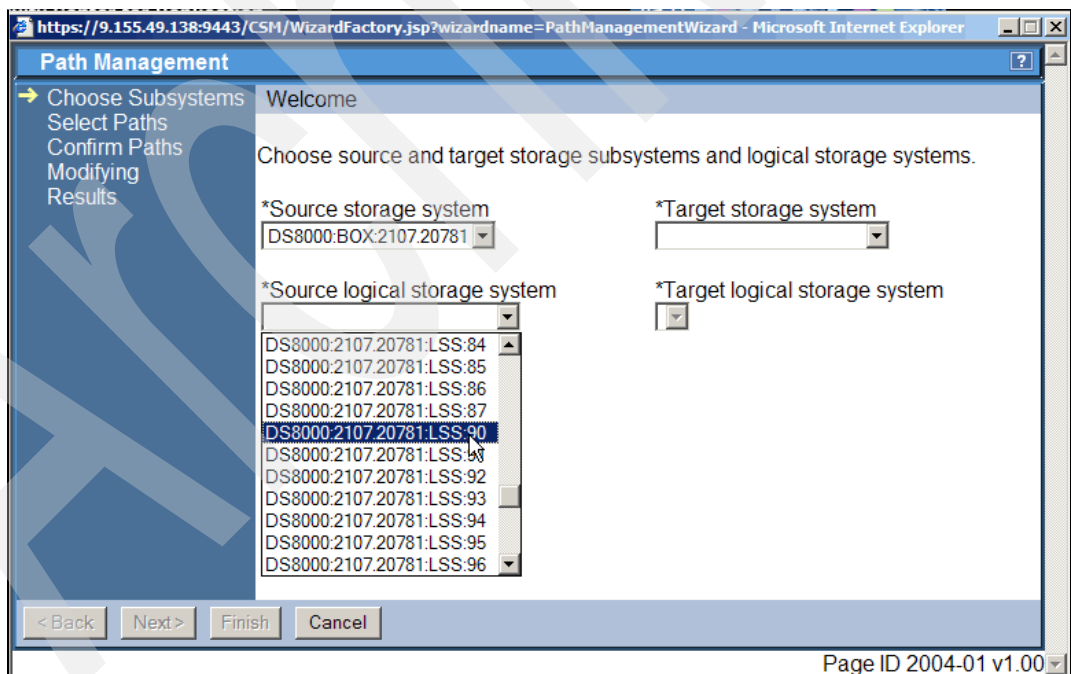


Figure 5-230 Select primary LSS

Now we define the secondary or target storage server and LSS. Figure 5-231 on page 246 shows the first decision on the target site and we chose the box with the serial number 03461.

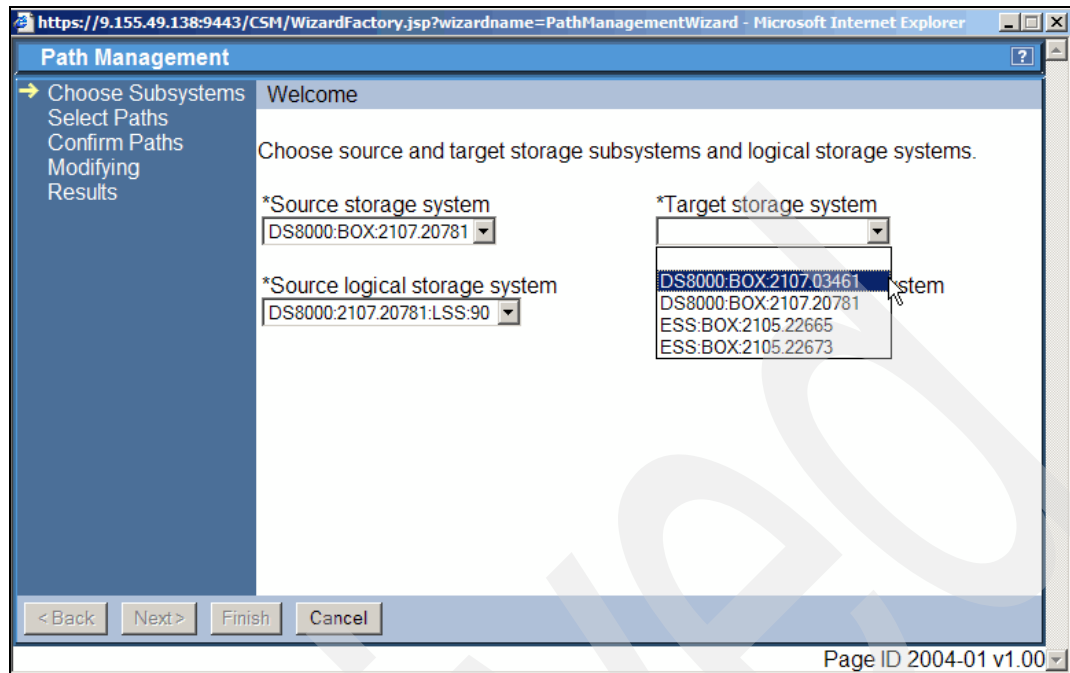


Figure 5-231 Select secondary storage system

Figure 5-232 shows the last decision point with the corresponding LSS in the target storage server. This is, in our case, LSS A0.

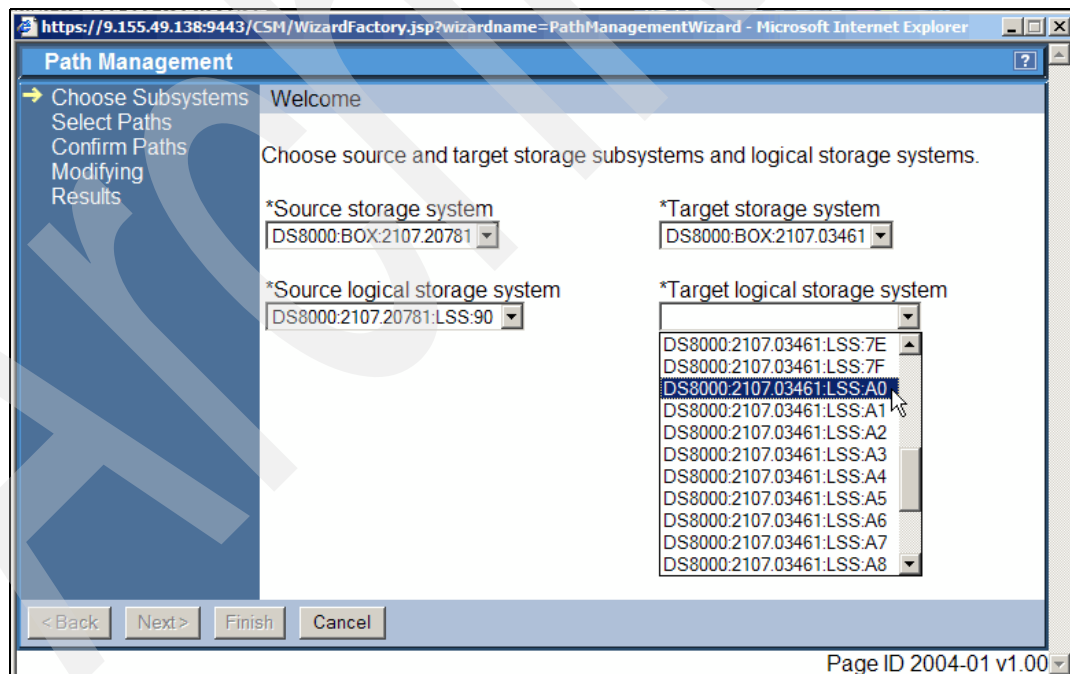


Figure 5-232 Select secondary LSS

Figure 5-233 on page 247 displays a summary panel of source and target site. Continue by clicking on the *Next* button which leads to the panel in Figure 5-234 on page 248.

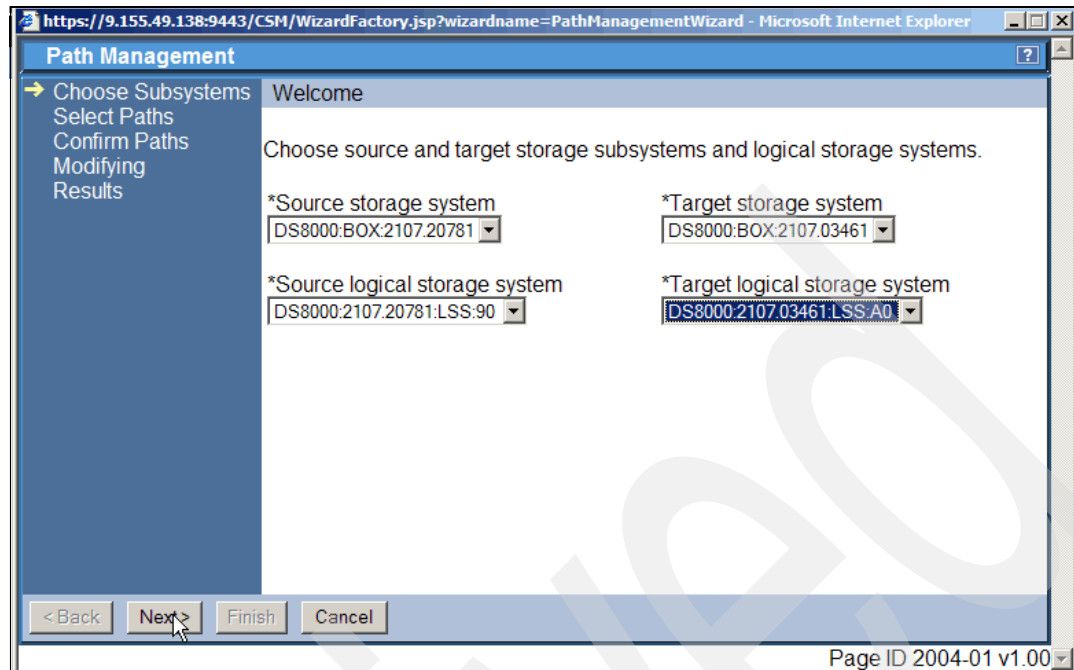


Figure 5-233 Overview panel on primary and secondary LSS

This brings us to the point where you select from a list of available PPRC source ports the first source port. Figure 5-234 on page 248 reveals that there are four ports available at the source site:

1. 0501
2. 0402
3. 0400
4. 0001

We select port 0400 as the first PPRC path source port.

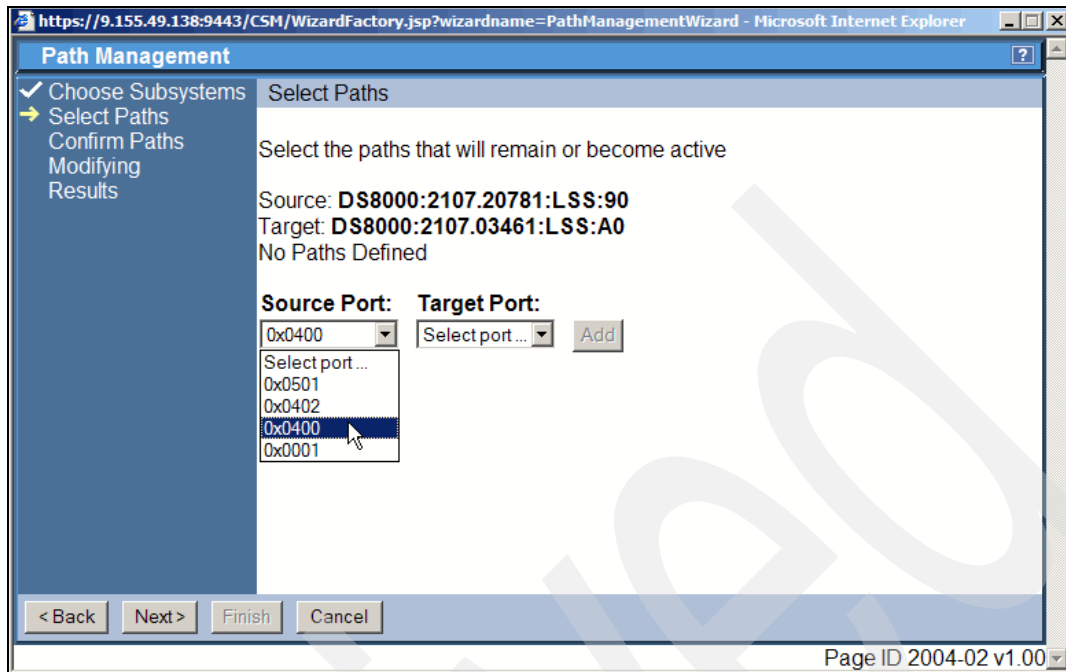


Figure 5-234 Select PPRC FCP port at primary storage server

Clicking the Next button takes you to the panel which provides the potential target port. Figure 5-235 displays two possible target ports to pair up with the selected source port. This indicates that this is not a point-to-point direct link connection but a link route through a switched fabric. From the source port 0400 you can target port 0140 or port 0143 at the Site 2 box. We selected port 0140 as the corresponding target port.

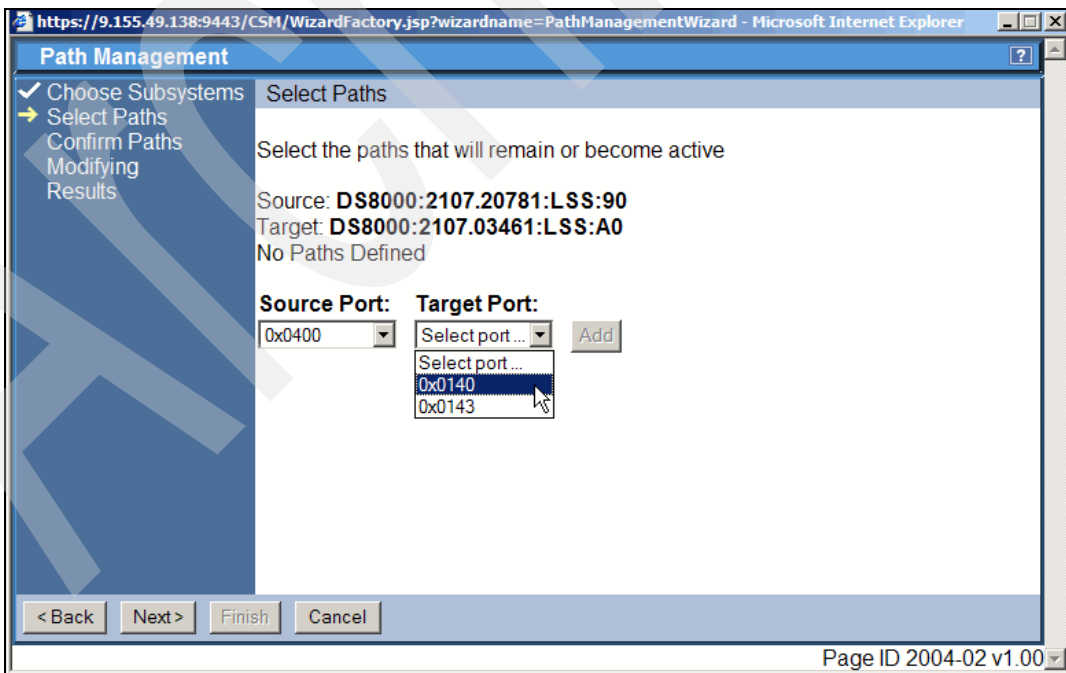


Figure 5-235 Select PPRC FCP port at secondary storage server

Once we selected the pairing target port the Add button becomes available and we add both selected ports to form the first PPRC paths over a link between both selected ports (see Figure 5-236). Click Next to continue.

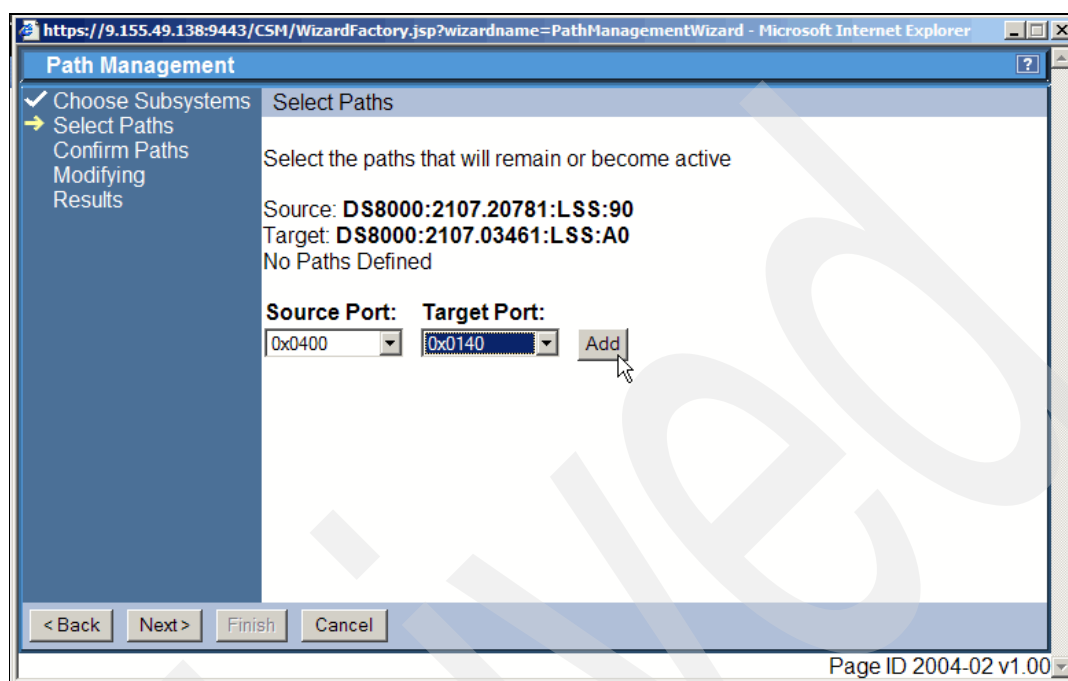


Figure 5-236 Select and add first new PPR path

Figure 5-237 is the next panel which starts again to create the next PPRC path. As a second PPRC path we select port 0402 as the source port.

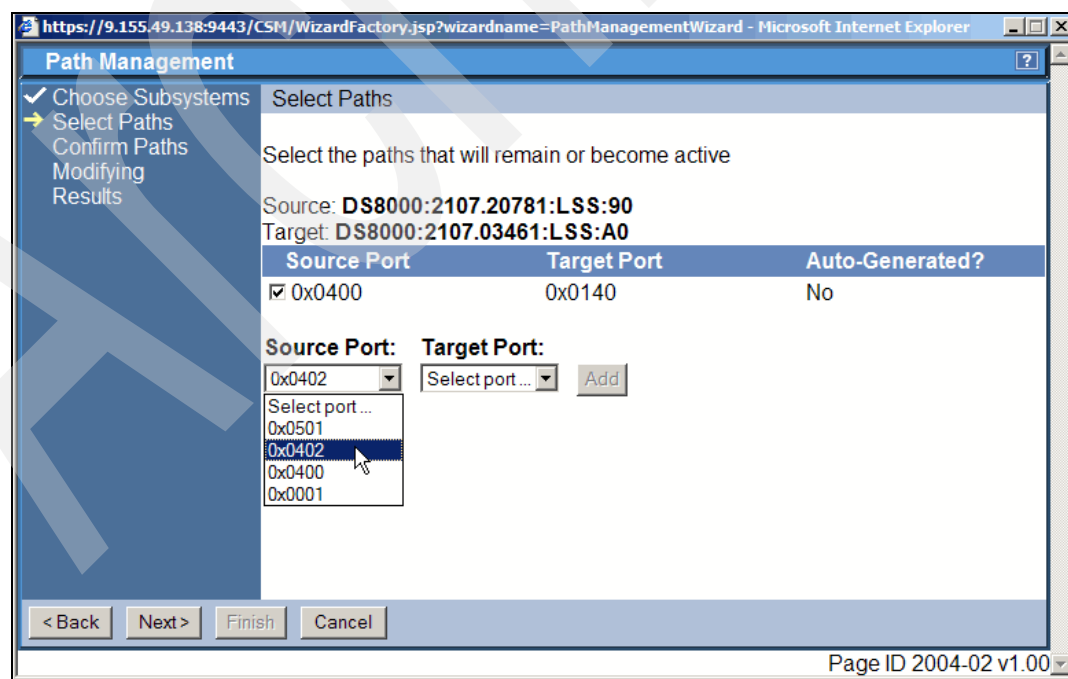


Figure 5-237 Select second primary port

After we decided the source port TPC for Replication now offers only a single target port which may form the next PPRC path over a link between 0402 and 0143. The fact that there is only a single target port to select from may indicate that this is a point-to-point link between both ports (see Figure 5-238).

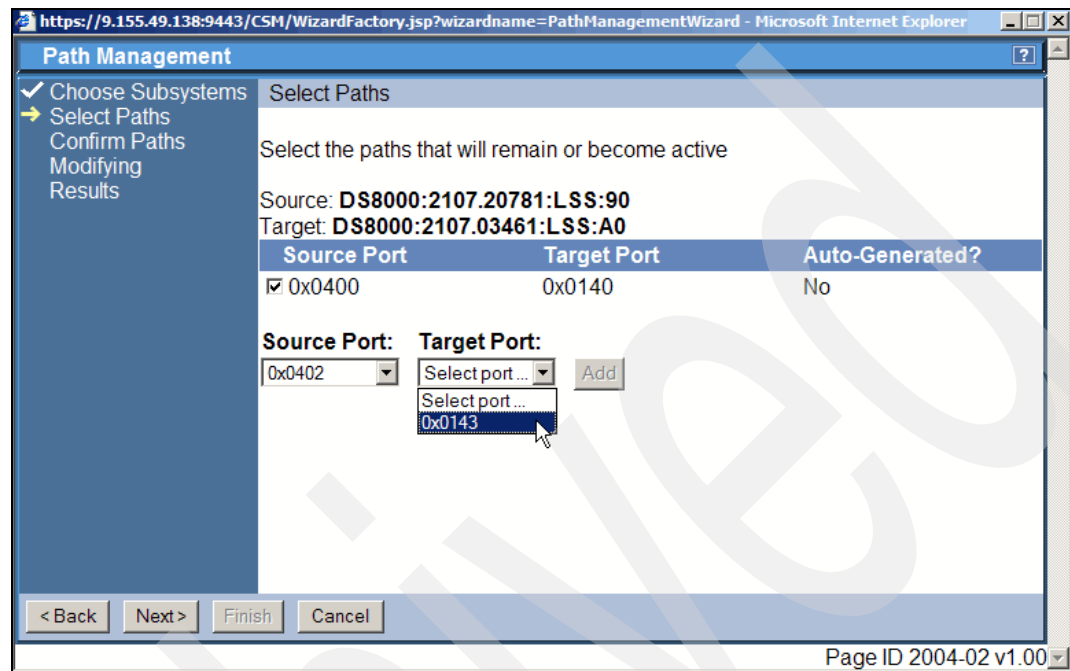


Figure 5-238 Select second port at secondary storage server

To create a third PPRC path we start again to select another source port and a matching target port as Figure 5-239 on page 251 and Figure 5-240 on page 251 shows. Again Figure 5-240 on page 251 displays only one target port which may indicate a point-to-point link connection between both boxes.

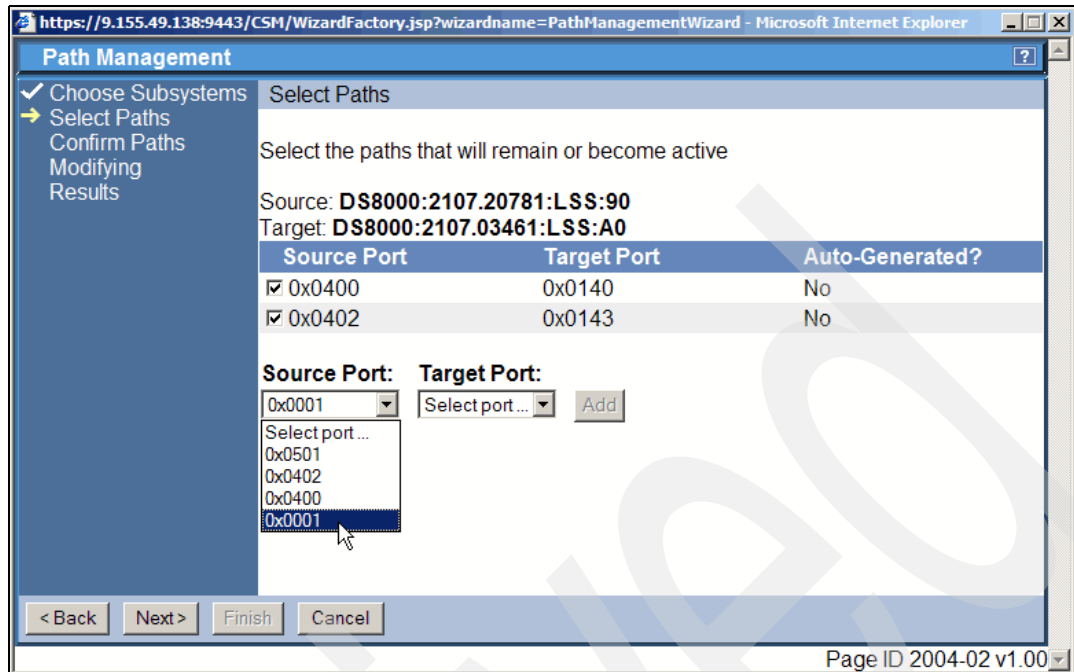


Figure 5-239 Select third primary PPRC port

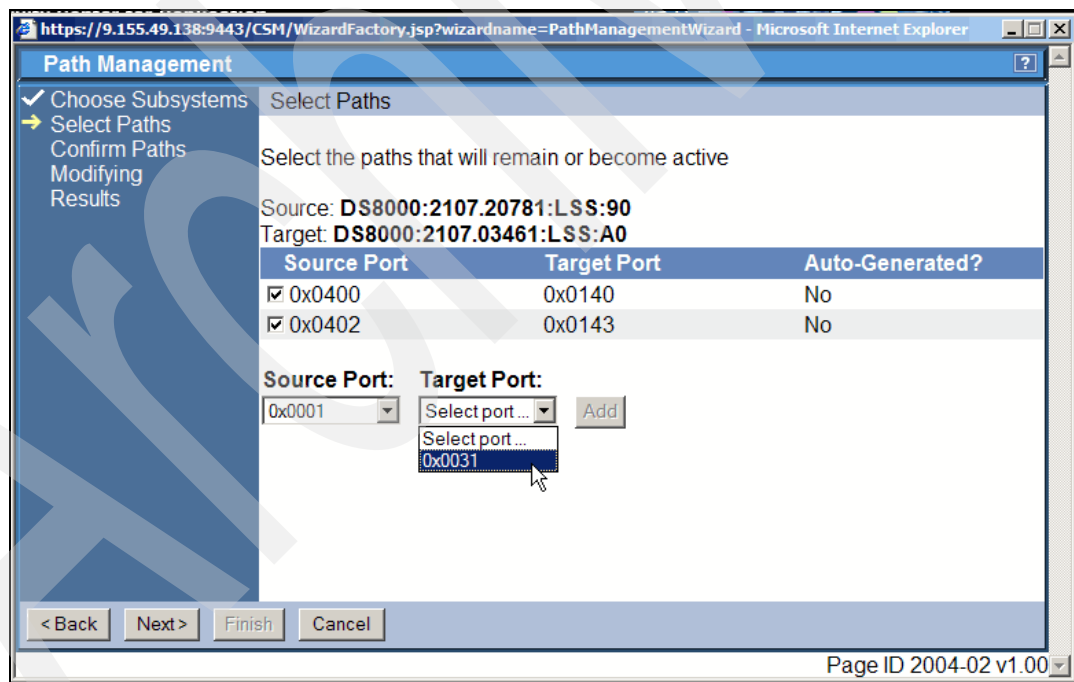


Figure 5-240 Select third PPRC secondary port

Finally we select source port 0501 to form the fourth PPRC path as shown in Figure 5-241 on page 252.

Figure 5-242 on page 252 shows the remaining target port to select to match with the source port. Note the list of PPRC paths we selected so far and the check mark in front of each PPRC path and its respective port pairs.

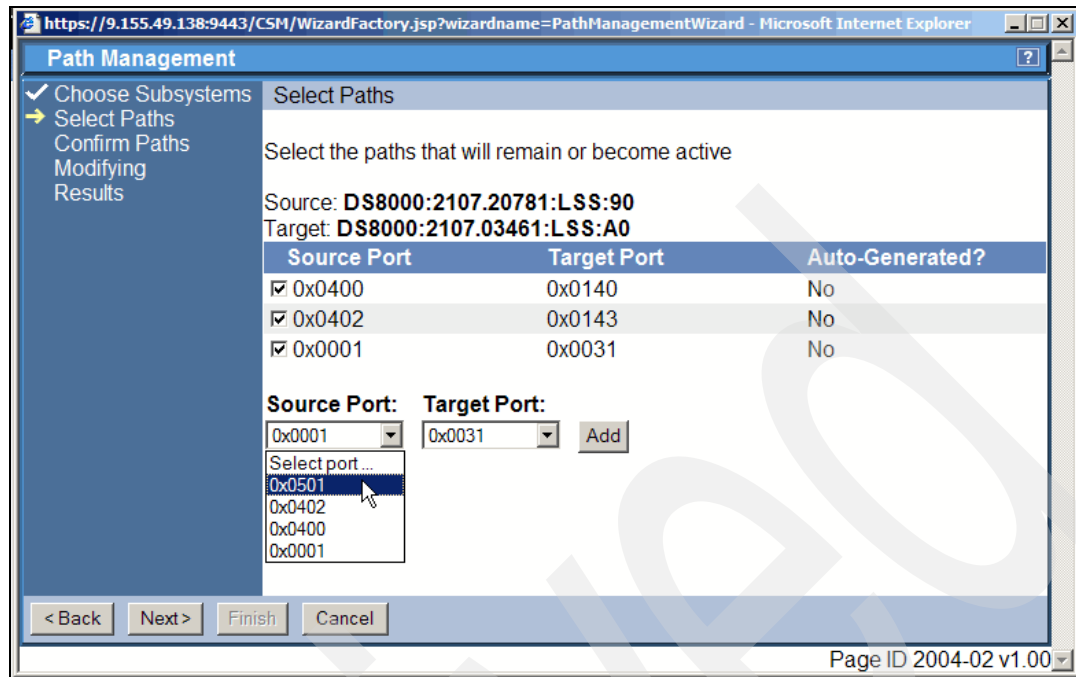


Figure 5-241 Select fourth PPRC primary port

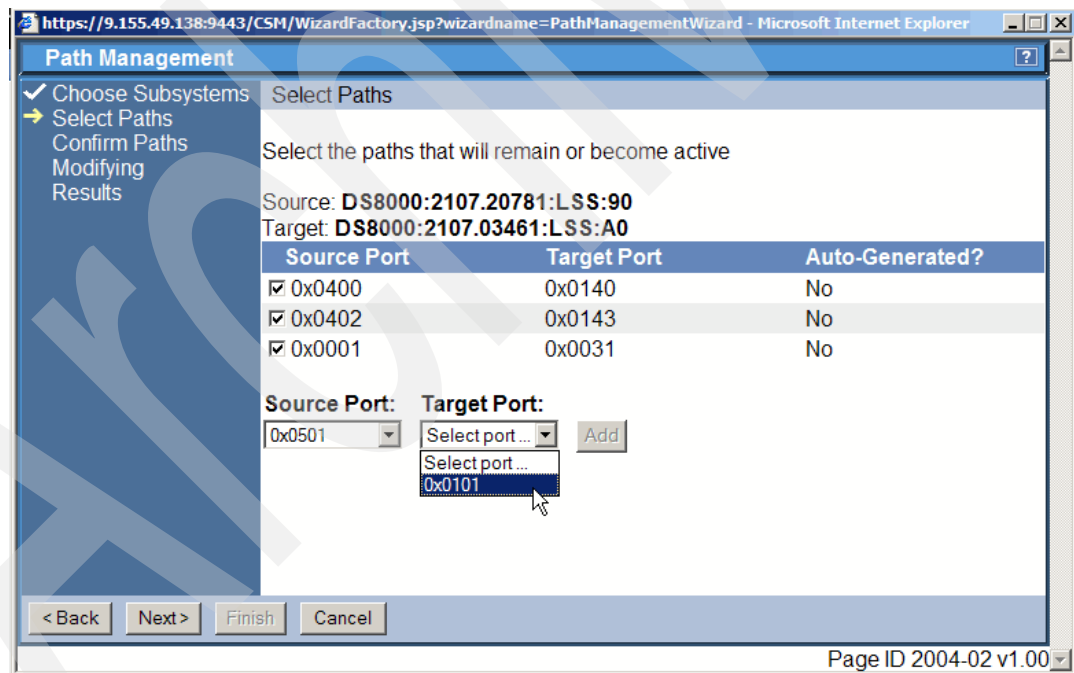


Figure 5-242 Select fourth PPRC secondary port

Figure 5-243 on page 253 shows the final overview panel which displays all paths selected so far. From here on we continue with Next to the confirmation panel which Figure 5-244 on page 253 displays.

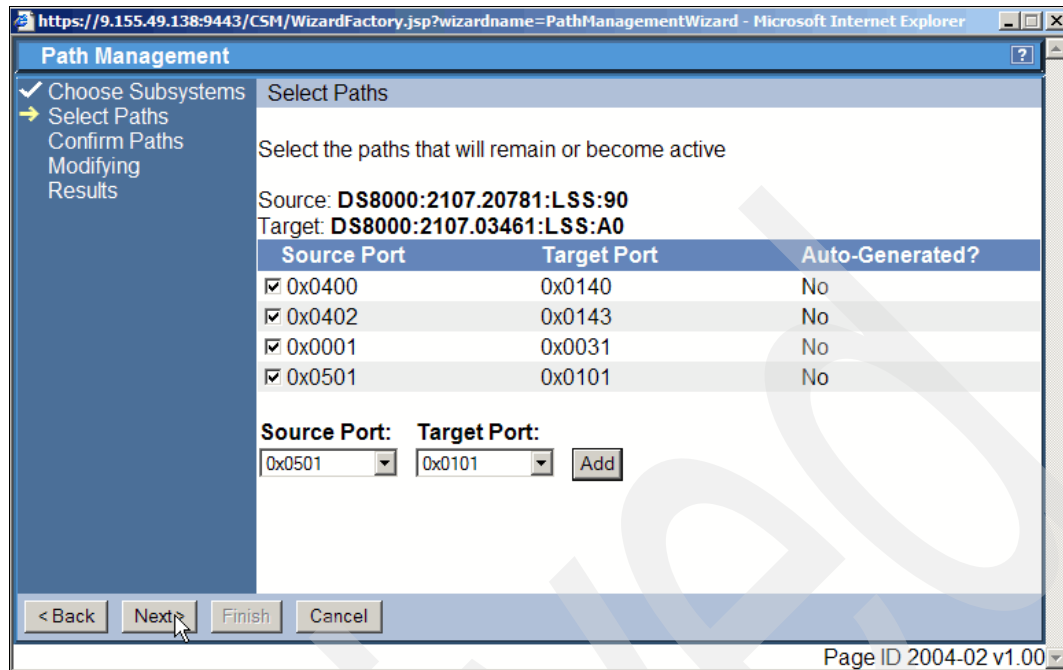


Figure 5-243 Overview of selected PPRC paths

Figure 5-244 shows the confirmation panel. Click the Next button to continue.

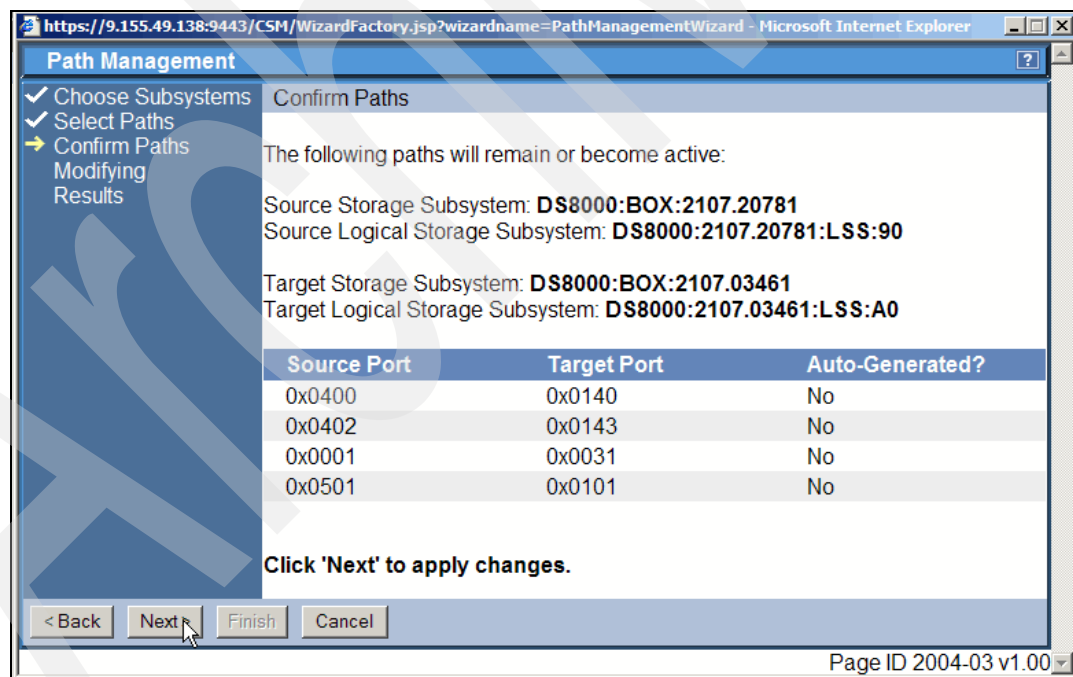


Figure 5-244 Confirm to define PPRC ports

Figure 5-245 on page 254 shows the *Modifying* panel. Here TPC for Replication transparently issues the required commands to establish the paths and updates its database accordingly.

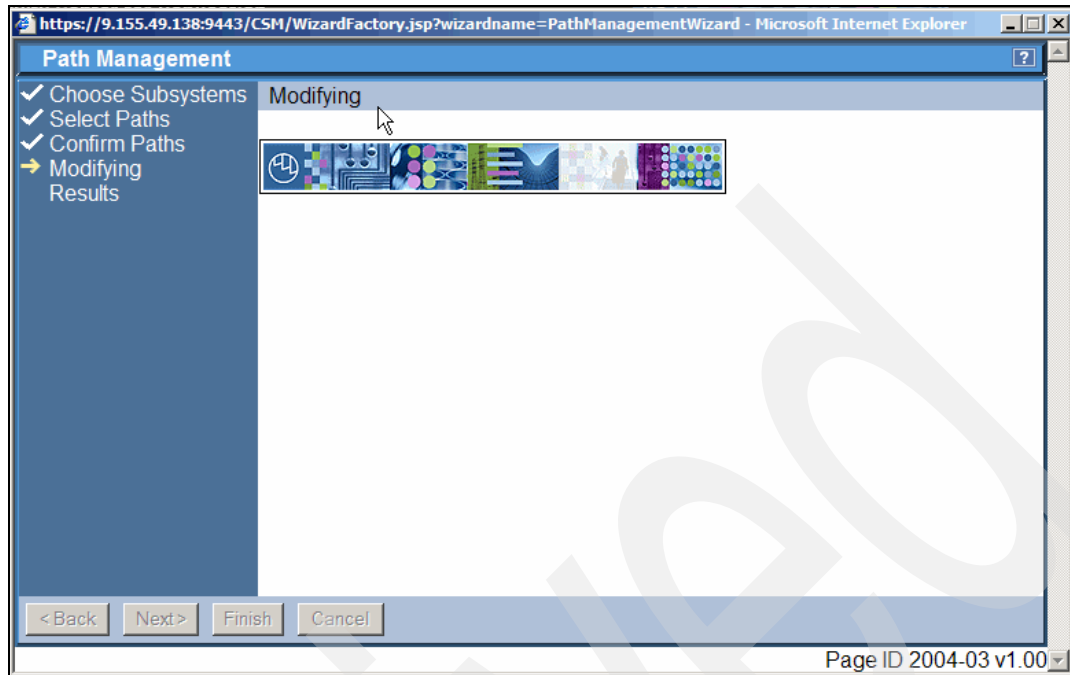


Figure 5-245 Modify PPRC path configuration

Figure 5-246 is the final and concluding panel in this sequence to create PPRC paths. It shows the results and the check mark indicates that all PPRC paths are successfully created. It also instructs you to click Finish to exit the *Path Management* wizard which concludes the PPRC paths definition between a LSS pair.

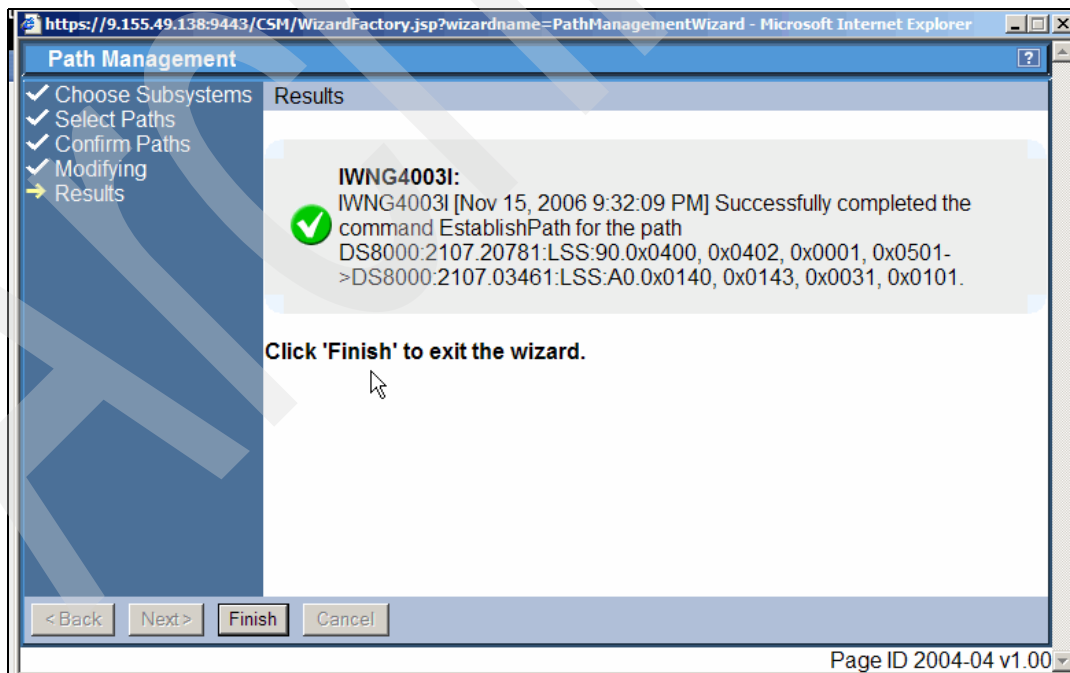


Figure 5-246 Results panel confirms PPRC path definition

We are then back to the ESS/DS Paths overview panel which Figure 5-247 on page 255 displays. This panel now shows the source DS8000 with the four newly defined PPRC paths.

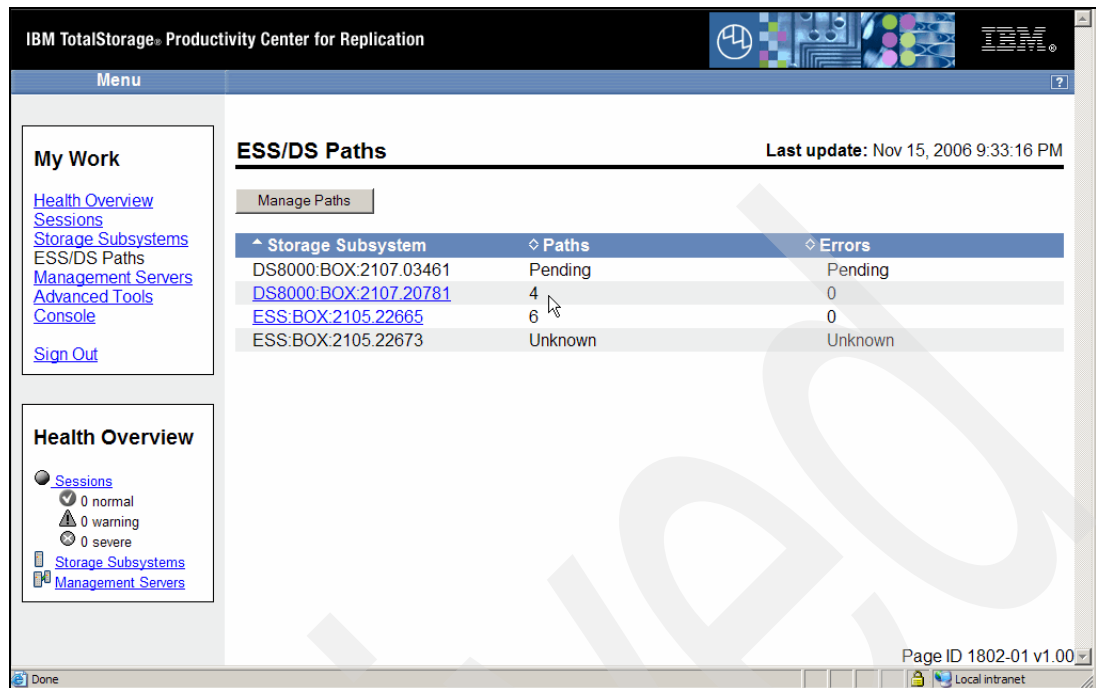


Figure 5-247 Path overview panel

This concludes the PPRC Path Management wizard GUI application to create PPRC paths.

5.4.10 Managing paths using the CSMCLI

Managing PPRC paths is usually rather static and does not change often. This may be reason enough to create the PPRC path via the GUI once and do not bother with developing scripts. When you intend to change the PPRC path configuration more often then you may consider to develop a scripted approach which is certainly more sophisticated than what we did here in the following sections. But the following sections provide an idea about the usage of CSMCLI scripts. You may also consider using CSMCLI commands in the interactive mode. But this requires a secure handling with all these lengthy device names and the periods and colons within the names.

Nonetheless this section briefly covers the related CSMCLI commands which you may use when managing a PPRC path configuration. We still use small script files.

Create PPRC paths using CSMCLI commands

First you determine the available FCP ports for PPRC path between LSS 90 in 20781 and LSS A0 in 03461. Example 5-46 shows a one line script with the CSMCLI command to determine the available ports between the specific LSS pair.

Example 5-46 Script to list available FCP ports between two LSS

```
#
# List available PPRC FCP port(s)
# -----

lsavailports -src ds8000:2107.20781:lss:90 -tgt ds8000:2107.03461:lss:A0

# ----- end of script -----
```

Example 5-47 displays the result when executing the brief script in Example 5-46 on page 255. There are four dedicated ports in either site although there are five entries shown in Example 5-47. This is because of source port 0400 which potentially connects to two target ports.

Example 5-47 Script output to list available FCP ports between two LSS

C:\Program Files\IBM\CSMCLI\CLI>csmcli -script lsavailports.txt

Source	Target	Type
ESS:2107.20781:LSS:90.0x0001	ESS:2107.03461:LSS:a0.0x0031	Fibre Channel
ESS:2107.20781:LSS:90.0x0501	ESS:2107.03461:LSS:a0.0x0101	Fibre Channel
ESS:2107.20781:LSS:90.0x0400	ESS:2107.03461:LSS:a0.0x0140	Fibre Channel
ESS:2107.20781:LSS:90.0x0400	ESS:2107.03461:LSS:a0.0x0143	Fibre Channel
ESS:2107.20781:LSS:90.0x0402	ESS:2107.03461:LSS:a0.0x0143	Fibre Channel

C:\Program Files\IBM\CSMCLI\CLI>

We decide to create the same four PPRC paths which we defined in 5.4.9, “Managing paths using the GUI” on page 242 when we defined the PPRC paths through the GUI. Refer also to Figure 5-244 on page 253.

Figure 5-248 shows our test configuration again and the utilized PPRC FCP ports used in the following examples.

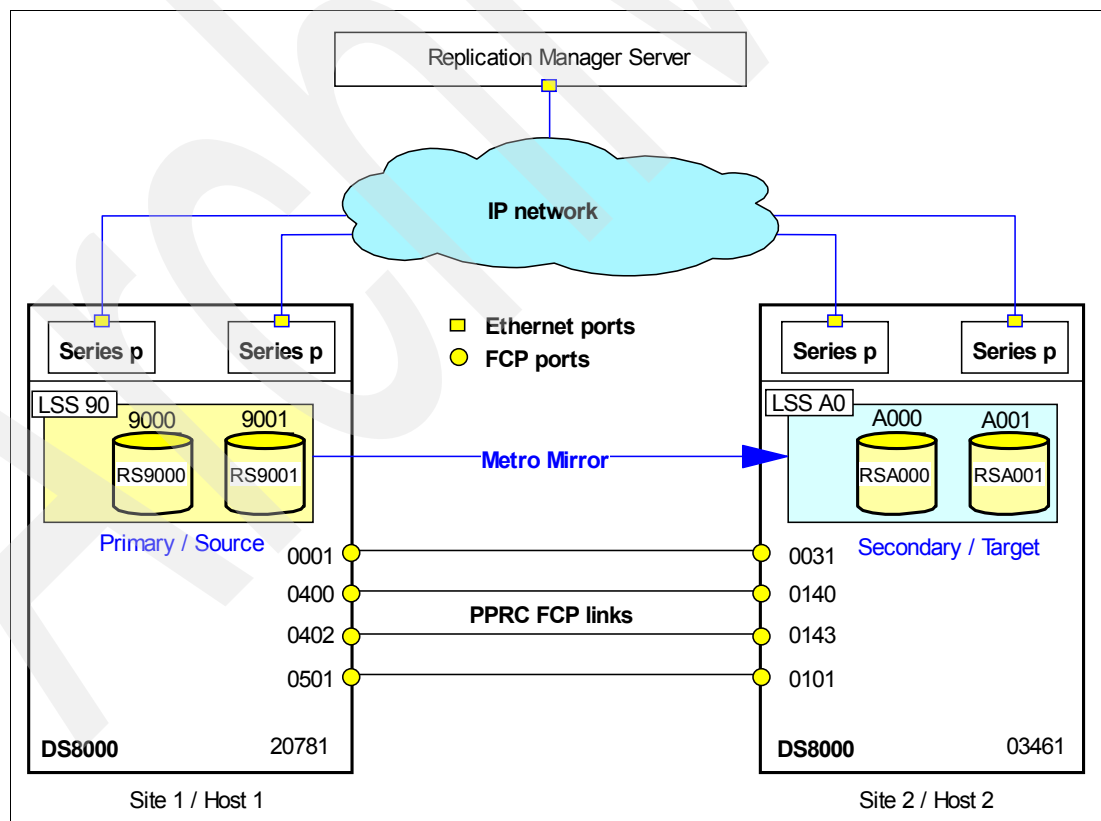


Figure 5-248 PPRC FCP ports used in example GUI panels and example scripts

The source and matching target ports which we are going to use in the following CSMCLI commands and scripts are:

1. 0001 - 0031
2. 0400 - 0140
3. 0402 - 0143
4. 0501 - 0101

Example 5-48 shows a brief script which contains six CSMCLI commands. A list path command follows four commands to establish four PPRC paths between LSS 90 in 20781 and LSS A0 in 03461.

Example 5-48 Script to establish PPRC paths

```
#
# Establish PPRC path(s)
# -----

lspath -src ds8000:2107.20781:lss:90 -tgt ds8000:2107.03461:lss:A0

mkpath -src ds8000:2107.20781:lss:90.0001 -tgt ds8000:2107.03461:lss:A0.0031
mkpath -src ds8000:2107.20781:lss:90.0400 -tgt ds8000:2107.03461:lss:A0.0140
mkpath -src ds8000:2107.20781:lss:90.0402 -tgt ds8000:2107.03461:lss:A0.0143
mkpath -src ds8000:2107.20781:lss:90.0501 -tgt ds8000:2107.03461:lss:A0.0101

lspath -src ds8000:2107.20781:lss:90 -tgt ds8000:2107.03461:lss:A0

# ----- end of script -----
```

Example 5-49 shows the result when executing the script in Example 5-48. Note that the first list path commands does not find any existing path and after the four make PPRC path commands complete the following list path command reports the successful creation of these four paths.

Example 5-49 Create four PPRC paths - script output

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script mk4paths.txt
IWN2302W [Dec 23, 2006 9:46:20 PM] No path matched the input criteria.

IWNH1000I [Dec 23, 2006 9:46:26 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 9:46:31 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 9:46:34 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 9:46:39 PM] The command completed successfully.
Source                                Target                                Type Status Auto-Generated
=====
DS8000:2107.20781:LSS:90.0x0001 DS8000:2107.03461:LSS:a0.0x0031 ESS Normal No
DS8000:2107.20781:LSS:90.0x0400 DS8000:2107.03461:LSS:a0.0x0140 ESS Normal No
DS8000:2107.20781:LSS:90.0x0402 DS8000:2107.03461:LSS:a0.0x0143 ESS Normal No
DS8000:2107.20781:LSS:90.0x0501 DS8000:2107.03461:LSS:a0.0x0101 ESS Normal No

C:\Program Files\IBM\CSMCLI\CLI>
```

When you define a path which is already defined you get a message which indicates that this path does already exist.

Remove PPRC paths using CSMCLI commands

Example 5-50 on page 258 shows a script to remove four PPRC paths between LSS 90 in 20781 and LSS A0 in 03461. Note that the script in Example 5-50 on page 258 is slightly edited. Originally a **rmpath** CSMCLI command is in a single line. Here the source line is split in two lines for better reading.

Example 5-50 Script to remove 4 paths

```
#
# Remove PPRC path(s)
# -----

lspath          -src ds8000:2107.20781:lss:90          -tgt ds8000:2107.03461:lss:A0

rmppath -quiet -src ds8000:2107.20781:lss:90.0001
              -tgt ds8000:2107.03461:lss:A0.0031
rmppath -quiet -src ds8000:2107.20781:lss:90.0400
              -tgt ds8000:2107.03461:lss:A0.0140
rmppath -quiet -src ds8000:2107.20781:lss:90.0402
              -tgt ds8000:2107.03461:lss:A0.0143
rmppath -quiet -src ds8000:2107.20781:lss:90.0501
              -tgt ds8000:2107.03461:lss:A0.0101

lspath          -src ds8000:2107.20781:lss:90          -tgt ds8000:2107.03461:lss:A0
# ----- end of script -----
```

Before and after the deletion of the PPRC paths is a list command to verify which path existed before and whether all paths have been deleted. Example 5-51 shows the result of executing the script in Example 5-50.

Example 5-51 Script output of script to remove PPRC paths

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script rm4paths.txt
Source                                     Target                                     Type Status Auto-Generated
=====
DS8000:2107.20781:LSS:90.0x0001 DS8000:2107.03461:LSS:a0.0x0031 ESS Normal No
DS8000:2107.20781:LSS:90.0x0400 DS8000:2107.03461:LSS:a0.0x0140 ESS Normal No
DS8000:2107.20781:LSS:90.0x0402 DS8000:2107.03461:LSS:a0.0x0143 ESS Normal No
DS8000:2107.20781:LSS:90.0x0501 DS8000:2107.03461:LSS:a0.0x0101 ESS Normal No

IWNH1000I [Dec 23, 2006 9:50:51 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 9:50:55 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 9:51:00 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 9:51:04 PM] The command completed successfully.

IWNC2302W [Dec 23, 2006 9:51:05 PM] No path matched the input criteria.

C:\Program Files\IBM\CSMCLI\CLI>
```

Due to the quiet parameter the remove paths command does not ask to confirm the removal of the path and just executes quietly as Example 5-51 shows. The list command before and after the delete path commands verify that all paths are deleted.

When you attempt to delete a path which no longer exists you get a little ambiguous message "... was not found" indicating that the device does not exist.

