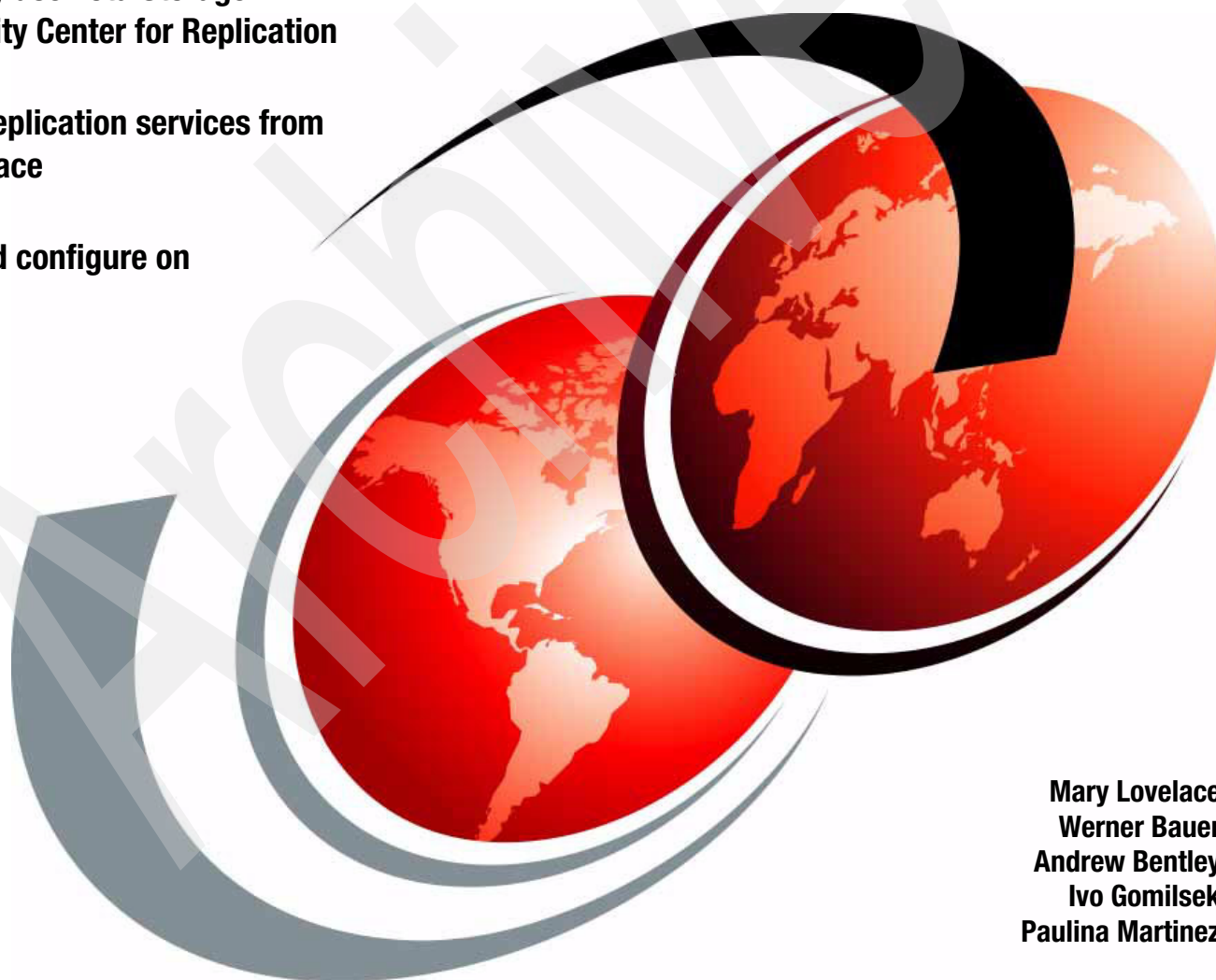


IBM TotalStorage Productivity Center for Replication on Linux

Effectively use TotalStorage
Productivity Center for Replication

Manage replication services from
one interface

Install and configure on
Linux



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Redbooks



International Technical Support Organization

**IBM TotalStorage Productivity Center for Replication
on Linux**

May 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 (May 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 Linux® platform.

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

- ▶ *IBM TotalStorage Productivity Center for Replication on Windows*, SG24-7250
- ▶ *IBM TotalStorage Productivity Center for Replication on AIX*, SG24-7407

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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

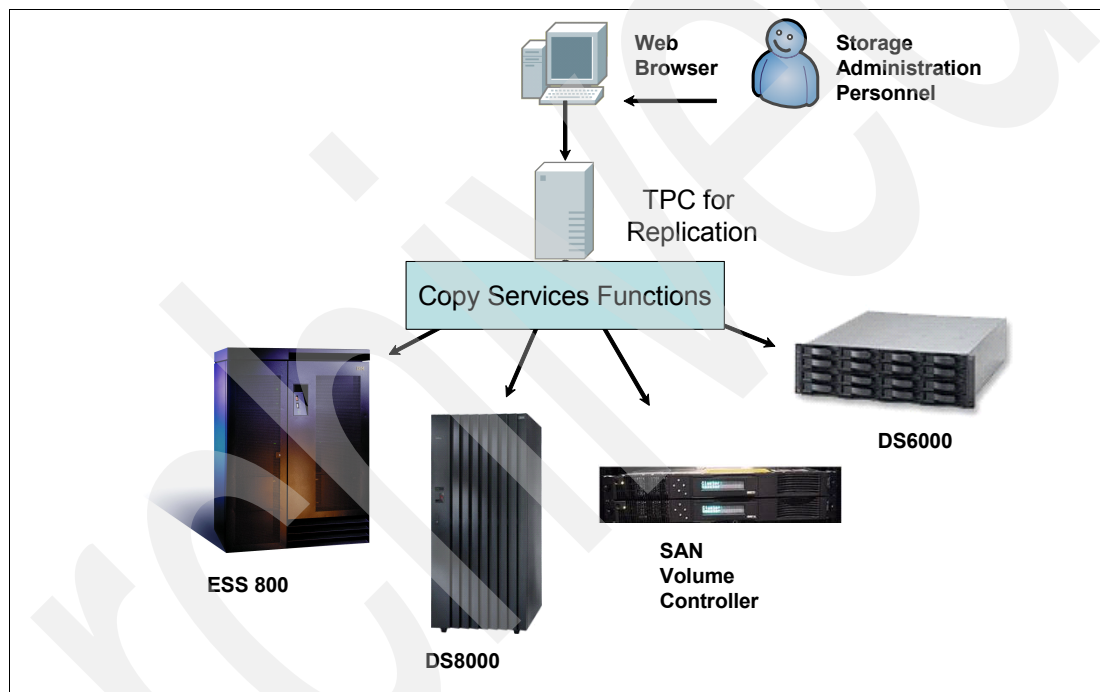


Figure 1-1 TPC for Replication environment

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.

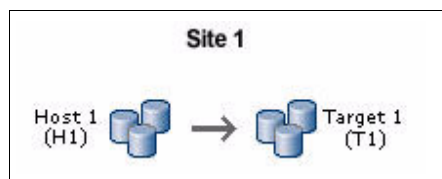


Figure 1-2 Flashcopy session

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.

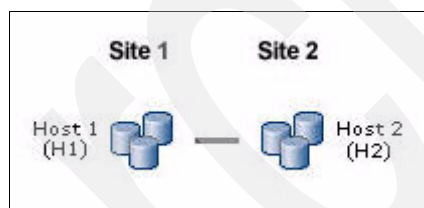


Figure 1-3 Metro Mirror session

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

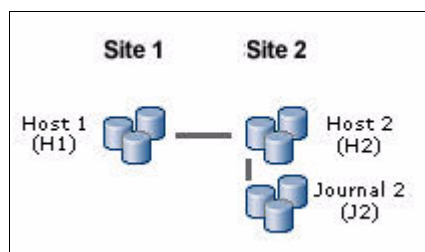


Figure 1-4 Global Mirror session

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.

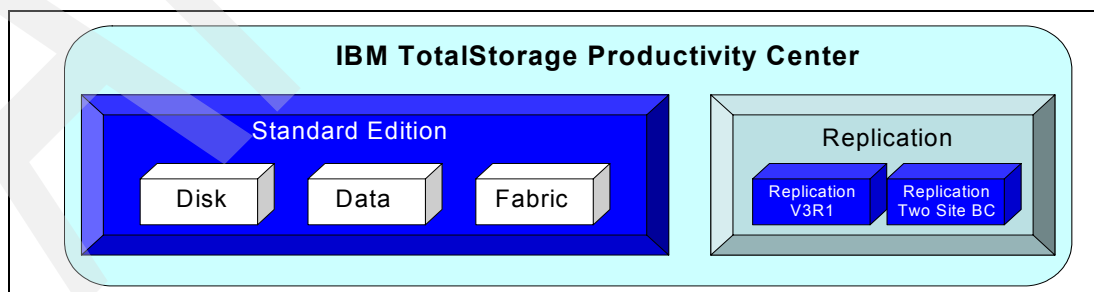


Figure 1-5 TotalStorage Productivity Center product set

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.

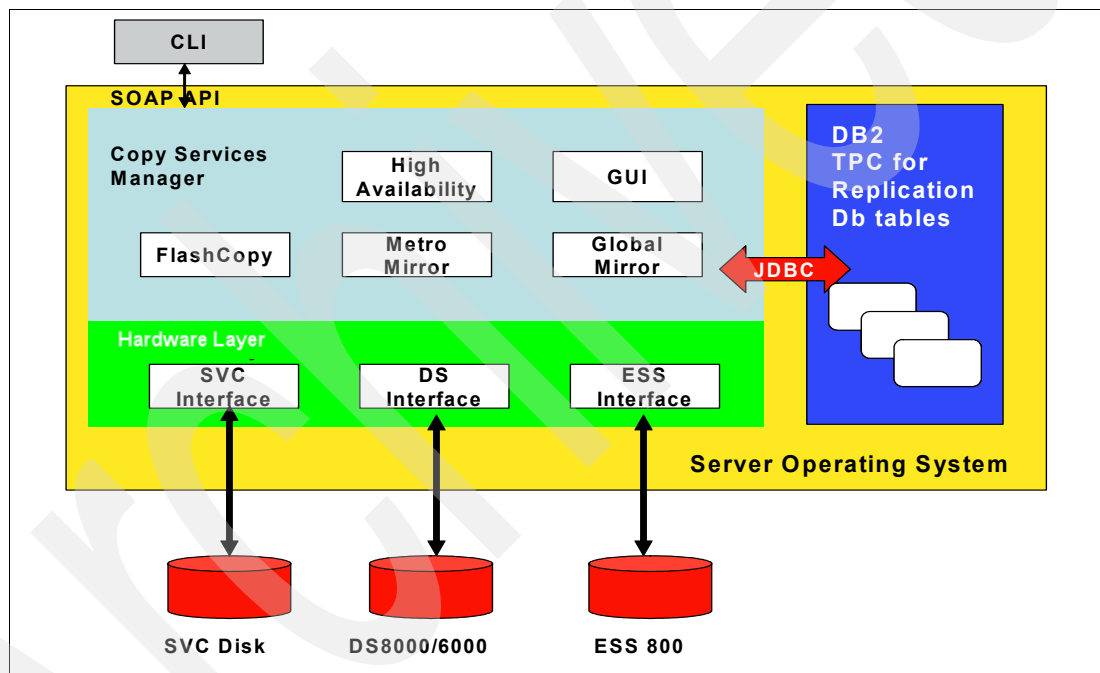


Figure 1-6 Application design

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.

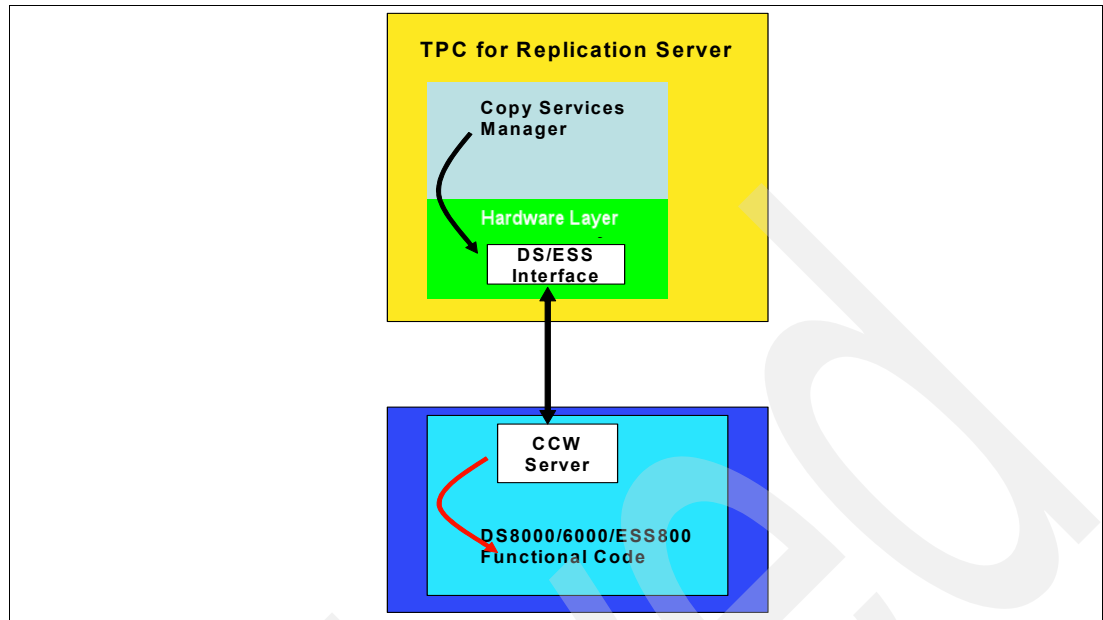


Figure 1-7 CSM to storage communications

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.

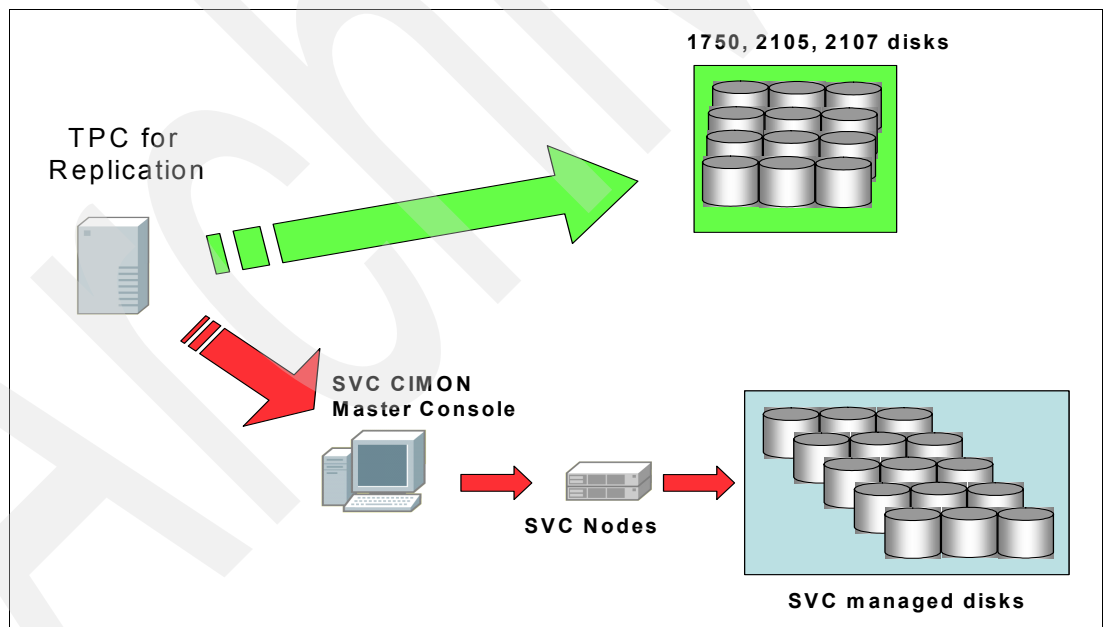


Figure 1-8 Server to hardware communications

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.

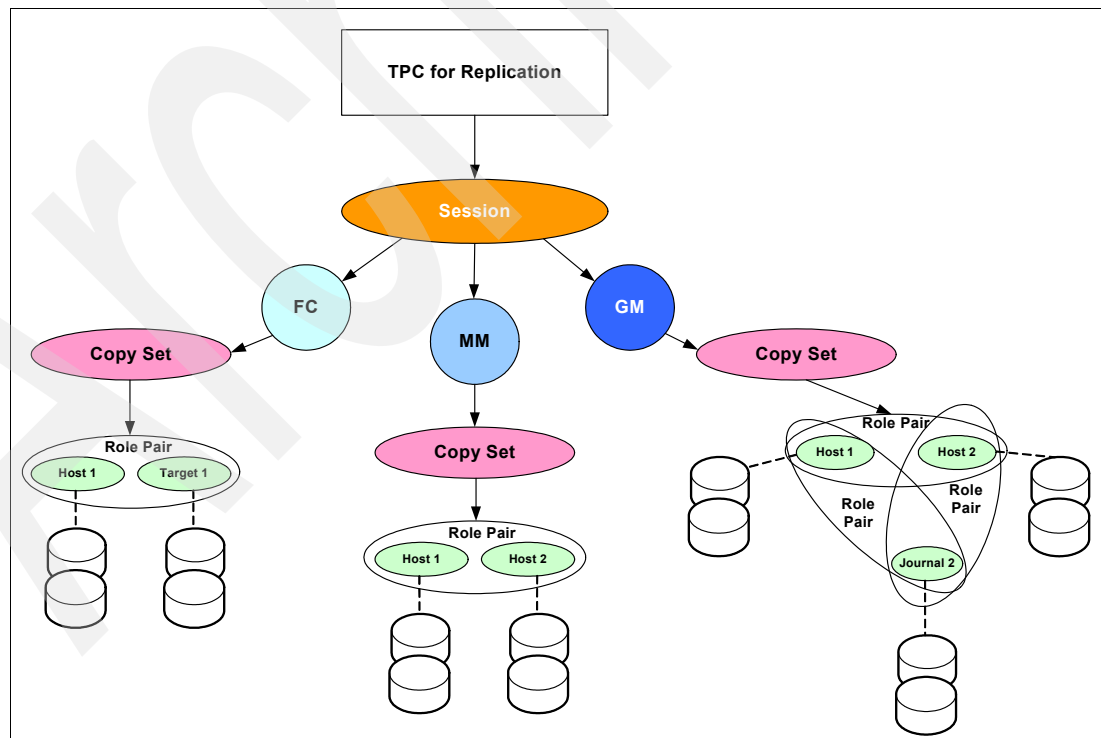


Figure 1-9 TotalStorage Productivity Center for Replication terminology

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.

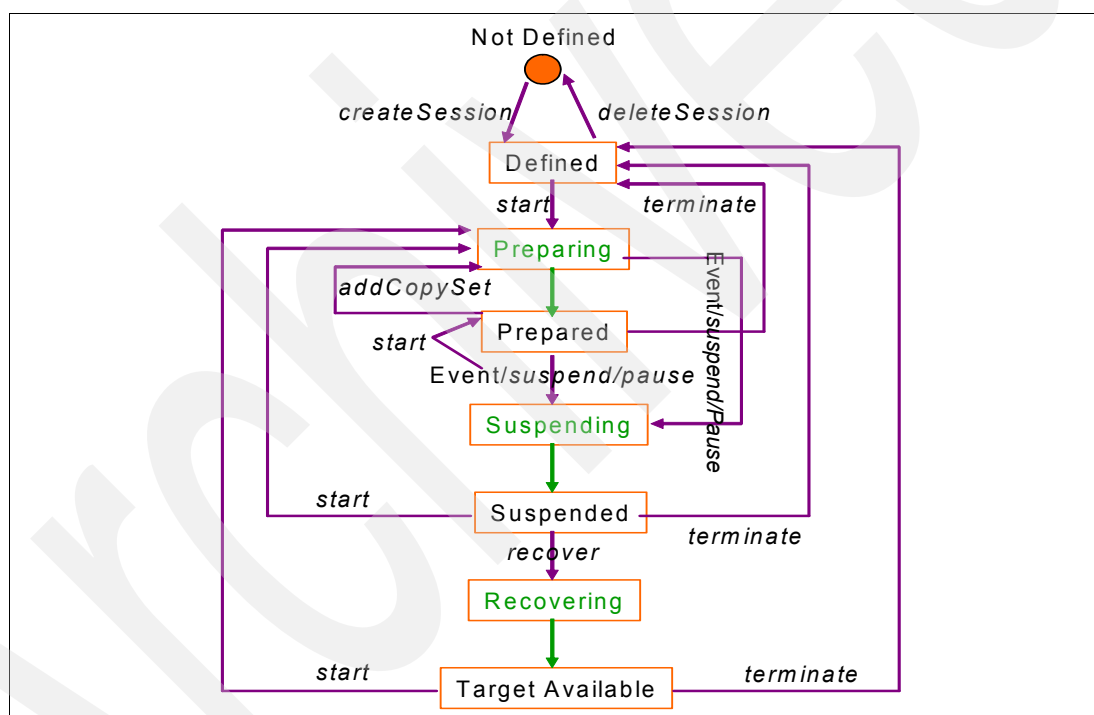


Figure 1-10 Session state transition - continuous replication

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

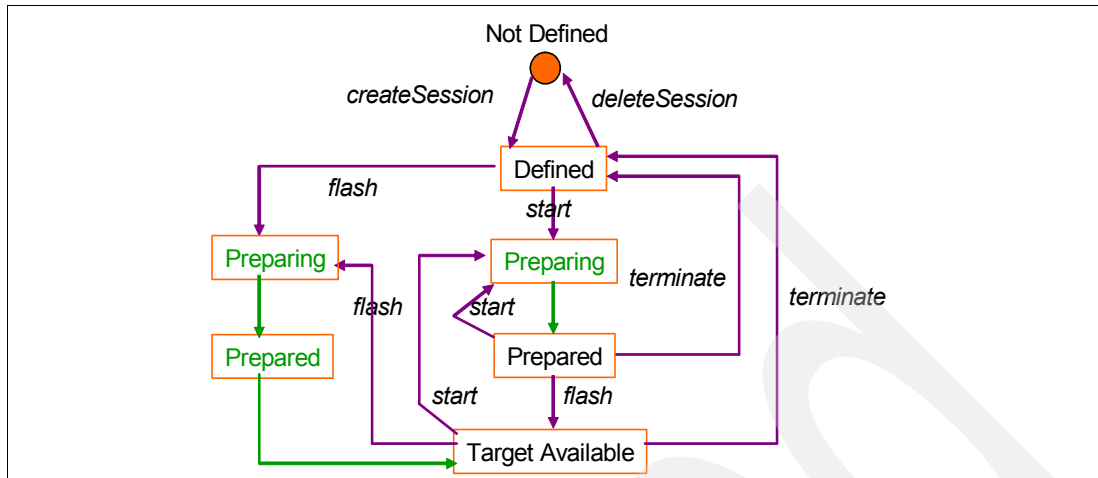


Figure 1-11 Session state transition - point in time

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.
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 shows the HTML layout of the interface

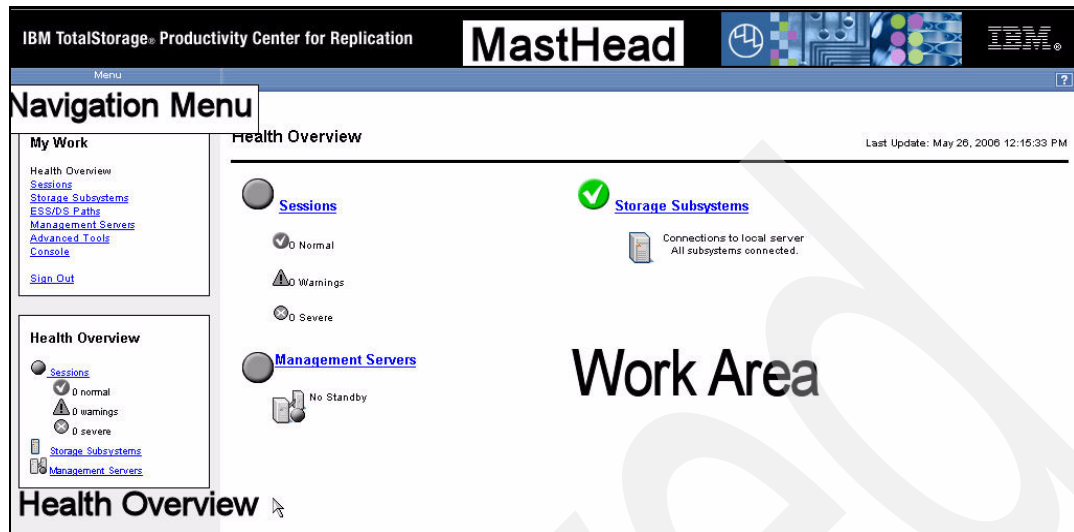


Figure 1-12 GUI Interface Layout

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 below in Table 1-4.

- ▶ **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.
	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 15 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.

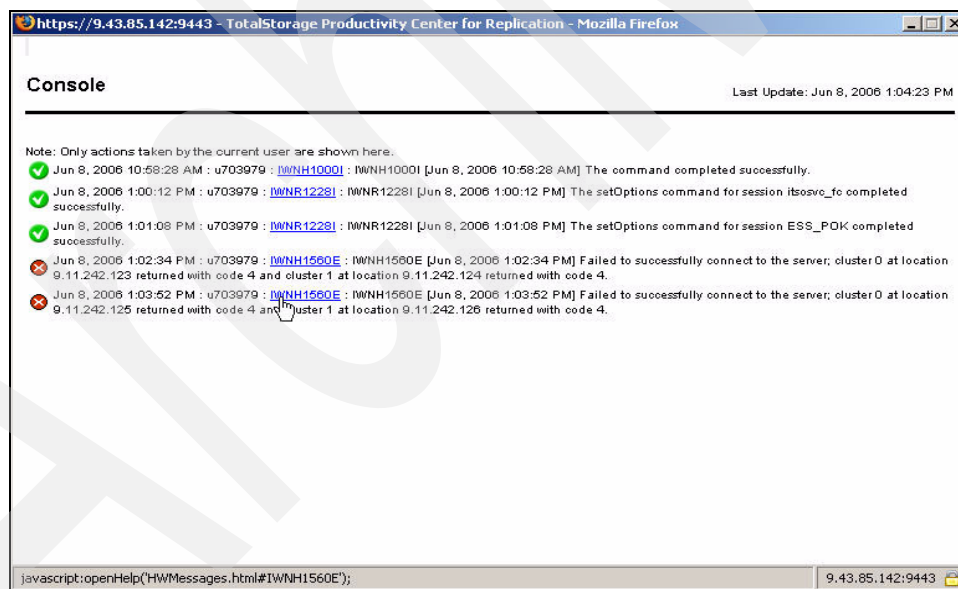


Figure 1-14 Console panel

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.

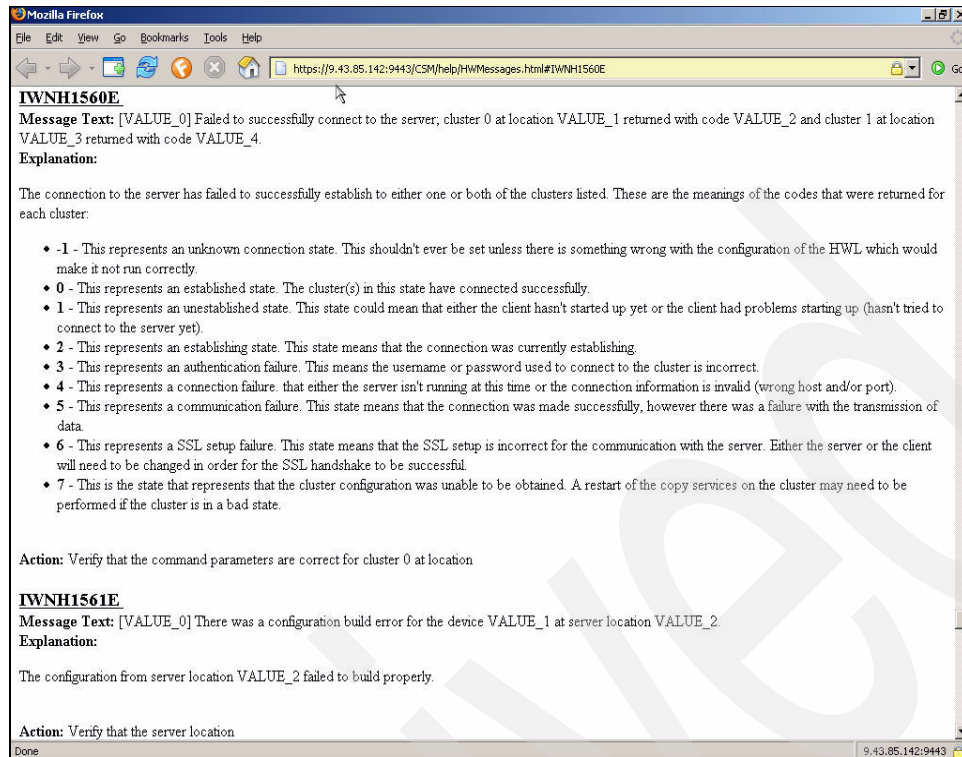


Figure 1-15 Help panel

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 **mksses** 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> csmcli mkcpset -cptype fc mySession**
- ▶ Script
 - **cli> csmcli -script ~/scripts/volreport**
- ▶ Interactive
 - **cli> csmcli**

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 **csmcli 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 **csmcli 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        mkssess    setoutput
hareconnect    lsrolepairs   mksnmp     setparameter
hatakeover     lsrolescset   quit       setstdby
help           lssess        repcli     showcset
lsavailports   lssessactions rmcset     showdevice
lscset         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 225.

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.

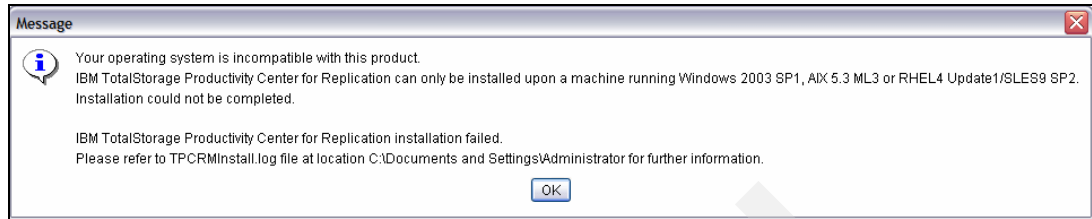


Figure 2-1 Error message for incompatible operating system

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).

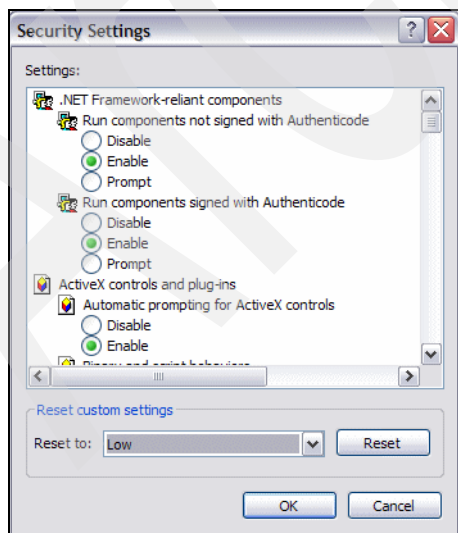


Figure 2-2 Resetting custom settings to Low

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.

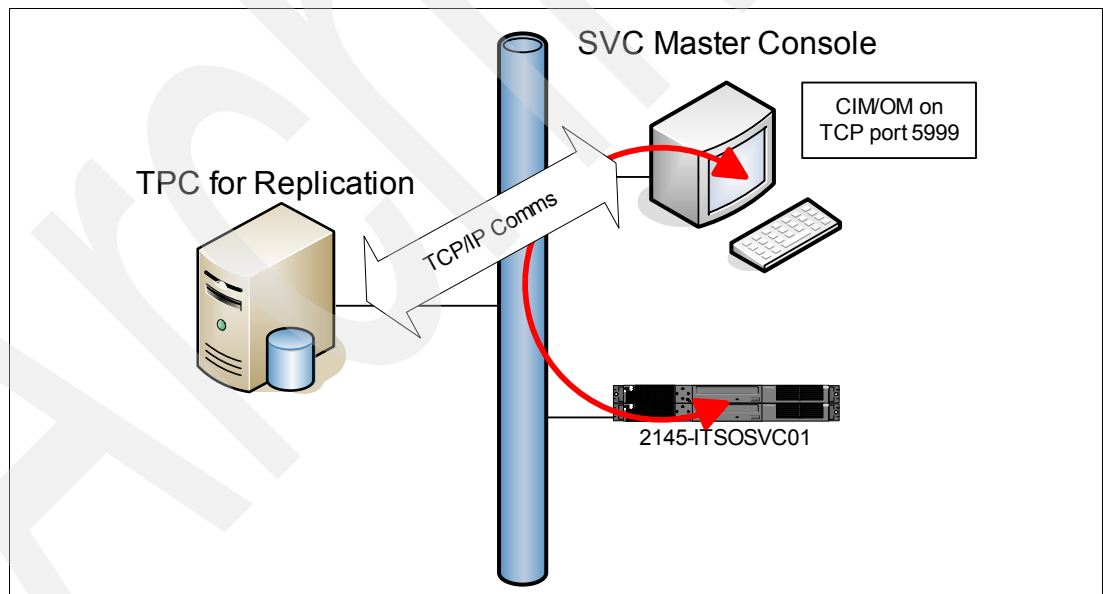


Figure 2-3 SVC communications

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.

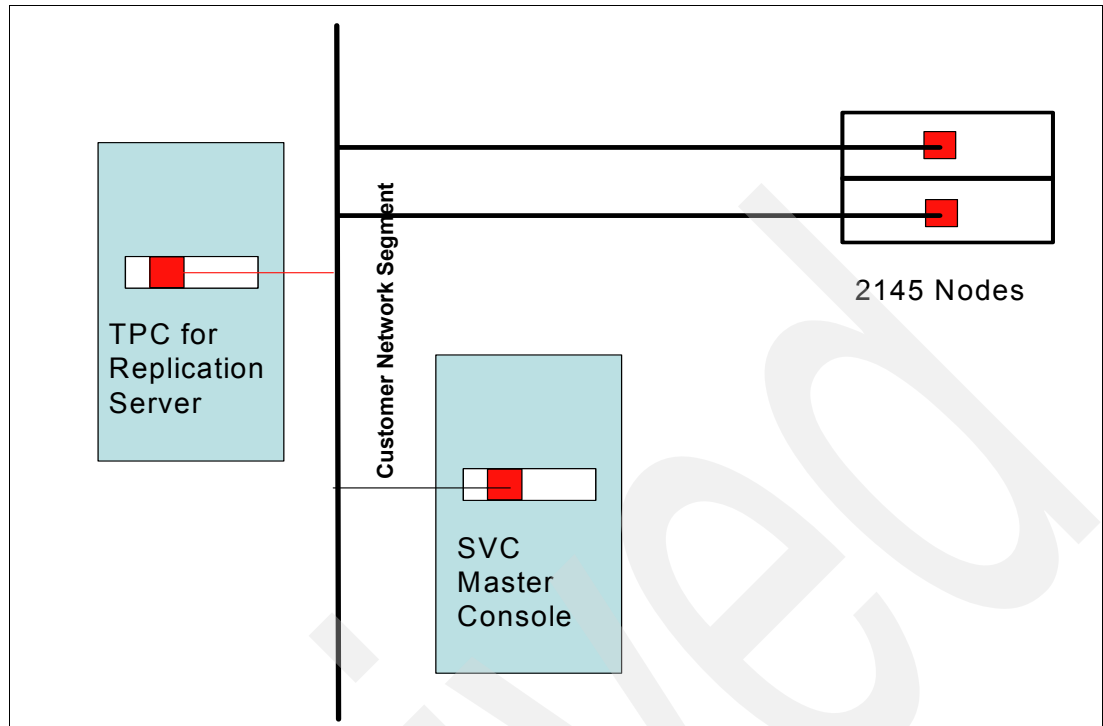


Figure 2-4 SVC cabling

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.

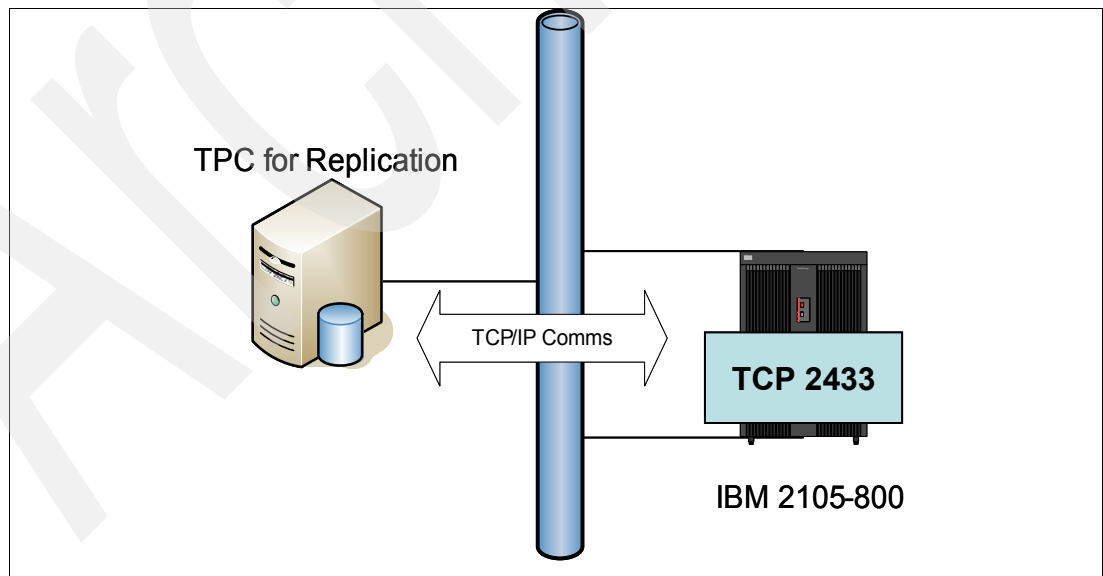


Figure 2-5 ESS communications

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.

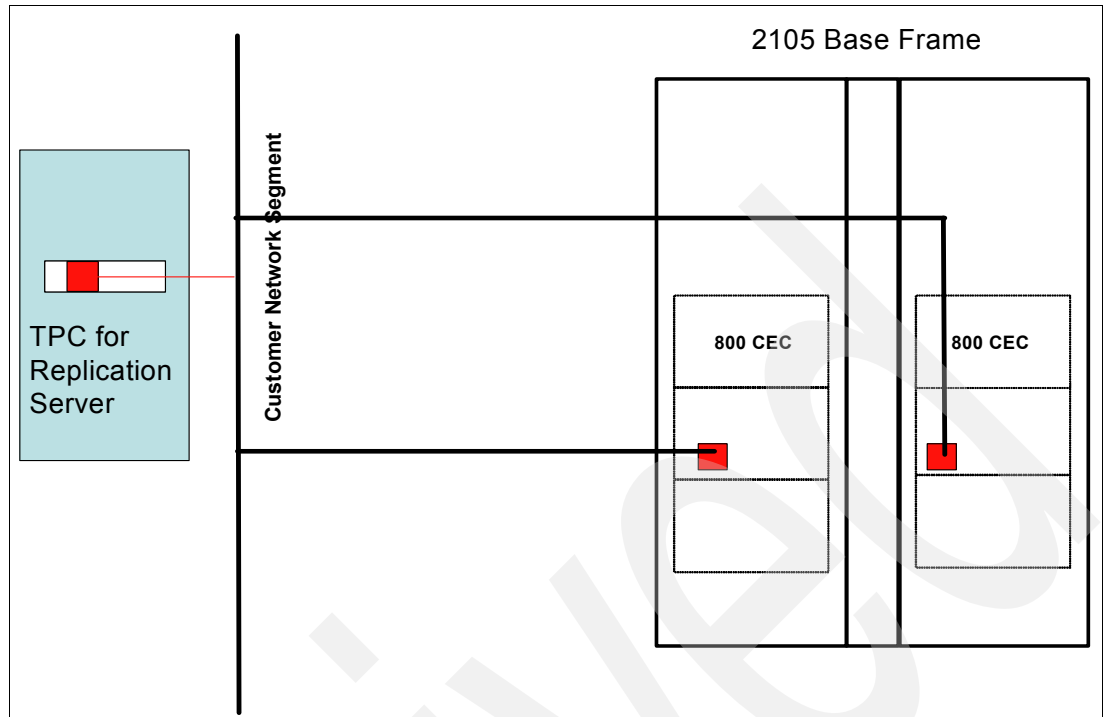


Figure 2-6 ESS connectivity

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 it connects to the DS6000.

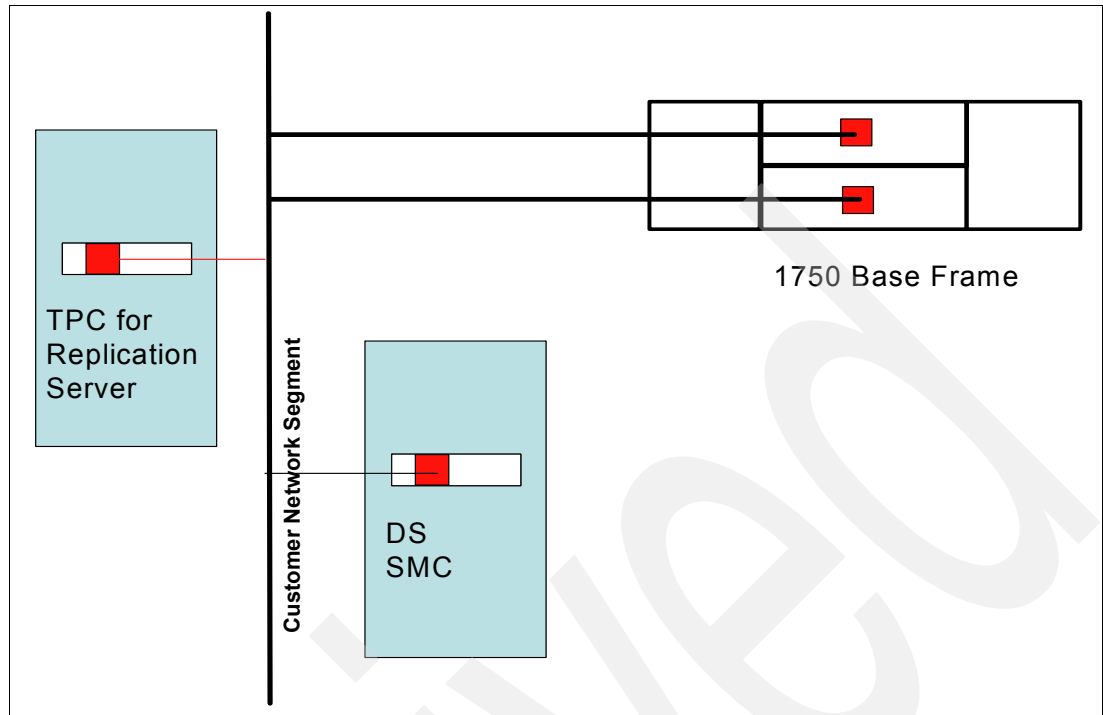


Figure 2-7 DS6000 connectivity

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.

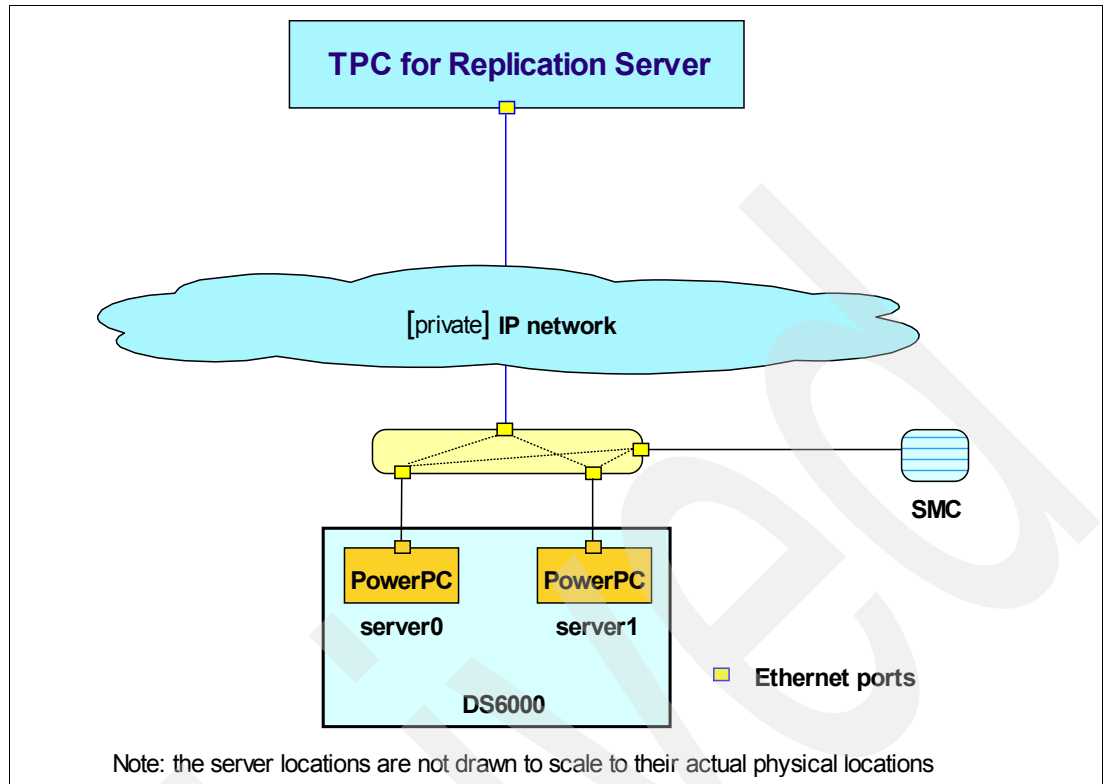


Figure 2-8 TPC for Replication server connection to DS6000

After TPC for Replication server connects to the DS6000 network, define the storage server, here the DS6000, to the TPC for Replication server.