Example 5-52 Execute script to delete PPRC path which does not exist

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script rm4paths.txt
IWNC2302W [Dec 23, 2006 10:16:40 PM] No path matched the input criteria.
IWNC3601W [Dec 23, 2006 10:16:44 PM] Device DS8000:BOX:2107.03461:A0 was not
found.
IWNC3601W [Dec 23, 2006 10:16:48 PM] Device DS8000:BOX:2107.03461:A0 was not
found.
```

IWNC3601W [Dec 23, 2006 10:16:51 PM] Device DS8000:BOX:2107.03461:A0 was not found.
IWNC3601W [Dec 23, 2006 10:16:55 PM] Device DS8000:BOX:2107.03461:A0 was not found.
IWNC2302W [Dec 23, 2006 10:16:55 PM] No path matched the input criteria.

The script from Example 5-50 on page 258 executes a second time and has nothing to delete.

5.4.11 Managing Metro Mirror with the GUI

Once we defined a Metro Mirror session and populated the session with Copy Sets and also defined the required paths between both sites we can start the session.

Start Metro Mirror session through the GUI

Figure 5-249 displays the session MM1 as we defined it previously. Note this is the first Metro Mirror session MM1 with 2 Copy Sets which were created by explicitly selecting the particular volumes.

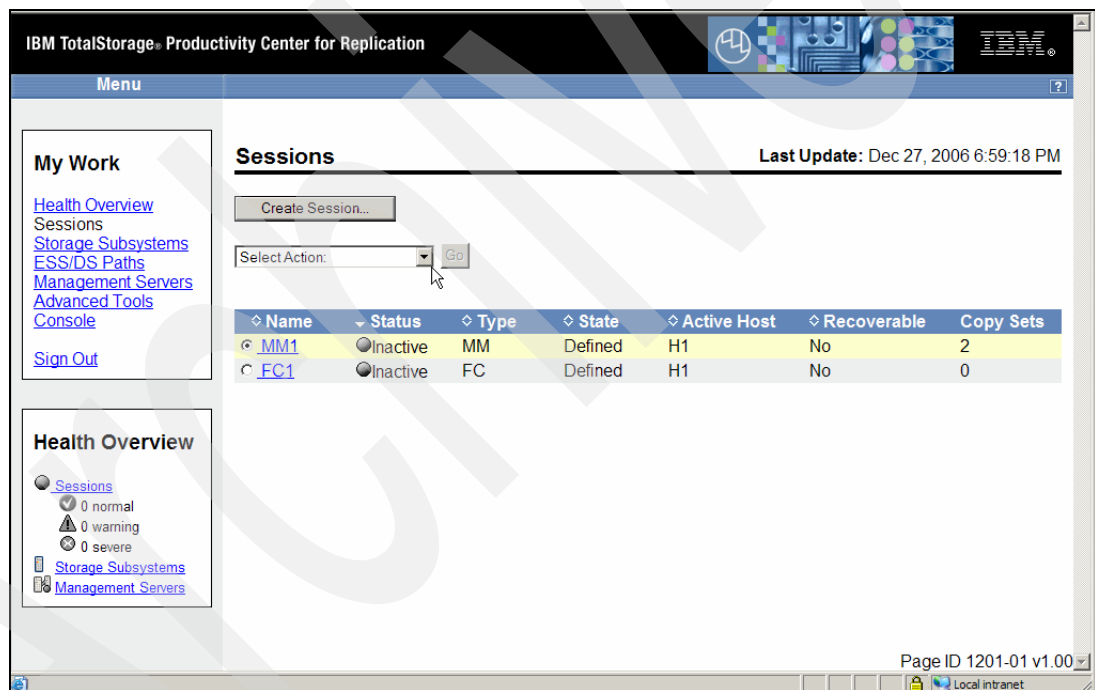


Figure 5-249 Metro Mirror session with two copy sets

As Figure 5-249 shows you open the Select Action list first which brings you to the next panel shown in Figure 5-250 on page 260.

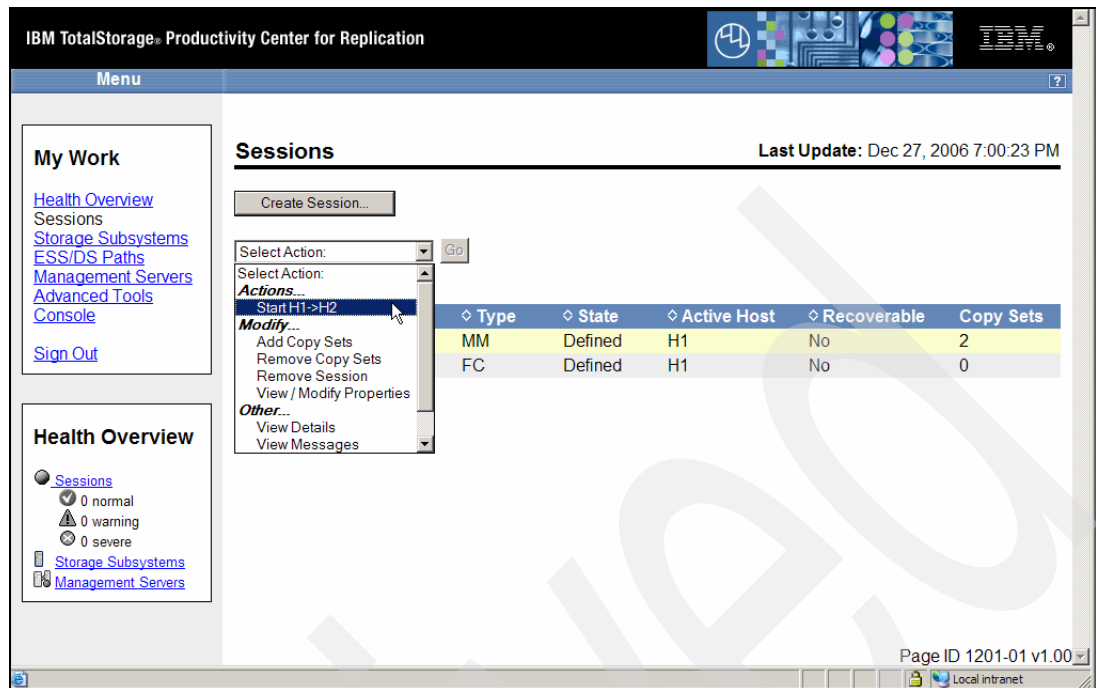


Figure 5-250 Metro Mirror Action is left to Start the session MM1

Figure 5-250 shows that the only possible action is to start the session H1-H2. Do not forget to click the Go button to start the session (see Figure 5-251).

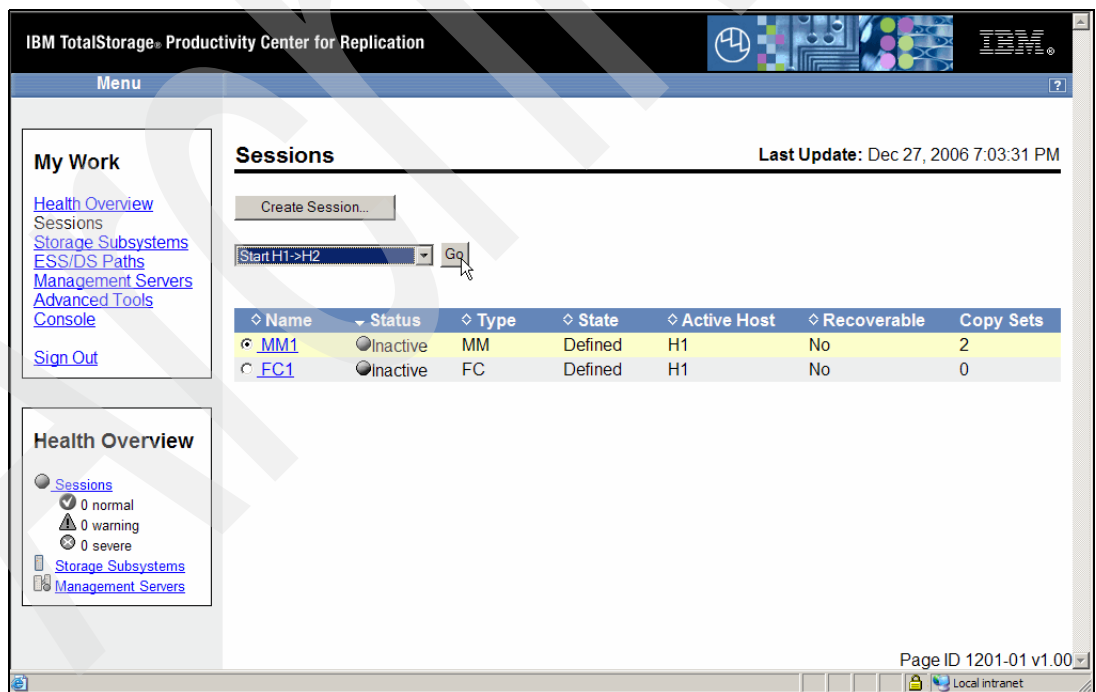


Figure 5-251 Do not forget the "Go" button after selecting the proper action which here is start

After clicking the Go button the session is started which means that all volumes in the session change from SIMPLEX state to DUPLEX PENDING state. TPC for Replication reflects this PENDING state through a *Warning* Status and as *Preparing* State as Figure 5-253 shows.

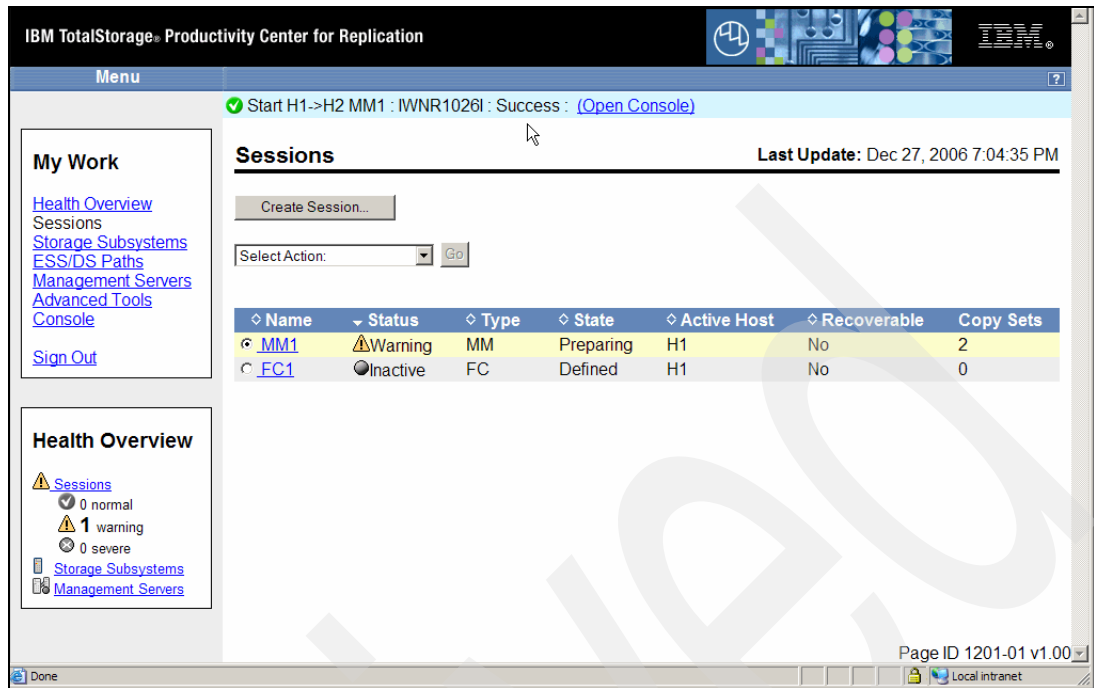


Figure 5-252 Session start is reported as successful

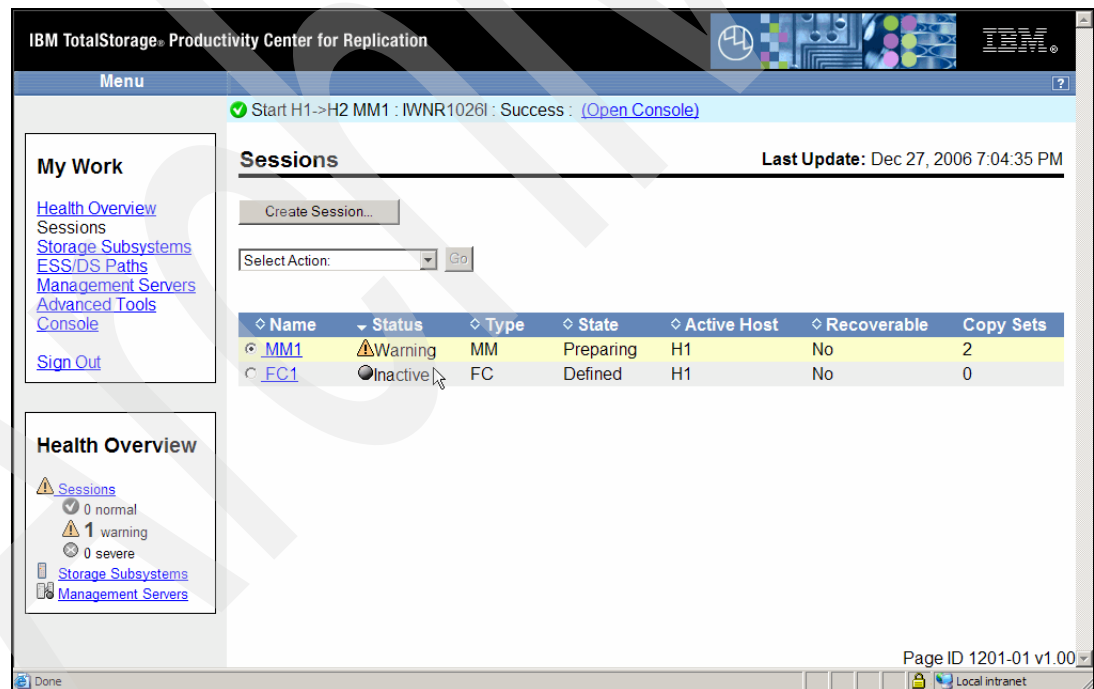


Figure 5-253 Metro Mirror session in Warning Status

The session itself is successfully started as Figure 5-252 also displays. To verify all activities you may check the Console log for the session activities as the panel in Figure 5-252 on page 261 suggests in the text line with the leading check mark in the top of the panel.

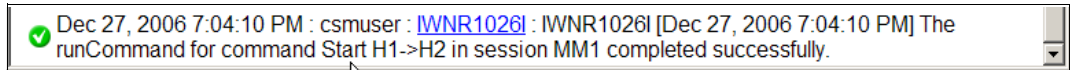


Figure 5-254 Console log provides protocol

Figure 5-254 is a fragment of this console log with an entry that the start command completed successfully.

Eventually all PPRC pairs completed their full initial copy operations and switch their state from PENDING to DUPLEX. TPC for Replication reflects these states as *Preparing*. See Figure 5-253 on page 261 and as *Prepared* as Figure 5-255 shows.

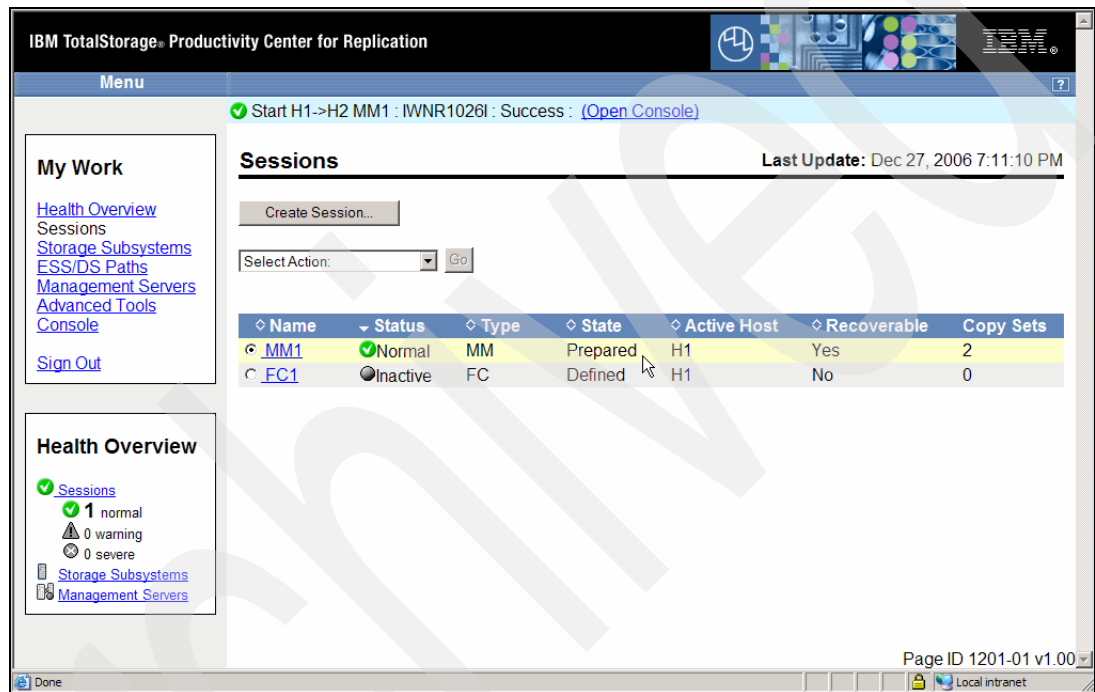


Figure 5-255 Metro Mirror session MM1 is prepared

Because this Metro Mirror session MM1 contains CKD volumes as copy sets you may follow up the PPRC volume state and state change in a concerning SYSLOG. When the source volumes are connected and online to a z/OS system then their state change is reflected through an IEA494I message. Example 5-53 is the corresponding SYSLOG fragment to the start of the session MM1 as Figure 5-251 on page 260 shows.

Example 5-53 State change messages due to session MM1 start

```

19:02:18.97 IEA494I 9001,RS9001,PPRC PAIR PENDING,SSID=9000,CCA=01
19:02:18.97 IEA494I 9000,RS9000,PPRC PAIR PENDING,SSID=9000,CCA=00

19:03:55.04 IEA494I 9001,RS9001,PPRC PAIR FULL DUPLEX,SSID=9000,CCA=01
19:03:55.58 IEA494I 9000,RS9000,PPRC PAIR FULL DUPLEX,SSID=9000,CCA=00

```

As soon as the PPRC volume status change to FULL DUPLEX the GUI session overview shows this state as *Prepared*. This may happen a few seconds after the fact due to the panel refresh rate.

Example 5-54 shows another possibility to query the PPRC volume status with CKD volumes. Besides ICKDSF there is also a full set of TSO commands which handle all PPRC functions for CKD and FB volumes. Note that often TSO commands may help to manage FB volumes when a DSCLI based approach may fail or the DS6000 or DS8000 GUI is not available. TSO based commands are routed directly to the functional microcode in the DS6000 or DS8000 and do not go through the DS8000 HMC neither do they go through the external SMC in case of a DS6000 environment.

Example 5-54 CQUERY primary Metro Mirror device

```

ANTP8802I CQUERY dev(9000)
ANTP0090I CQUERY FORMATTED LVL 4 747
VOLUME REPORT
***** PPRC REMOTE COPY CQUERY - VOLUME *****
*
*                                     (PRIMARY)  (SECONDARY) *
*                                     SSID CCA LSS SSID CCA LSS*
*DEVICE   LEVEL   STATE   PATH STATUS   SERIAL#   SERIAL#   *
*-----   -
* 9000     .....  SMPLEX.CAS  INACTIVE   9000 00 90  ..... *
*                                     000000020781 ..... *
*                                     ..... *
* PATHS SAID DEST STATUS: DESCRIPTION *
* ----- *
* 0      ---- ----  00    NO PATH..... *
*                                     *
*      ---- ----  00    NO PATH..... *
*                                     *
*      ---- ----  00    NO PATH..... *
*                                     *
*      ---- ----  00    NO PATH..... *
*                                     *
* SUBSYSTEM          WNNN          LIC LEVEL *
* ----- *
* PRIMARY.... 5005076303FFC1A5          5.2.200.534 *
* SECONDARY.1 5005076303FFC08F *
*****
VOLUME REPORT
***** PPRC REMOTE COPY CQUERY - VOLUME *****
*
*                                     (PRIMARY)  (SECONDARY) *
*                                     SSID CCA LSS SSID CCA LSS*
*DEVICE   LEVEL   STATE   PATH STATUS   SERIAL#   SERIAL#   *
*-----   -
* 9000     PRIMARY.. DUPLEX.CAS  ACTIVE.. 9000 00 90  A000 00 A0 *
*      CRIT(NO)..... CGRPLB(NO). 000000020781 000000003461*
*      INCRES(NO). *
* PATHS PFCA SFCA STATUS: DESCRIPTION *
* ----- *
* 4      0001 0031  13    PATH ESTABLISHED... *
*      0400 0140  13    PATH ESTABLISHED... *
*      0402 0143  13    PATH ESTABLISHED... *
*      0501 0101  13    PATH ESTABLISHED... *
* SUBSYSTEM          WNNN          LIC LEVEL *
* ----- *
* PRIMARY.... 5005076303FFC1A5          5.2.200.534 *
* SECONDARY.1 5005076303FFC08F *
*****
ANTP0001I CQUERY COMMAND COMPLETED FOR DEVICE 9000. COMPLETION CODE: 00

```

Note that TPC for Replication always defines the primary volumes as cascaded volumes for a potential Metro/Global Mirror configuration - even when it is only used in a two site Metro Mirror configuration as in this example. Example 5-54 on page 263 shows two VOLUME REPORT entries. For our two site Metro Mirror volume pairs the second volume report applies. This **CQUERY** command output provides a good overview with all relevant information you need to know between a Metro Mirror volume pair.

As for the source or primary Metro Mirror volume you may also query the target or secondary Metro Mirror volume. Example 5-55 shows a TSO based query example to query a secondary Metro Mirror volume.

Example 5-55 CQUERY secondary Metro Mirror device

```

ANTP8802I CQUERY dev(a000)
ANTP0090I CQUERY FORMATTED LVL 4 750
VOLUME REPORT
***** PPRC REMOTE COPY CQUERY - VOLUME *****
*
*                                     (PRIMARY) (SECONDARY) *
*                                     SSID CCA LSS SSID CCA LSS*
*DEVICE    LEVEL    STATE    PATH STATUS  SERIAL#    SERIAL#    *
*-----
* A000  SECONDARY  DUPLEX...  ACTIVE..   9000 00 90  A000 00 A0 *
*          .....          ..... 0000000020781 000000003461*
*          .....
* PATHS SAID DEST STATUS: DESCRIPTION
* -----
* 0  ---- 00 NO PATH.....
*      00 NO PATH.....
*      00 NO PATH.....
*      00 NO PATH.....
* SUBSYSTEM      WNNN      LIC LEVEL
* -----
* PRIMARY.... 5005076303FFC1A5      5.2.200.534
* SECONDARY.1 5005076303FFC08F
*****
ANTP0001I CQUERY COMMAND COMPLETED FOR DEVICE A000. COMPLETION CODE: 00

```

5.4.12 Query Metro Mirror session via the GUI

Start from the sessions overview panel to query a certain session. Click the session name hyper link of session MM1 as Figure 5-256 on page 265 shows.

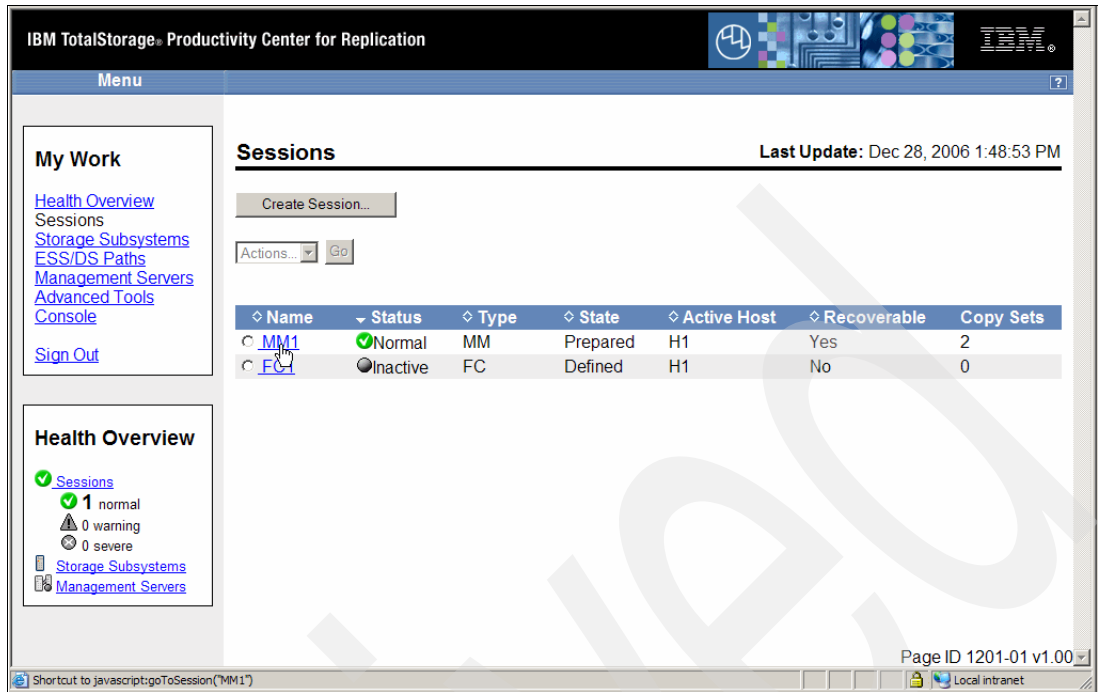


Figure 5-256 Start to query session details

After you clicked on the session name hyper link a corresponding new panel opens up as Figure 5-257 displays.

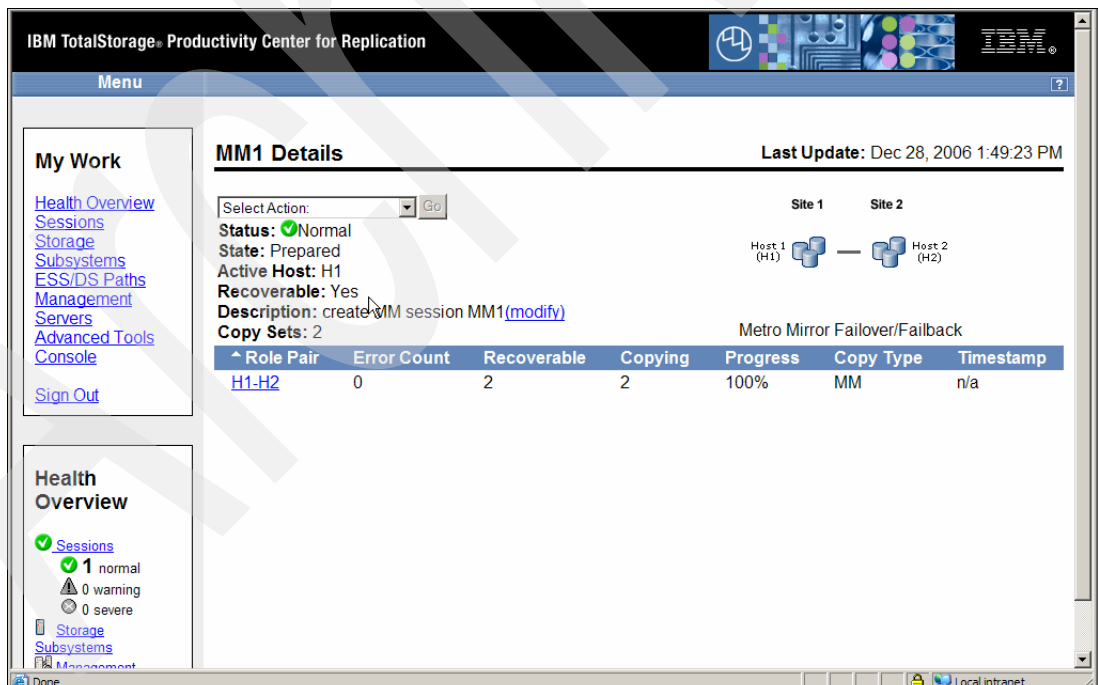


Figure 5-257 Session details

This panel in Figure 5-257 is important to understand. It reports the overall session state as Prepared and the session is recoverable which translates to a healthy session status. From here on you may recover at the Site 2 at any time and get a complete set of consistent

volumes at the H2 site. This in turn translates that all H2 volumes are in FULL DUPLEX state and, therefore, provide a consistent set of volumes to recover with.

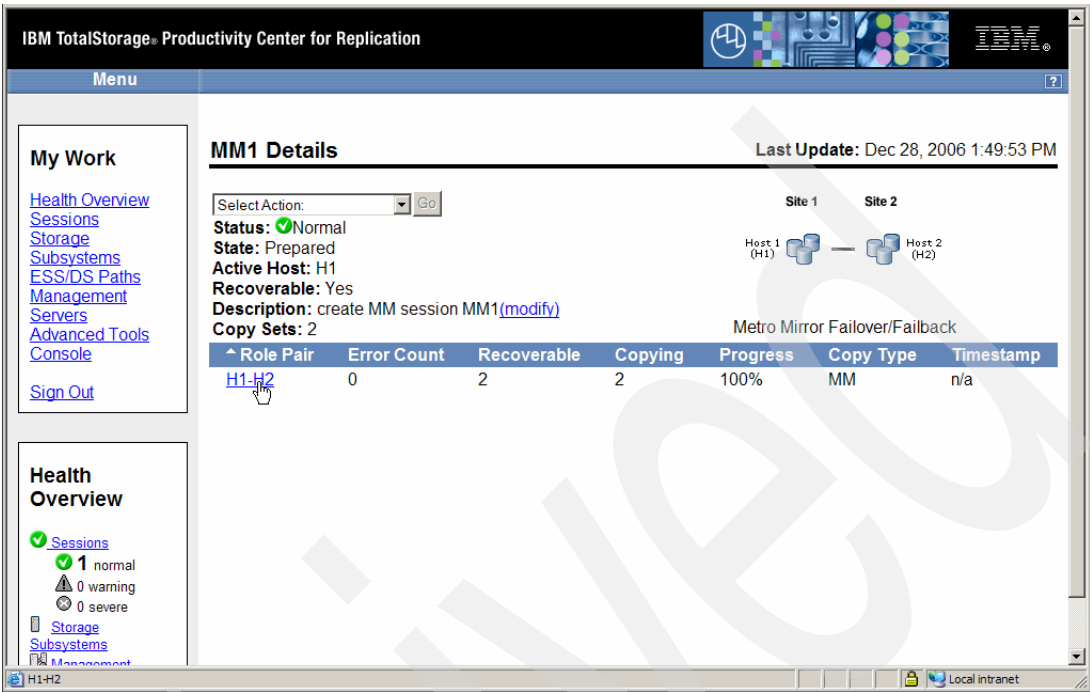


Figure 5-258 Query role pair details

Figure 5-258 shows that you may dig further down into the selected session MM1 and further query all copy sets within this session. Click H1-H2 hyper link which then opens up another panel which Figure 5-259 displays.

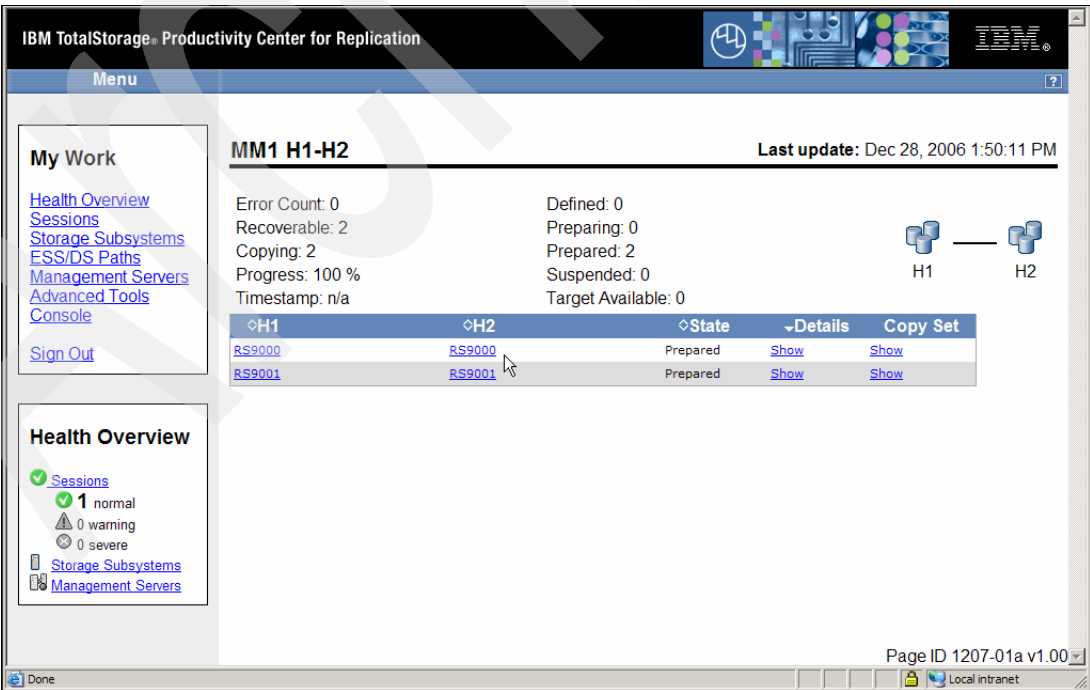


Figure 5-259 Volume details of specific Copy Set

Figure 5-259 on page 266 is again a particular naming case for CKD volumes. It displays all copy sets within the session MM1. As H1 and H2 user name you see here again the CKD volume label as the user name.

Each user name under the heading H1 and H2 is another hyper link which drills further down to the individual volume within the storage server.

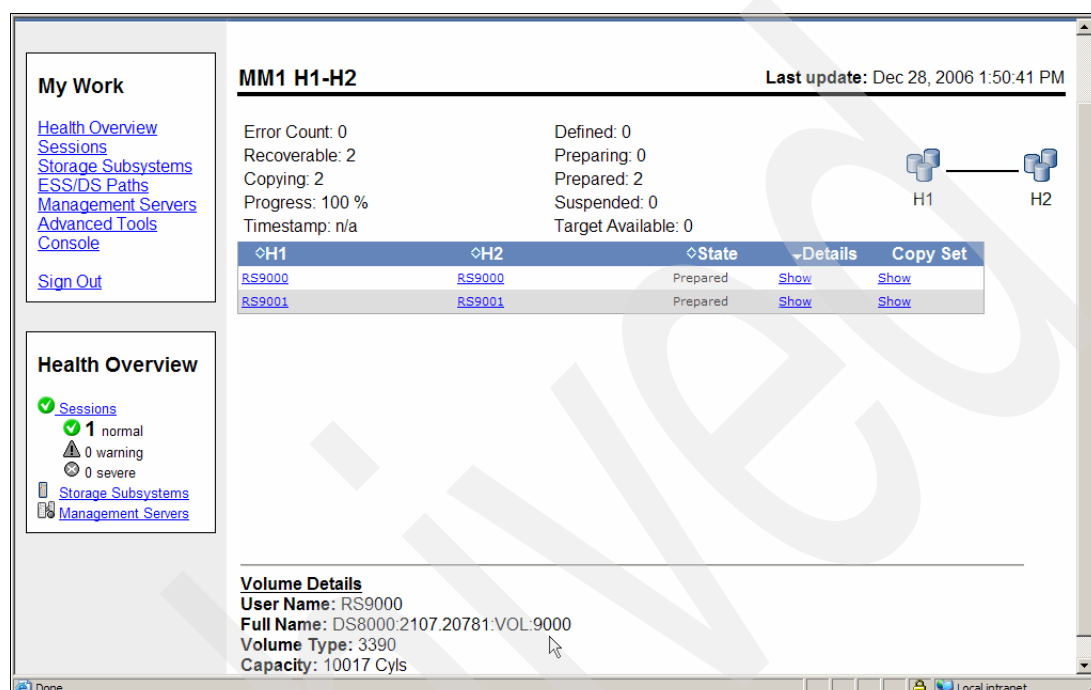


Figure 5-260 Details of specific H1 volume

When you click RS9000 under the H1 heading a Volume Details section, it opens up in the lower part of the panel as shown in Figure 5-260. Again the *user name* is the volume label and the *Full Name* contains the volume name as it is known by the storage server. Note that the last qualifier in the Full Name is the device number as it is managed by the storage server. 9000 translates into device 00 in LSS 90 following the device numbering scheme for the DS6000 and the DS8000.

To determine what the actual device at the H2 site is, click RS9000 under H2, which brings us to Figure 5-261 on page 268.

Note that the reason for the same User Name of the device in H1 and H2 is related to the fact that PPRC replicates the complete source volume. This includes also the very first track and record of the source volume where the label is stored. For that reason we see as a User Name or label the same name for the H2 volume as the name of the H1 volume.

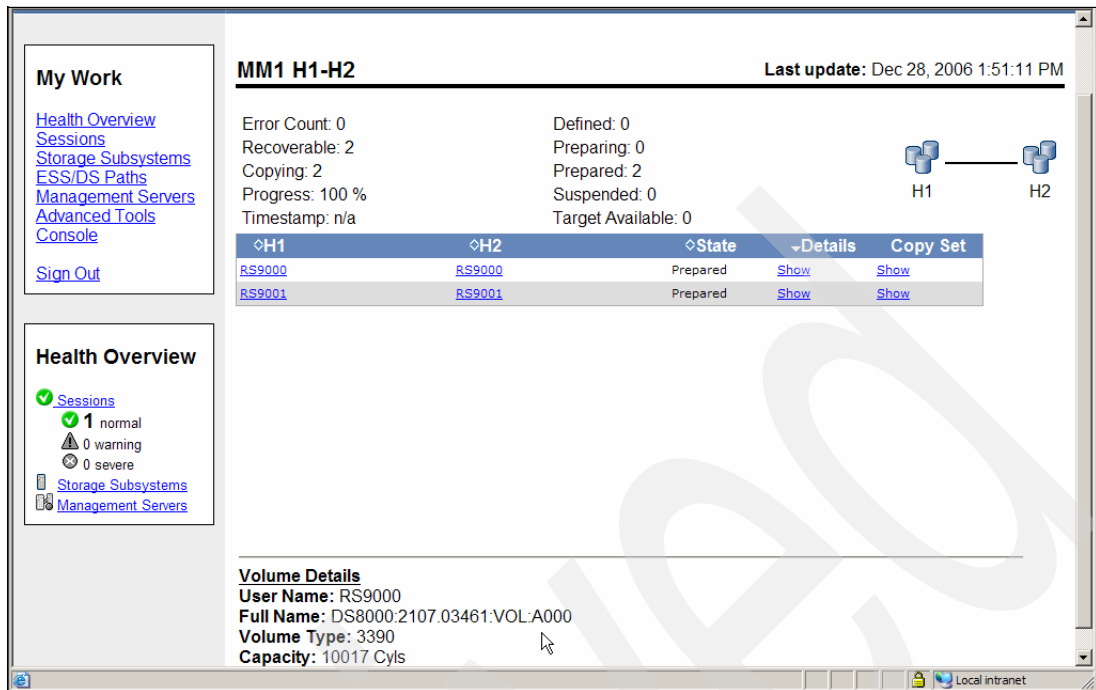


Figure 5-261 Details of specific H2 volume

Figure 5-261 displays the specific secondary volume which corresponds the H1 volume. As intended the secondary volume is on device 00 in LSS A0 in the 03461 box.

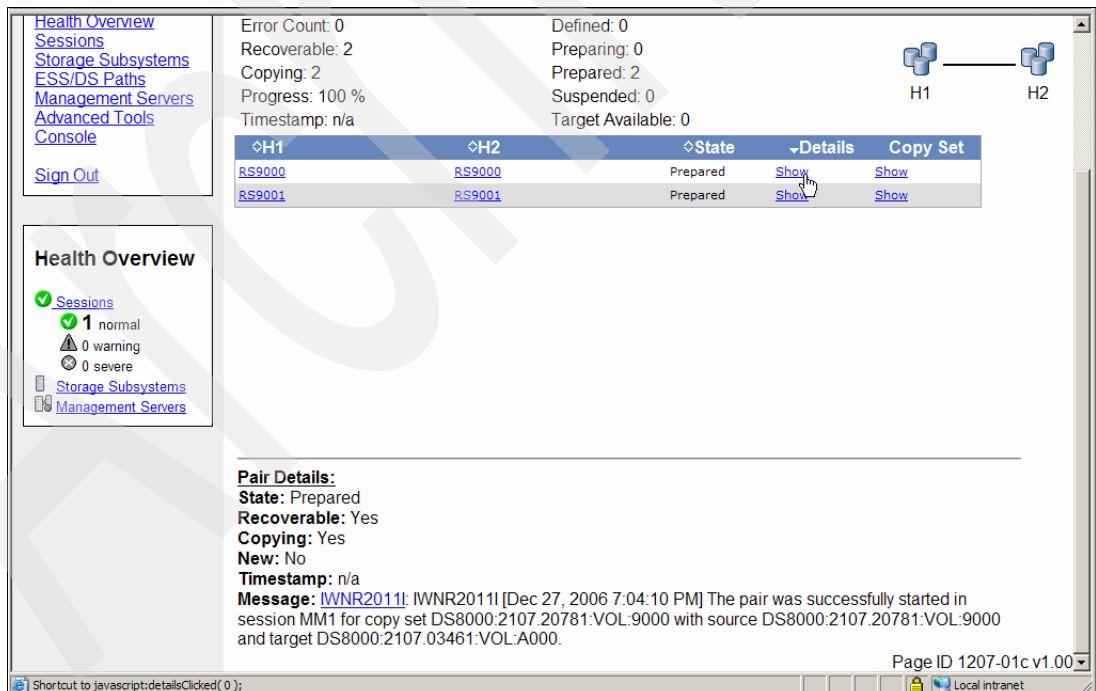


Figure 5-262 Details of specific Copy Set

Figure 5-262 is another good source about the history of a particular Copy Set. When you click the *Show* hyper link under *Details* as Figure 5-262 shows, a *Pair Details* section opens up in the lower portion of the panel (see Figure 5-262). This section also comments about

when the pair was created as well as the source and target volume information and the PPRC pair status.

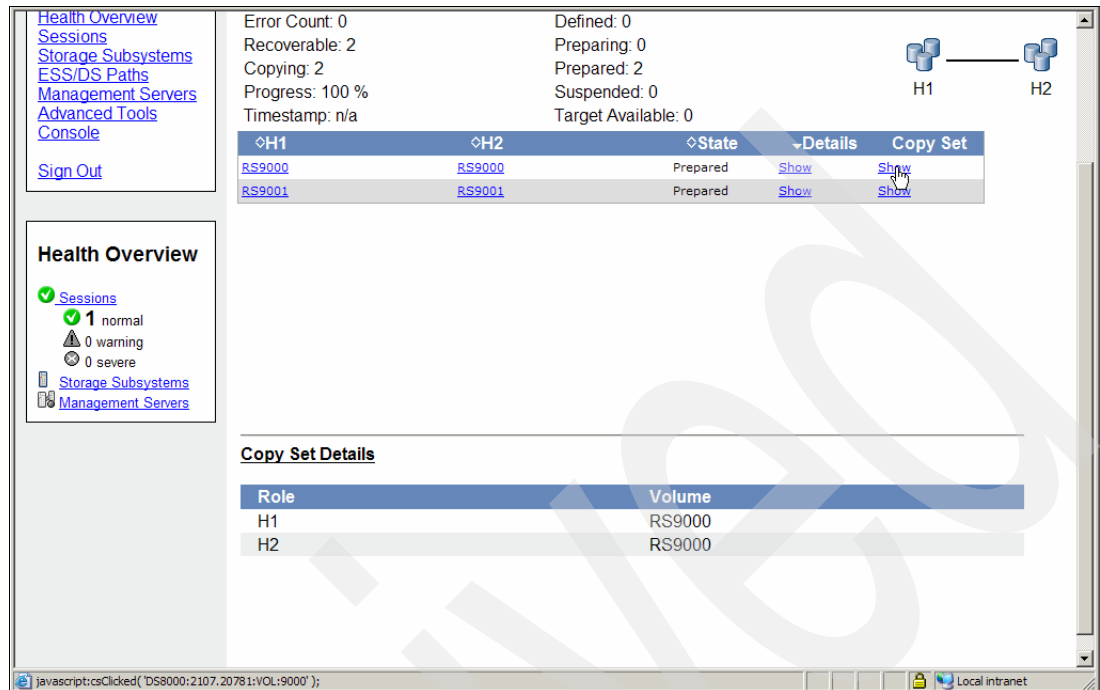


Figure 5-263 Volumes in a Copy Set

The hyper link *Show* under *Copy Set* within a *Copy Set* line does not reveal anything new in the lower portion of the panel in Figure 5-263. The *Copy Set Details* repeats what the panel already displays in the upper portion.

All this detailed information does not show anything about the related PPRC paths, although a TSO **CQUERY** command does (see Example 5-54 on page 263).

This concludes the brief excursion about how to utilize the GUI when it comes to manage Metro Mirror sessions.

5.4.13 Managing Metro Mirror session through the CSMCLI

Figure 5-264 on page 270 shows again the test environment which we will pursue and use for the following scenario and create a Metro Mirror session through the CSMCLI interface.

We removed the MM1 session previously created before we continue to exercise the CSMCLI approach to create the Metro Mirror session MM1 again.

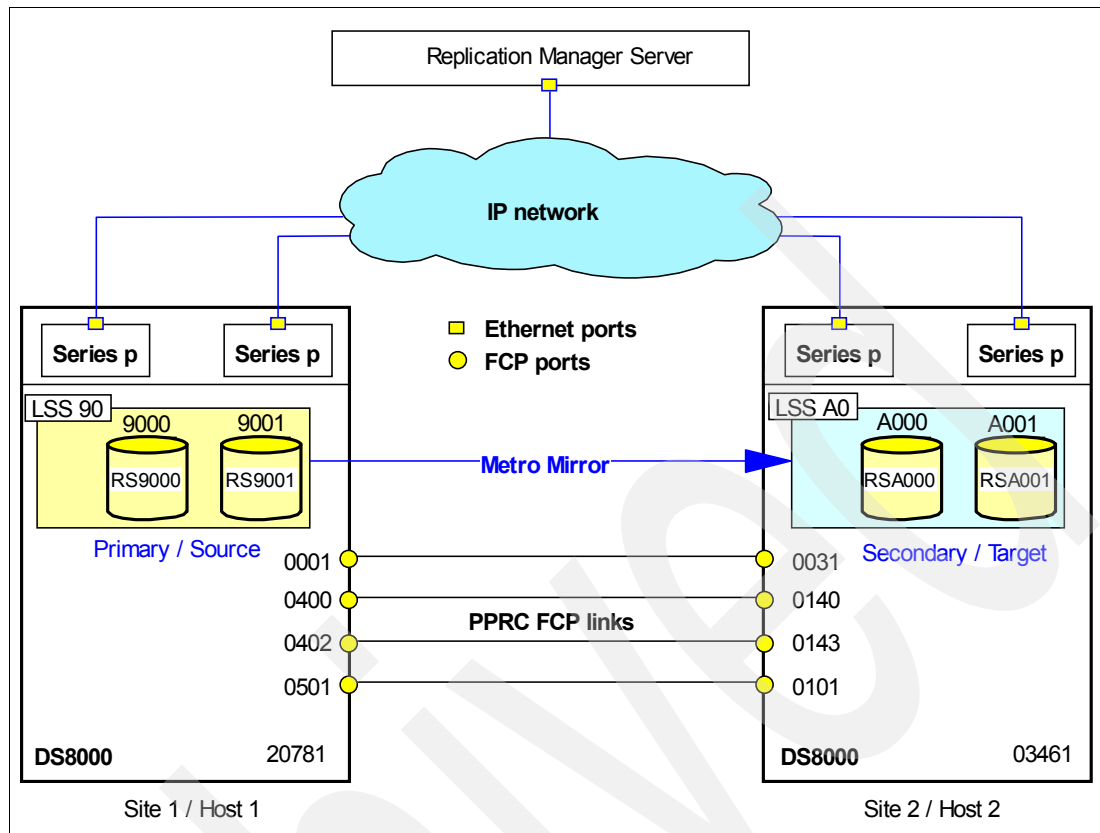


Figure 5-264 Metro Mirror example with two copy sets

We chose to use only two copy sets to keep the test as simple as possible and focus on the principle operation.

Create Metro Mirror session using CSMCLI commands

Example 5-56 shows a brief script with three CSMCLI commands:

1. List all defined sessions
2. Create a Metro Mirror session MM1 with Failover / Failback capability
3. Another list command to list all defined sessions

Example 5-56 Script "mksess.txt"

```
#
# Make MM1 session
# -----

lsess -l

mksess -cptype mmfofb -desc "create MM session MM1" MM1

lsess -l
# ----- end of script -----
```

Example 5-57 on page 271 displays what the script in Example 5-56 does.

Example 5-57 Execute script "mksess.txt"

```
C:\Program Files\IBM\CSMCLI\CLI> csmcli -script mksess.txt
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
FC1	Normal	Target Available	Flash Copy	Yes	No	2	No

IWNR1021I [Dec 7, 2006 5:26:48 PM] Session MM1 was successfully created.

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
FC1	Normal	Target Available	Flash Copy	Yes	No	2	No
MM1	Inactive	Defined	Metro Mirror Failover/Failback	No	No	0	No

Before the **mksess** command there is already a sessions defined, session FC1. Then the script output acknowledges that the session MM1 was successfully created. A subsequent **lssess** command confirms that the new session MM1 was successfully created.

Populate Metro Mirror session using CSMCLI commands

Example 5-58 displays a short script with six CSMCLI commands. The intention of this brief script is to define two Copy Sets to Metro Mirror session MM1

1. List all defined sessions so far
2. Create a Copy Set within Metro Mirror session MM1
3. Create another Copy Set within Metro Mirror session MM1
4. List first Copy Set just defined before
5. List second Copy Set just defined before
6. List all defined sessions

Example 5-58 Script "mkcpset.txt"

```
#
# Add copy sets
# -----

lssess -l

mkcpset -h1 ds8000:2107.20781:vol:9000 -h2 ds8000:2107.03461:vol:A000 MM1
mkcpset -h1 ds8000:2107.20781:vol:9001 -h2 ds8000:2107.03461:vol:A001 MM1

lspair -l -cpset ds8000:2107.20781:vol:9000 MM1
lspair -l -cpset ds8000:2107.20781:vol:9001 MM1

lssess -l
# ----- end of script -----
```

Example 5-59 shows the output when the script in Example 5-58 executes.

Example 5-59 Execute script "mkcpset.txt"

```
C:\Program Files\IBM\CSMCLI\CLI> csmcli -script mkcpset.txt
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
FC1	Normal	Target Available	Flash Copy	Yes	No	2	No

MM1 Inactive Defined Metro Mirror Failover/Failback No No 0 No

IWNR2001I [Dec 7, 2006 6:21:23 PM] The pair was successfully created in session MM1 for copy set DS8000:2107.20781:VOL:9000 with source DS8000:2107.20781:VOL:9000 and target DS8000:2107.03461:VOL:A000.

IWNR2001I [Dec 7, 2006 6:21:24 PM] The pair was successfully created in session MM1 for copy set DS8000:2107.20781:VOL:9001 with source DS8000:2107.20781:VOL:9001 and target DS8000:2107.03461:VOL:A001.

Source volume Timestamp Last result	Target volume	RolePair	State	Recoverable	Copying	New Copy set
DS8000:2107.20781:VOL:9000 DS8000:2107.20781:VOL:9000 n/a	DS8000:2107.03461:VOL:A000	H1-H2	Defined	No	No	Yes

IWNR2001I

Source volume Timestamp Last result	Target volume	RolePair	State	Recoverable	Copying	New Copy set
DS8000:2107.20781:VOL:9001 DS8000:2107.20781:VOL:9001 n/a	DS8000:2107.03461:VOL:A001	H1-H2	Defined	No	No	Yes

IWNR2001I

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
FC1	Normal	Target Available	Flash Copy	Yes	No	2	No
MM1	Inactive	Defined	Metro Mirror Failover/Failback	No	No	2	No

The focus is on session MM1. Before defining the two Copy Sets to MM1 the session displays a zero for Copy Sets. CSMCLI acknowledges that the two Copy Sets were successfully created. Subsequent **lspair** commands display the details on these two newly defined Copy Sets. A concluding **lssess** displays the Metro Mirror session MM1 now with two Copy Sets defined.

Note the poor default formatting output of the **lspair** command. Example 5-60 shows a mini script with two **lspair** commands with a dedicated format request of stanza.

Example 5-60 Script "lspair.txt" with format stanza

```
#
# List Copy sets in session MM1
# -----

lspair -l -cpset ds8000:2107.20781:vol:9000 -fmt stanza MM1
lspair -l -cpset ds8000:2107.20781:vol:9001 -fmt stanza MM1

# ----- end of script -----
```

Example 5-61 on page 273 displays the output of the script in Example 5-60.

Compare the formatting in Example 5-59 on page 271 with the formatting in Example 5-61 on page 273.

Example 5-61 Output of script "lapair.txt" with format stanza

```
C:\Program Files\IBM\CSMCLI\CLI> csmcli -script lapair.txt
```

```
Source volume DS8000:2107.20781:VOL:9000
Target volume DS8000:2107.03461:VOL:A000
RolePair      H1-H2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9000
Timestamp     n/a
Last result   IWNR2011I
```

```
Source volume DS8000:2107.20781:VOL:9001
Target volume DS8000:2107.03461:VOL:A001
RolePair      H1-H2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9001
Timestamp     n/a
Last result   IWNR2011I
```

The output in Example 5-61 is structured better than the output in Example 5-59 on page 271. Note that none of the examples is edited here.

Next step is to start the Metro Mirror session MM1. Example 5-62 displays a mini script which contains three CSMCLI commands:

1. Query all defined sessions
2. Start the Metro Mirror session MM1
3. Query again all defined sessions and their status

Example 5-62 Script "cmdsess.txt"

```
#
# Start MM1 session
# -----

lssess -l

cmdsess -quiet -action Start_h1:h2 MM1

lssess -l
# ----- end of script -----
```

Executing the script from Example 5-62 provides the results which are displayed in Example 5-63.

Example 5-63 Execute script "cmdsess.txt" to start Metro Mirror session MM1

```
C:\Program Files\IBM\CSMCLI\CLI> csmcli -script cmdsess.txt
Name Status   State          Copy type          Recoverable Copying
Copy sets Error
```

```
=====
=====
FC1 Normal Target Available Flash Copy Yes No
2 No
MM1 Inactive Defined Metro Mirror Failover/Failback No No
2 No
```

IWNR1026I [Dec 7, 2006 6:26:45 PM] The runCommand for command Start H1->H2 in session MM1 completed successfully.

```
Name Status State Copy type Recoverable Copying
Copy sets Error
=====
=====
FC1 Normal Target Available Flash Copy Yes No
2 No
MM1 Warning Preparing Metro Mirror Failover/Failback No Yes
2 No
```

As Example 5-63 on page 273 displays the Metro Mirror session MM1 is first inactive with its two copy set members. Then the command **cmdsess** starts the session and the following **lsess** command now displays the Metro Mirror session MM1 in **Preparing** state which translates that the Metro Mirror Copy Sets changed their state from SIMPLEX to COPY PENDING which is here in TPC for Replication the **Preparing** state.

Shortly after Example 5-64 shows another **lsess** query command which is issued in interactive CSMCLI state. It displays that all Copy Sets within session MM1 completed their initial full copy and changed their status from COPY PENDING to DUPLEX which translates in TPC for Replication to **Prepared** state.

*Example 5-64 MM1 Copy Sets are all in DUPLEX state and in **Prepared** state*

```
csmdi> lsess -l
Name Status State Copy type Recoverable Copying Copy
sets Error
=====
=====
FC1 Inactive Defined Flash Copy No No
0 No
MM1 Normal Prepared Metro Mirror Failover/Failback Yes Yes
2 No

csmdi> lsess -l -fmt stanza
Name FC1
Status Inactive
State Defined
Copy type Flash Copy
Recoverable No
Copying No
Copy sets 0
Error No

Name MM1
Status Normal
State Prepared
Copy type Metro Mirror Failover/Failback
```

```

Recoverable Yes
Copying      Yes
Copy sets   2
Error       No
csmcli>

```

Note that the `1ssess` command in Example 5-64 on page 274 is issued twice and utilizes again different output formats.

This concludes the CSMCLI considerations when building up a Metro Mirror session.

5.4.14 Managing FlashCopy with the GUI

Figure 5-265 shows the expansion of Figure 5-264 on page 270. Metro Mirror secondary volumes or Site 2 volumes in LSS A0 are now FlashCopy source volumes. Corresponding FlashCopy target volumes are in LSS 7C.

A FlashCopy may make sense after a planned or unplanned FREEZE event for the Metro Mirror session to create a copy of the Metro Mirror secondary volumes before the Metro Mirror session is re-started to re-synchronize the Metro Mirror session.

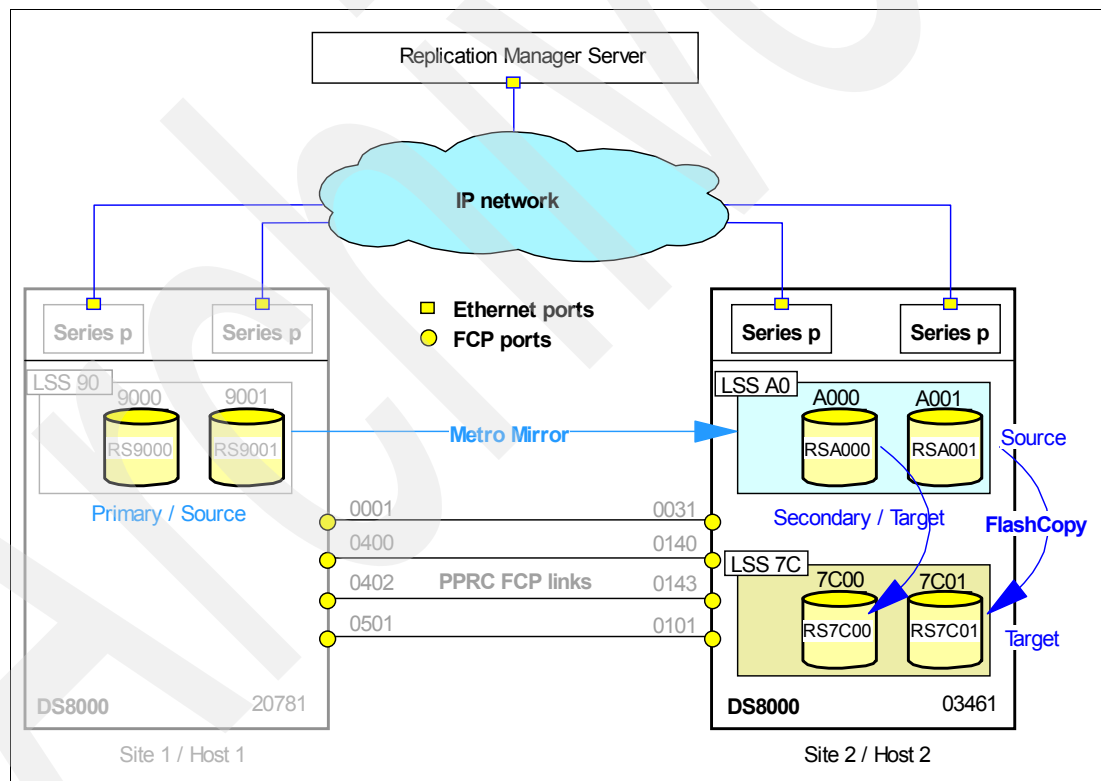


Figure 5-265 FlashCopy the MM secondary volumes - configuration setup

Create FlashCopy session using the GUI

Click *Create Session* after you selected the *Sessions* application under My Work as shown in Figure 5-266 on page 276.

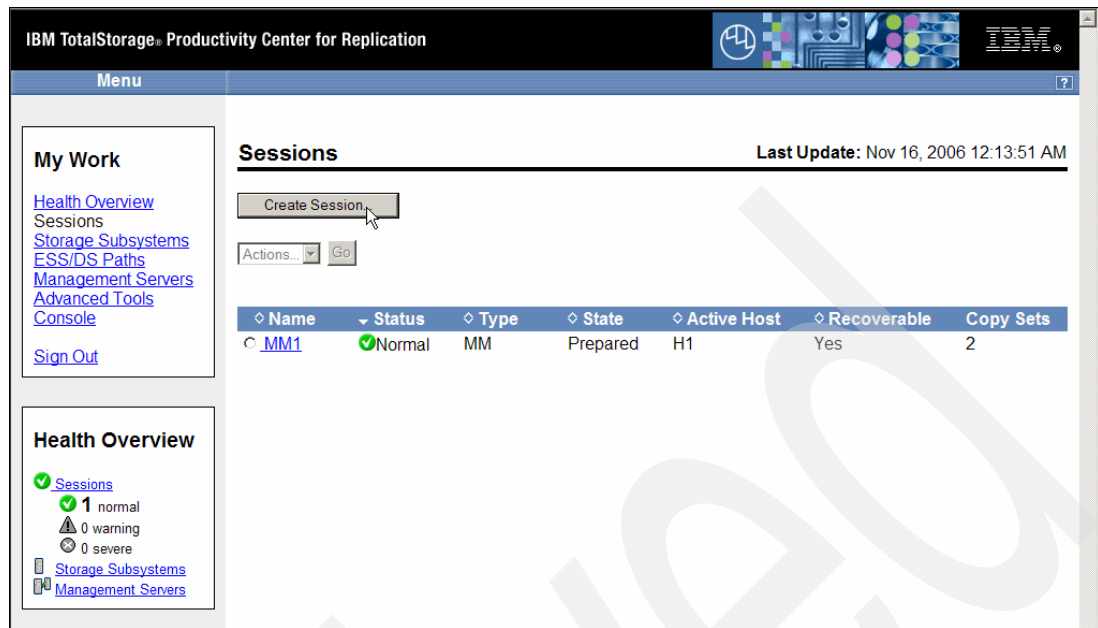


Figure 5-266 Select Create session in Sessions application

After you selected the session type of FlashCopy as shown in Figure 5-267 continue by clicking on Next.

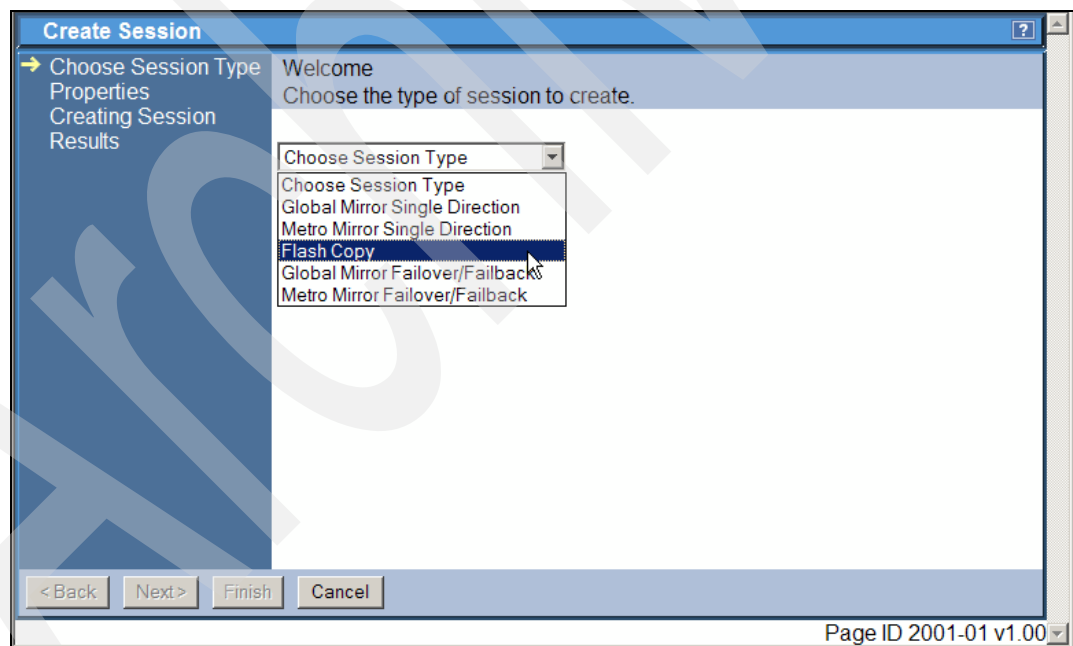


Figure 5-267 Create FlashCopy session - choose session type

Figure 5-268 on page 277 shows the *Properties* panel within this *Create Session* wizard panel sequence. We chose a session name of FC2 and an optional Description. Then continue by clicking *Next* to the *Results* panel.

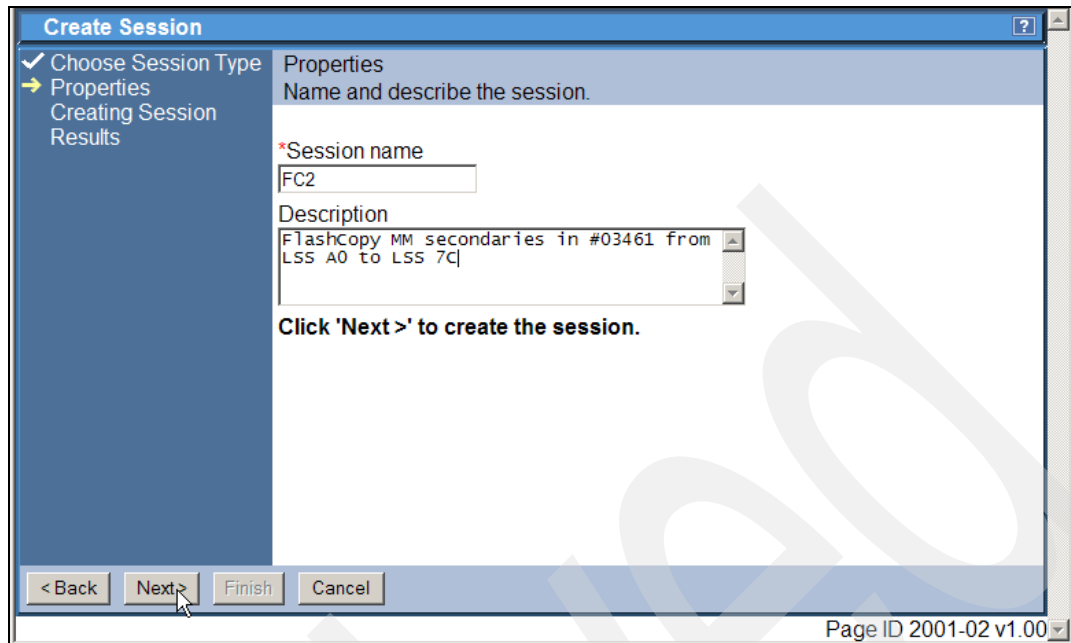


Figure 5-268 Define properties for FlashCopy session

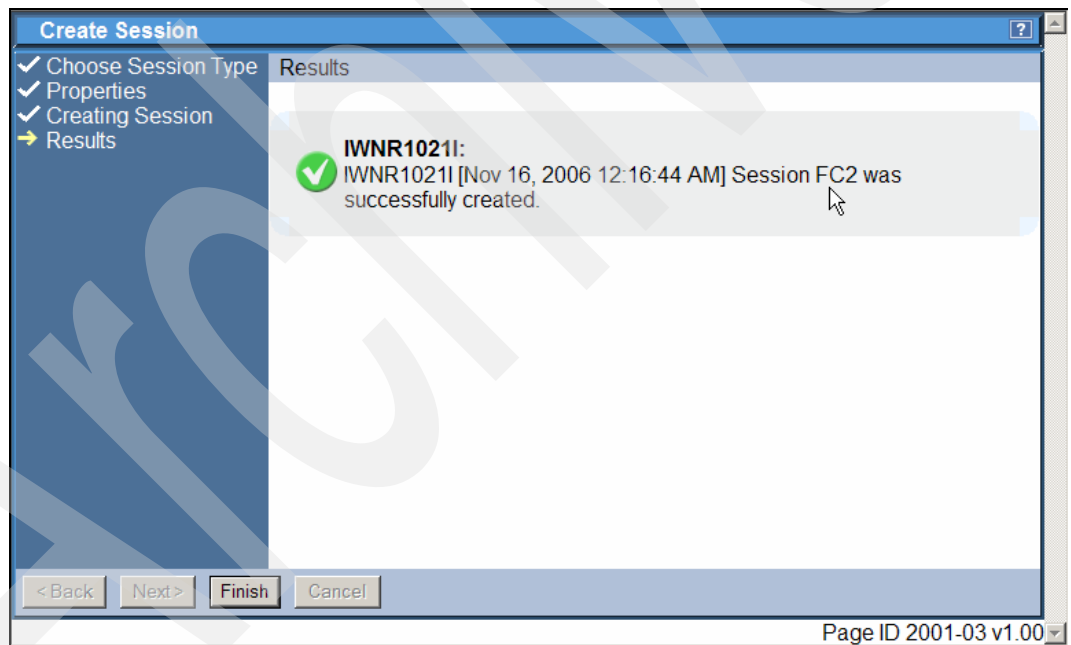


Figure 5-269 Results panel displays that session was successfully created

Figure 5-269 shows that the session FC2 was successfully created. Note that this is just a name or token which goes into the TPC for Replication database. Clicking on Finish in Figure 5-269 brings you back to the sessions overview panel as shown in Figure 5-270 on page 278. This overview again indicates that the session is still empty and waits to be populated with corresponding Copy Sets.

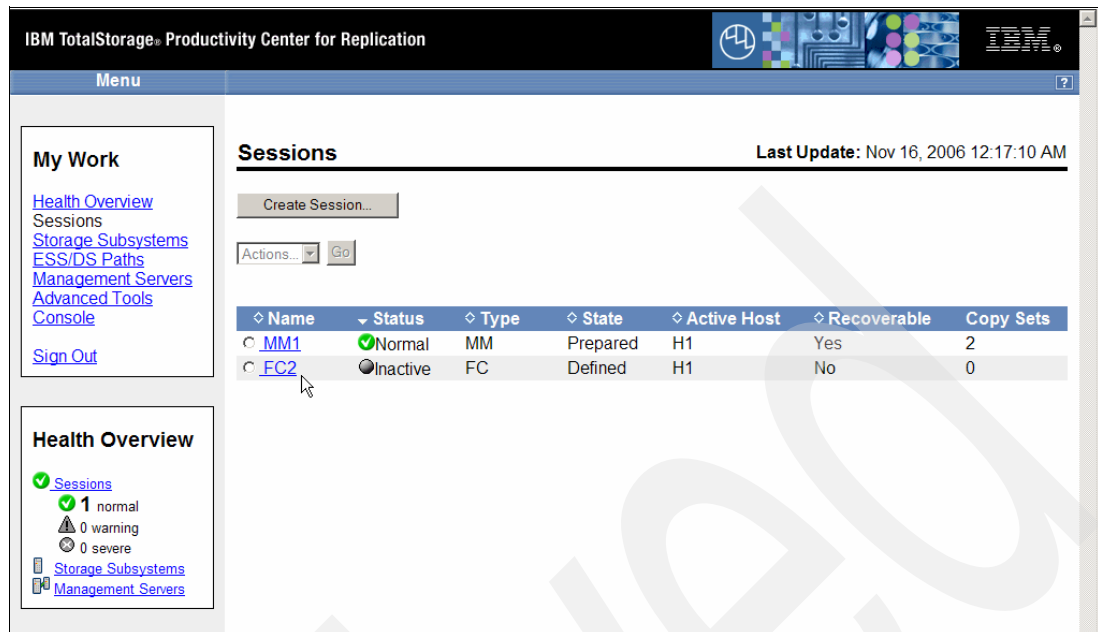


Figure 5-270 FlashCopy session created

Populate FlashCopy session using the GUI

The next step is to populate a FlashCopy session with Copy Sets. Note that we are back to FlashCopy session FC1 which is going to be used later in this scenario when populating the FlashCopy session with Copy Sets.

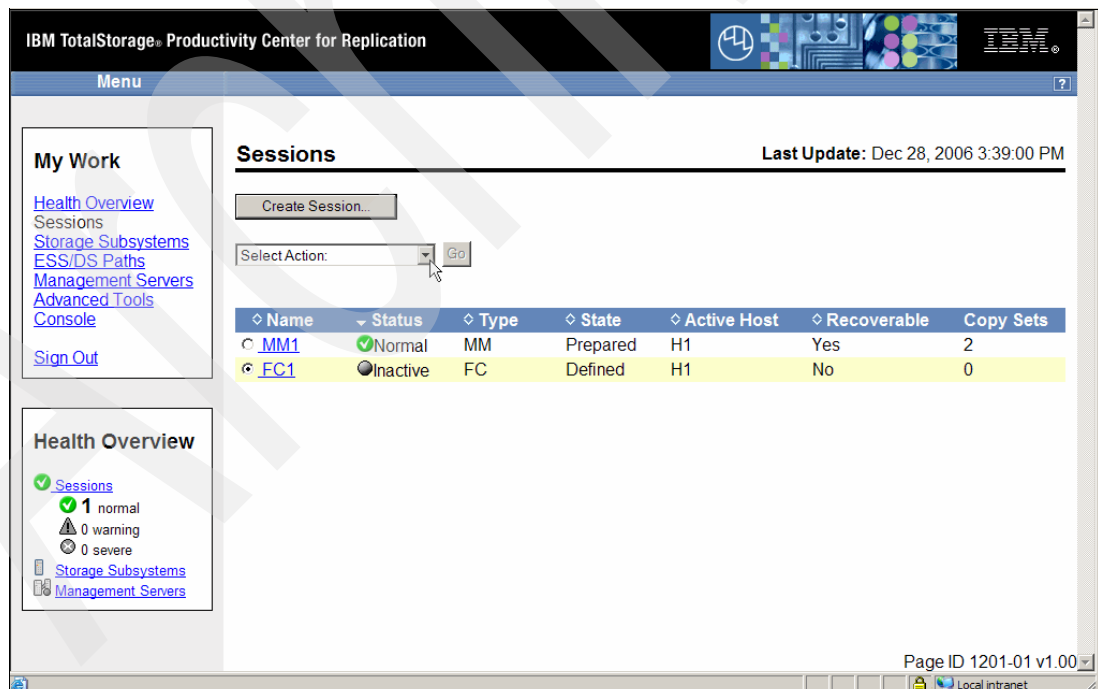


Figure 5-271 Select FlashCopy session

In Figure 5-271 we selected the FlashCopy session FC1 and then continue to select the corresponding action.

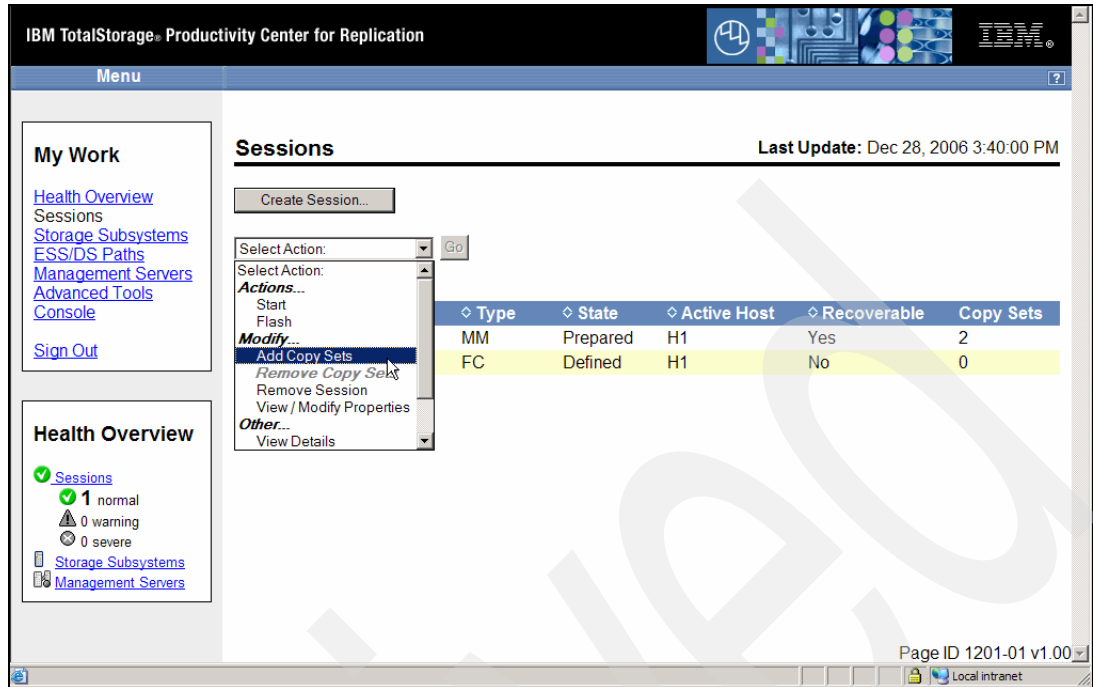


Figure 5-272 Select Add Copy Sets for FlashCopy session FC1

We select Add Copy Sets as Figure 5-272 shows which opens the Add Copy Sets wizard with its first panel as shown in Figure 5-273.

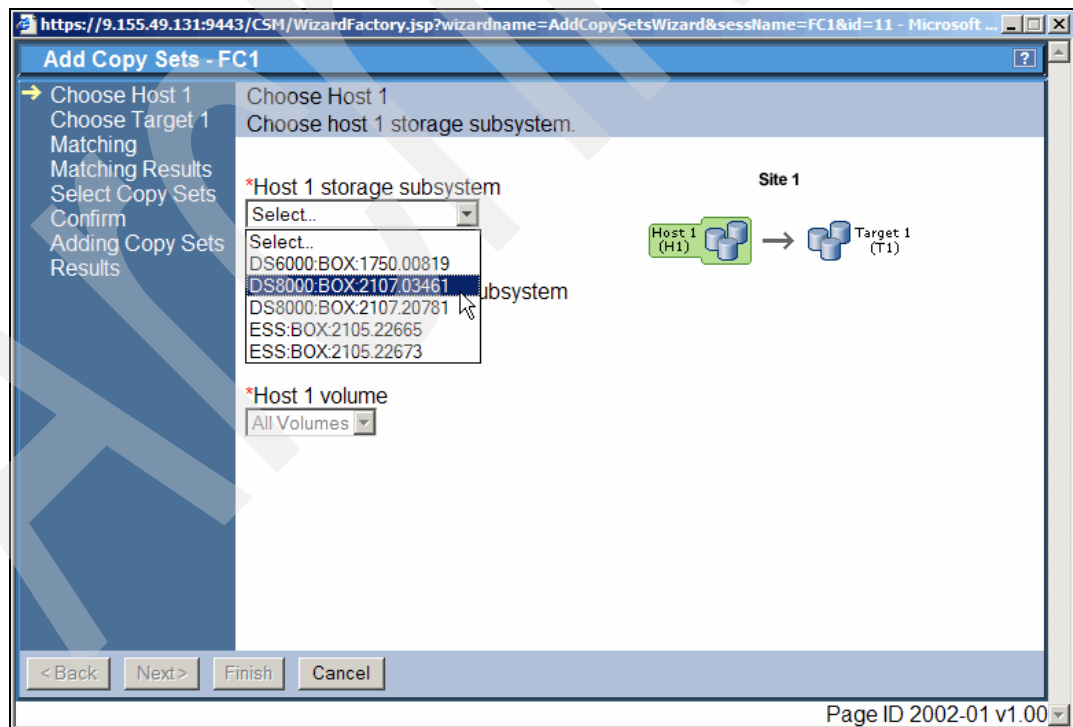


Figure 5-273 FlashCopy Sets wizard - choose Host 1 environment

Because we intend to FlashCopy the PPRC target volumes we select the corresponding DS8000 with serial number 03461 (see also Figure 5-265 on page 275).

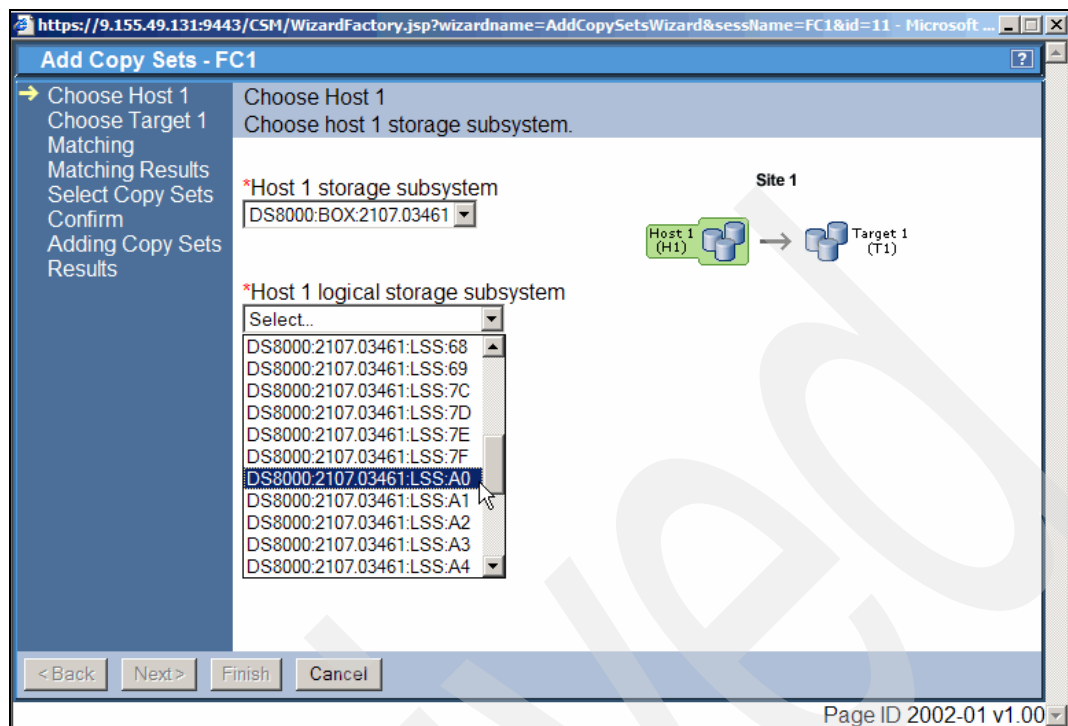


Figure 5-274 FlashCopy Sets wizard - choose Host 1 LSS

As Figure 5-274 shows we select the LSS which contains the PPRC target volumes. After we chose LSS A0 the next panel is displayed as shown in Figure 5-275.

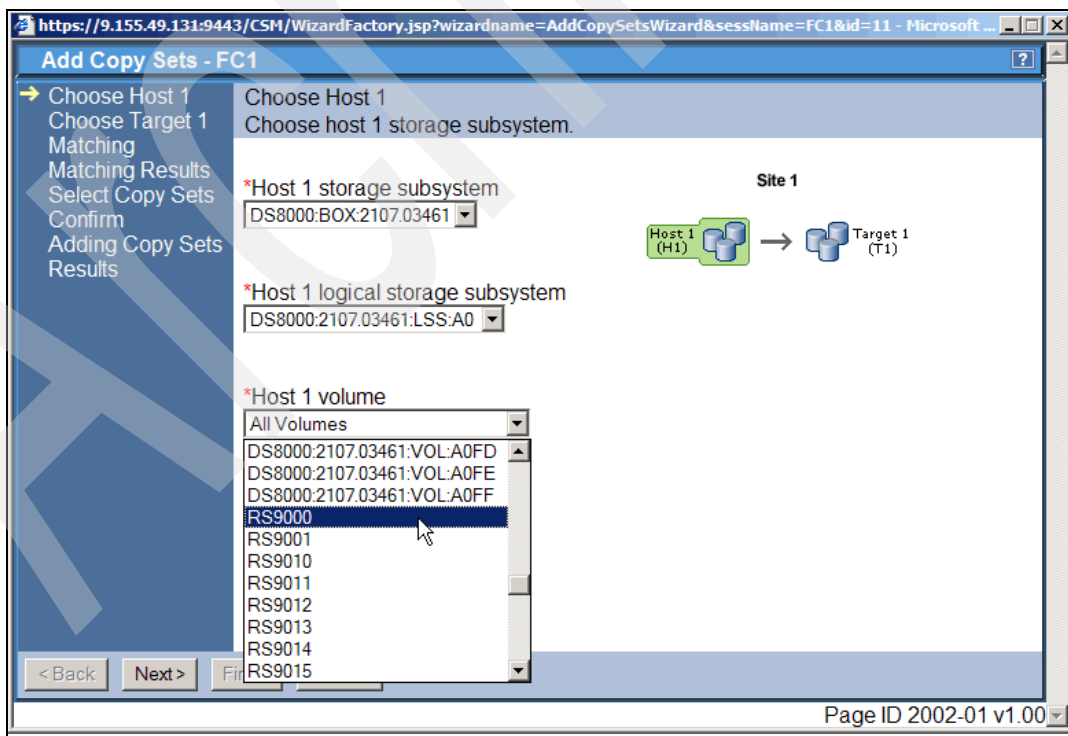


Figure 5-275 FlashCopy Sets wizard - choose Host 1 volumes

Figure 5-275 on page 280 shows a Host 1 volume list box. Here you may either select all volumes within LSS A0 or you select a single FlashCopy source volume. As we pointed out before, the *user name* or volume name in the display is the volume label of the selected CKD volume. Because this is the Metro Mirror target volume it shows the label of the corresponding Metro Mirror source volume which is RS9000 as shown in Figure 5-275 on page 280. We select RS9000 as the FlashCopy source or Host 1 volume. This concludes the Host 1 volume selection as Figure 5-276 shows. Click Next to define the FlashCopy Target volume.

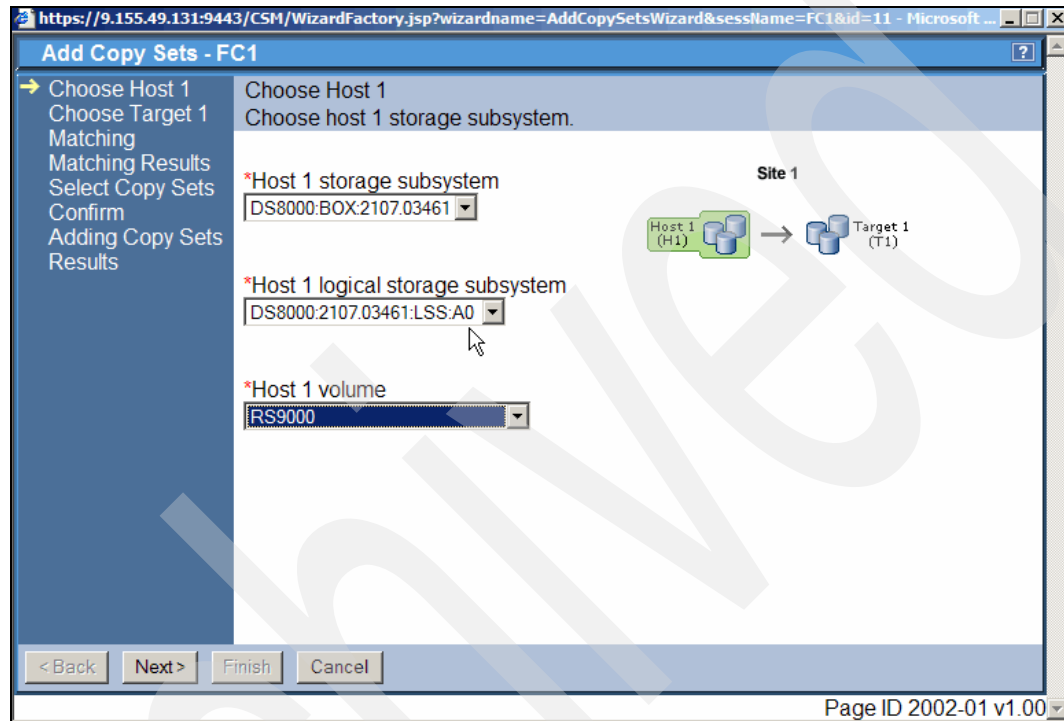


Figure 5-276 FlashCopy Sets wizard - Host 1 environment decided on

Figure 5-277 on page 282 displays the first panel in the scenario to define a FlashCopy target volume.

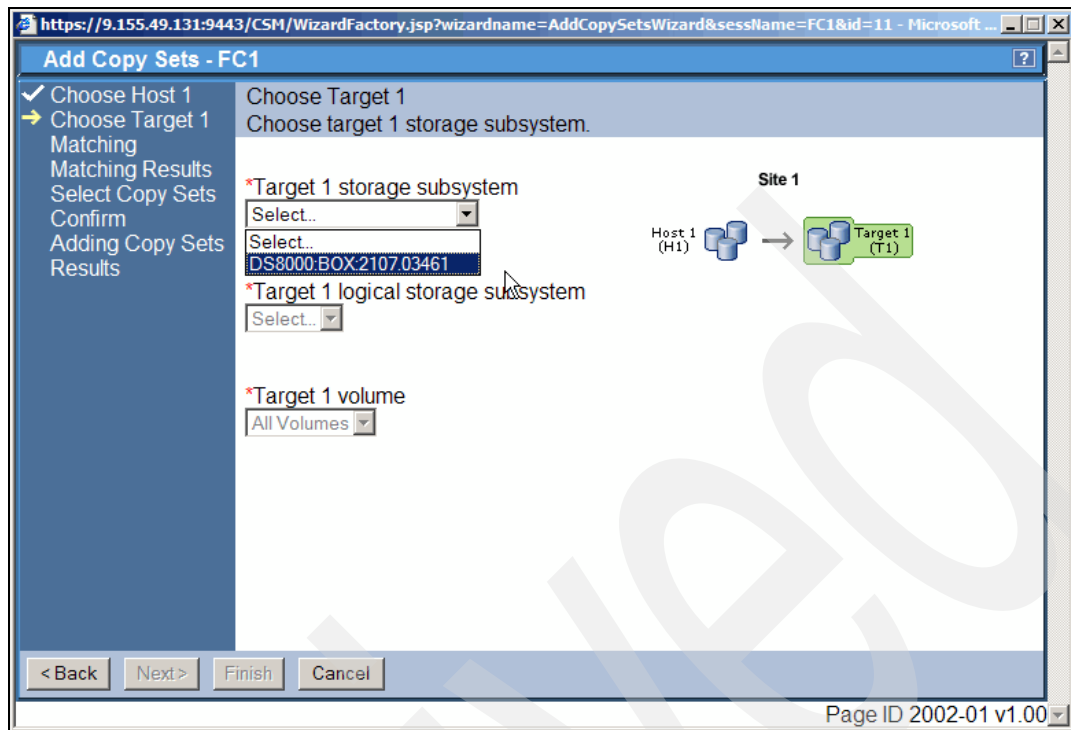


Figure 5-277 FlashCopy Sets wizard - define Target 1 environment

Because FlashCopy is only possible within the same DS6000 / DS8000 subsystem the panel in Figure 5-277 offers only the 03461 box. Select 03461 as the FlashCopy target storage subsystem and then select Next to display the panel which defines the target LSS.

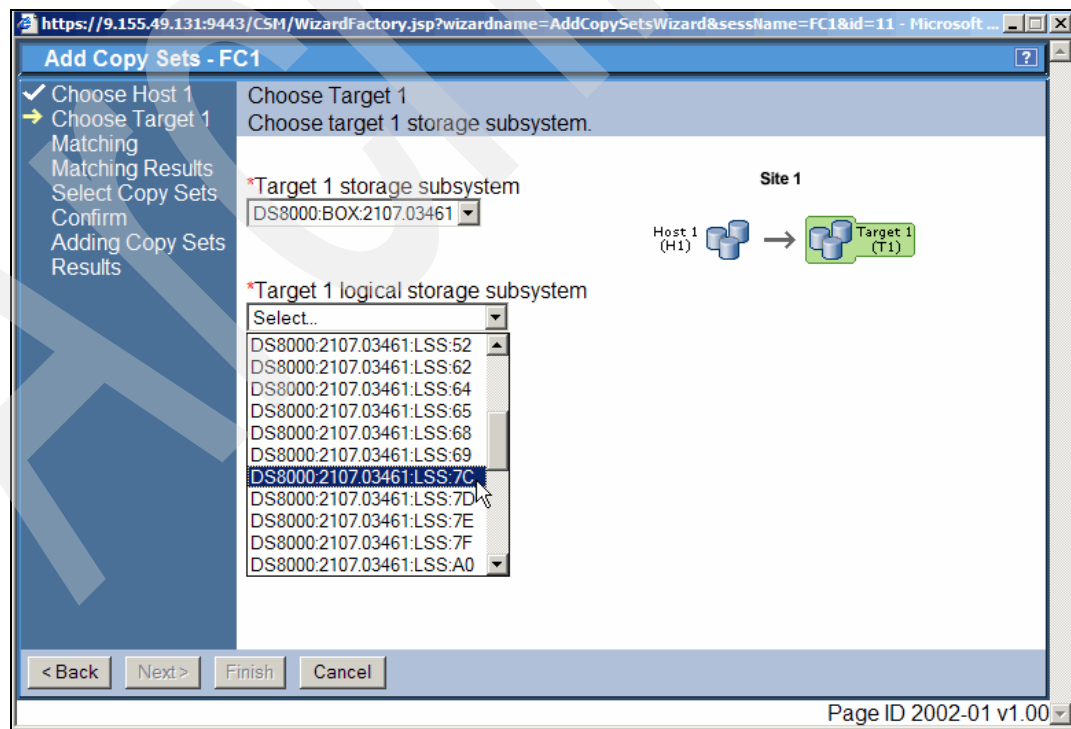


Figure 5-278 FlashCopy Sets wizard - choose target FlashCopy LSS

Figure 5-278 on page 282 shows that we decided to use LSS 7C for the FlashCopy target volume. Click Next to continue to Figure 5-279. We match the first device from LSS A0 to the first device in LSS 7C as Figure 5-279 shows. We select this device by its volume or user name which is 7C00. Click Next to continue.

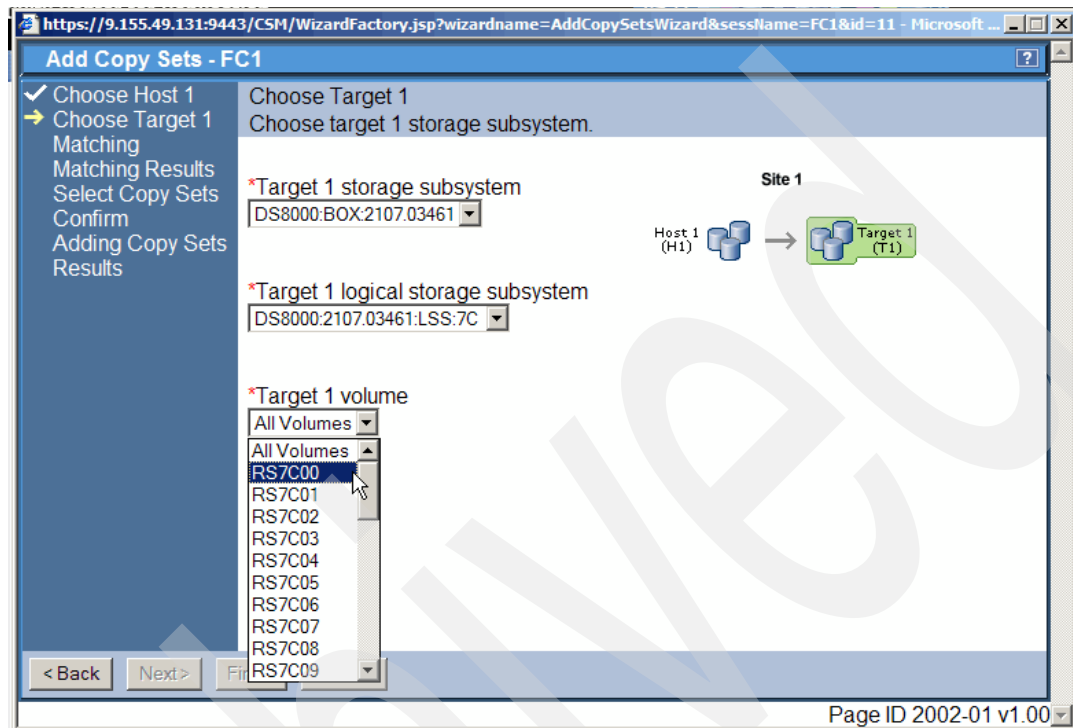


Figure 5-279 FlashCopy Sets wizard - choose FlashCopy target volume

Figure 5-280 on page 284 reports that the Copy set successfully matched. Continue by clicking on the Next button.

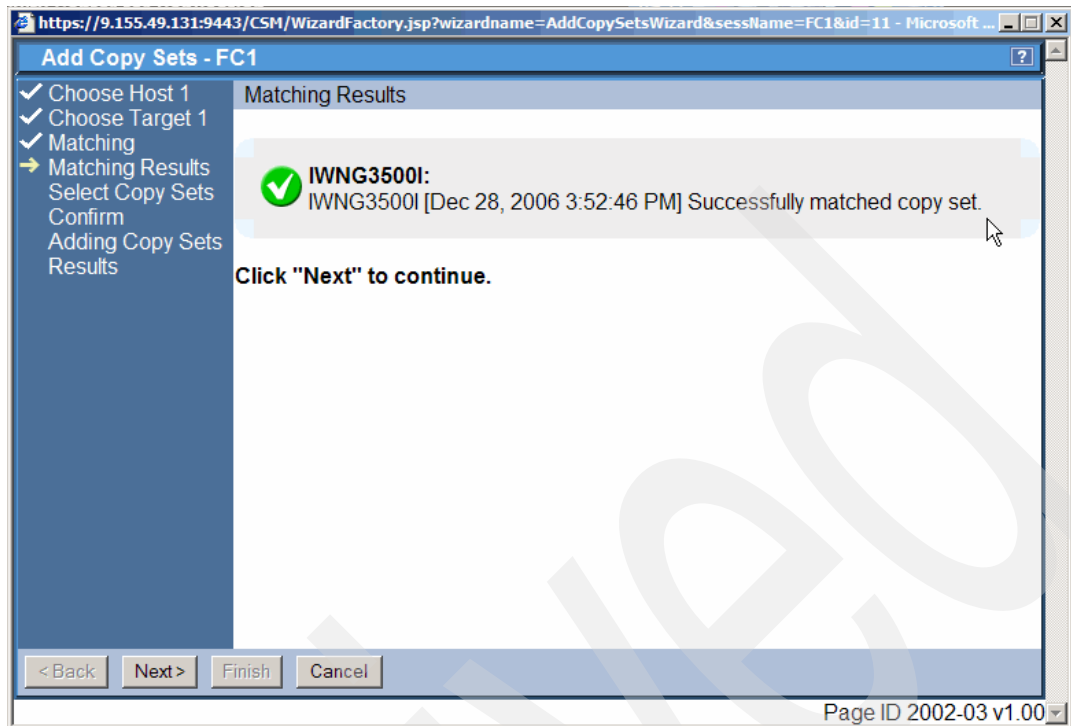


Figure 5-280 FlashCopy Sets wizard - matching results

Figure 5-281 shows the next panel in this sequence which provides an overview of the selected H1 volumes. Using the hyper link under the column Copy Set you may query the source and target volume within this copy set.

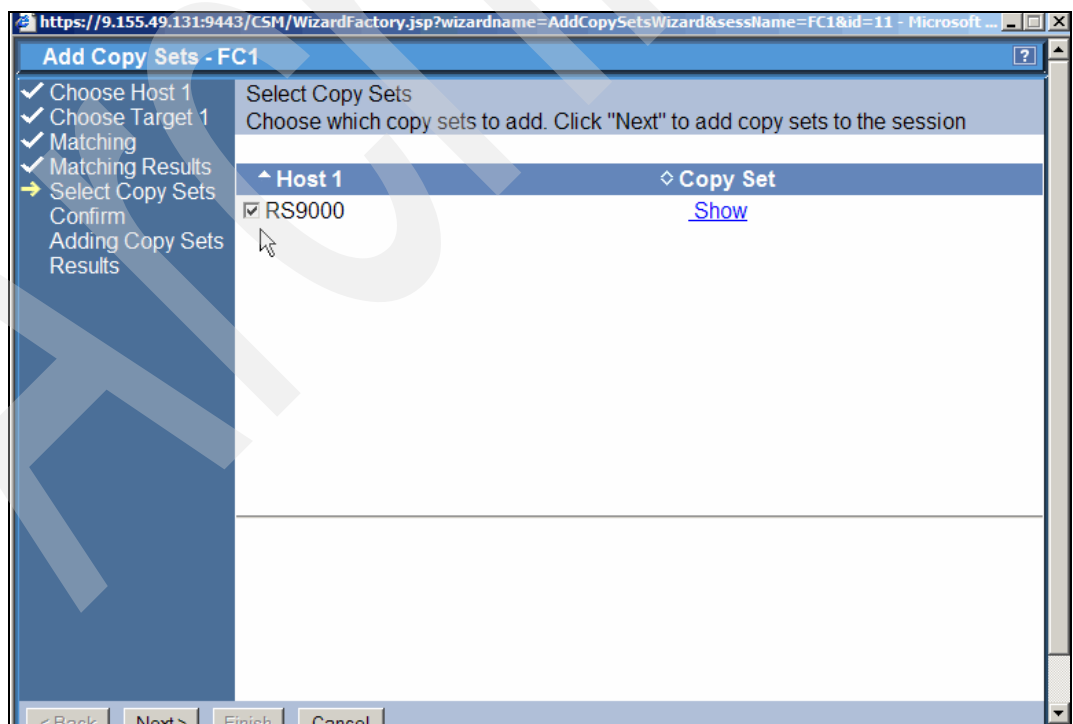


Figure 5-281 FlashCopy Sets wizard - Selected Copy Sets overview

Figure 5-282 shows a confirmation panel to acknowledge the Copy Set creation. Click Next to add copy sets.

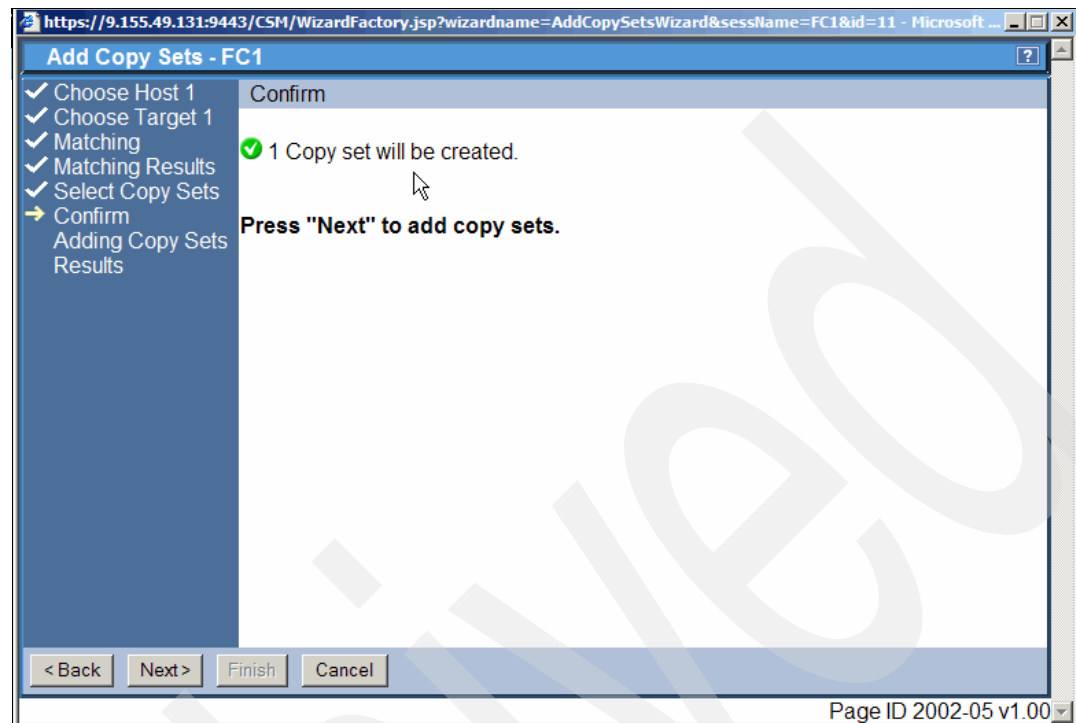


Figure 5-282 FlashCopy Sets wizard - confirmation panel

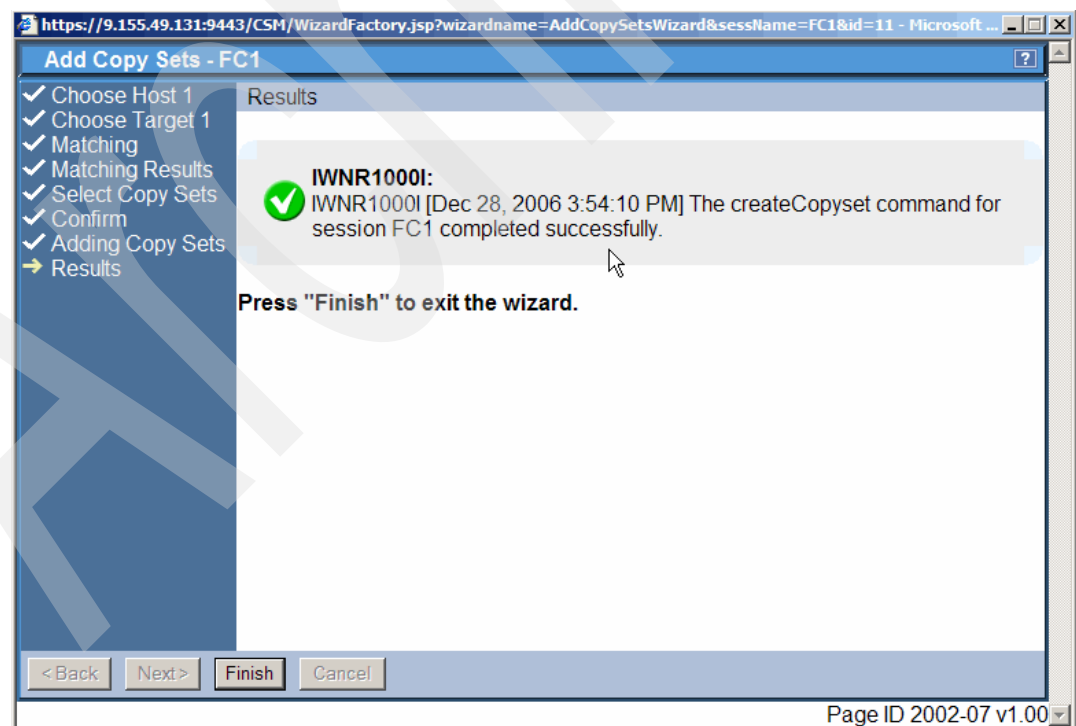


Figure 5-283 FlashCopy Sets wizard - results panel

Figure 5-283 on page 285 shows the final panel within this scenario to create a FlashCopy Copy Set. The Copy Set is successfully created and the related TPC for Replication database update was successful. By clicking on the Finish button the wizard takes us back to the session overview panel as shown in Figure 5-284.

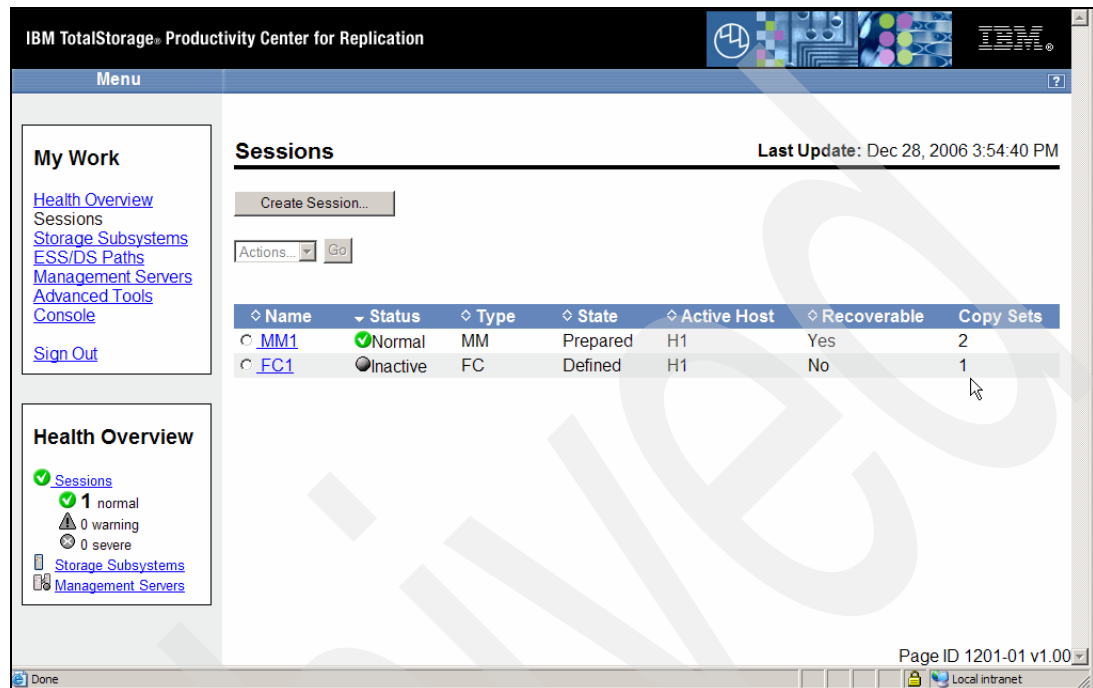


Figure 5-284 Session overview panel with FlashCopy session FC1

Figure 5-284 displays a Copy Set. But we need another Copy Set for the second Metro Mirror target volume which we intend to FlashCopy also. This second volume is device 01 in LSS A0 in 03461.

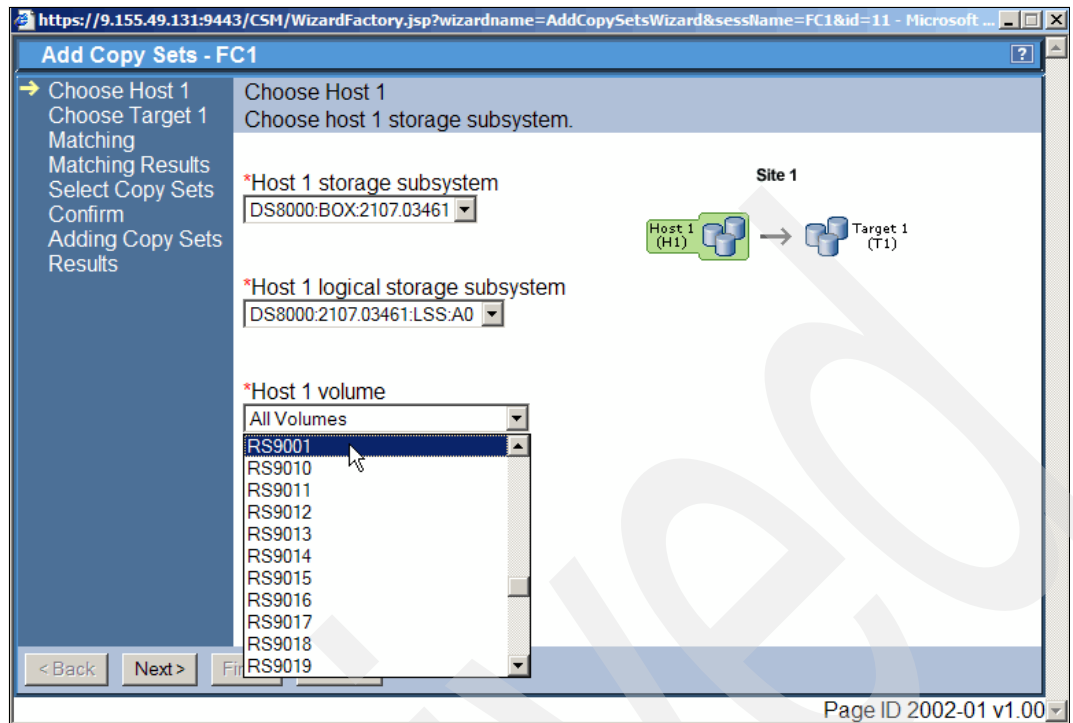


Figure 5-285 Select second FlashCopy source volume

Figure 5-285 displays the second FlashCopy source volume. Again note that as the volume name we see here the label of the Metro Mirror source volume which is RS9001 in 20781 or device 01 in LSS 90 in 20781. This label shows also as the Metro Mirror target volume name although it is the volume 01 in LSS A0 in storage subsystem 03461.

Figure 5-286 on page 288 is the final panel when selecting the matching FlashCopy target volume. This again goes into LSS 7C as device 01 or the user or volume name of RS7C01.

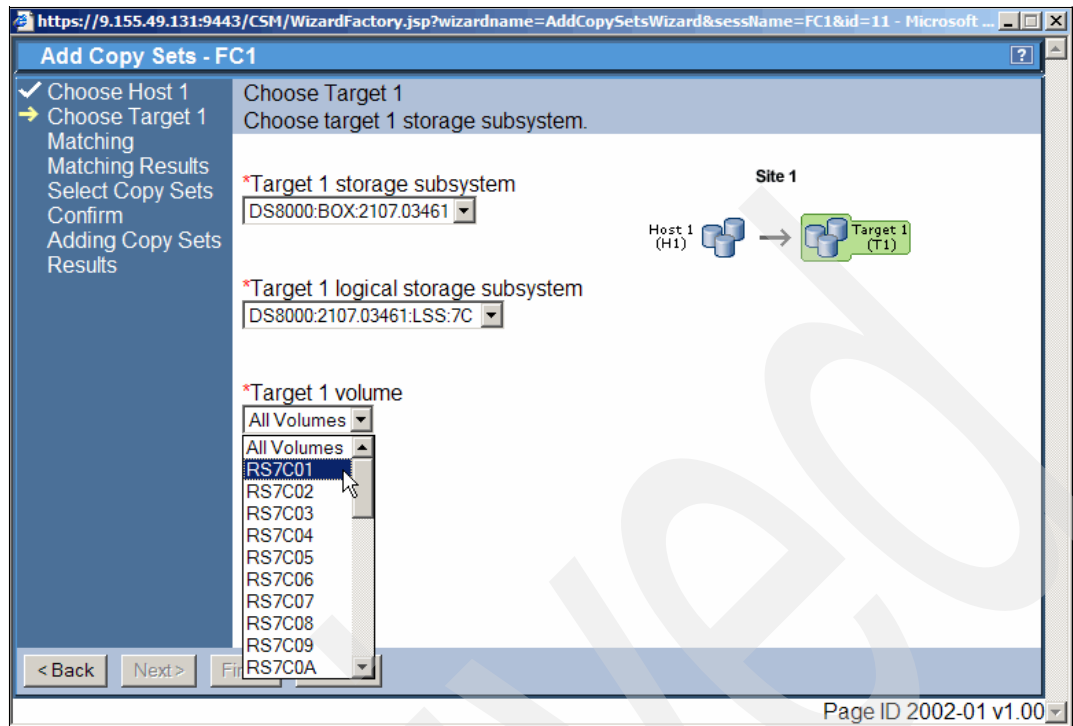


Figure 5-286 Second FlashCopy target volume

The following sequence of panels is a repetition of what we went through previously when we defined the first FlashCopy Copy Set. Refer to Figure 5-287, Figure 5-288 on page 289, Figure 5-289 on page 289, and Figure 5-290 on page 290. In Figure 5-287 click Next to go to the Select Copy Sets panel.

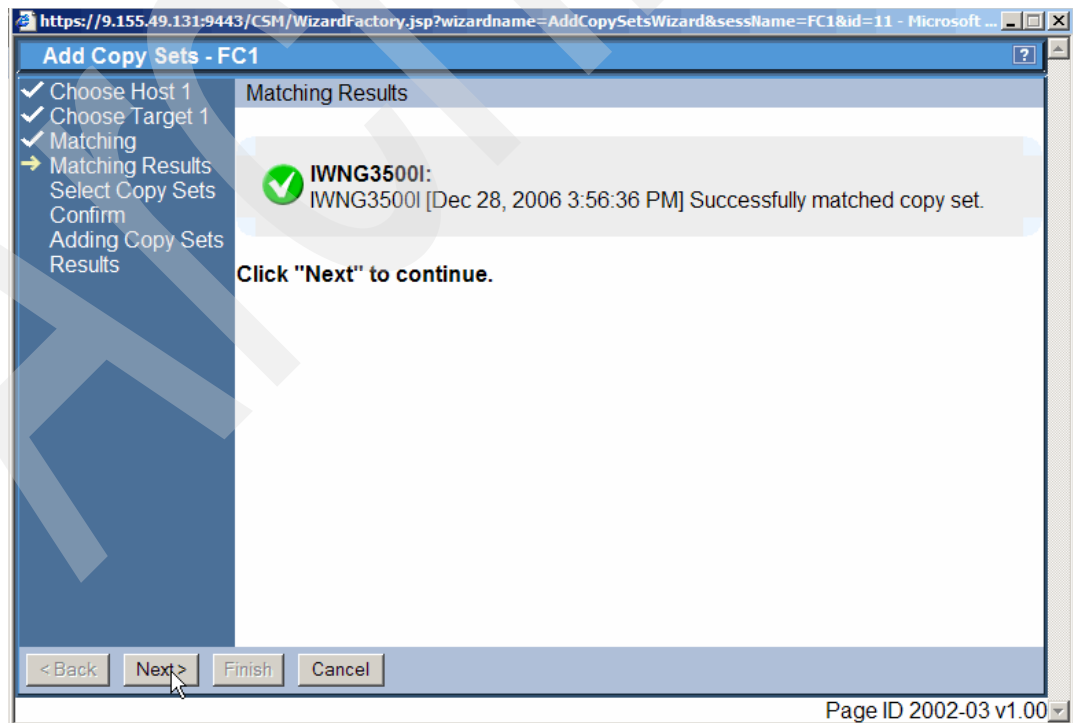


Figure 5-287 Source and target volume matched successfully

.As shown in Figure 5-288 click Next to continue to the next panel.

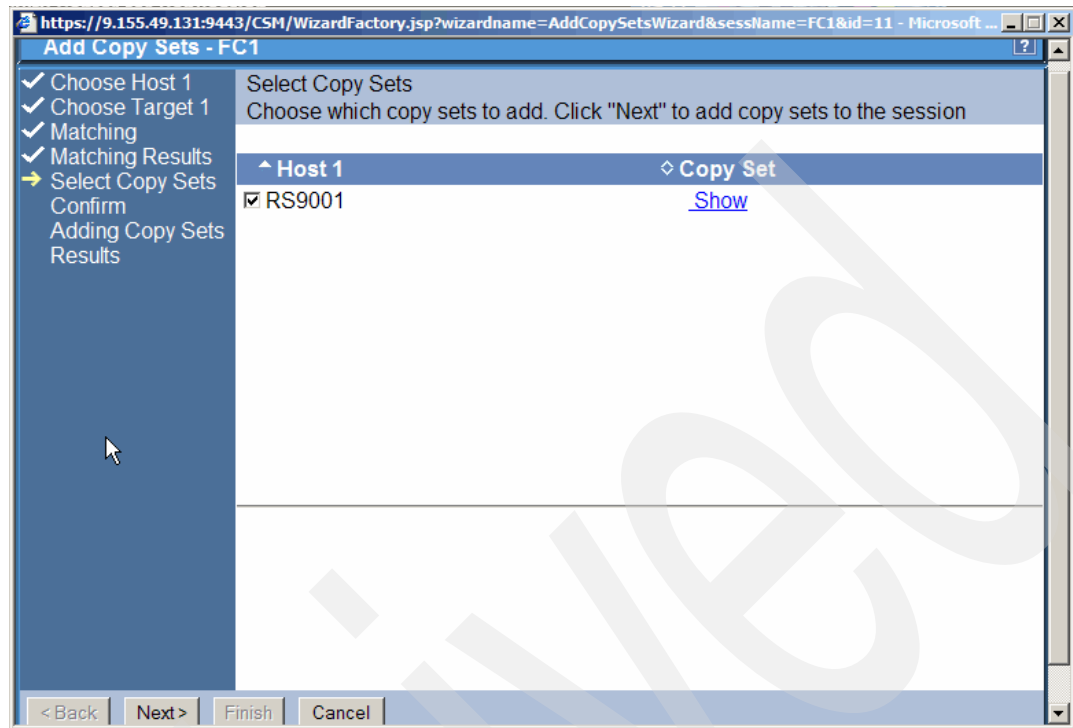


Figure 5-288 View selected source volume(s)

The panel in Figure 5-289 asks for confirmation to add the copy sets. Click Next to do so and to move on to actually create the selected Copy Sets.

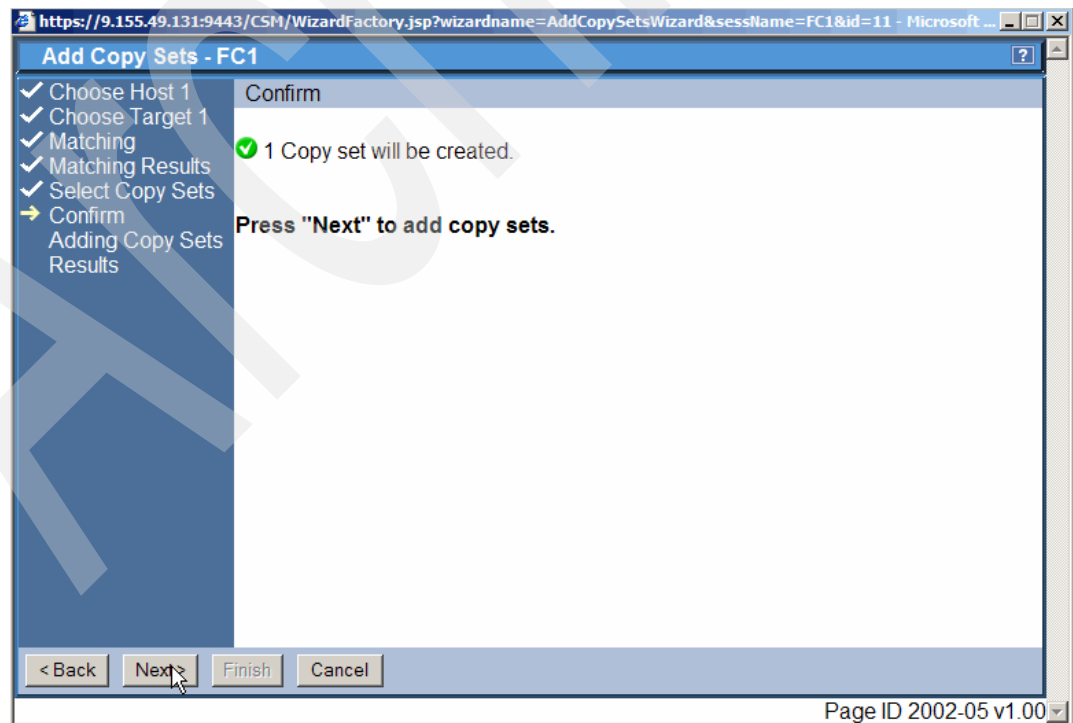


Figure 5-289 Confirm to create selected Copy Set

Figure 5-290 shows the createCopyset command was successful. Click Finish to continue.

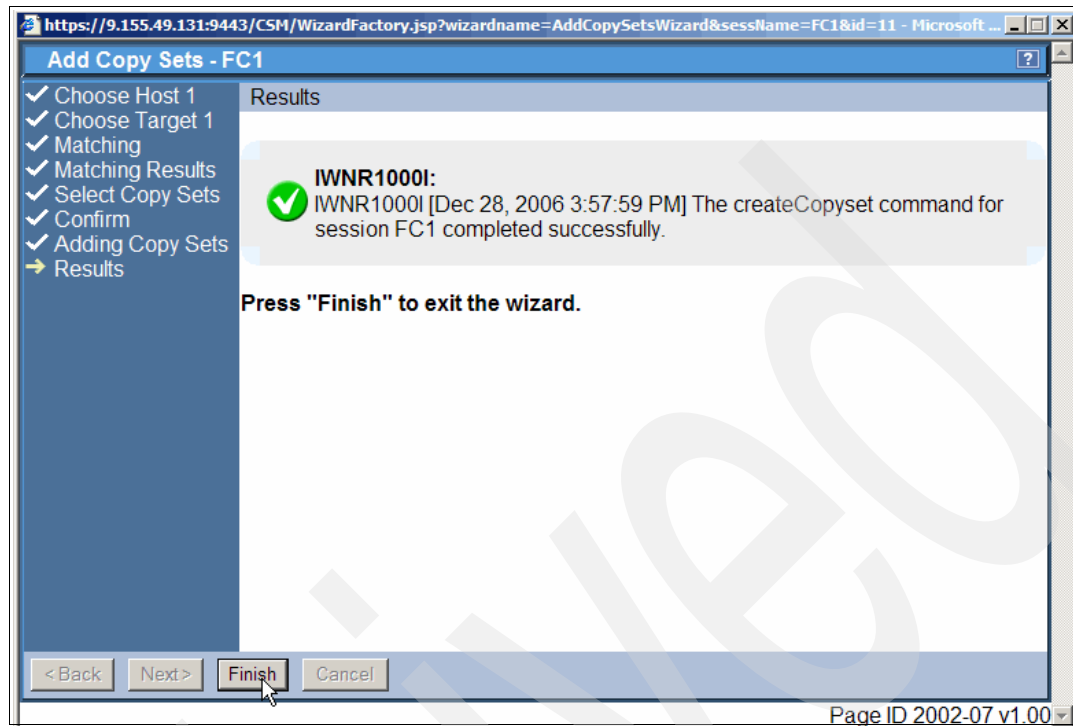


Figure 5-290 Copy Set is successfully created

This concludes the sequence of panels to go through the Add Copy Sets wizard and brings us back to the session overview panel as Figure 5-291 displays.

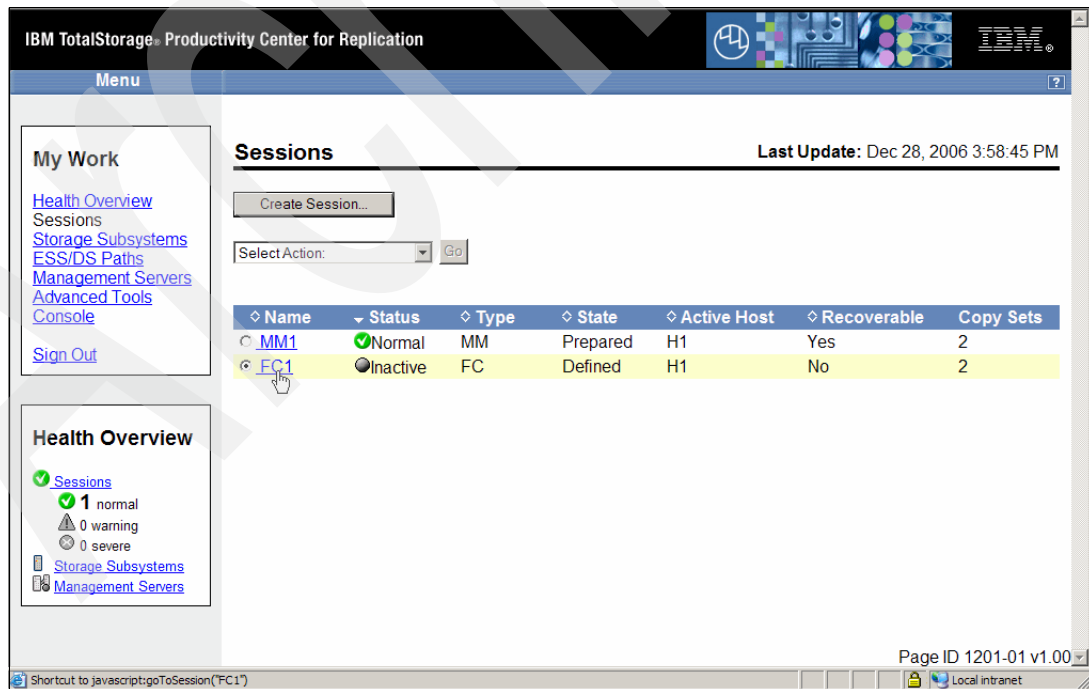


Figure 5-291 Session overview panel

Figure 5-291 displays the FlashCopy session FC1 now with two copy sets.

The name FC1 serves also as a hyper link to find more out about this session. Click the name FC1 as Figure 5-291 on page 290 shows which brings you to the following panel shown in Figure 5-292.

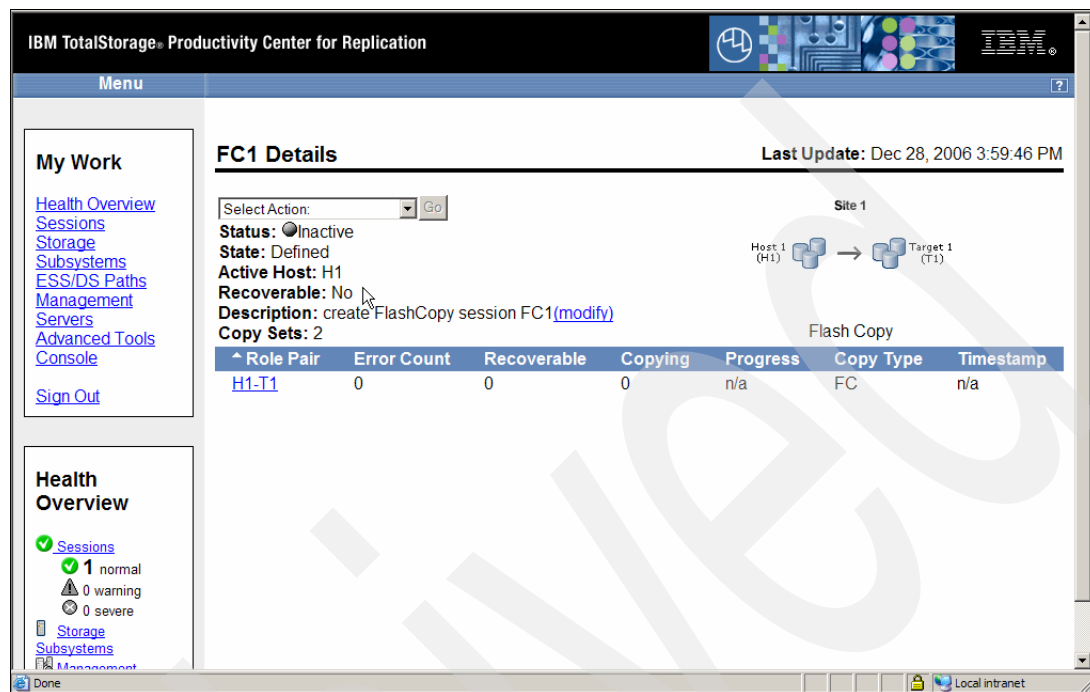


Figure 5-292 FlashCopy session details

When you click the FC1 session name Figure 5-292, the next panel that this session is still inactive and, therefore, not recoverable. So the next logical step is to create a FlashCopy.

Start FlashCopy session through the GUI

Since all session activities originate from the session overview panel we continue to start the session FC1 from this panel.

Select the FC1 session and move to the *Select Action* drop-down menu as shown in Figure 5-293 on page 292.

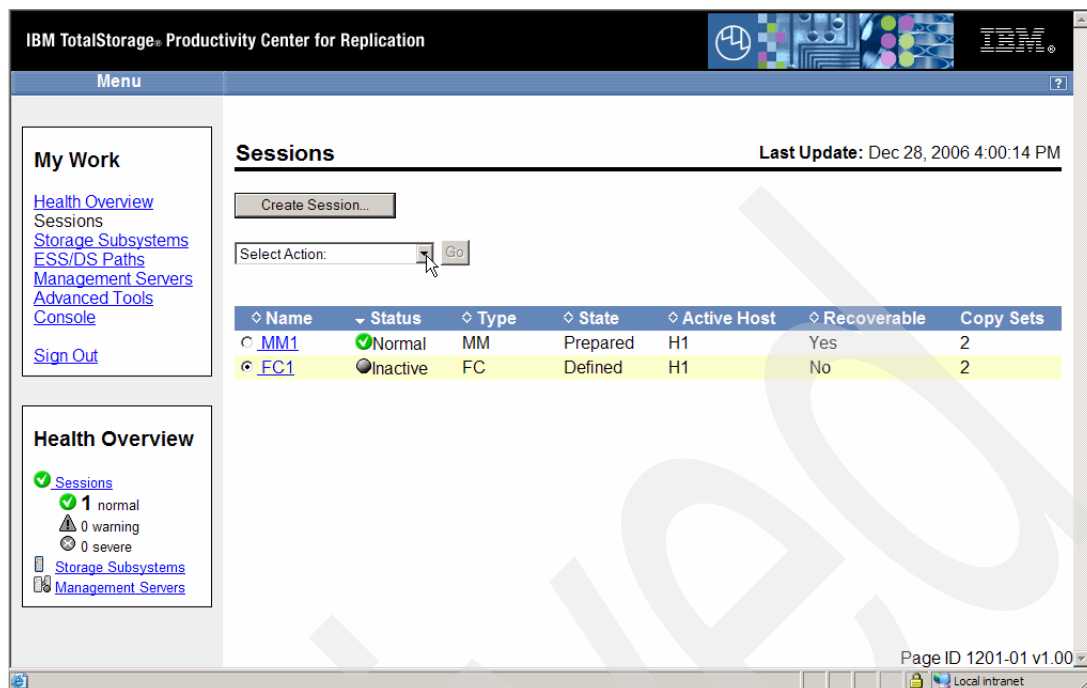


Figure 5-293 About the start FlashCopy session FC1

Figure 5-294 displays as possible actions a *Start* and a *Flash* action. *Start* applies only to a SAN Volume Controller, SVC, configuration. With ESS 800, DS6000, and DS8000 you just select Flash to establish a FlashCopy relationship.

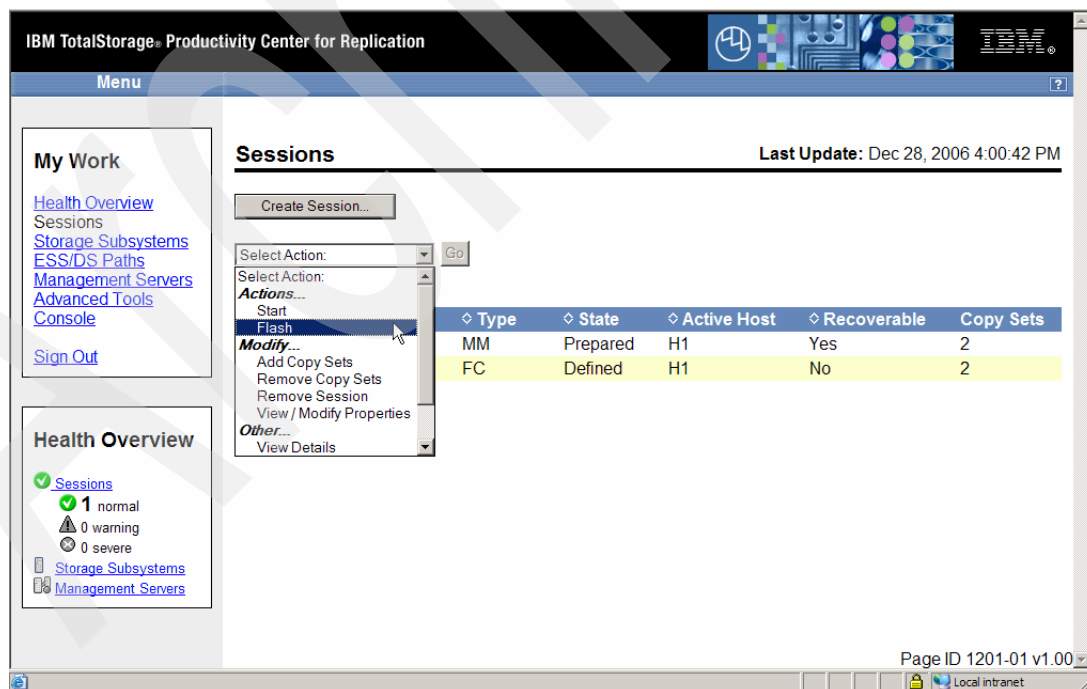


Figure 5-294 Select Flash action

So we select Flash here which immediately switches back to the Sessions overview panel as shown in Figure 5-295 on page 293.

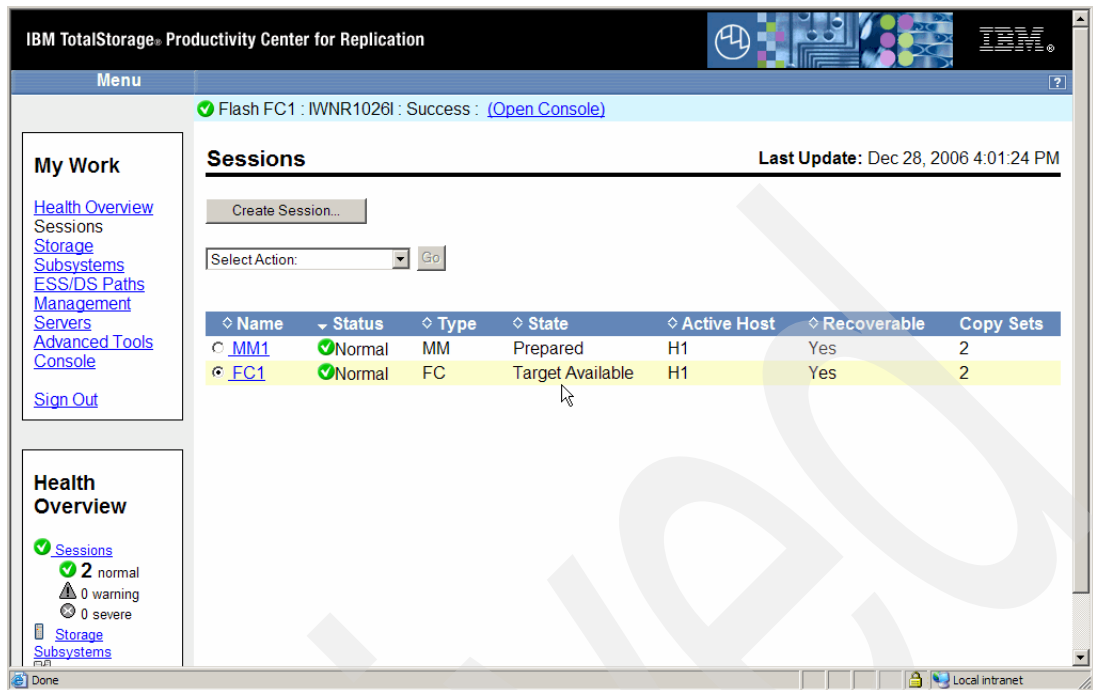


Figure 5-295 FC1 session provides a ready to use FlashCopy target volume set

As Figure 5-295 displays the FlashCopy target volumes are immediately ready for use.

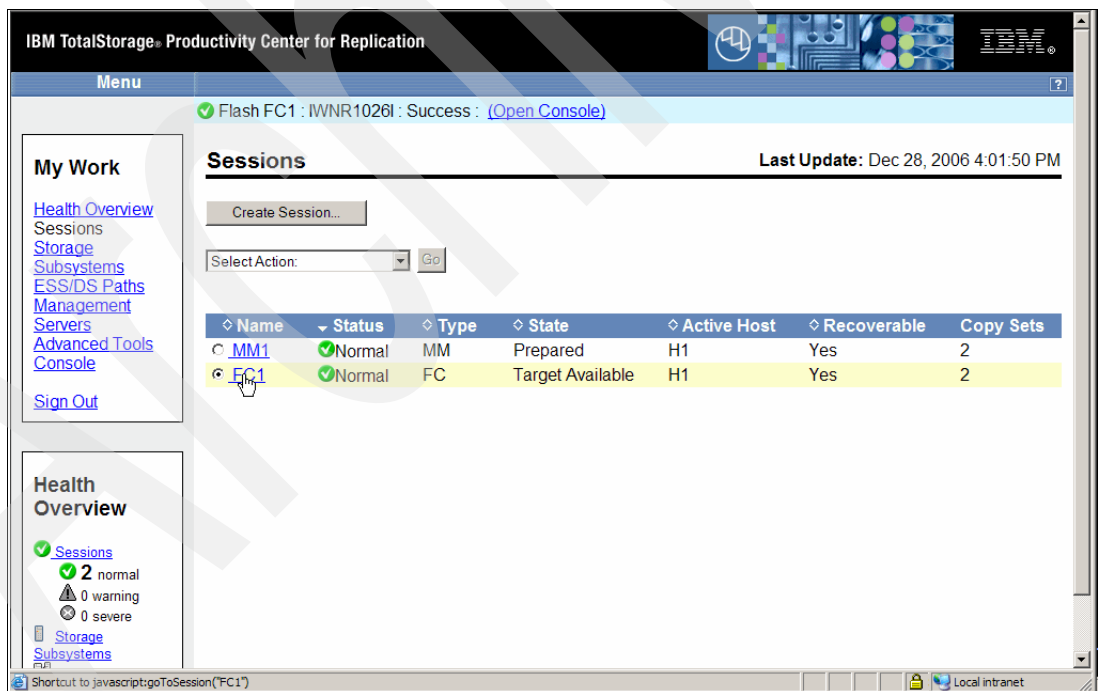


Figure 5-296 View FlashCopy session details

Figure 5-296 shows how to determine more about the FlashCopy session FC1. Click the name hyper link which opens up the next panel which Figure 5-297 on page 294 displays.

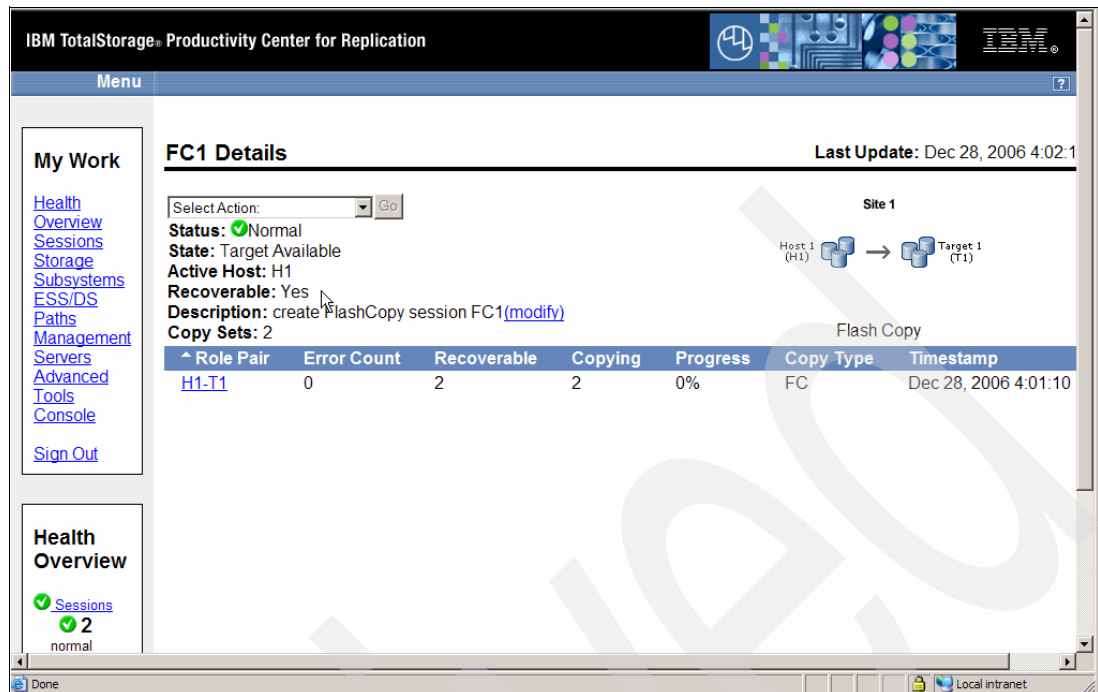


Figure 5-297 FlashCopy session FC1 details

Figure 5-297 displays the session details which indicate that the FlashCopy targets are available and in a consistent state. The overview further shows that a background copy operation is in progress and the Progress column indicates that both background copy operations did not complete yet. Note that the progress percentage relates to the number of FlashCopy volume pairs which completed their background copy operation. When one FlashCopy pair out of these two FlashCopy pairs completes its background copy operation the progress percentage will show 50% complete. So this progress percentage does not reflect the number of tracks copied but rather the number of background copy completion per FlashCopy volume pair.

A click on the H1-T1 Role Pair hyper link opens the panel shown in Figure 5-298 on page 295.

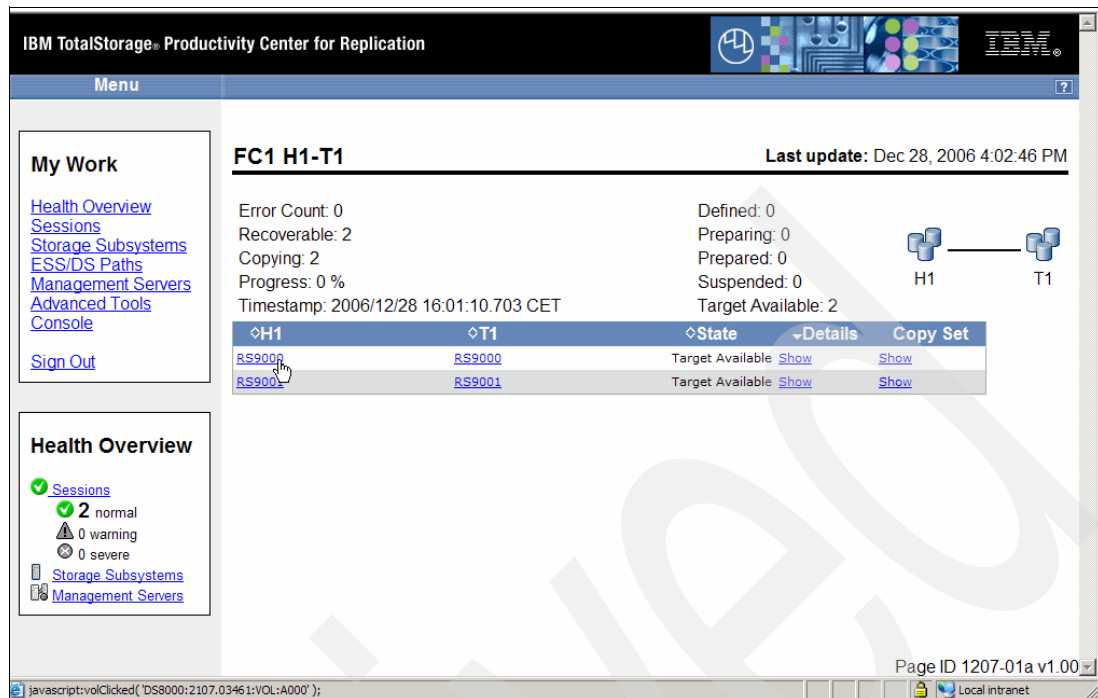


Figure 5-298 FC1 session copy sets overview

Figure 5-298 displays all related Copy Sets within the FlashCopy session FC1. Again the volume names are all the same due to the fact that the Metro Mirror source volume is completely replicated to the Metro Mirror target volume including the label or volume name. Because FlashCopy does the same and replicates everything including the volume name the source name or H1 volume name is the same as the target name or T1 name.

To determine which device is actually behind this volume name, click the hyper link under H1, as shown in Figure 5-299 on page 296.

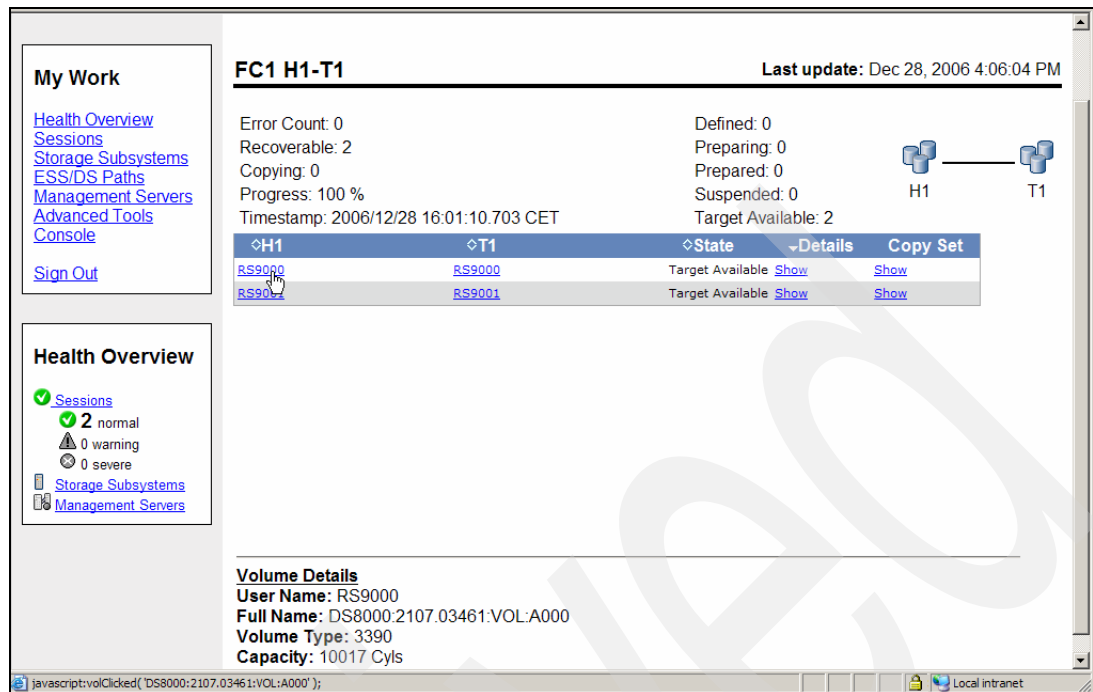


Figure 5-299 FlashCopy source volume details

Figure 5-299 displays in the lower portion the details panel of the actual volume which is behind the H1 name *RS9000*. It points to the LSS A0 and device 00 in the storage subsystem 03461.

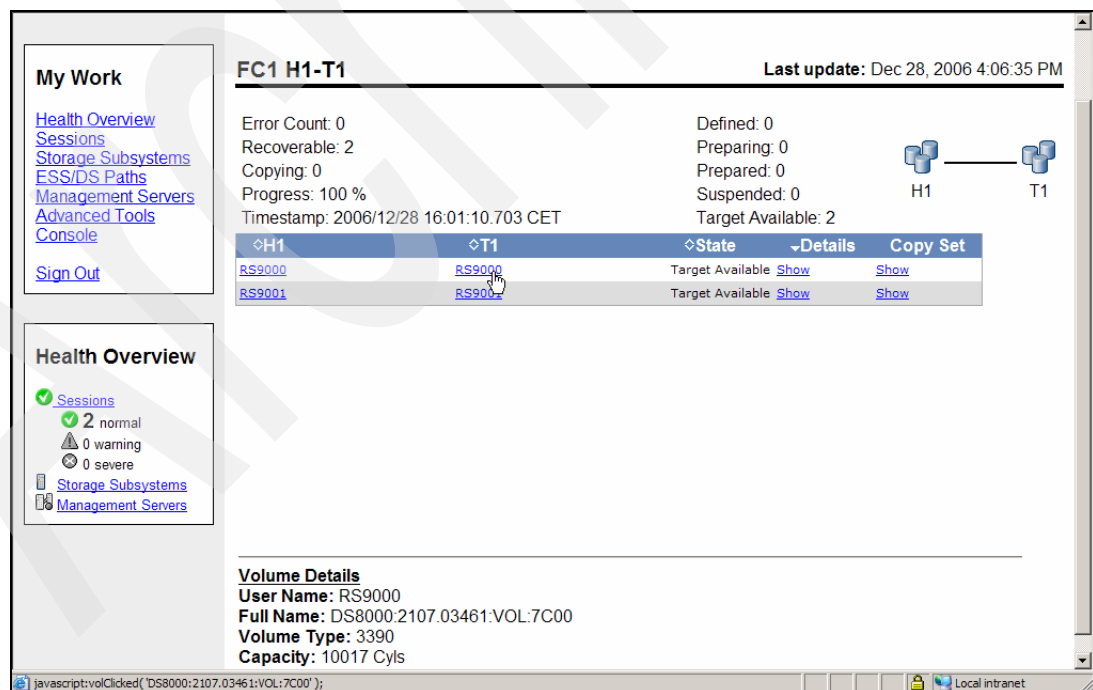


Figure 5-300 FlashCopy target volume details

Similar to what Figure 5-299 shows for the FlashCopy source volume shows Figure 5-300 for the FlashCopy target volume when you click the volume name hyper link in the T1 column. T1

points to LSS 7C and device 00 as the FlashCopy target volume which matches with the device A000 as the corresponding FlashCopy source volume.

Figure 5-301 displays the FlashCopy volume pair details and some timing details about the volume pair.

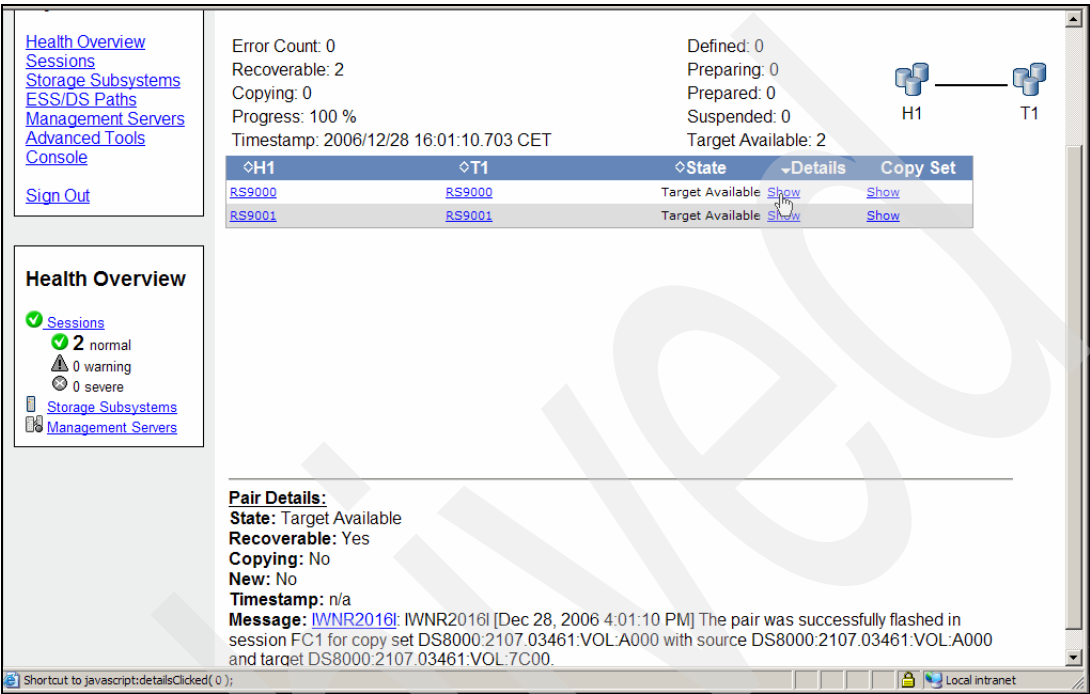


Figure 5-301 FlashCopy copy set details

Figure 5-302 on page 298 displays Copy Set details when clicking on the hyper link under *Show* in the *Copy Set* column. This does not display any more details than are already in the list in the upper portion of the panel which Figure 5-302 on page 298 shows.

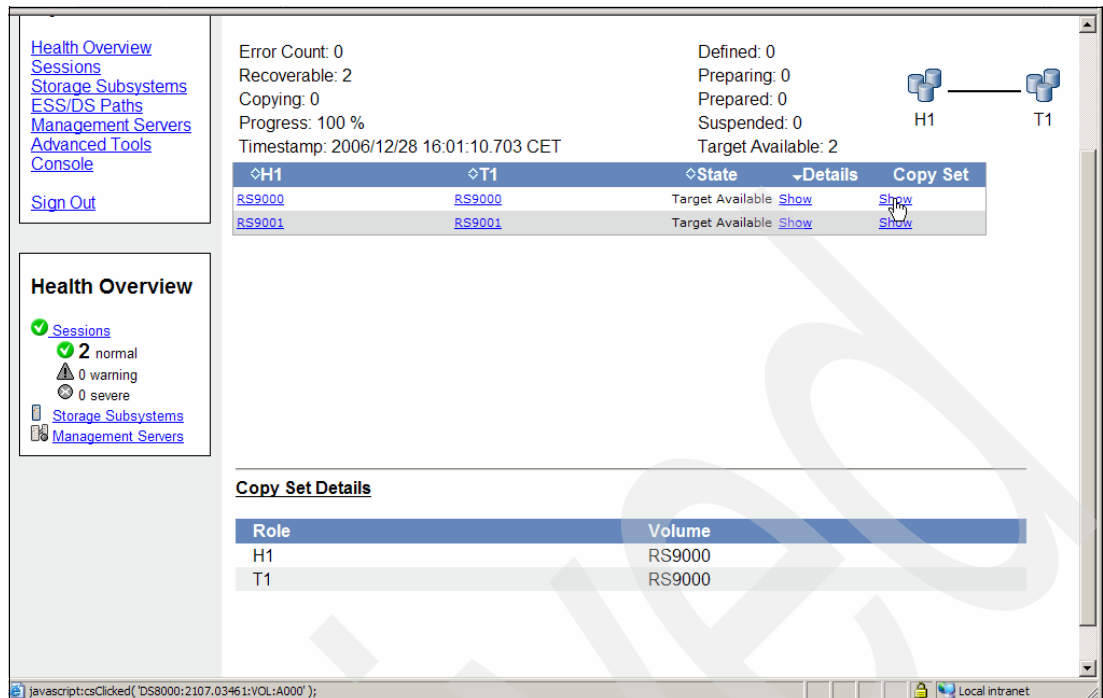


Figure 5-302 FlashCopy volume pair

Figure 5-303 shows again the session overview panel which is also the starting point to view the background copy progress through the action *View Progress* for the FlashCopy session FC1. Click the Go button to continue to the next panel in Figure 5-304 on page 299.

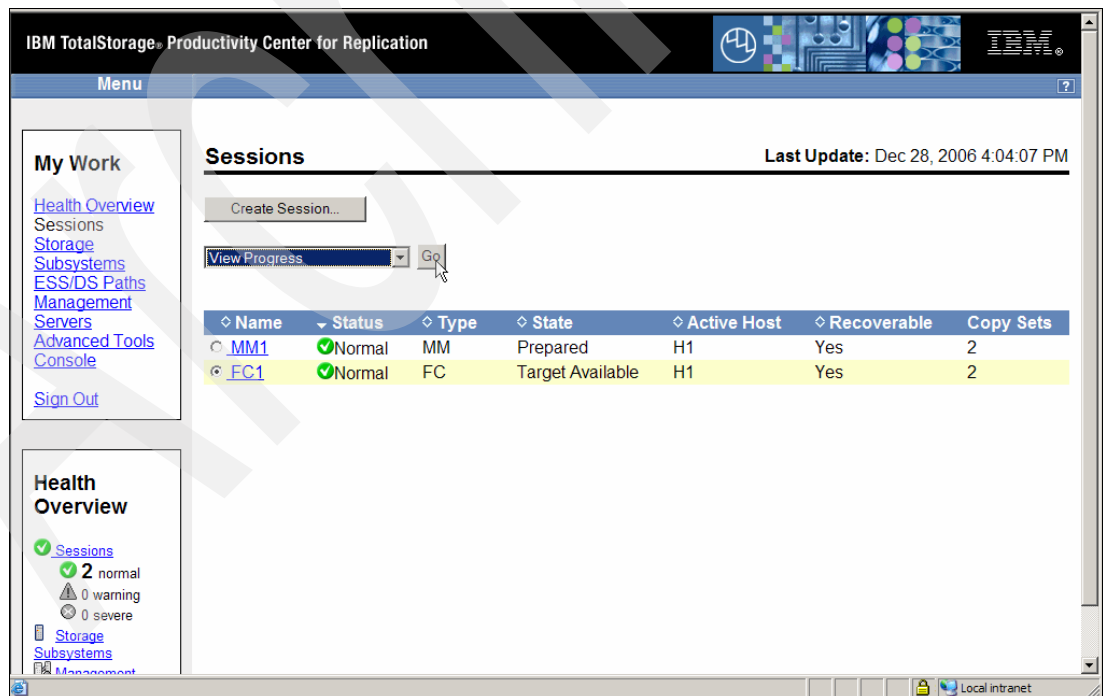


Figure 5-303 Query progress of Copy Sets within session FC1

Figure 5-304 on page 299 reports that all Copy Sets completed their background copy operation. Note again that the percentages do not relate to the number of tracks copied but

rather to the number of FlashCopy volume pairs or Copy Sets that have completed their background copy operation.

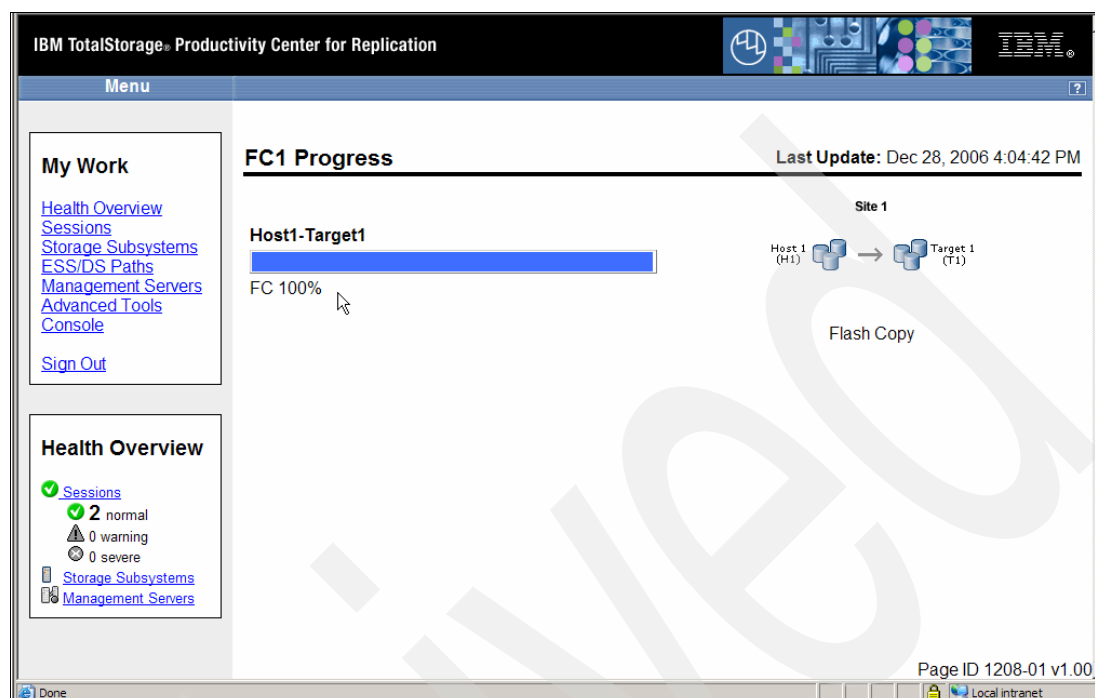


Figure 5-304 All Background FlashCopy completed

5.4.15 Managing FlashCopy through the CSMCLI

It is common to use scripts for regularly occurring activities like creating flash copies. You might want to subdivide the activities that create a session and populate the session from actually creating flash copies.

Create FlashCopy session using CSMCLI commands

We create a FlashCopy session with the name FC1 using a simple script file which Example 5-65 shows.

Example 5-65 Create FlashCopy session script crflash.txt