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.

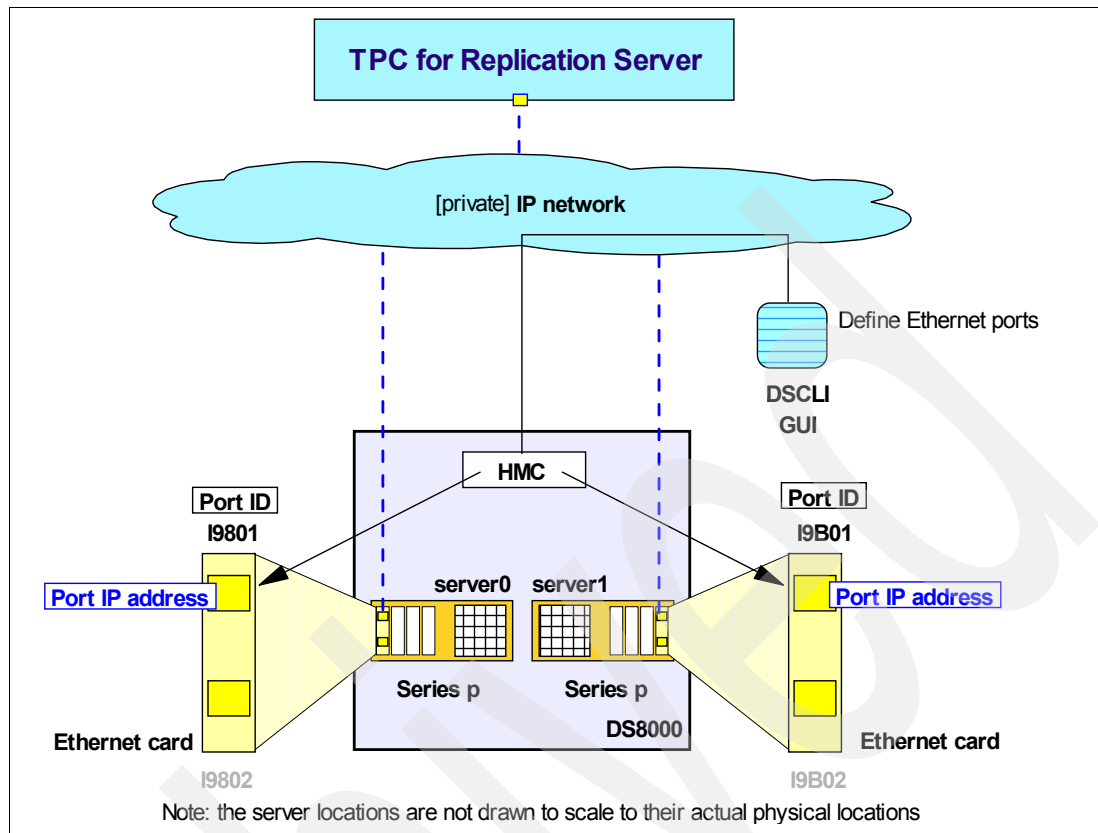


Figure 2-9 Define Ethernet ports for TPC for Replication server connectivity to DS8000

The HMC is used to configure these new Ethernet ports. This is done either through the DCLI 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.

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.

2.3.8 DS8000 Ethernet card configuration

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.

2.3.9 Define a DS6000 to TPC-RM through the GUI

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

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

Figure 2-10 shows the window 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.

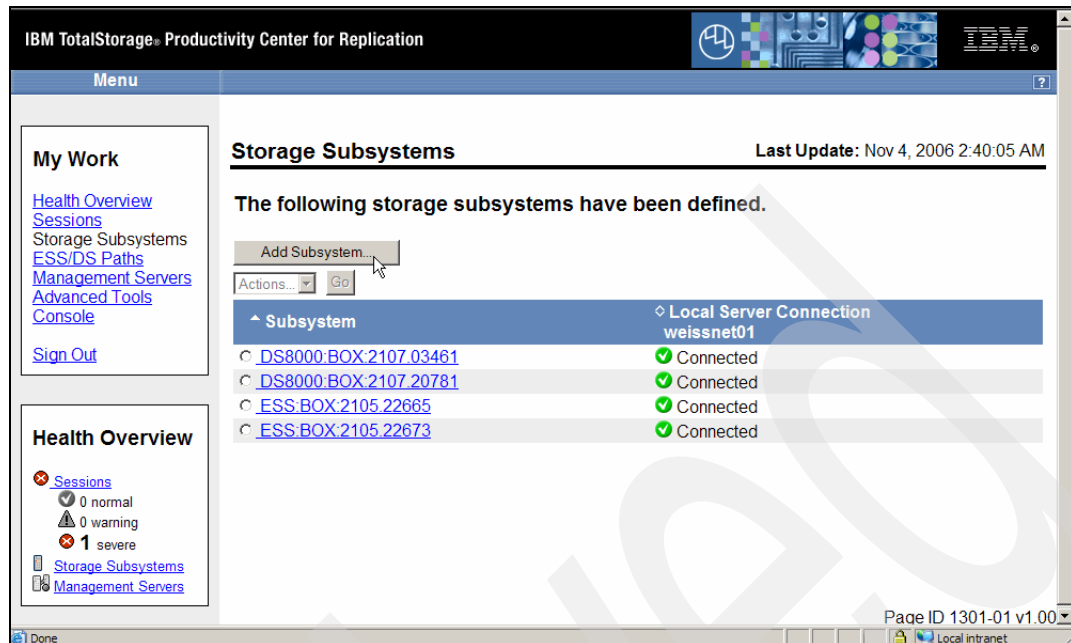


Figure 2-10 Add Storage Subsystem to RM server - start with Storage Subsystems in My Work

Figure 2-11 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 then click OK to continue.

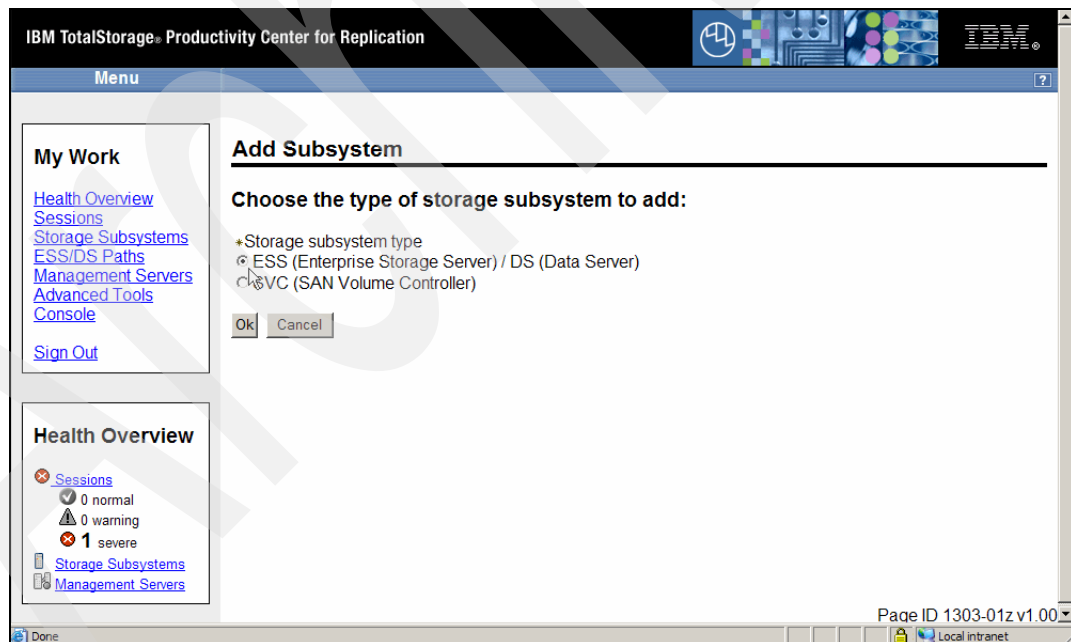


Figure 2-11 Add Storage Subsystem to RM server - Select ESS / DS radio button

Figure 2-12 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 2-12 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. The panel in Figure 2-12 calls these servers *Cluster 0* and *Cluster 1*.

The port in Figure 2-12 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 2-12 on page 31 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 2-1 shows an example of the DS6800 based username and password file.

Example 2-1 DS6800 based file which contains username and password

```
1
tpc passw0rd
```

In Figure 2-12 on page 31, 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 2-13. It shows the new box with a warning mark and in the process of *Connecting*.

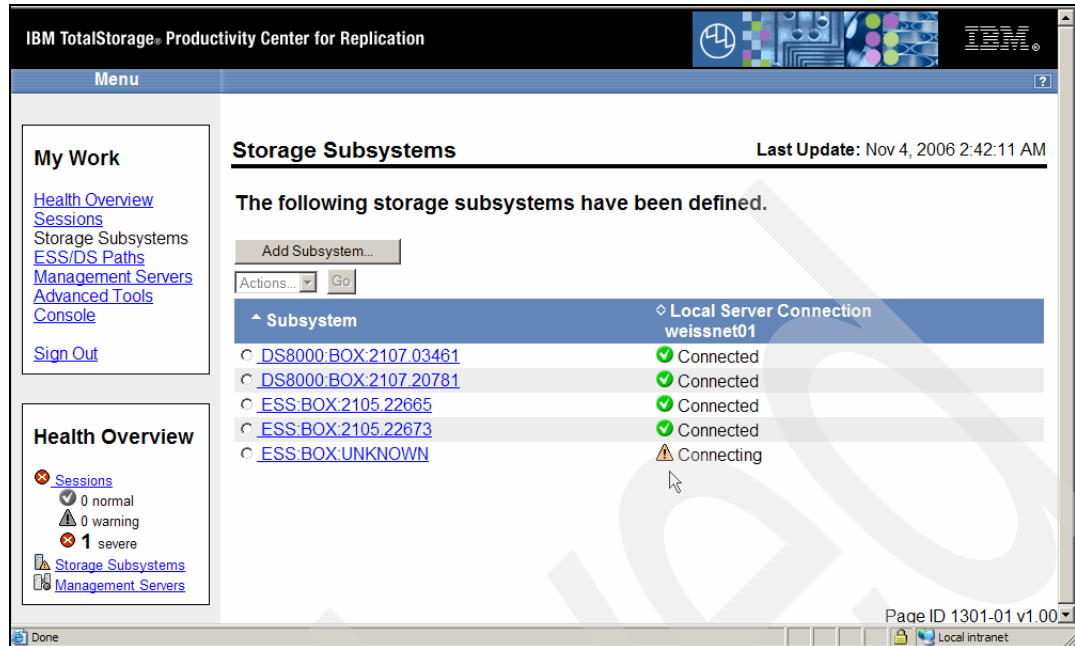


Figure 2-13 Add Storage Subsystem to RM server - RM server is about to connect to DS6000

After a brief period Figure 2-14 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.

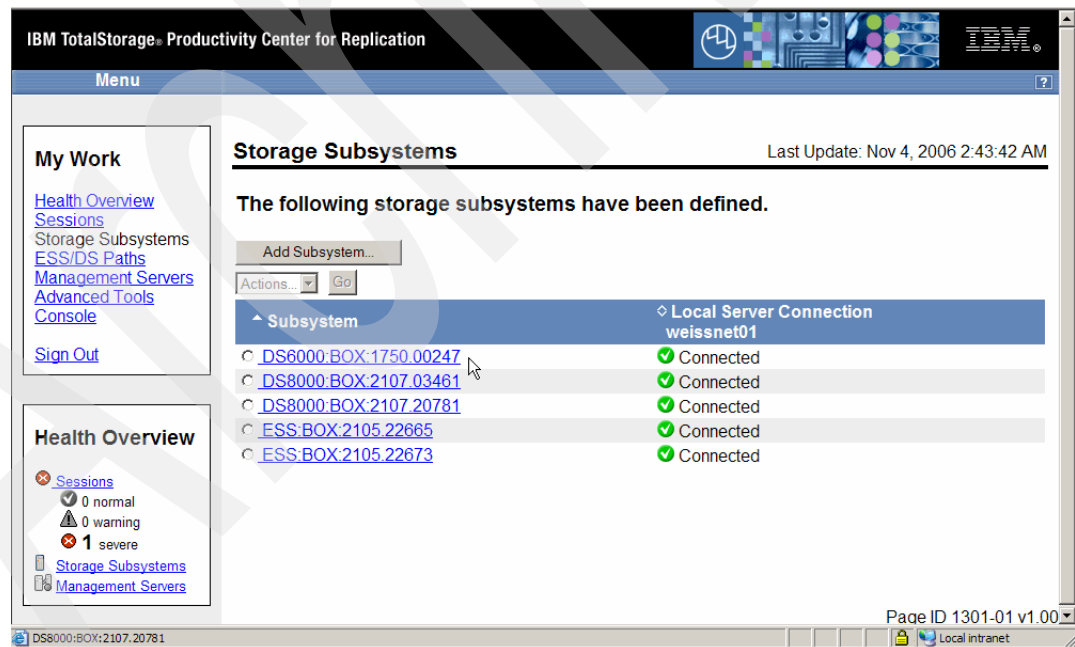


Figure 2-14 Add Storage Subsystem to RM server - completed

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

2.3.10 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 2-12 on page 31 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.

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 2-12 on page 31 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 2-2 shows this new command.

Example 2-2 New DSCLI command to alter the password

```
setrmppw -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.

2.3.11 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 2-3 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 2-3 Script file [lsdevice.txt](#) with delimiter separator request for output

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

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

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.

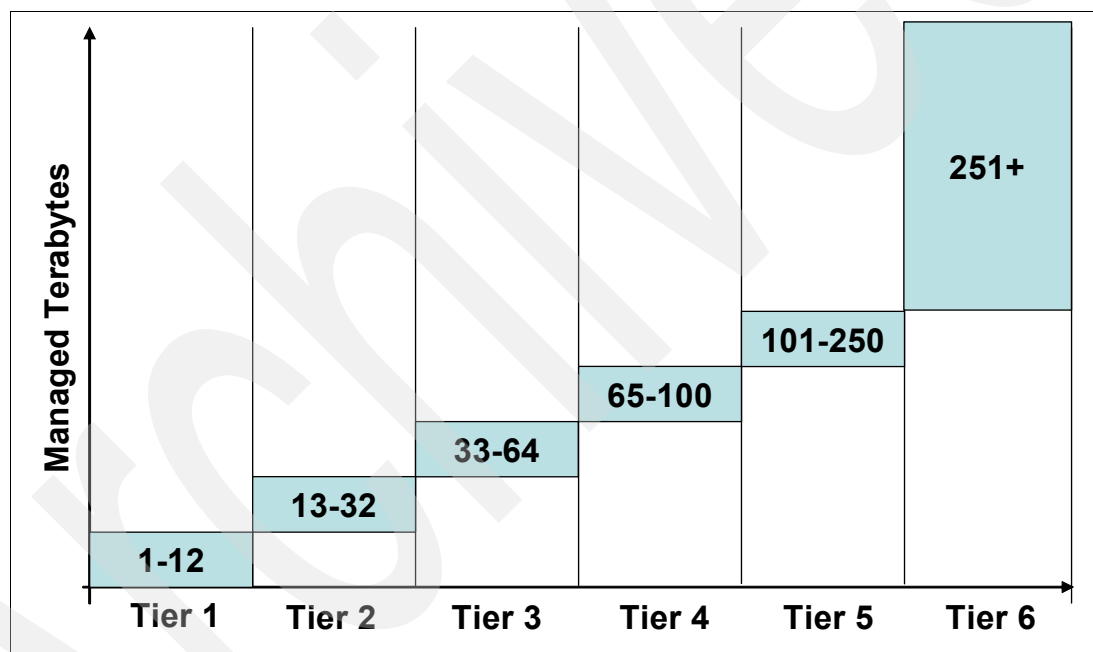


Figure 2-15 License tiering methodology

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 2-4. 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 2-4 Check port assignments in the system which is 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 2.2, “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.

Archived

Installation on Linux

This chapter takes you through the installation of TotalStorage Productivity Center for Replication on the Linux platform. In our example we used SUSE Linux Enterprise Server 9.

The TotalStorage Productivity Center for Replication (TPC for Replication) product utilizes 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 following message as shown in Figure 3-1.

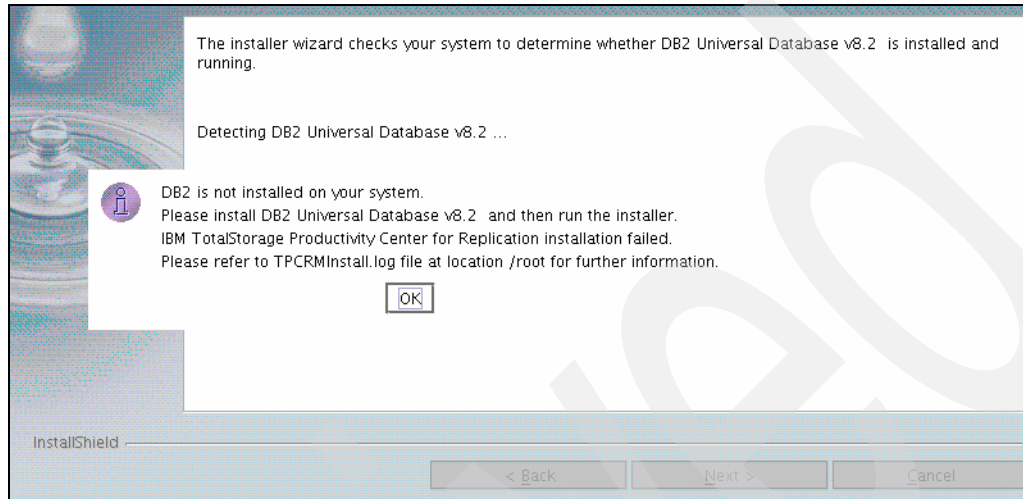


Figure 3-1 TPC for Replication - DB2 warning window

For installation on Linux, you begin the installation of DB2 by starting the **db2setup** command, as shown in Figure 3-2, from the **db2_82_express** directory found within your installation package or CD.

```
sles9spig:/media/cdrom/db2_82_express # ./db2setup
```

Figure 3-2 Running the **db2setup** command

The following figures contain the installation windows for the installation of DB2 UDB on to your designated TotalStorage Productivity Center for Replication Linux server. Upon starting the command **db2setup**, the DB2 launchpad window will be displayed as shown in Figure 3-3 on page 39.

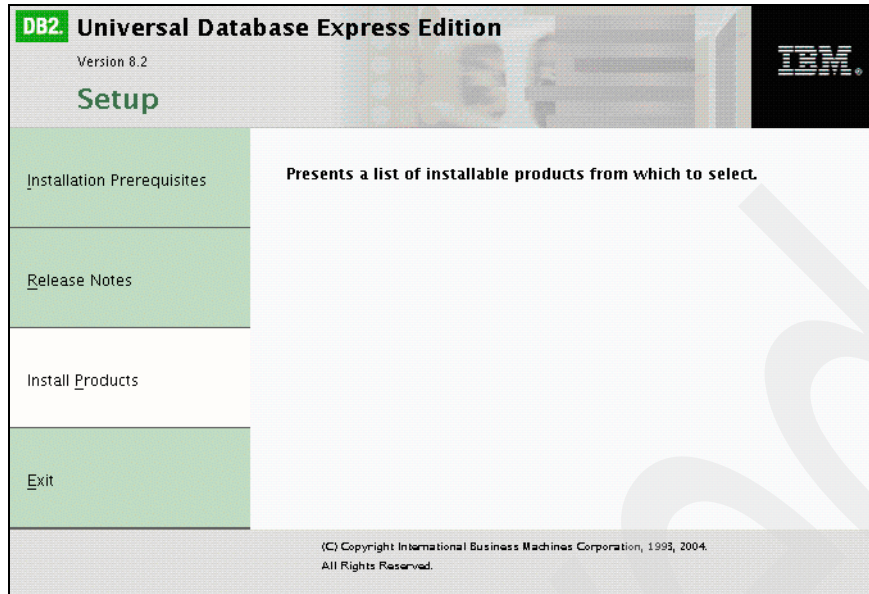


Figure 3-3 DB2 UDB Launchpad

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

After clicking **Install Product** you will see the *DB2 UDB Express Setup* window as shown in Figure 3-4.

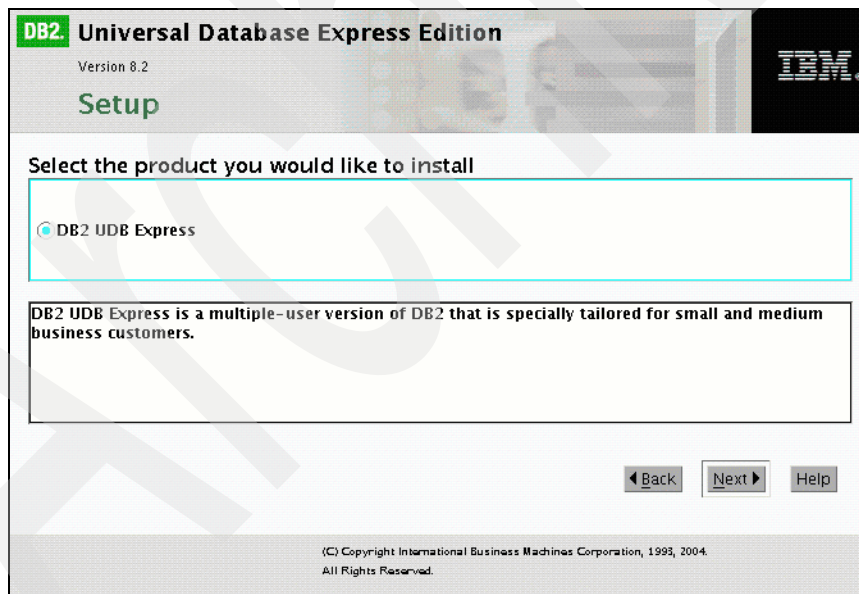


Figure 3-4 DB2 UDB installation

Click the **Next** button, you will see the DB2 Setup Wizard panel as shown in Figure 3-5 on page 40.

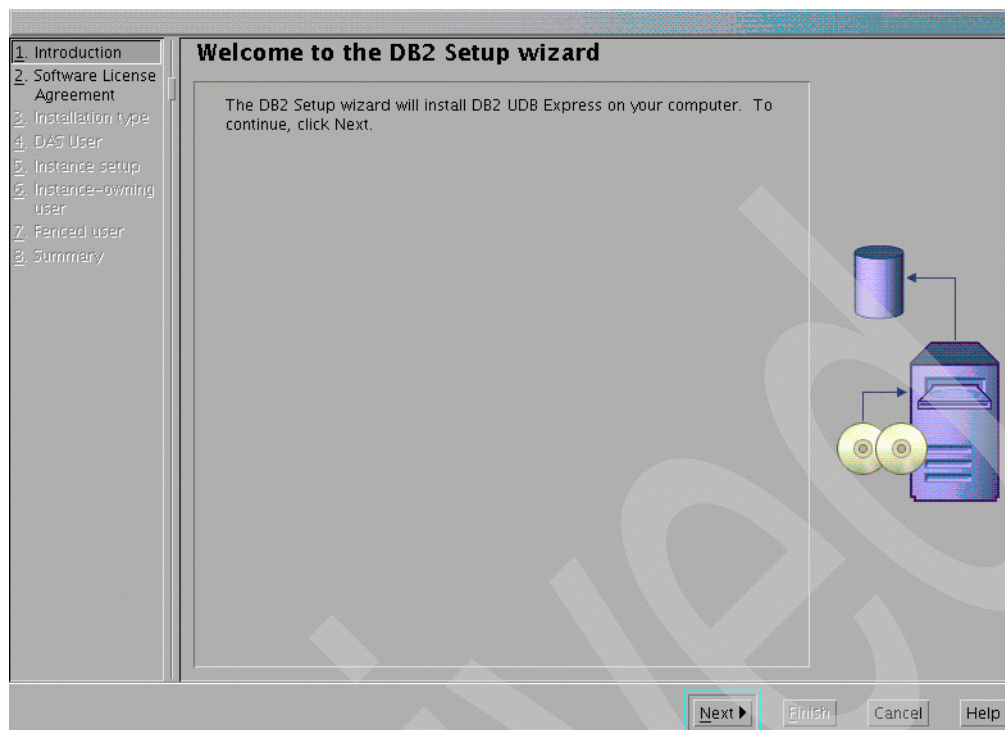


Figure 3-5 DB2 UDB Welcome to the DB2 Setup wizard

Click the **Next** button and the Licensing window is displayed as in Figure 3-6.

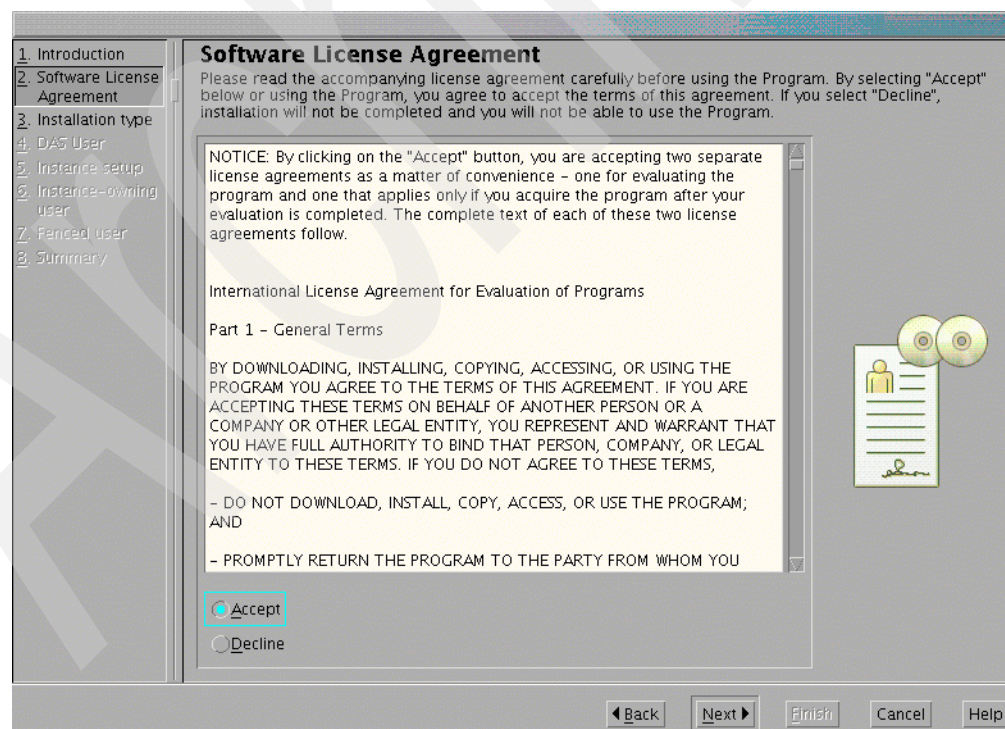


Figure 3-6 DB2 UDB Software License Agreement

Read and accept the licensing terms, then click **Next** to continue. The Select the installation type window will be displayed as shown in Figure 3-7 on page 41.

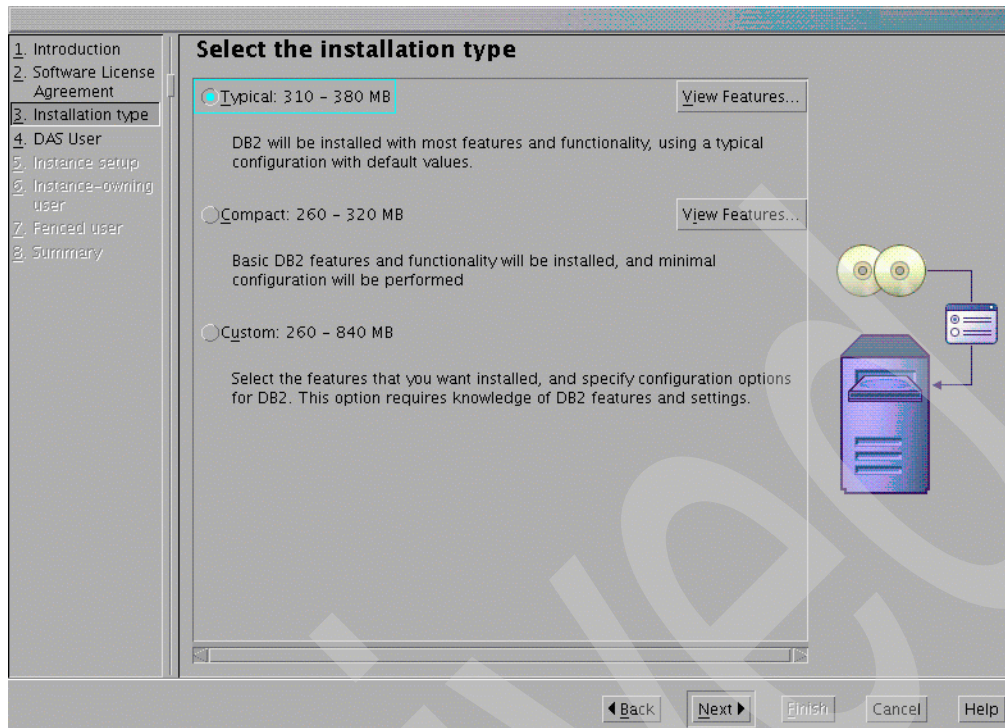


Figure 3-7 DB2 UDB Select the installation type

We recommend that you select **Typical** as your installation type as this will install all the prerequisite components needed for your TotalStorage Productivity Center for Replication Server to function. Upon selection of Typical, click the **Next** button to display the *Set user information for the DB2 Administration Server* window as shown in Figure 3-8.

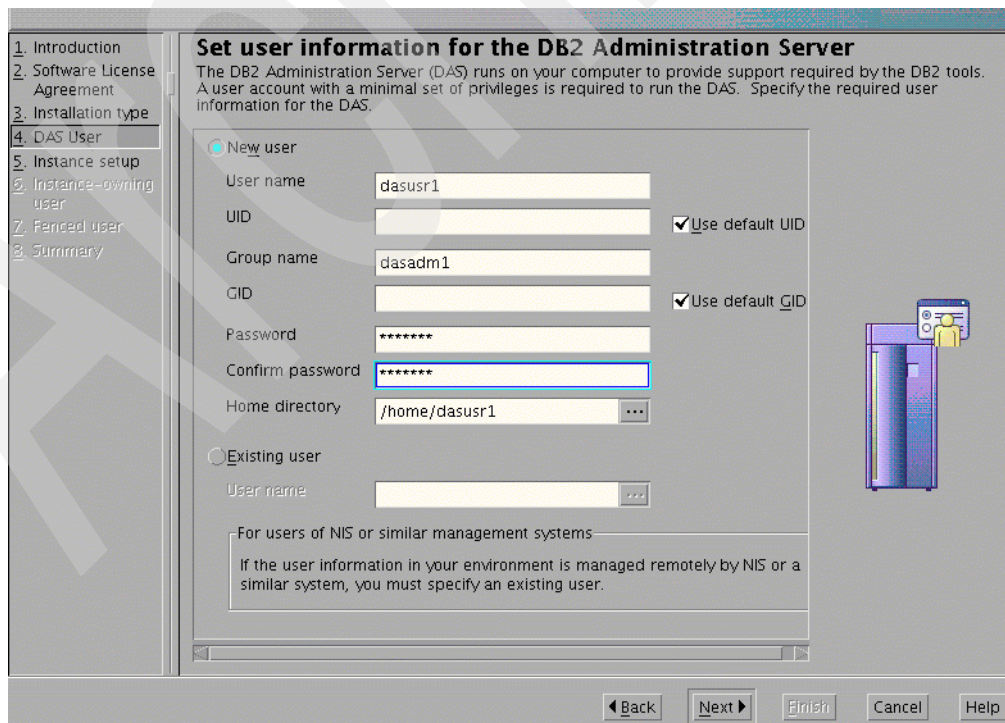


Figure 3-8 DB2 UDB Set user information for the DB2 Administration Server

Enter the desired settings for this user ID and click the **Next** button. This will display the Set up a DB2 instance window as shown in Figure 3-9.

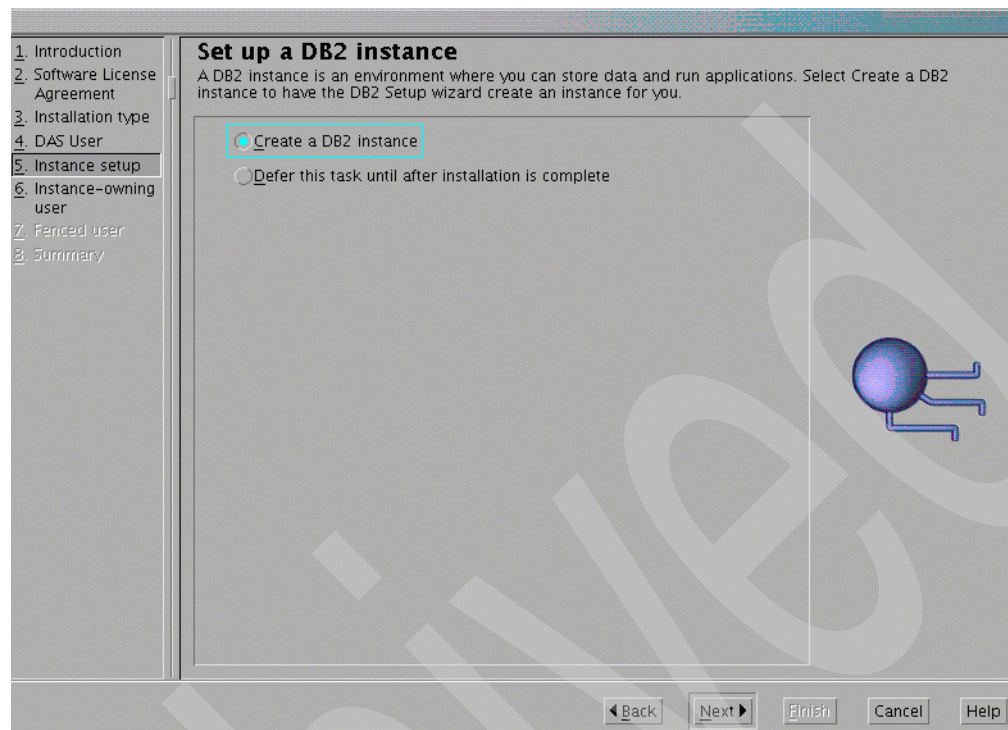


Figure 3-9 DB2 UDB Set up a DB2 instance

Select **Create a DB2 instance** and click the **Next** button to display the Set user information for the DB2 instance owner as shown in Figure 3-10.

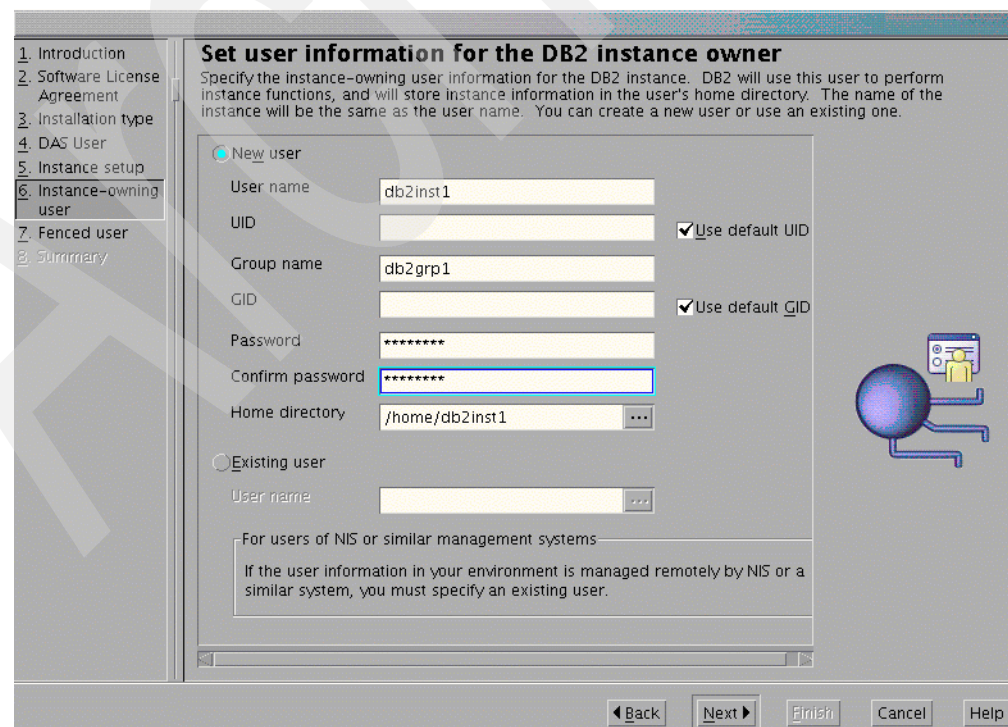


Figure 3-10 DB2 UDB Set user information for the DB2 instance owner

Type in desired settings for this user ID and click the **Next** button to display the Set user information for the fenced user window as shown in Figure 3-11.

Set user information for the fenced user

Enter the required user information for the fenced user. Fenced user defined functions (UDFs) and stored procedures will execute under this user and group. For security reasons it is recommended that you do not use the same user account for the fenced user as you used for the instance-owning user.

☒ **New user**

User name: db2fenc1

UID: ☒ Use default UID

Group name: db2fgrp1

GID: ☒ Use default GID

Password:

Confirm password:

Home directory: /home/db2fenc1

☐ Existing user

User name:

User administration

Local users and groups will be created if necessary.

Navigation: Back, Next, Finish, Cancel, Help

Figure 3-11 DB2 UDB Set user information for the fenced user

Type in desired settings for this user ID and click the **Next** button to display the Start copying files window as shown in Figure 3-12 on page 44. Should you want to change anything specific, now is your last chance. If you are satisfied with the options and configurations which you have supplied previously, select the **Finish** button to proceed with the DB2 installation.

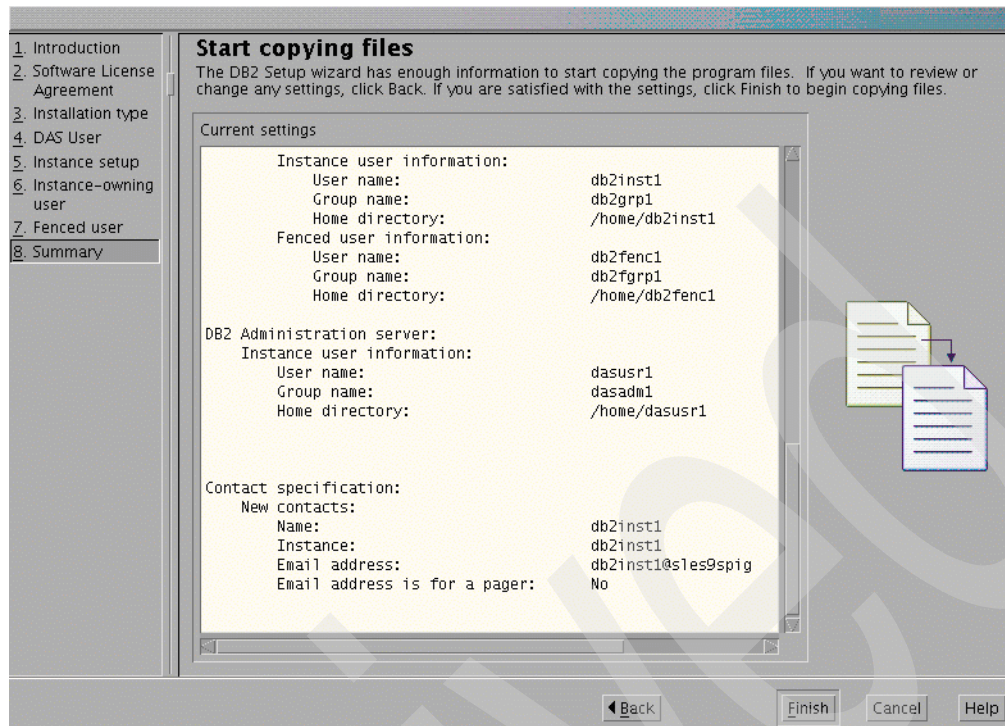


Figure 3-12 DB2 UDB Installation and configuration summary

Once all the files are installed, the *Setup is Complete* window is displayed as shown in Figure 3-13. From here, click the **Finish** button.

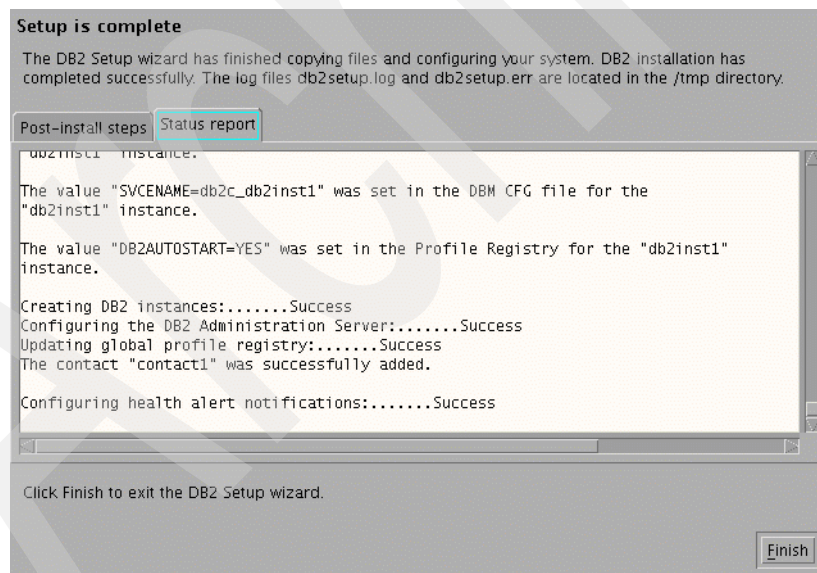


Figure 3-13 DB2 UDB installation complete

You have now completed the prerequisite DB2 installation and are now ready to install TotalStorage Productivity Center for Replication.

3.2 TPC for Replication installation

Before starting the installation you should verify that host name can be resolved. If you are not using DNS you should check for correct entry in `/etc/hosts` file. The example of `/etc/hosts` file for our installation is shown in Figure 3-14.

```
sles9spig:~ # cat /etc/hosts
#
# hosts          This file describes a number of hostname-to-address
#                mappings for the TCP/IP subsystem.  It is mostly
#                used at boot time, when no name servers are running.
#                On small systems, this file can be used instead of a
#                "named" name server.
# Syntax:
#
# IP-Address    Full-Qualified-Hostname  Short-Hostname
#
127.0.0.1       localhost

# special IPv6 addresses
::1            localhost ipv6-localhost ipv6-loopback

fe00::0        ipv6-localnet

ff00::0        ipv6-mcastprefix
ff02::1        ipv6-allnodes
ff02::2        ipv6-allrouters
ff02::3        ipv6-allhosts
172.31.4.63    sles9spig.site sles9spig
```

Figure 3-14 `/etc/hosts`

To start the Linux installation of TPC for Replication V3.1, run the **setuplinux.bin** found in the source installation directory or CD as shown in Figure 3-15.