```
# Create FlashCopy session
# -----

mkssess -cptype fc -desc "Create FlashCopy session" FC1

lssess -l
# ----- end of script -----
```

The name of the script file is *crflash.txt* and we invoke this script via the CSMCLI script environment. Example 5-66 shows the result of this brief script.

Example 5-66 Invoke FlashCopy session creation script

```
C:\Program Files\IBM TPC RM\CLI>csmccli -script crflash.txt
```

```
IWNR1021I [Nov 4, 2006 7:43:14 AM] Session FC1 was successfully created.
```

Name	Status	State	Copy type	Recoverable	Copying
Copy sets	Error				
=====					
=====					
FC1	Inactive	Defined	Flash Copy	No	No
0	No				

After the actual make session command a subsequent list session command acknowledges that the session was created.

Populate FlashCopy session using CSMCLI commands

The next logical step after the FlashCopy session is created is to populate the FlashCopy session with Copy Sets. As shown in Figure 5-265 on page 275 we flash device A000 to device 7C00. Device A001 is FlashCopy source with 7C01 as the corresponding FlashCopy target device. Example 5-67 shows the script which creates these two FlashCopy Copy Sets in session FC1.

Example 5-67 Add Copy Sets to FlashCopy session FC1

```
#
# Add copy sets to FlashCopy session FC1
# -----

mkcpset -h1 ds8000:2107.03461:vol:A000 -t1 ds8000:2107.03461:vol:7C00 FC1
mkcpset -h1 ds8000:2107.03461:vol:A001 -t1 ds8000:2107.03461:vol:7C01 FC1

lspair -l -fmt stanza -rolepair h1-t1 FC1
lscpset FC1
# ----- end of script -----
```

Example 5-68 shows the script from Example 5-67 and its output. It first creates two Copy Sets and then lists these Copy Sets through a `lspair` command and a `lscpset` command focusing on FC1 session.

Example 5-68 Execute FlashCopy script to create Copy Sets

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script FC1mkcpset.txt

IWN2001I [Jan 7, 2007 11:15:15 PM] The pair was successfully created in session
FC1 for copy set DS8000:2107.03461
:VOL:A000 with source DS8000:2107.03461:VOL:A000 and target
DS8000:2107.03461:VOL:7C00.
IWN2001I [Jan 7, 2007 11:15:18 PM] The pair was successfully created in session
FC1 for copy set DS8000:2107.03461
:VOL:A001 with source DS8000:2107.03461:VOL:A001 and target
DS8000:2107.03461:VOL:7C01.

Source volume DS8000:2107.03461:VOL:A000
Target volume DS8000:2107.03461:VOL:7C00
RolePair      H1-T1
State         Defined
Recoverable   No
Copying       No
New           Yes
Copy set      DS8000:2107.03461:VOL:A000
```

```

Timestamp      n/a
Last result    IWNR2001I

Source volume  DS8000:2107.03461:VOL:A001
Target volume  DS8000:2107.03461:VOL:7C01
RolePair       H1-T1
State          Defined
Recoverable    No
Copying        No
New            Yes
Copy set       DS8000:2107.03461:VOL:A001
Timestamp      n/a
Last result    IWNR2001I

```

```

H1 Volume                      Session Volumes
=====
DS8000:2107.03461:VOL:A000 FC1      2
DS8000:2107.03461:VOL:A001 FC1      2

```

```
C:\Program Files\IBM\CSMCLI\CLI>
```

After the session is populated with Copy Sets it is ready to create FlashCopies.

Create FlashCopy with CSMCLI commands

Example 5-69 shows a script which creates FlashCopy relationships for all FlashCopy volume pairs which are included in the session FC1.

Example 5-69 Create FlashCopy relationship

```

#
# Create FlashCopy relation ship
# -----

lsess -l -fmt stanza FC1
cmdsess -quiet -action flash FC1
lsess -l -fmt stanza FC1
# ----- end of script -----

```

Note to start a FlashCopy relationship use the action **flash** which immediately creates a FlashCopy relationship for all related FlashCopy pairs within the session. This applies to the ESS800, DS6000, and DS8000. For the SVC you need to prepare the FlashCopy session first through the action parameter of **start** and then you issue the actual FlashCopy command through the action parameter **flash**.

Example 5-70 displays the FlashCopy script output listing the session FC1 first to verify that the session exists. Because this is the first time a FlashCopy relationship is created note the Status and State state before and after the actual flash command.

Example 5-70 FlashCopy script output

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script FlashFC1.txt
```

```

Name      FC1
Status    Inactive
State     Defined
Copy type Flash Copy

```

IWNR1026I [Jan 5, 2007 8:24:41 PM] **The runCommand for command Flash in session FC1 completed successfully.**

Name FC1
Status Normal
State Target Available
Copy type Flash Copy

C:\Program Files\IBM\CSMCLI\CLI>

Once the Flash command finishes the FlashCopy target is available and the status changes to Normal.

In order to create the next FlashCopy just execute the script as shown in Example 5-69 on page 301 again. The only difference compared to the very first FlashCopy is the list session output before the actual Flash. Compare Example 5-70 on page 301 with Example 5-71.

Example 5-71 Second invocation of FlashCopy script

C:\Program Files\IBM\CSMCLI\CLI>**csmdi -script FlashFC1.txt**

Name FC1
Status Normal
State Target Available
Copy type Flash Copy

IWNR1026I [Jan 5, 2007 8:31:36 PM] **The runCommand for command Flash in session FC1 completed successfully.**

Name FC1
Status Normal
State Target Available
Copy type Flash Copy

C:\Program Files\IBM\CSMCLI\CLI>

You may also combine all CSMCLI commands to create a FlashCopy environment into a single script. Example 5-72 is such a script which does the following

- ▶ Create a FlashCopy session
- ▶ Populate this FlashCopy session with 32 Copy Sets
- ▶ Make a Flash immediately.

Example 5-72 Source script to create a FlashCopy environment

```
# -----  
# Create FlashCopy session FC2 in 20781 from LSS 90 to LSS 00  
# -----  
  
setoutput -fmt stanza  
lssess -l  
mkssess -cptype fc -desc "create FlashCopy session FC2" FC2  
lssess -l  
  
# -----  
# Add copy sets to FlashCopy session FC2  
# -----
```



```

mkcpset -h1 ds8000:2107.20781:vol:9000 -t1 ds8000:2107.20781:vol:0000 FC2
mkcpset -h1 ds8000:2107.20781:vol:9001 -t1 ds8000:2107.20781:vol:0001 FC2
mkcpset -h1 ds8000:2107.20781:vol:9002 -t1 ds8000:2107.20781:vol:0002 FC2
mkcpset -h1 ds8000:2107.20781:vol:9003 -t1 ds8000:2107.20781:vol:0003 FC2
mkcpset -h1 ds8000:2107.20781:vol:9004 -t1 ds8000:2107.20781:vol:0004 FC2
mkcpset -h1 ds8000:2107.20781:vol:9005 -t1 ds8000:2107.20781:vol:0005 FC2
mkcpset -h1 ds8000:2107.20781:vol:9006 -t1 ds8000:2107.20781:vol:0006 FC2
mkcpset -h1 ds8000:2107.20781:vol:9007 -t1 ds8000:2107.20781:vol:0007 FC2
mkcpset -h1 ds8000:2107.20781:vol:9008 -t1 ds8000:2107.20781:vol:0008 FC2
mkcpset -h1 ds8000:2107.20781:vol:9009 -t1 ds8000:2107.20781:vol:0009 FC2
mkcpset -h1 ds8000:2107.20781:vol:900a -t1 ds8000:2107.20781:vol:000a FC2
mkcpset -h1 ds8000:2107.20781:vol:900b -t1 ds8000:2107.20781:vol:000b FC2
mkcpset -h1 ds8000:2107.20781:vol:900c -t1 ds8000:2107.20781:vol:000c FC2
mkcpset -h1 ds8000:2107.20781:vol:900d -t1 ds8000:2107.20781:vol:000d FC2
mkcpset -h1 ds8000:2107.20781:vol:900e -t1 ds8000:2107.20781:vol:000e FC2
mkcpset -h1 ds8000:2107.20781:vol:900f -t1 ds8000:2107.20781:vol:000f FC2

mkcpset -h1 ds8000:2107.20781:vol:9010 -t1 ds8000:2107.20781:vol:0010 FC2
mkcpset -h1 ds8000:2107.20781:vol:9011 -t1 ds8000:2107.20781:vol:0011 FC2
mkcpset -h1 ds8000:2107.20781:vol:9012 -t1 ds8000:2107.20781:vol:0012 FC2
mkcpset -h1 ds8000:2107.20781:vol:9013 -t1 ds8000:2107.20781:vol:0013 FC2
mkcpset -h1 ds8000:2107.20781:vol:9014 -t1 ds8000:2107.20781:vol:0014 FC2
mkcpset -h1 ds8000:2107.20781:vol:9015 -t1 ds8000:2107.20781:vol:0015 FC2
mkcpset -h1 ds8000:2107.20781:vol:9016 -t1 ds8000:2107.20781:vol:0016 FC2
mkcpset -h1 ds8000:2107.20781:vol:9017 -t1 ds8000:2107.20781:vol:0017 FC2
mkcpset -h1 ds8000:2107.20781:vol:9018 -t1 ds8000:2107.20781:vol:0018 FC2
mkcpset -h1 ds8000:2107.20781:vol:9019 -t1 ds8000:2107.20781:vol:0019 FC2
mkcpset -h1 ds8000:2107.20781:vol:901a -t1 ds8000:2107.20781:vol:001a FC2
mkcpset -h1 ds8000:2107.20781:vol:901b -t1 ds8000:2107.20781:vol:001b FC2
mkcpset -h1 ds8000:2107.20781:vol:901c -t1 ds8000:2107.20781:vol:001c FC2
mkcpset -h1 ds8000:2107.20781:vol:901d -t1 ds8000:2107.20781:vol:001d FC2
mkcpset -h1 ds8000:2107.20781:vol:901e -t1 ds8000:2107.20781:vol:001e FC2
mkcpset -h1 ds8000:2107.20781:vol:901f -t1 ds8000:2107.20781:vol:001f FC2

# -----
# list copy sets
# -----

lscpset FC2

# -----
# Create FlashCopies ...
# -----

cmdsess -quiet -action flash FC2
lsess -l -fmt stanza FC2
# ----- end of script -----

```

Note that currently you cannot specify a range of volumes when you define many Copy Sets even when the address range is contiguous. So you need to utilize the respective command for each single make Copy Set command. This may be enhanced in the future to ease the scripting for large configuration with many hundreds of Copy Sets.

Example 5-73 on page 304 shows the results of the script from Example 5-72 on page 302.

Example 5-73 Script output to create entire FlashCopy environment

C:\Program Files\IBM\CSMCLI\CLI>csmcli -script FC2.txt

Name FC3
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying No
Copy sets 32
Error No

Name FC1
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying Yes
Copy sets 36
Error No

IWNR1021I [Jan 14, 2007 7:42:03 PM] Session FC2 was successfully created.

Name FC3
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying No
Copy sets 32
Error No

Name FC2
Status Inactive
State Defined
Copy type Flash Copy
Recoverable No
Copying No
Copy sets 0
Error No

Name FC1
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying Yes
Copy sets 36
Error No

IWNR2001I [Jan 14, 2007 7:42:06 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9000 with source DS8000:2107.20781:VOL:9000 and target DS8000:2107.20781:VOL:0000.

IWNR2001I [Jan 14, 2007 7:42:08 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781

:VOL:9001 with source DS8000:2107.20781:VOL:9001 and target DS8000:2107.20781:VOL:0001.
IWNR2001I [Jan 14, 2007 7:42:10 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9002 with source DS8000:2107.20781:VOL:9002 and target DS8000:2107.20781:VOL:0002.
IWNR2001I [Jan 14, 2007 7:42:12 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9003 with source DS8000:2107.20781:VOL:9003 and target DS8000:2107.20781:VOL:0003.
IWNR2001I [Jan 14, 2007 7:42:13 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9004 with source DS8000:2107.20781:VOL:9004 and target DS8000:2107.20781:VOL:0004.
IWNR2001I [Jan 14, 2007 7:42:15 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9005 with source DS8000:2107.20781:VOL:9005 and target DS8000:2107.20781:VOL:0005.
IWNR2001I [Jan 14, 2007 7:42:17 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9006 with source DS8000:2107.20781:VOL:9006 and target DS8000:2107.20781:VOL:0006.
IWNR2001I [Jan 14, 2007 7:42:19 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9007 with source DS8000:2107.20781:VOL:9007 and target DS8000:2107.20781:VOL:0007.
IWNR2001I [Jan 14, 2007 7:42:20 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9008 with source DS8000:2107.20781:VOL:9008 and target DS8000:2107.20781:VOL:0008.
IWNR2001I [Jan 14, 2007 7:42:22 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:9009 with source DS8000:2107.20781:VOL:9009 and target DS8000:2107.20781:VOL:0009.
IWNR2001I [Jan 14, 2007 7:42:24 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:900A with source DS8000:2107.20781:VOL:900A and target DS8000:2107.20781:VOL:000A.
IWNR2001I [Jan 14, 2007 7:42:25 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:900B with source DS8000:2107.20781:VOL:900B and target DS8000:2107.20781:VOL:000B.
IWNR2001I [Jan 14, 2007 7:42:27 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:900C with source DS8000:2107.20781:VOL:900C and target DS8000:2107.20781:VOL:000C.
IWNR2001I [Jan 14, 2007 7:42:29 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:900D with source DS8000:2107.20781:VOL:900D and target DS8000:2107.20781:VOL:000D.
IWNR2001I [Jan 14, 2007 7:42:30 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:900E with source DS8000:2107.20781:VOL:900E and target DS8000:2107.20781:VOL:000E.

IWNR2001I [Jan 14, 2007 7:42:32 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:900F with source DS8000:2107.20781:VOL:900F and target DS8000:2107.20781:VOL:000F.

IWNR2001I [Jan 14, 2007 7:42:34 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9010 with source DS8000:2107.20781:VOL:9010 and target DS8000:2107.20781:VOL:0010.

IWNR2001I [Jan 14, 2007 7:42:35 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9011 with source DS8000:2107.20781:VOL:9011 and target DS8000:2107.20781:VOL:0011.

IWNR2001I [Jan 14, 2007 7:42:37 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9012 with source DS8000:2107.20781:VOL:9012 and target DS8000:2107.20781:VOL:0012.

IWNR2001I [Jan 14, 2007 7:42:39 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9013 with source DS8000:2107.20781:VOL:9013 and target DS8000:2107.20781:VOL:0013.

IWNR2001I [Jan 14, 2007 7:42:40 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9014 with source DS8000:2107.20781:VOL:9014 and target DS8000:2107.20781:VOL:0014.

IWNR2001I [Jan 14, 2007 7:42:42 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9015 with source DS8000:2107.20781:VOL:9015 and target DS8000:2107.20781:VOL:0015.

IWNR2001I [Jan 14, 2007 7:42:44 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9016 with source DS8000:2107.20781:VOL:9016 and target DS8000:2107.20781:VOL:0016.

IWNR2001I [Jan 14, 2007 7:42:45 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9017 with source DS8000:2107.20781:VOL:9017 and target DS8000:2107.20781:VOL:0017.

IWNR2001I [Jan 14, 2007 7:42:47 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9018 with source DS8000:2107.20781:VOL:9018 and target DS8000:2107.20781:VOL:0018.

IWNR2001I [Jan 14, 2007 7:42:49 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:9019 with source DS8000:2107.20781:VOL:9019 and target DS8000:2107.20781:VOL:0019.

IWNR2001I [Jan 14, 2007 7:42:51 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:901A with source DS8000:2107.20781:VOL:901A and target DS8000:2107.20781:VOL:001A.

IWNR2001I [Jan 14, 2007 7:42:53 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781 :VOL:901B with source DS8000:2107.20781:VOL:901B and target DS8000:2107.20781:VOL:001B.

IWNR2001I [Jan 14, 2007 7:42:54 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781

:VOL:901C with source DS8000:2107.20781:VOL:901C and target DS8000:2107.20781:VOL:001C.
IWNR2001I [Jan 14, 2007 7:42:56 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:901D with source DS8000:2107.20781:VOL:901D and target DS8000:2107.20781:VOL:001D.
IWNR2001I [Jan 14, 2007 7:42:58 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:901E with source DS8000:2107.20781:VOL:901E and target DS8000:2107.20781:VOL:001E.
IWNR2001I [Jan 14, 2007 7:43:00 PM] The pair was successfully created in session FC2 for copy set DS8000:2107.20781
:VOL:901F with source DS8000:2107.20781:VOL:901F and target DS8000:2107.20781:VOL:001F.

H1 Volume DS8000:2107.20781:VOL:9000
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9001
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9002
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9003
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9004
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9005
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9006
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9007
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9008
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9009
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:900A
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:900B
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:900C
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:900D
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:900E
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:900F
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9010
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9011
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9012
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9013
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9014
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9015
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9016
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9017
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9018
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:9019
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:901A
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:901B
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:901C
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:901D
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:901E
Session FC2
Volumes 2

H1 Volume DS8000:2107.20781:VOL:901F
Session FC2
Volumes 2

IWNR1026I [Jan 14, 2007 7:43:03 PM] **The runCommand for command Flash in session FC2 completed successfully.**

Name FC2
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying Yes
Copy sets 32
Error No

C:\Program Files\IBM\CSMCLI\CLI>

This concludes our discussion on the considerations for managing FlashCopy sessions with CSMCLI commands.

5.4.16 Managing Global Mirror with the GUI

This section covers a Global Mirror environment, in more detail. In addition to *create a session*, to *populate a session*, and to *start the session*, it also goes through a failover and fallback scenario.

The simple test environment we are working with consists of two Global Mirror Copy Sets. Note that each Global Mirror Copy Set consists of three volumes:

1. Global Copy primary or source volume. This is sometimes also considered as the “A” volume. TPC for Replication notes it as the H1 volume.
2. Global Copy secondary or target volume. This is sometimes also considered as the “B” volume. TPC for Replication knows this volume as the H2 volume. This volume is at the same time also a FlashCopy source volume because Global Mirror is comprised of Global Copy and FlashCopy.
3. The third volume is a FlashCopy target volume and is sometimes also considered as the “C” volume. TPC for Replication knows this volume as the J2 volume because this volume functions similar to a journal volume.

Figure 5-305 summarizes our simple test environment and the volumes which are involved.

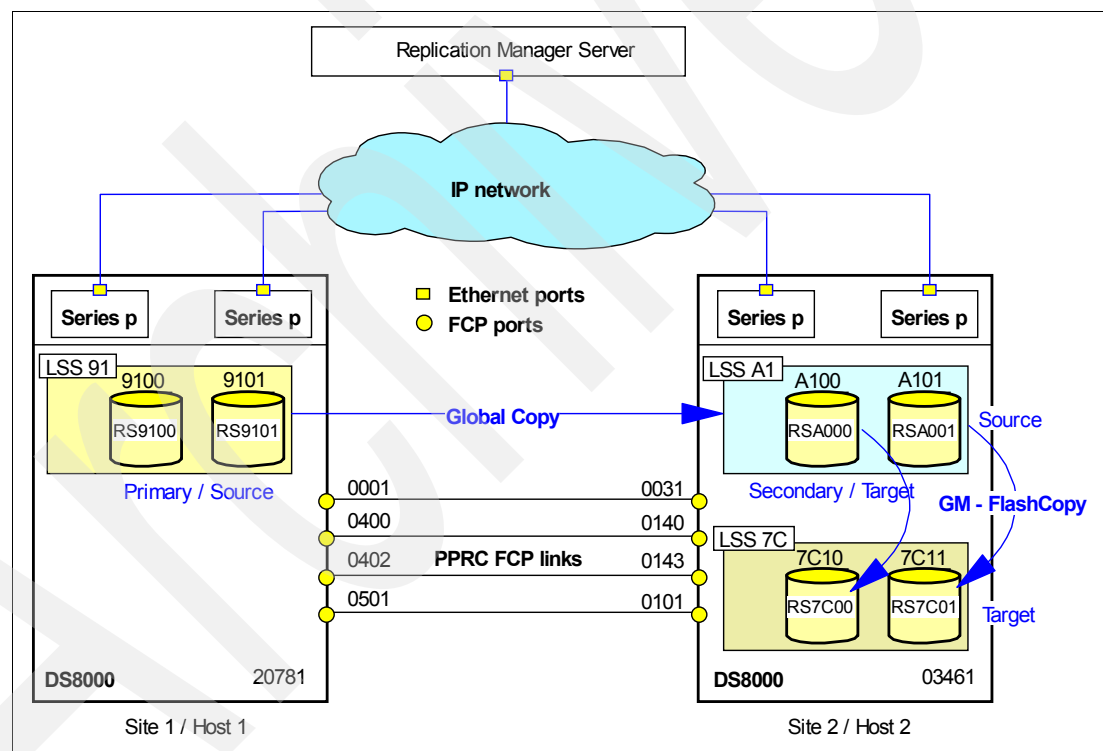


Figure 5-305 Global Mirror example with two copy sets

The GUI approach is similar to the way it is when working with ESS 800.

Create Global Mirror session GM1 through the GUI

First we define a Global Mirror session with the name of GM1 and start from the session application. Note that the volume selection process is going to be improved in a follow-on release when you intend to select only certain volumes within a LSS. As soon as you have standardized LSS sizes with the same number of volumes which are all identical in size and

volume geometry it is already very simple and you just select **all** volumes per LSS. In our scenario we select only two volumes within each of the LSSs.

You start as usual from the Sessions overview panel and click the *Create Session* button. This brings you to the panel in Figure 5-306. We select the session type of Global Mirror Failover/Failback. Once the session type is selected the Next button becomes available. Click the Next button to continue.

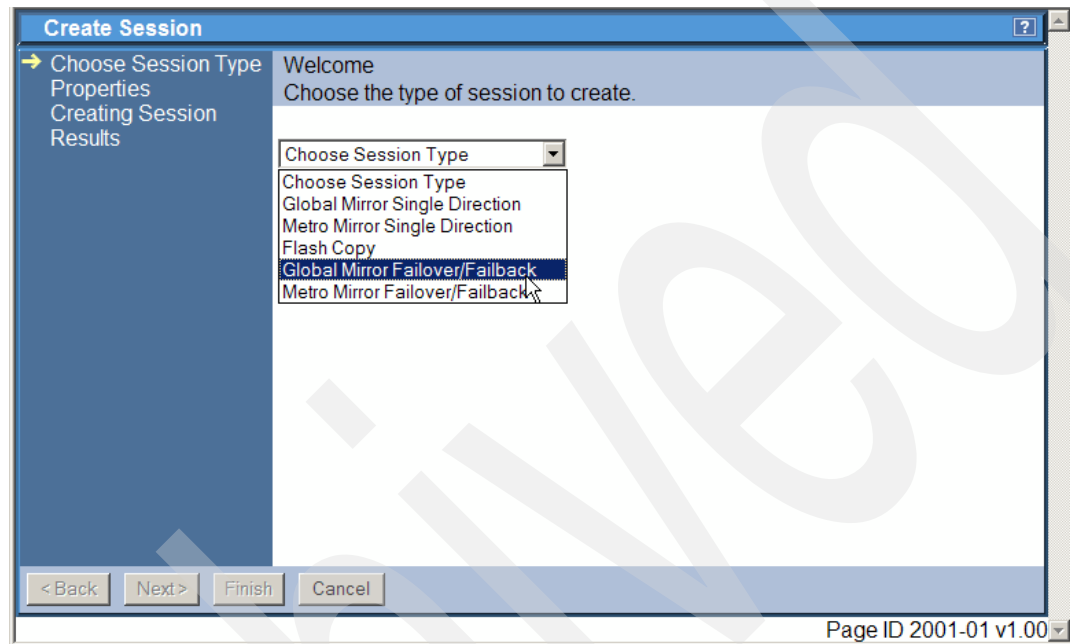


Figure 5-306 Choose Global Mirror session type

Figure 5-307 on page 312 shows the next panel where you provide a mandatory session name and an optional description. To keep it simple we name our Global Mirror session GM1 and in the description box we note the local and remote storage servers and the related LSS numbers. Click the **Next** button to continue.

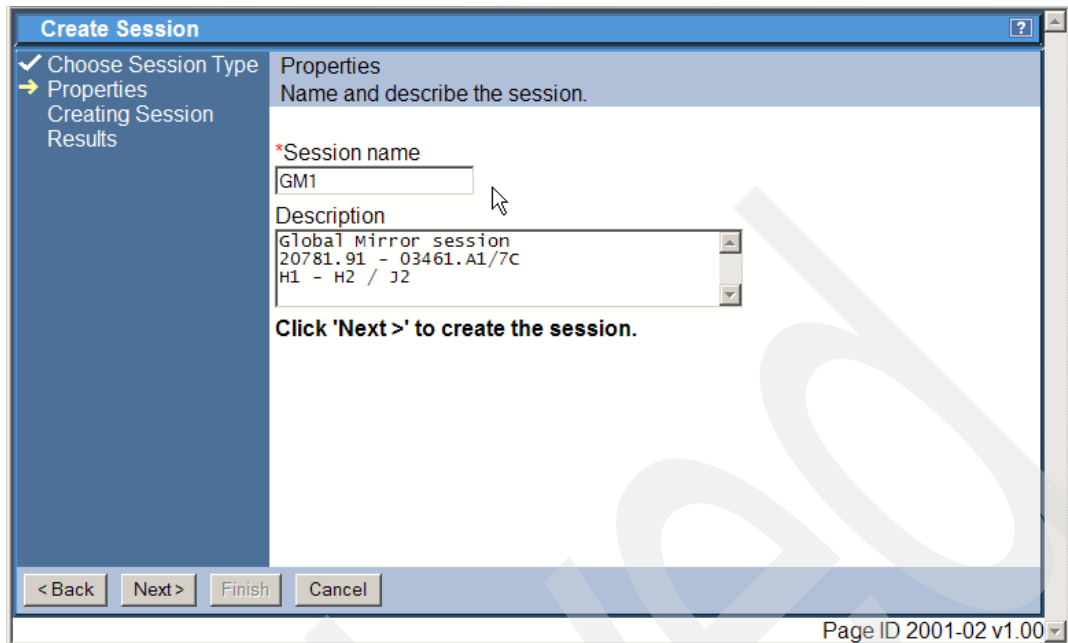


Figure 5-307 Provide Global Mirror session name

Figure 5-308 displays a confirmation panel which tells us that the session was successfully created with a name of GM1. Again this session name is just a token and represents a session in the sense of TPC for Replication.

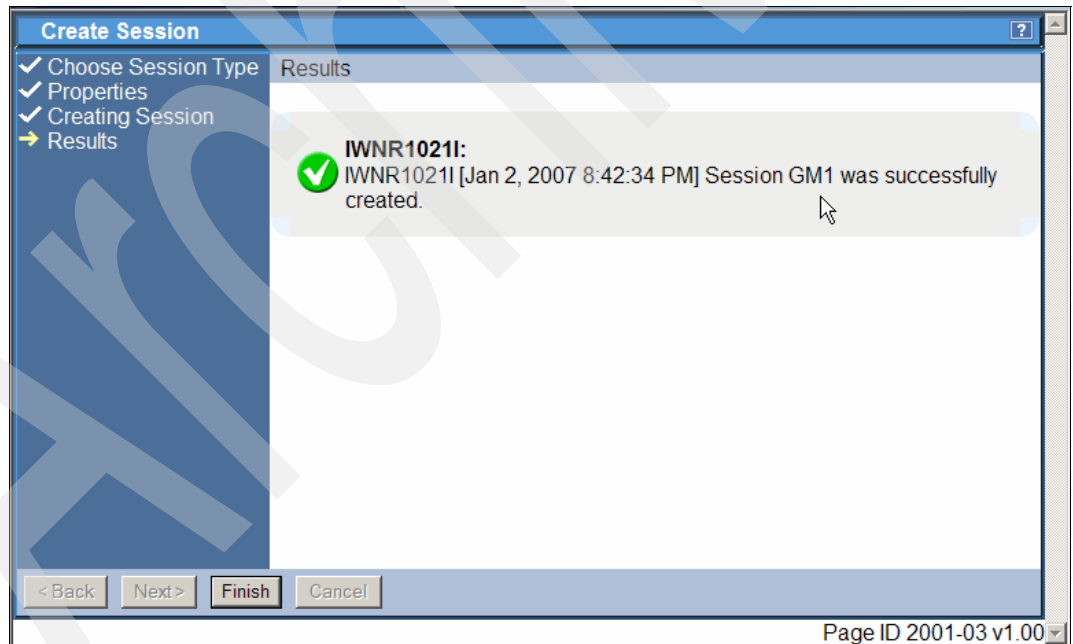


Figure 5-308 Global Mirror session is successfully created

Click the **Finish** button to complete this session definition path and automatically swap back to the session overview panel shown in Figure 5-309 on page 313.

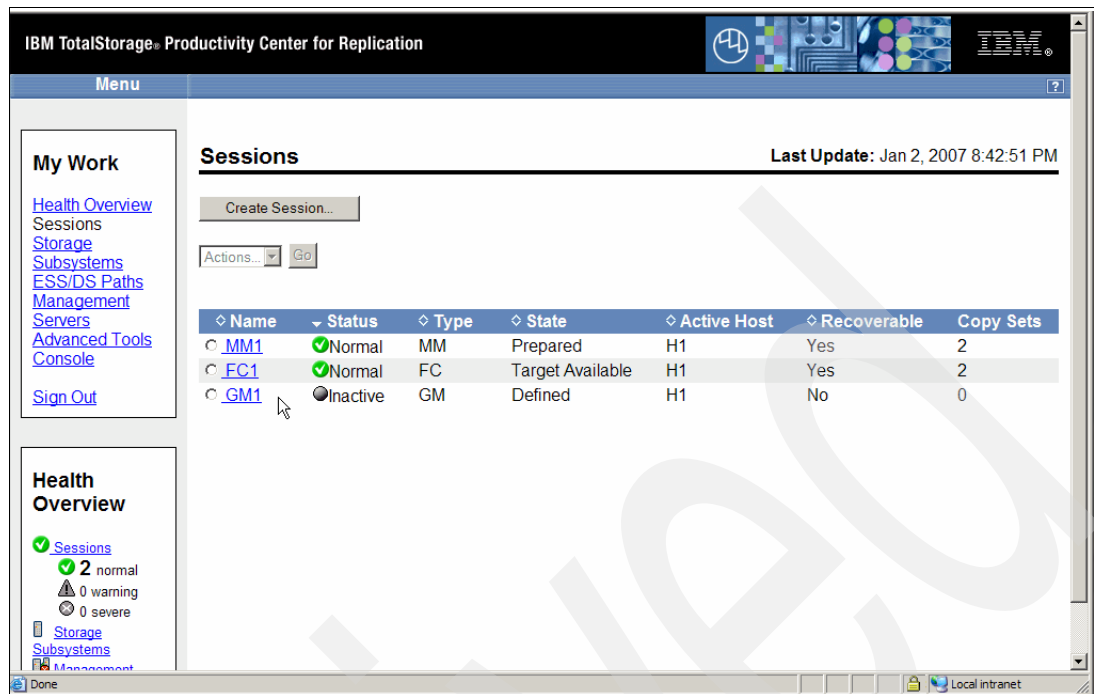


Figure 5-309 Session overview reflects the newly defined Global Mirror session GM1

Figure 5-309 displays the GM1 session in a new line with the state of Defined. It does not contain any volumes yet.

Populate GM1 session with Copy Sets

Next logical step is to add Copy Sets to the Global Copy session GM1.

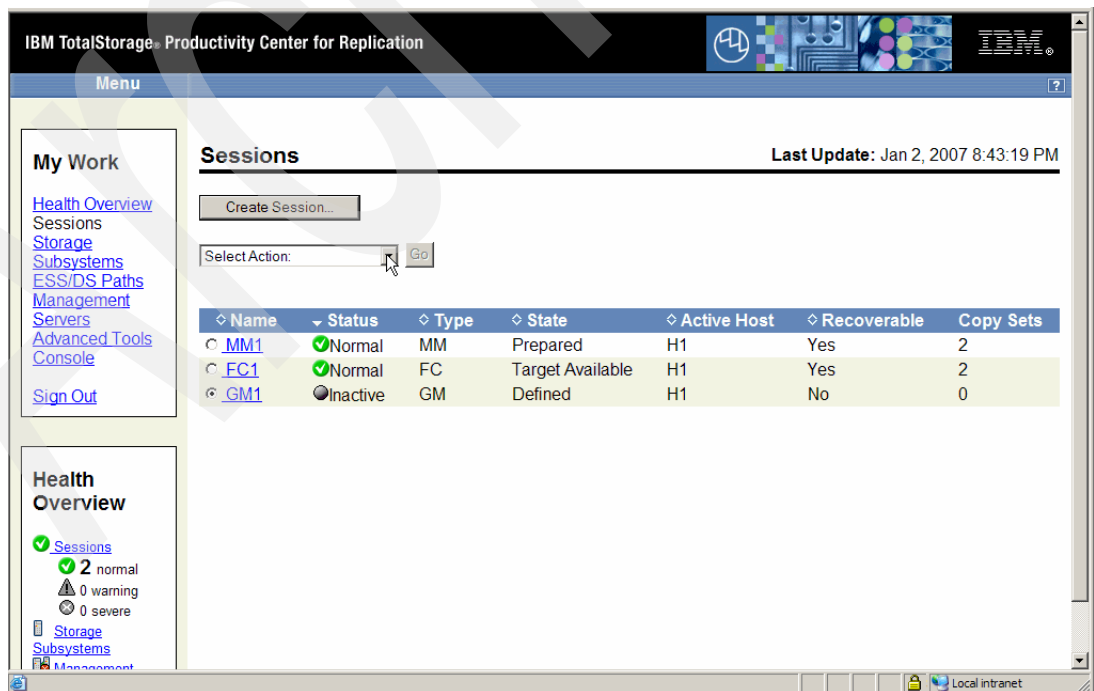


Figure 5-310 Select Action on the newly defined Global Mirror session GM1

In Figure 5-310 on page 313 we selected the session GM1 through its radio button in front of the session name and then select an action. We select the action *Add Copy Sets* as shown in Figure 5-311.

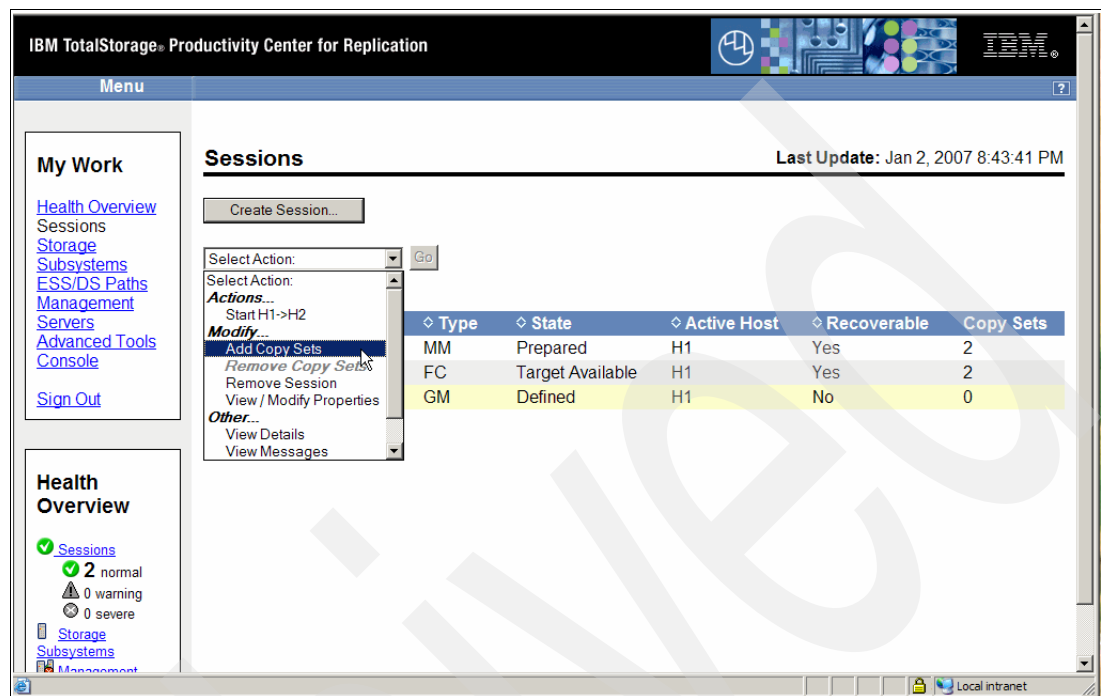


Figure 5-311 Start to add Copy Sets to Global Mirror session GM1

From here on we go through a panel sequence which repeats three times when we define the three different Global Mirror volumes types. Figure 5-312 on page 315 is the first panel in a sequence of a number of panels to create Copy Sets for our GM1 session. Again, note the visual assistance in the right-hand side of this panel to help you to orient yourself and understand where you are selecting volumes.

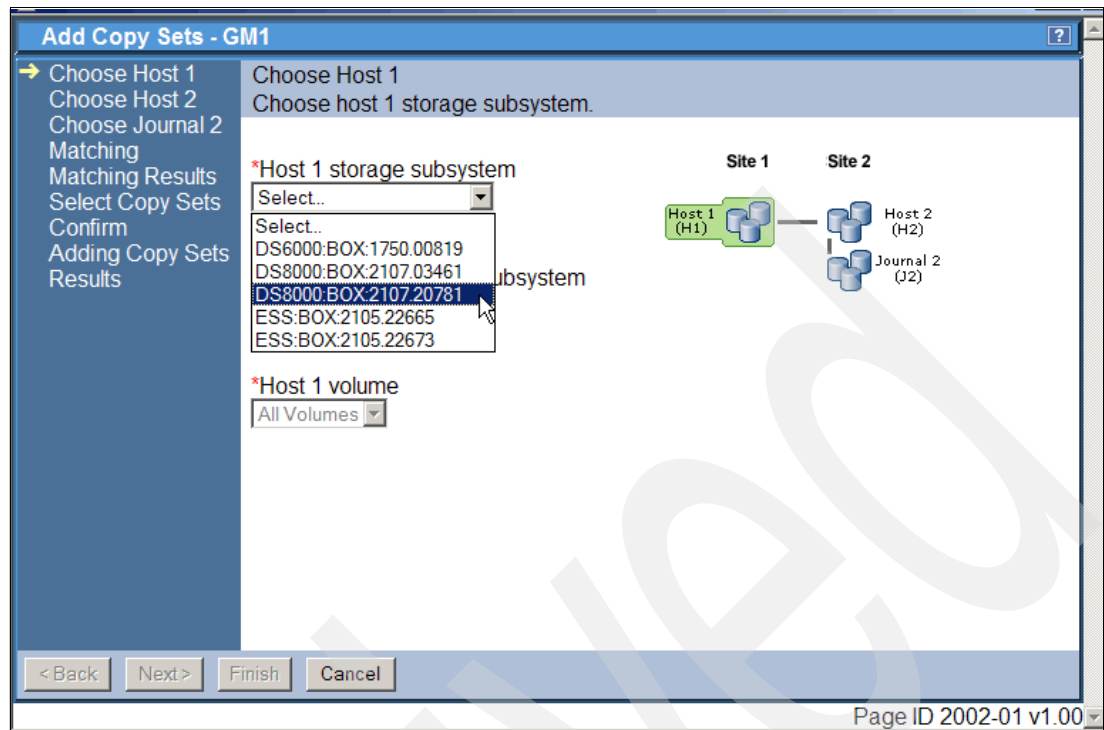


Figure 5-312 Create Global Mirror Copy Sets - select H1 storage subsystem

We first select the storage subsystem in Site 1 which is going to host the application volumes (see Figure 5-312).

The next logical step is to select the LSS which holds the application volumes which are going to become part of the Global Mirror session GM1 as shown in Figure 5-313 on page 316.

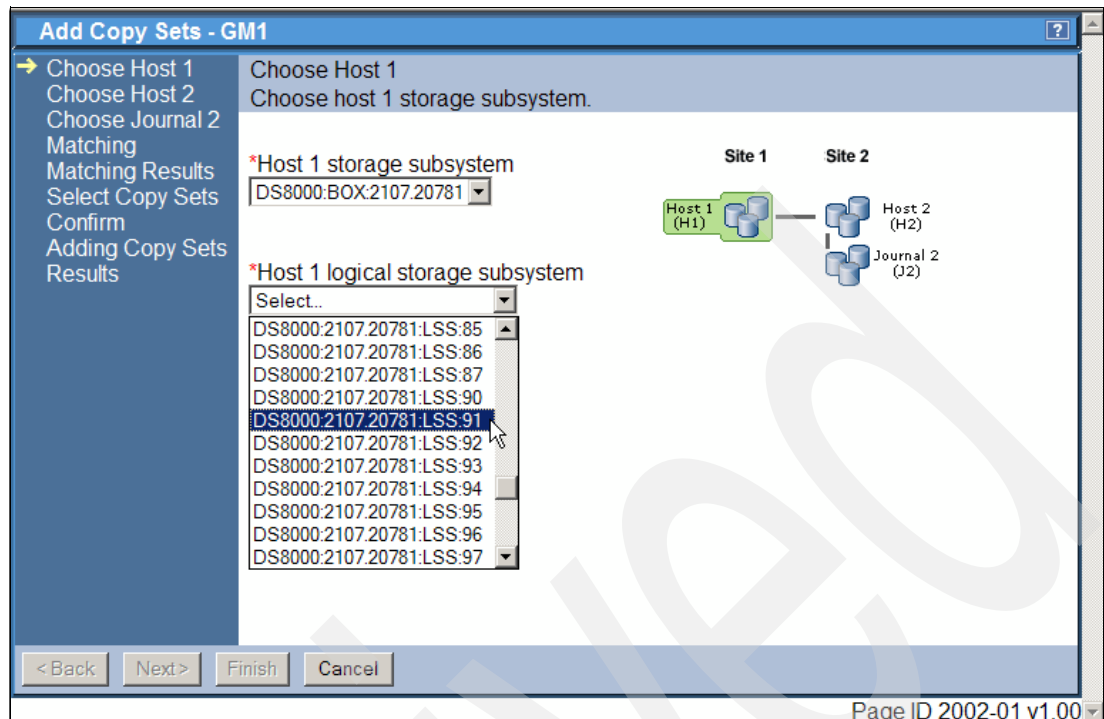


Figure 5-313 Create Global Mirror Copy Sets - select H1 LSS

Figure 5-314 on page 317 displays the last panel where you define H1 volumes or Site 1 volumes. Note again the particular naming for CKD volumes which are the volume labels of the related CKD volume. This is also because a storage administrator usually manages CKD volumes by their labels and sometime also by their z/OS based device numbers. In our test environment here we chose volume labels which contain the DS8000 device number in the label name prefixed by the constant "RS". So we chose device 00 in LSS 91 which is the corresponding label RS9100.

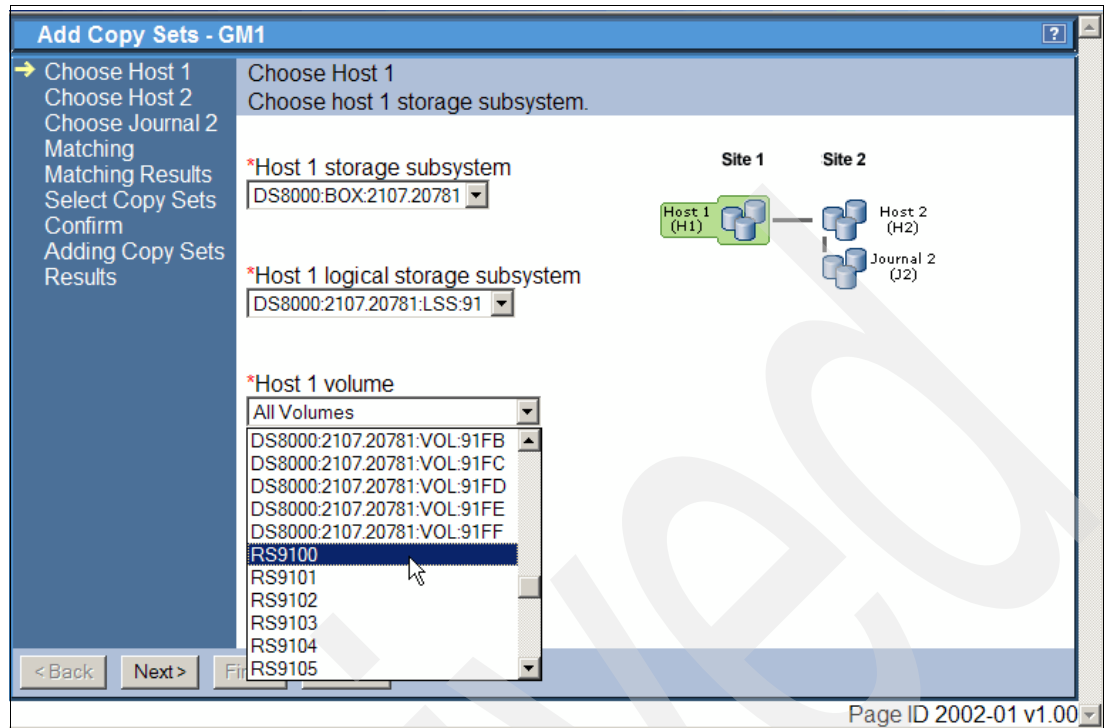


Figure 5-314 Create Global Mirror Copy Sets - select H1 volumes

Figure 5-315 displays the first panel to define the H2 volumes in Site 2. This is indicated by the color shading of the disk volume symbols in the upper right panel. The first thing again is to select a storage subsystem at Site 2 as shown in Figure 5-315.

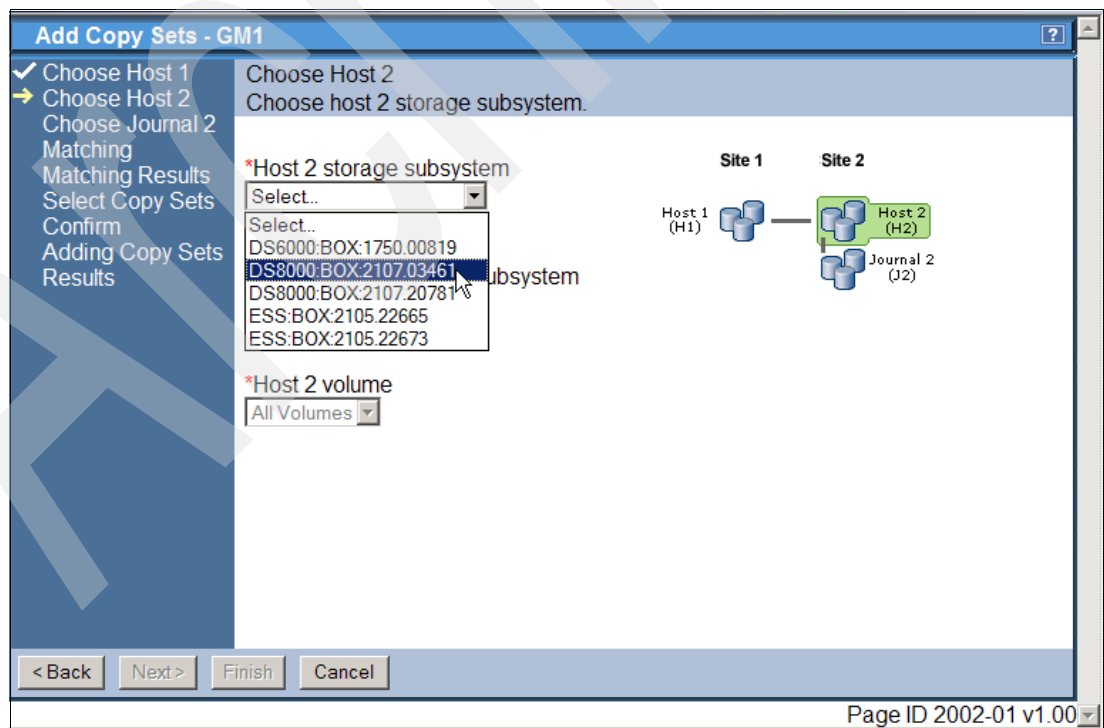


Figure 5-315 Create Global Mirror Copy Sets - select H2 storage subsystem

The next step is to select a LSS in the Site 2 storage subsystem which holds the pairing volumes for H1 volumes (see Figure 5-316).

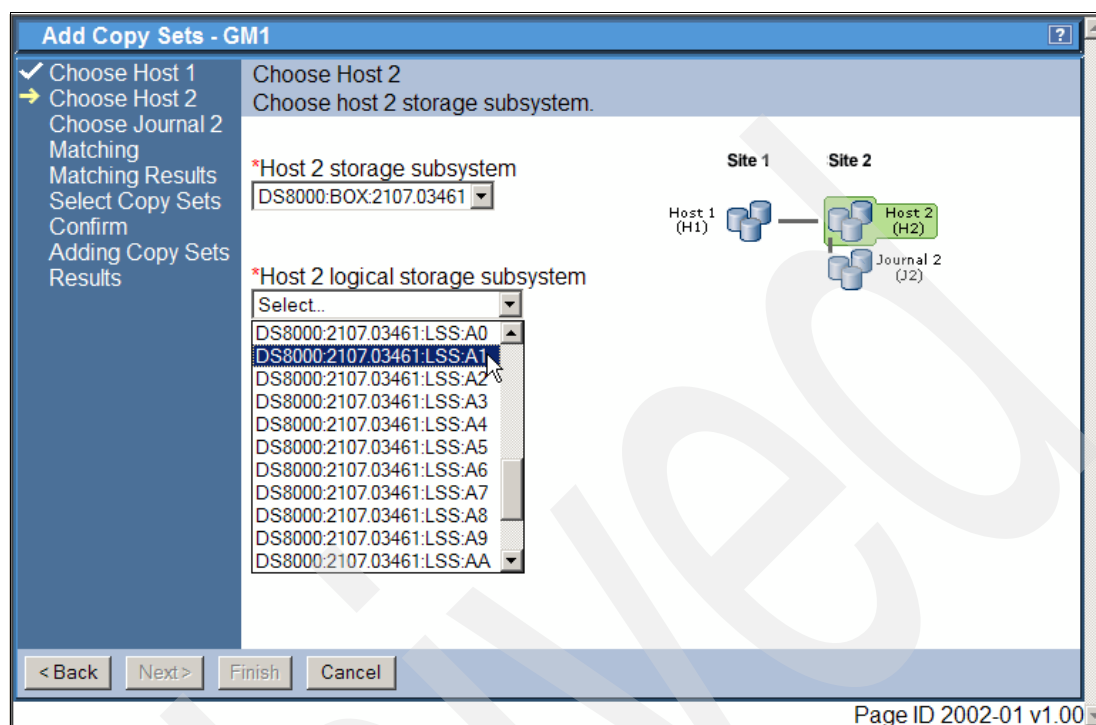


Figure 5-316 Create Global Mirror Copy Sets - select H2 LSS

The last step to define H2 volumes is to select the actual volumes. Figure 5-317 on page 319 shows under the drop-down box *Host 2 volume* all potential volumes. We select from this box the actual H2 volumes. Because we selected only a single volume as H1 volume we also select here a single volume as shown in Figure 5-317 on page 319. This is device 00 in LSS A1 with the corresponding label RSA100.

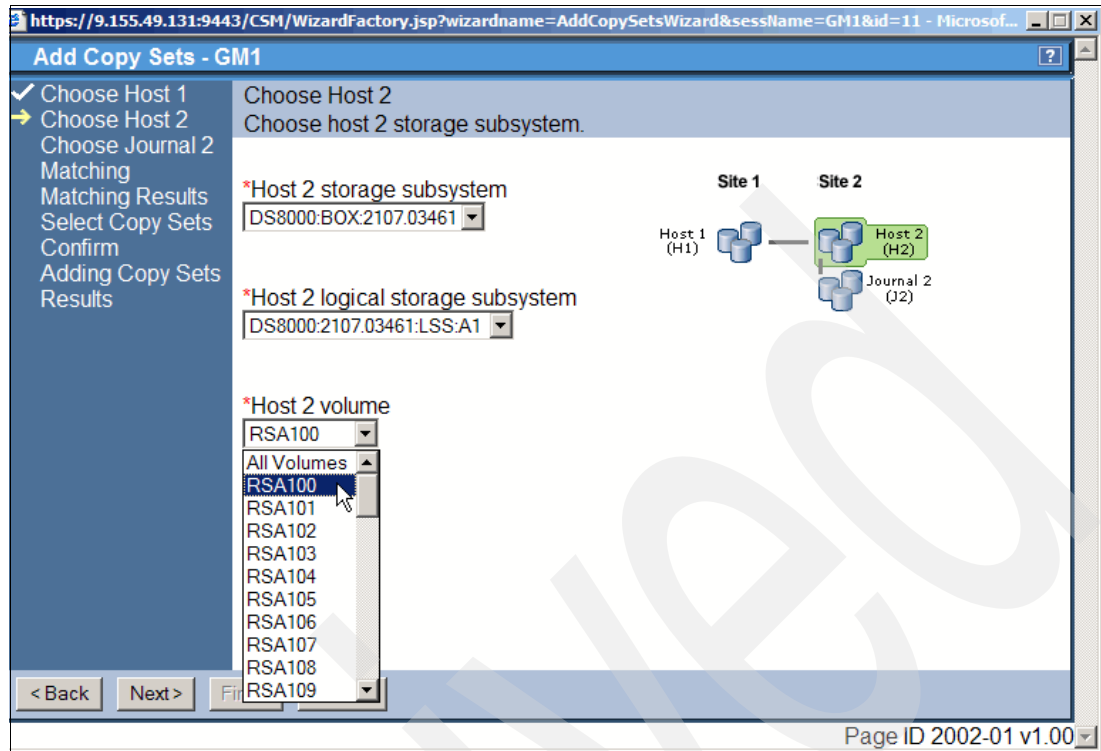


Figure 5-317 Create Global Mirror Copy Sets - select H2 volume

As the pictograph shows in Figure 5-318 on page 320 the third and last set of volumes are the Journal or J2 volumes. Again we go through a similar panel sequence as we did previously when we selected H1 volumes and H2 volumes.

Because there is a FlashCopy relationship between H2 volumes and J2 volumes the box in Figure 5-318 on page 320 offers only the storage subsystem for J2 volumes which is determined by the H2 volumes. In our case this is storage subsystem 03461.

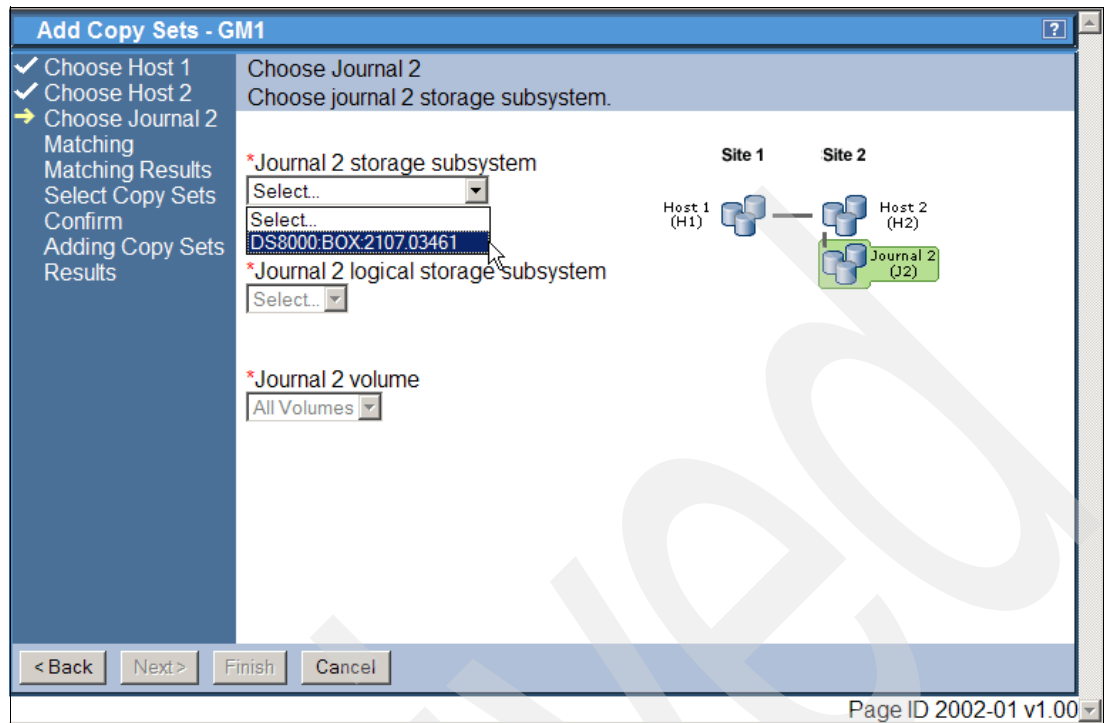


Figure 5-318 Create Global Mirror Copy Sets - select J2 storage subsystems

The next step is to select a related Journal 2 LSS as shown in Figure 5-319.

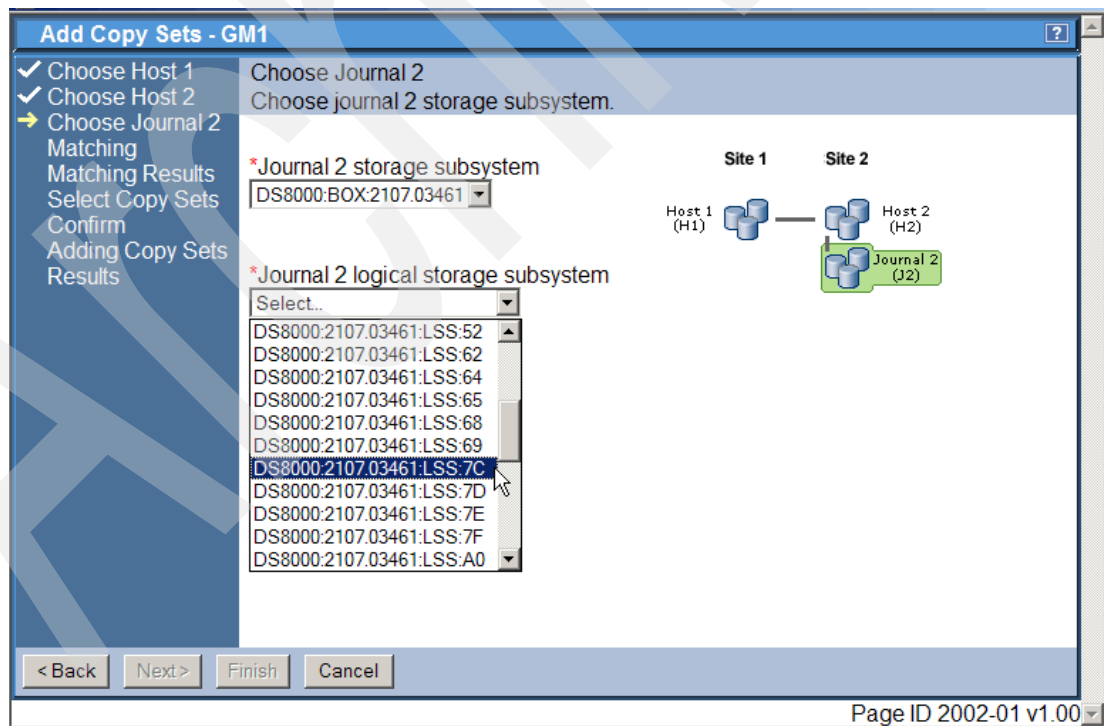


Figure 5-319 Create Global Mirror Copy Sets - select J2 LSS

Figure 5-320 shows the *Next* button still greyed out with *All Volumes* selected as *Journal 2 volume*. This means we need to specify a dedicated J2 volume as shown in the panel in Figure 5-321 on page 322.

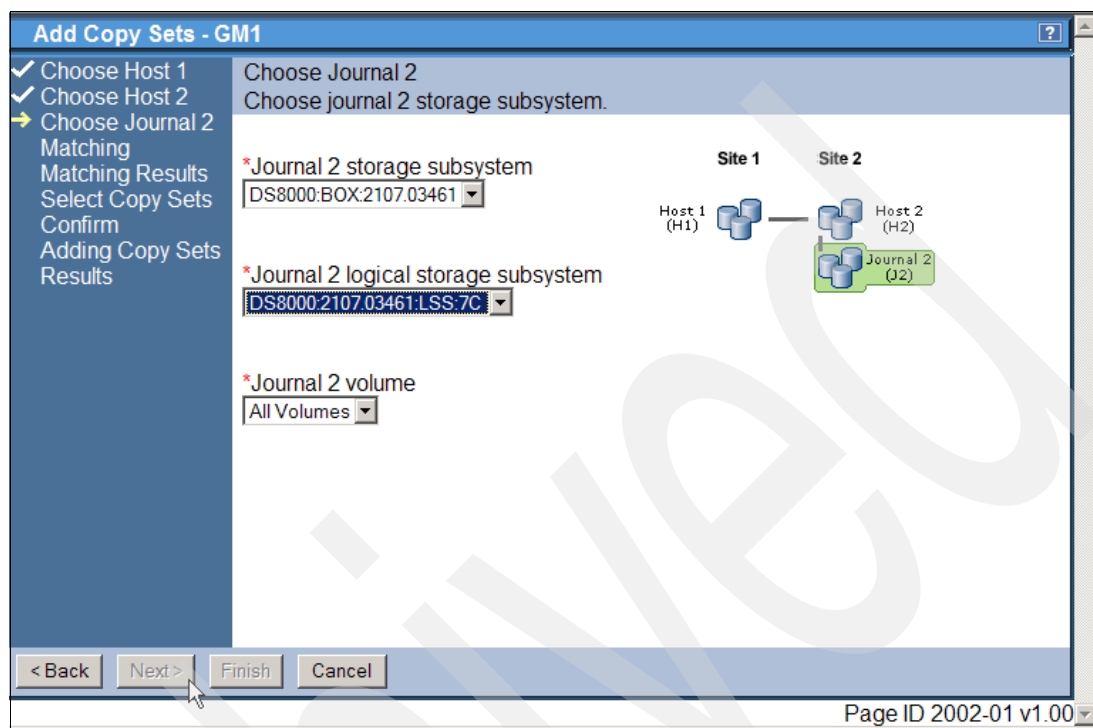


Figure 5-320 Create Global Mirror Copy Sets - select J2 LSS