```
sles9spig:/media/cdrom # ll
total 47141
dr-xr-xr-x  9 root root    2048 May 31 00:37 .
drwxr-xr-x  4 root root      96 Aug 10  2005 ..
dr-xr-xr-x 12 root root    2048 May 31 00:40 .rr_moved
dr-xr-xr-x 20 root root    4096 May 22 16:53 EmbeddedExpress_linux_ia32
dr-xr-xr-x  2 root root    2048 May 30 23:05 Scripts
dr-xr-xr-x  7 root root    2048 May 30 23:05 TPCRM
dr-xr-xr-x  4 root root    2048 May 22 16:54 db2_82_express
dr-xr-xr-x  2 root root    4096 May 22 16:54 eula
-rwxr-xr-x  1 root root 48249856 May 30 23:00 setuplinux.bin
dr-xr-xr-x  2 root root    4096 May 30 23:05 supportfiles
sles9spig:/media/cdrom # ./setuplinux.bin
```

Figure 3-15 TPC for Replication directory

After the start of installation *Welcome* window will be displayed as shown in Figure 3-16 on page 46.

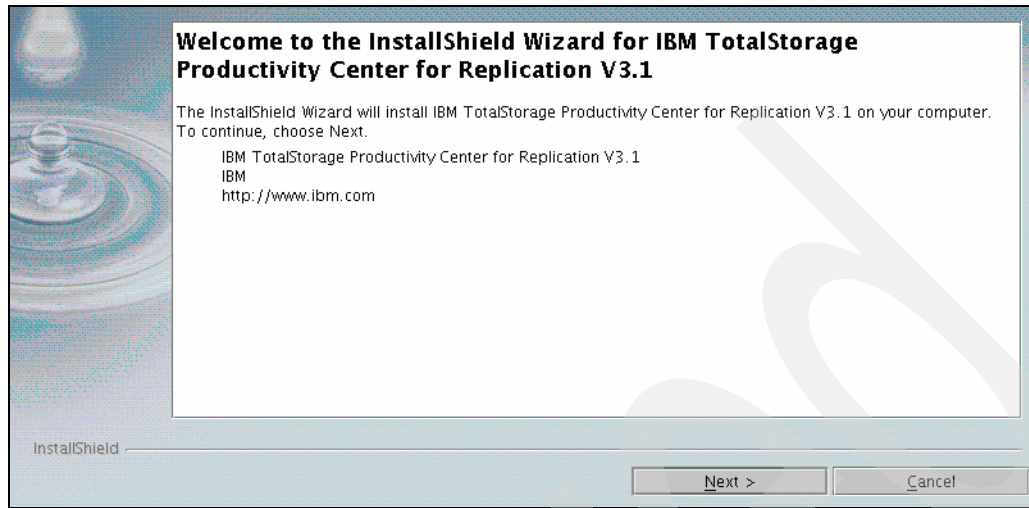


Figure 3-16 TPC for Replication Welcome window

Click **Next** to continue installation. In this step the installation program will check your system for prerequisites. If your system has all the required prerequisites you will see window similar to Figure 3-17.

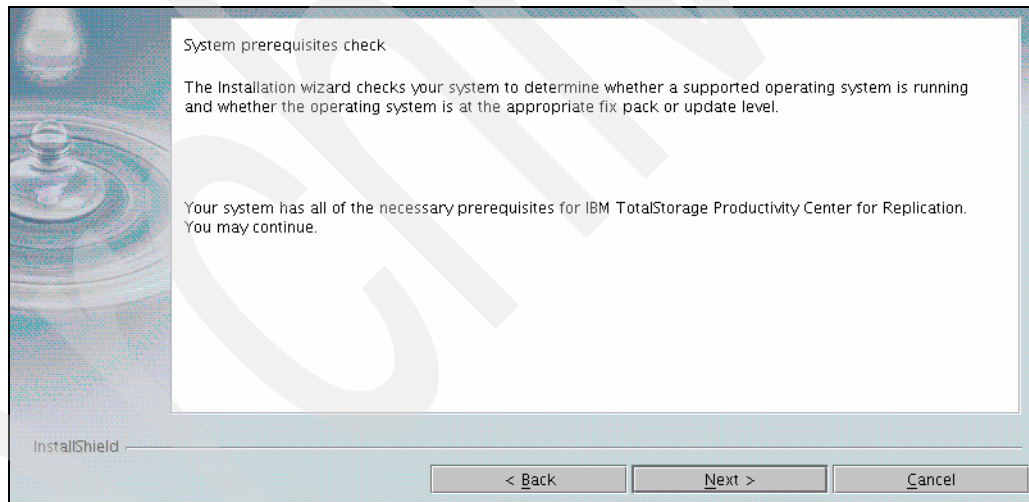


Figure 3-17 TPC for Replication System prerequisites check

Click **Next** to continue installation and the *License* window will be displayed as shown in Figure 3-18 on page 47.

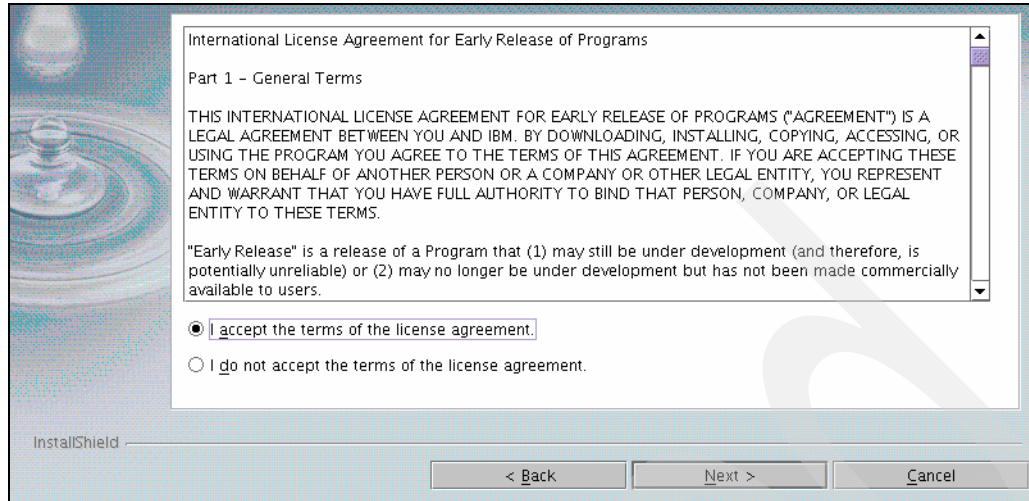


Figure 3-18 TPC for Replication License window

Read and accept the license, then click **Next** to continue. The installation program will check for the presence of DB2 and report findings as shown in Figure 3-19.

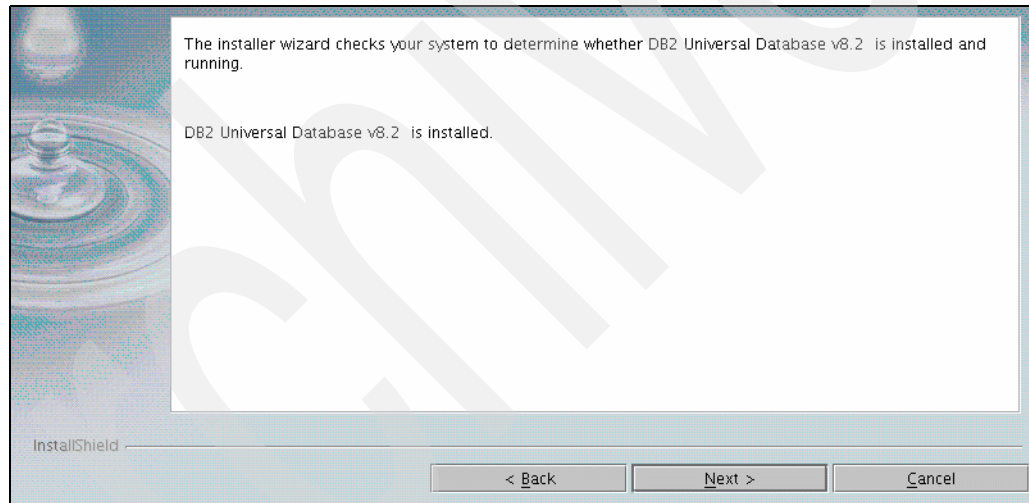


Figure 3-19 TPC for Replication DB2 check

Click **Next** to continue the installation. The *Target directory* window will be displayed as shown in Figure 3-20 on page 48.

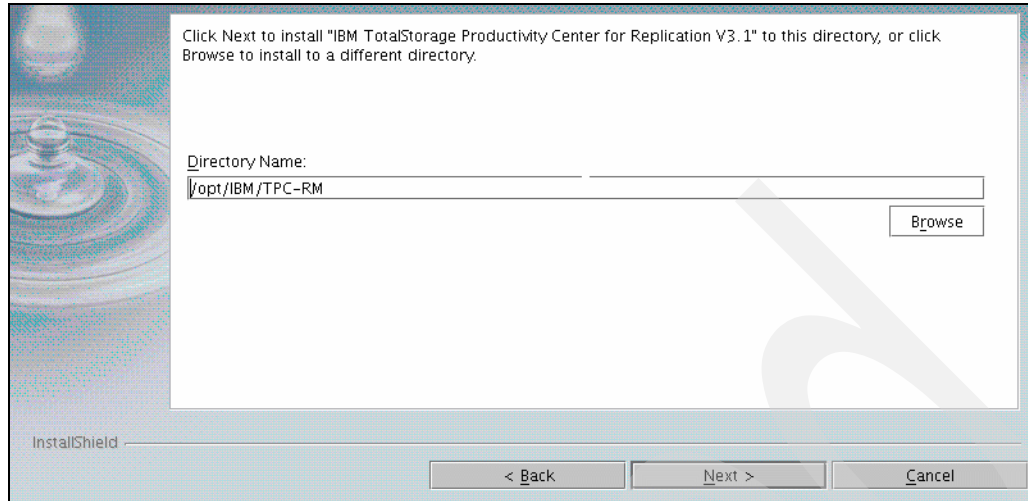


Figure 3-20 TPC for Replication Target directory

Specify the desired target directory. In our example we accepted the defaults as shown in Figure 3-20. Once the target directory is specified click **Next** to continue the installation. The **DB2 user** window will be displayed as shown in Figure 3-21.

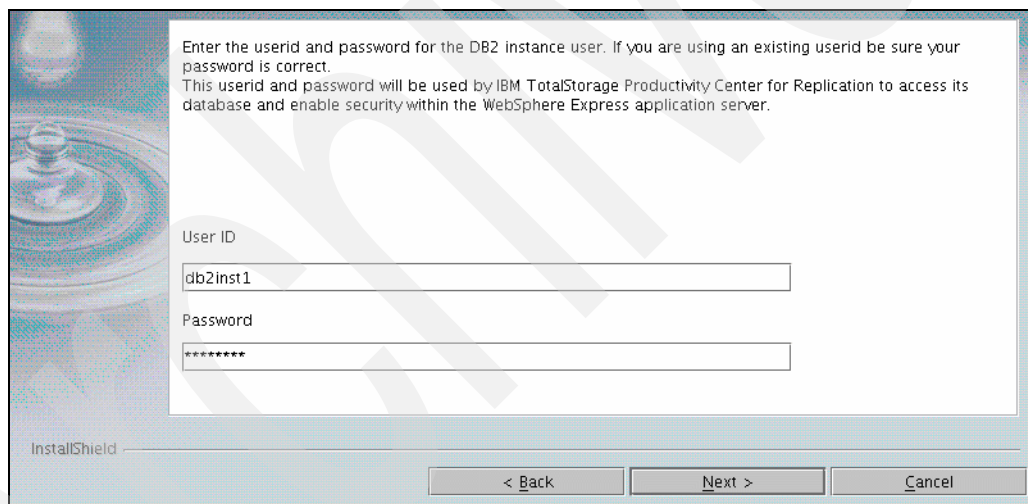


Figure 3-21 TPC for Replication DB2 user

Type in the user ID and password for the DB2 instance user which will be used to create the TPC for Replication database. When you are done click **Next** to continue, the **Ports** window will be displayed as shown in Figure 3-22 on page 49.

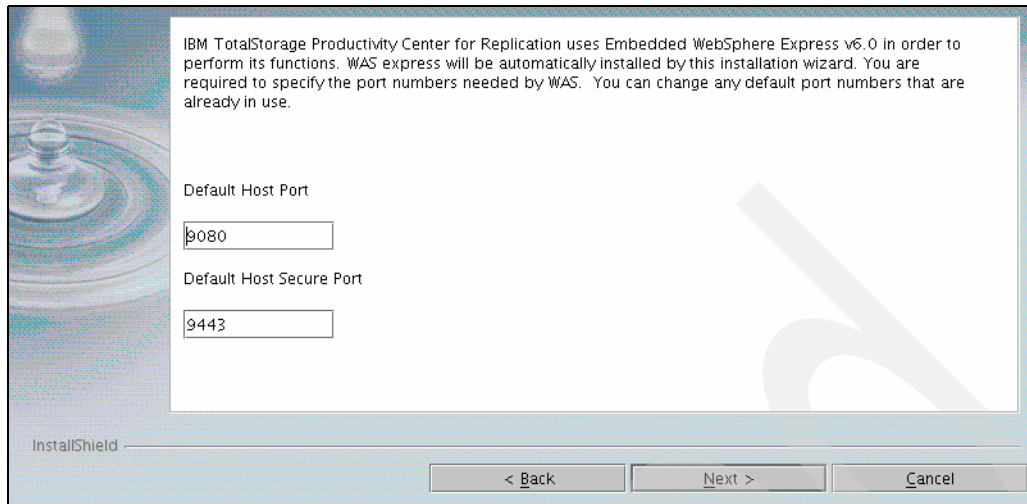


Figure 3-22 TPC for Replication Ports

On this panel you can specify ports needed for installation of Embedded WebSphere Express V6.0. Embedded WAS is used by TPC for Replication in order to perform its functions. It is recommended that you accept default values unless you have specific needs. Once the ports are defined click **Next** to continue, the *Database* window will be displayed as shown in Figure 3-23.

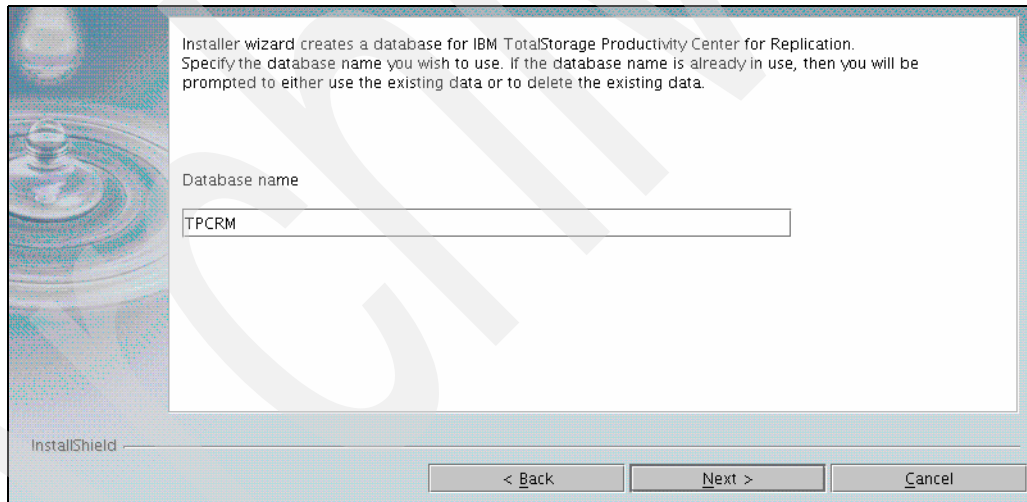


Figure 3-23 TPC for Replication Database

Type in the database name and click **Next** to continue. The CSM User window will be displayed as shown in Figure 3-24 on page 50.

Enter the userid and password for IBM TotalStorage Productivity Center for Replication CSM user. If you are using an existing userid be sure your password is correct. If Active Directory is installed on the system then enter the Active Directory compliant userid and password.

CSM User ID
csmuser

Password

Enter the password again to confirm

InstallShield

< Back Next > Cancel

Figure 3-24 TPC for Replication CSM User

CSM User is used to authenticate in TPC for Replication. Enter the desired user ID and password. If user ID does not exist on the system it will be created. Once the user ID is defined, click **Next** to continue. The Group window will be displayed as shown in Figure 3-25.

Enter the Local Operating system group name which contains authorized users of IBM TotalStorage Productivity Center for Replication. If the group name you specify does not exist, then it will be created.

Group Name
rmgroup

InstallShield

< Back Next > Cancel

Figure 3-25 TPC for Replication Group

Enter the group name for the users of TPC for Replication. The users who are members of this group will be able to access the TPC for Replication application. If the group does not exist on the system it will be created. Once the group is defined, click **Next** to continue. The Summary window will be displayed as shown in Figure 3-26 on page 51.

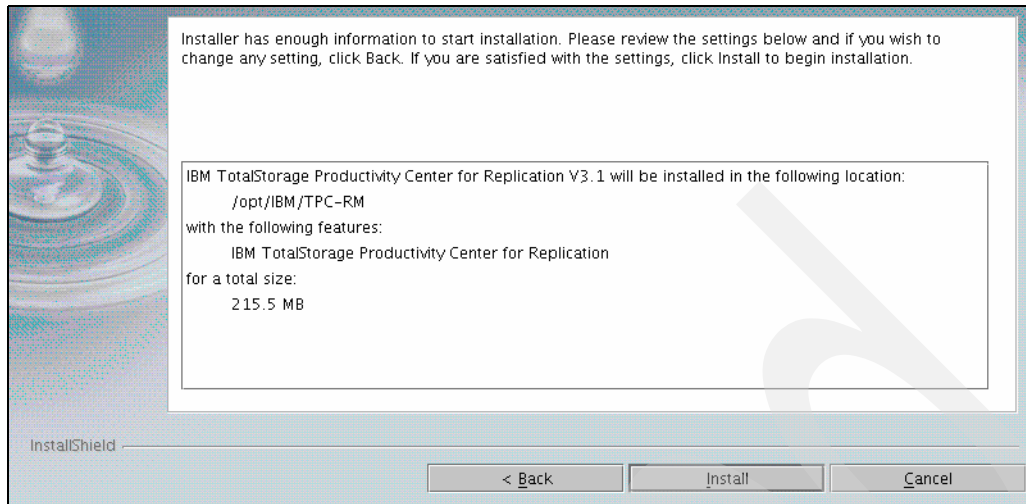


Figure 3-26 TPC for Replication Summary

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, click the **Install** button to proceed with the TPC for Replication installation. During the installation the database parameters will be updated as shown in Figure 3-27. Click **OK** to continue.

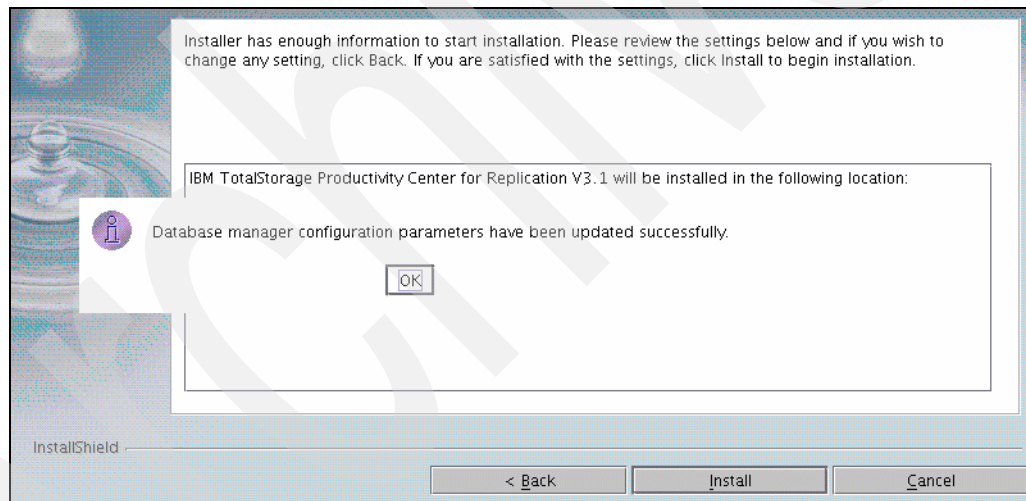


Figure 3-27 TPC for Replication Database parameters

As the installation progresses the installation *Progress* window will be displayed as shown in Figure 3-28 on page 52.

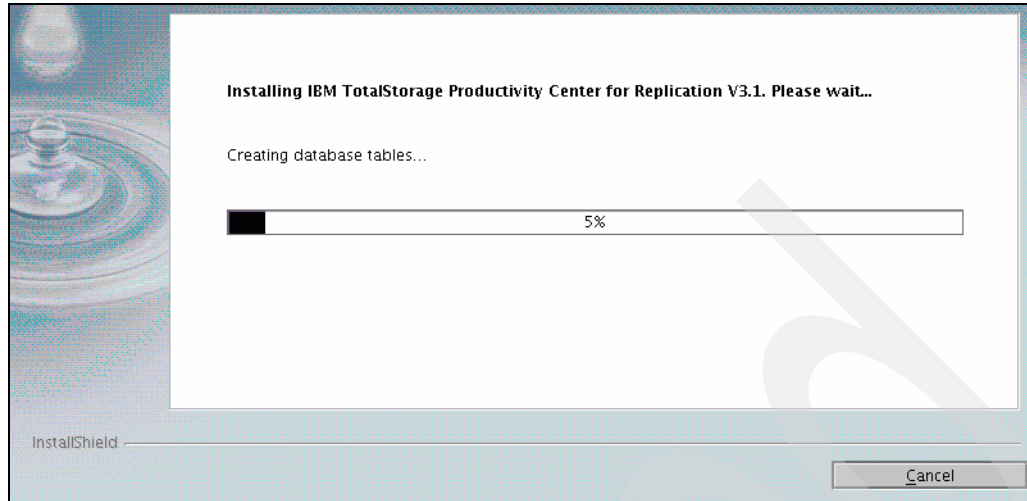


Figure 3-28 TPC for Replication Progress

Once the installation is finished the *Installation summary* window will be displayed as shown in Figure 3-29. Click **Finish** to end the installation.

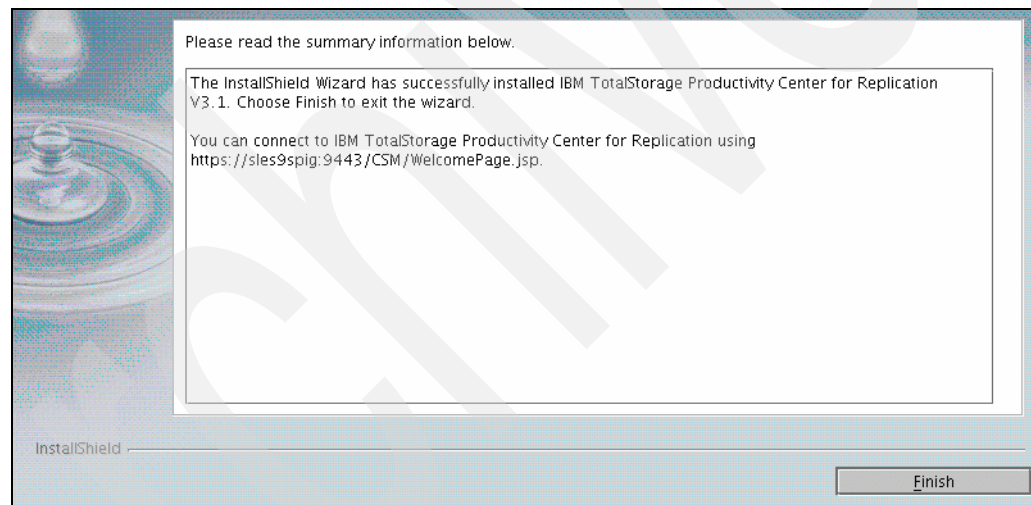


Figure 3-29 TPC for Replication Installation summary

Congratulations. You have now completed the Linux Server, TPC for Replication installation.

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 you performed installation of TPC for Replication. After doing that you should see a window similar to Figure 3-30 on page 53.



Figure 3-30 TPC for Replication Logon window

3.3 TPC for Replication Two site BC installation

If you want to utilize the TPC for Replication Business Continuity feature which allows the use of a standby server in case of a disaster, you need to install the advanced version of TPC for Replication. If you previously installed the basic version this can be upgraded to advanced version. In this section we describe the upgrade process. The difference between basic and advanced version is only in licenses.

The upgrade process will just install the necessary licenses.

To start the upgrade to advanced version, run the **setuplinux.bin** found in the source installation directory or CD as shown in Figure 3-31.

```
sles9spig:/media/cdrom # ll
total 129768
dr-xr-xr-x 3 root root    2048 May 31 00:11 .
drwxr-xr-x 4 root root      96 Aug 10 2005 ..
dr-xr-xr-x 3 root root    2048 May 26 01:05 TPCRM
-rwxr-xr-x 1 root root 43243520 May 26 00:54 setupaix.bin
-rwxr-xr-x 1 root root 48126976 May 26 00:54 setuplinux.bin
-rwxr-xr-x 1 root root 41506850 May 26 00:54 setupwin32.exe
sles9spig:/media/cdrom # ./setuplinux.bin
```

Figure 3-31 TPC for Replication Two site BC installation

After the start of installation the *Welcome* window will be displayed as shown in Figure 3-32 on page 54.

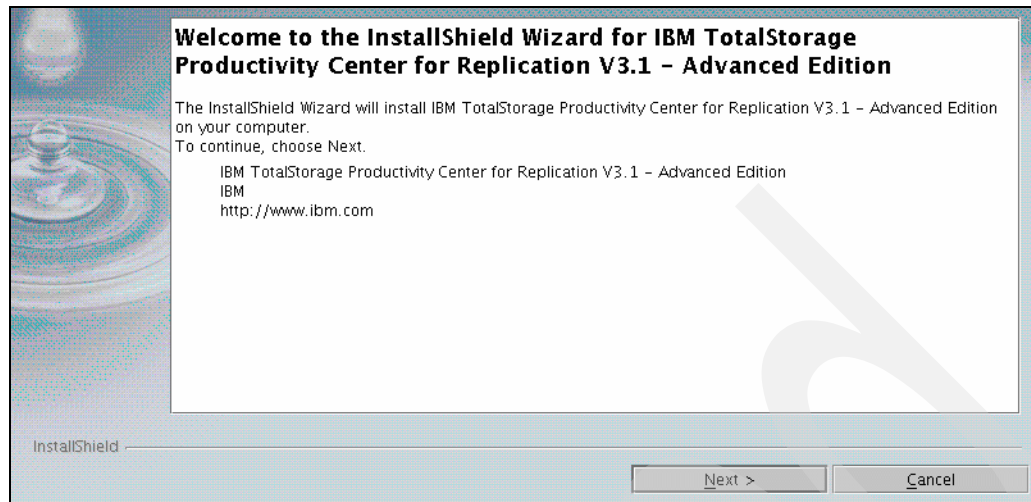


Figure 3-32 TPC for Replication AE Welcome window

Click **Next** to continue the installation. In this step the installation program will check your system for prerequisites. If your system has all the necessary prerequisites you will see a window similar to Figure 3-33.

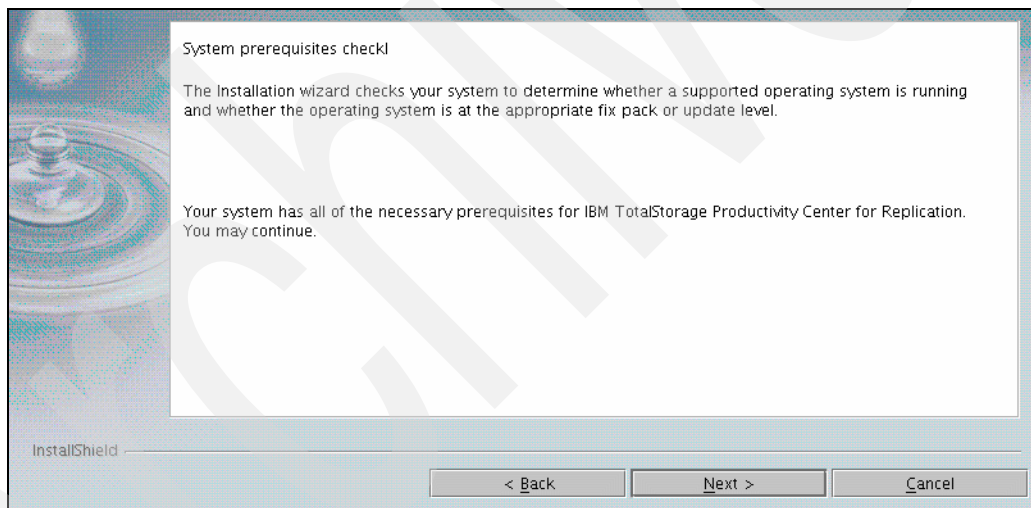


Figure 3-33 TPC for Replication AE System prerequisites check

Click **Next** to continue installation and the *License* window will be displayed as shown in Figure 3-34 on page 55.

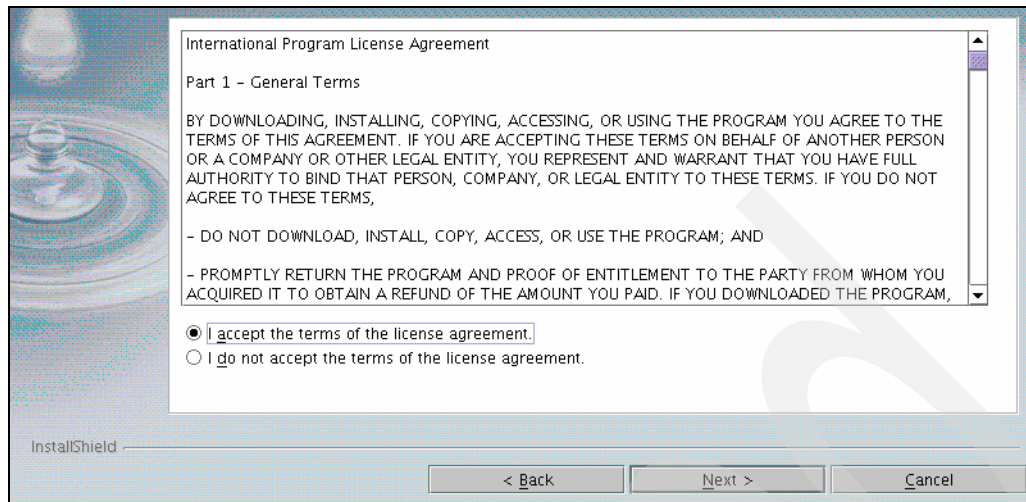


Figure 3-34 TPC for Replication AE License window

Read and accept the license, then click **Next** to continue, the *Path* window will be displayed as shown in Figure 3-35.

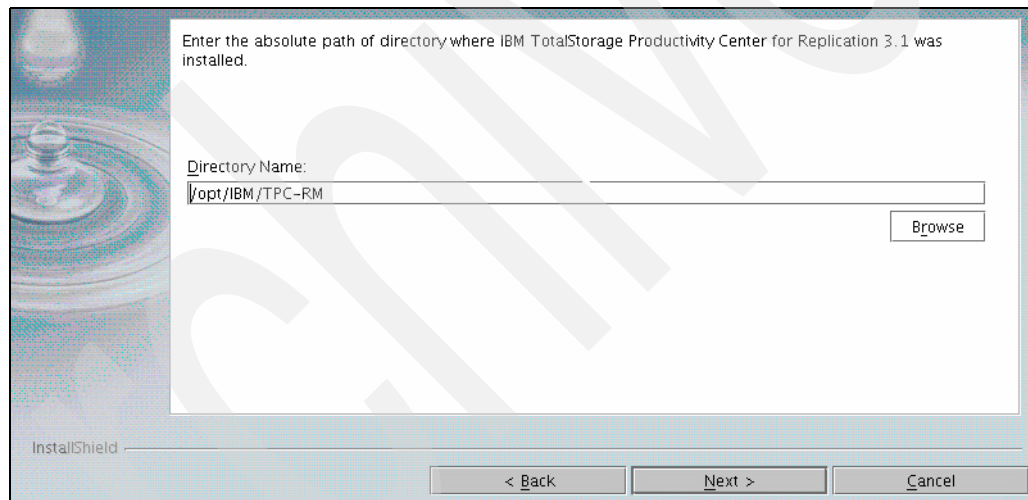


Figure 3-35 TPC for Replication AE Path window

Type in the absolute path where you installed TPC for Replication basic version. In our example this was `/opt/IBM/TPC-RM`. Click **Next** to continue. The *Summary* window will be displayed as shown in Figure 3-36 on page 56.

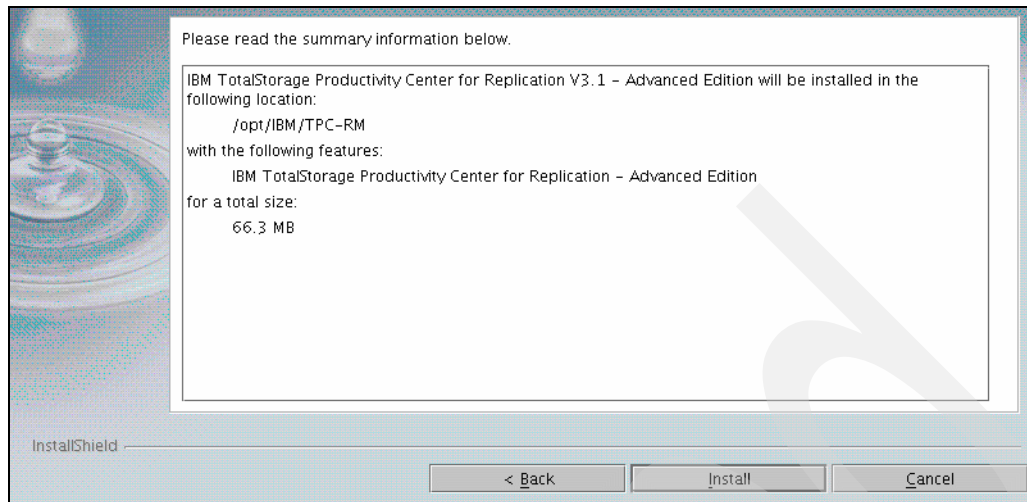


Figure 3-36 TPC for Replication AE Summary

Should you want to change anything specific, now is your last chance. If you are satisfied with the options and configurations which you previously entered, click the **Install** button to proceed with the TPC for Replication AE installation. During installation a *Progress* window will be displayed as shown in Figure 3-37.

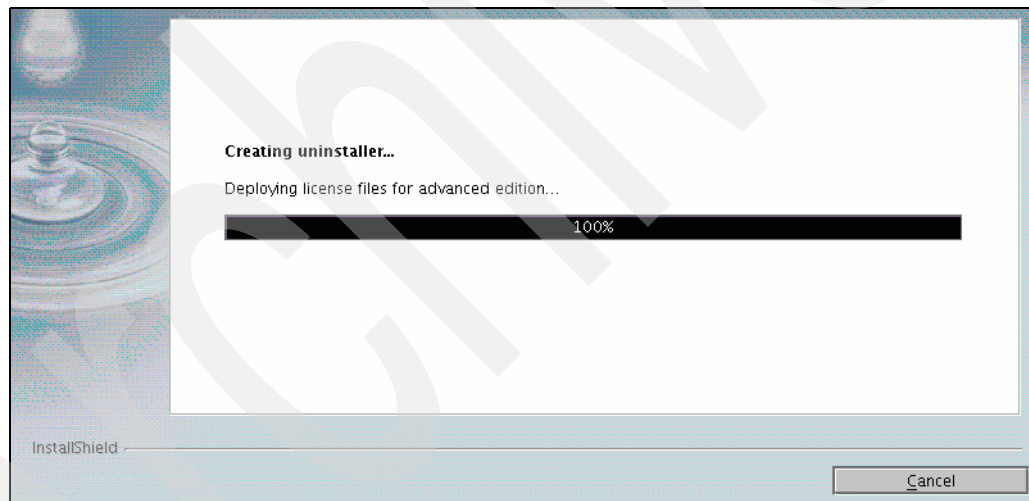


Figure 3-37 TPC for Replication AE Progress

Once the installation is finished the *Installation summary* window will be displayed as shown in Figure 3-38 on page 57. Click **Finnish** to end the installation.

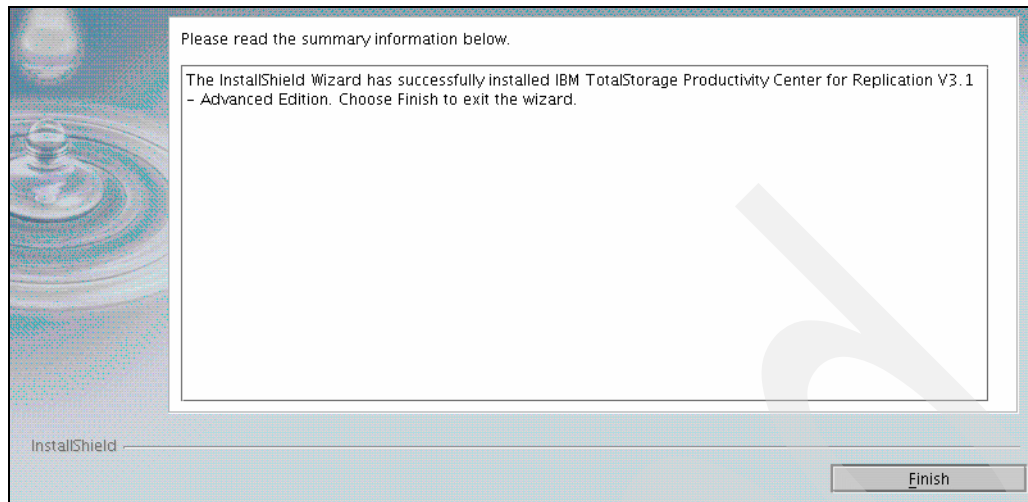


Figure 3-38 TPC for Replication AE Installation summary

Congratulations. You have now completed the Linux Server, TPC for Replication AE installation.

Archived

Configuration and usage basics on Linux

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.
- ▶ Setting up user accounts on CIMOM servers and the storage subsystems
- ▶ Setting up additional user accounts on the TotalStorage Productivity Center for Replication server
- ▶ Logging on to the TotalStorage Productivity Center for Replication server
- ▶ Setting up the standby server
- ▶ Remote installation and customizing of the CLI

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 61 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.

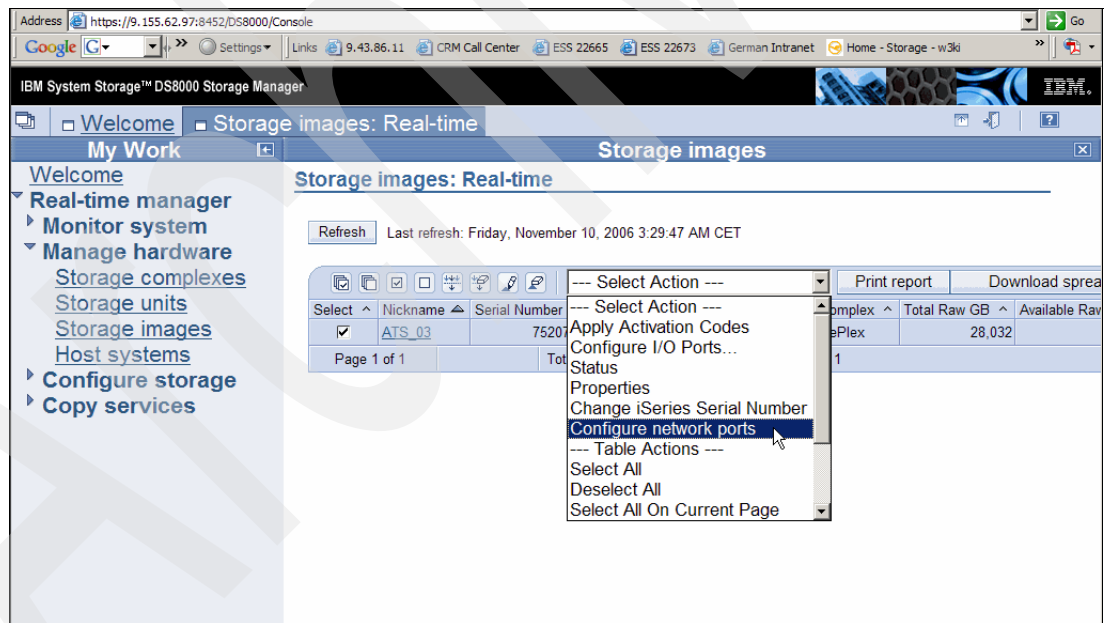


Figure 4-2 Select Configure network ports

Have the following information available to fill in the next panel as shown in Figure 4-3 on page 62.

- ▶ 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

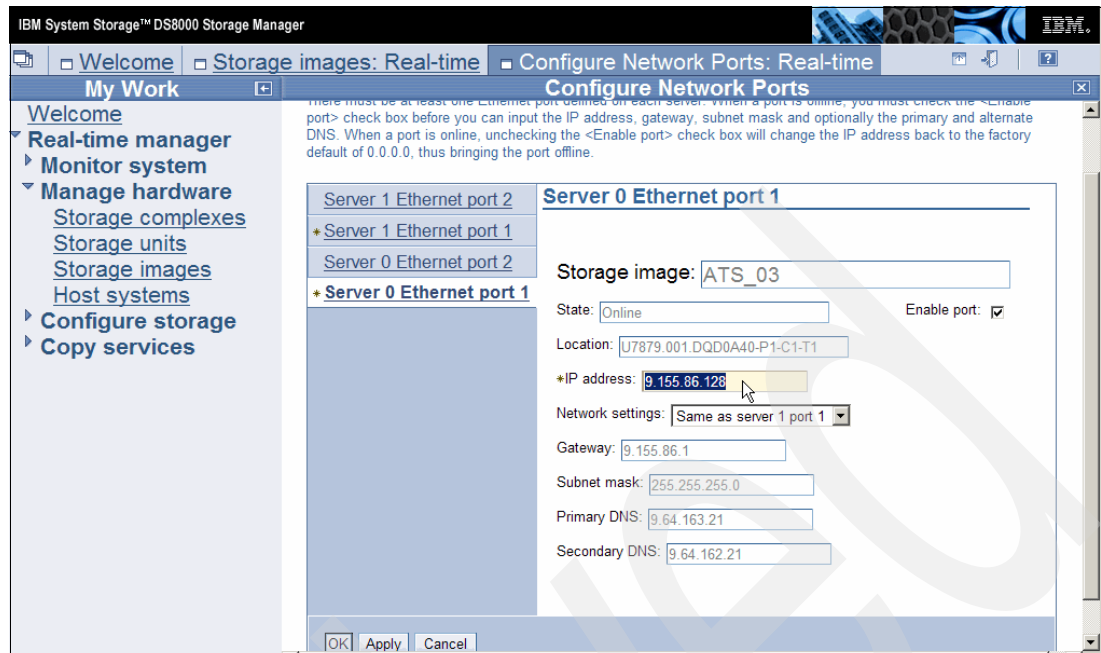


Figure 4-3 Ethernet port setup through the GUI

Click **OK** and this will complete the GUI walk through on 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 63.

► **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 64

► **setnetworkport**

This command configures the network ports. Example 4-1 on page 63 displays a command example and configures the first port on the Ethernet card in server0.

Figure 4-4 on page 63 provides an overview of the **setnetworkport** command (refer to Example 4-1 on page 63).

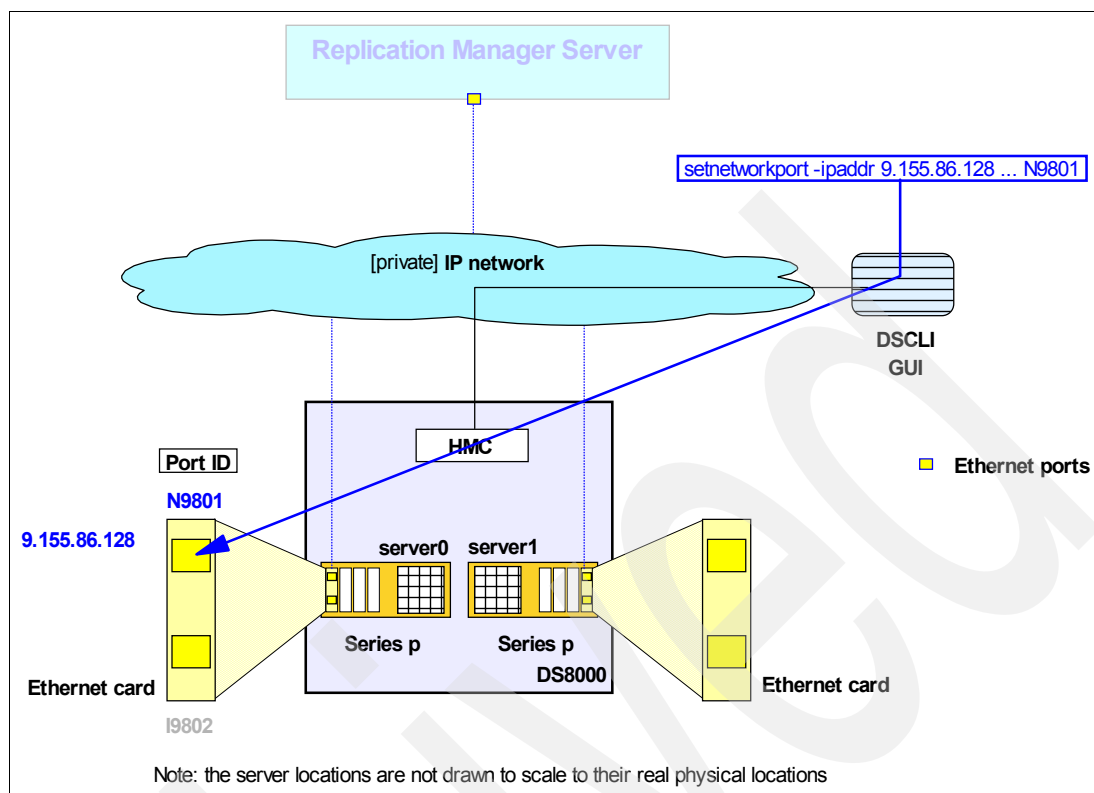


Figure 4-4 Define Ethernet port attached to server 0 in DS8000

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 The `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 64 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

```
dscli> 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 **shownetworkport** command output of an unused and not explicitly configured Ethernet port.

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

```
dscli> 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.

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 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 later used when you define storage subsystems in TotalStorage Productivity Center for Replication server. The following sections describe how to define new accounts for various storage subsystems.

4.2.1 SAN Volume Controller

To define an account for TotalStorage Productivity Center for Replication server for your SAN Volume Controller (SVC) you need to start the SVC 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 SAN Volume Controller Master Console or another server where SAN Volume Controller Console code is installed.

You will see a window similar to Figure 4-5.

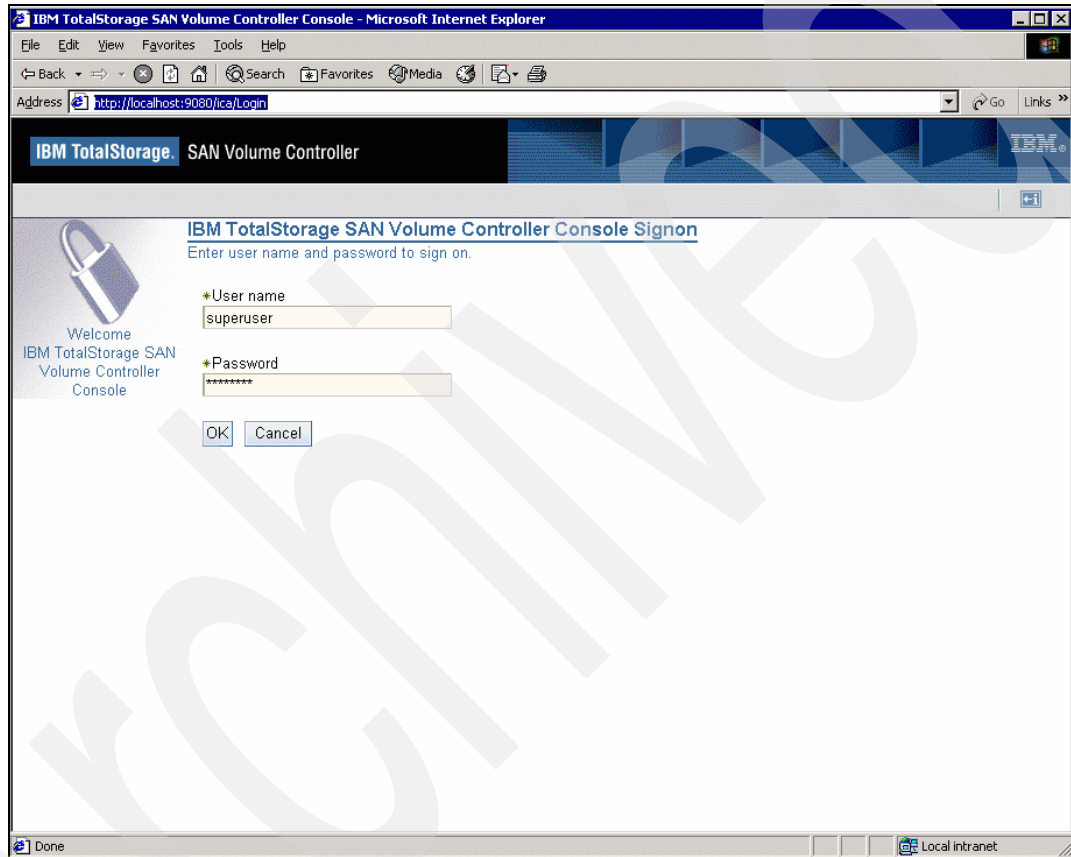


Figure 4-5 SAN Volume Controller Console login window

Logon with the superuser ID, you will see a window similar to Figure 4-6 on page 66.

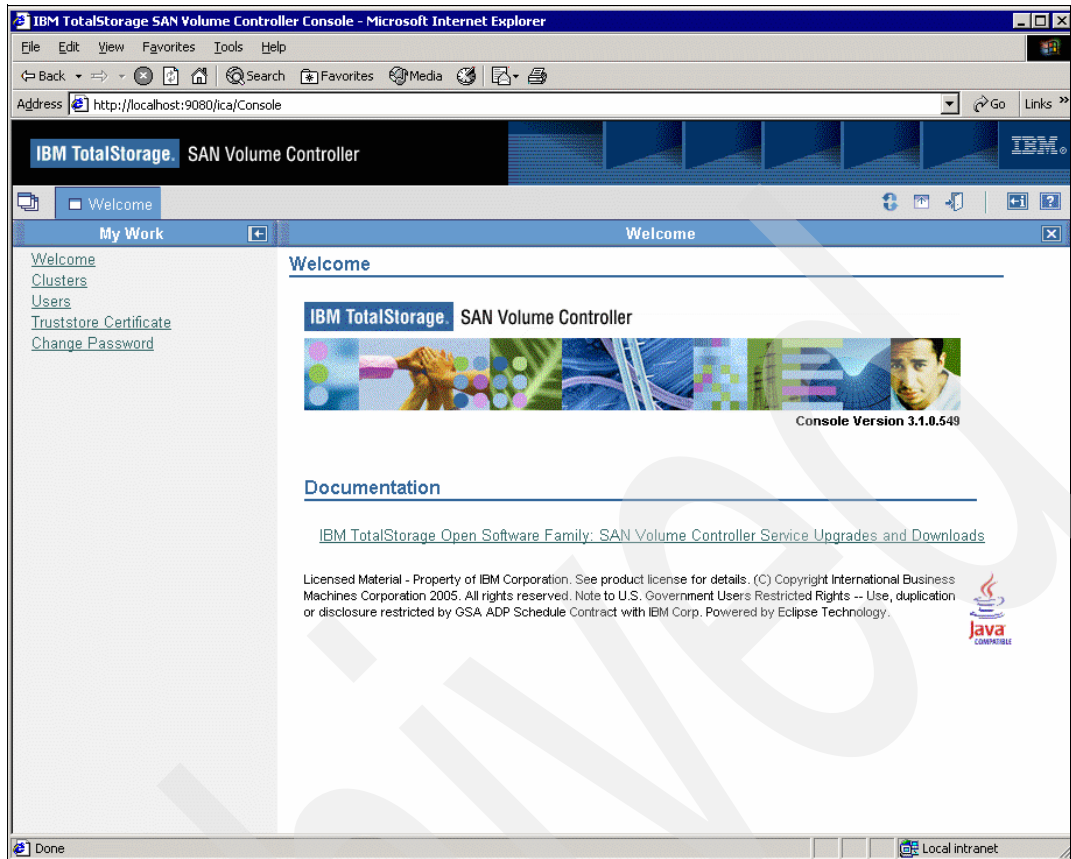


Figure 4-6 SAN Volume Controller Console

Select **Users** link and a window similar to Figure 4-7 on page 67 will be displayed. To add a user, select the action **Add a User** from the Select Action menu. Click **Go** to continue.

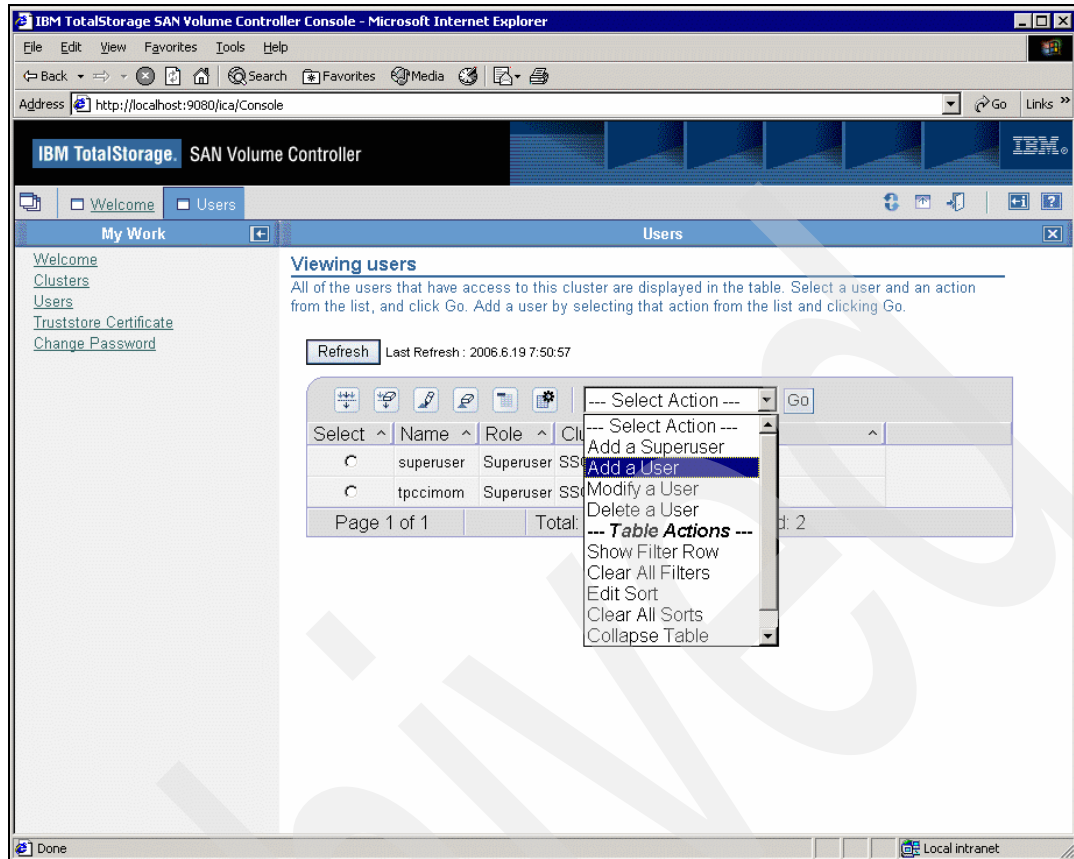


Figure 4-7 SAN Volume Controller Console Users

The Users Introduction window is displayed as shown in Figure 4-8. Click **Next** to continue.

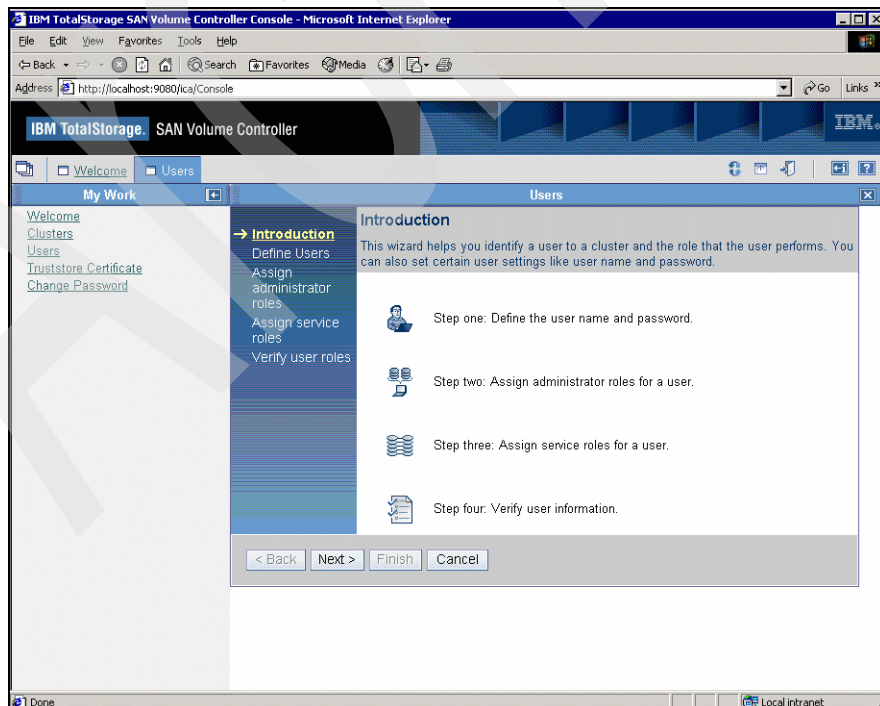


Figure 4-8 SAN Volume Controller Console Add User

The Define Users is the next window as show in Figure 4-9. Type in the new **User Name** and **Password**. Click **Next** to continue.

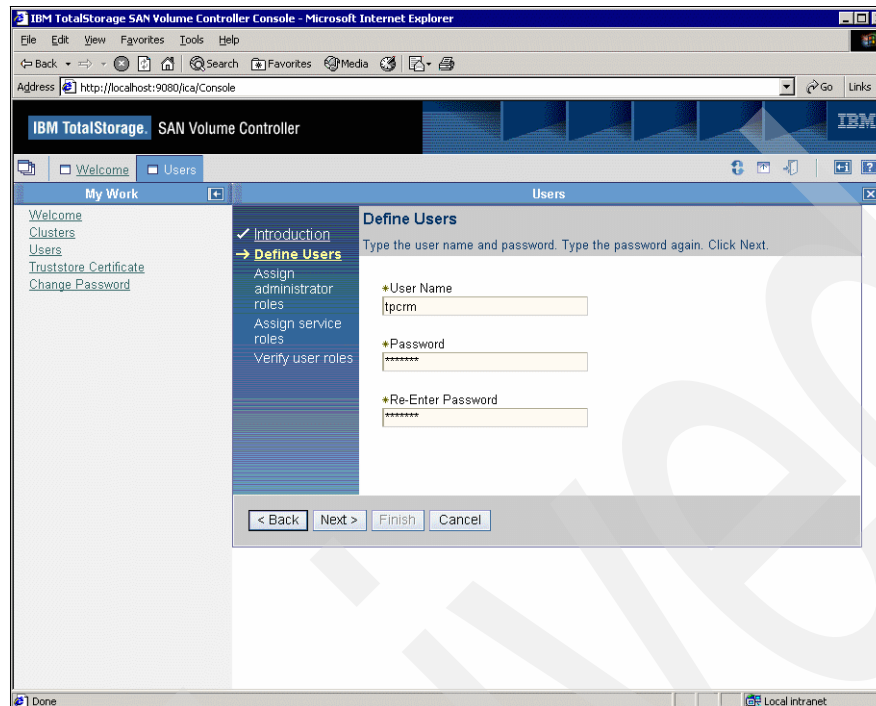


Figure 4-9 SAN Volume Controller Console New User

The next panel allows you to assign administrator roles to the user being created as shown in Figure 4-10 on page 69. 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 with names *SSCLAB-SVC1* and *SVCLAB-SVC2*. Click **Next** to continue.

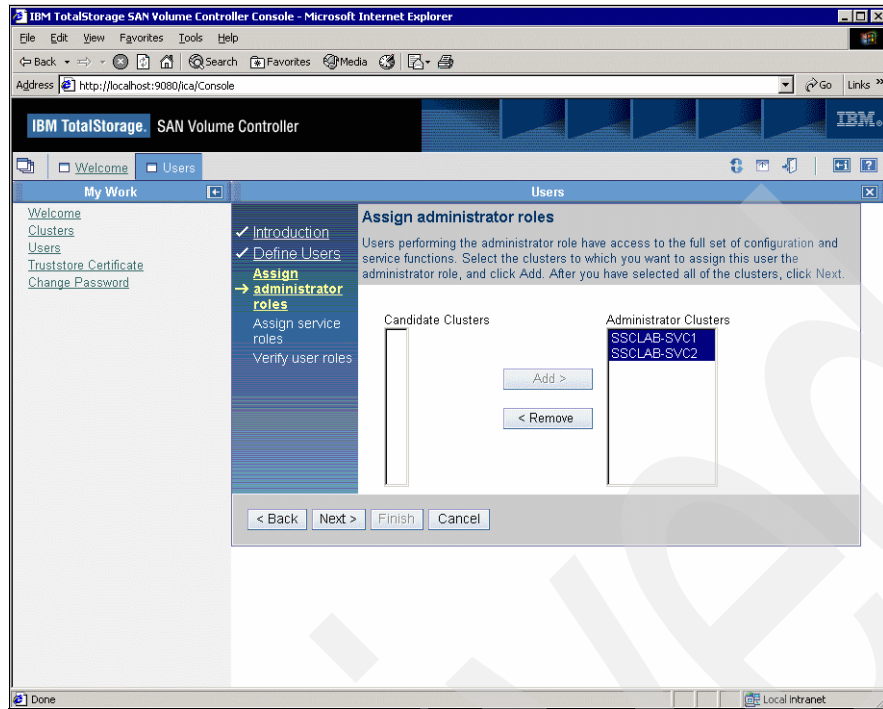


Figure 4-10 SAN Volume Controller Console Administrator Roles

The Assign service roles window as shown in Figure 4-11 on page 70 is displayed. For the TotalStorage Productivity Center for Replication server you do not need to define any Service roles. Click **Next** to continue.

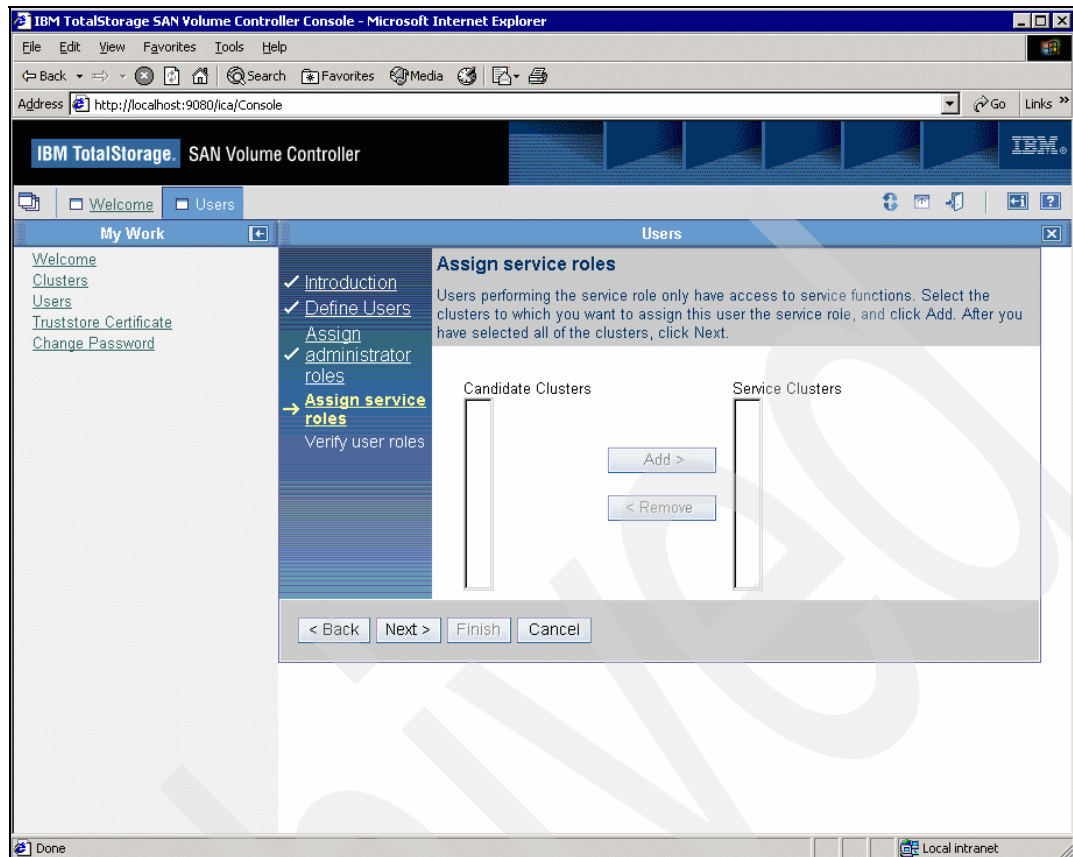


Figure 4-11 SAN Volume Controller Console Service Roles

The Verify user roles panel is displayed, as shown in Figure 4-12 on page 71. If you want to change any of the user properties, now is your last chance. If you are happy with the user and the options you have specified, click **Finish** to save the user.

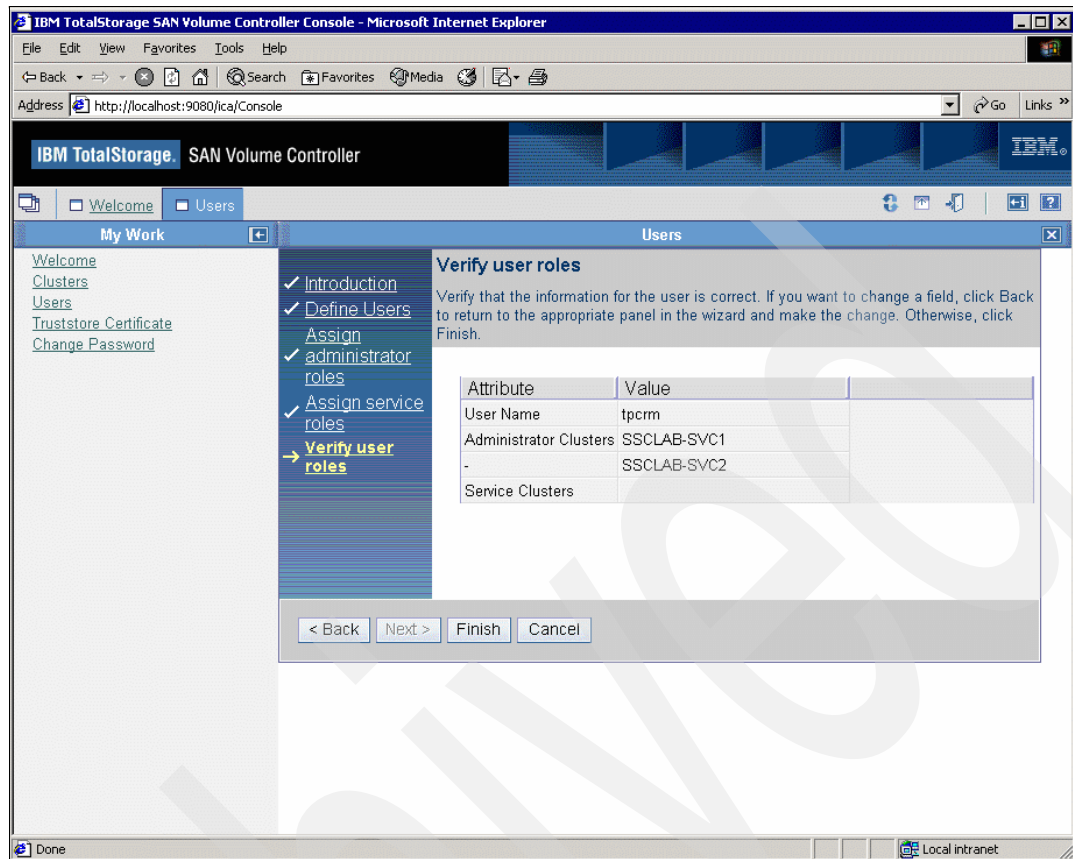


Figure 4-12 SAN Volume Controller Console Verify Roles

The Viewing Users window (see Figure 4-13 on page 72) will be displayed. This new user, in our example *tpcrm*, can be used in the TotalStorage Productivity Center for Replication server when defining the SAN Volume Controller storage subsystem.

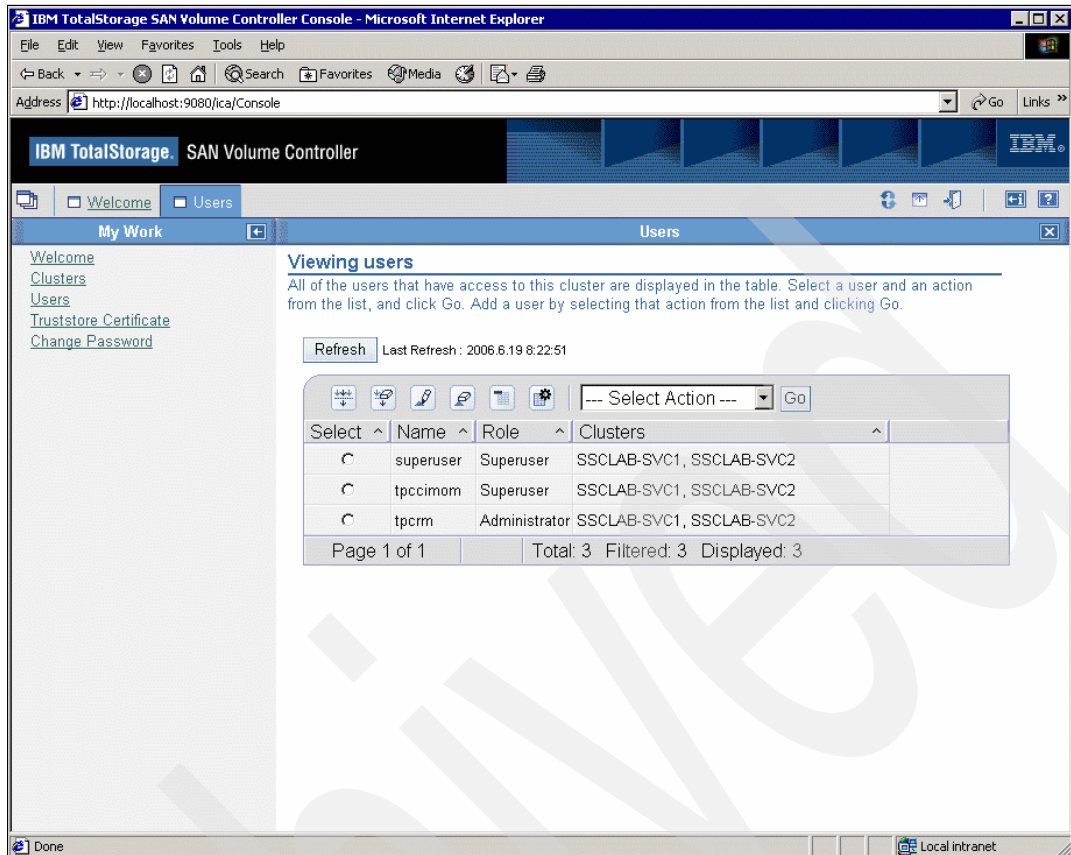


Figure 4-13 SAN Volume Controller Console New User Defined

4.3 User management

During initial TotalStorage Productivity Center for Replication installation you have defined or created a user ID which will be used with the TotalStorage Productivity Center for Replication server. In our example this was the new *csmuser*. As you can see from Figure 4-14, the installation program created the user on the system.

```
csmuser:x:1000:100::/home/csmuser:/bin/bash
```

Figure 4-14 TPC for Replication initial user

During initial installation you also specified the user group ID. All members of this user group can use TotalStorage Productivity Center for Replication server. In our example this was *rmuser*, as you can see from Figure 4-15, the installation program created the group on the system and also included the initial user into that group.

```
rmgroup:!:1000:csmuser
```

Figure 4-15 TPC for Replication User Group

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 specified during installation, in our example *rmgroup*. You can create new users by using your Linux

distribution specific tools or by using standard Linux commands. This can be seen in the following screens. In Figure 4-16 we create a user ID *tpcrmuser*, with the *useradd* command.

```
sles9spig:/ # useradd tpcrmuser -s /bin/false

sles9spig:/ # cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
.
.
tpcrmuser:x:1002:100::/home/tpcrmuser:/bin/false
```

Figure 4-16 Adding New User

As you can see from our example the *tpcrmuser* we added does not have shell defined. This means that it cannot actually login to the server itself. It will be only used for accessing the TotalStorage Productivity Center for Replication server. The new user has to have a valid password defined. We defined a new password with the *passwd* command as shown in Figure 4-17.

```
sles9spig:/ # passwd tpcrmuser
Changing password for tpcrmuser.
New password:
Re-enter new password:
Password changed
```

Figure 4-17 Defining Password for New User

Next we add the new user to the *rmgroup* group as shown in Figure 4-18

```
sles9spig:/ # usermod tpcrmuser -G rmgroup

sles9spig:/ # cat /etc/group
root:x:0:
.
.
rmgroup:!:1000:csmuser,tpcrmuser
```

Figure 4-18 Adding New User to *rmgroup*

Finally we can use the new user to sign in to the TPC for Replication application as shown in Figure 4-19 on page 74.

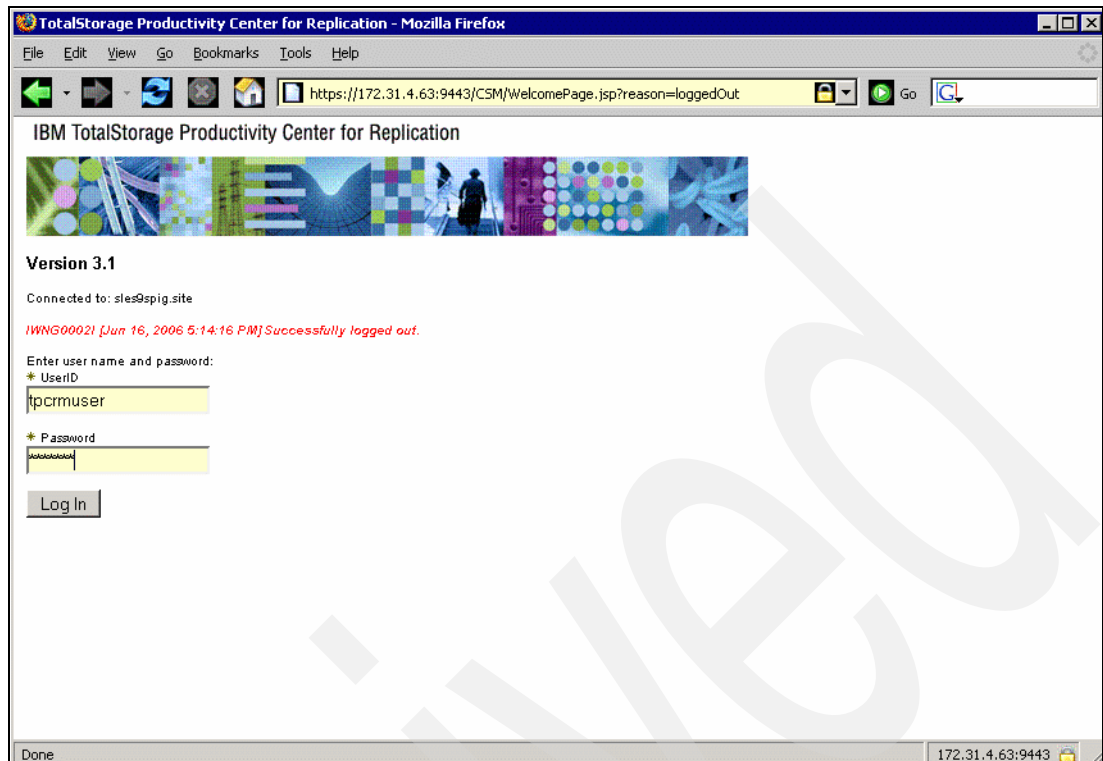


Figure 4-19 TPC for Replication Signon

4.4 Signing on to TPC for Replication GUI interface

There are essentially two ways to signing in to your TPC for Replication server. But all GUI access utilizes a Web browser. You can sign on:

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

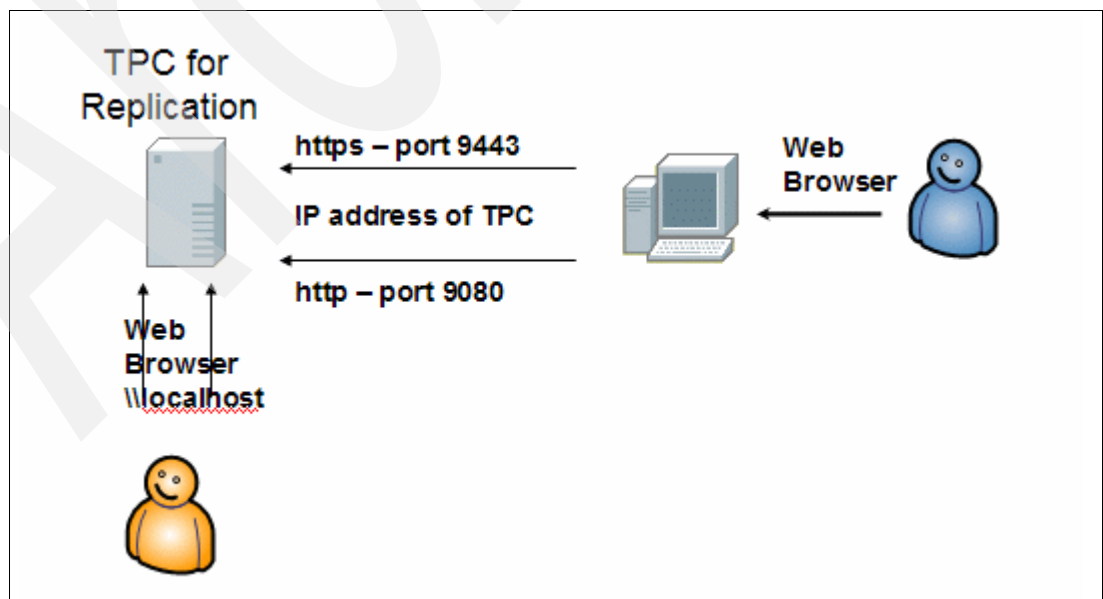


Figure 4-20 TPC for Replication Sign In

In all the following examples the WebSphere application name **CSM** is used (*not csm*). The application name is case sensitive.

In the first instance (Figure 4-21) you see a sign in via the local host attachment.

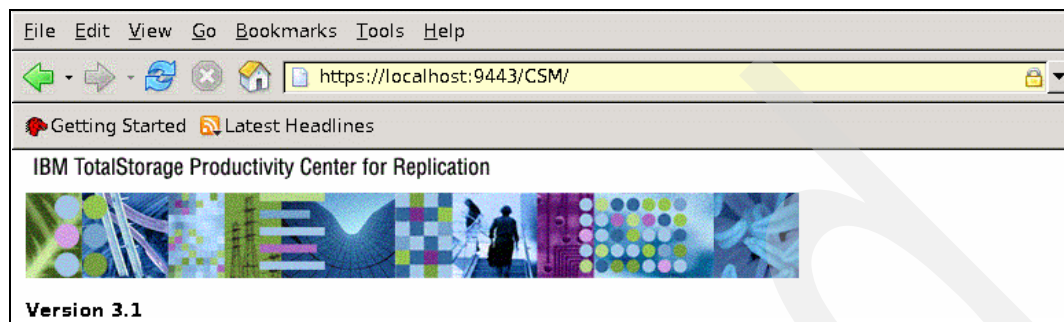


Figure 4-21 Localhost

In Figure 4-22 we can see that the DNS entry for the TPC for Replication server is called along with the secure TCP/IP port is used.



Figure 4-22 Computername

In the third example (Figure 4-23), an IP address is used to sign in to the application.

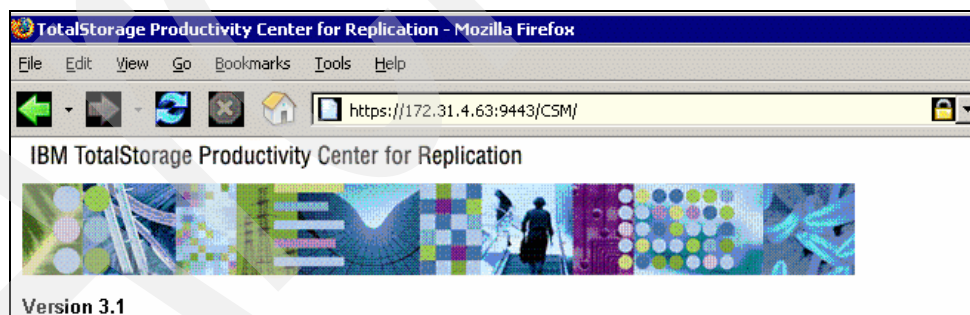


Figure 4-23 IP address

A secure session establishment will require you to accept the certificate as shown in Figure 4-24.

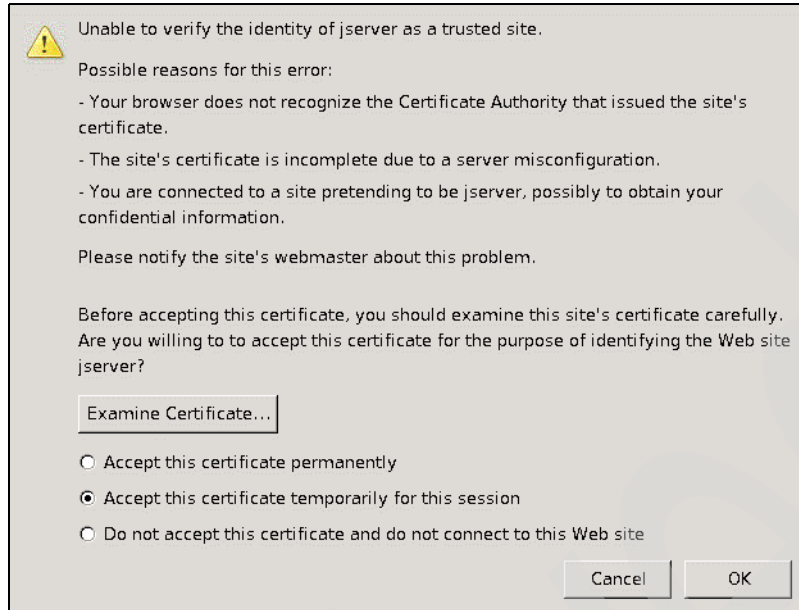


Figure 4-24 Session Certificate

4.5 Setting up a TPC for Replication Standby Server

To support High available environments TPC for Replication Two Site BC provides you with the ability to define and use standby servers. A standby server is a separate instance of TPC for Replication that runs on a different physical server, but is continuously synchronized with the primary TPC for Replication server. Figure 4-25 on page 76 shows our Master / Standby server setup. The colored boxes on the servers represent application spawned ports to enable the transfer of data to be passed between them. Additional ports (for communications with the storage subsystems) will be opened by the standby server as the two servers are synchronizing.

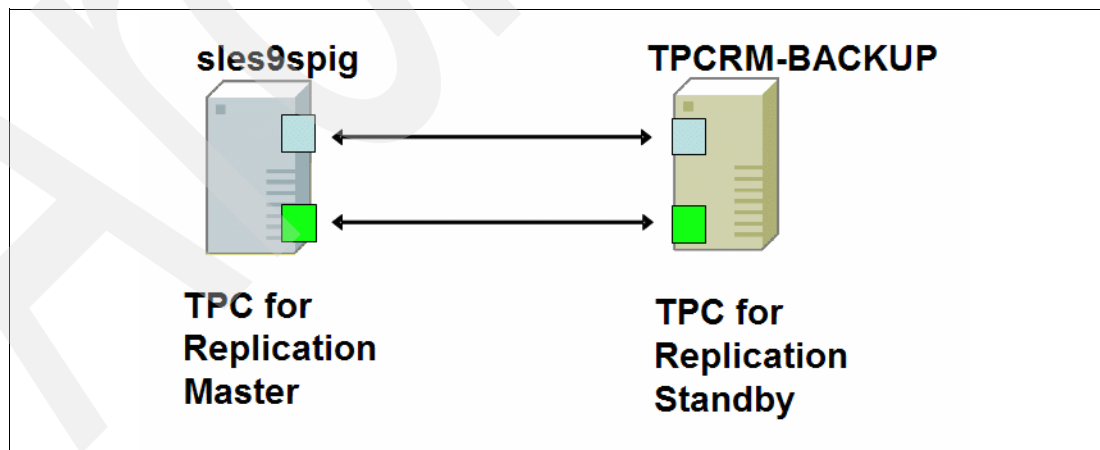


Figure 4-25 Standby Setup

With high availability, the active server issues commands and processes events while the standby server records the changes to the active servers. Then, if the active server fails, you issue a Takeover command to make the standby server take over.

In an environment with high availability enabled, when the connection between the active and standby servers breaks (instead of the active server failing), and you perform a Takeover command from the standby server, you must ensure that you do not have two active servers as a result. Two active servers can result when the connection between them breaks. But if both servers remain functional, you need to perform a *set standby* action for one of the active servers, and then the connection will be reestablished. If you do not, both active servers will be trying to manage the defined sessions. In addition, if you perform an action on either server while they are disconnected, the servers would not be in synch. If you must perform a takeover and use the standby server, ensure that you shut down the active server first.

4.6 Remote CLI installation

To install the CLI code on workstation other than your TPC for Replication Server, complete the following steps:

- ▶ Create a CLI folder on your machine, for example CSMCLI.
- ▶ Copy the entire TPC CLI program subfolder including sub directories into your local CLI directory as shown in Figure 4-26 on page 77.

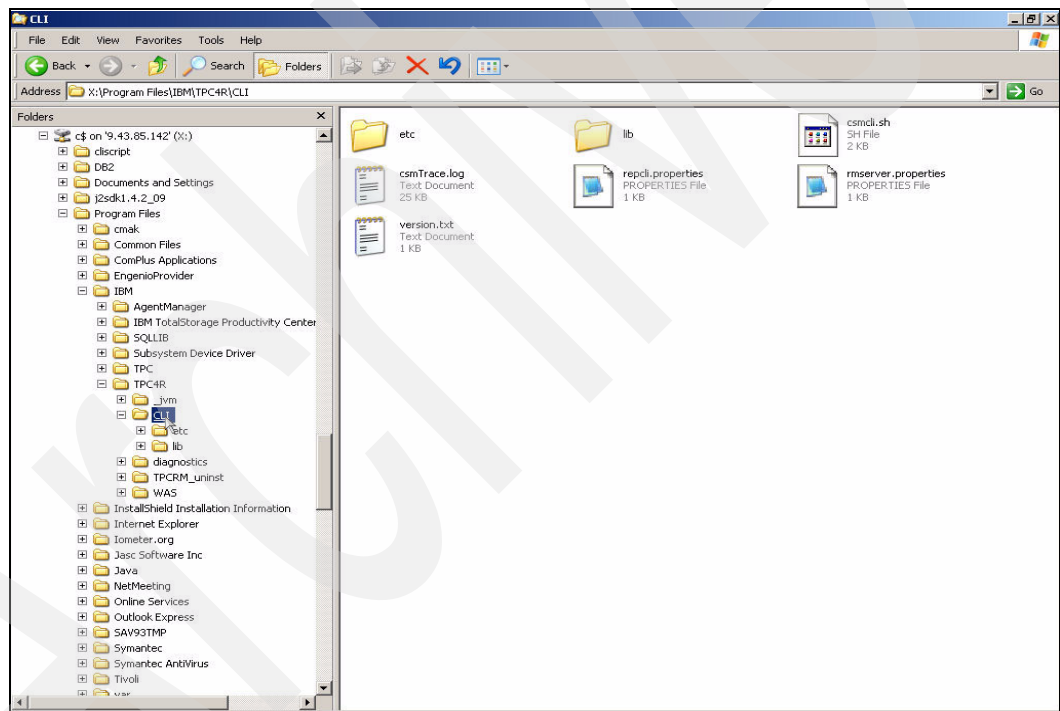


Figure 4-26 CLI directory

- ▶ Copy the csmcli.bat into your local CLI directory.
- ▶ Edit the CSMJDK and CSMCLI location lines in csmcli.bat to meet your local directory structure. An example is shown in Example 4-5.

Example 4-5 CSMCLI.bat

```

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=c:\Program Files\Java\j2re1.4.2_06
  
```