We decided to use device 10 in LSS 7C as the J2 volume for our first Copy Set which has the volume label of RS7C10. See also Figure 5-305 on page 310.

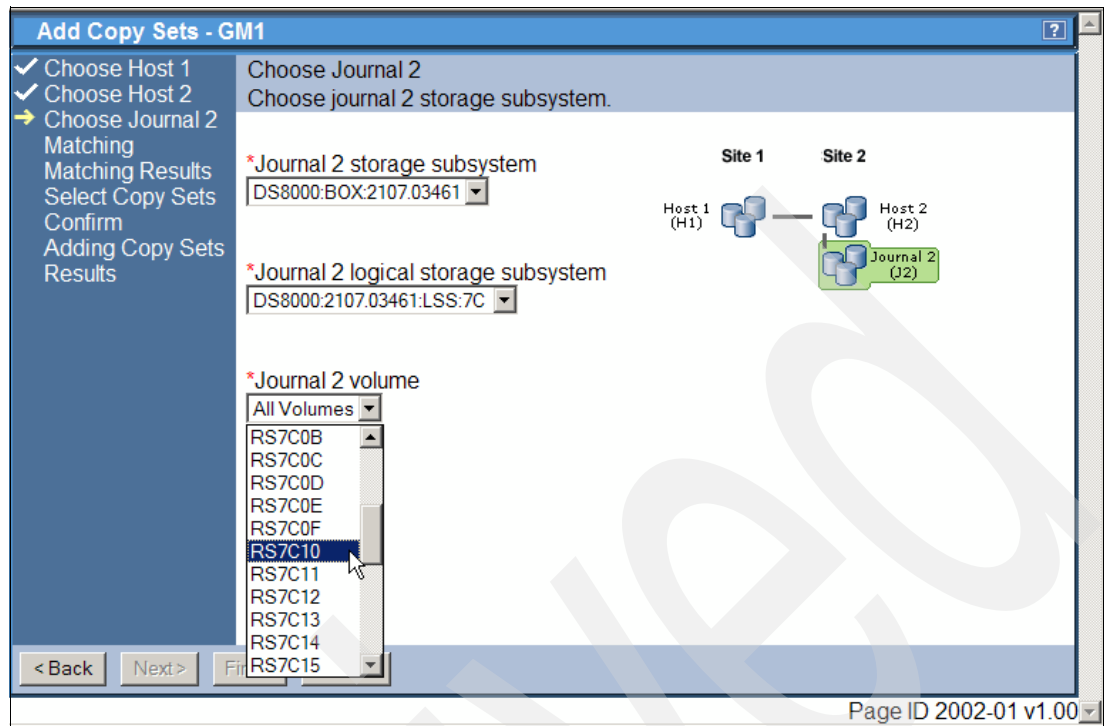


Figure 5-321 Create Global Mirror Copy Sets - select actual J2 volume

This concludes the actual volume selection for this Global Mirror Copy Set. Figure 5-322 confirms that all selected volumes are successfully matched.

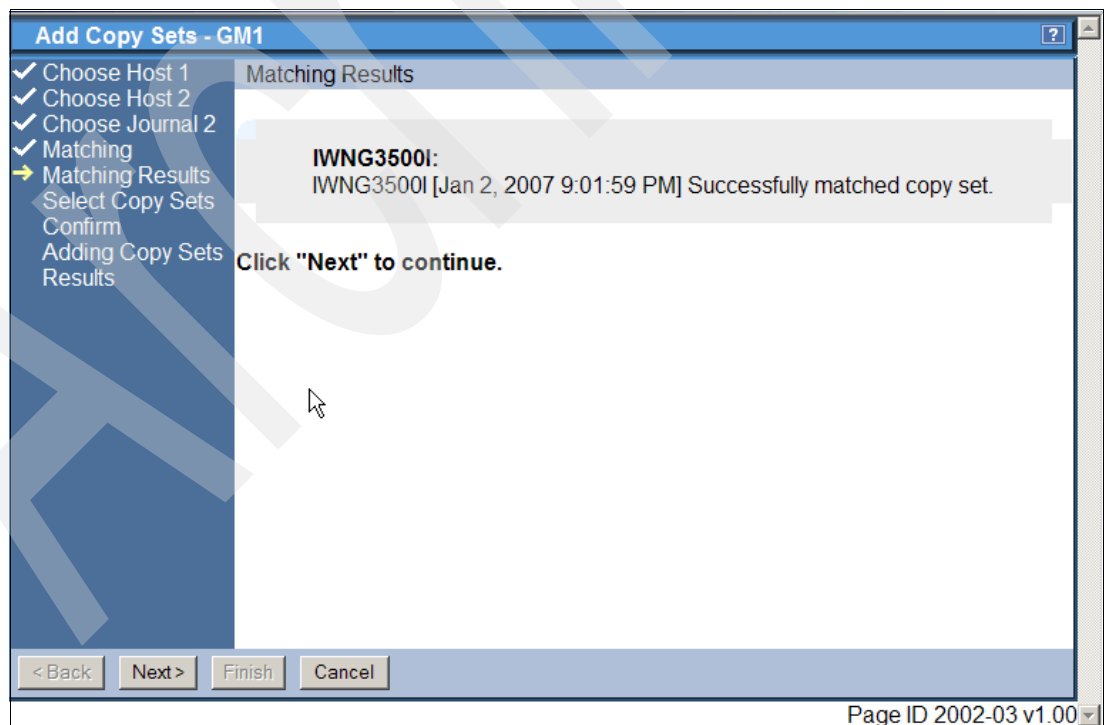


Figure 5-322 Create Global Mirror Copy Sets - Copy Set matches

Figure 5-323 provides an overview and a final decision point regarding which Copy Set is to be created. Here we keep the check mark in front of the Host 1 volume and continue by clicking on *Next*.

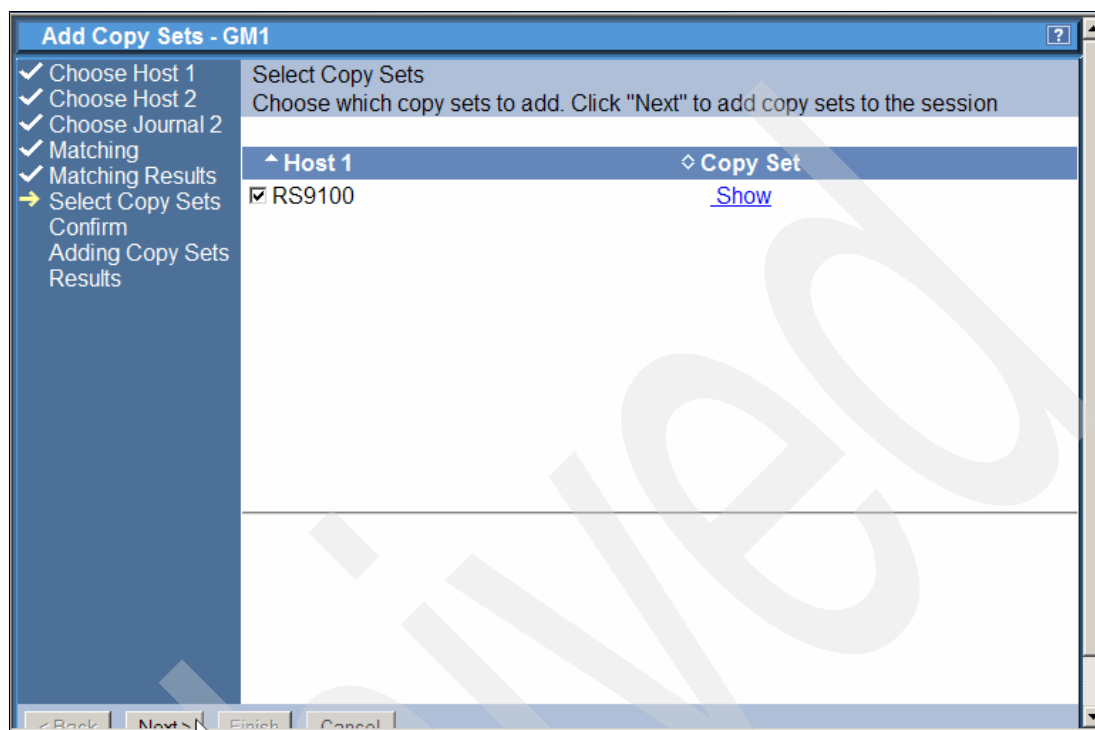


Figure 5-323 Create Global Mirror Copy Sets - choose actual copy sets

Figure 5-324 summarizes the number of Copy Sets to be created. Confirm the Copy Set creation by clicking on the *Next* button.

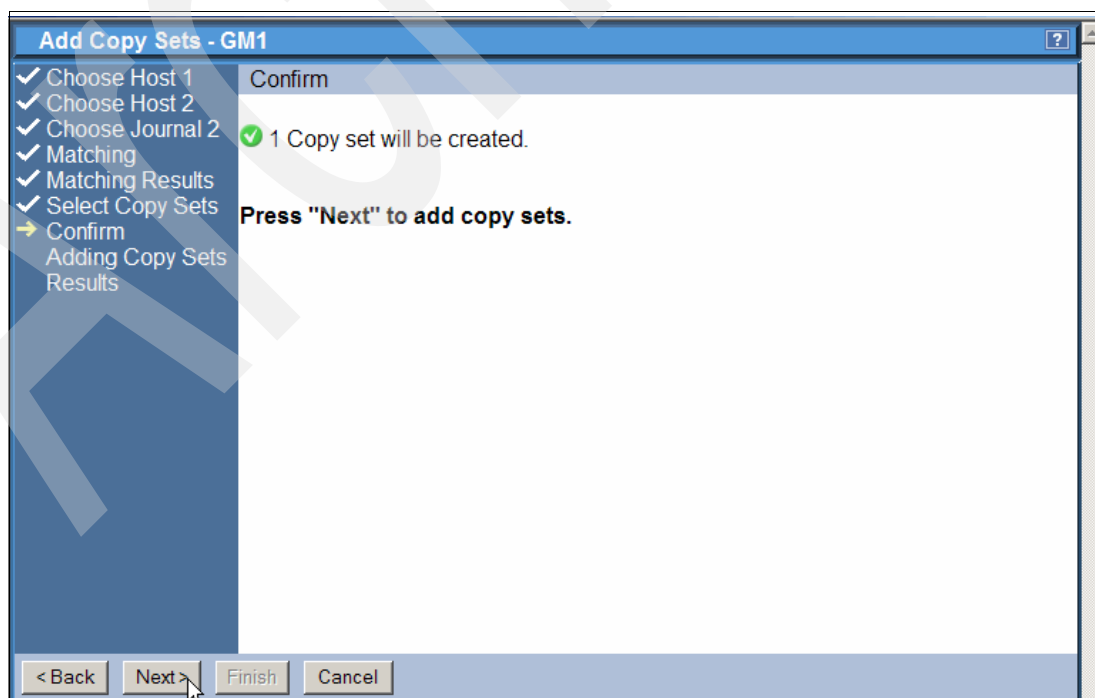


Figure 5-324 Create Global Mirror Copy Sets - Confirm Copy Set creation

Figure 5-325 shows the progress of the Copy Set creation and indicates the number of copy sets that have been added to the session. The Copy Set will be added to the session GM1 in the TPC for Replication database.

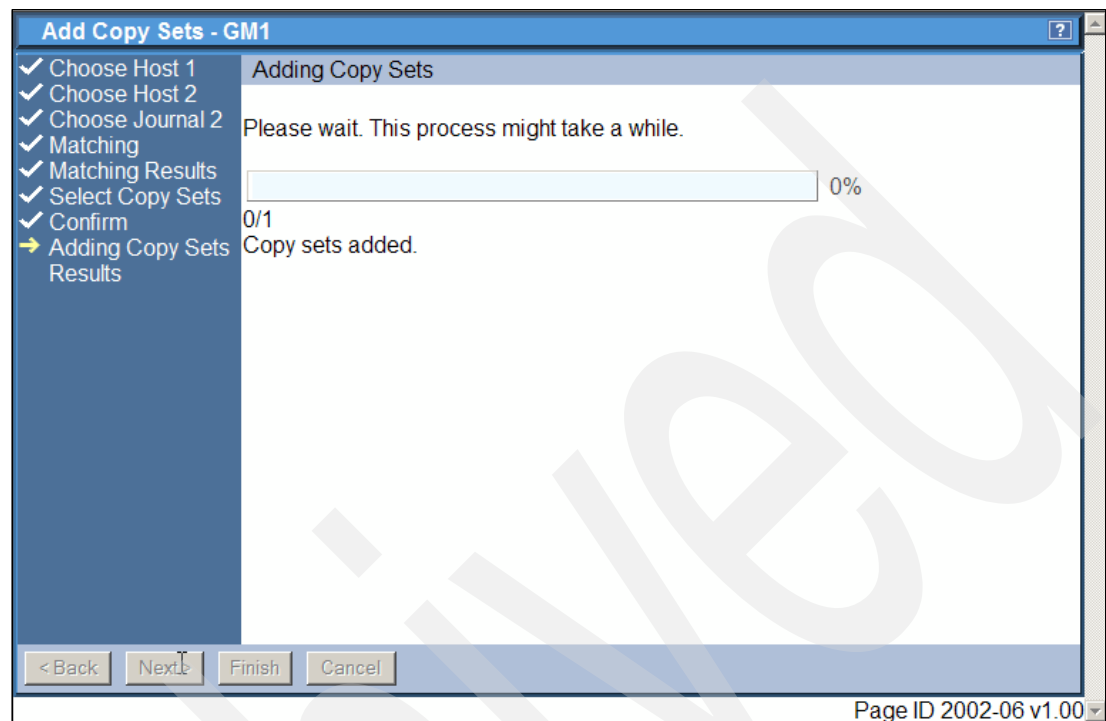


Figure 5-325 Create Global Mirror Copy Sets - Copy Set creation progress panel

Once the adding Copy Sets process in Figure 5-325 completes you progress to the Results panel shown in Figure 5-326 on page 325. Clicking the **Finish** button completes this process to add Copy Sets to the session.

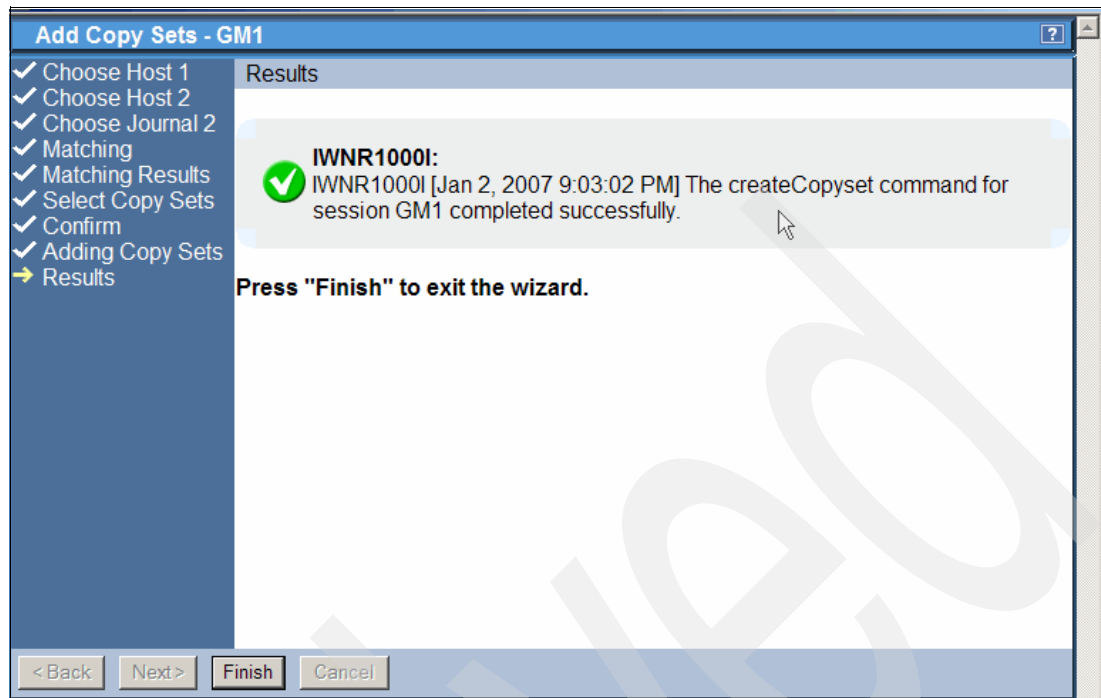


Figure 5-326 Create Global Mirror Copy Sets - Copy Set successfully created

With the panel in Figure 5-327 we completed the sequence of panels which you go through when you create Copy Sets for a Global Mirror session. At this point we have just created a single Copy Set. According to our Figure 5-305 on page 310 we need a second Copy Set. In the following panels we just repeat the same panel sequence as we did with the first Copy Set.

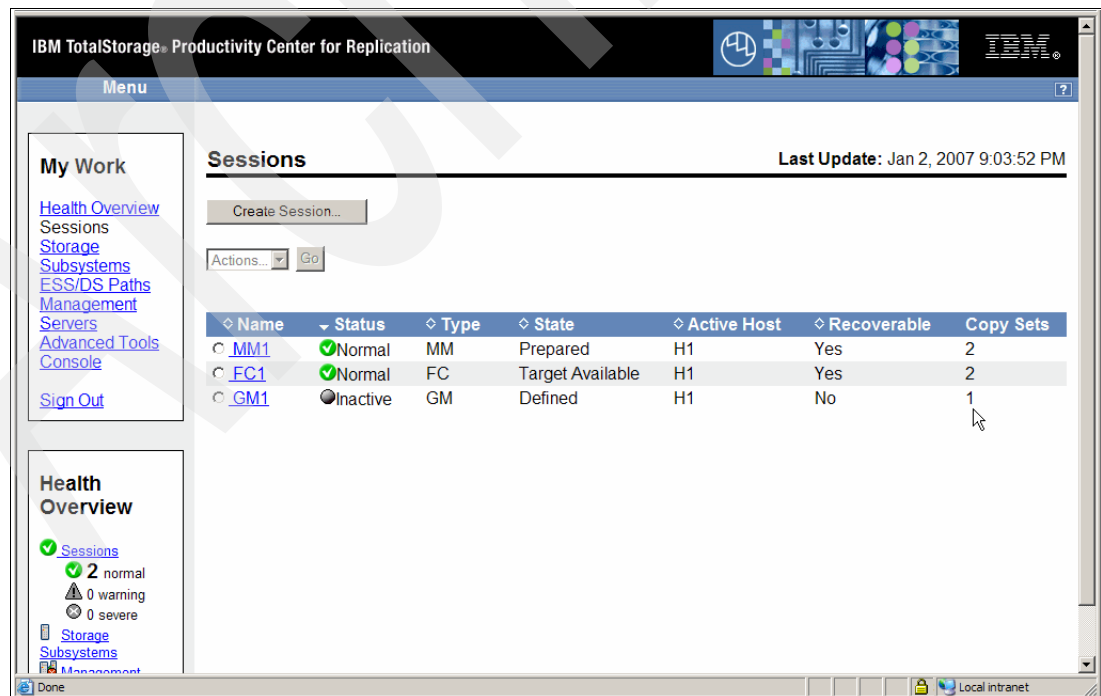


Figure 5-327 Create Global Mirror Copy Sets - Copy Set creation completed

As Figure 5-328 displays we selected all three required items in Site 1. Note that we used volume RS9100 in the previous Copy Set and just use the next logical volume as the H1 volume. Here we select RS9101.

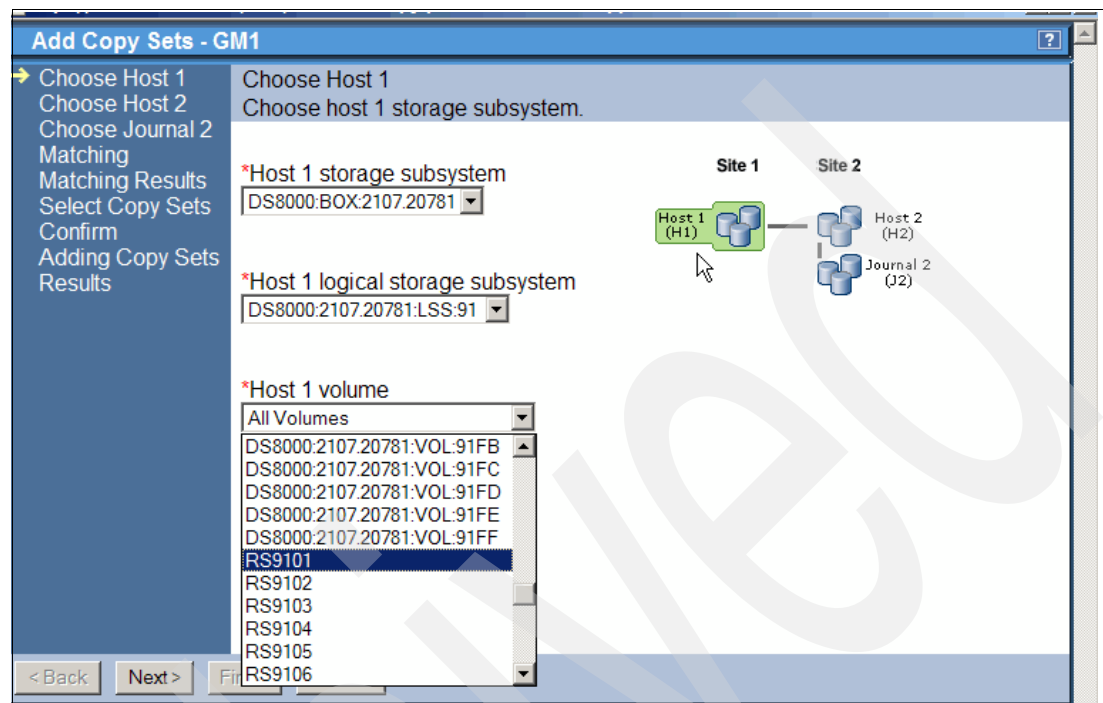


Figure 5-328 Create second Copy Set - H1 volume

Figure 5-329 shows the volume selection from the available H2 volumes. In our case we select device 01 in LSS A1 which has a corresponding label of RSA101.

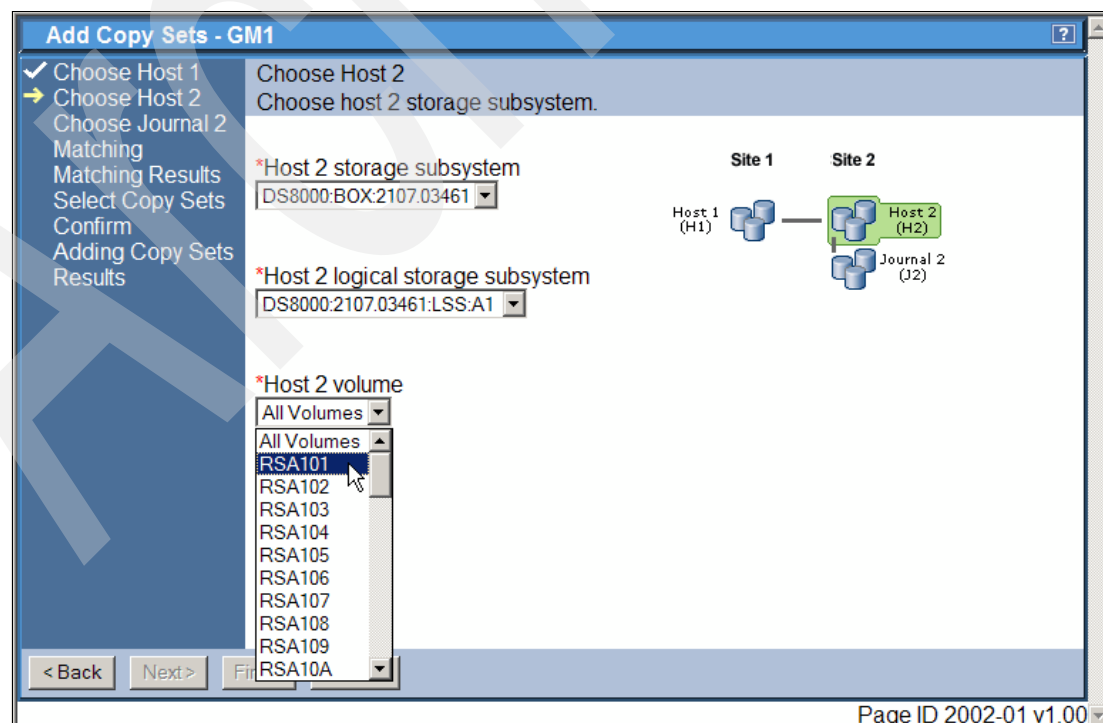


Figure 5-329 Create second Copy Set - H2 volume

Finally we select the J2 volume as shown in Figure 5-330.

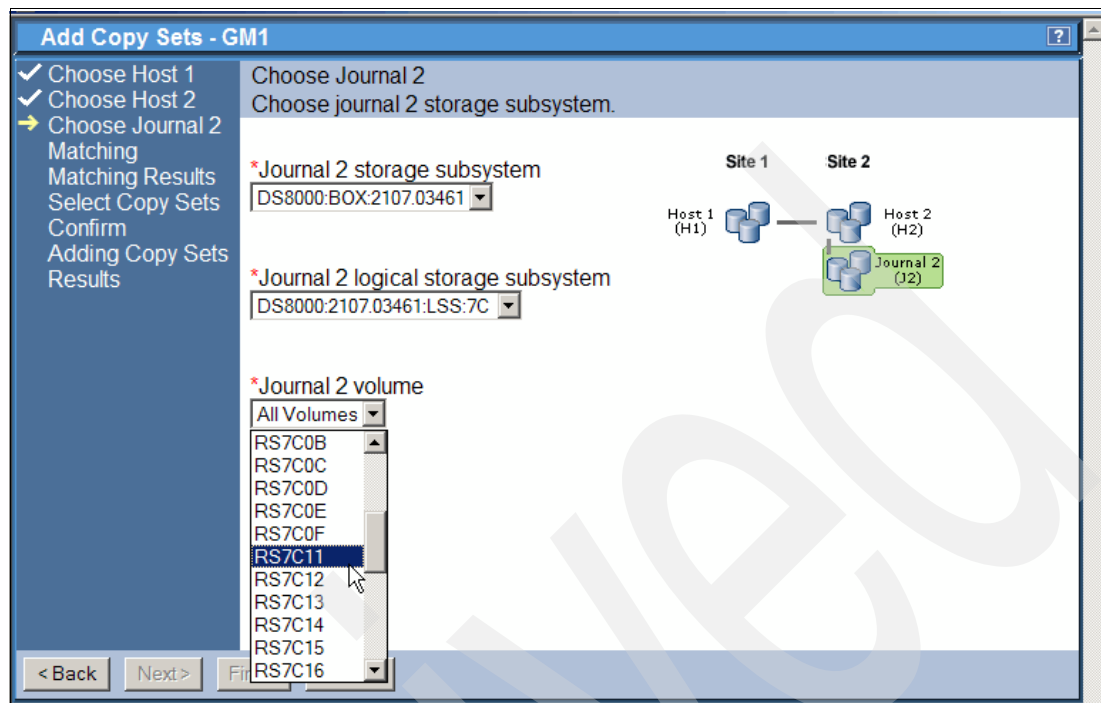


Figure 5-330 Create second Copy Set - J2 volume

Figure 5-331 shows the single Copy Set which we keep selected and then progress via *Confirm* and *Adding Copy Sets* back to the session overview panel.

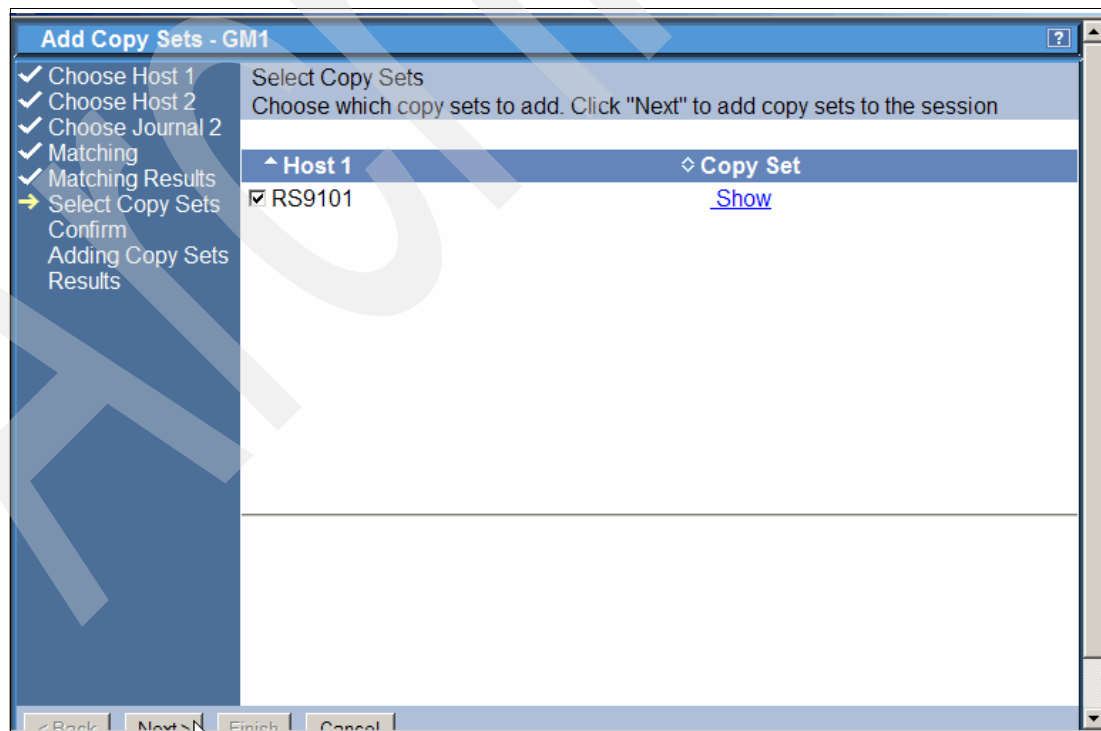


Figure 5-331 Create second Copy Set - select actual Copy Set

Figure 5-332 now shows the two Copy Sets which we created for the session GM1.

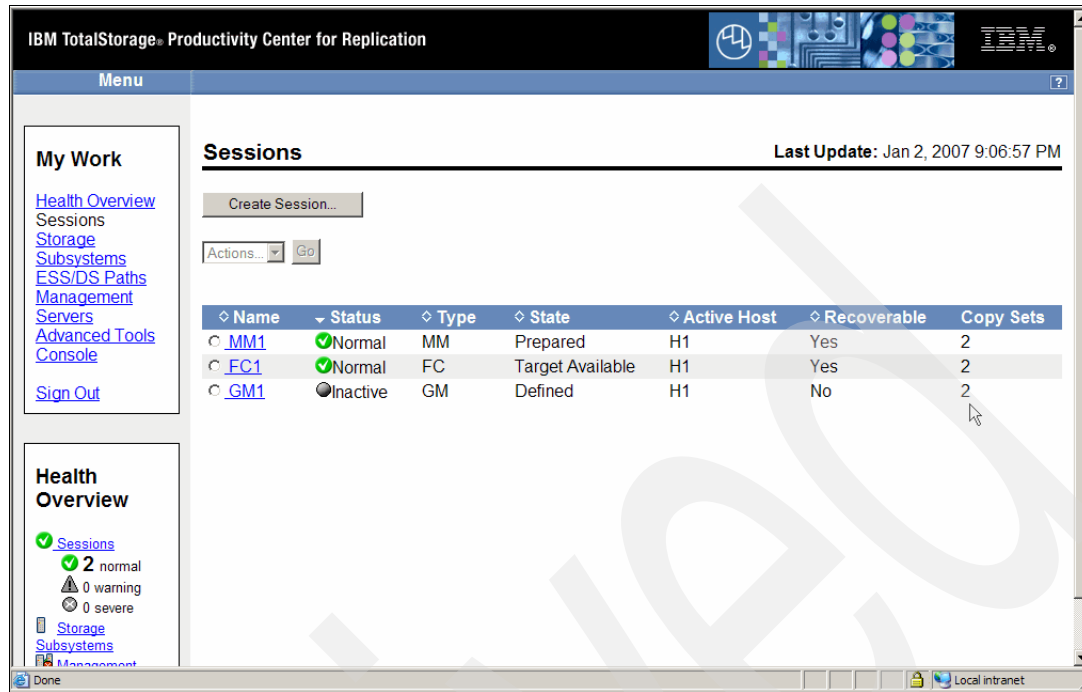


Figure 5-332 GM1 contains two Copy Sets

Note that you may go through this selection process as often as required to define all Global Mirror Copy Sets. This may be a volume out of more than a storage subsystem in Site 1 and out of multiple LSSs.

Start Global Mirror session GM1 through the GUI

We are now ready to start the Global Mirror session which includes a number of activities in the background. First Global Copy is started for all Global Copy pairs within session GM1 and goes through a full initial copy phase which we call here phase 1.

As soon as this first full copy phase is completed the session starts to form Consistency Groups which is indicated through the session state. From this point on Global Mirror keeps forming Consistency Groups and provides a consistent set of volumes at Site 2.

As Figure 5-333 on page 329 displays we selected the session GM1 and are about to select an action.

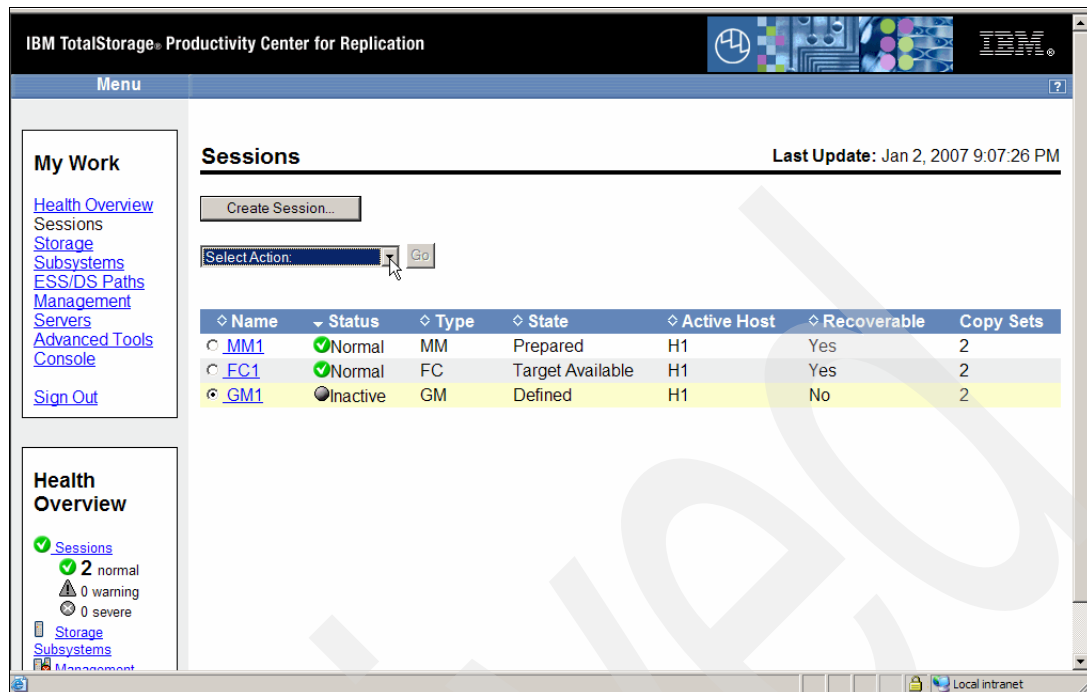


Figure 5-333 About to start Global Mirror session GM1

As Figure 5-334 displays TPC for Replication offers only one possible action here, which is Start H1 → H2. This is because the session is completely defined and ready to start. After we select the Start action the Go button becomes active. Click Go to continue.

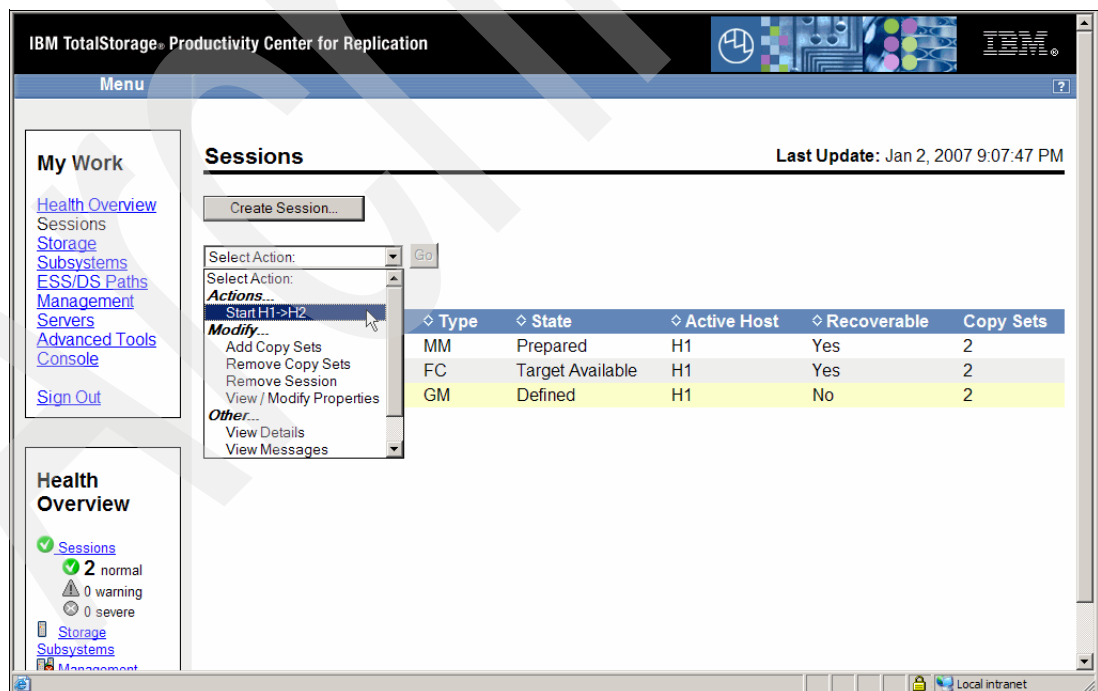


Figure 5-334 Select action Start

The panel in Figure 5-335 on page 330 provides the Global Mirror *Status* and *State* just after we started the GM1 session. The Status shows Warning because the State shows Preparing

which means that this is the first phase where Global Copy does a full initial copy. At this point the volumes are not ready yet to provide consistent data in Site 2.

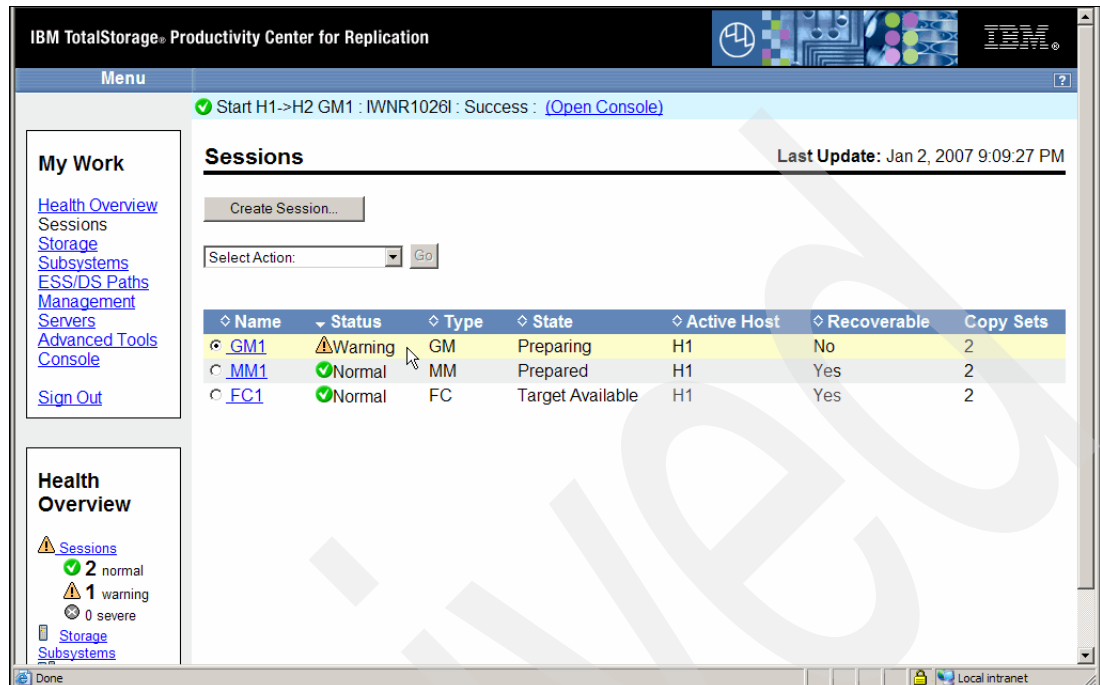


Figure 5-335 Global Mirror session GM1 is started and preparing

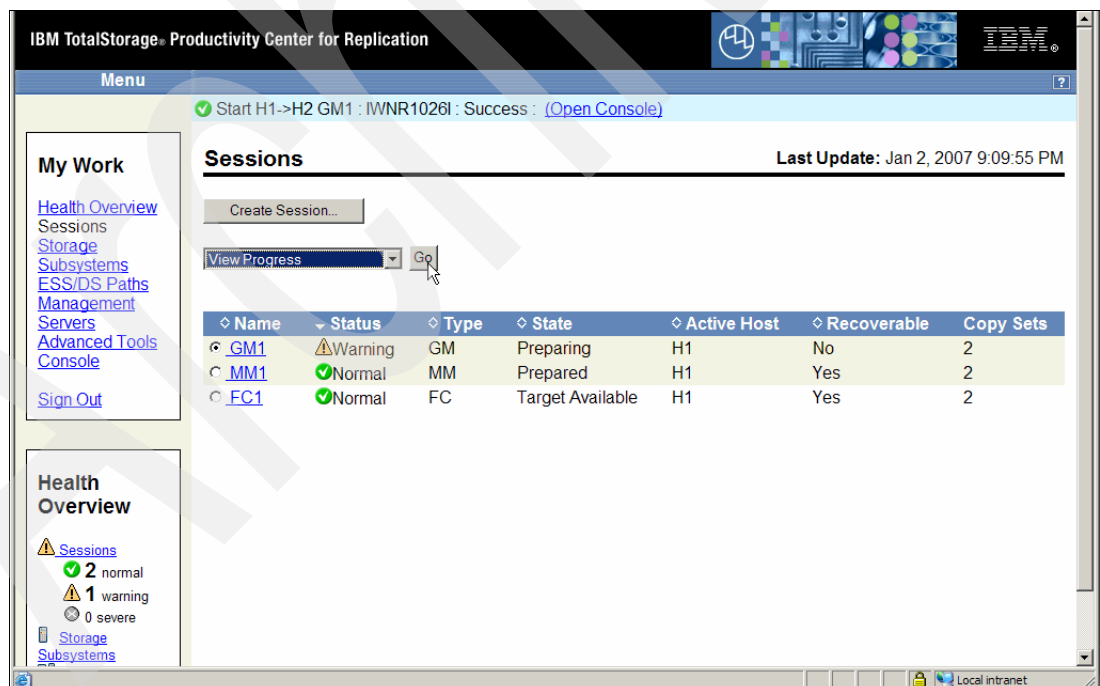


Figure 5-336 Check Progress of Global Mirror session GM1

To verify the status and check whether the first full copy, phase 1 is complete you can select the action View Progress as shown in Figure 5-337 on page 331.

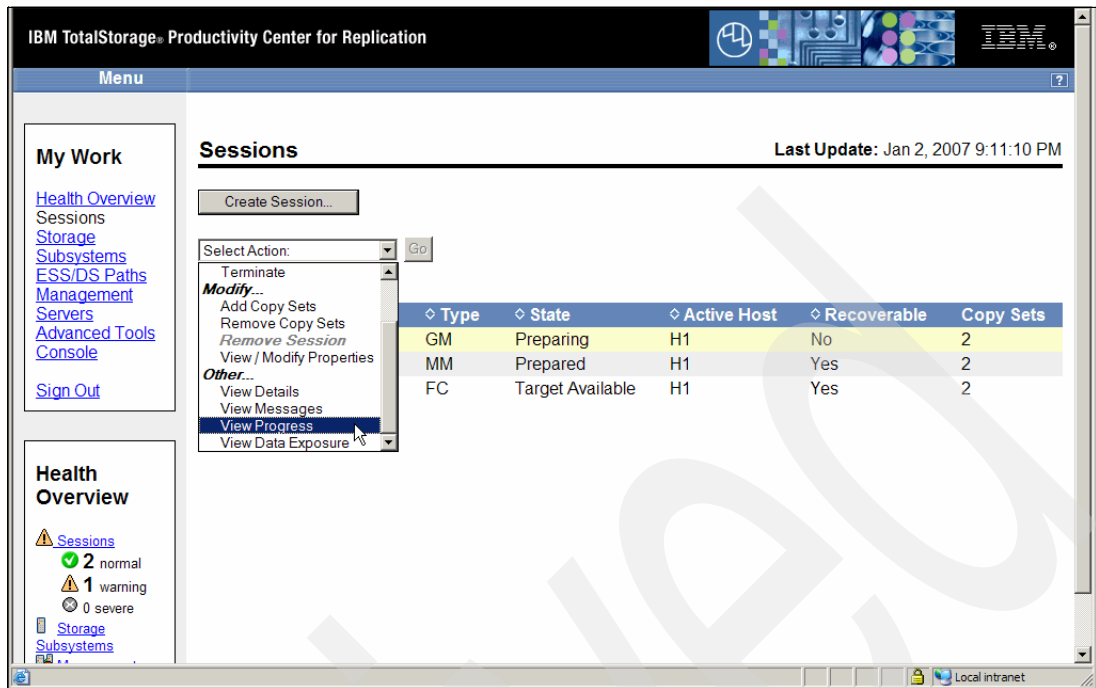


Figure 5-337 Select View Progress for session GM1

After selecting the action *View Progress* the **Go** button becomes active. Click the **Go** button to continue. The panel in Figure 5-338 indicates that none of the Copy volume pairs complete their first phase yet to complete copy of the related volume pair.

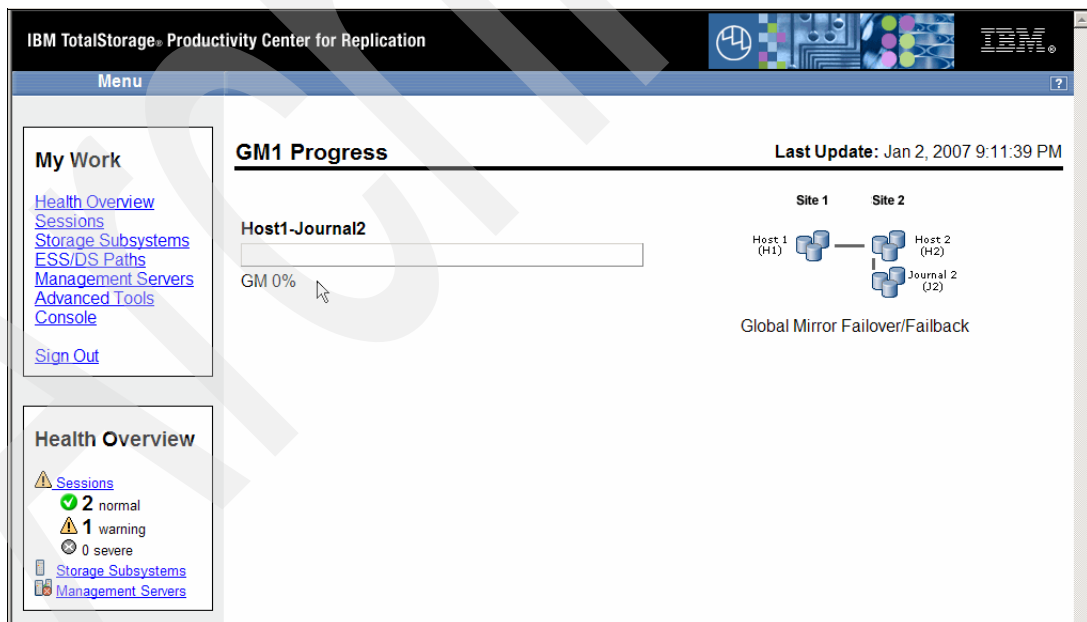


Figure 5-338 GM1 Progress panel

Figure 5-339 on page 332 shows another interesting action activity: *View Data Exposure*. This basically translates into recovery point objective (RPO) or how much the Site 2 volumes progress lack behind the Site 1 volume set.

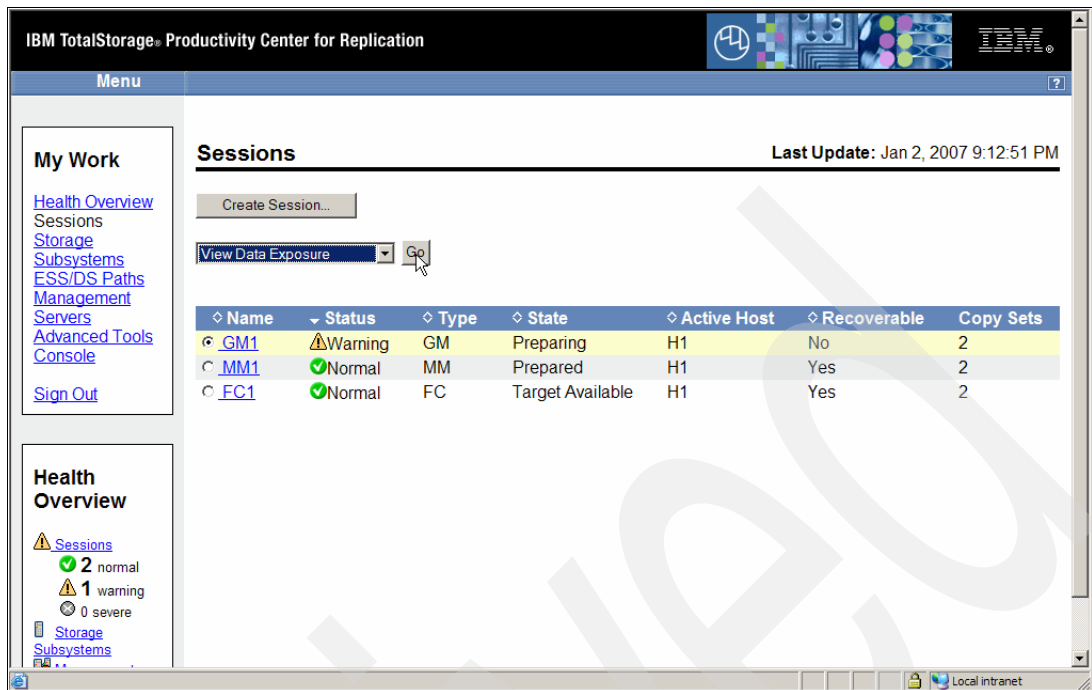


Figure 5-339 View Data Exposure data for Global Mirror session GM1

Figure 5-340 shows the panel which is displayed after clicking on the **Go** button in Figure 5-339. This panel gives you an indication on the success of the formation of Global Mirror Consistency Groups. As with Data Exposure you see the time which the Site 2 lacks behind the Site 1. Figure 5-340 shows it is less than a second.

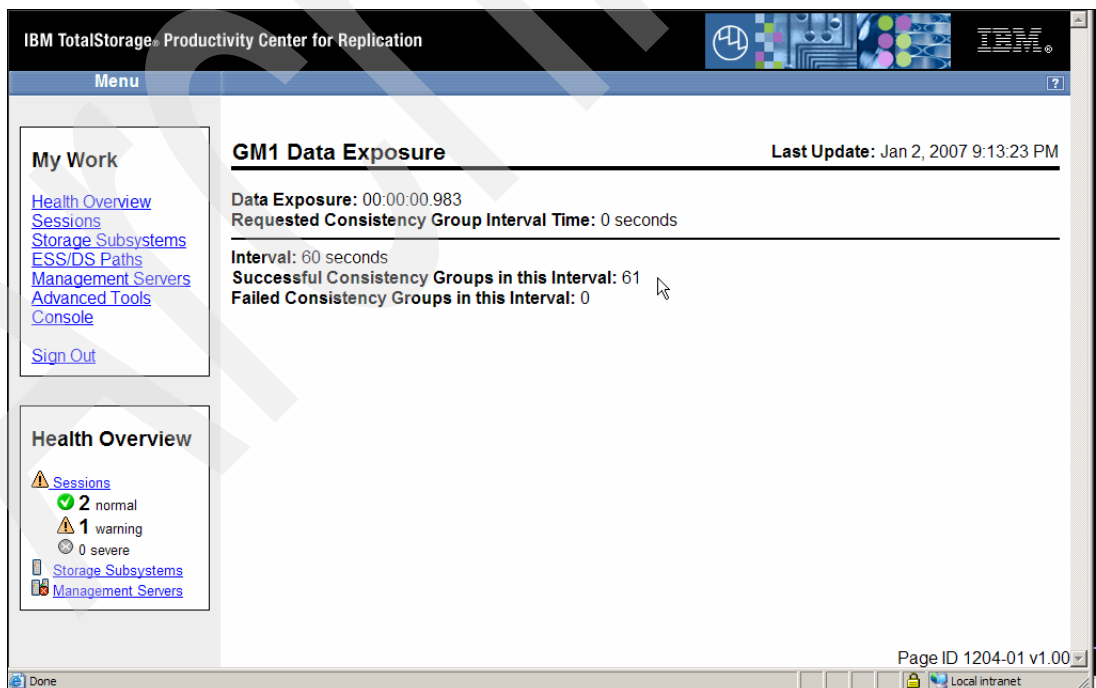


Figure 5-340 Rudimentary information about the Data Exposure of Global Mirror session GM1

Figure 5-341 on page 333 shows another progress panel which confirms that all Global Copy pairs completed their first phase and completely replicated their related source volume.

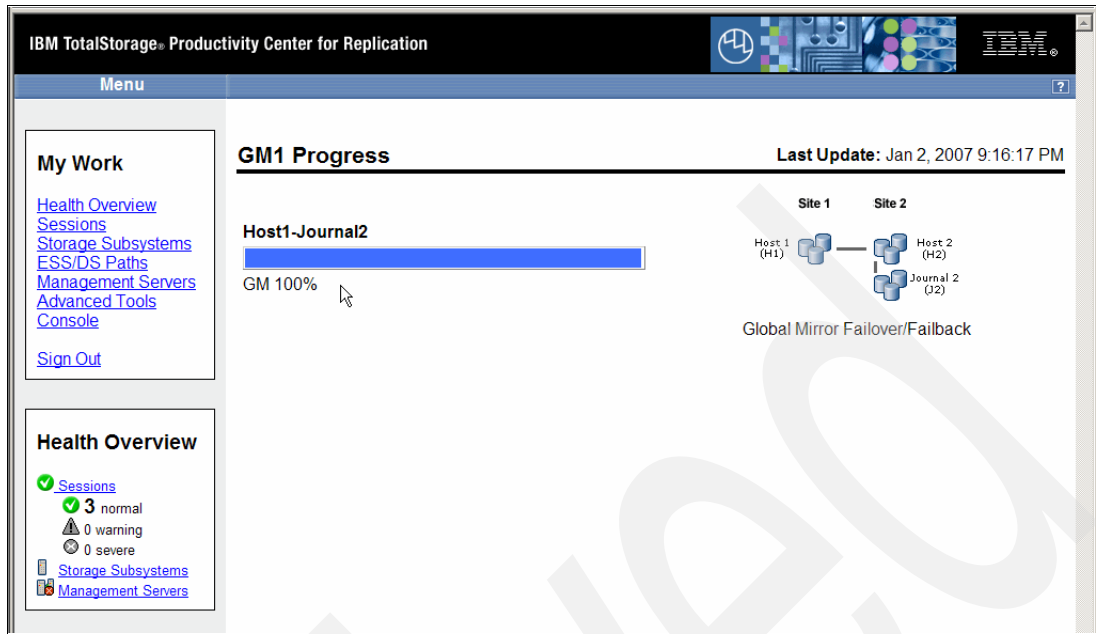


Figure 5-341 All Global Copy pairs completed their first phase of full initial copy

Figure 5-342 displays the moment from which the Global Mirror session state reports itself as *prepared*. The *prepared* state means that the first phase for all related volume pairs is complete and Global Mirror provides from now on consistent data at Site 2 and forms Consistency Groups. This is the normal mode of operation for a Global Mirror session and, again is indicated by the session State of *Prepared*.

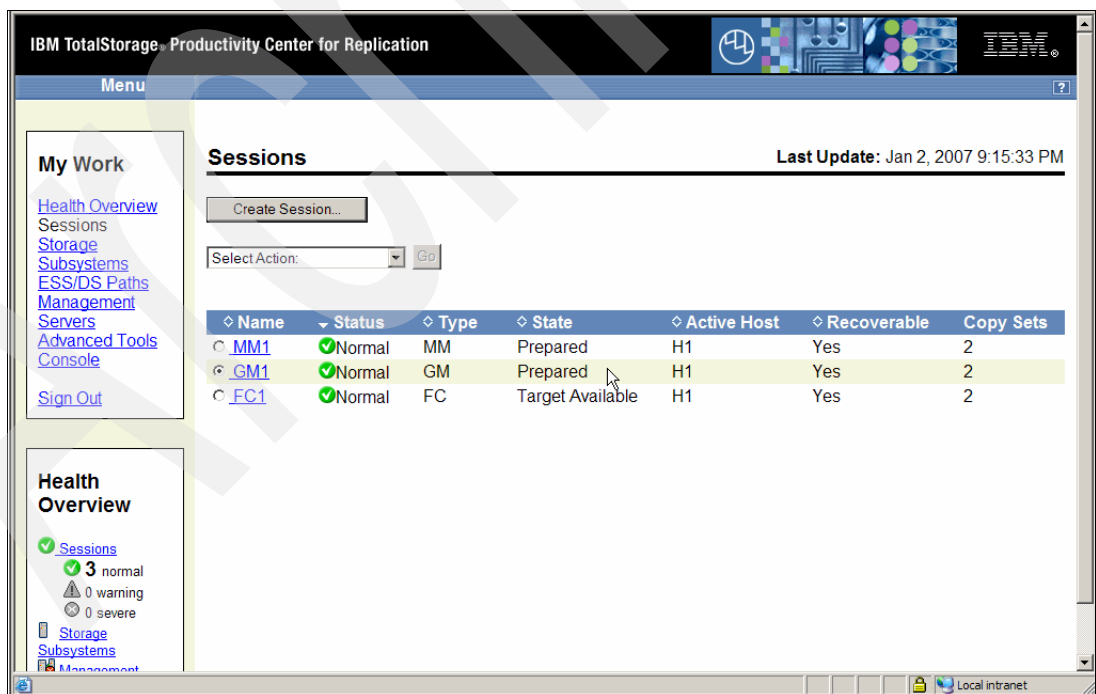


Figure 5-342 Global Mirror session GM1 is ready and prepared

Change Session properties

The GUI offers some limited possibilities to alter Global Mirror session parameters. Figure 5-343 shows the starting point to view and alter session properties.



Figure 5-343 Change session properties

Figure 5-344 shows the panel with Global Mirror session properties. You may alter the Description and also the time interval between formation of the next Consistency Group.

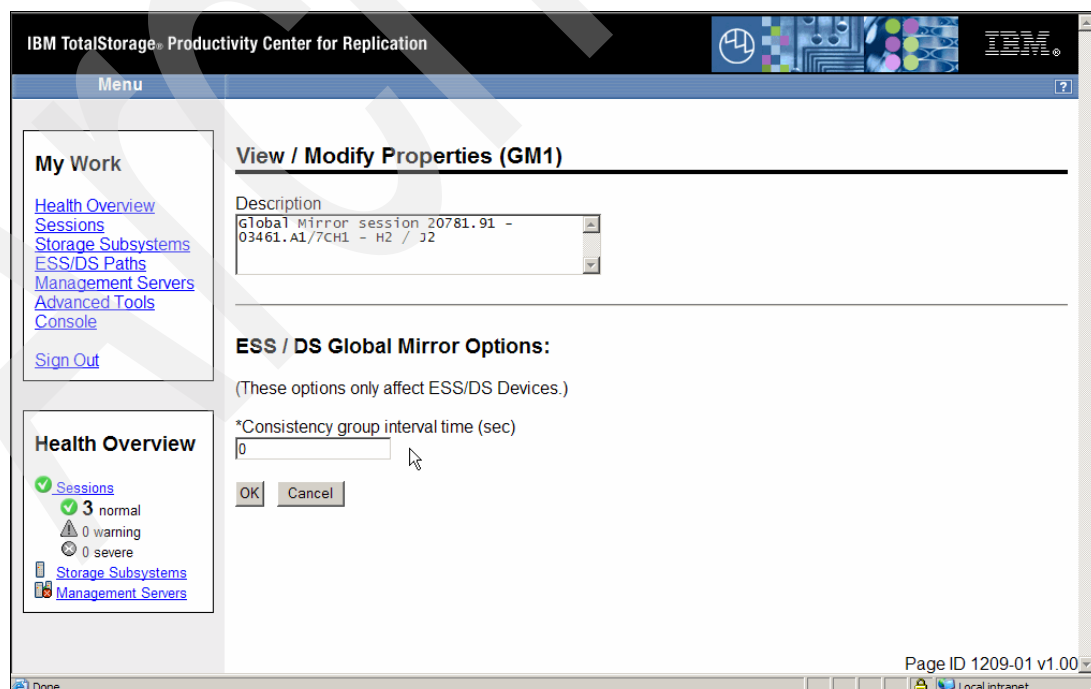


Figure 5-344 View or modify session properties

In Figure 5-345 shows we have changed the default time of zero seconds between forming Consistency Groups to 10 seconds. This means that Global Mirror pauses for 10 seconds after it successfully created a Consistency Group before it starts to create the next Consistency Group. Note that altering this value may take some time because TPC for Replication has to stop the session, alter the value and then restart the session again.

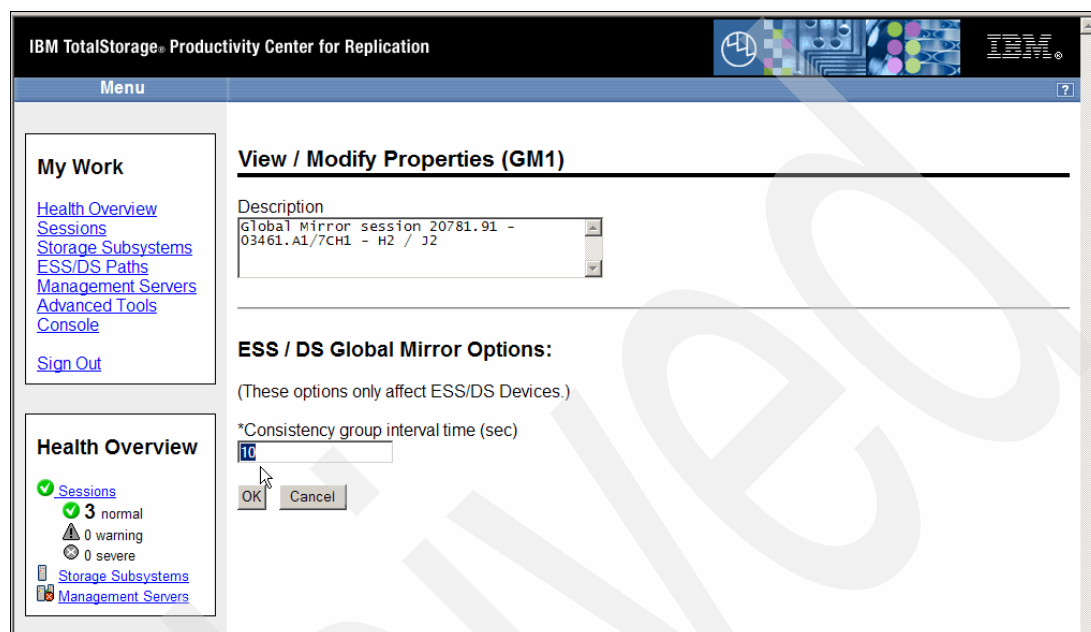


Figure 5-345 Change Consistency Group interval time

Failover and Failback of Global Mirror session GM1

For some planned or unplanned reason you may consider moving the application volumes to the Site 2. A quick and elegant way to swap sites is the Failover process. This is an action targeted to the Site 2 H2 volumes. You do not have about targeting the correct volumes because TPC for Replication takes care of this.

The following panel sequence goes through the process to first Failover to Site 2 and H2 volumes. After that we establish a Global Copy relationship from H2 volumes in Site 2 to H1 volumes in Site 1 which is a Failback from Site 2 to Site 1. And finally we swap the application volumes back to Site 1. This is just a Failover and Failback process from H1 volumes in Site 1 to H2 volumes in Site 2 before we start Global Mirror again in the original direction.

Figure 5-346 on page 336 displays the panel where we start. We select the action *Suspend* which then makes the *Go* button clickable.

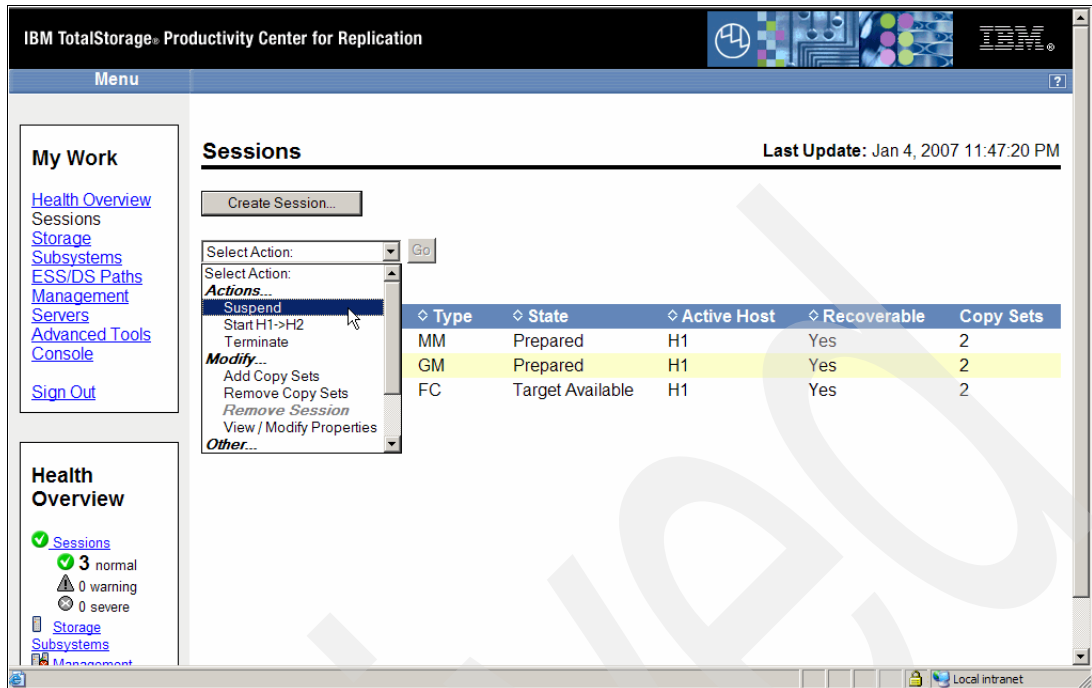


Figure 5-346 Suspend Global Mirror session

After clicking **Go** we progress to an updated Sessions overview panel as shown in Figure 5-347. The panel displays the GM1 session in Suspended State which translates into a Global Mirror session status of PAUSED. This means Global Mirror does not form Consistency Groups any longer but Global Copy continues to replicate data from the source volumes to the target volumes.

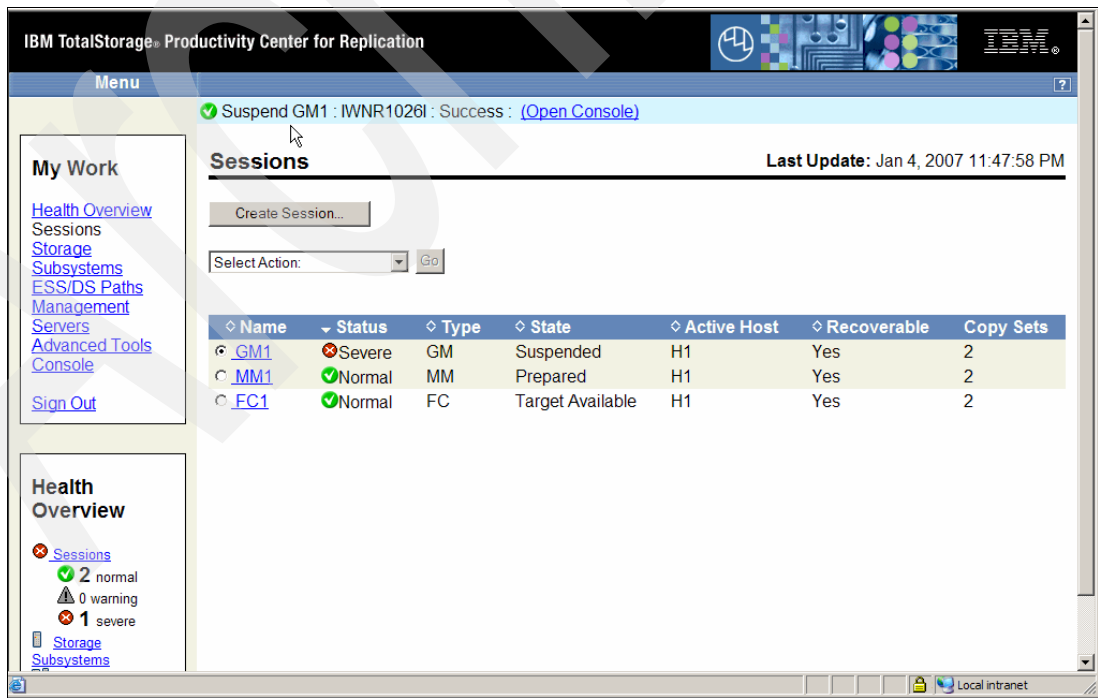


Figure 5-347 Session GM1 is suspended or paused

Figure 5-348 shows another action, View Data Exposure, to find out about the concurrency of the data at the volumes in Site 2.



Figure 5-348 Check on Global Mirror session data exposure

Figure 5-349 shows in the Global Mirror session Details under the Global Mirror Role Pair H1-J2 the timestamp when Global Mirror successfully formed the last Consistency Group before we suspended or paused the Global Mirror session.

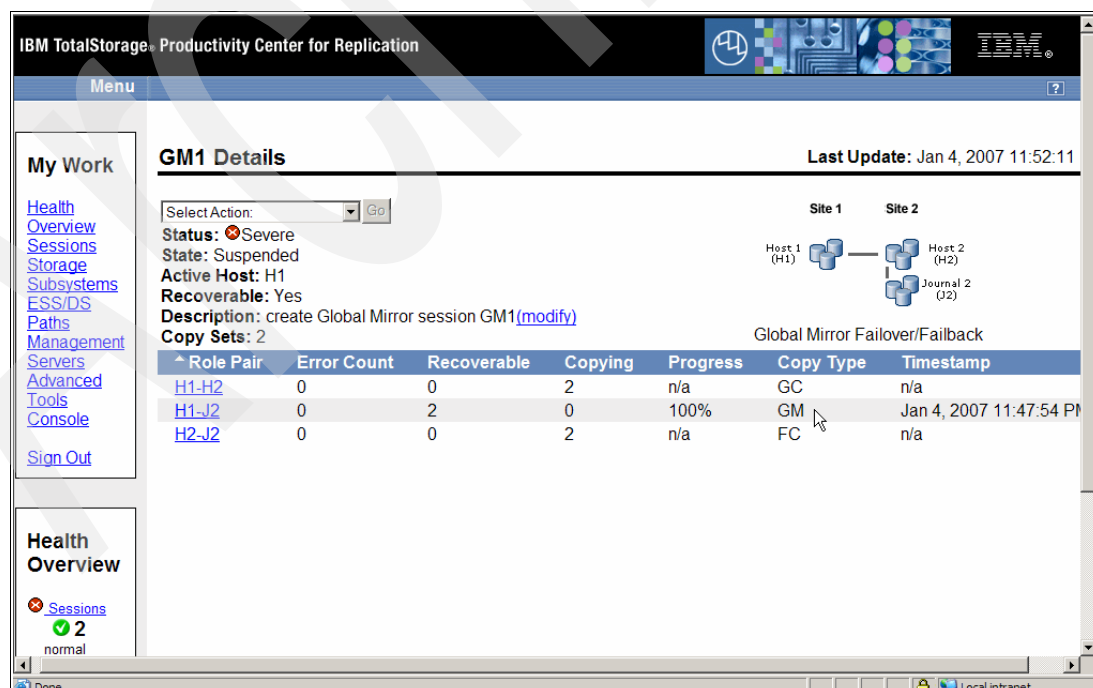


Figure 5-349 Global Mirror data exposure

Figure 5-350 shows the next logical activity to make the Site 2 volumes available. The recover activity implies a Failover to the H2 volumes as well as a respective FlashCopy activity to maintain the H2 volumes to a level that it contains all data needed to be consistent and at the level as the timestamp in the H1-J2 line outlines.

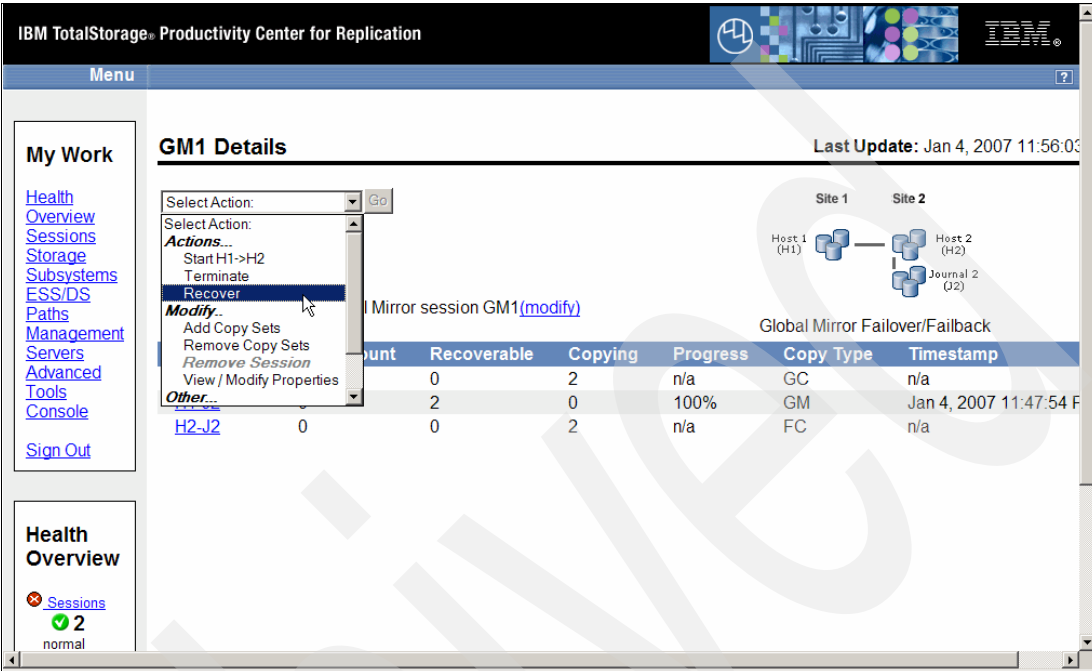


Figure 5-350 Recover the Global Mirror session

Note the updated Active Host in Figure 5-351 which is now H2 - compared to what Figure 5-349 on page 337 displays before the recover action. From here on the H2 volumes are in a PRIMARY SUSPENDED state as well as the H1 volumes.

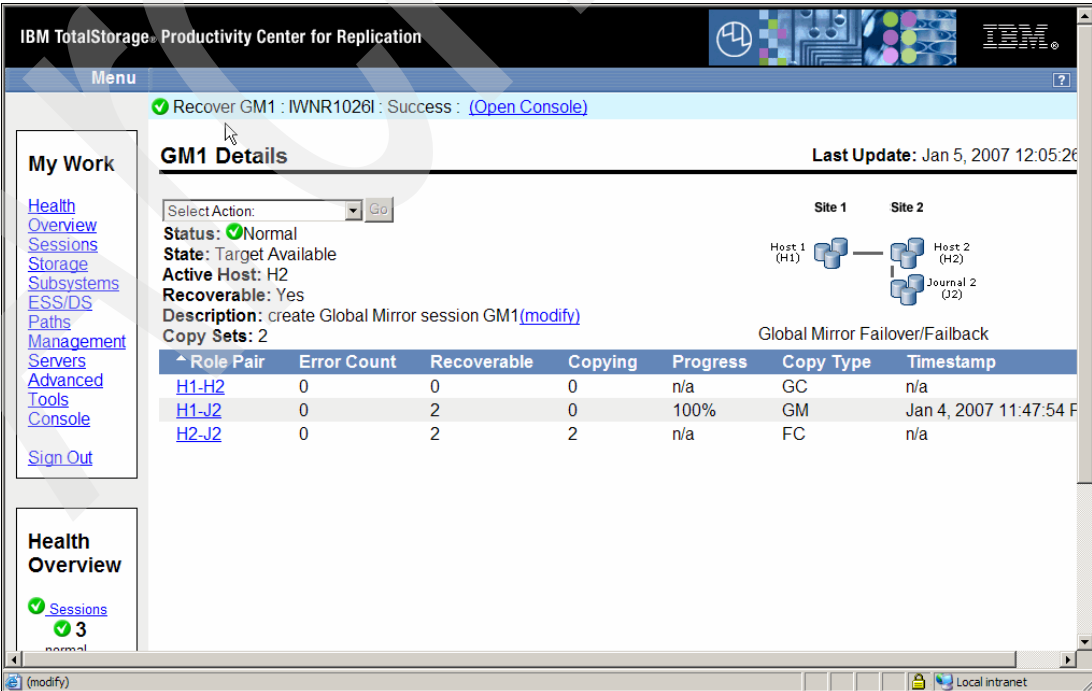


Figure 5-351 Active Host is now H2

Note again the timestamp to which we recovered the H2 volumes before they became the active host volumes as shown in Figure 5-352.

GM1 Details Last Update: Jan 5, 2007 12:06:46

Select Action:

Status: ✔ Normal
State: Target Available
Active Host: H2
Recoverable: Yes
Description: create Global Mirror session GM1([modify](#))
Copy Sets: 2

Role Pair	Error Count	Recoverable	Copying	Progress	Copy Type	Timestamp
H1-H2	0	0	0	n/a	GC	n/a
H1-J2	0	2	0	100%	GM	Jan 4, 2007 11:47:54 PM
H2-J2	0	2	2	n/a	FC	n/a

Global Mirror Failover/Failback

Health Overview
✔ Sessions
✔ 3
normal

Figure 5-352 H2 volumes with data exposure timestamp

You can start the applications again which would now perform their I/Os against the H2 volumes in Site 2. Before you consider moving back to Site 1 you may have to copy updated data from H2 volumes in Site 2 to H1 volumes in Site 1. This happens through a *Start H2->H1* action on a session level. In the background this translates to a Failback from H2 volumes from Site 2 to H1 volumes in Site 1. This is what we do in the panel in Figure 5-353 on page 340. You may perform this Start H2->H1 as soon as the Site 1 is available again. This may be an intermediate action in the case of a planned site swap. Remember to verify that there are PPRC paths between Site 2 and Site 1.

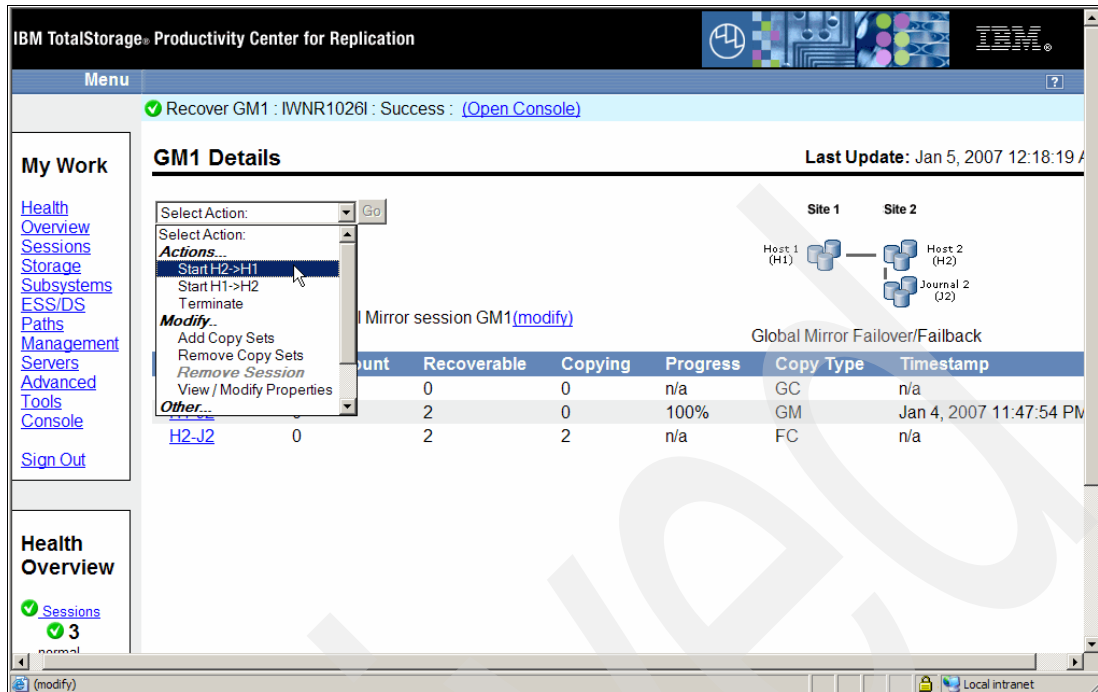


Figure 5-353 Start Global Copy from Site 2 to Site 1 volumes

Figure 5-354 shows that we now copy the data from H2 volumes as Active Host to H1 volumes. Global Copy stays always in the PENDING state which translates in the panel in Figure 5-354 as *Preparing* in the *State* column. This is the reason why the session status stays in Warning.

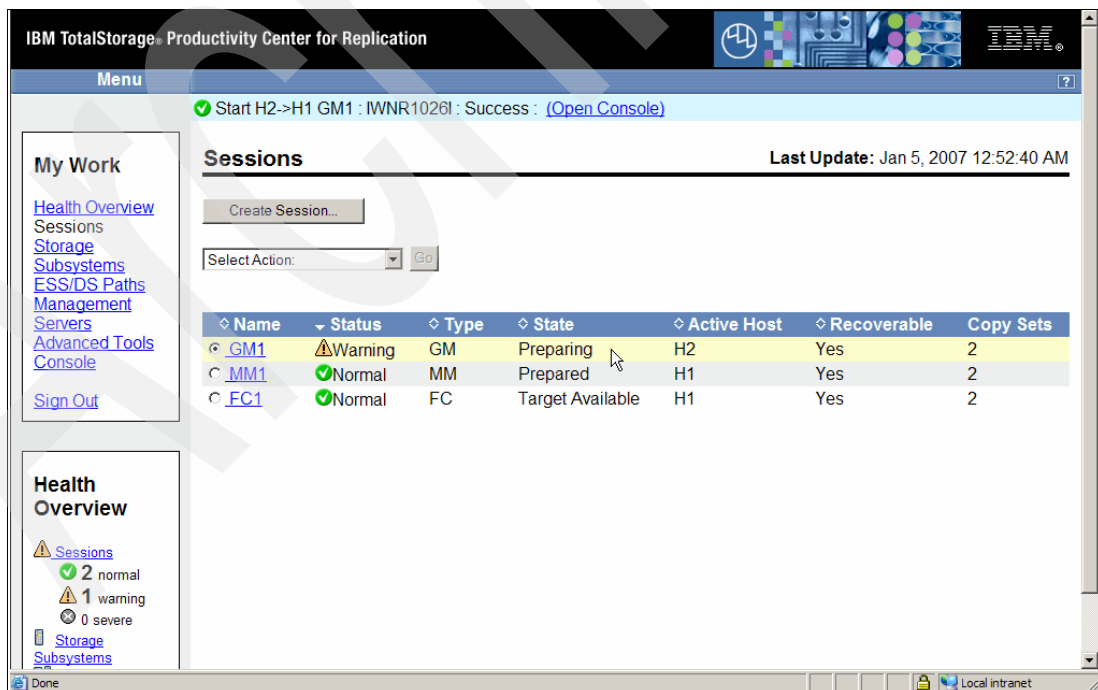


Figure 5-354 Global Copy between H2 and H1 volumes

Note that this status *Warning* and the state *Preparing* does not change because this is just a Global Copy relationship and stays there until we swap back to Site 1.

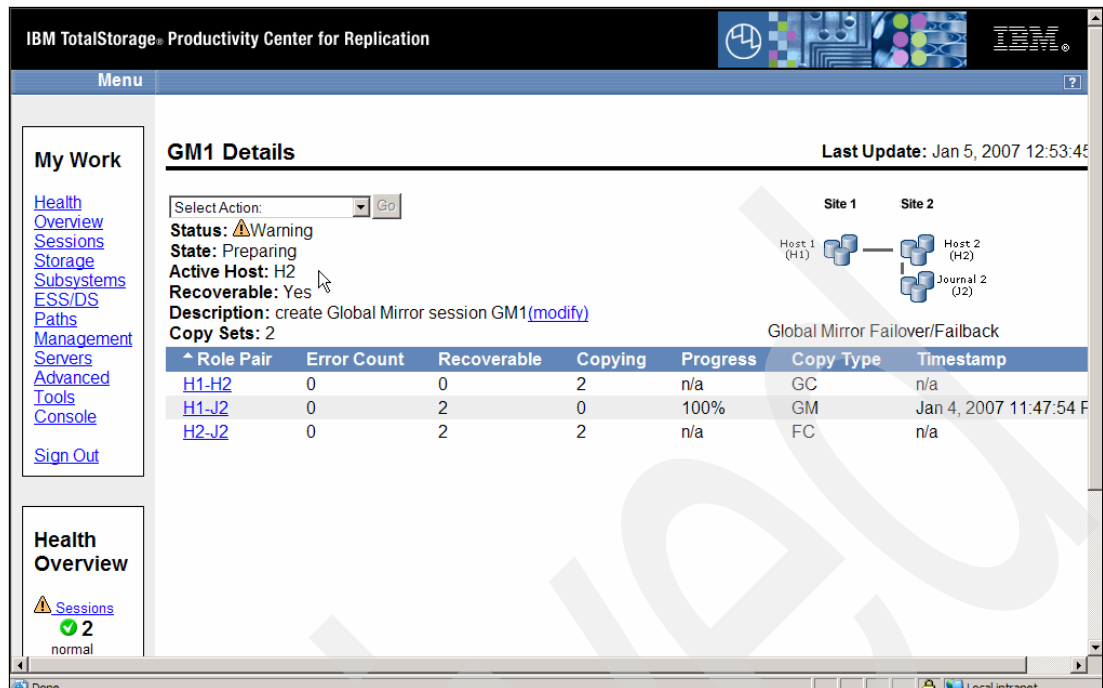


Figure 5-355 GM1 details after Failback

Note that the FlashCopy relationship between H2 and J2 volumes changed in the course of the previous recover operation which included a Fast Reverse Restore from J2 to H2. Therefore we still see the J2 volumes as the source volume from which we restored the H2 volume during the recover operation previously (see Figure 5-356).

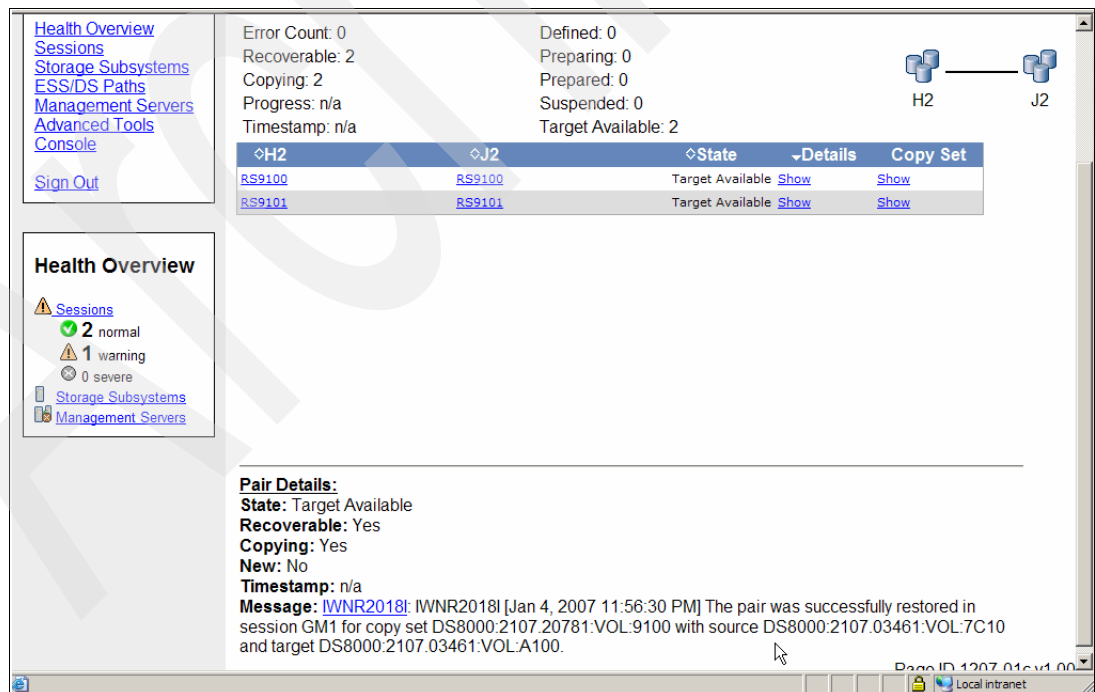


Figure 5-356 Former FlashCopy relationship between H2 and J2 volumes changed

Before you consider to swap back to the Site 1 with the active application volumes you may have to stop the respective applications. In order to perform a Failover and Failback for the

H1 volumes in Site 1 to turn everything back again to its original configuration we execute a session suspend first (see Figure 5-357).

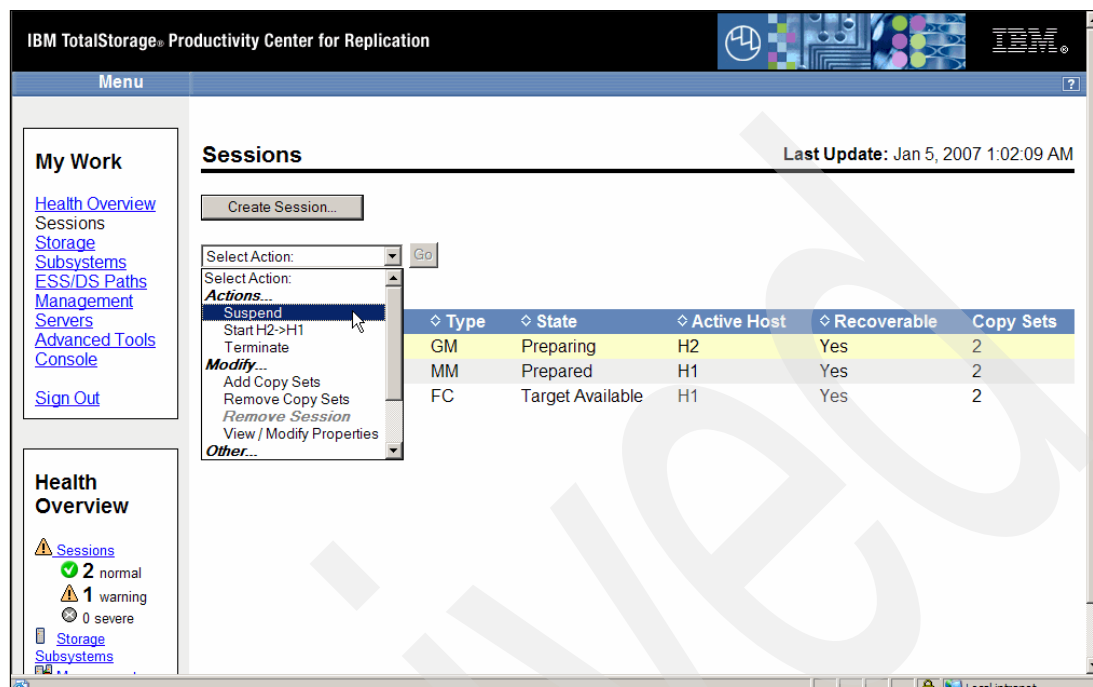


Figure 5-357 Suspend session again

After clicking on the Go button in Figure 5-357 the GUI comes back and the immediate screen capture in Figure 5-358 shows a *Suspending* state. Note that the session status still shows as Normal which is correct because it reflects the Global Copy status between H2 and H2 volumes.

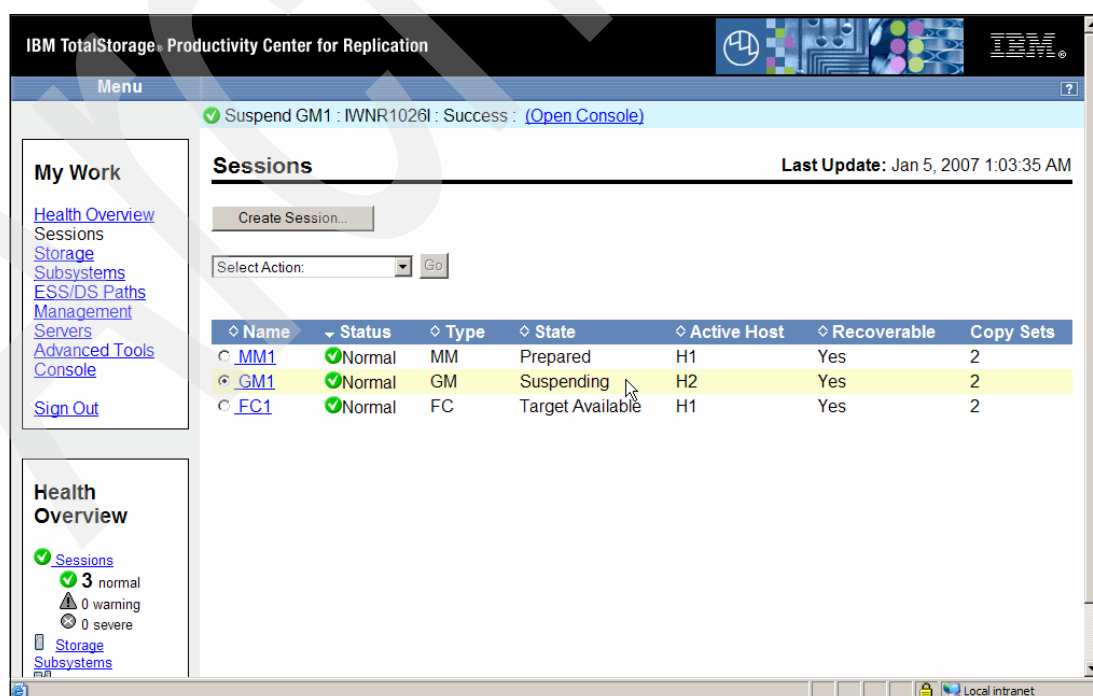


Figure 5-358 Suspending state

Eventually the State changes to Suspended which indicates that all volumes are in PRIMARY SUSPENDED state with change recording active (see Figure 5-359). Note that the status changed now to *Severe* because the Global Copy relationship changed to SUSPENDED.

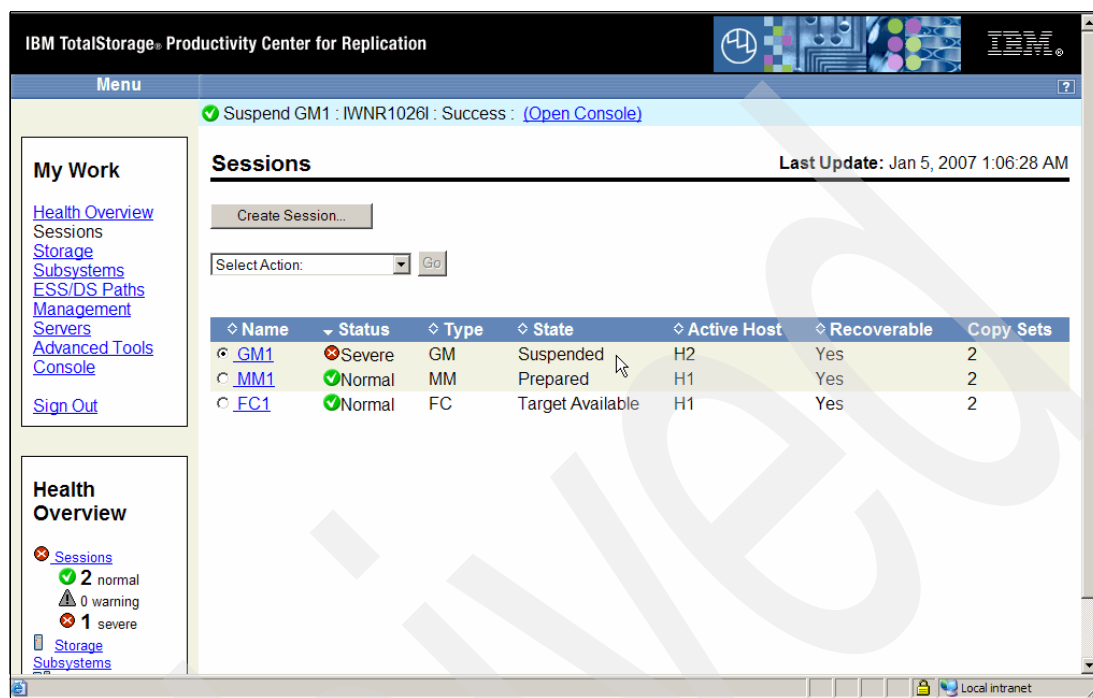


Figure 5-359 Suspended state

Figure 5-360 shows the next action as recover which translates to a Failback from H1 to H2 volumes so back in the original replication direction. Note that you have to verify that the PPRC paths are still available between Site 1 and Site 2.

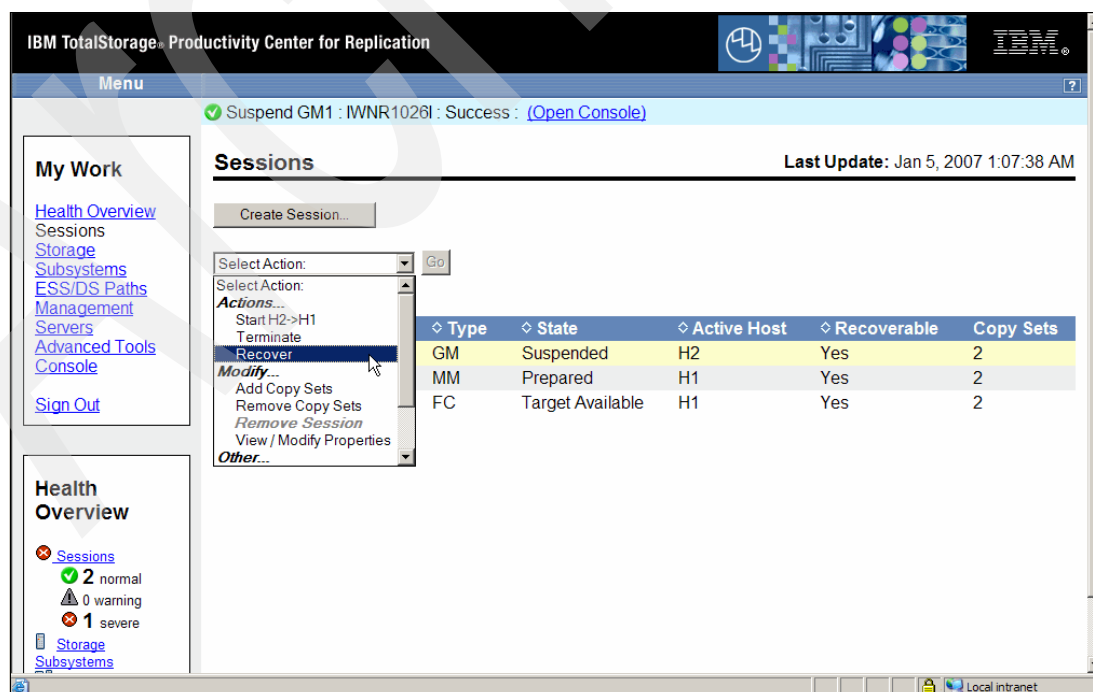


Figure 5-360 Recover or Failback from H1 to H2 volumes

Figure 5-361 shows the successful recover action which is now Global Copy replicating data again from H1 to H2 volumes with H1 as active host and the Status as *Normal*. The state *Prepared* indicates that the first phase completed and Global Copy is in a conventional replication mode.



Figure 5-361 Global Copy from H1 to H2 is back and running

In order to start Global Mirror again we select the appropriate action as Figure 5-362 shows. This is a Start from H1 to H2.

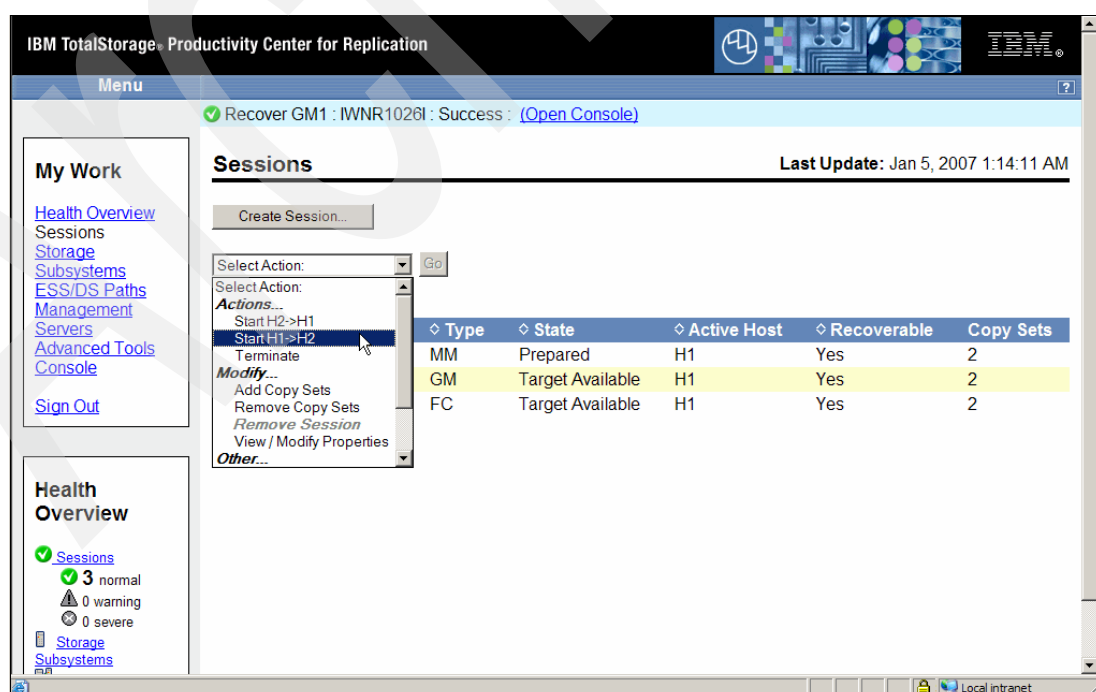


Figure 5-362 Start Global Mirror again

Figure 5-363 shows that the Global Mirror session GM1 is about to form Consistency Groups as soon as the state changes from *Preparing* to *Prepared* and the status changes from *Warning* to *Normal*.

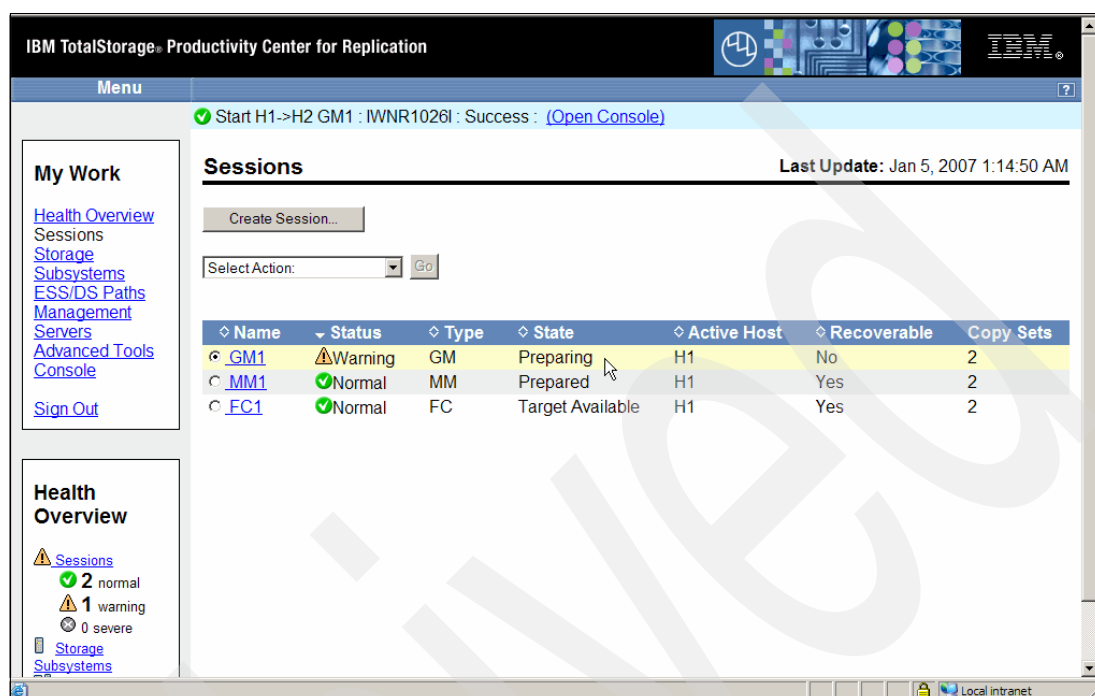


Figure 5-363 Global Mirror session restarted and about to return to Normal Status

This concludes the considerations about Global Mirror session management through the GUI.

5.4.17 Managing Global Mirror through the CSMCLI

To create a Global Mirror session and populate the session with Copy Sets and finally start the session this paragraph provides a few basic scripts you can use to create a script for a more complex configuration.

Example 5-74 is the first script which creates the required PPRC paths as the Figure 5-305 on page 310 indicates before we establish a Global Mirror configuration between both DS8000s.

Example 5-74 Script to establish PPRC paths for Global Copy between H1 and H2