```
if "%CSMJDK%"==" " GOTO ERROR_JAVA
set CSMCLI=c:\CSM-CLI
if "%CSMCLI%"==" " GOTO ERROR_CLI
set
PATH=%CSMCLI%\lib;%PATH%
```

- ▶ Edit the repcli.properties file to include your environment variables (for example username/password) as shown in Figure 4-27. 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 used to communicate with the TPC for Replication Server.

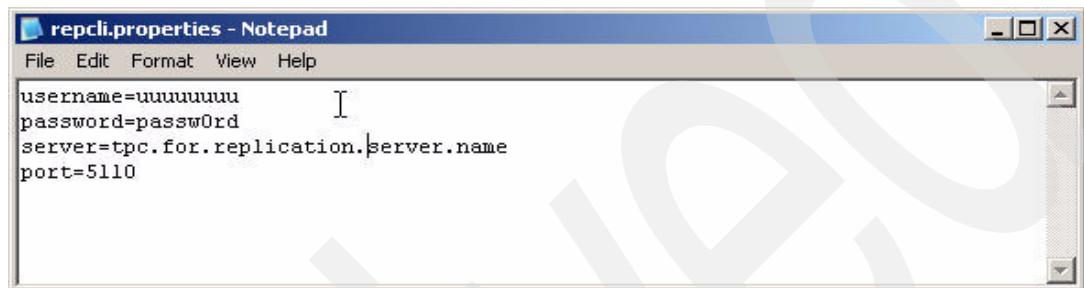


Figure 4-27 repcli.properties file

- ▶ Verify the CSMCLI works by starting it up from a command prompt. A successful installation should start the CLI interface as shown in Figure 4-28.

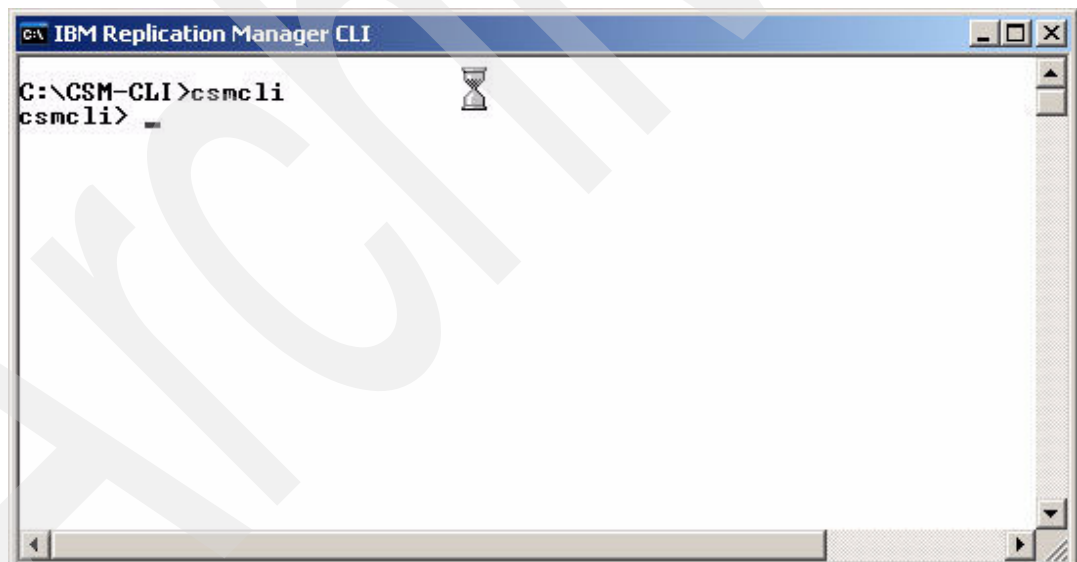


Figure 4-28 CSMCLI prompt

The CSMCLI uses Java™ Keystores to provide authentication regime for the session. The CSMCLI establishes an SSL link for the term of the session as shown in Figure 4-29.

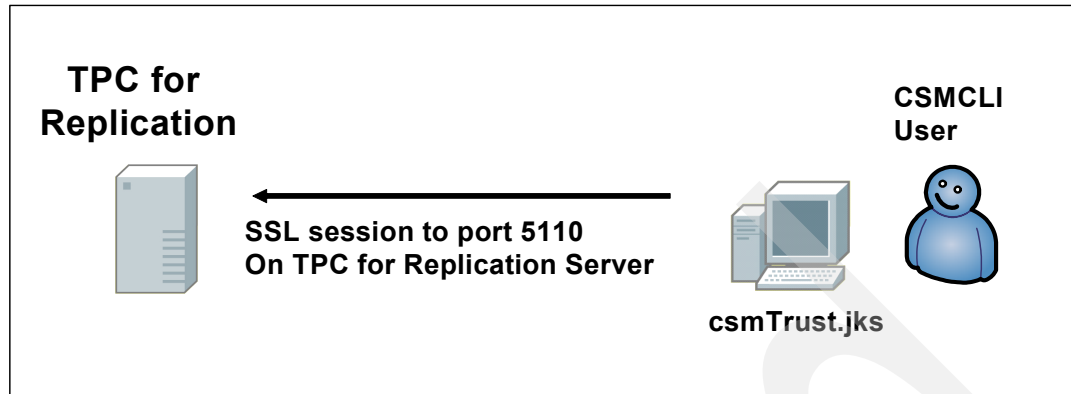


Figure 4-29 CSMCLI communications

When you start a CSMCLI session, a communication session is established between a local port (random) and the remote port 5110 on the TPC for Replication Server. We can see in Figure 4-30, a number of local address and port combinations but the destination address is always the same combination.

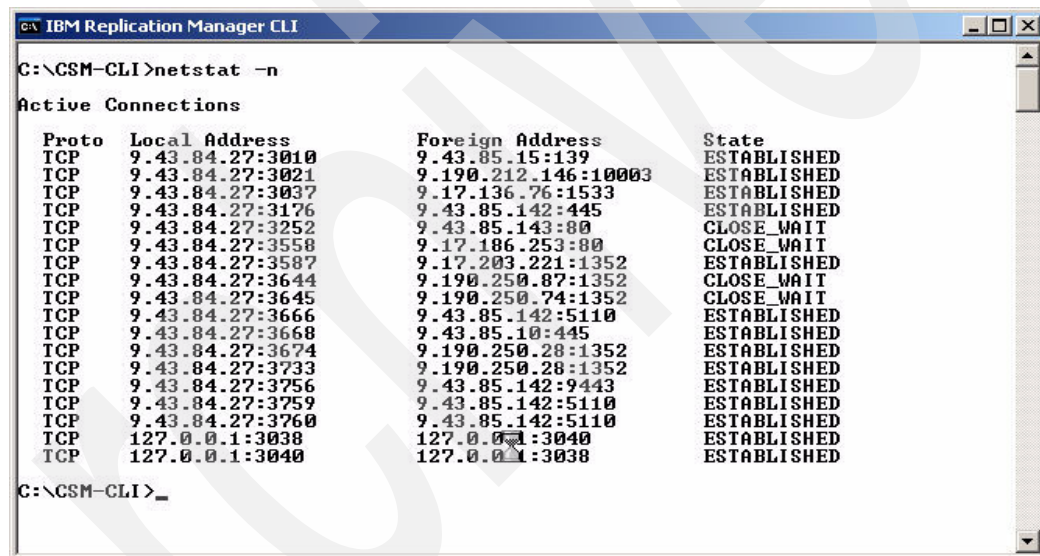


Figure 4-30 CSM ports

4.7 TPC for Replication Logging

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 within the WAS directories as we can see in Figure 4-31 on page 80.

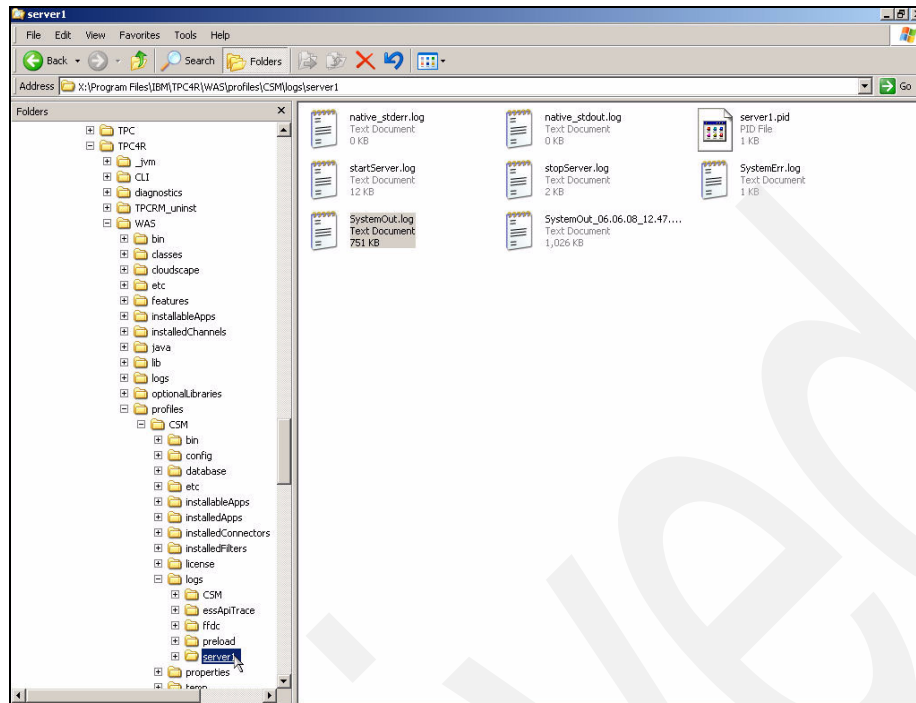


Figure 4-31 WAS logs

Additionally as shown in Figure 4-32, the various CSM trace files provide a useful diagnostic tool.

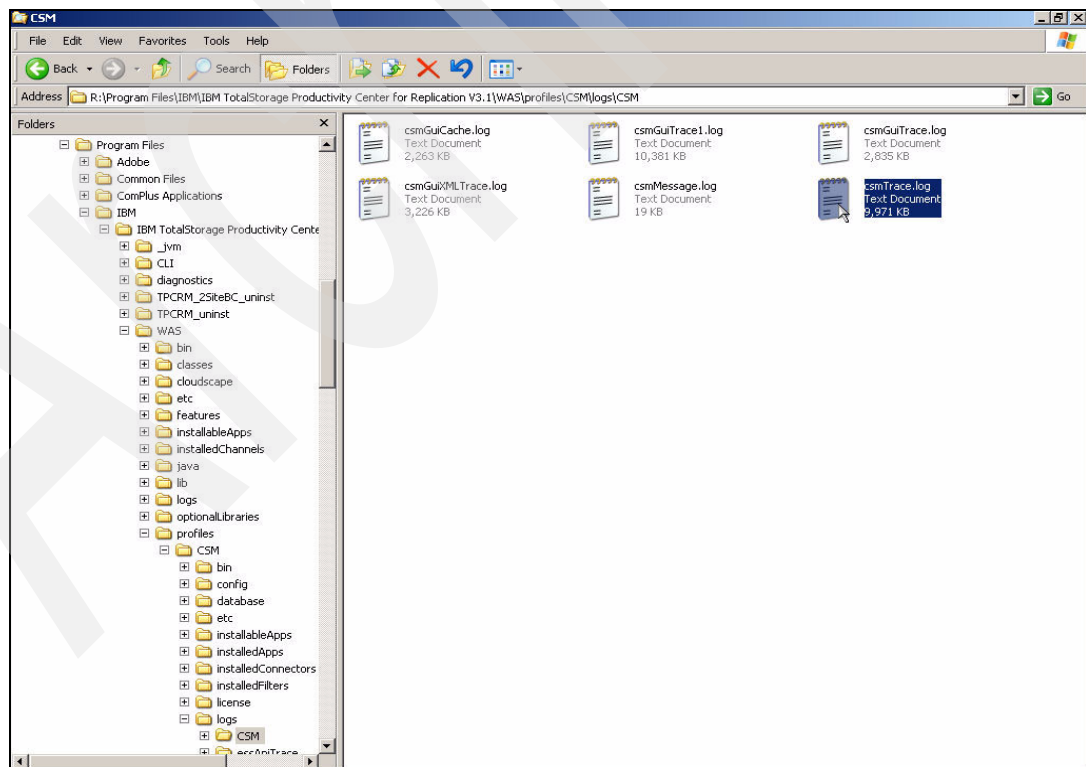


Figure 4-32 CSM trace files

Configuring and using TotalStorage Productivity Center for Replication on Linux

At this point you have successfully installed the TotalStorage Productivity Center for Replication. In this chapter we show you how to set up and manage replication sessions.

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

- ▶ SAN Volume Controller (SVC)
- ▶ ESS 800

Scenarios are included that document the work we completed in our lab environment using:

- ▶ GUI configuration
- ▶ CLI configuration
- ▶ Flashcopy
- ▶ Metro Mirror

5.1 TPC for Replication and SAN Volume Controller

As we have seen in the planning section, the TPC for Replication tool communicates with the SAN Volume Controller (SVC) via CIMOM, which is installed on the SVC Master Console as shown in Figure 5-1.

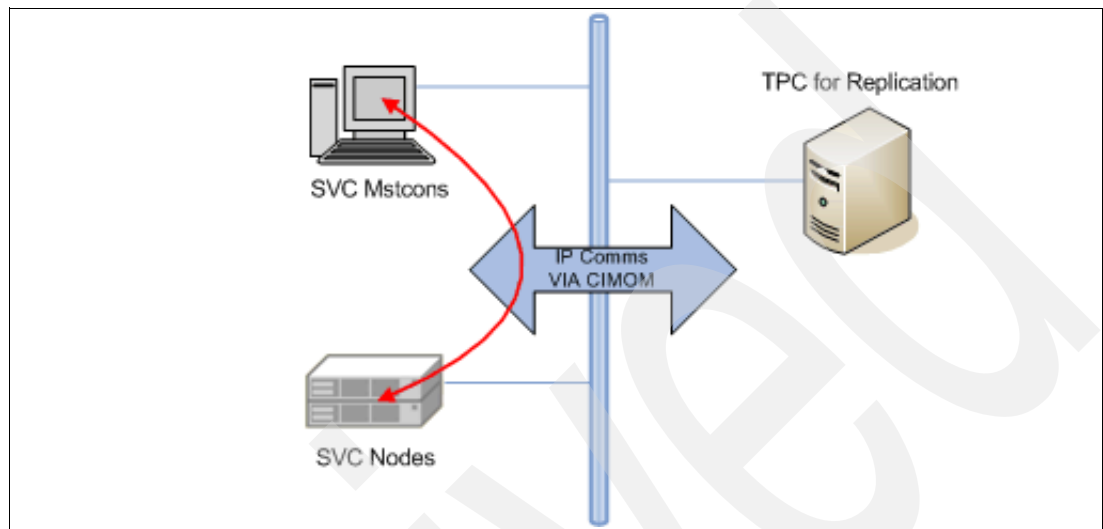


Figure 5-1 IP connectivity for TPC for Replication and SVC

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 lab setup can be seen in Figure 5-2 on page 83

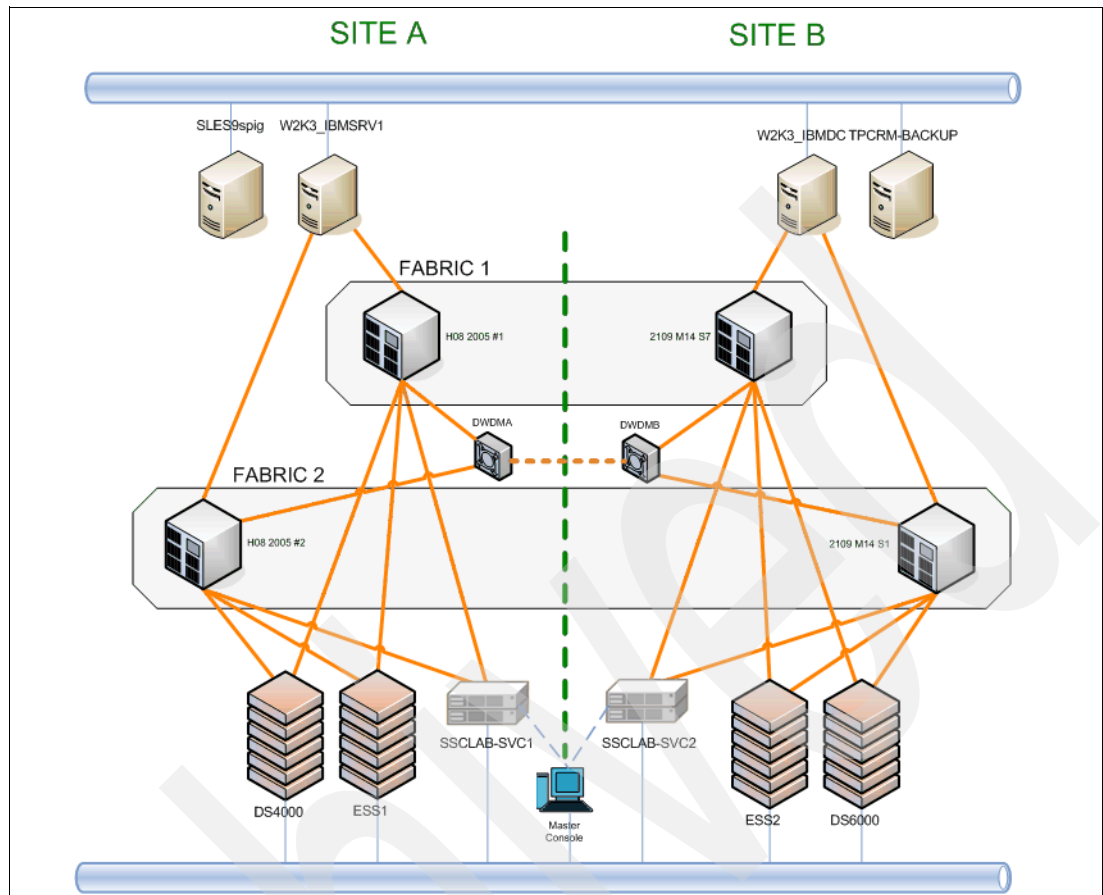


Figure 5-2 ITSO Linux Lab setup

5.1.1 Adding the SAN Volume Controller using the Linux 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 5-3 on page 84.

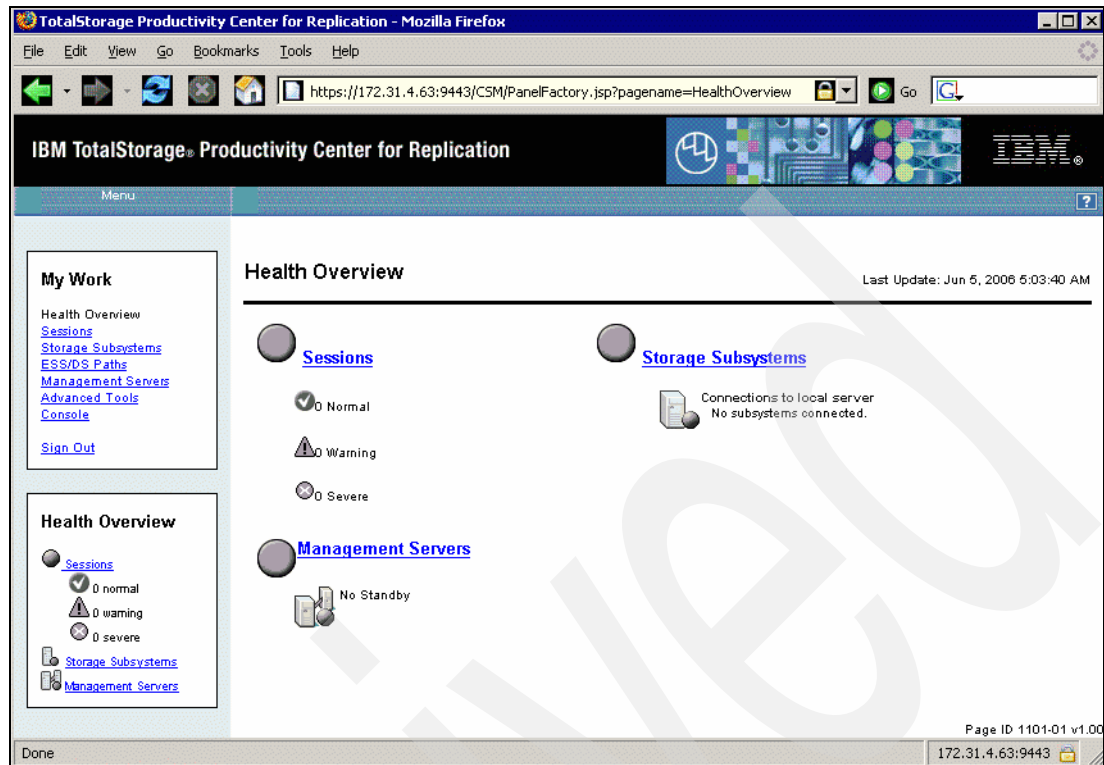


Figure 5-3 TPC for Replication Health Overview

After selecting Storage Subsystems a window similar to Figure 5-4 on page 85 will be displayed. Click **Add Subsystem** to continue.

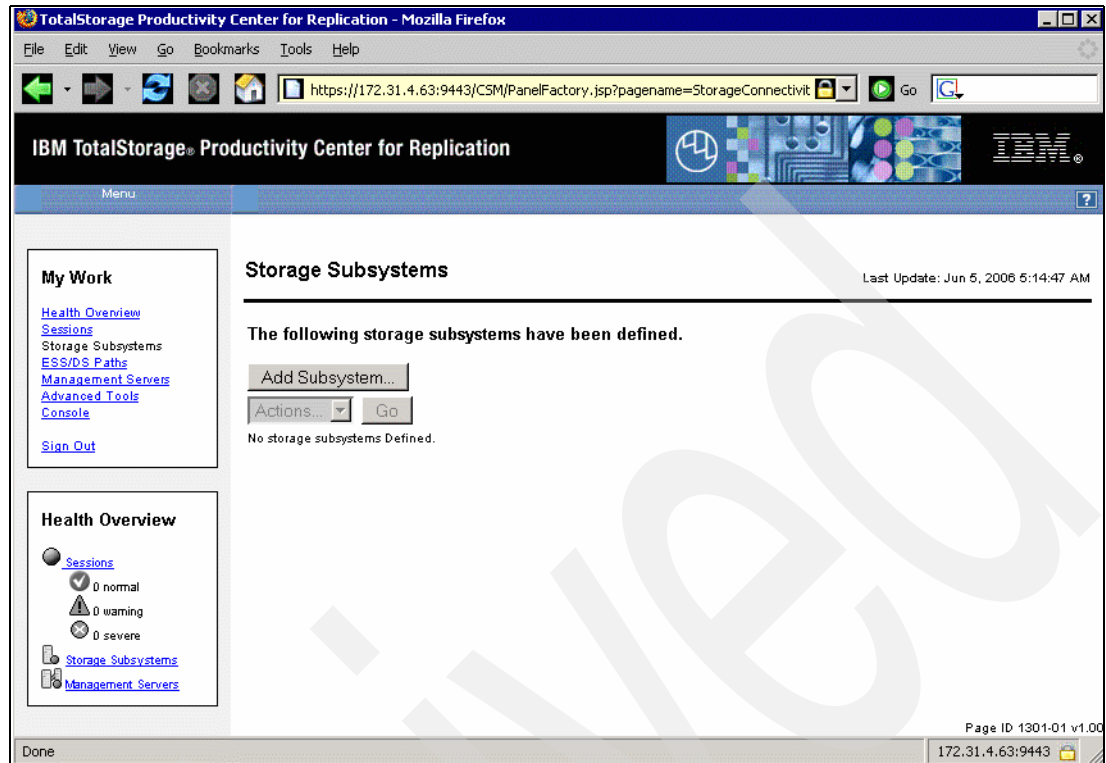


Figure 5-4 TPC for Replication Storage Subsystems

In the next panel select the radio button next to SVC (SAN Volume Controller) as shown in Figure 5-5 and click **OK** to continue.

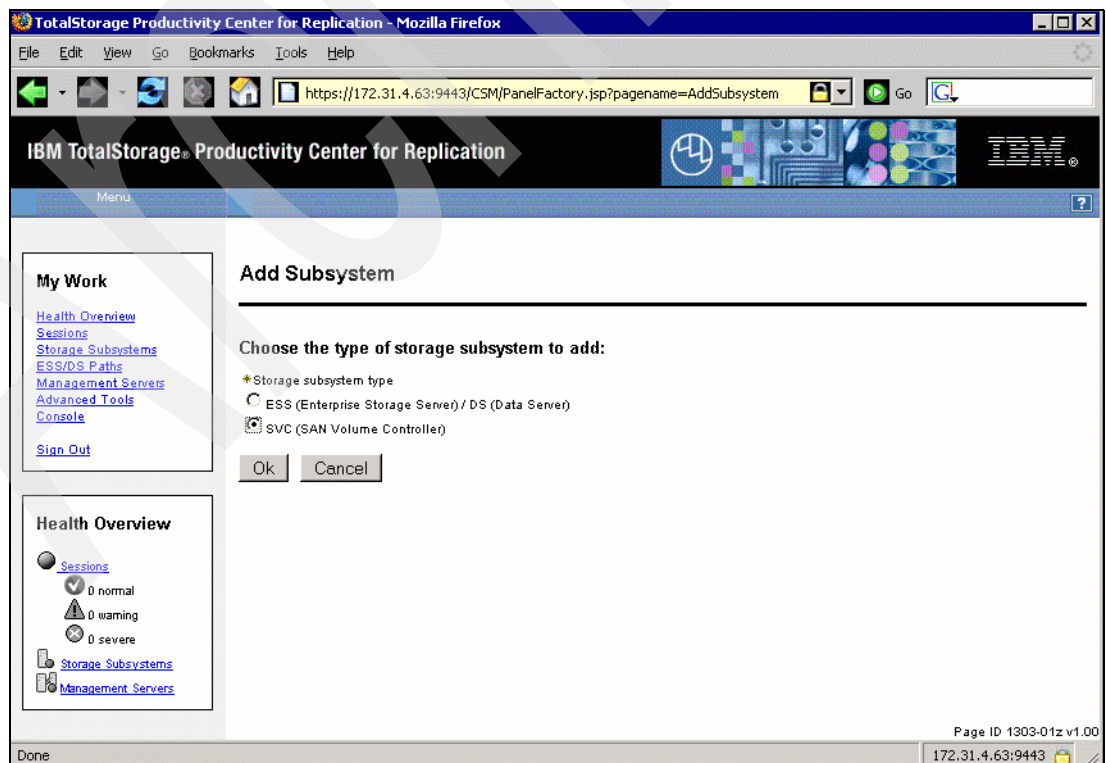


Figure 5-5 TPC for Replication Add Subsystem

Now enter the IP address (or the fully qualified name) of the SVC Master Console or the server where the SVC CIMOM is installed as well as the defined user account and password for TPC for Replication's use as shown in Figure 5-6. Click **OK** to continue.

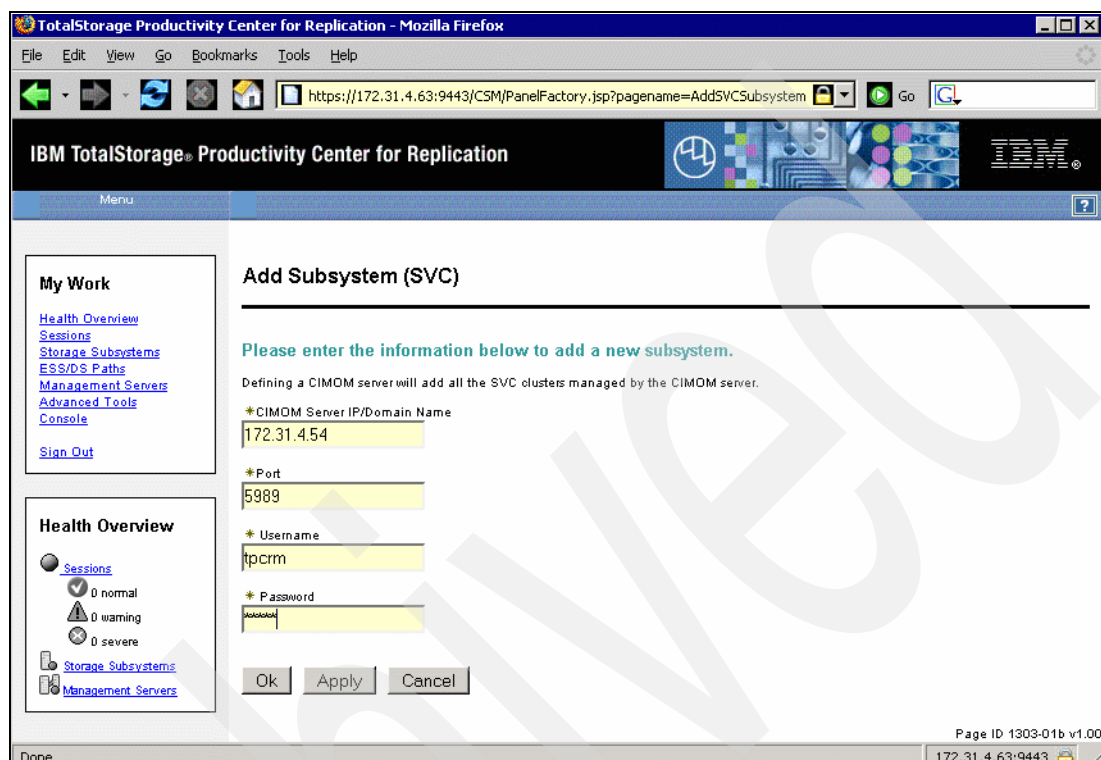


Figure 5-6 TPC for Replication Add Subsystem (SVC)

In our example we used *http (unsecure)* protocol for accessing the SVC CIMOM. It is also possible to use *https (secure)* protocol. To use the secure protocol you need to use port 5999 instead of port 5989. Click **OK** to continue to the panel in Figure 5-7 on page 87. Note the SVC has been defined and the TPC for Replication server is connecting to it.

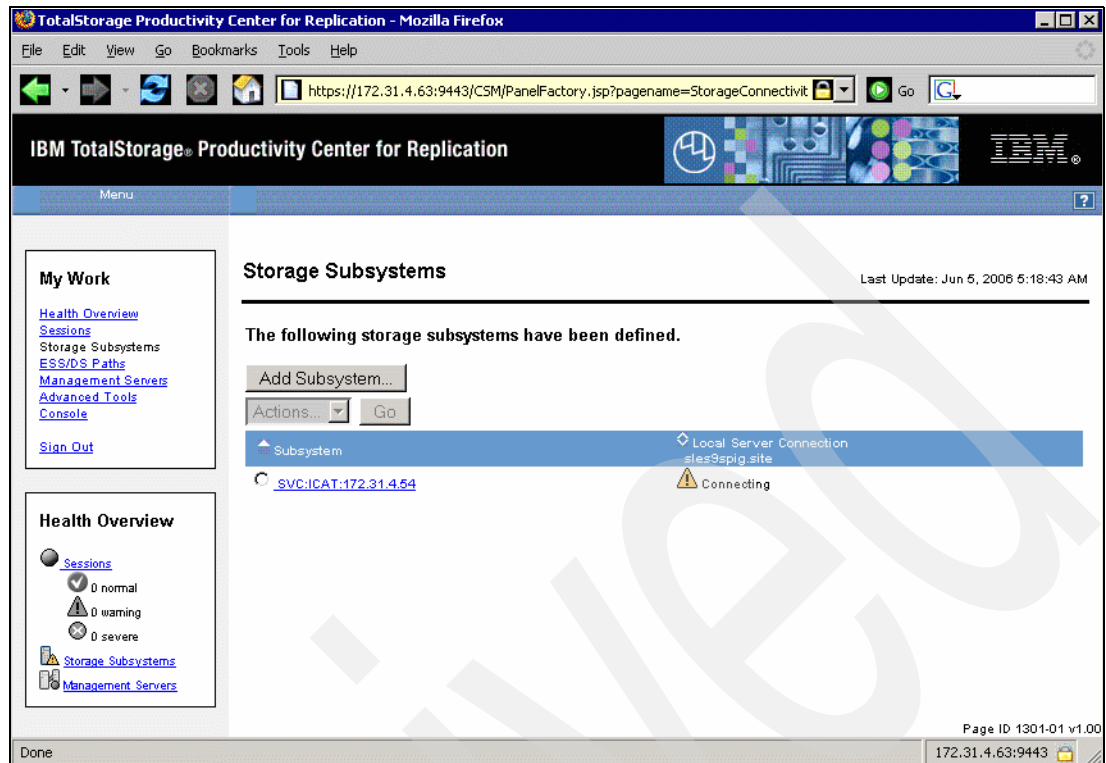


Figure 5-7 TPC for Replication SVC Subsystem Added

When the SVC is successfully connected, this will be reflected in the **Health Overview** panel as shown in Figure 5-8.

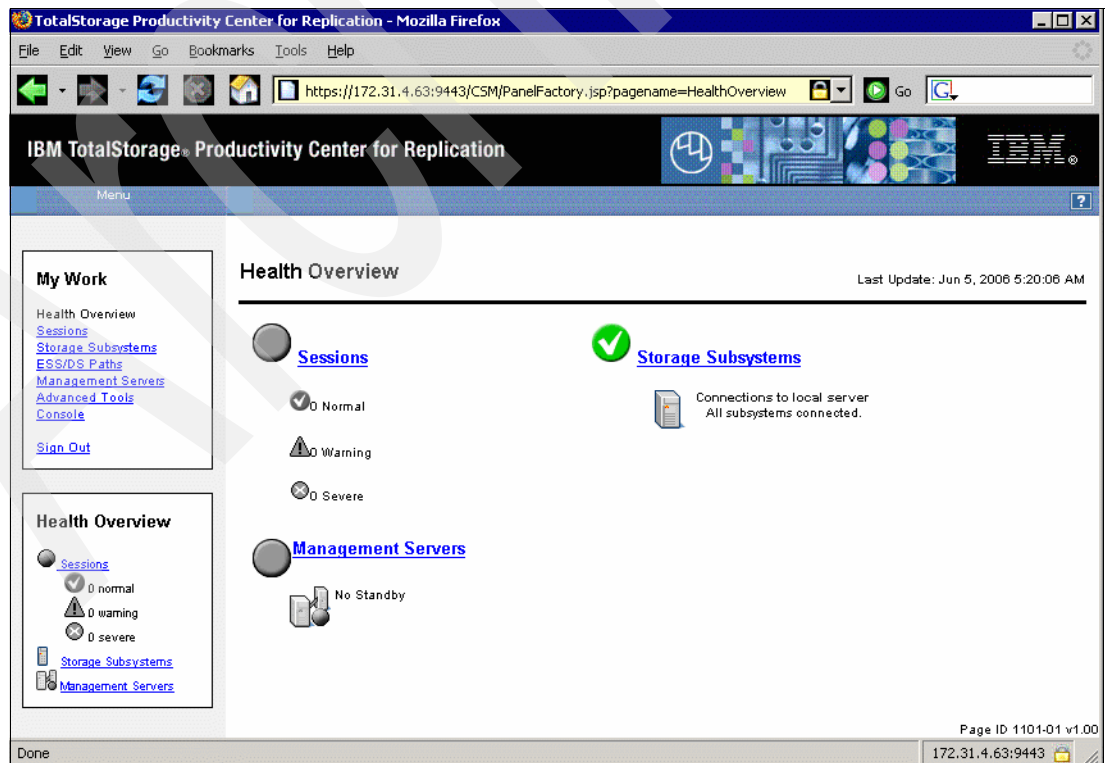


Figure 5-8 TPC for Replication SVC Subsystem Connected

The green checkmark beside **Storage Subsystems** means that our SVC Subsystem is successfully connected.

5.1.2 Adding the SVC with the Linux CLI

Using the command line interface, we can achieve the same result as with the GUI. For this effort we have created a script file which can be seen in Figure 5-9.

```
sles9spig:/tpcrm # cat addsvc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Replication
#
setoutput -fmt delim -v on
adddevice -devtype SVC -ip 172.31.4.54 -username tpcrm -port 5989
lsdevice -devtype svc
```

Figure 5-9 Add SVC Subsystem script

While we can setup a script to perform this, because the **adddevice** command requires a password, it must be added interactively as shown in Figure 5-10.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/addsvc.txt
Please enter a password for the device userid of tpcrm:
```

Figure 5-10 Add Subsystem script

Once the password is entered correctly we see the result as shown in Figure 5-11.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/addsvc.txt
Please enter a password for the device userid of tpcrm:
IWNH1000I [Jun 17, 2006 1:21:23 PM] The command completed successfully.
Device ID,Device type
=====
SVC:BOX:172.31.4.54,SVC
```

Figure 5-11 CLI result

5.1.3 Adding a FlashCopy Session using the GUI

Now that we have a subsystem to use, we can create a session to meet our copy services requirements. Remember that a Session is the highest order component. As such, it represents a consistency group for all copy sets defined within it.

In this instance, we will create a FlashCopy Session as shown in Figure 5-12 on page 89.

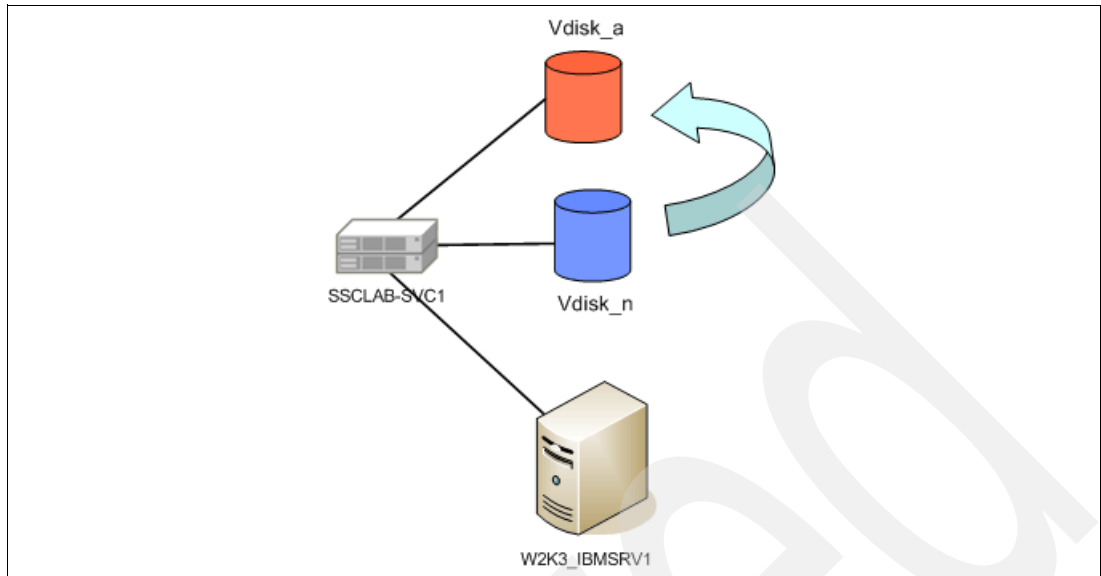


Figure 5-12 Flashcopy ITSO Linux lab setup

The first step is to select the **Create Session** button from the Sessions panel as shown in Figure 5-13.

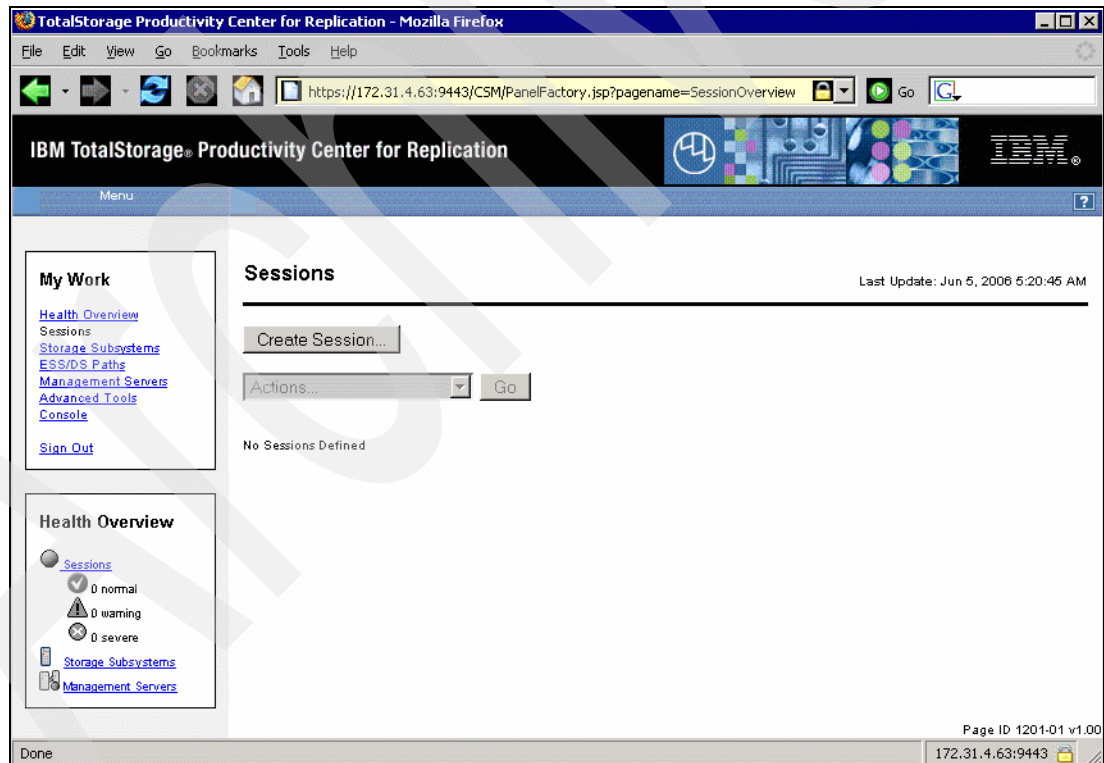


Figure 5-13 TPC for Replication Sessions

This will open a new panel where you choose the session type to add as shown in Figure 5-14 on page 90.

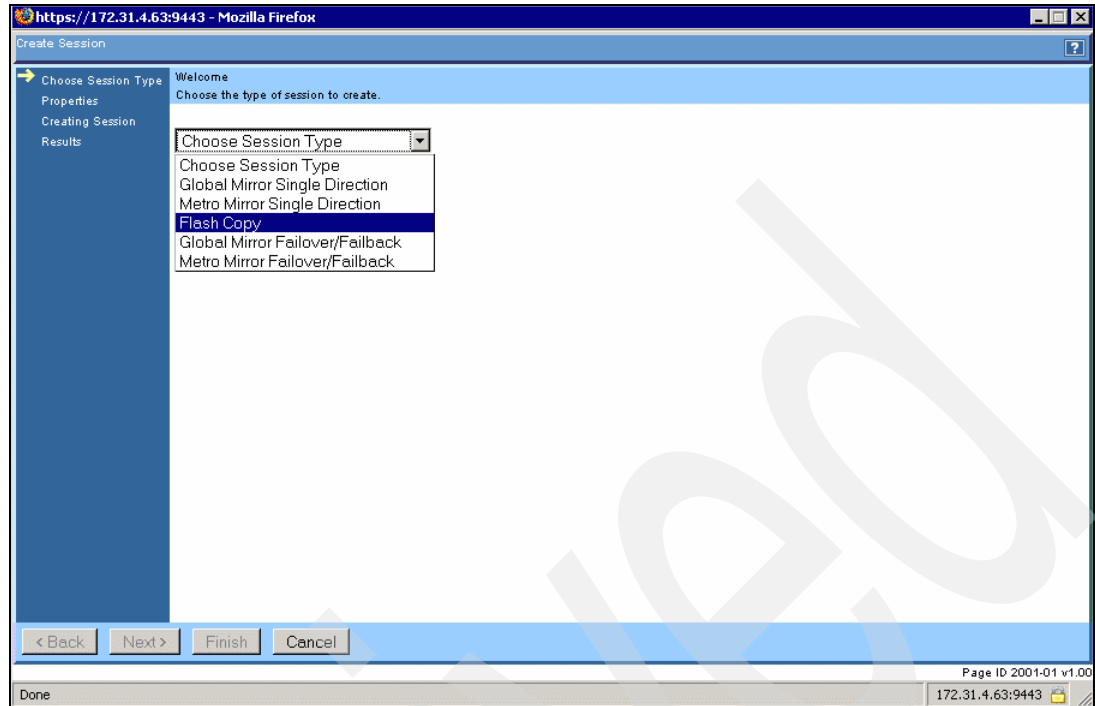


Figure 5-14 TPC for Replication Create Session

Select your Session Type, in our example *Flash Copy*, and click the **Next** button. The window similar to Figure 5-15 will be displayed.

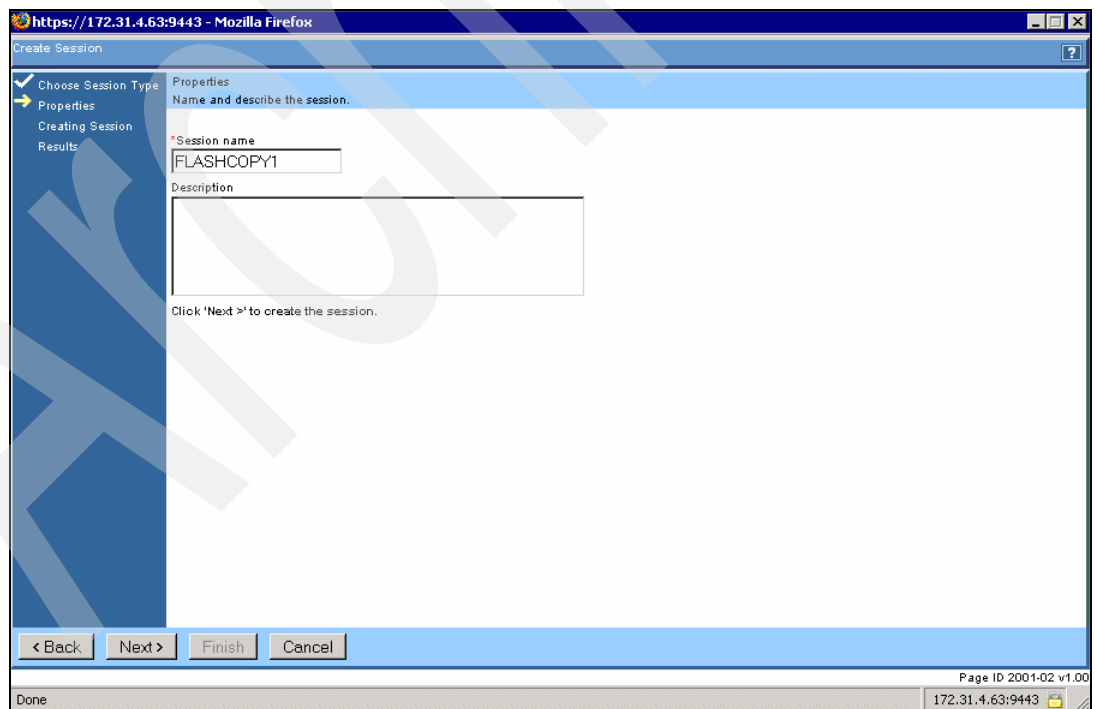


Figure 5-15 TPC for Replication Create Session Properties

Type in a meaningful name for the session in the **Session name** box as well as any informational text in the **Description** box. Click **Next** to continue. The session will be created and the window similar to Figure 5-16 will be displayed.

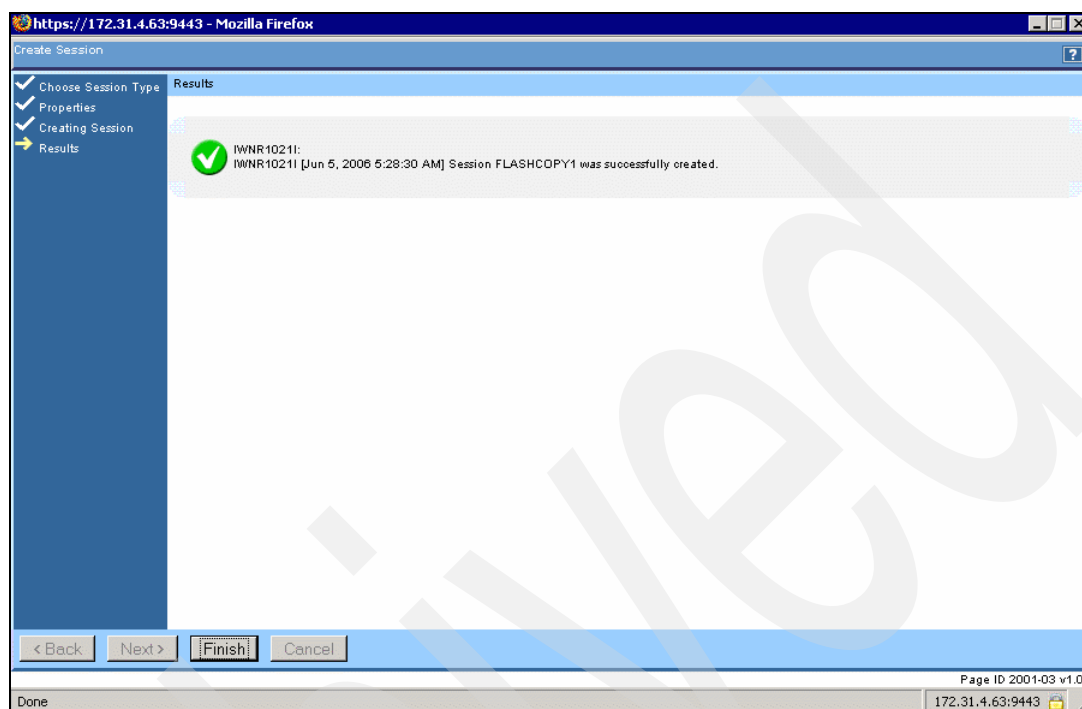


Figure 5-16 TPC for Replication Session Created

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

5.2 Adding a FlashCopy session using the Linux CLI

Once again using the command line interface, we can achieve the same result. For this effort we have created another script file which can be seen in Figure 5-17. Note that we have added a list session command (`lssess -l`) to display the defined sessions once our new one has been created.

```
sles9spig:/tpcrm # cat createfcsession.txt
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype fc -desc FLASHCOPY1 FLASHCOPY1
lssess -l
```

Figure 5-17 Add FC Session script file

The result of the execution of this script can be seen in Figure 5-18 on page 92.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/createfcsession.txt
IWNR1021I [Jun 17, 2006 4:05:33 PM] Session FLASHCOPY1 was successfully
created.
Name          Status   State   Copy type   Recoverable Copying Copy sets Error
=====
FLASHCOPY1 Inactive Defined Flash Copy No           No           0 No
```

Figure 5-18 FC Session CLI result

5.2.1 Adding Copy Sets to a FlashCopy Session using GUI

Now that we have a session created, we can begin to create copy sets within the session. First you need to select the session, in our example *FLASHCOPY1*, to which you want to add copy sets. From the Sessions panel, select the **Add Copy Sets** option from the drop-down menu as shown in Figure 5-19.

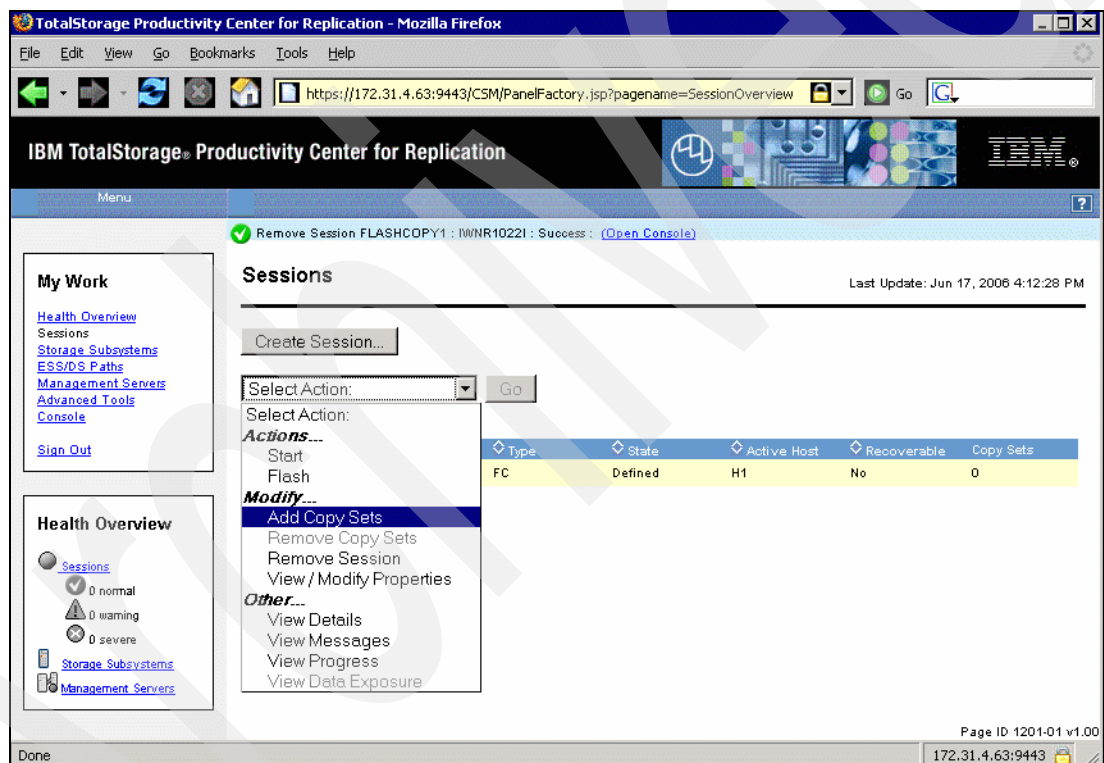


Figure 5-19 TPC for Replication Add Copy Sets

Click the **Go** button to continue. This will open a new window where we will define the copy sets as shown in Figure 5-20 on page 93. In this window we define the source subsystems using the first drop-down menu.

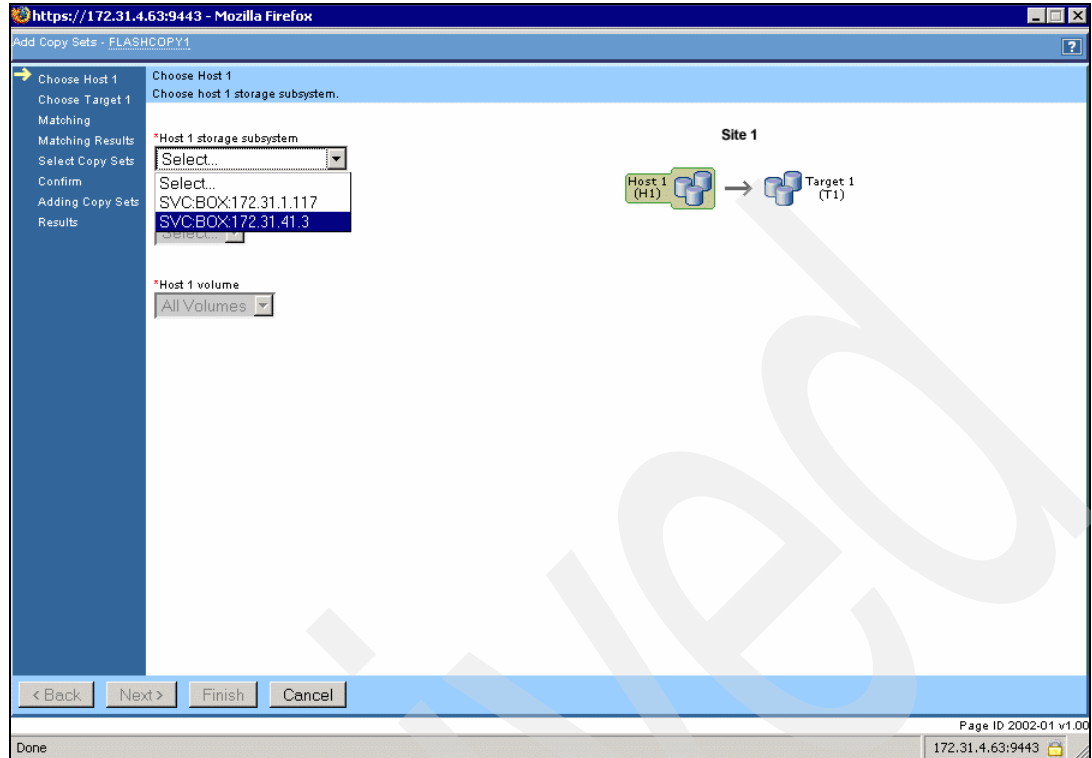


Figure 5-20 TPC for Replication Source SVC

Select your source SAN Volume Controller, in our example we selected **SVC:BOX:172.31.41.3**. The **Host 1 IO group** pull-down menu will become available as shown in Figure 5-21.

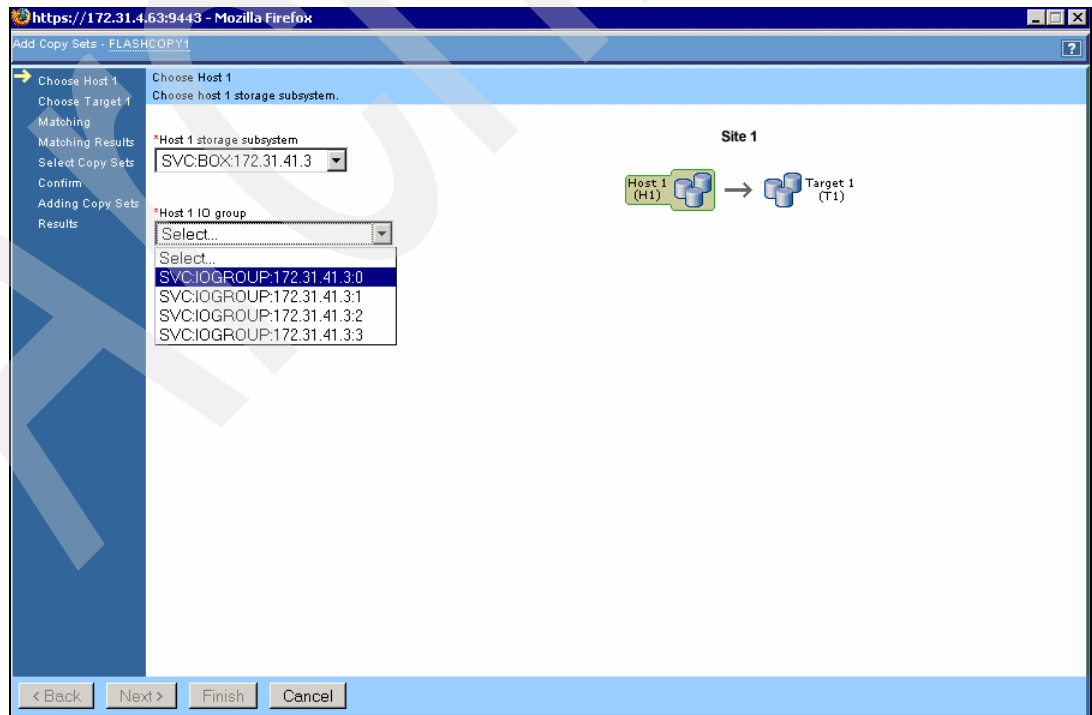


Figure 5-21 TPC for Replication Source SVC IO Group

From the **Host 1 I/O group** pull-down menu, select your source SVC I/O group. We selected SVC:IOGROUP:172.32.41.3:0. The **Host 1 volume** pull-down menu becomes available as shown in Figure 5-22. Select your source volume, we selected *TPCRM1* volume. Once the source volume is selected, click the **Next** button to proceed to the Target definitions as shown in Figure 5-23 on page 95.

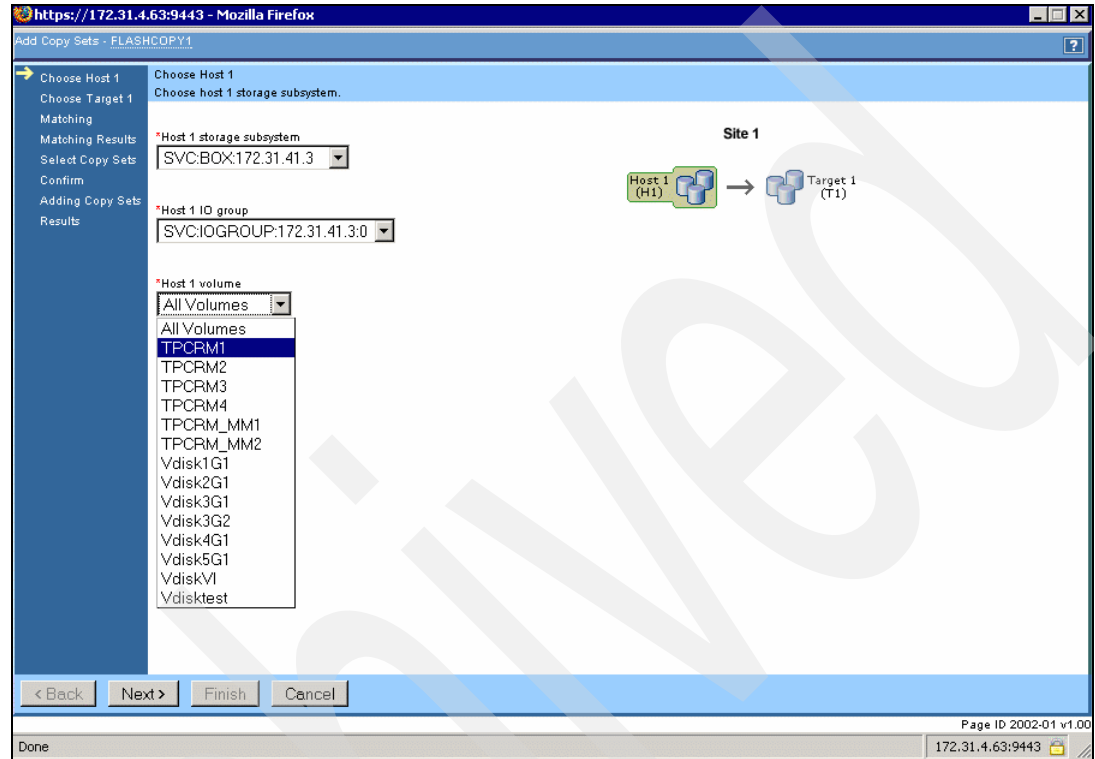


Figure 5-22 TPC for Replication SVC Source Volume

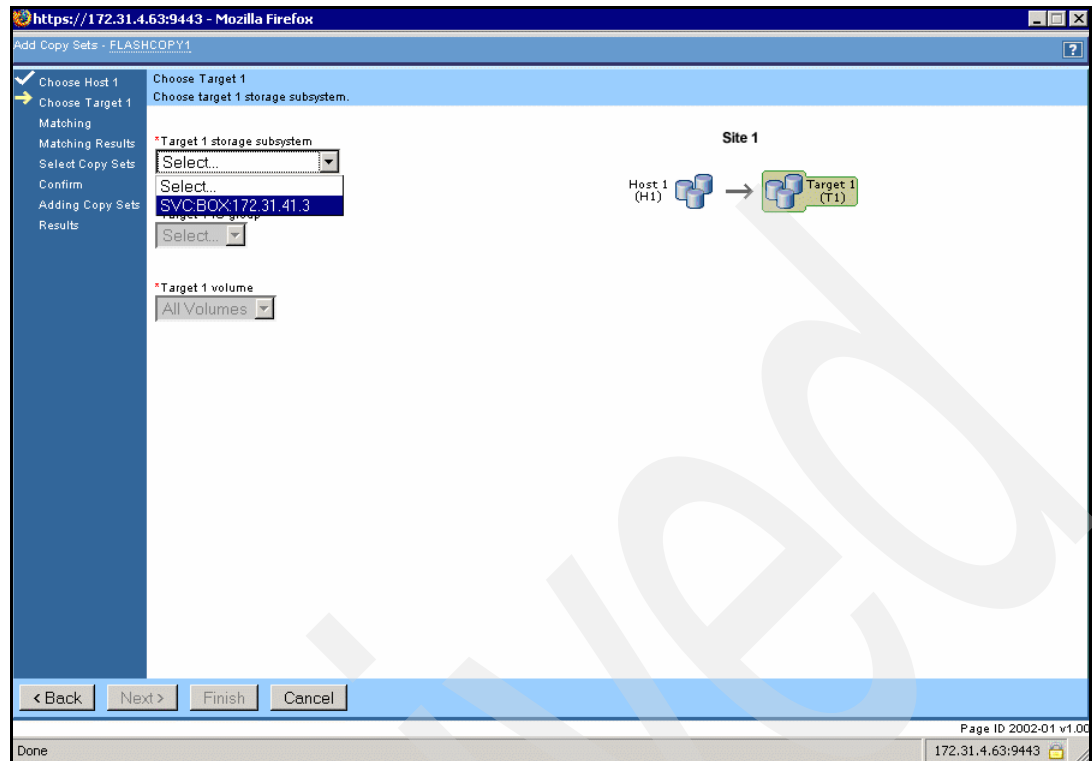


Figure 5-23 TPC for Replication Target SVC

Select your target SAN Volume Controller from the **Target 1 storage subsystem** pull-down menu. We selected **SVC:BOX:172.31.41.3**. The **Target1 IO group** pull-down menu becomes available as shown in Figure 5-24 on page 96.

Note: As you can see in our example only one SAN Volume Controller is available for target selection. The reason for this is that FlashCopy operation can only be performed within the same SAN Volume Controller cluster.

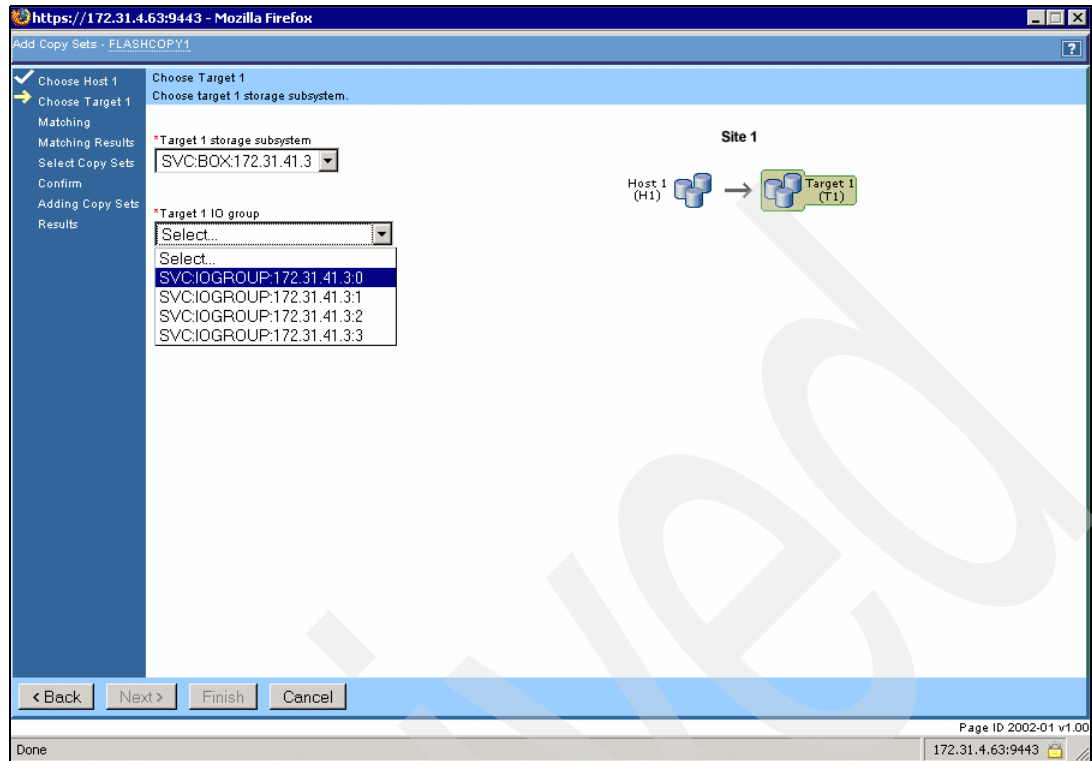


Figure 5-24 TPC for Replication Target SVC IO Group

Select your target SAN Volume Controller IO group from the Target 1 I/O group pull-down. We selected SVC:IOGROUP:172.31.41.3:0. The **Target 1 volume** pull-down menu becomes available as shown in Figure 5-25 on page 97.

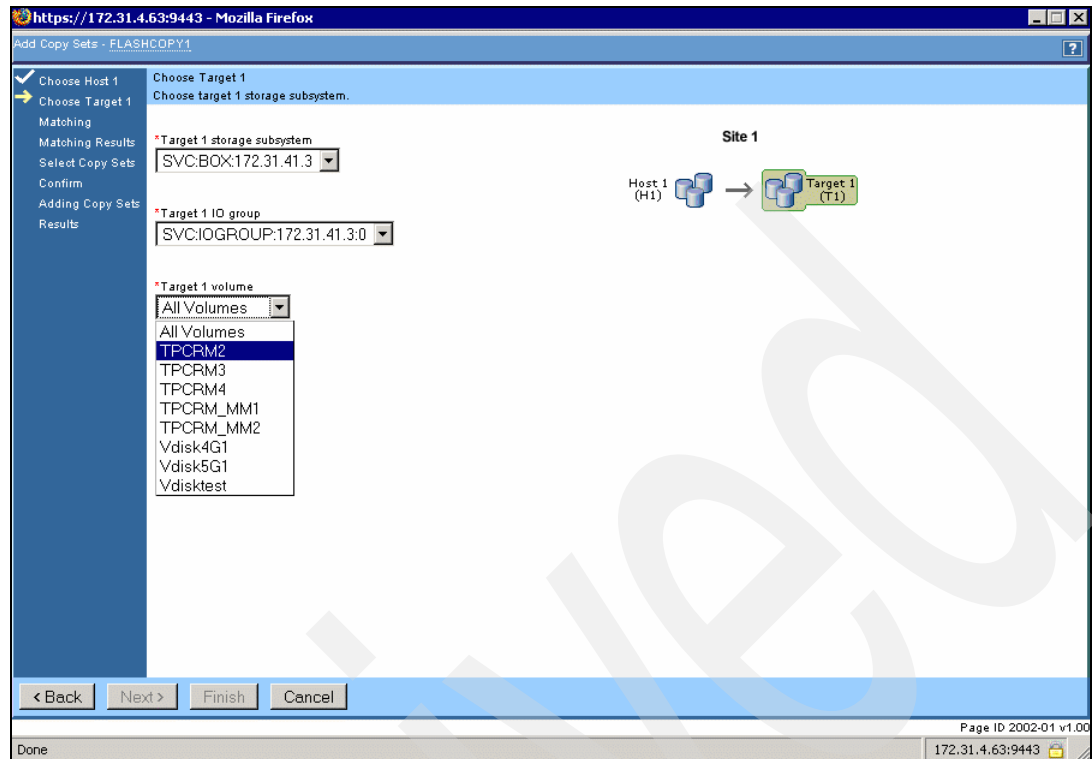


Figure 5-25 TPC for Replication SVC Target Volume

Select your target volume, we selected volume *TPCRM2* volume. Once the source volume is selected, click the **Next** button to continue. TPC for Replication will now perform a check to confirm the volume attributes match. This checking process can be seen in Figure 5-26 on page 98.

Note: Only volumes fulfilling the requirements to be a FlashCopy target will be displayed.

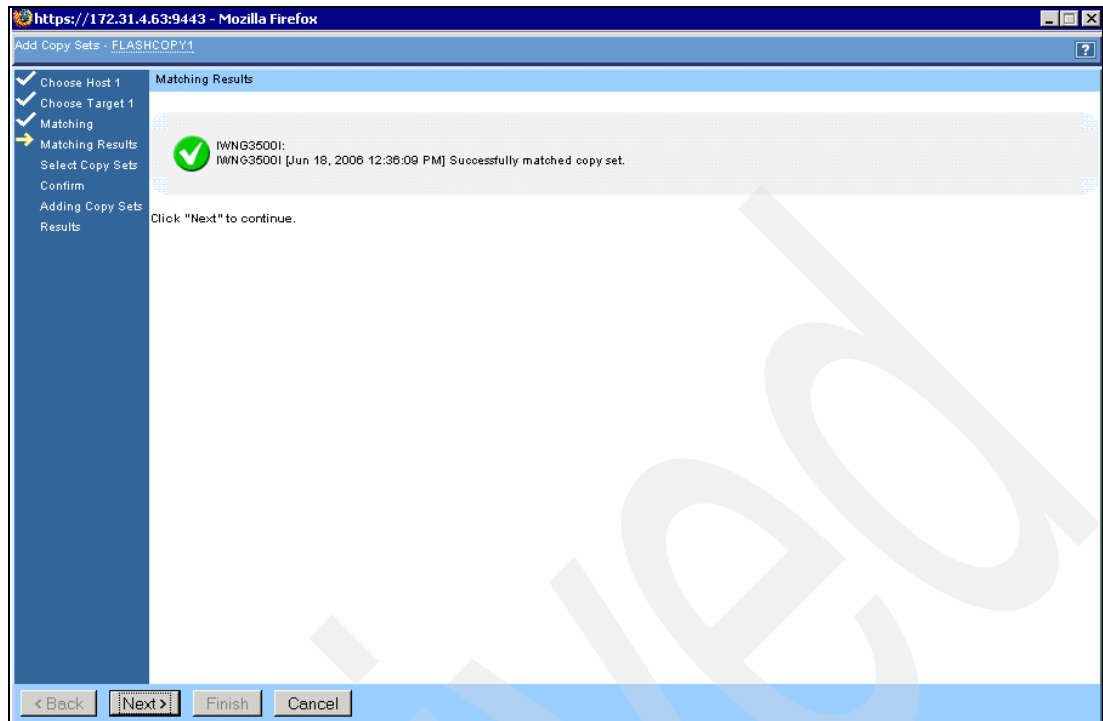


Figure 5-26 TPC for Replication Volume Match OK

You can see that TPC for Replication has matched the volumes. You can proceed by clicking the **Next** button. The window similar to Figure 5-27 will be displayed where you see the copy sets available to add.

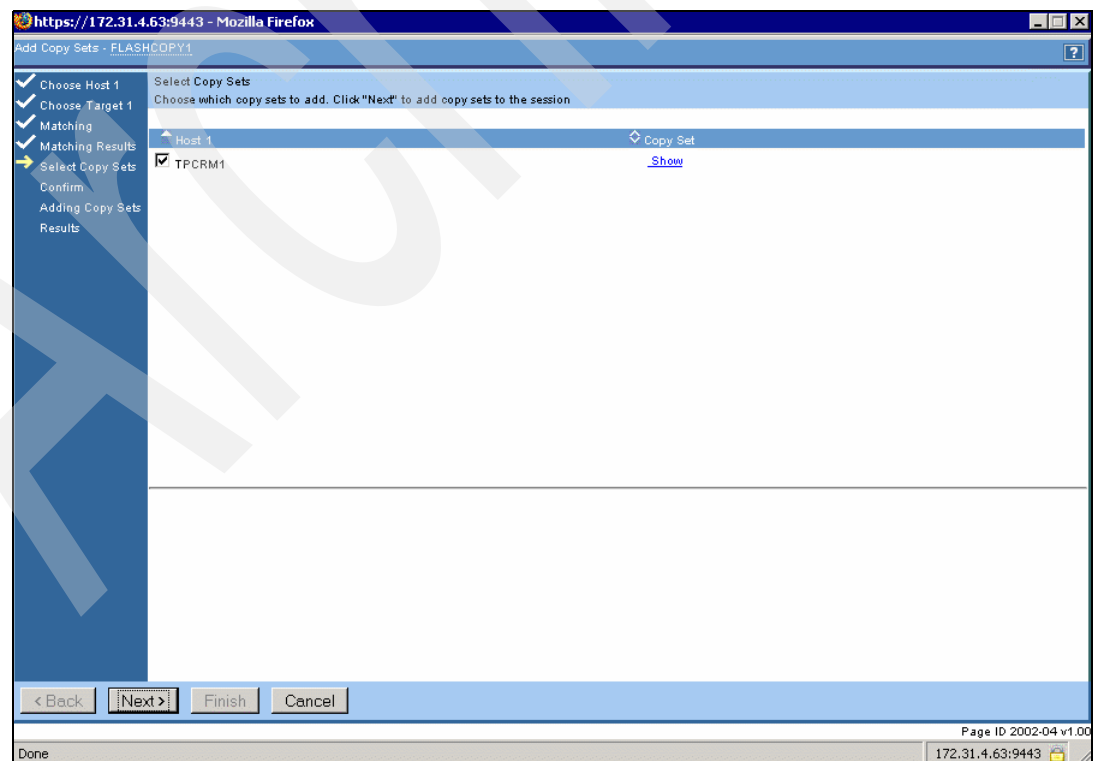


Figure 5-27 TPC for Replication Select Copy Set

The Copy Set is preselected, you just click **Next** to continue, the window similar to Figure 5-28 will be displayed.

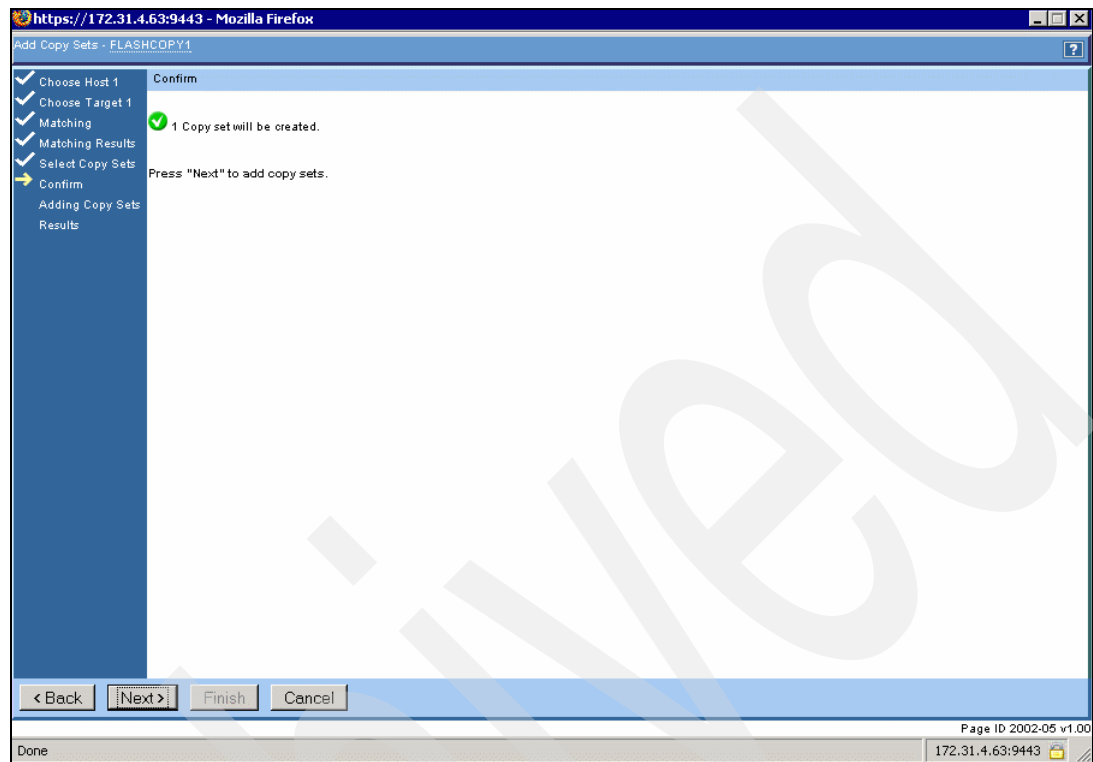


Figure 5-28 TPC for Replication Copy Set Confirm

TPC for Replication requires you to confirm your configuration as we shown in Figure 5-28. From here just click the **Next** button. The window similar to Figure 5-29 on page 100 will be displayed.

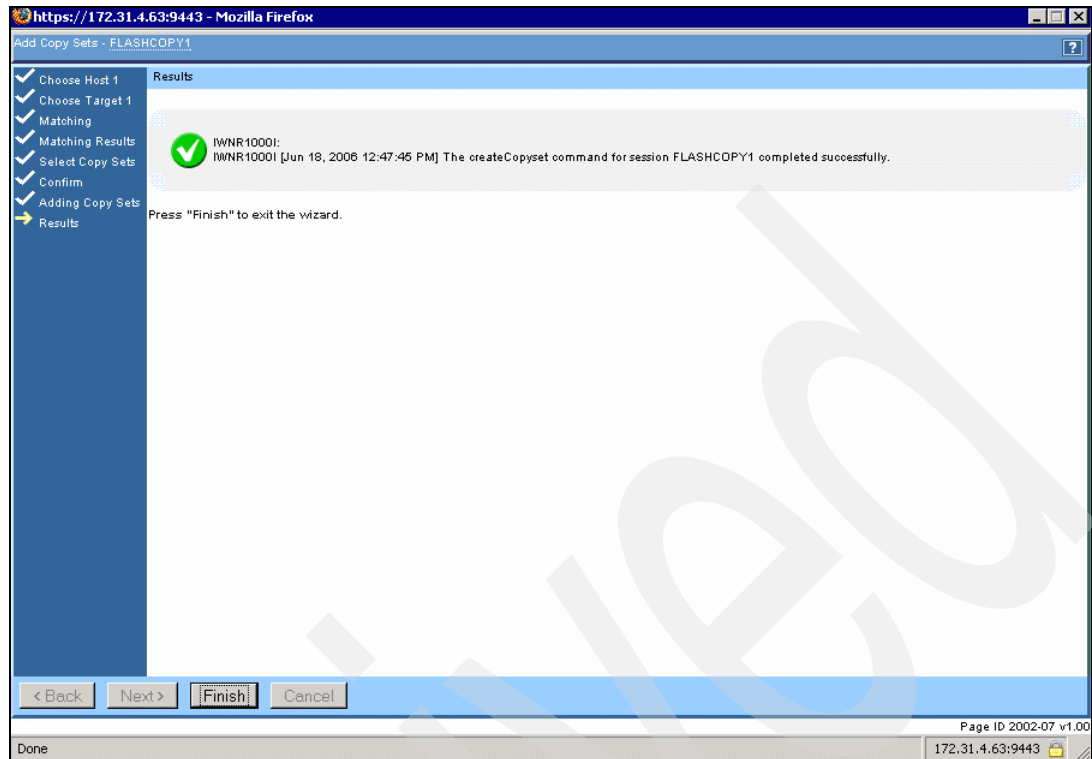


Figure 5-29 TPC for Replication Finish Adding Copy Sets

Finally, once you have added a Copy set successfully, click the **Finish** button to complete the task.

5.2.2 Adding Copy Sets to a FlashCopy Session using CLI

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 5-31 on page 101, 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 as seen in Figure 5-30.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh lsvol -l -devtype svc | grep 172.31.41.3 | grep TPC
```

TPCRM1	SVC:VOL:172.31.41.3:0:9	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB
TPCRM11	SVC:VOL:172.31.41.3:0:6	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM10	SVC:VOL:172.31.41.3:0:23	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM9	SVC:VOL:172.31.41.3:0:22	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM8	SVC:VOL:172.31.41.3:0:21	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM7	SVC:VOL:172.31.41.3:0:20	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM6	SVC:VOL:172.31.41.3:0:19	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM5	SVC:VOL:172.31.41.3:0:18	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM14	SVC:VOL:172.31.41.3:0:17	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM13	SVC:VOL:172.31.41.3:0:16	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM12	SVC:VOL:172.31.41.3:0:15	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM2	SVC:VOL:172.31.41.3:0:14	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB
TPCRM_MM1	SVC:VOL:172.31.41.3:0:13	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB
TPCRM4	SVC:VOL:172.31.41.3:0:12	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB
TPCRM3	SVC:VOL:172.31.41.3:0:11	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB
TPCRM2	SVC:VOL:172.31.41.3:0:10	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB

Figure 5-30 List of possible volumes

Some of those volumes were used as part of the **mkcpset** command as shown in Figure 5-31 on page 101.

```
sles9spig:/tpcrm # cat svcfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mkssess -cptype fc -desc FLASHCOPY2 FLASHCOPY2
lssess -l
lsvol -l -devtype svc
mkcpset -h1 svc:vol:172.31.41.3:0:11 -t1 svc:vol:172.31.41.3:0:12 FLASHCOPY2
mkcpset -h1 svc:vol:172.31.41.3:0:18 -t1 svc:vol:172.31.41.3:0:19 FLASHCOPY2
lscpsset -l FLASHCOPY2
```

Figure 5-31 SVC FC script

The results of the execution of this script are shown in Example 5-1. Note that we have formatted the output to fit the page.

Example 5-1 SVC FC script output

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svcfc.txt
IWNR1021I [Jun 18, 2006 1:39:35 PM] Session FLASHCOPY2 was successfully created.
Name      Status   State   Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Inactive Defined Flash Copy No          No          0 No
FLASHCOPY1 Inactive Defined Flash Copy No          No          1 No
Name      ID          Dev          Dev Type Vol format LSS/IO Group Vol Type Size   Size Unit
=====
TPCRM1    SVC:VOL:172.31.41.3:0:9  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
Vdisk3G2  SVC:VOL:172.31.41.3:0:8  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
VdiskVI   SVC:VOL:172.31.41.3:0:7  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      5.000 GB
TPCRM11   SVC:VOL:172.31.41.3:0:6  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
Vdisk5G1  SVC:VOL:172.31.41.3:0:5  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
Vdisk4G1  SVC:VOL:172.31.41.3:0:4  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
Vdisktest SVC:VOL:172.31.41.3:0:3  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
TPCRM10   SVC:VOL:172.31.41.3:0:23 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM9    SVC:VOL:172.31.41.3:0:22 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM8    SVC:VOL:172.31.41.3:0:21 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM7    SVC:VOL:172.31.41.3:0:20 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
Vdisk3G1  SVC:VOL:172.31.41.3:0:2  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM6    SVC:VOL:172.31.41.3:0:19 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM5    SVC:VOL:172.31.41.3:0:18 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM14   SVC:VOL:172.31.41.3:0:17 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM13   SVC:VOL:172.31.41.3:0:16 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM12   SVC:VOL:172.31.41.3:0:15 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
TPCRM_MM2 SVC:VOL:172.31.41.3:0:14 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
TPCRM_MM1 SVC:VOL:172.31.41.3:0:13 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
TPCRM4    SVC:VOL:172.31.41.3:0:12 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
TPCRM3    SVC:VOL:172.31.41.3:0:11 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
TPCRM2    SVC:VOL:172.31.41.3:0:10 2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      1.000 GB
Vdisk2G1  SVC:VOL:172.31.41.3:0:1  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
Vdisk1G1  SVC:VOL:172.31.41.3:0:0  2145-172.31.41.3-IBM SVC      FIXEDBLK 0          FB      2.000 GB
MMVOL3    SVC:VOL:172.31.1.117:0:9  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      1.000 GB
MMVOL2    SVC:VOL:172.31.1.117:0:8  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      1.000 GB
MMVOL1    SVC:VOL:172.31.1.117:0:7  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      1.000 GB
MMVOL4    SVC:VOL:172.31.1.117:0:6  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      1.000 GB
FCTEST2   SVC:VOL:172.31.1.117:0:5  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      10.000 GB
FCTEST1   SVC:VOL:172.31.1.117:0:4  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      10.000 GB
LV01      SVC:VOL:172.31.1.117:0:3  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      40.000 GB
LV02      SVC:VOL:172.31.1.117:0:2  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      40.000 GB
TPCRM_MM2 SVC:VOL:172.31.1.117:0:11 2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      1.000 GB
TPCRM_MM1 SVC:VOL:172.31.1.117:0:10 2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      1.000 GB
LV03      SVC:VOL:172.31.1.117:0:1  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      40.000 GB
LV04      SVC:VOL:172.31.1.117:0:0  2145-172.31.1.117-IBM SVC      FIXEDBLK 0          FB      40.000 GB
IWNR2001I [Jun 18, 2006 1:39:37 PM] The pair was successfully created in session FLASHCOPY2 for copy set
SVC:VOL:172.31.41.3:0:11 with source SVC:VOL:172.31.41.3:0:11(TPCRM3) and target SVC:VOL:172.31.41.3:0:12(TPCRM4).
IWNR2001I [Jun 18, 2006 1:39:37 PM] The pair was successfully created in session FLASHCOPY2 for copy set
SVC:VOL:172.31.41.3:0:18 with source SVC:VOL:172.31.41.3:0:18(TPCRM5) and target SVC:VOL:172.31.41.3:0:19(TPCRM6).
```

H1 Volume	Session	Volumes
SVC:VOL:172.31.41.3:0:11	FLASHCOPY2	2
SVC:VOL:172.31.41.3:0:18	FLASHCOPY2	2

sles9spig:/opt/IBM/TPC-RM/CLI #

Now that the session is created and has valid copy set, we can start using it.

5.2.3 Preparing a FlashCopy Session using GUI

To start using a FlashCopy session you previously defined, go to the Sessions panel as shown in Figure 5-32.

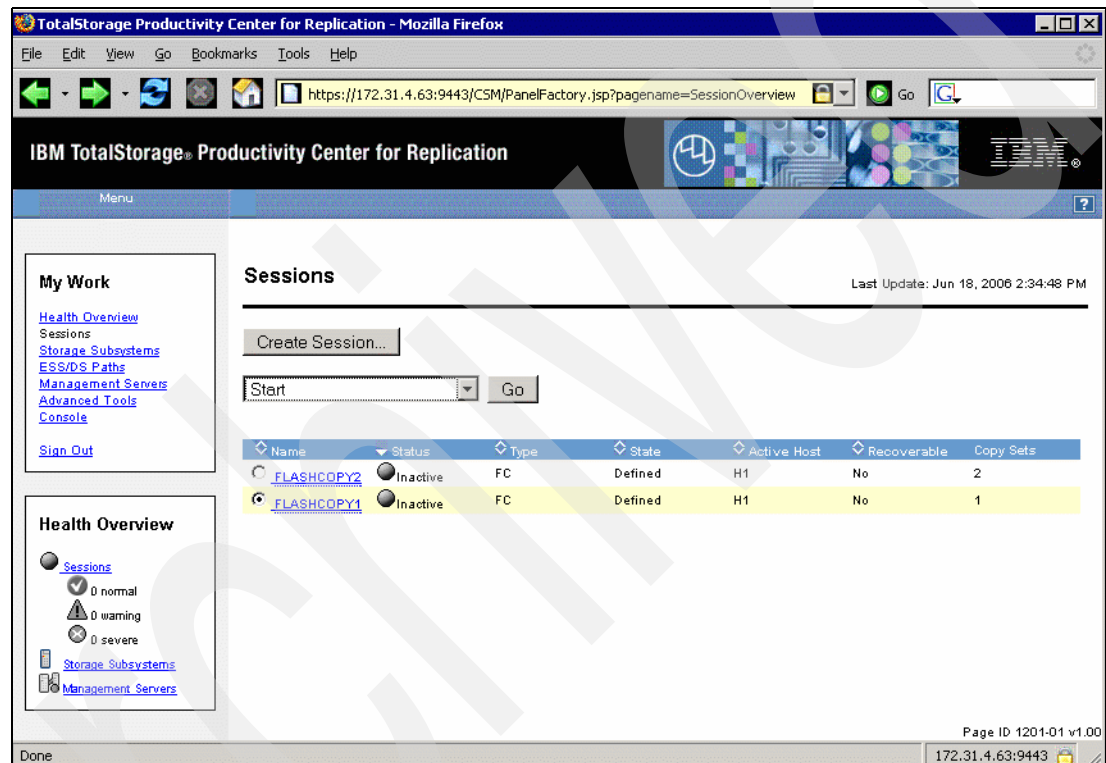


Figure 5-32 TPC for Replication Start FlashCopy Session

Before executing the FlashCopy session needs to be prepared. To prepare a session, select the session you want to prepare - in our example *FLASHCOPY1*. From the pull-down menu, select **Start** and click **Go**. The selected session will enter in preparing state, as shown in Figure 5-33 on page 103.