```
#
# Establish PPRC path(s)
# -----

lsavailports -src ds8000:2107.20781:1ss:91 -tgt ds8000:2107.03461:1ss:A1

mkpath -src ds8000:2107.20781:1ss:91.0001 -tgt ds8000:2107.03461:1ss:A1.0031
mkpath -src ds8000:2107.20781:1ss:91.0400 -tgt ds8000:2107.03461:1ss:A1.0140
mkpath -src ds8000:2107.20781:1ss:91.0402 -tgt
ds8000:2107.03461:1ss:A1.00143
mkpath -src ds8000:2107.20781:1ss:91.0501 -tgt ds8000:2107.03461:1ss:A1.0101

lspath -src ds8000:2107.20781:1ss:91 -tgt ds8000:2107.03461:1ss:A1
```

```
# ----- end of script -----
```

Example 5-75 contains the actual invocation of the script in Example 5-74 on page 345 and its results.

Example 5-75 Script output of script mkpaths.txt

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script mkpaths.txt
IWNC2302W [Dec 23, 2006 11:09:03 PM] No path matched the input criteria.

IWNH1000I [Dec 23, 2006 11:09:07 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 11:09:12 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 11:09:16 PM] The command completed successfully.
IWNH1000I [Dec 23, 2006 11:09:20 PM] The command completed successfully.

Source                                     Target                                     Type Status
Auto-Generated
=====
=====
DS8000:2107.20781:LSS:91.0x0001 DS8000:2107.03461:LSS:a1.0x0031 ESS Normal No
DS8000:2107.20781:LSS:91.0x0400 DS8000:2107.03461:LSS:a1.0x0140 ESS Normal No
DS8000:2107.20781:LSS:91.0x0402 DS8000:2107.03461:LSS:a1.0x0143 ESS Normal No
DS8000:2107.20781:LSS:91.0x0501 DS8000:2107.03461:LSS:a1.0x0101 ESS Normal No

C:\Program Files\IBM\CSMCLI\CLI>
```

Create Global Mirror session

Independent from the PPRC path definition you may create a Global Mirror session at any time because this is just a name or token which goes into the TPC for Replication database.

Note that the term *Global Mirror session* which is used here in the context with TPC for Replication is slightly different then what a Global Mirror session is from a DS6000 or DS8000 point of view. Currently the Licensed Internal Code (LIC) in a DS6000 or a DS8000 allows only a single Global Mirror session at the primary or local site with its Global Mirror Master role. When you manage a Global Mirror session outside of TPC for Replication you may choose a Global Mirror session number of your choosing and may select a number between 1 and 255. When you manage your Copy Services environment through TPC for Replication you do not select a Global Mirror session number. TPC for Replication by default currently selects a session number of "2". Again this is a session number or token which is handled by the DS6000 or DS8000 LIC. TPC for Replication also knows the term Session or Session name. This Session name internally translates to the LIC controlled session number "2" which is fully transparent to TPC for Replication and its Global Mirror session management.

Example 5-76 shows another brief CSMCLI script with three CSMCLI commands. The actual make session command is prefixed by a list session command and another list session command follows to verify the session creation.

Example 5-76 Script to create Global Mirror session

```
#
# Make Global Mirror session GM1
# -----

lsess -l -fmt stanza

mkssess -cptype gmfofb -desc "create Global Mirror session GM1" GM1
```

```
lssess -l -fmt stanza
# ----- end of script -----
```

Example 5-77 shows the script output from the script in Example 5-76 on page 346.

Example 5-77 Script output from mkGMsess.txt script

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script GM1mksess.txt
```

```
Name      FC1
Status    Normal
State      Target Available
Copy type  Flash Copy
Recoverable Yes
Copying    No
Copy sets  2
Error      No
```

```
Name      MM1
Status    Normal
State      Prepared
Copy type  Metro Mirror Failover/Failback
Recoverable Yes
Copying    Yes
Copy sets  2
Error      No
```

```
IWNR1021I [Jan 6, 2007 12:02:24 AM] Session GM1 was successfully created.
```

```
Name      FC1
Status    Normal
State      Target Available
Copy type  Flash Copy
Recoverable Yes
Copying    No
Copy sets  2
Error      No
```

```
Name      MM1
Status    Normal
State      Prepared
Copy type  Metro Mirror Failover/Failback
Recoverable Yes
Copying    Yes
Copy sets  2
Error      No
```

```
Name      GM1
Status    Inactive
State      Defined
Copy type  Global Mirror Failover/Failback
Recoverable No
Copying    No
Copy sets  0
Error      No
```

C:\Program Files\IBM\CSMCLI\CLI>

The Global Mirror session GM1 is successfully created as the list session command confirms after the actual make session command completed.

Populate Global Mirror session with Copy Sets

The next logical step is to populate the Global Mirror session with corresponding Copy Sets. Example 5-78 shows a script source example which creates two Copy Sets.

Example 5-78 Script to add Copy Sets to Global Mirror session GM1

```
#
# Add copy sets to Global Mirror session GM1
# -----

lssess -l

mkcpset -h1 ds8000:2107.20781:vol:9100 -h2 ds8000:2107.03461:vol:A100
-j2 ds8000:2107.03461:vol:7C10 GM1
mkcpset -h1 ds8000:2107.20781:vol:9101 -h2 ds8000:2107.03461:vol:A101
-j2 ds8000:2107.03461:vol:7C11 GM1

lspair -l -cpset ds8000:2107.20781:vol:9100 GM1
lspair -l -cpset ds8000:2107.20781:vol:9101 GM1

lssess -l
# ----- end of script -----
```

Note that the **mkcpset** commands in Example 5-78 are slightly modified for better reading. A CSMCLI command is usually noted in one line.

After the make Copy Set command we list the newly added Copy Sets to confirm their successful creation in the corresponding Global Mirror session GM1.

Example 5-79 Output of GM script mkGMcpset.txt

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script mkGMcpset.txt
Name Status State Copy type Recoverable Copying Copy
sets Error
=====
=====
FC1 Inactive Defined Flash Copy No No
0 No
MM1 Inactive Defined Metro Mirror Failover/Failback No No
2 No
GM1 Inactive Defined Global Mirror Failover/Failback No No
0 No
```

IWRN2001I [Dec 23, 2006 11:33:23 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9100 with source DS8000:2107.03461:VOL:A100 and target DS8000:2107.03461:VOL:7C10.

IWRN2001I [Dec 23, 2006 11:33:23 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9100 with source DS8000:2107.20781:VOL:9100 and target DS8000:2107.03461:VOL:A100.

IWNR2001I [Dec 23, 2006 11:33:23 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9100 with source DS8000:2107.20781:VOL:9100(RS9100) and target DS8000:2107.03461:VOL:7C10(RSA100).

IWNR2001I [Dec 23, 2006 11:33:25 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9101 with source DS8000:2107.03461:VOL:A101 and target DS8000:2107.03461:VOL:7C11.

IWNR2001I [Dec 23, 2006 11:33:25 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9101 with source DS8000:2107.20781:VOL:9101 and target DS8000:2107.03461:VOL:A101.

IWNR2001I [Dec 23, 2006 11:33:25 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9101 with source DS8000:2107.20781:VOL:9101(RS9101) and target DS8000:2107.03461:VOL:7C11(RSA101).

Source volume	Target volume	RolePair	State	Recoverable
Copying New Copy set				
Timestamp Last result				
=====				
=====				
DS8000:2107.03461:VOL:A100	DS8000:2107.03461:VOL:7C10	H2-J2	Defined	No
No Yes DS8000:2107.20781:VOL:9100	n/a	IWNR2001I		
DS8000:2107.20781:VOL:9100	DS8000:2107.03461:VOL:A100	H1-H2	Defined	No
No Yes DS8000:2107.20781:VOL:9100	n/a	IWNR2001I		
DS8000:2107.20781:VOL:9100	DS8000:2107.03461:VOL:7C10	H1-J2	Defined	No
No Yes DS8000:2107.20781:VOL:9100	n/a	IWNR2001I		
Source volume	Target volume	RolePair	State	Recoverable
Copying New Copy set				
Timestamp Last result				
=====				
=====				
DS8000:2107.03461:VOL:A101	DS8000:2107.03461:VOL:7C11	H2-J2	Defined	No
No Yes DS8000:2107.20781:VOL:9101	n/a	IWNR2001I		
DS8000:2107.20781:VOL:9101	DS8000:2107.03461:VOL:A101	H1-H2	Defined	No
No Yes DS8000:2107.20781:VOL:9101	n/a	IWNR2001I		
DS8000:2107.20781:VOL:9101	DS8000:2107.03461:VOL:7C11	H1-J2	Defined	No
No Yes DS8000:2107.20781:VOL:9101	n/a	IWNR2001I		
Name	Status	State	Copy type	Recoverable Copying Copy
sets Error				
=====				
=====				
FC1	Inactive	Defined	Flash Copy	No No
0 No				
MM1	Inactive	Defined	Metro Mirror Failover/Failback	No No
2 No				
GM1	Inactive	Defined	Global Mirror Failover/Failback	No No
2 No				

Once you defined all Copy Sets which are supposed to be in the Global Mirror session you start the session.

Start Global Mirror session

Example 5-80 shows a brief script which issues a start command for the Global Mirror GM1. Note the syntax of the **-action** parameter which indicates the copy direction which is in our case from H1 to H2 volumes. Note the different list commands at the beginning of the script and after issuing the start session command display the session GM1 and its different states.

Example 5-80 Script to start Global Mirror session GM1

```
#
# Start Global Mirror session GM1
# -----

lsess -l -fmt stanza                                GM1
lscpset                                             GM1
lspair -l -fmt stanza -rolepair h1-j2              GM1

cmdsess -quiet -action start_H1:H2                GM1

lspair -l -fmt stanza -rolepair h1-j2              GM1
lsess -l -fmt stanza                                GM1
# ----- end of script -----
```

Example 5-81 shows the results when executing the script from Example 5-80.

Example 5-81 Script output to start Global Mirror GM1

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script GM1start.txt
```

```
Name          GM1
Status        Inactive
State         Defined
Copy type     Global Mirror Failover/Failback
Recoverable   No
Copying      No
Copy sets     2
Error         No
```

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100	GM1 3
DS8000:2107.20781:VOL:9101	GM1 3

```
Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair      H1-J2
State         Defined
Recoverable   No
Copying      No
New           Yes
Copy set      DS8000:2107.20781:VOL:9100
Timestamp     n/a
Last result   IWN2001I
```

```
Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair      H1-J2
```



```

State          Defined
Recoverable    No
Copying        No
New            Yes
Copy set       DS8000:2107.20781:VOL:9101
Timestamp      n/a
Last result    IWNR2001I

```

IWNR1026I [Jan 6, 2007 12:17:09 AM] **The runCommand for command Start H1->H2 in session GM1 completed successfully.**

```

Source volume  DS8000:2107.20781:VOL:9100
Target volume  DS8000:2107.03461:VOL:7C10
RolePair       H1-J2
State          Preparing
Recoverable    No
Copying        Yes
New            Yes
Copy set       DS8000:2107.20781:VOL:9100
Timestamp      n/a
Last result    IWNR2011I

```

```

Source volume  DS8000:2107.20781:VOL:9101
Target volume  DS8000:2107.03461:VOL:7C11
RolePair       H1-J2
State          Preparing
Recoverable    No
Copying        Yes
New            Yes
Copy set       DS8000:2107.20781:VOL:9101
Timestamp      n/a
Last result    IWNR2011I

```

```

Name           GM1
Status         Warning
State          Preparing
Copy type      Global Mirror Failover/Failback
Recoverable    No
Copying        Yes
Copy sets      2
Error          No

```

C:\Program Files\IBM\CSMCLI\CLI>

Example 5-82 shows two list session commands which follow closely to each other. The first **lssess** command displays the status and state which indicates that Global Mirror is still not forming Consistency Groups to guarantee data consistent volume sets at Site 2.

As soon as the status changes to *Normal* and the state to *Prepared* Global Mirror starts to provide consistent data and volume sets in Site 2. This shows the second **lssess** command in Example 5-82.

Example 5-82 List the session to note when Global Mirror starts to form Consistency Groups

```
csmdi> lssess -l -fmt stanza GM1
```

```
Name      GM1
Status    Warning
State     Preparing
Copy type Global Mirror Failover/Failback
Recoverable No
Copying   Yes
Copy sets 2
Error     No
```

```
csmdi> lsess -l -fmt stanza GM1
Name      GM1
Status    Normal
State     Prepared
Copy type Global Mirror Failover/Failback
Recoverable Yes
Copying   Yes
Copy sets 2
Error     No
csmdi>
```

From here you may have to check the session states. The following section provide hints about how to query the session.

Monitor Global Mirror session

CSMCLI offers a few commands to follow and monitor a TPC for Replication Global Mirror session, here in our test environment the session GM1. These commands do not reveal all the available detailed information and you may additionally use DSCLI commands, or when a z/OS environment is available you may also exercise TSO RQUERY commands.

Example 5-83 is the first CSMCLI command which provides a first glance on what is happening in a Global Mirror session. We invoked a **lsess** command interactively and explicitly specified the Global Mirror session GM1.

Example 5-83 CSMCLI command lsess

```
csmdi> lsess -l -fmt stanza GM1

Name      GM1
Status    Normal
State     Prepared
Copy type Global Mirror Failover/Failback
Recoverable Yes
Copying   Yes
Copy sets 2
Error     No
```

In Example 5-83 we focus on the session Status and on the session State. *Prepared* indicates that Global Mirror is forming Consistency Groups and Recoverable indicates that the Consistency Groups contribute to a set of consistent volumes at the Site 2.

Example 5-84 on page 353 shows another CSMCLI command. **lscpset** provides a H1 volume overview for a certain session, that is GM1. This does not reveal in which state these volumes are, but it helps understand the involved local or H1 volumes.

Example 5-84 CSMCLI command lscpset

```
csmdi> lscpset GM1
```

H1 Volume	Session Volumes
=====	
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

The CSMCLI list pair command **lspair** provides through the **-rolepair** parameter to query all volumes within a certain session. For Global Mirror the H1- J2 relation reports on the Global Mirror state. Example 5-85 provides information about our Global Mirror session GM1 and the related volumes in the relationship H1 - J2.

Example 5-85 CSMCLI command lspair

```
csmdi> lspair -l -fmt stanza -rolepair h1-j2 GM1
```

```
Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair      H1-J2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9100
Timestamp     n/a
Last result   IWNR2011I
```

```
Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair      H1-J2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9101
Timestamp     n/a
Last result   IWNR2011I
```

```
csmdi>
```

To query Global Mirror session details like the number of successfully formed Consistency Groups or how often did the formation of Consistency Groups fail and what is the reason that forming Consistency Groups failed provide DSCLI commands.

To query session details use the DSCLI command **showgmir**. Note this is not a CSMCLI command but a DSCLI command. Example 5-86 show an example of **showgmir** which reports all the details about our test environment and the Global Mirror session GM1. GM1 is shown indirectly. We know that the default session number which TPC for Replication chose is 02. We also know that the Global Mirror session is started through LSS 91 in 20781. The Global Mirror master LSS is decided by the Global Mirror start and to the LSS which this start command is directed to. In our test environment this is LSS 91.

Example 5-86 DSCLI command showgmir

```
dscli> dscli> showgmir -dev ibm.2107-7520781 -metrics 91
```

Date/Time: 08 January 2007 11:52:33 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781

```
ID IBM.2107-7520781/91
Total Failed CG Count 17
Total Successful CG Count 10239
Successful CG Percentage 99
Failed CG after Last Success 1
Last Successful CG Form Time 01/08/2007 11:50:34 CET
Coord. Time (seconds) 50
Interval Time (seconds) 0
Max Drain Time (seconds) 30
First Failure Control Unit IBM.2107-7520781
First Failure LSS Not Available
First Failure Status Error
First Failure Reason Max Drain Time Exceeded
First Failure Master State Drain in Progress
Last Failure Control Unit IBM.2107-7520781
Last Failure LSS Not Available
Last Failure Status Error
Last Failure Reason Max Drain Time Exceeded
Last Failure Master State Drain in Progress
Previous Failure Control Unit IBM.2107-7520781
Previous Failure LSS Not Available
Previous Failure Status Error
Previous Failure Reason Max Drain Time Exceeded
Previous Failure Master State Drain in Progress
dscli>
```

Example 5-87 is another DSCLI command to query a Global Mirror session. This DSCLI command **showgmroos** displays the number of tracks which are still not replicated yet by Global Copy from the source to the target volume. This show out-of-sync tracks command is directed to Global Mirror by the Global Mirror session number as the DS8000 maintains it. This is not the TPC for Replication session name GM1 - although behind this session name is the session number 02 as discussed before.

Example 5-87 DSCLI command showgmroos

```
dscli> showgmroos -dev ibm.2107-7520781 -scope si -lss 91 02
```

Date/Time: 08 January 2007 11:55:18 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope IBM.2107-7520781
Session 02
OutOfSyncTracks 263525

A more typical behavior of a busy Global Mirror environment is shown in Example 5-88.

Example 5-88 Busy Global Mirror session

```
dscli> showgmroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:17 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope IBM.2107-7520781
Session 02
OutOfSyncTracks 0
```

```
dsccli> showgmiroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:23 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 355
```

```
dsccli> showgmiroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:25 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 0
```

```
dsccli> showgmiroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:40 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 706
```

```
dsccli> showgmiroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:42 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 0
```

```
dsccli> showgmiroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:50 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
CMUN02497E showgmiroos: The storage unit is busy.
```

```
dsccli> showgmiroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:19:53 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 0
```

Most of the time you will observe zero out-of-sync (OOS) tracks - although it may depend on the bandwidth between both sites and the individual workload in each configuration.

This command **showgmiroos** provides also a timestamp so you may be able to evaluate the transfer rate between the H1 and H2 volumes between two **showgmiroos** commands when this OOS Tracks number is significant. In Example 5-88 on page 354 this number is not really significant and you can see that a few hundred OOS tracks are replicated in one to two seconds - provided that there is sufficient bandwidth between the H1 and H2 volumes.

In Example 5-89 on page 356 this OOS tracks number gets very high. Stopping the workload and following the pace about how quickly GM drains these OOS tracks from H1 to H2 gives you an idea about the throughput capability between both sites, H1 and H2. Remember these are just two H1 volumes within LSS 91.

Example 5-89 Drain capability in GM1 session

```
dscli> showgmroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:14:49 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 87033

dscli> showgmroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:15:55 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 6578

dscli> showgmroos -dev ibm.2107-7520781 -scope si -lss 91 02
Date/Time: 08 January 2007 14:16:40 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
Scope          IBM.2107-7520781
Session        02
OutOfSyncTracks 0
```

showgmroos reports at 14:14:49 the OOS tracks number with 87,033 tracks and 66 seconds later the OOS tracks number is 6,578. This translates to 1,219 tracks per second transfer rate. You may remember that we defined four PPRC FCP links between both DS8000s. So the limitation is imposed by the fact that we transfer tracks from two volumes only out of a single LSS. Note that there is no editing in these examples. Again the throughput is determined by the network capabilities between both sites and also how well the volumes are spread out in the storage subsystem and on the actual I/O workload to the Site 1 storage subsystem which holds these Global Mirror H1 volumes.

Failover and Failback

In the following section we go through a Failover/failback process to move from Site 1 to Site 2 using CSMCLI commands in brief scripts. This is what you may know as a Failover/Failback operation to the B/C volumes which includes a Failover to the B volumes, followed by a fast reverse restore, FRR from C to B to make B the consistent volumes and then restart the application to the B volume(s). Before you restart the application to the B volume(s) you may failback from B to A. This is what we do in the following example as well. Failback from B to A is basically to turn Global Copy around and replicate the data from B to A or from Site 2 to Site 1. Note we do not establish a Global Mirror environment from Site 2 to Site 1.

After some time you may want to return to Site 1 with the application volumes. This is what will conclude this section here when we do a Failover/Failback to A with Failover to the A volumes and then a Failback from A to B and re-establish the original Global Mirror session again.

Again, with TPC for Replication the commands and terminology is slightly different to what you may be familiar with from the past using DSCLI commands or other interface support solutions to Copy Services.

We start with the brief script which Example 5-90 on page 357 shows. Note that a suspend of a Global Mirror session in TPC for Replication translates to a Global Mirror session PAUSE from the DS8000 viewpoint. PAUSE just stops to form Consistency Groups but Global Copy keeps replicating data from H1 to H2 volumes, provided the application is still up and running.

Example 5-90 Suspend TPC for Replication Global Mirror session GM1

```
#
# Suspend session GM1
# -----

lssess -l -fmt stanza          GM1
lscpset                               GM1
lspair -l -fmt stanza -rolepair h1-h2 GM1
lspair -l -fmt stanza -rolepair h1-j2 GM1
lspair -l -fmt stanza -rolepair h2-j2 GM1

cmdsess -quiet -action Suspend      GM1

lspair -l -fmt stanza -rolepair h1-j2 GM1
lscpset                               GM1
lssess -l -fmt stanza          GM1
# ----- end of script -----
```

Example 5-91 is the output which the script in Example 5-90 provides.

Example 5-91 Script output to suspend GM1 session

C:\Program Files\IBM\CSMCLI\CLI>**csmccli -script GM1suspend.txt**

```
Name      GM1
Status    Normal
State     Prepared
Copy type  Global Mirror Failover/Failback
Recoverable Yes
Copying    Yes
Copy sets  2
Error      No
```

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

```
Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:A100
RolePair      H1-H2
State         Preparing
Recoverable   No
Copying       Yes
New           Yes
Copy set      DS8000:2107.20781:VOL:9100
Timestamp     n/a
Last result   IWNR2011I
```

```
Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:A101
RolePair      H1-H2
State         Preparing
Recoverable   No
Copying       Yes
```

New Yes
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair H1-J2
State Prepared
Recoverable Yes
Copying Yes
New No
Copy set DS8000:2107.20781:VOL:9100
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair H1-J2
State Prepared
Recoverable Yes
Copying Yes
New No
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.03461:VOL:A100
Target volume DS8000:2107.03461:VOL:7C10
RolePair H2-J2
State Target Available
Recoverable No
Copying Yes
New No
Copy set DS8000:2107.20781:VOL:9100
Timestamp n/a
Last result IWNR2016I

Source volume DS8000:2107.03461:VOL:A101
Target volume DS8000:2107.03461:VOL:7C11
RolePair H2-J2
State Target Available
Recoverable No
Copying Yes
New No
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2016I

IWNR1026I [Jan 8, 2007 2:58:49 PM] **The runCommand for command Suspend in session GM1 completed successfully.**

Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair H1-J2


```

State           Suspended
Recoverable     Yes
Copying         No
New             No
Copy set        DS8000:2107.20781:VOL:9100
Timestamp       Jan 8, 2007 2:58:24 PM
Last result     IWNR2027I

```

```

Source volume   DS8000:2107.20781:VOL:9101
Target volume   DS8000:2107.03461:VOL:7C11
RolePair        H1-J2
State           Suspended
Recoverable     Yes
Copying         No
New             No
Copy set        DS8000:2107.20781:VOL:9101
Timestamp       Jan 8, 2007 2:58:24 PM
Last result     IWNR2027I

```

```

H1 Volume           Session Volumes
=====
DS8000:2107.20781:VOL:9100 GM1           3
DS8000:2107.20781:VOL:9101 GM1           3

```

```

Name           GM1
Status         Severe
State          Suspended
Copy type      Global Mirror Failover/Failback
Recoverable    Yes
Copying        Yes
Copy sets      2
Error          No

```

```
C:\Program Files\IBM\CSMCLI\CLI>
```

As Example 5-91 on page 357 displays we issue several different list commands to the running GM1 session. The `list pair` commands report the different rolepairs and do understand their different states. H1-H2 is a Global Copy relationship and, therefore, always in the state *Preparing*. H2-J2 is a FlashCopy relationship and, therefore, indicates *Target Available* as a normal state. The overall Global Mirror session state is indicated in the rolepair H1-J2. This is the rolepair relationship you usually focus on.

After we suspended the GM1 session the list command about the GM1 session reports the state *Suspended* and the status *Severe* because it does not create Consistency Groups any longer.

Example 5-92 shows a DSCLI command which reports the Global Mirror Copy State as *paused*. This is different from what you may think about a suspend operation. Understand that the TPC for Replication Global Mirror session suspend is actually a PAUSE of the related Global Mirror session as shown in Example 5-92.

Example 5-92 DSCLI command displays Global Mirror Copy State

```

dscli> showgmir -dev ibm.2107-7520781 -fullid 91
Date/Time: 08 January 2007 15:08:15 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781

```

ID	IBM.2107-7520781/91
Master Count	1
Master Session ID	0x02
Copy State	Paused
Fatal Reason	Not Fatal
CG Interval (seconds)	0
XDC Interval (milliseconds)	50
CG Drain Time (seconds)	30
Current Time	01/08/2007 15:10:18 CET
CG Time	01/08/2007 15:00:51 CET
Successful CG Percentage	99
FlashCopy Sequence Number	0x45A24E93
Master ID	IBM.2107-7520781
Subordinate Count	0
Master/Subordinate Assoc	-

dscli>

This *Paused* or *Suspended* state stops the formation of Consistency Groups, so no FlashCopies are happening any longer between H2 and J2 volumes. But Global Copy is still replicating data from H1 to H2 when there is still write I/O activity happening to H1 volumes.

After the TPC for Replication based session suspend we continue to failover to the H2 volumes. This is a recover action to the TPC for Replication Global Mirror session. Example 5-93 shows the brief script which we execute next.

Example 5-93 CSMCLI based script to failover to Site 2

```
#
# Recover session GM1 = Failover to H2
# -----

lsess -l -fmt stanza GM1
lscpset GM1
lspair -l -fmt stanza -rolepair h1-j2 GM1

cmdsess -quiet -action Recover GM1

lspair -l -fmt stanza -rolepair h1-j2 GM1
lscpset GM1
lsess -l -fmt stanza GM1
# ----- end of script -----
```

Example 5-94 shows the results when executing the script from Example 5-93.

Example 5-94 CSMCLI Script recover output

C:\Program Files\IBM\CSMCLI\CLI>**csmdi -script GM1recover.txt**

Name	GM1
Status	Severe
State	Suspended
Copy type	Global Mirror Failover/Failback
Recoverable	Yes
Copying	Yes
Copy sets	2
Error	No

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

Source volume DS8000:2107.20781:VOL:9100
 Target volume DS8000:2107.03461:VOL:7C10
 RolePair H1-J2
 State Suspended
 Recoverable Yes
 Copying No
 New No
 Copy set DS8000:2107.20781:VOL:9100
 Timestamp Jan 8, 2007 2:58:24 PM
 Last result IWNR2027I

Source volume DS8000:2107.20781:VOL:9101
 Target volume DS8000:2107.03461:VOL:7C11
 RolePair H1-J2
 State Suspended
 Recoverable Yes
 Copying No
 New No
 Copy set DS8000:2107.20781:VOL:9101
 Timestamp Jan 8, 2007 2:58:24 PM
 Last result IWNR2027I

IWNR1026I [Jan 8, 2007 3:17:38 PM] **The runCommand for command Recover in session GM1 completed successfully.**

Source volume DS8000:2107.20781:VOL:9100
 Target volume DS8000:2107.03461:VOL:7C10
 RolePair H1-J2
 State Target Available
 Recoverable Yes
 Copying No
 New No
 Copy set DS8000:2107.20781:VOL:9100
 Timestamp Jan 8, 2007 2:58:24 PM
 Last result IWNR2724I

Source volume DS8000:2107.20781:VOL:9101
 Target volume DS8000:2107.03461:VOL:7C11
 RolePair H1-J2
 State Target Available
 Recoverable Yes
 Copying No
 New No
 Copy set DS8000:2107.20781:VOL:9101
 Timestamp Jan 8, 2007 2:58:24 PM
 Last result IWNR2724I

H1 Volume	Session Volumes
-----------	-----------------

```
DS8000:2107.20781:VOL:9100 GM1      3
DS8000:2107.20781:VOL:9101 GM1      3
```

```
Name      GM1
Status    Normal
State     Target Available
Copy type Global Mirror Failover/Failback
Recoverable Yes
Copying   Yes
Copy sets 2
Error     No
```

```
C:\Program Files\IBM\CSMCLI\CLI>
```

After the TPC for Replication Global Mirror session recover the Global Copy relation between H1 and H2 is Suspended with PRIMARY SUSPENDED for the H1 volume - when it would still be available - and also with PRIMARY SUSPENDED for the H2 volume which translates that the Failover to the B volume was successful.

Because this is also a CKD volume environment we can also verify the Copy Services state with a simple system command, Device Service command. See Example 5-95.

Example 5-95 Verify Copy Services state with z/OS system command

DS P,9100,2

```
IEE459I 15.27.39 DEVSERV PATHS 002
UNIT DTYPE M CNT VOLSER CHPID=PATH STATUS
      RTYPE SSID CFW TC DFW PIN DC-STATE CCA DDC ALT CU-TYPE
9100,33909 ,0,000,RS9100,B5=+ B7=+
      2107 9001 Y YY. YY. N PPRI-SUSP 00 00 2107
9101,33909 ,0,000,RS9101,B5=+ B7=+
      2107 9001 Y YY. YY. N PPRI-SUSP 01 01 2107
***** SYMBOL DEFINITIONS *****
0 = ONLINE + = PATH AVAILABLE
```

DS P,A100,2

```
IEE459I 15.27.48 DEVSERV PATHS 004
UNIT DTYPE M CNT VOLSER CHPID=PATH STATUS
      RTYPE SSID CFW TC DFW PIN DC-STATE CCA DDC ALT CU-TYPE
A100,33909 ,0,000,RS A100,BD=+ BE=+
      2107 A001 Y YY. YY. N PPRI-SUSP 00 00 2107
A101,33909 ,0,000,RS A101,BD=+ BE=+
      2107 A001 Y YY. YY. N PPRI-SUSP 01 01 2107
***** SYMBOL DEFINITIONS *****
0 = ONLINE + = PATH AVAILABLE
```

Remember that the device number or UNIT in Example 5-95 is also the DS8000 device number. So 9100 is device 00 in LSS 91. All volumes in either site are now in PRIMARY SUSPENDED mode indicating that every change to these volumes from now on are recorded in a respective bitmap.

There is another helpful variation of this Device Service command (see Example 5-96 on page 363). Besides the serial number of the involved DS8000s it also displays the type of DS8000 as well as the volume capacity.

Example 5-96 Device Service command reveals involved DS8000 serial number

DS QD,9100,2

```
IEE459I 15.32.01 DEVSERV QDASD 068
UNIT VOLSER SCUTYPE DEVTYPE   CYL  SSID SCU-SERIAL DEV-SERIAL EF-CHK
9100 RS9100 2107922 2107900 10017  9001 0175-20781 0175-20781 **OK**
9101 RS9101 2107922 2107900 10017  9001 0175-20781 0175-20781 **OK**
****          2 DEVICE(S) MET THE SELECTION CRITERIA
****          0 DEVICE(S) FAILED EXTENDED FUNCTION CHECKING
```

DS QD,A100,2

```
IEE459I 15.32.12 DEVSERV QDASD 070
UNIT VOLSER SCUTYPE DEVTYPE   CYL  SSID SCU-SERIAL DEV-SERIAL EF-CHK
A100 RSA100 2107922 2107900 10017  A001 0175-03461 0175-03461 **OK**
A101 RSA101 2107922 2107900 10017  A001 0175-03461 0175-03461 **OK**
****          2 DEVICE(S) MET THE SELECTION CRITERIA
****          0 DEVICE(S) FAILED EXTENDED FUNCTION CHECKING
```

Back to the Failover/Failback process. Now that both sites, H1 and H2 volumes are in a PRIMARY and SUSPENDED state we can start a resync operation from either site. Here we intend to establish a Global Copy from H2 to H1. Note that you need one or more PPRC paths from Site 2 to Site 1. TPC for Replication makes an attempt to automatically create these PPRC paths when there is none defined yet between H2 and H1.

Example 5-97 is the next script which we execute to Failback from Site 2 and H2 volumes to Site 1 and its H1 volumes. This translates to a Failback operation from B to A volumes.

Example 5-97 CSMCLI script to failback from B to A or from H2 to H1 or from Site 2 to Site 1 volumes

```
#
# Start Global Mirror session GM1 H2-> H1
# -----

lssess -l -fmt stanza          GM1
lscpset                          GM1

cmdsess -quiet -action start_H2:H1 GM1

lspair -l -fmt stanza -rolepair h1-j  GM1
lscpset                          GM1
lssess -l -fmt stanza          GM1
# ----- end of script -----
```

Example 5-98 displays the results when executing the script from Example 5-97. Note the **-action** start parameter which indicates the Global Copy direction from H2 volumes in Site 2 to H1 volumes in Site 1 which is the opposite direction from what it did before.

Example 5-98 CSMCLI Failback from H2 to H1 - script output

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script GM1starth2h1.txt
```

```
Name          GM1
Status        Normal
State         Target Available
Copy type     Global Mirror Failover/Failback
Recoverable   Yes
Copying       Yes
```

Copy sets 2
Error No

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

IWNR1026I [Jan 8, 2007 3:45:36 PM] The runCommand for command Start H2->H1 in session GM1 completed successfully.

Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair H1-J2
State Target Available
Recoverable Yes
Copying No
New No
Copy set DS8000:2107.20781:VOL:9100
Timestamp Jan 8, 2007 2:58:24 PM
Last result IWNR2724I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair H1-J2
State Target Available
Recoverable Yes
Copying No
New No
Copy set DS8000:2107.20781:VOL:9101
Timestamp Jan 8, 2007 2:58:24 PM
Last result IWNR2724I

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

Name GM1
Status Warning
State **Preparing**
Copy type Global Mirror Failover/Failback
Recoverable Yes
Copying Yes
Copy sets 2
Error No

C:\Program Files\IBM\CSMCLI\CLI>

The last **lssess** command in Example 5-97 on page 363 displays the state *Preparing* and it will stay in this state because we do just a Global Copy from H2 to H1 volumes.

In order to understand the state change of the involved volumes after the start H2->H1 we exercise again this Device Service command in Example 5-99 on page 365. It shows that the former PRIMARY SUSPENDED state of the Site 1 or H1 volumes changed now to

SECONDARY PENDING and the PRIMARY SUSPEND state of the Site 2 or H2 volumes changed to PRIMARY PENDING. This is the normal state of a successful Global Copy volume pair relationship.

Example 5-99 Verify the Failback from Site 2 to Site 1 volumes

DS P,9100,2

```
IEE459I 15.48.15 DEVSERV PATHS 204
UNIT DTYPE M CNT VOLSER CHPID=PATH STATUS
      RTYPE SSID CFW TC DFW PIN DC-STATE CCA DDC ALT CU-TYPE
9100,33909 ,0,000,RS9100,B5=X B7=X
      2107 9001 Y YY. YY. N PSEC-PNDG 00 00 2107
9101,33909 ,0,000,RS9101,B5=X B7=X
      2107 9001 Y YY. YY. N PSEC-PNDG 01 01 2107
***** SYMBOL DEFINITIONS *****
O = ONLINE X = INDETERMINATE FAILING UNIT
```

DS P,A100,2

```
IEE459I 15.48.22 DEVSERV PATHS 206
UNIT DTYPE M CNT VOLSER CHPID=PATH STATUS
      RTYPE SSID CFW TC DFW PIN DC-STATE CCA DDC ALT CU-TYPE
A100,33909 ,0,000,RSA100,BD=+ BE=+
      2107 A001 Y YY. YY. N PPRI-PNDG 00 00 2107
A101,33909 ,0,000,RSA101,BD=+ BE=+
      2107 A001 Y YY. YY. N PPRI-PNDG 01 01 2107
***** SYMBOL DEFINITIONS *****
O = ONLINE + = PATH AVAILABLE
```

To swap back to Site 1 we execute again the scripts we used before when swapping to Site 2 volumes.

Start with script *GM1suspend.txt* followed by the script *GM1recover.txt*. This is possible because TPC for Replication manages its volume through this session concept so we do not have to focus on individual volumes but just on the session name. Therefore we do not get lost selecting the correct volumes in the correct site.

Then we can start again the Global Mirror session in its original configuration and activate Global Mirror with *GM1startH1H2.txt* which starts GM1 again from H1 to H2. Example 5-100 shows the three scripts which we executed one after another.

Example 5-100 Script to fail back to Site 1 and H1 volumes

```
# -----
# GM1suspend.txt
# Suspend session GM1
# -----

lsess -l -fmt stanza GM1

cmdsess -quiet -action Suspend GM1

lsess -l -fmt stanza GM1
# ----- end of script -----

# -----
# GM1recover.txt
# Recover session GM1
```

```
# -----

lsess -l -fmt stanza GM1

cmdsess -quiet -action Recover GM1

lsess -l -fmt stanza GM1
# ----- end of script -----

# -----
# GM1startH1H2.txt
# Start Global Mirror session GM1 H1->H2
# -----

lsess -l -fmt stanza GM1

cmdsess -quiet -action start_H1:H2 GM1

lsess -l -fmt stanza GM1
# ----- end of script -----
```

When combining all three scripts into a single script we experienced some timing difficulties. For example the recover command followed too quickly after the suspend command and came back with a respective message which indicated that the suspend was not visible yet to the recover command. Running theses scripts one after another worked just fine (see Example 5-101).

Example 5-101 Script output to failback to Site 1 and resume Global Mirror

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script GM1suspend.txt
```

```
Name      GM1
Status    Warning
State     Preparing
Copy type  Global Mirror Failover/Failback
Recoverable Yes
Copying   Yes
Copy sets 2
Error     No
```

```
IWNR1026I [Jan 8, 2007 6:34:38 PM] The runCommand for command Suspend in session
GM1 completed successfully.
```

```
Name      GM1
Status    Normal
State     Suspending
Copy type  Global Mirror Failover/Failback
Recoverable Yes
Copying   Yes
Copy sets 2
Error     No
```

```
C:\Program Files\IBM\CSMCLI\CLI>csmdi -script GM1recover.txt
```

```
Name      GM1
Status    Severe
```



```

State      Suspended
Copy type   Global Mirror Failover/Failback
Recoverable Yes
Copying     Yes
Copy sets   2
Error       No

```

IWNR1026I [Jan 8, 2007 6:36:04 PM] **The runCommand for command Recover in session GM1 completed successfully.**

```

Name       GM1
Status     Normal
State      Target Available
Copy type   Global Mirror Failover/Failback
Recoverable Yes
Copying     Yes
Copy sets   2
Error       No

```

C:\Program Files\IBM\CSMCLI\CLI>**csmcli -script GM1startH1H2.txt**

```

Name       GM1
Status     Normal
State      Target Available
Copy type   Global Mirror Failover/Failback
Recoverable Yes
Copying     Yes
Copy sets   2
Error       No

```

IWNR1026I [Jan 8, 2007 6:41:56 PM] **The runCommand for command Start H1->H2 in session GM1 completed successfully.**

```

Name       GM1
Status     Warning
State      Preparing
Copy type   Global Mirror Failover/Failback
Recoverable No
Copying     Yes
Copy sets   2
Error       No

```

C:\Program Files\IBM\CSMCLI\CLI>

Example 5-101 on page 366 shows the GM1 session in *Warning* state. Eventually the session state changes to *Prepared* as shown in Example 5-102. From now on the session is creating Consistency Groups again. Example 5-102 shows the source of the script which performs three different list commands as well as the script output.

Example 5-102 List Global Mirror session GM1

```

#
# List    session GM1
# -----

```

```

lsess  -l -fmt stanza          GM1
lscpset                                     GM1

```

```
lspair -l -fmt stanza -rolepair h1-j2 GM1
```

```
# ----- end of script -----
```

```
C:\Program Files\IBM\CSMCLI\CLI>csmcli -script GM1list1.txt
```

```
Name      GM1
Status    Normal
State     Prepared
Copy type  Global Mirror Failover/Failback
Recoverable Yes
Copying    Yes
Copy sets  2
Error     No
```

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

```
Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair      H1-J2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9100
Timestamp     n/a
Last result   IWNR2011I
```

```
Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair      H1-J2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9101
Timestamp     n/a
Last result   IWNR2011I
```

```
C:\Program Files\IBM\CSMCLI\CLI>
```

Example 5-103 is another DSCLI showgmir command example which indicates the successful creation of Consistency Groups.

Example 5-103 GM1 session is back to its original configuration

```
dscli> showgmir -dev ibm.2107-7520781 -metrics 91
```

```
Date/Time: 08 January 2007 18:42:45 CET IBM DSCLI Version: 5.2.200.308 DS:
IBM.2107-7520781
ID                               IBM.2107-7520781/91
Total Failed CG Count           1
Total Successful CG Count       47
```

```

Successful CG Percentage      97
Failed CG after Last Success  0
Last Successful CG Form Time 01/08/2007 18:44:49 CET
Coord. Time (seconds)        50
Interval Time (seconds)      0
Max Drain Time (seconds)     30
First Failure Control Unit    IBM.2107-7520781
First Failure LSS             0x91
First Failure Status          Error
First Failure Reason          Session or Session Members not in Correct State
First Failure Master State    Global Mirror Run in Progress
Last Failure Control Unit     IBM.2107-7520781
Last Failure LSS             0x91
Last Failure Status          Error
Last Failure Reason          Session or Session Members not in Correct State
Last Failure Master State    Global Mirror Run in Progress
Previous Failure Control Unit -
Previous Failure LSS         -
Previous Failure Status      No Error
Previous Failure Reason      -
Previous Failure Master State -
dscli>

```

This concludes the Failover/Failback which was performed twice in this section using CSMCLI commands.

Modify Global Mirror session parameters

For a Global Mirror session in the sense from the storage servers respectively from the Global Mirror master storage server there are three external parameters you can change to change the parameters for your environment.

These three parameters are:

1. Consistency Group creation time as the time between the formation of consistency groups. The default is zero seconds which means that as soon as a consistency group is created the next consistency group creation is started immediately. When you intend to pause for ten minutes before the next consistency group has to be created after the last successful consistency group formation you specify 600 seconds in the **-rpo** parameter in the **chsess** CSMCLI command.
2. Drain time is the time frame in which all data has to be replicated to the remote site during the course when creating a consistency group. The default is 30 seconds. You may consider 300 seconds and specify the parameter **-maxdrain 300** in the corresponding **chsess** CSMCLI command.
3. Coordination time is the brief period in the first phase when the master storage server initiates the start to form a consistency group. The default is 20 milliseconds.

Example 5-104 is a **chsess** CSMCLI command which is invoked interactively. After the command completed successfully the coordination interval is set to 10 ms, the maximum drain time frame is five minutes and between each consistency group formation is a pause of 10 minutes.

Example 5-104 Modify GM1 session parameters

```

csmcli> chsess -quiet -coordint 10 -rpo 600 -maxdrain 300 GM1

```

Internally this **chsess** command stops the session, changes to session parameters and then restarts the session again.

Remove Global Mirror session

When you intend to end a Global Mirror session and its related constructs you first remove the related copy sets. In our examples these are two Copy Sets and the Example 5-105 displays a script which contains two remove Copy Sets commands. Note that it is only required to specify the H1 or Global Mirror source volume in the corresponding **rmcpset** command although each Copy Set is comprised of three volumes.

Example 5-105 Script to remove Copy Sets from Global Mirror session GM1

```
#
# Remove Global Mirror copy sets from session GM1
# -----

lsess -l

rmcpset -h1 ds8000:2107.20781:vol:9100 GM1
rmcpset -h1 ds8000:2107.20781:vol:9101 GM1

lspair -l -cpset ds8000:2107.20781:vol:9100 GM1
lspair -l -cpset ds8000:2107.20781:vol:9101 GM1

lsess -l
# ----- end of script -----
```

After you removed all Copy Sets from Global Mirror session GM1 the next example is a brief script which finally removes the Global Mirror session GM1 from the TPC for Replication database (see Example 5-106).

Example 5-106 Script to remove Global Mirror session GM1

```
#
# Remove GM1 session
# -----

lsess -l

rmsess GM1

lsess -l
# ----- end of script -----
```

When there is no other Copy Services session between LSS 91 and LSS A1 you may also consider removing the corresponding PPRC paths between these two LSS.

To cleanup the PPRC path and remove these path execute the script displayed in Example 5-107.

Example 5-107 Remove PPRC paths

```
#
# Remove PPRC path(s)
# -----
```

```

lspath -src ds8000:2107.20781:lss:91 -tgt ds8000:2107.03461:lss:A1

rmpath -src ds8000:2107.20781:lss:91.0001 -tgt ds8000:2107.03461:lss:A1.0031
rmpath -src ds8000:2107.20781:lss:91.0400 -tgt ds8000:2107.03461:lss:A1.0140
rmpath -src ds8000:2107.20781:lss:91.0402 -tgt ds8000:2107.03461:lss:A1.0143
rmpath -src ds8000:2107.20781:lss:91.0501 -tgt ds8000:2107.03461:lss:A1.0101

lspath -src ds8000:2107.20781:lss:91 -tgt ds8000:2107.03461:lss:A1

# ----- end of script -----

```

Create Global Mirror environment via a single script

Example 5-108 shows a single script, mkGM.txt, which creates a Global Mirror session, populates the newly created session GM1 with two Copy Sets as the test configuration Figure 5-305 on page 310 shows and finally starts the session GM1.

Between these functional CSMCLI commands are various list commands to show you the different information provided by the listings.

Example 5-108 Script to create Global Mirror environment

```

#
# Make complete Global Mirror session GM1
# -----

lssess -l -fmt stanza

mkssess -cptype gmfofb -desc "create Global Mirror session GM1" GM1

lssess -l -fmt stanza

mkcpset -h1 ds8000:2107.20781:vol:9100 -h2 ds8000:2107.03461:vol:A100 -j2
ds8000:2107.03461:vol:7C10 GM1
mkcpset -h1 ds8000:2107.20781:vol:9101 -h2 ds8000:2107.03461:vol:A101 -j2
ds8000:2107.03461:vol:7C11 GM1

lspair -l -fmt stanza -cpset ds8000:2107.20781:vol:9100 GM1
lspair -l -fmt stanza -cpset ds8000:2107.20781:vol:9101 GM1

lscpset GM1

cmdsess -quiet -action start_H1:H2 GM1

lspair -l -fmt stanza -rolepair h1-h2 GM1
lspair -l -fmt stanza -rolepair h1-j2 GM1
lspair -l -fmt stanza -rolepair h2-j2 GM1
# ----- end of script -----

```

An interesting list command is the **lspair** command with the **-rolepair** parameter. The last three lspair commands in Example 5-108 relate to the different relationships within each Global Mirror Copy Set (see Example 5-109).

Example 5-109 Execute script mkGM.txt

```

C:\Program Files\IBM\CSMCLI\CLI>csmdi -script mkGM.txt

```

Name FC1
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying No
Copy sets 2
Error No

Name MM1
Status Normal
State Prepared
Copy type Metro Mirror Failover/Failback
Recoverable Yes
Copying Yes
Copy sets 2
Error No

IWNR1021I [Jan 3, 2007 3:11:07 PM] Session GM1 was successfully created.

Name FC1
Status Normal
State Target Available
Copy type Flash Copy
Recoverable Yes
Copying No
Copy sets 2
Error No

Name MM1
Status Normal
State Prepared
Copy type Metro Mirror Failover/Failback
Recoverable Yes
Copying Yes
Copy sets 2
Error No

Name GM1
Status Inactive
State Defined
Copy type Global Mirror Failover/Failback
Recoverable No
Copying No
Copy sets 0
Error No

IWNR2001I [Jan 3, 2007 3:11:15 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:
VOL:9100 with source DS8000:2107.03461:VOL:A100 and target
DS8000:2107.03461:VOL:7C10.

IWNR2001I [Jan 3, 2007 3:11:15 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:
VOL:9100 with source DS8000:2107.20781:VOL:9100 and target
DS8000:2107.03461:VOL:A100.

IWNR2001I [Jan 3, 2007 3:11:15 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9100 with source DS8000:2107.20781:VOL:9100(RS9100) and target DS8000:2107.03461:VOL:7C10(RS7C10).

IWNR2001I [Jan 3, 2007 3:11:17 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9101 with source DS8000:2107.03461:VOL:A101 and target DS8000:2107.03461:VOL:7C11.

IWNR2001I [Jan 3, 2007 3:11:17 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9101 with source DS8000:2107.20781:VOL:9101 and target DS8000:2107.03461:VOL:A101.

IWNR2001I [Jan 3, 2007 3:11:17 PM] The pair was successfully created in session GM1 for copy set DS8000:2107.20781:VOL:9101(RS9101) and target DS8000:2107.03461:VOL:7C11(RS7C11).

Source volume DS8000:2107.03461:VOL:A100
 Target volume DS8000:2107.03461:VOL:7C10
 RolePair H2-J2
 State **Defined**
 Recoverable No
 Copying No
 New Yes
 Copy set DS8000:2107.20781:VOL:9100
 Timestamp n/a
 Last result IWNR2001I

Source volume DS8000:2107.20781:VOL:9100
 Target volume DS8000:2107.03461:VOL:A100
 RolePair H1-H2
 State **Defined**
 Recoverable No
 Copying No
 New Yes
 Copy set DS8000:2107.20781:VOL:9100
 Timestamp n/a
 Last result IWNR2001I

Source volume DS8000:2107.20781:VOL:9100
 Target volume DS8000:2107.03461:VOL:7C10
 RolePair H1-J2
 State **Defined**
 Recoverable No
 Copying No
 New Yes
 Copy set DS8000:2107.20781:VOL:9100
 Timestamp n/a
 Last result IWNR2001I

Source volume DS8000:2107.03461:VOL:A101
 Target volume DS8000:2107.03461:VOL:7C11
 RolePair H2-J2
 State **Defined**

Recoverable No
Copying No
New Yes
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2001I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:A101
RolePair H1-H2
State **Defined**
Recoverable No
Copying No
New Yes
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2001I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair H1-J2
State **Defined**
Recoverable No
Copying No
New Yes
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2001I

H1 Volume	Session Volumes
DS8000:2107.20781:VOL:9100 GM1	3
DS8000:2107.20781:VOL:9101 GM1	3

IWNR1026I [Jan 3, 2007 3:11:23 PM] The runCommand for command Start H1->H2 in session GM1 completed successfully.

Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:A100
RolePair H1-H2
State **Preparing**
Recoverable No
Copying Yes
New Yes
Copy set DS8000:2107.20781:VOL:9100
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:A101
RolePair H1-H2
State **Preparing**
Recoverable No
Copying Yes

New Yes
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair H1-J2
State **Preparing**
Recoverable No
Copying Yes
New Yes
Copy set DS8000:2107.20781:VOL:9100
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair H1-J2
State **Preparing**
Recoverable No
Copying Yes
New Yes
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2011I

Source volume DS8000:2107.03461:VOL:A100
Target volume DS8000:2107.03461:VOL:7C10
RolePair H2-J2
State Target Available
Recoverable No
Copying Yes
New No
Copy set DS8000:2107.20781:VOL:9100
Timestamp n/a
Last result IWNR2016I

Source volume DS8000:2107.03461:VOL:A101
Target volume DS8000:2107.03461:VOL:7C11
RolePair H2-J2
State Target Available
Recoverable No
Copying Yes
New No
Copy set DS8000:2107.20781:VOL:9101
Timestamp n/a
Last result IWNR2016I

C:\Program Files\IBM\CSMCLI\CLI>

Note after the Global Mirror session GM1 started successfully these three **lspair** commands follow. Each **lspair** provides a view from each volume within a Global Mirror Copy set.

1. H1-H2 is the Global Copy relationship between a source or primary Global Copy volume and its corresponding target or secondary volume. There are two volume pairs listed and referred here to as Source volume and Target volume. This relationship stays always in the state of **Preparing** due to its nature by Global Copy which is always in a PENDING or COPYING state.
2. H1-J2 reflects the actual Global Mirror relationship. This is in the beginning also in a **Preparing** state until the first initial copy phase is finished and the Global Copy volume pair went through a first full volume copy operation. This state implies also that you cannot recover at the remote site at this point in time. Once this first phase is finished for all Global Mirror Copy Sets this state changes to **prepared** which indicates that it provides from now on a consistent set of volumes at the remote site from which you may safely recover when needed. This is now indicated by the Recoverable Yes list pair output (see Example 5-110).
3. H2-J2 reflects the FlashCopy relationship between the Global Copy secondary or target volume which is also at the same time a FlashCopy source volume. J2 is the journal volume or the corresponding FlashCopy target volume. It stays in the state **Target Available** and, therefore, indicates that you may recover at the remote site with these FlashCopy volume pairs through respective FlashCopy commands. Note that the terminology and management for Global Mirror is slightly different with TPC for Replication than what the DSClI or z/OS based interfaces provide. This is particularly true for the various failover / failback operations within a Global Mirror session which we exercised in previous paragraphs. Most of the commands you may be familiar with are hidden in TPC for Replication to ease the management of a Global Mirror session.

Example 5-110 List Global Mirror state of session GM1

```

csmcli> lspair -l -fmt stanza -rolepair h1-j2 GM1

Source volume DS8000:2107.20781:VOL:9100
Target volume DS8000:2107.03461:VOL:7C10
RolePair      H1-J2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9100
Timestamp     n/a
Last result   IWNR2011I

Source volume DS8000:2107.20781:VOL:9101
Target volume DS8000:2107.03461:VOL:7C11
RolePair      H1-J2
State         Prepared
Recoverable   Yes
Copying       Yes
New           No
Copy set      DS8000:2107.20781:VOL:9101
Timestamp     n/a
Last result   IWNR2011I
csmcli>

```

When you compare the list pair output in Example 5-109 on page 371 with what happened just after the Global Mirror session is started with the list pair output in Example 5-110 you note the difference for the Global Mirror state which changes from **Preparing** to **Prepared** indicating that from now on you are ready to recover at the remote site.

Example 5-111 shows the FlashCopy volume pairs which is no different than what Example 5-109 on page 371 shows right after the session is started. So you usually focus always on the state of the rolepair H1-J2.

Example 5-111 Rolepair listing for FlashCopy relationships within Global Mirror Copy Sets

```
csmlcli> lspair -l -fmt stanza -rolepair h2-j2 GM1
```

Source volume	DS8000:2107.03461:VOL:A100
Target volume	DS8000:2107.03461:VOL:7C10
RolePair	H2-J2
State	Target Available
Recoverable	No
Copying	Yes
New	No
Copy set	DS8000:2107.20781:VOL:9100
Timestamp	n/a
Last result	IWNR2016I

Source volume	DS8000:2107.03461:VOL:A101
Target volume	DS8000:2107.03461:VOL:7C11
RolePair	H2-J2
State	Target Available
Recoverable	No
Copying	Yes
New	No
Copy set	DS8000:2107.20781:VOL:9101
Timestamp	n/a
Last result	IWNR2016I

This concludes the considerations about Global Mirror sessions and CSMCLI commands to handle and manage a Global Mirror session.

Archived



Useful hints and tips

This chapter contains information that we found helpful for using and debugging TPC for Replication.

6.1 Uninstalling TPC for Replication manually on Windows

To uninstall TPC for Replication manually start by going to **Start** → **Control Panel** → **Administrative Tools** → **Services** and in the list of services scroll down until you see IBM WebSphere Application Server V6 - CSM. Right-click that service and select Stop as shown in Figure 6-1.

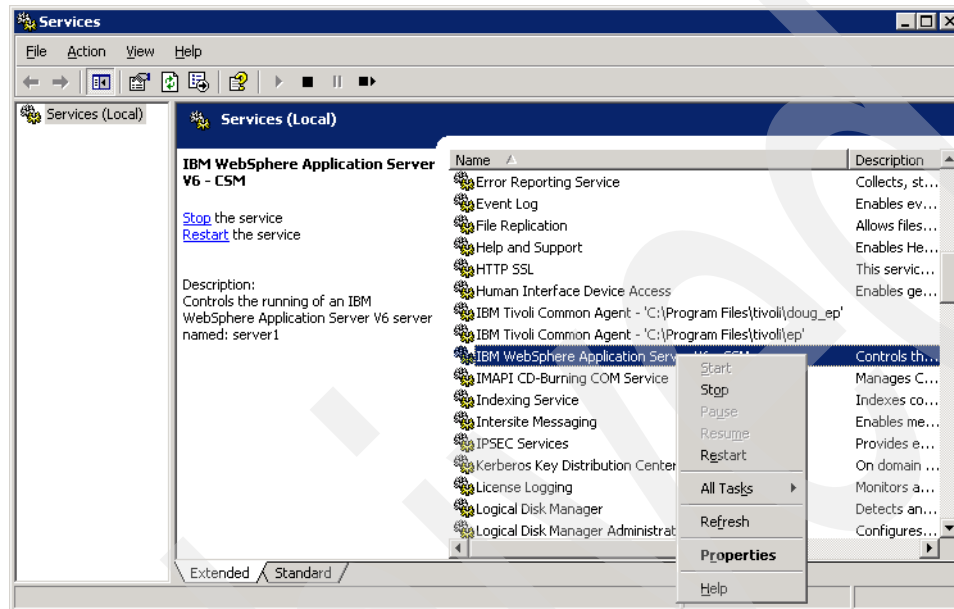


Figure 6-1 Stopping WebSphere

Next delete the directory where TPC for Replication was installed. The default directory if only TPC for Replication V3.1 was installed is:

C:\Program Files\IBM\IBM Total Storage Productivity Center

However if TPC for Replication V3.1.1 was installed, the default installation directory is:

C:\Program Files\IBM\TPC4R.

6.1.1 Deleting the DB2 database

Deleting the TPC for Replication database is optional. When you re-install TPC for Replication you will be prompted to enter the DB2 database name. If you specify an existing database (for example, from the previous installation) you will be asked if you should use the existing database or delete it.

If you choose to delete the DB2 database manually, open the DB2 Control Center by going to **Start** → **All Programs** → **IBM DB2** → **General Administration Tools** → **Control Center** as shown in Figure 6-2 on page 381.

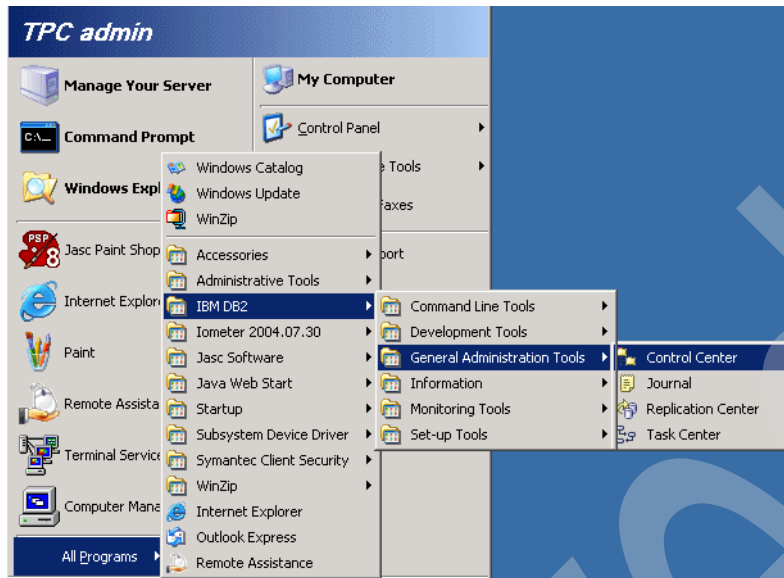


Figure 6-2 Starting DB2 Control Center

Accept the defaults and click **OK** on the Control Center View window as shown in Figure 6-3.

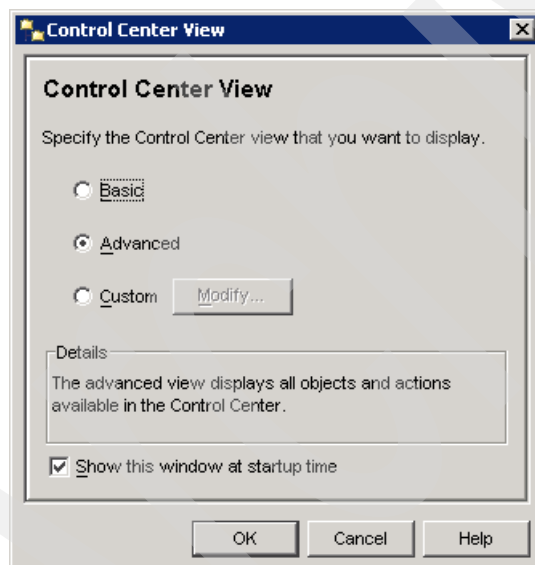


Figure 6-3 Control Center View

On the Control Center Panel, click **All Databases** then right-click **TPCRM** and select **Drop** as shown in Figure 6-4 on page 382.

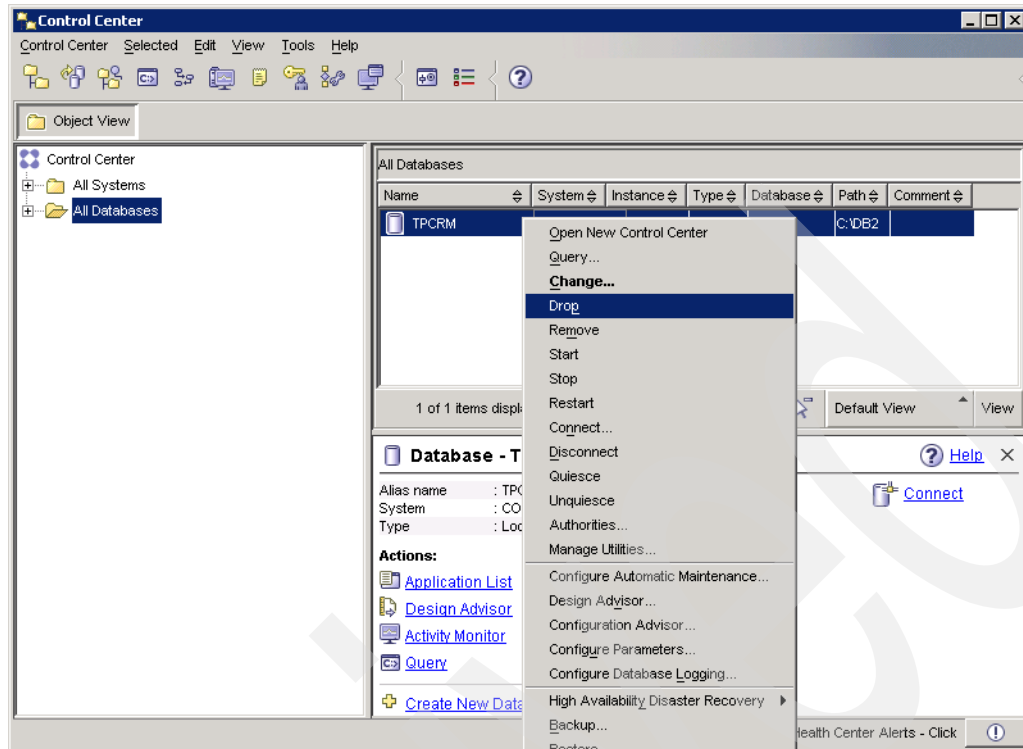


Figure 6-4 Dropping TPCRM database

6.2 Uninstalling TPC for Replication manually on AIX and Linux

The steps to manually uninstall TPC for Replication on AIX and Linux are the same with the exception of the command to delete the DB2 group. For that command, the specific steps are given in Example 6-7 on page 383 and Example 6-8 on page 383. Besides this command, all the other commands are the same for both platforms.

To uninstall TPC for Replication, open a command prompt and obtain the process ID (PID) for TPC for Replication by issuing the command shown in Example 6-1.

Example 6-1 Listing process IDs

```
ps -ef | grep CSM
```

Next you need to stop the TPC for Replication service by issuing the command shown in Example 6-2. Note that the <process_id> needs to be replaced by the TPC for Replication process ID obtained from the command above.

Example 6-2 Killing the TPC for Replication process ID

```
kill -9 <process_id>
```

Next, delete the directory where TPC for Replication was installed using the command in Example 6-3 on page 383. Replace <directory_name> with the name of the directory where TPC for Replication was installed. The default installation directory is /opt/IBM/TPC-RM.

Example 6-3 Deleting the TPC for Replication installation directory

```
rm -Fr <direcotry_name>
```

6.2.1 Deleting the DB2 database

Deleting the TPC for Replication database is optional. When you re-install TPC for Replication you will be prompted to enter the DB2 database name. If you specify an existing database (for example, from the previous installation) you will be asked if you should use the existing database or delete it.

If you choose to delete the DB2 database manually, first change directories by issuing the command in Example 6-4. Replace <db2_instance_name> with the name of the DB2 instance created during the DB2 installation.

Example 6-4 Changing to the db2 directory

```
. /home/<db2_instance_name>/sql1lib/db2profile
```

Now drop (remove) the database by issuing the command in Example 6-5. Replace <database_name> with the name of the database created during the DB2 installation and used by TPC for Replication.

Example 6-5 Dropping the database

```
db2 drop db <database_name>
```

Next, from the same directory, remove the db2 user by issuing the command shown in Example 6-6. Replace <username> with the name of the DB2 user created during the DB2 installation.

Example 6-6 Deleting the DB2 username

```
userdel <username>
```

Now you need to remove the DB2 group. The command to remove the group is different for the AIX and Linux platforms. To remove the DB2 group on an AIX server, issue the command in Example 6-7. Replace <group_name> with name of the DB2 group created during the DB2 installation.

Example 6-7 Deleting the DB2 group on AIX platform

```
rmgroup <groupname>
```

To remove the DB2 group on a Linux server issue the command shown in Example 6-8. Replace <group_name> with the name of the DB2 group created during the DB2 installation.

Example 6-8 Deleting the DB2 group on Linux platform

```
groupdel <groupname>
```

6.3 Upgrading to TPC for Replication V3.1.1

When installing TPC for Replication V3.1.1, it is important to note that it is an upgrade and not a full version of the product. The installation of TPC for Replication V3.1.1 will only be

successful if TPC for Replication V3.1 was previously installed. If you attempt to install V3.1.1 without having TPC for Replication V3.1 already installed on the server the installation will fail with the message seen in Figure 6-5.

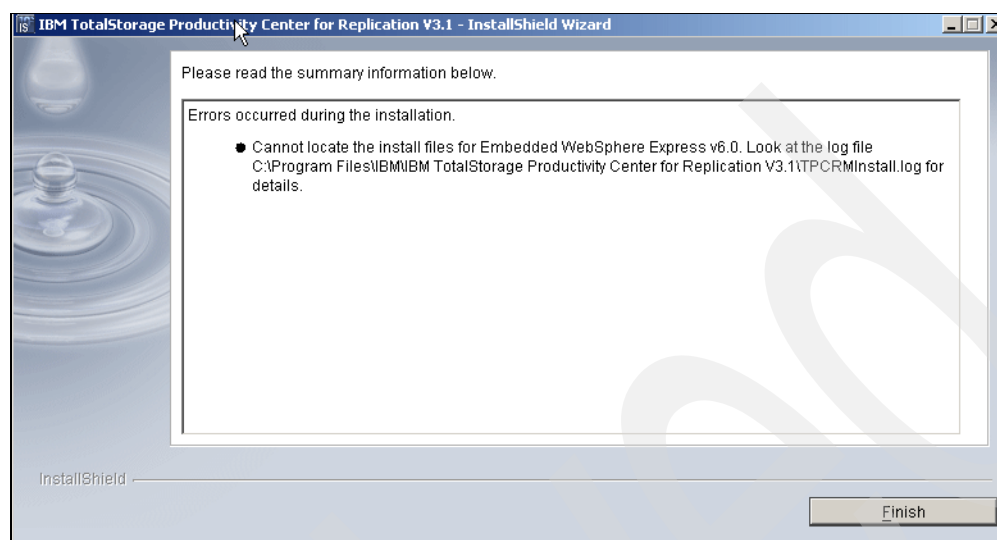


Figure 6-5 Installation failure message

6.4 Sharing a DB2 instance

If you want TotalStorage Productivity Center for Replication to share a DB2 instance located in another client, make sure that DB2 is stopped during the TPC for Replication installation given that configuration changes are made to the DB2 instance during the installation and require a restart of the instance. If other clients have active connections to the DB2 instance, the configuration changes will not be allowed and the installation will be unsuccessful.

6.5 TPC for Replication V3.1 versus TPC for Replication Two Site BC V3.1

TotalStorage Productivity Center for Replication V3.1 includes the management interface for copy and mirroring services including FlashCopy, Metro Mirror and Global Mirror for the IBM ESS 800, IBM DS6000 and IBM DS8000. Flashcopy and Metro Mirror are also managed for the IBM SAN Volume Controller. TPC for Replication Two Site Business Continuity provides the previously mentioned capabilities as well as disaster recovery management through planned and unplanned failover and failback automation for IBM ESS800, IBM DS6000 and IBM DS8000. TPC for Replication Two Site BC V3.1 also offers a High Availability capability which is designed to maintain your data online and available even if the primary site fails. In this two server environment, the second server, which is the standby server, will take over in case of a failure and the services from original active server will the will switch to this server. When the primary site is back online, a failback is performed and the default configuration will resume.

The TotalStorage Productivity Center for Replication V3.1 requires a single-direction license key meaning that data is copied from the primary site to the secondary site. Whereas TotalStorage Productivity Center for Replication BC V3.1 requires a BC license key in order

to perform failover and failback to maintain the data on both sites and to reverse the data flow direction in case of a failure.

6.6 High Availability server platforms

When operating in a high availability environment, your TPC for Replication active server and standby server can be servers of the same operating systems or servers of different operating systems. For example, your active server can be a Windows server and your standby server can be a Linux server or vice-versa. A same-server example would be having your active server and your standby server both be AIX servers.

6.7 SNMP setup

TPC for Replication can be sent up the send SNMP traps to registered SNMP managers when various events occur. These general events include:

- ▶ Session state change
- ▶ Configuration change
- ▶ Suspending-event notification
- ▶ Communication failure
- ▶ High-availability state change

You can use the **mksnmp** CLI command to add a specified manager to the list of servers to which SNMP alerts are sent. Details of the mksnmp command can be found in the *TPC for Replication Command Line Interface - User's Guide*, SC32-0104.

You can see the SNMP traps in the CsmTrace.log files as shown in Figure 6-9 on page 388. The figure contains a segment of the log. As such you can see the details of the trap being captured and prepared.

```
[2006-06-23 16:16:12.828-07:00] Work-2 RepMgr D
com.ibm.csm.server.session.snmp.SnmpNotification sendMsg TRACE: Message :
version=1 communityString=public
errorStatus=Success
operation=V2 TRAP requestId=0 correlator=0      (
1.3.6.1.2.1.1.3:17270546,
1.3.6.1.6.3.1.1.4.1:1.3.6.1.4.1.2.6.204.2.1.3,
1.3.6.1.6.3.1.1.4.3:1.3.6.1.4.1.2,
1.3.6.1.4.1.2.6.204.3.1:ess_gmsd_cli,
1.3.6.1.4.1.2.6.204.3.2:Preparing,
1.3.6.1.4.1.2.6.204.3.3:Prepared,
1.3.6.1.4.1.2.6.204.3.4:H1)
```

Figure 6-6 CsmTrace.log

Additionally, the TPC for Replication Server can be set up to receive SNMP traps from the IBM ESS model 800. While not being required, the use of the SNMP alert reduces the latency between the time that a freeze event occurs and the time that TPC for Replication recognizes that the event is occurring. With or without the SNMP alert function, however, TPC for Replication maintains data consistency of its sessions during the freeze event. The SNMP trap destination can be setup on your ESS via the ESS Specialist.

6.8 TPC for Replication logging

Should problems occur within your TPC for Replication server environment, there are various ways you can collect logs.

6.8.1 Collecting Logs using the TPC for Replication GUI

To collect logs via the TPC for Replication GUI, simply click the *Advanced Tools* hyperlink in the menu. Once you reach *Advanced Tools* page simply click the **Create** button to perform the action. In Figure 6-7, we show the successful creation of the package. This function collects all the relevant and required information and encapsulates it as a JAR (Java Archive file).

Note that upon successful creation of the package, the returned message will indicate the location of this JAR file. The default location is C:\Program Files\IBM\IBM TotalStorage Productivity Center for Replication V3.1\WAS\profiles\CSM\diagnostics.

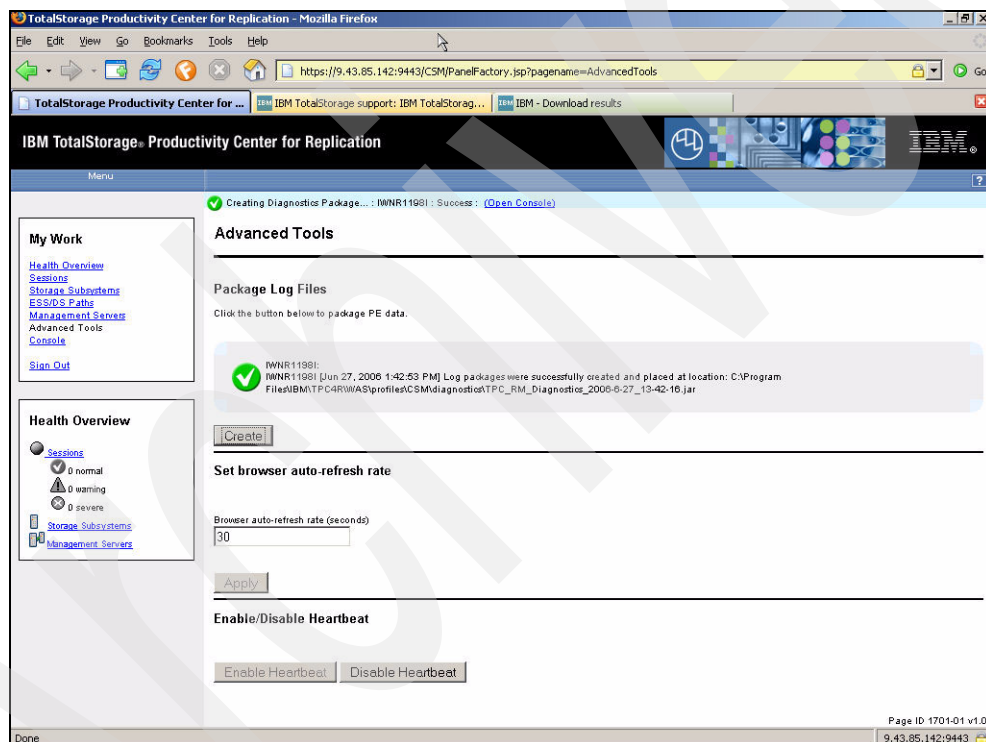


Figure 6-7 Log package creation

6.8.2 Collecting logs using the TPC for Replication CLI

You can also collect logs via the TPC for Replication command line interface. Start by opening up a command prompt from your TPC for Replication server and type **mklogpkg** and press Enter. The command prompt will then display the location of the logs.

6.8.3 Collecting logs manually

Another option is collecting the logs manually. You can collect the TPC for Replication logs by zipping up all the files in the following directories:

C:\Program Files\IBM\IBM TotalStorage Productivity Center for Replication
V3.1\WAS\profiles\CSM\logs\

C:\Program Files\IBM\IBM TotalStorage Productivity Center for Replication
V3.1\WAS\profiles\CSM\logs\CSM

6.8.4 Viewing logs

In the course of your usage you may need to obtain information about the operations of the TPC for Replication server. Since the CSM application is running within WebSphere, the relevant log files are stored in the directory:

C:\Program Files\IBM\IBM TotalStorage Productivity Center for Replication
V3.1\WAS\profiles\CSM\logs\server1 as shown in Figure 6-8.

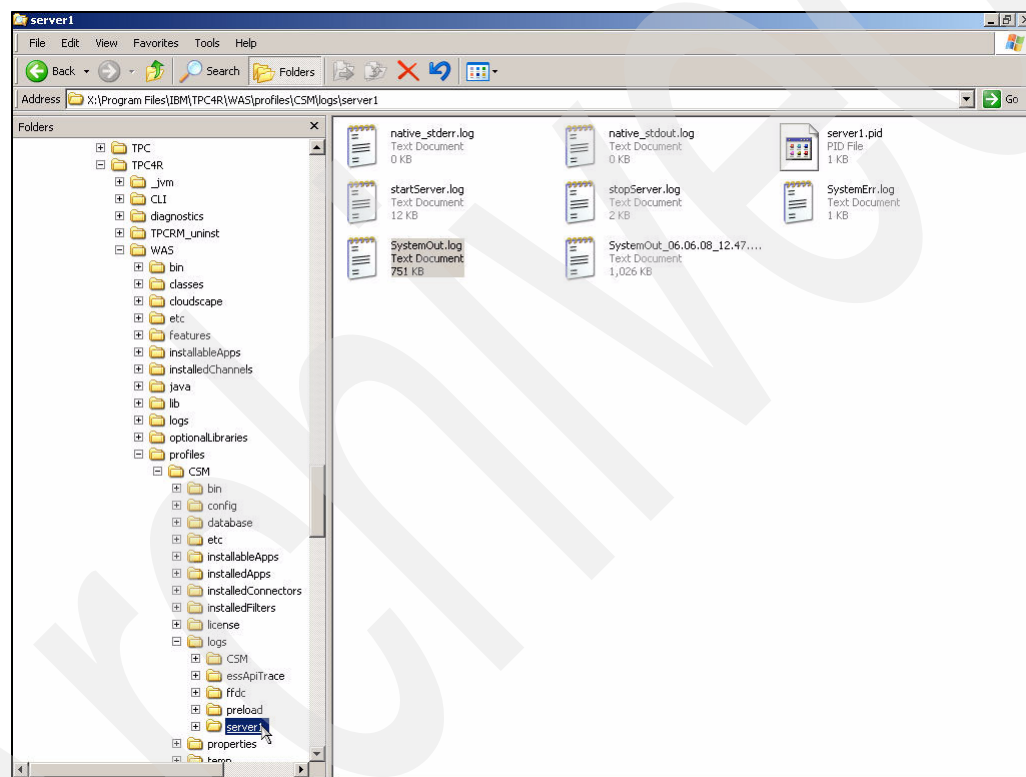


Figure 6-8 WAS logs

Additionally as shown in Figure 6-9 on page 388, the various CSM trace files provide a useful diagnostic tool.

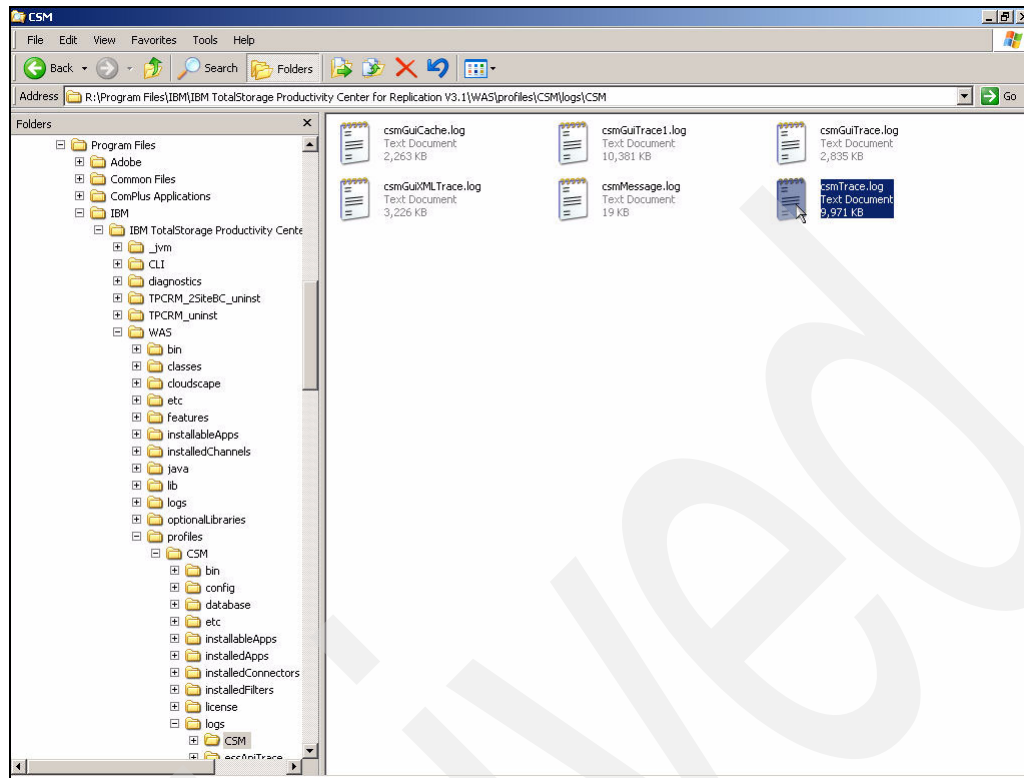


Figure 6-9 CSM trace files

6.9 Global Mirror

The TPC for Replication design only supports a single Global Mirror session to be active for IBM ESS 800, DS6000 and DS8000 when they are the source subsystem for a Global Mirror relationship. You cannot have more than one Global Mirror sessions running using the same subsystem as the source twice. However, it is possible to use other LSSs from the source subsystem on the first GM relationship as the target LSSs on another Global Mirror relationship. Keep in mind however, that in this scenario, performing a failover/failback would not be possible because it would cause a subsystem to be the source for two Global Mirror sessions. Furthermore, to be able to perform a failover/failback you need to remove one session. Thus, it is not recommended to have more than one Global Mirror session.

6.10 Auto refresh

You can customize the auto refresh by going to the *My Work* panel on the left-hand side on the main menu. Click *Advanced Tools*. The *Advanced Tools* panel will then appear. Under the *Set browser auto-refresh rate*, you can define the refresh rate for all non-wizard panels. The default auto-refresh time is 30 seconds.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this Redbooks publication.

IBM Redbooks

For information about ordering these publications, see “How to get IBM Redbooks” on page 389. Note that some of the documents referenced here may be available in softcopy only.

- ▶ *IBM System Storage DS8000 Series: Copy Services with IBM System z*, SG24-6787
- ▶ *IBM System Storage DS8000 Series: Copy Services in Open Environments*, SG24-6788
- ▶ *IBM System Storage DS6000 Series: Copy Services with IBM System z*, SG24-6782
- ▶ *IBM System Storage DS6000 Series: Copy Services in Open Environments*, SG24-6783
- ▶ *IBM TotalStorage Productivity Center for Replication on AIX*, SG24-7407
- ▶ *IBM TotalStorage Productivity Center for Replication on Linux*, SG24-7411

Other publications

These publications are also relevant as further information sources:

- ▶ *IBM TotalStorage Productivity for Replication Installation and Configuration Guide*, SC32-0102

Online resources

These Web sites and URLs are also relevant as further information sources:

- ▶ TotalStorage Productivity Center publications
<http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp/>
- ▶ TotalStorage Productivity Center technical support site
<http://www-03.ibm.com/servers/storage/support/software/tpc/>

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IBM TotalStorage Productivity Center for Replication Version 3, Release 1 brings support for the advanced copy services capabilities on the DS8000 and DS6000, in addition to the support for ESS model 800 and SVC. This support focuses on automating administration and configuration of these services, operational control (starting, suspending, resuming) copy services tasks and monitoring and managing the copy services sessions.

In addition to the support for FlashCopy and Metro Mirror, TotalStorage Productivity Center for Replication V3R1 supports Global Mirror on the ESS800, DS8000, and DS6000 hardware platforms. Advanced disaster recovery functions are also supported with failover/failback (planned and unplanned) from a primary site to a disaster recovery site. TotalStorage Productivity Center for Replication also can monitor the performance of the copy services that provide a measurement of the amount of replication and the amount of time that is required to complete the replication operations.

This IBM Redbooks publication provides the information you need to install TotalStorage Productivity Center for Replication, and create and manage replication sessions on a Windows 2003 platform. Scenarios are provided that document the work performed in our laboratory setting, using the GUI and CLI.

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