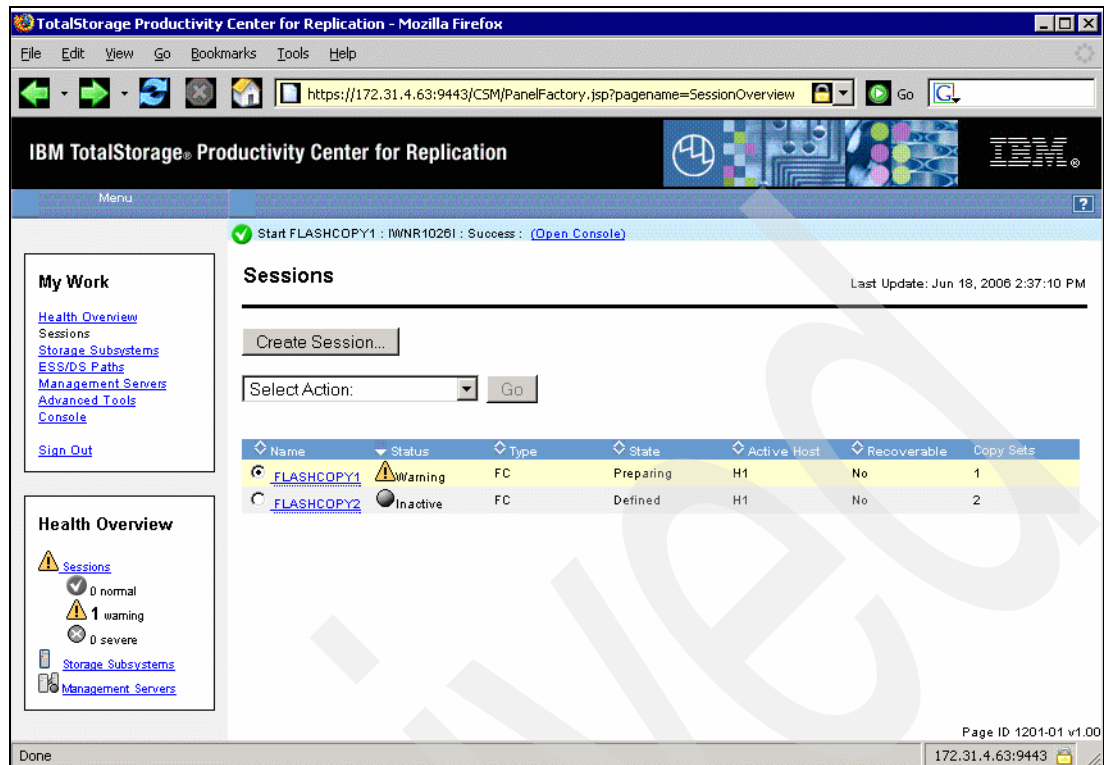


Figure 5-33 TPC for Replication Start FlashCopy Session Preparing

Once the session is prepared you will see a window similar to Figure 5-34.

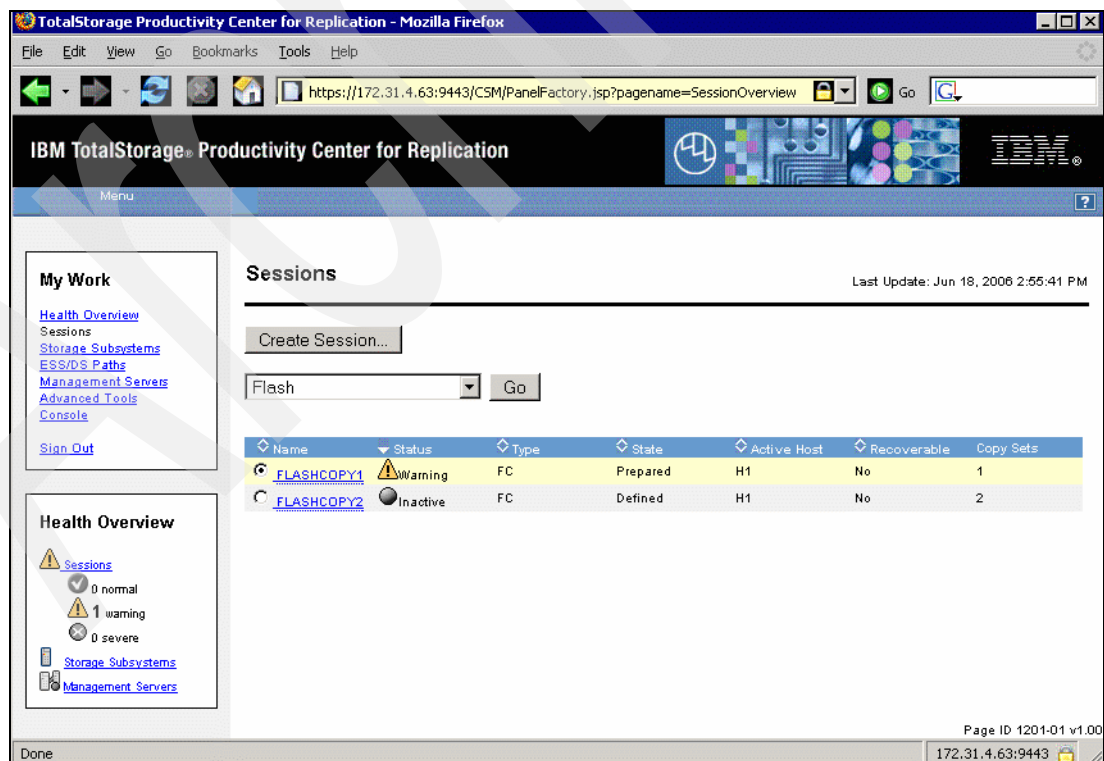


Figure 5-34 TPC for Replication Start FlashCopy Session Prepared

Preparing a session will actually create FlashCopy Mappings on the SAN Volume Controller for all Copy Sets included in this session. It will also create a FlashCopy Consistency Group for those FlashCopy Mappings.

Important: With a version of SAN Volume Controller Console up to 3.1.0.549 you need to restart the TPC for Replication server so it will correctly capture the prepared state. This is due to the problem in CIMOM interface on SAN Volume Controller Console.

5.2.4 Preparing a FlashCopy Session using CLI

In this instance we will prepare a session as part of a single script.

As you can see in Figure 5-31 on page 101, the script file contains multiple commands to display the session status before and after command, and to prepare the session. You can see the script in Figure 5-35.

```
sles9spig:/tpcrm # cat svcprepfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lsess -l FLASHCOPY2
cmdsess -quiet -action Start FLASHCOPY2
lsess -l FLASHCOPY2
```

Figure 5-35 SVC FC prepare script

The output of the script is shown in Figure 5-36.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svcprepfc.txt
Name      Status  State  Copy type  Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Inactive Defined Flash Copy No          No          2 No
IWNR1026I [Jun 19, 2006 12:22:56 PM] The runCommand for command Start in
session FLASHCOPY2 completed successfully.
Name      Status  State  Copy type  Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Warning Preparing Flash Copy No          Yes          2 No
```

Figure 5-36 SVC FC prepare script output

The *-quiet* option is used to run the script without needing to answer the prompt for execution of the prepare command as shown in Figure 5-37 on page 105.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svcprepfcng.txt
Name      Status  State  Copy type  Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Inactive Defined Flash Copy No          No          2 No
Are you sure you want to start session FLASHCOPY2? [y/n]:y
IWNR1026I [Jun 19, 2006 12:34:00 PM] The runCommand for command Start in
session FLASHCOPY2 completed successfully.
Name      Status  State  Copy type  Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Warning Preparing Flash Copy No          Yes         2 No
```

Figure 5-37 SVC FC prepare script output without -quiet

5.2.5 Starting a FlashCopy Session using the GUI

To start the FlashCopy process, select the session you want to copy from the Sessions panel - in our example *FLASHCOPY1*. From the pull-down menu select **Flash** and click **Go**.

Tip: The session has to be in prepared state to start **Flash** command.

The selected session will enter in target available state as shown in Figure 5-38.

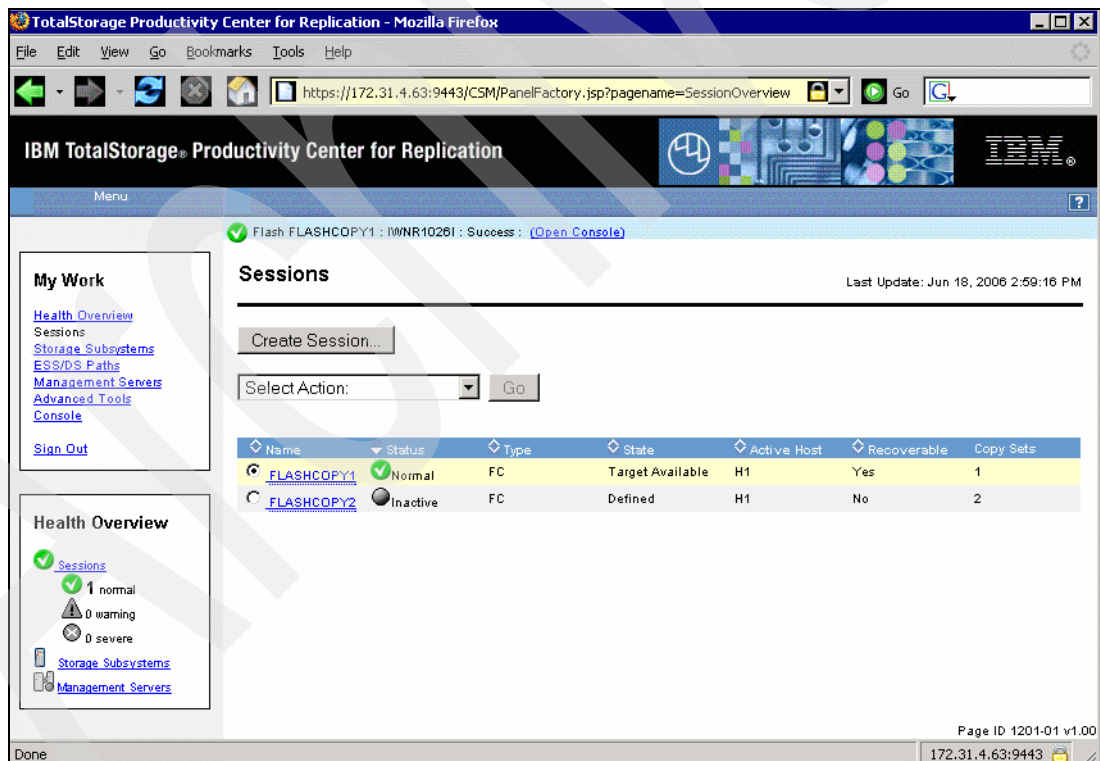


Figure 5-38 TPC for Replication Start FlashCopy Session Target Available

This means that the target volume, which is in fact a point in time copy of the source volume, is available to be used on the host. You can now map this volume to the host using SVC Console.

You can make a point in time copy for the session as many times as you like.

Note: You can execute the **Flash** command directly on an unprepared (defined) session and this will cause the session to be prepared before flashing.

5.2.6 Starting a FlashCopy Session using the CLI

In this instance we will flash a session as part of a single script.

As you can see in Figure 5-39, the script file contains multiple commands to display the session status before and after command the Flash command, and to flash the session.

```
sles9spig:/tpcrm # cat svcflashfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lsess -l FLASHCOPY2
cmdsess -quiet -action Flash FLASHCOPY2
lsess -l FLASHCOPY2
```

Figure 5-39 SVC FC flash script

The output of the script is shown in Figure 5-40.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svcflashfc.txt
Name      Status State   Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Warning Prepared Flash Copy No          Yes          2 No
IWNRI026I [Jun 19, 2006 12:56:45 PM] The runCommand for command Flash in session
FLASHCOPY2 completed successfully.
Name      Status State   Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Normal Target Available Flash Copy Yes          Yes          2 No
```

Figure 5-40 SVC FC flash script output

The **-quiet** option is used to run script without needing to answer the prompt for execution of the prepare command as shown in Figure 5-41.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svcflashfcnq.txt      Name
Status  State  Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Inactive Defined Flash Copy No          No          2 No
Are you sure you want to flash session FLASHCOPY2? [y/n]:y
IWNRI026I [Jun 19, 2006 1:13:34 PM] The runCommand for command Flash in session
FLASHCOPY2 completed successfully.
Name      Status State   Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Normal Target Available Flash Copy Yes          Yes          2 No
```

Figure 5-41 SVC FC flash script output without -quiet

5.2.7 Terminating a FlashCopy Session using the GUI

To terminate the FlashCopy process, select the session you want to terminate from the Sessions panel. In our example we selected *FLASHCOPY1*. From the pull-down menu, select **Terminate** and click **Go**. The selected session will terminate and enter in defined state as shown in Figure 5-42.

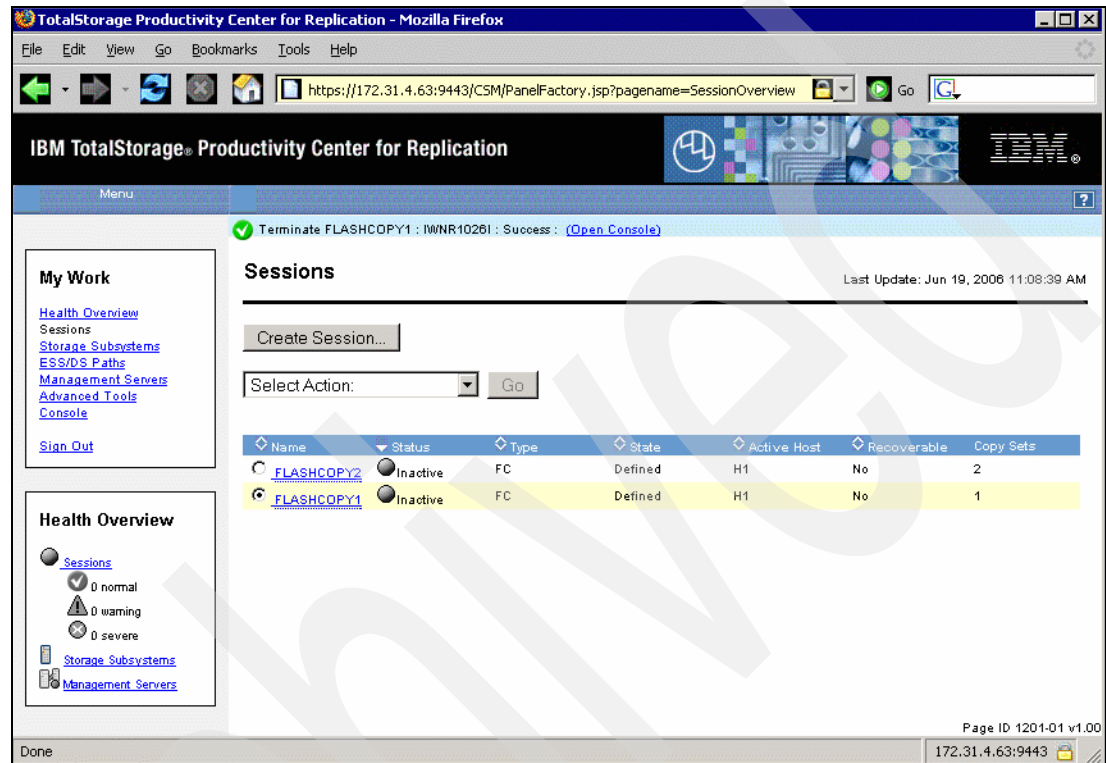


Figure 5-42 TPC for Replication Terminate FlashCopy Session Defined

A Session can be terminated anytime.

Terminating a session will actually delete FlashCopy Mappings on the SAN Volume Controller for all Copy Sets included in this session. It will also delete a FlashCopy Consistency Group for those FlashCopy Mappings.

5.2.8 Terminating a FlashCopy Session using the CLI

In this instance we will terminate a session as part of a single script.

As you can see in Figure 5-43 on page 108, the script file contains multiple commands to display the session status before and after the Terminate command, and to terminate the session.

```
sles9spig:/tpcrm # cat svctermfc
cat: svctermfc: No such file or directory
sles9spig:/tpcrm # cat svctermfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lssess -l FLASHCOPY2
cmdsess -quiet -action Terminate FLASHCOPY2
lssess -l FLASHCOPY2
```

Figure 5-43 SVC FC terminate script

The output of the script is shown in Figure 5-44.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svctermfc.txt
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Normal Target Available Flash Copy Yes      Yes      2 No
IWNRI026I [Jun 19, 2006 1:10:06 PM] The runCommand for command Terminate in session
FLASHCOPY2 completed successfully.
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Inactive Defined Flash Copy No      No      2 No
```

Figure 5-44 SVC FC terminate script output

The *-quiet* option is used to run script without need to answer the prompt for execution of prepare command as shown in Figure 5-45.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svctermfcnq.txt
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Normal Target Available Flash Copy Yes      Yes      2 No
Are you sure you want to terminate session FLASHCOPY2? [y/n]:y
IWNRI026I [Jun 19, 2006 1:21:17 PM] The runCommand for command Terminate in session
FLASHCOPY2 completed successfully.
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
FLASHCOPY2 Inactive Defined Flash Copy No      No      2 No
```

Figure 5-45 SVC FC terminate script output without -quiet

5.2.9 Adding a Metro Mirror Session using GUI

In this scenario we will set up an SVC based Metro Mirror Single Direction and Failover/Failback session with a single volume pair as shown in Figure 5-46 on page 109.

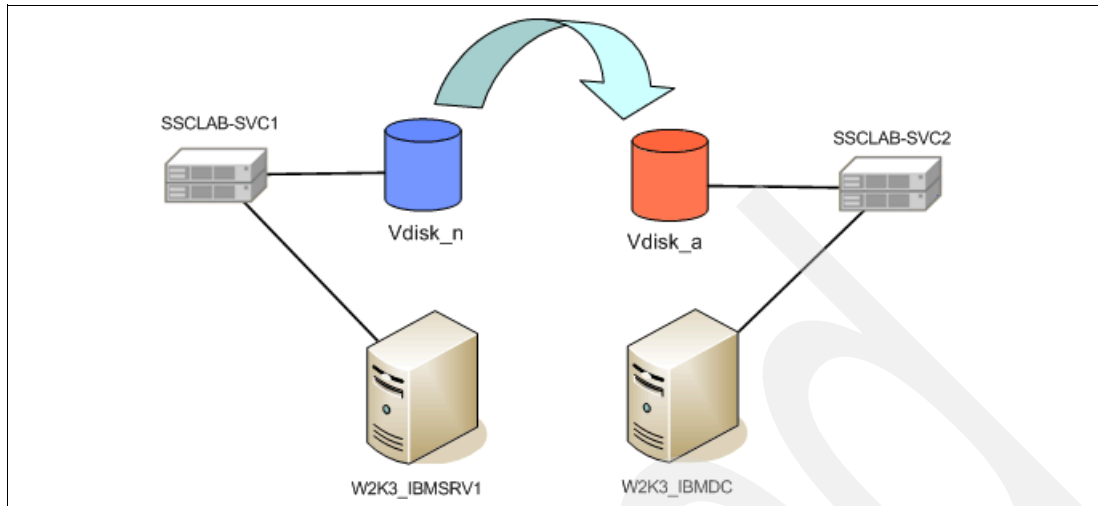


Figure 5-46 SVC based Metro Mirror setup

The first step is to select the **Create Session** button from the Sessions panel as shown in Figure 5-47.

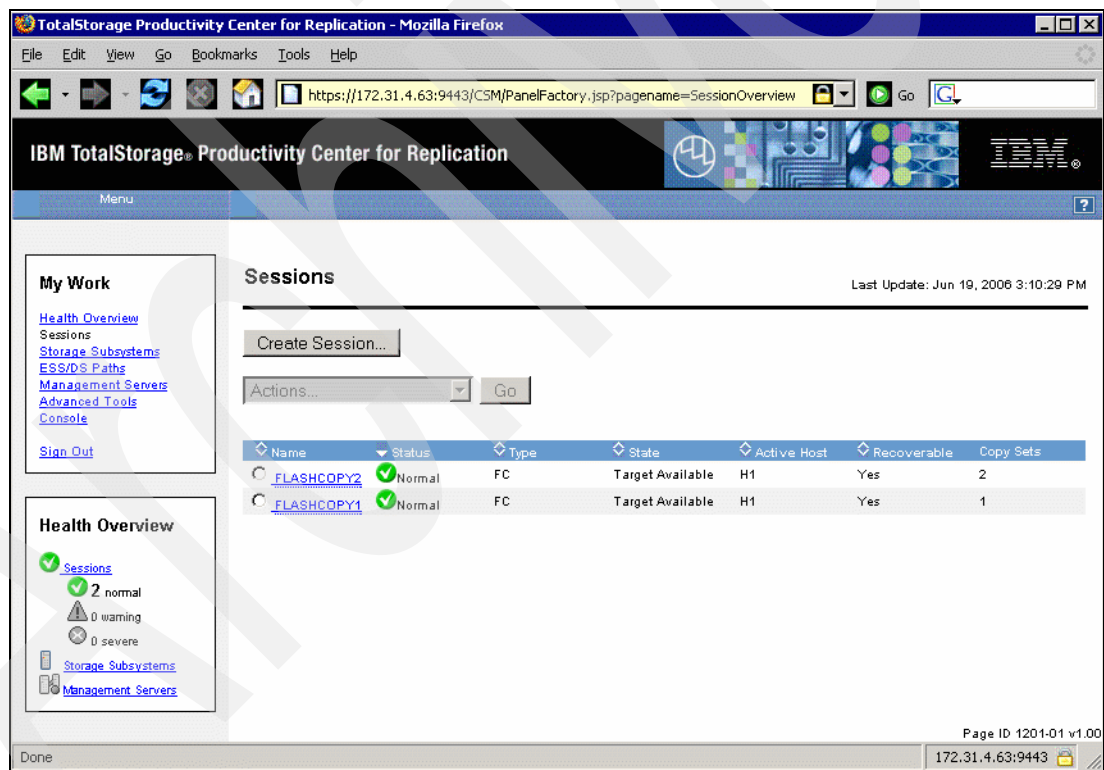


Figure 5-47 TPC for Replication MM Sessions

This will open a new window where you can add session details such as copy type, as you can see in Figure 5-48 on page 110.

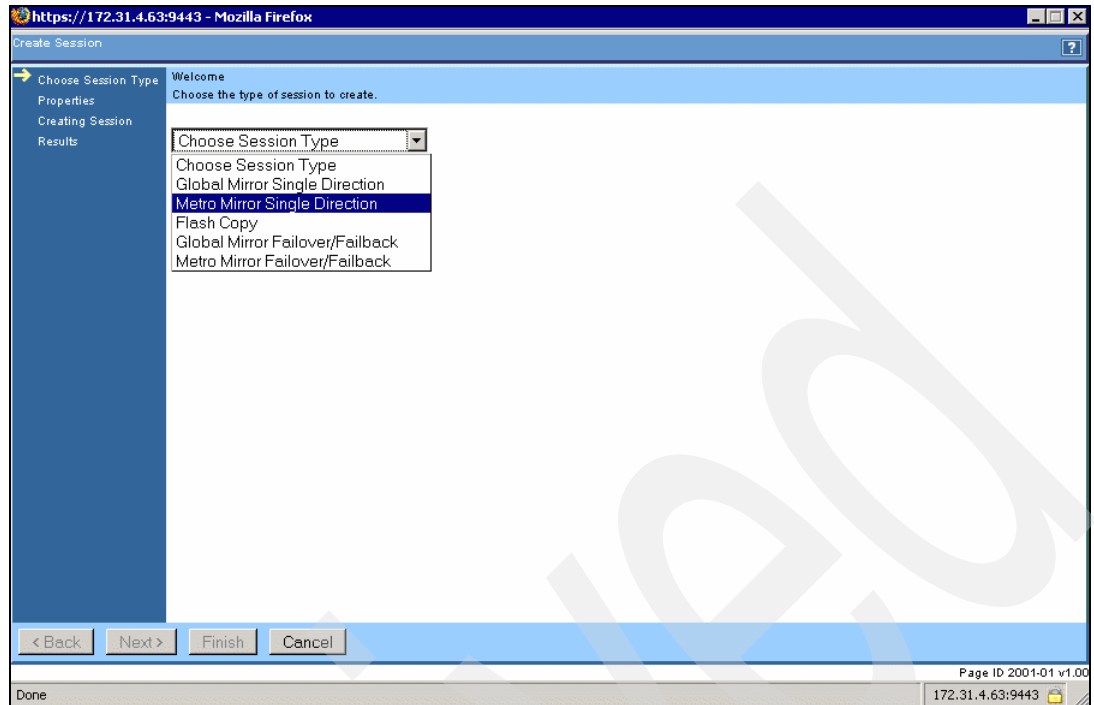


Figure 5-48 TPC for Replication MM Create Session

Select your copy type, in our example *Metro Mirror Single Direction*, and click the **Next** button. The window similar to Figure 5-49 will be displayed.

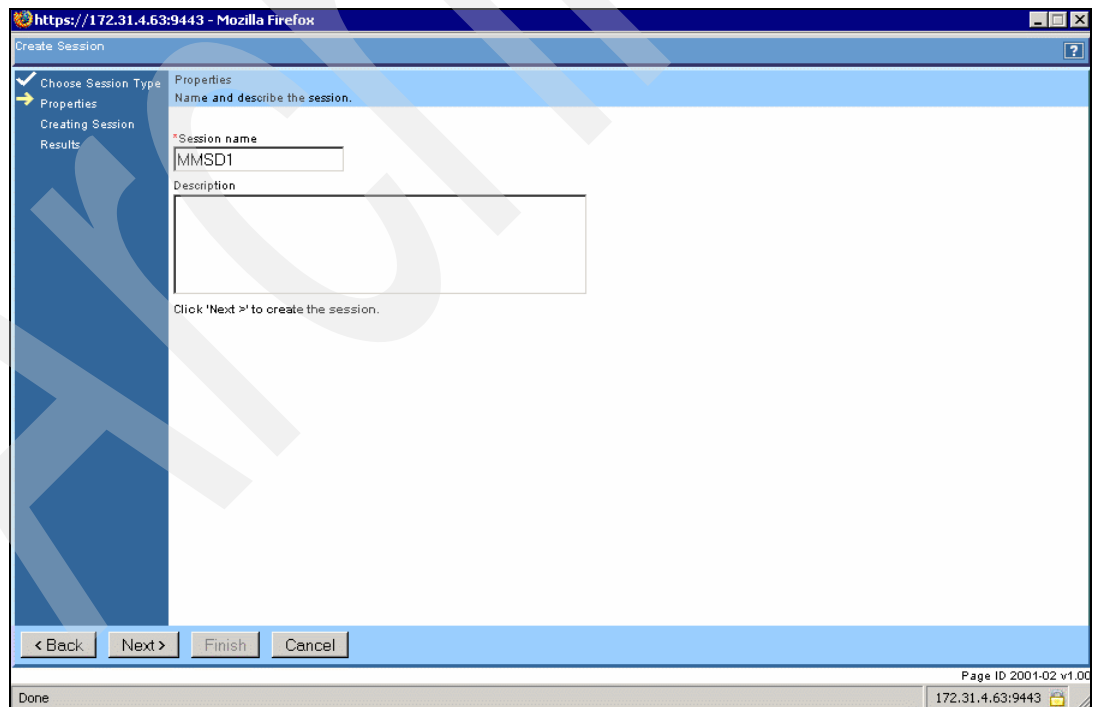


Figure 5-49 TPC for Replication MM Create Session Properties

Type in a meaningful name for the session in the **Session name** box as well as any informational text in the **Description** box. Now click **Next**, the session will be created and the window similar to Figure 5-50 will be displayed.

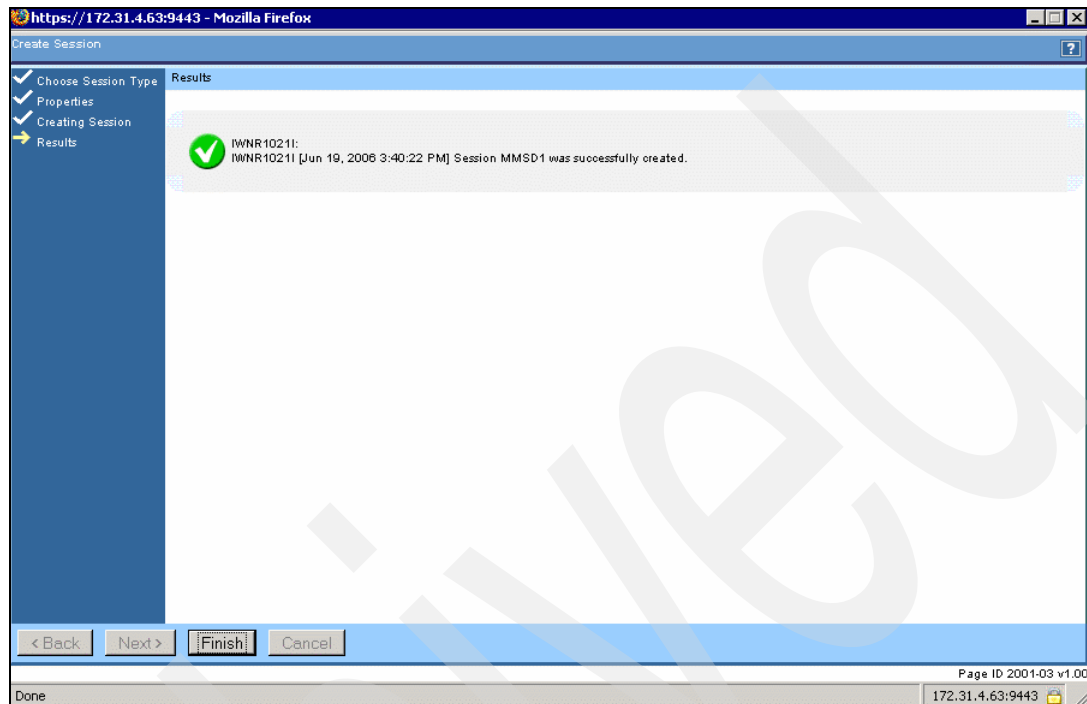


Figure 5-50 TPC for Replication MM Create Session Created

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

5.2.10 Adding a Metro Mirror Session using CLI

Once again using the command line interface, we can achieve the same result. For this effort we have created another script file which can be seen in Figure 5-51 (note that we have added a list session command (*lsess -l*) to display the defined sessions once our new one has been created). In this example we will create *Metro Mirror Failover/Failback* type of a session.

```
sles9spig:/tpcrm # cat createmmfofbsession.txt
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype mmfofb -desc MMFOFB1 MMFOFB1
lsess -l
```

Figure 5-51 Add MM session script file

The result of the execution of this script can be seen in Figure 5-52 on page 112.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tprcm/createmmfobfbsession.txt
IWNRI0211 [Jun 19, 2006 3:50:14 PM] Session MMFOFB1 was successfully created.
=====
Name      Status  State      Copy type      Recoverable Copying Copy sets Error
=====
MMFOFB1   Inactive Defined      Metro Mirror Failover/Failback No      No      0 No
FLASHCOPY2 Normal Target Available Flash Copy      Yes     Yes     2 No
MMSD1     Inactive Defined      Metro Mirror Single Direction No      No      0 No
FLASHCOPY1 Normal Target Available Flash Copy      Yes     Yes     1 No
=====
```

Figure 5-52 MM session CLI result

5.2.11 Adding Copy Sets to a Metro Mirror Session using GUI

Now that we have a session created, we can begin to create copy sets within the session. First you need to select the session, in our example *MMSD1*, to which you want to add copy sets. From the Sessions panel, select the **Add Copy Sets** option from the drop-down menu, as shown in Figure 5-53.

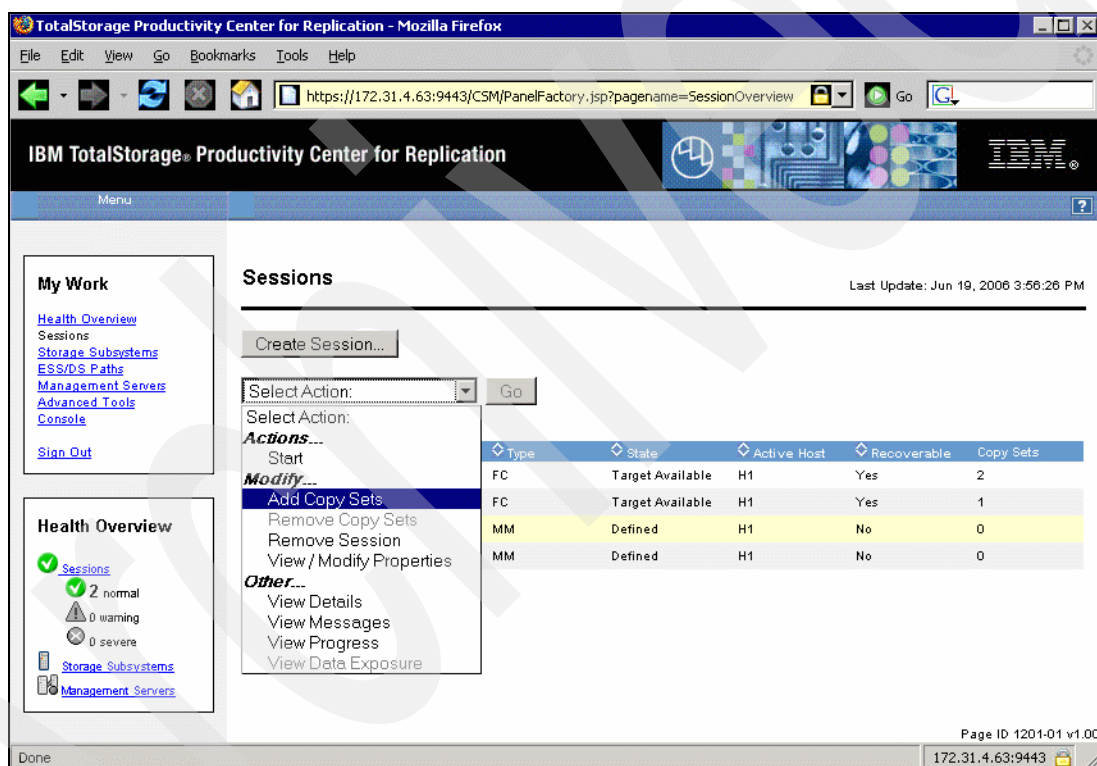


Figure 5-53 TPC for Replication MM Add Copy Sets

Click the **Go** button to continue. This will open a new window where we will define the copy sets as shown in Figure 5-54 on page 113. In this window we define the source subsystems through the Host 1 storage subsystem drop-down menu.

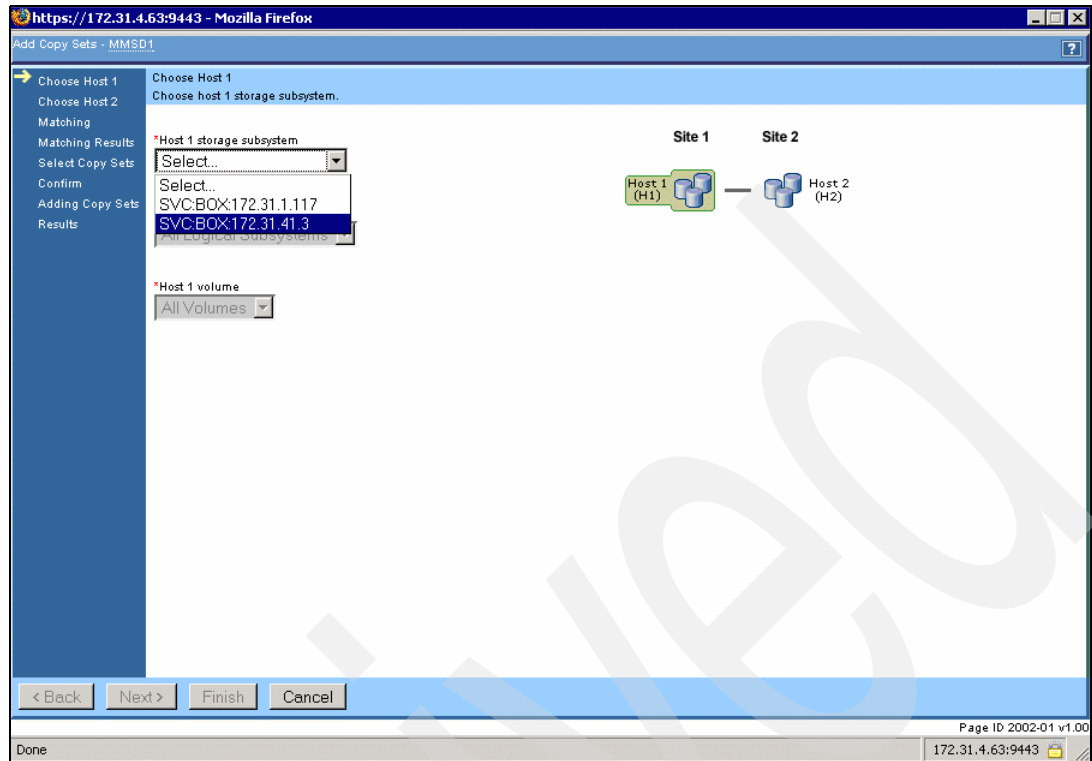


Figure 5-54 TPC for Replication MM Source SVC

Select your source SAN Volume Controller, in our example we selected **SVC:BOX:172.31.41.3**, and the **Host 1 IO group** pull-down menu will become available as shown in Figure 5-55 on page 114.

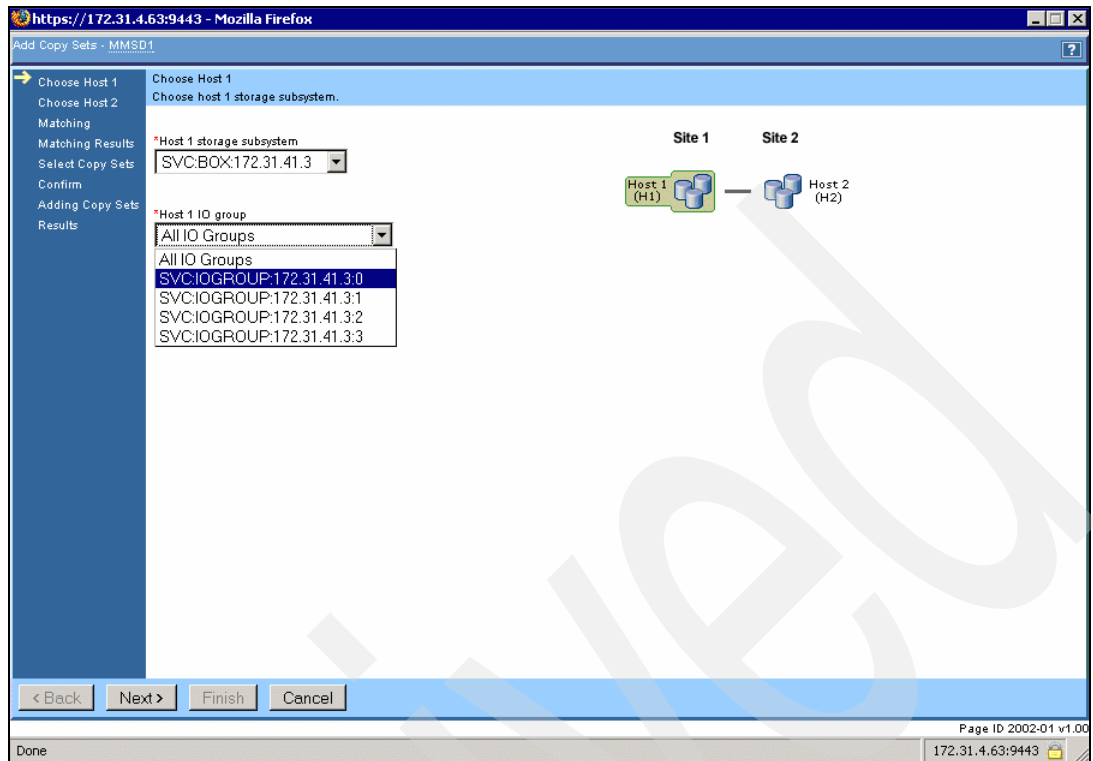


Figure 5-55 TPC for Replication MM Source SVC IO Group

Select your source SAN Volume Controller IO group, in our example we selected SVC:IOGROUP:172.31.41.3:0. The **Host 1 volume** pull-down menu will become available as shown in Figure 5-56 on page 115.

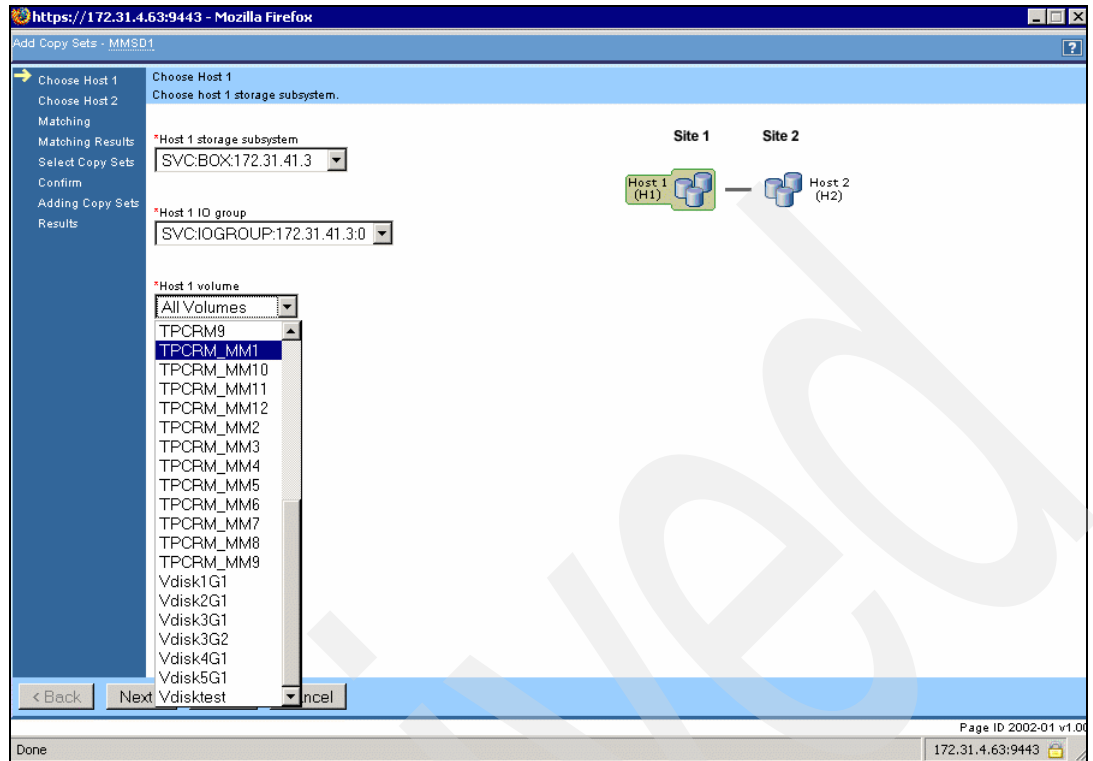


Figure 5-56 TPC for Replication MM SVC Source Volume

Select your source volume, we selected *TPCRM_MM1* volume. Once the source volume is selected, click the **Next** button to proceed to the Target definitions as shown in Figure 5-57.

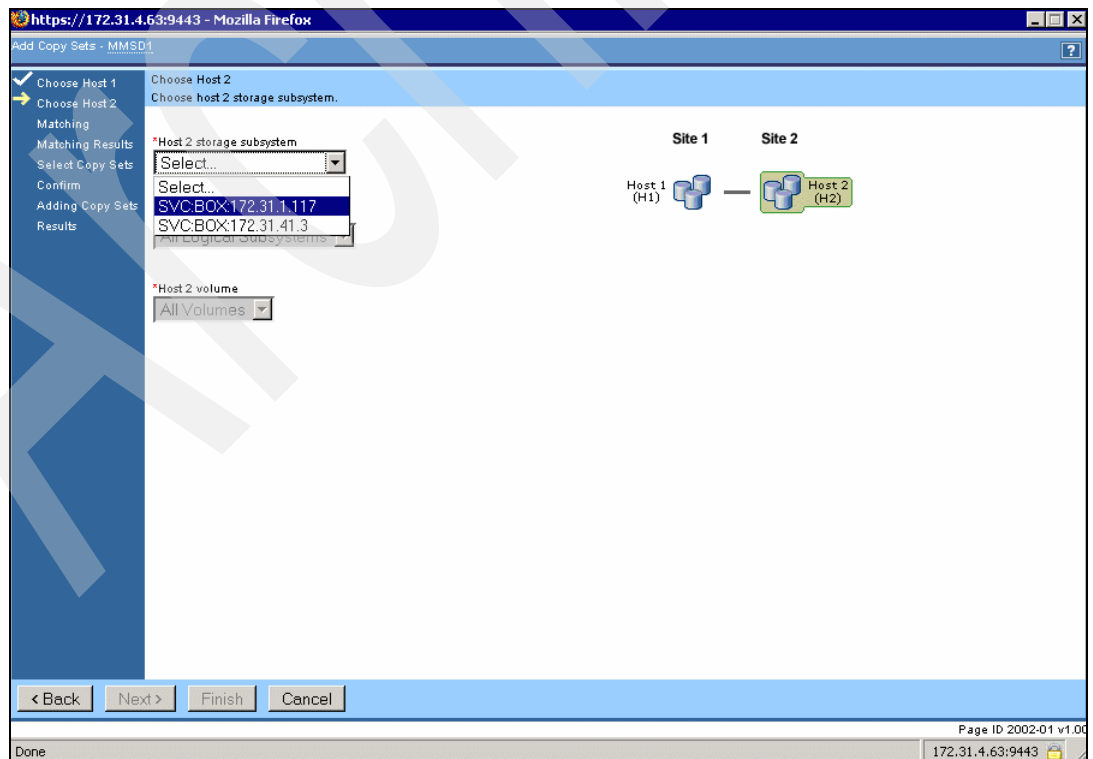


Figure 5-57 TPC for Replication MM Target SVC

Select your target SAN Volume Controller, in our example we selected **SVC:BOX:172.31.1.117** from the Host 2 storage subsystem pull-down menu. The Host 2 I/O group pull-down menu will become available as shown in Figure 5-58.

Note: As you can see in our example local and remote SAN Volume Controllers are available for target selection. The reason for this is that Metro Mirror operation can be performed within the same SAN Volume Controller cluster or between two SAN Volume Controller clusters.

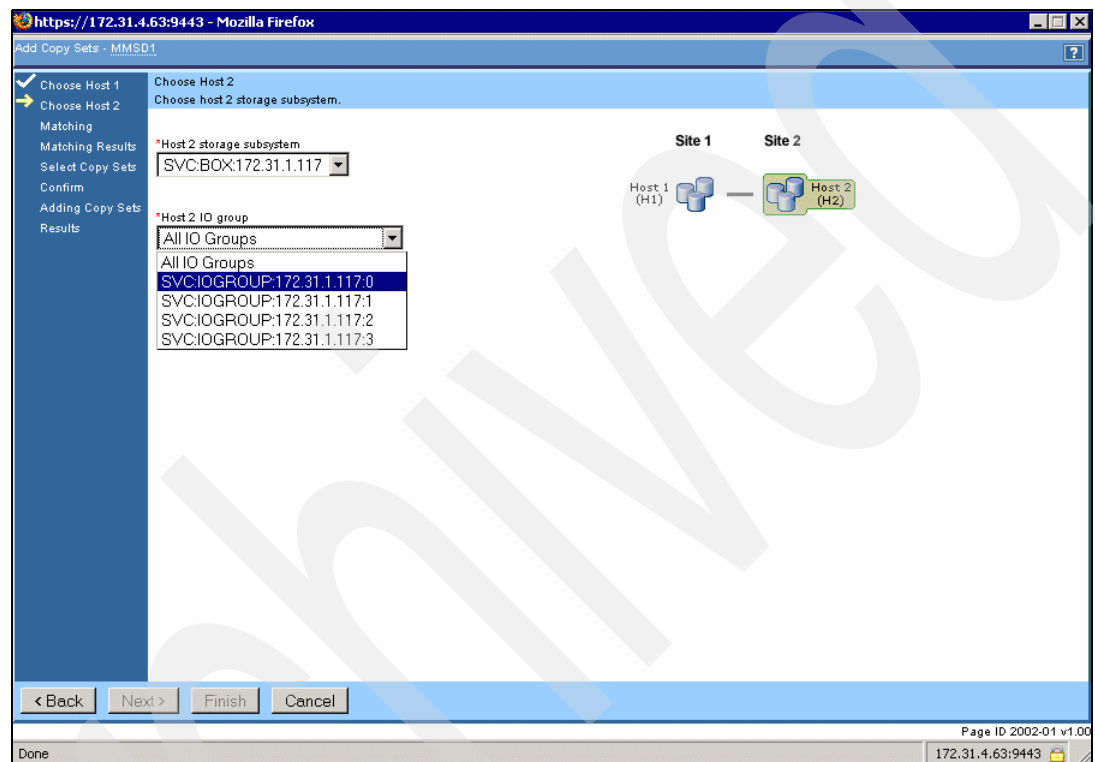


Figure 5-58 TPC for Replication MM Target SVC IO Group

Select your target SAN Volume Controller IO group, in our example we selected **SVC:IOGROUP:172.31.1.117:0** from the Host 2 I/O group. The Host 2 volume pull-down menu will become available as shown in Figure 5-59 on page 117.

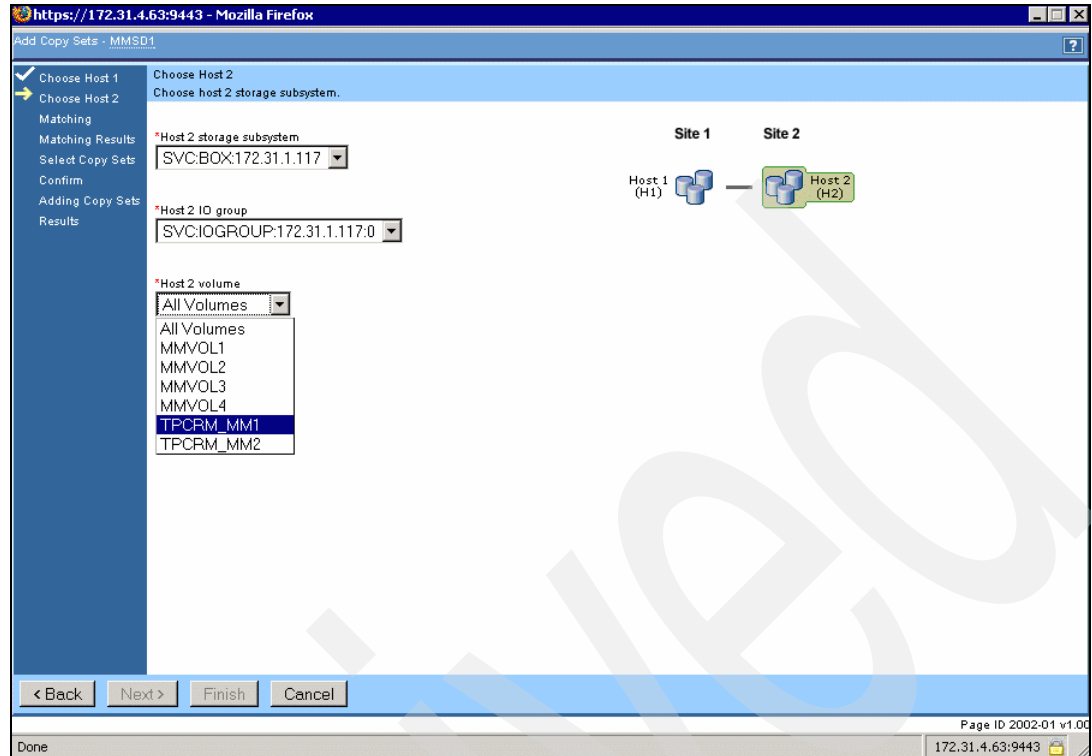


Figure 5-59 TPC for Replication MM SVC Target Volume

Select your target volume, in our example we selected *TPCRM_MM1* volume.

Note: Only volumes fulfilling the requirements to be a Metro Mirror target will be displayed.

Once the source volume is selected, click the **Next** button to continue. The TPC for Replication will now perform a check to confirm the volume attributes match. This checking process can be seen in Figure 5-60 on page 118.

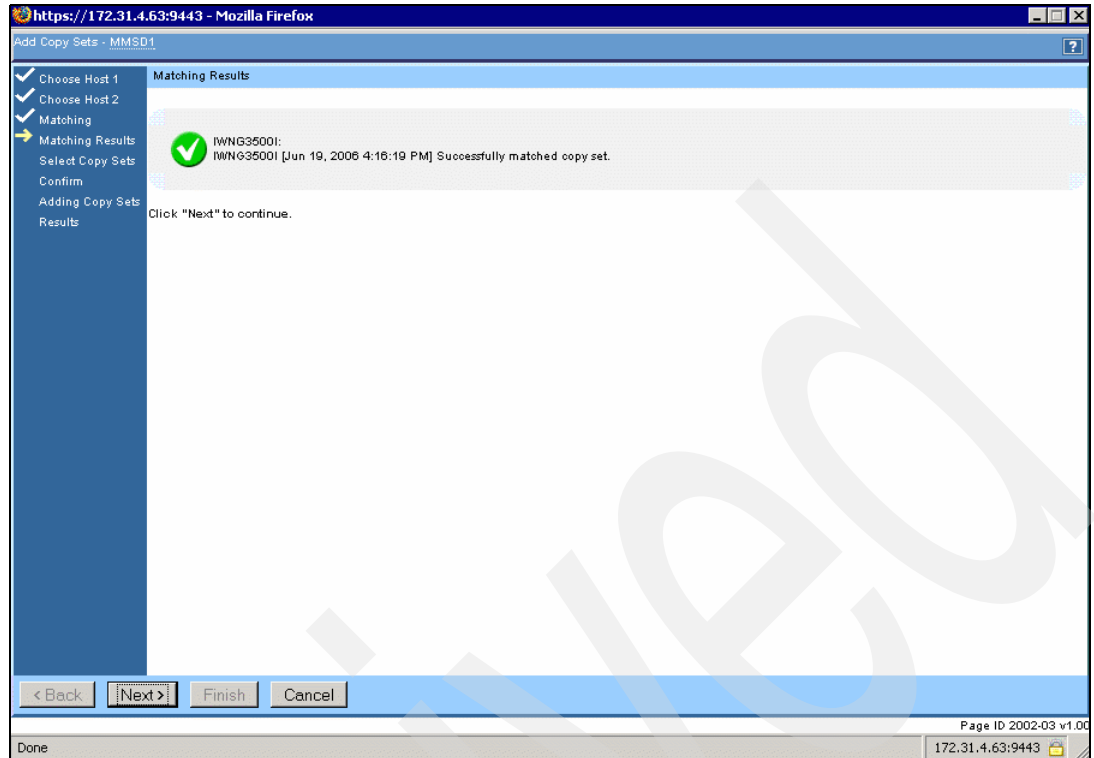


Figure 5-60 TPC for Replication MM Volume Match OK

You can see that TPC for Replication has matched the volumes, so you can proceed by clicking the **Next** button. The window similar to Figure 5-61 will be displayed.

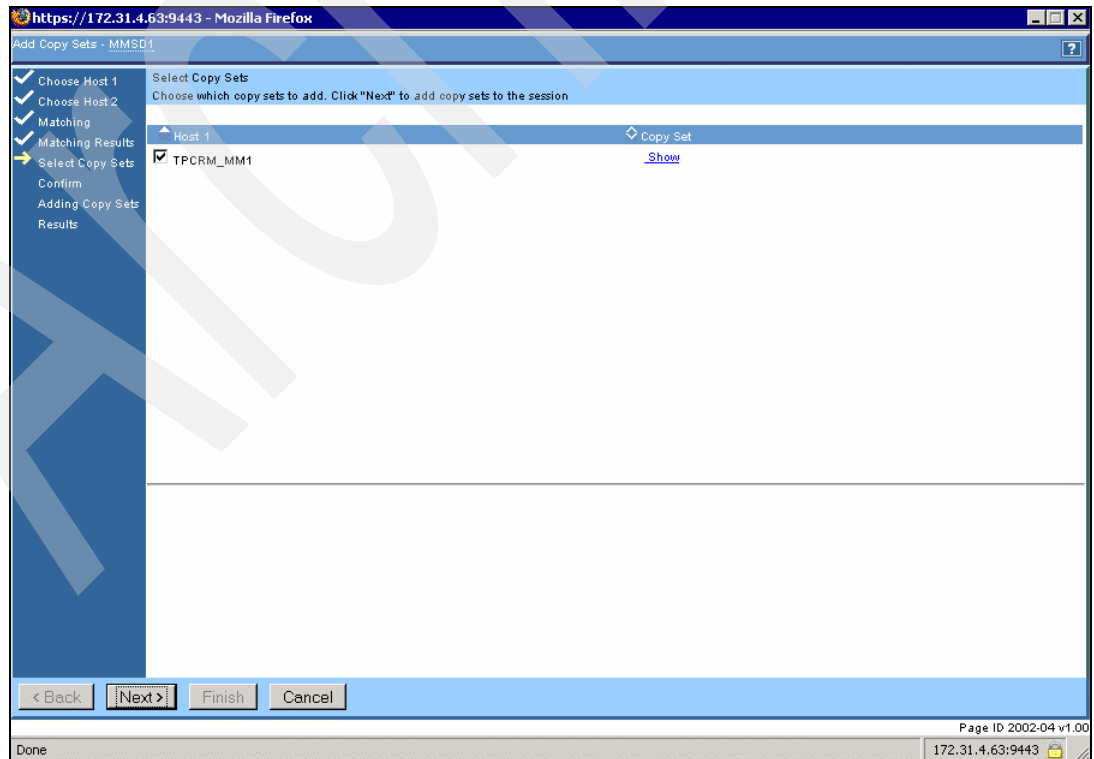


Figure 5-61 TPC for Replication MM Select Copy Set

The Copy Set is preselected, you just click **Next** to continue, the window similar to Figure 5-62 will be displayed.

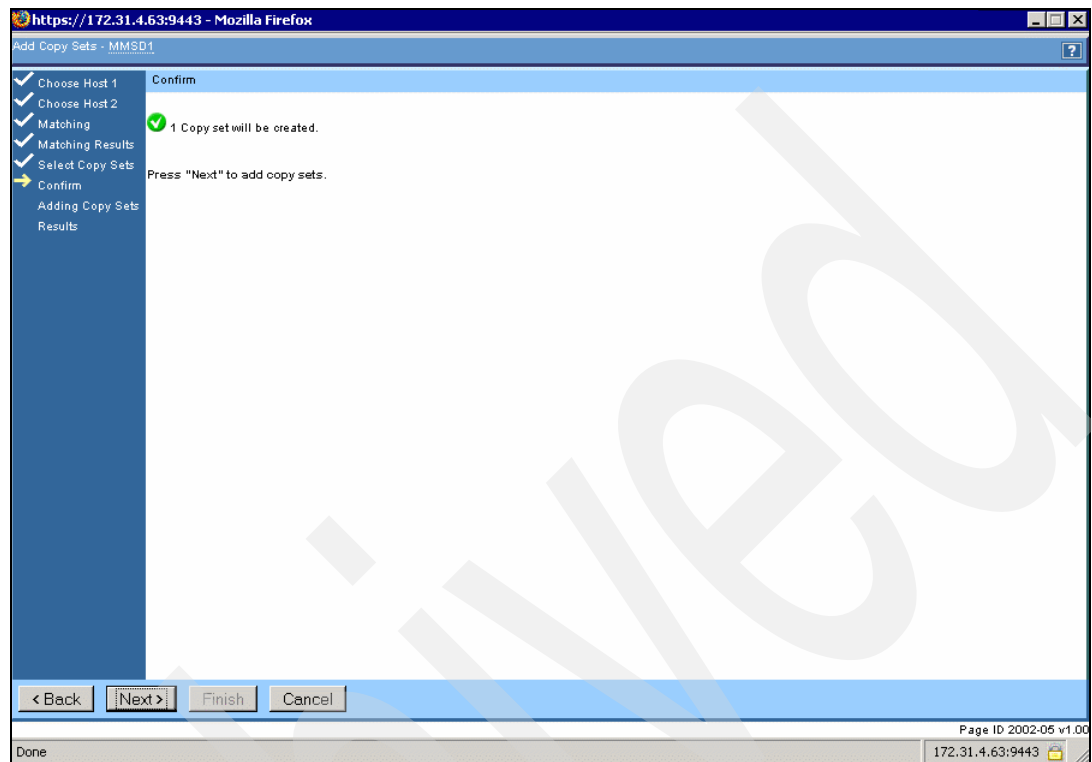


Figure 5-62 TPC for Replication MM Copy Set Confirm

TPC for Replication requires you to confirm your configuration as we can see in Figure 5-62. From here we just click the **Next** button. The window similar to Figure 5-63 on page 120 will be displayed.

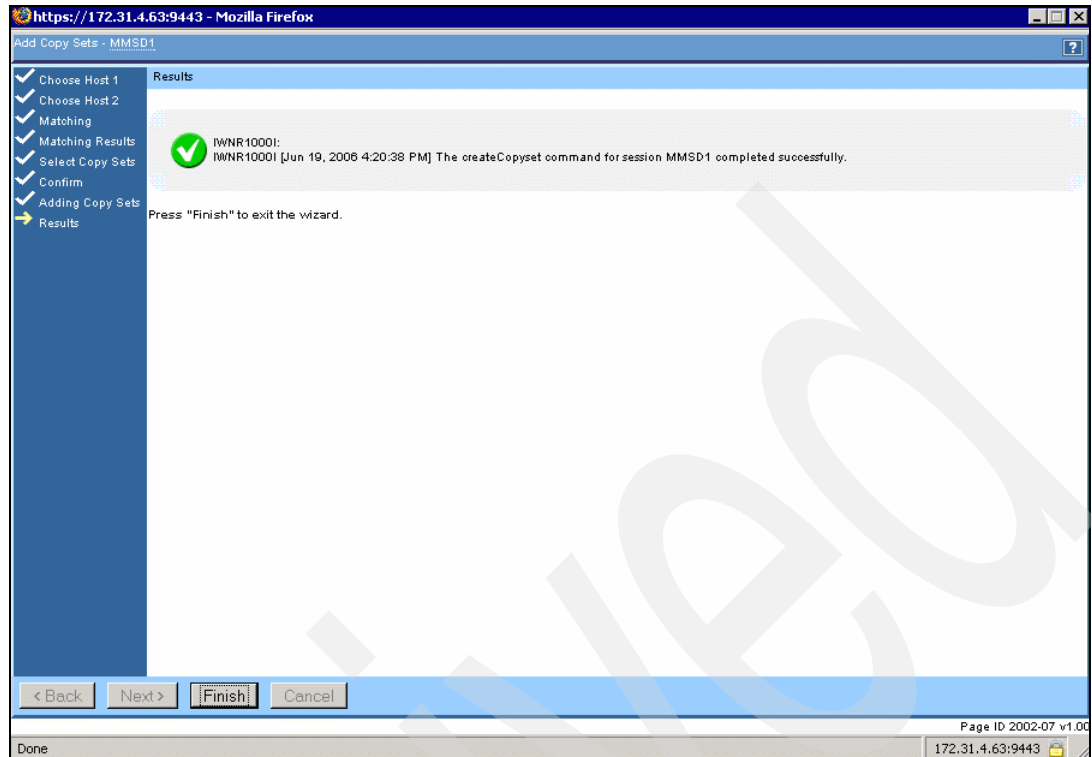


Figure 5-63 TPC for Replication MM Finish Adding Copy Sets

Finally, once you have achieved a successful add, click the **Finish** button to complete the task.

5.2.12 Adding Copy Sets to Metro Mirror Session using CLI

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 5-66 on page 121, 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 as seen in Figure 5-64 for source Metro Mirror volumes.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh lsvol -l -devtype svc | grep 172.31.41.3 | grep TPCRM_MM
```

TPCRM_MM12	SVC:VOL:172.31.41.3:0:7	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM10	SVC:VOL:172.31.41.3:0:34	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM9	SVC:VOL:172.31.41.3:0:32	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM8	SVC:VOL:172.31.41.3:0:31	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM7	SVC:VOL:172.31.41.3:0:30	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM6	SVC:VOL:172.31.41.3:0:29	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM5	SVC:VOL:172.31.41.3:0:28	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM4	SVC:VOL:172.31.41.3:0:27	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM3	SVC:VOL:172.31.41.3:0:26	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM11	SVC:VOL:172.31.41.3:0:25	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	2.000	GB
TPCRM_MM2	SVC:VOL:172.31.41.3:0:14	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB
TPCRM_MM1	SVC:VOL:172.31.41.3:0:13	2145-172.31.41.3-IBM	SVC	FIXEDBLK	0	FB	1.000	GB

Figure 5-64 List of possible volumes for MM source

We have pre-determined the volume pairs as seen in Figure 5-65 on page 121 for target Metro Mirror volumes.

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh lsvol -l -devtype svc | grep 172.31.1.117 | grep TPCRM_MM
TPCRM_MM10 SVC:VOL:172.31.1.117:0:21 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM9 SVC:VOL:172.31.1.117:0:20 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM8 SVC:VOL:172.31.1.117:0:19 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM7 SVC:VOL:172.31.1.117:0:18 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM6 SVC:VOL:172.31.1.117:0:17 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM5 SVC:VOL:172.31.1.117:0:16 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM4 SVC:VOL:172.31.1.117:0:15 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM3 SVC:VOL:172.31.1.117:0:14 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM12 SVC:VOL:172.31.1.117:0:13 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM11 SVC:VOL:172.31.1.117:0:12 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM2 SVC:VOL:172.31.1.117:0:11 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM_MM1 SVC:VOL:172.31.1.117:0:10 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
```

Figure 5-65 List of possible volumes for MM target

Some of those volumes were used as part of the **mkcpsset** command as shown in Figure 5-66. We have also specified that the Metro Mirror session type is **mmfofb** or Metro Mirror Failover/Failback.

```
sles9spig:/tpcrm # cat svcmmfob.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mkssess -cptype mmfofb -desc MMFOFB2 MMFOFB2
lsess -l
lsvol -l -devtype svc
mkcpset -h1 svc:vol:172.31.41.3:0:26 -h2 svc:vol:172.31.1.117:0:14 MMFOFB2
mkcpset -h1 svc:vol:172.31.41.3:0:27 -h2 svc:vol:172.31.1.117:0:15 MMFOFB2
mkcpset -h1 svc:vol:172.31.41.3:0:28 -h2 svc:vol:172.31.1.117:0:16 MMFOFB2
mkcpset -h1 svc:vol:172.31.41.3:0:29 -h2 svc:vol:172.31.1.117:0:17 MMFOFB2
mkcpset -h1 svc:vol:172.31.41.3:0:30 -h2 svc:vol:172.31.1.117:0:18 MMFOFB2
lscpsset -l MMFOFB2
```

Figure 5-66 SVC MM script

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

Example 5-2 SVC MM script output

```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh -script /tpcrm/svcmmfob.txt
IWNRR1021I [Jun 20, 2006 10:19:33 AM] Session MMFOFB2 was successfully created.
Name      Status   State      Copy type      Recoverable Copying Copy sets Error
=====
MMFOFB2    Inactive  Defined    Metro Mirror Failover/Failback No      No      0 No
MMFOFB1    Inactive  Defined    Metro Mirror Failover/Failback No      No      0 No
FLASHCOPY2 Normal    Target Available Flash Copy      Yes     Yes     2 No
MMSD1      Inactive  Defined    Metro Mirror Single Direction No      No      1 No
FLASHCOPY1 Normal    Target Available Flash Copy      Yes     Yes     1 No
Name      ID      Dev      Dev Type Vol format LSS/IO Group Vol Type Size Size Unit
=====
TPCRM1    SVC:VOL:172.31.41.3:0:9 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
Vdisk3G2 SVC:VOL:172.31.41.3:0:8 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM12 SVC:VOL:172.31.41.3:0:7 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM11    SVC:VOL:172.31.41.3:0:6 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
Vdisk5G1 SVC:VOL:172.31.41.3:0:5 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
Vdisk4G1 SVC:VOL:172.31.41.3:0:4 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM_MM10 SVC:VOL:172.31.41.3:0:34 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
ITSO_RM2 SVC:VOL:172.31.41.3:0:33 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 15.000 GB
TPCRM_MM9 SVC:VOL:172.31.41.3:0:32 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM8 SVC:VOL:172.31.41.3:0:31 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM7 SVC:VOL:172.31.41.3:0:30 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
VdiskTest SVC:VOL:172.31.41.3:0:3 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM_MM6 SVC:VOL:172.31.41.3:0:29 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM5 SVC:VOL:172.31.41.3:0:28 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
```

```

TPCRM_MM4 SVC:VOL:172.31.41.3:0:27 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM3 SVC:VOL:172.31.41.3:0:26 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM11 SVC:VOL:172.31.41.3:0:25 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
ITSO_RM1 SVC:VOL:172.31.41.3:0:24 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 15.000 GB
TPCRM10 SVC:VOL:172.31.41.3:0:23 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM9 SVC:VOL:172.31.41.3:0:22 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM8 SVC:VOL:172.31.41.3:0:21 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM7 SVC:VOL:172.31.41.3:0:20 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
Vdisk3G1 SVC:VOL:172.31.41.3:0:2 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM6 SVC:VOL:172.31.41.3:0:19 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM5 SVC:VOL:172.31.41.3:0:18 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM14 SVC:VOL:172.31.41.3:0:17 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM13 SVC:VOL:172.31.41.3:0:16 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM12 SVC:VOL:172.31.41.3:0:15 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM2 SVC:VOL:172.31.41.3:0:14 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM_MM1 SVC:VOL:172.31.41.3:0:13 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM4 SVC:VOL:172.31.41.3:0:12 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM3 SVC:VOL:172.31.41.3:0:11 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM2 SVC:VOL:172.31.41.3:0:10 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 1.000 GB
Vdisk2G1 SVC:VOL:172.31.41.3:0:1 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
Vdisk1G1 SVC:VOL:172.31.41.3:0:0 2145-172.31.41.3-IBM SVC FIXEDBLK 0 FB 2.000 GB
MMVOL3 SVC:VOL:172.31.1.117:0:9 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
MMVOL2 SVC:VOL:172.31.1.117:0:8 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
MMVOL1 SVC:VOL:172.31.1.117:0:7 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
MMVOL4 SVC:VOL:172.31.1.117:0:6 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
FCTEST2 SVC:VOL:172.31.1.117:0:5 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 10.000 GB
FCTEST1 SVC:VOL:172.31.1.117:0:4 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 10.000 GB
LV01 SVC:VOL:172.31.1.117:0:3 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 40.000 GB
TPCRM_MM10 SVC:VOL:172.31.1.117:0:21 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM9 SVC:VOL:172.31.1.117:0:20 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
LV02 SVC:VOL:172.31.1.117:0:2 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 40.000 GB
TPCRM_MM8 SVC:VOL:172.31.1.117:0:19 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM7 SVC:VOL:172.31.1.117:0:18 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM6 SVC:VOL:172.31.1.117:0:17 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM5 SVC:VOL:172.31.1.117:0:16 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM4 SVC:VOL:172.31.1.117:0:15 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM3 SVC:VOL:172.31.1.117:0:14 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM12 SVC:VOL:172.31.1.117:0:13 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM11 SVC:VOL:172.31.1.117:0:12 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 2.000 GB
TPCRM_MM2 SVC:VOL:172.31.1.117:0:11 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
TPCRM_MM1 SVC:VOL:172.31.1.117:0:10 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 1.000 GB
LV03 SVC:VOL:172.31.1.117:0:1 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 40.000 GB
LV04 SVC:VOL:172.31.1.117:0:0 2145-172.31.1.117-IBM SVC FIXEDBLK 0 FB 40.000 GB
IWN2001I [Jun 20, 2006 10:19:38 AM] The pair was successfully created in session MMFOFB2 for copy set
SVC:VOL:172.31.41.3:0:26 with source SVC:VOL:172.31.41.3:0:26(TPCRM_MM3) and target
SVC:VOL:172.31.1.117:0:14(TPCRM_MM3).
IWN2001I [Jun 20, 2006 10:19:40 AM] The pair was successfully created in session MMFOFB2 for copy set
SVC:VOL:172.31.41.3:0:27 with source SVC:VOL:172.31.41.3:0:27(TPCRM_MM4) and target
SVC:VOL:172.31.1.117:0:15(TPCRM_MM4).
IWN2001I [Jun 20, 2006 10:19:43 AM] The pair was successfully created in session MMFOFB2 for copy set
SVC:VOL:172.31.41.3:0:28 with source SVC:VOL:172.31.41.3:0:28(TPCRM_MM5) and target
SVC:VOL:172.31.1.117:0:16(TPCRM_MM5).
IWN2001I [Jun 20, 2006 10:19:46 AM] The pair was successfully created in session MMFOFB2 for copy set
SVC:VOL:172.31.41.3:0:29 with source SVC:VOL:172.31.41.3:0:29(TPCRM_MM6) and target
SVC:VOL:172.31.1.117:0:17(TPCRM_MM6).
IWN2001I [Jun 20, 2006 10:19:48 AM] The pair was successfully created in session MMFOFB2 for copy set
SVC:VOL:172.31.41.3:0:30 with source SVC:VOL:172.31.41.3:0:30(TPCRM_MM7) and target
SVC:VOL:172.31.1.117:0:18(TPCRM_MM7).
H1 Volume Session Volumes
=====
SVC:VOL:172.31.41.3:0:26 MMFOFB2 2
SVC:VOL:172.31.41.3:0:27 MMFOFB2 2
SVC:VOL:172.31.41.3:0:28 MMFOFB2 2
SVC:VOL:172.31.41.3:0:29 MMFOFB2 2
SVC:VOL:172.31.41.3:0:30 MMFOFB2 2

```

From the CSMCLI interface we can interrogate the session via the **showsess** command as shown in Figure 5-67 on page 123.


```
sles9spig:/opt/IBM/TPC-RM/CLI # ./csmcli.sh
csmcli> showsess MMFOFB2
Name          MMFOFB2
Type          Metro Mirror Failover/Failback
State         Defined
Status        Inactive
Copy sets     5
Copying       No
Recoverable   No
Error count   0
Description   MMFOFB2

IWNRI500I [Jun 20, 2006 11:15:24 AM] The getSessionInfo command for session
MMFOFB2 completed successfully.
```

Figure 5-67 The showsess command

Now that we have a session with valid Copy Sets, we can start using it.

5.2.13 Starting a Metro Mirror Session using the GUI

To start the Metro Mirror process, select the session you want to start from the Sessions panel - in our example *MMSD1*. From the pull-down menu, select **Start** and click **Go**, as shown in Figure 5-68.

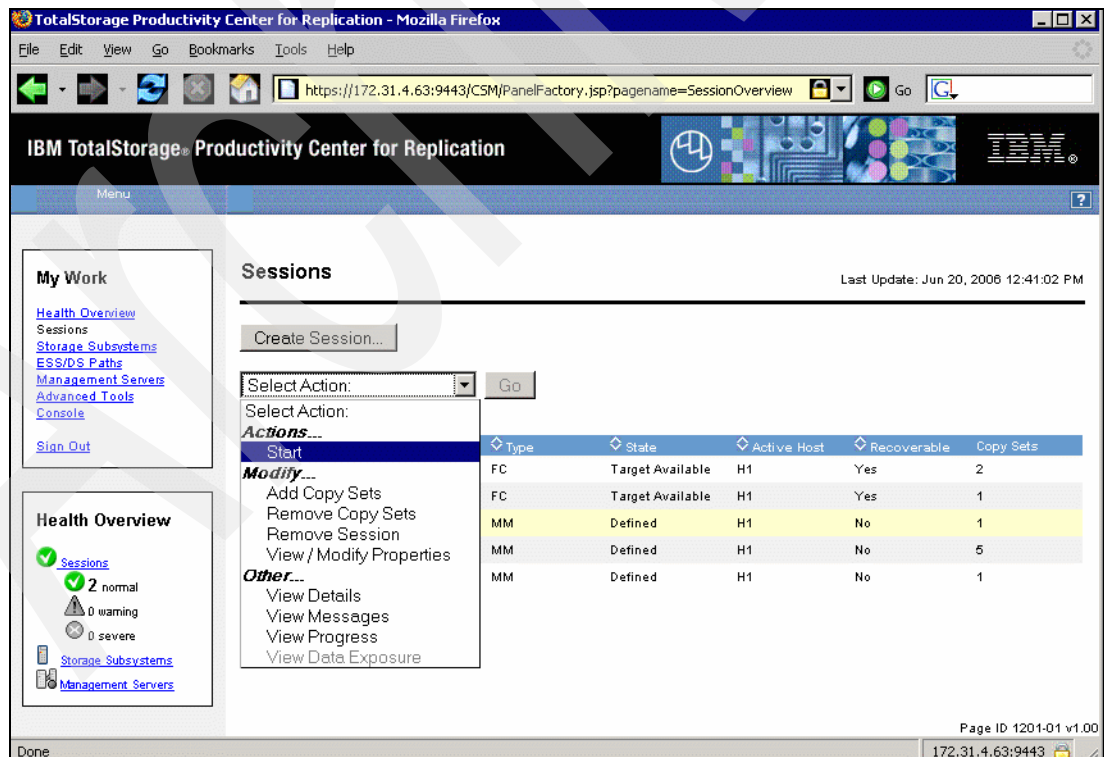


Figure 5-68 TPC for Replication Start Metro Mirror Single Direction Session

The selected session will enter in preparing state as shown in Figure 5-69 on page 124.

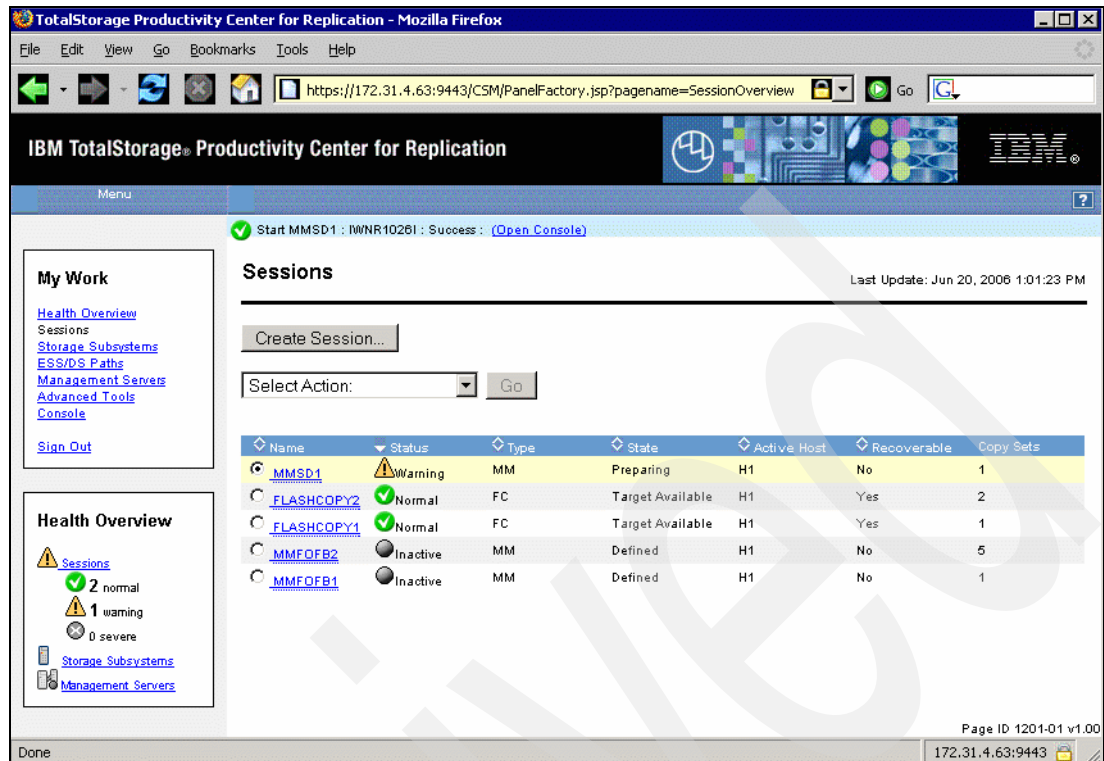


Figure 5-69 TPC for Replication Start Metro Mirror Single Direction Session Preparing

After preparation the session will be in prepared state as shown in Figure 5-70.

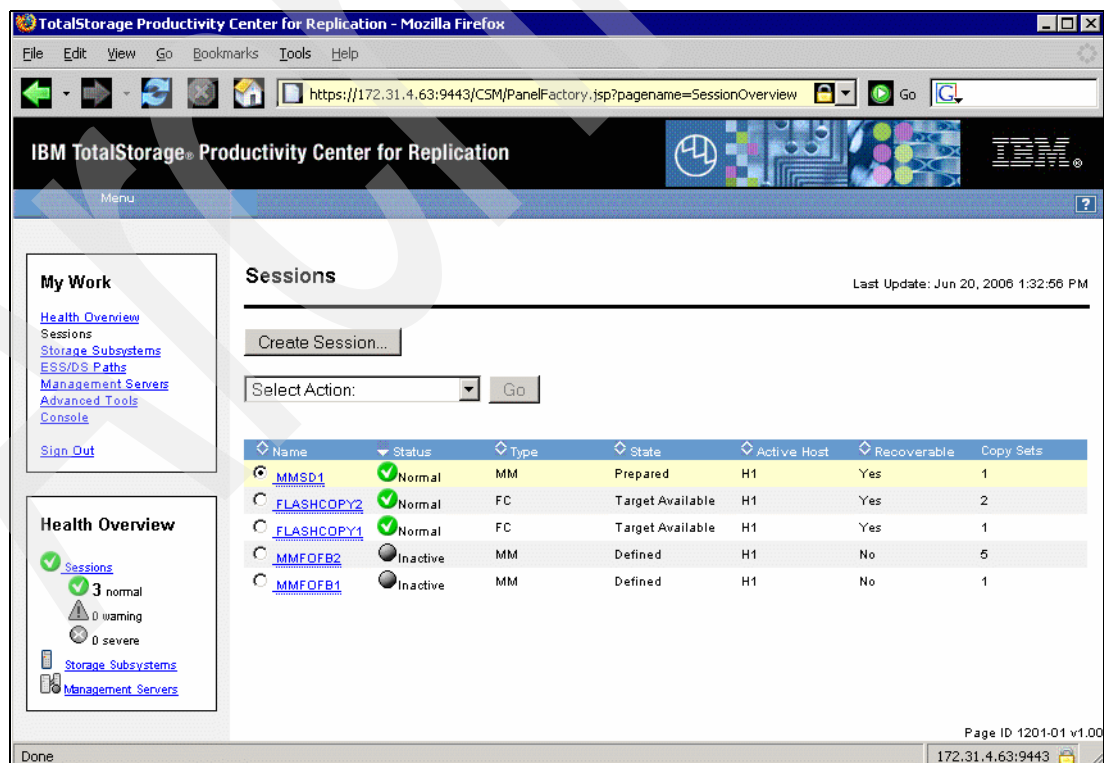


Figure 5-70 TPC for Replication Start Metro Mirror Single Direction Session Prepared

Once session is prepared this would mean that the initial copy was completed and that copy set volumes are synchronized and online. In this state all application I/O on primary site will be synchronously copied to secondary site.

You can make use the start session as many times as you like.

Important: With a version of SAN Volume Controller Console up to 3.1.0.549 you need to restart the TPC for Replication server so it will correctly capture the prepared state. This is due to a problem in the CIMOM interface on SAN Volume Controller Console.

5.2.14 Starting a Metro Mirror Session using the CLI

In this instance we will start a session using interactive command line interface. In this example we will use the Metro Mirror Failover/Failback session we created earlier.

We can start session with the **cmdsess** command as shown in Figure 5-71. 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_h1:h2 MMF0FB2
Are you sure you want to start_h1:h2 session MMF0FB2? [y/n]:y
IWNR1026I [Jun 20, 2006 2:43:44 PM] The runCommand for command Start H1->H2 in
session MMF0FB2 completed successfully.
csmcli>
```

Figure 5-71 MM FOFB start session

When we then check the session status as shown in Figure 5-72, we discover a *Warning* status. This is due to the fact that the volumes are not yet synchronized.

```
csmcli> showsess MMF0FB2
Name          MMF0FB2
Type          Metro Mirror Failover/Failback
State         Preparing
Status        Warning
Copy sets     5
Copying       Yes
Recoverable   No
Error count   0
Description   MMF0FB2

IWNR1500I [Jun 20, 2006 2:44:35 PM] The getSessionInfo command for session
MMF0FB2 completed successfully.
csmcli>
```

Figure 5-72 MM FOFB show session after start

Since the synchronization process can take time, you could sign into the SAN Volume Controller Console to check the progress. As we can see in Figure 5-73 on page 126, the copy is progressing.

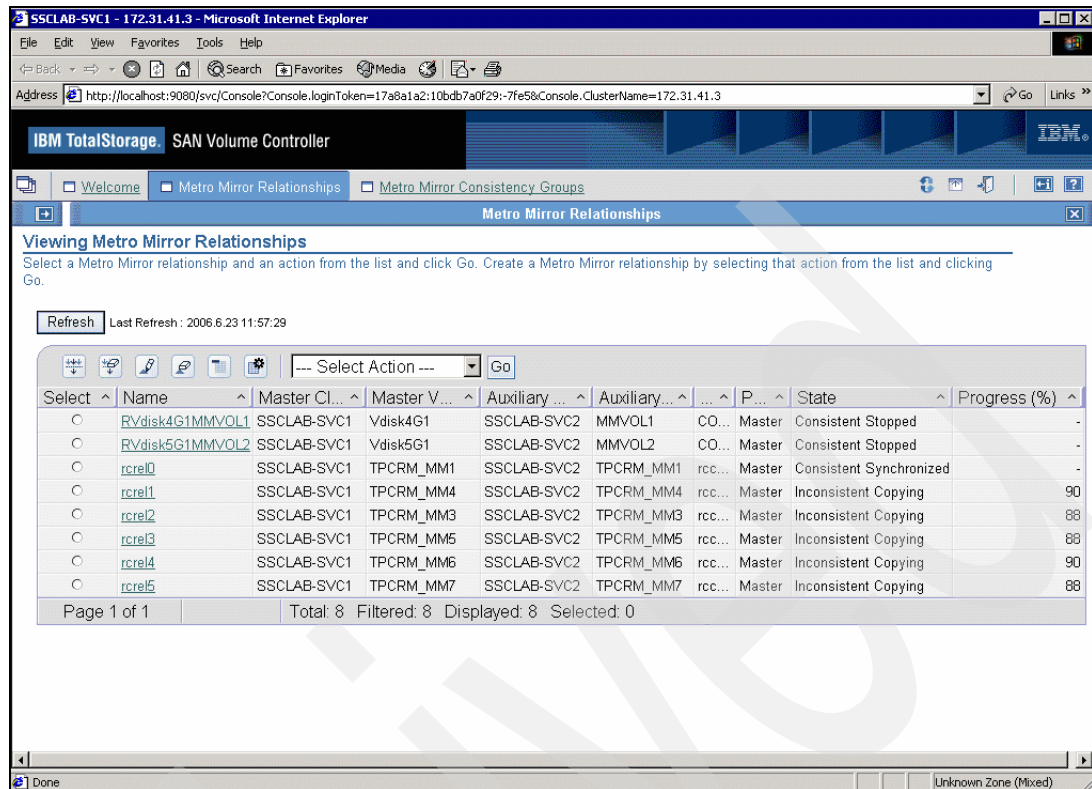


Figure 5-73 SVC copy progress

Once the copy is complete we can re-issue the showsess command. The command output is shown in Figure 5-74.

```

csmcli> showsess MMFOFB2
Name          MMFOFB2
Type          Metro Mirror Failover/Failback
State         Prepared
Status        Normal
Copy sets     5
Copying       Yes
Recoverable   Yes
Error count   0
Description   MMFOFB2

IWNR1500I [Jun 21, 2006 6:06:13 AM] The getSessionInfo command for session
MMFOFB2 completed successfully.

```

Figure 5-74 MM FOFB session established and synchronized

Once session is prepared this would mean that the initial copy was completed and that copy set volumes are synchronized and online. In this state all application I/O on primary site will be synchronously copied to secondary site.

You can make use start session as many times as you like.

After the session is prepared the following options are available:

- ▶ Metro Mirror Single Direction
 - **Suspend** - this will stop copying with consistent secondary volumes
 - **Stop** - this will stop copying with inconsistent secondary volumes
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
- ▶ Metro Mirror Failover/Failback
 - **Suspend** - this will stop copying with consistent secondary volumes
 - **Stop** - this will stop copying with inconsistent secondary volumes
 - **Start H1->H2** - this will reestablish copying in original direction, from primary to secondary location
 - **Terminate** - this will terminate the session

5.2.15 Suspend a Metro Mirror Session using the GUI

To suspend the Metro Mirror process, select the session you want to suspend from the Sessions panel. We will suspend session *MMSD1*. From the pull-down, Select Action menu, select **Suspend**, and click **Go**, as shown in Figure 5-75.

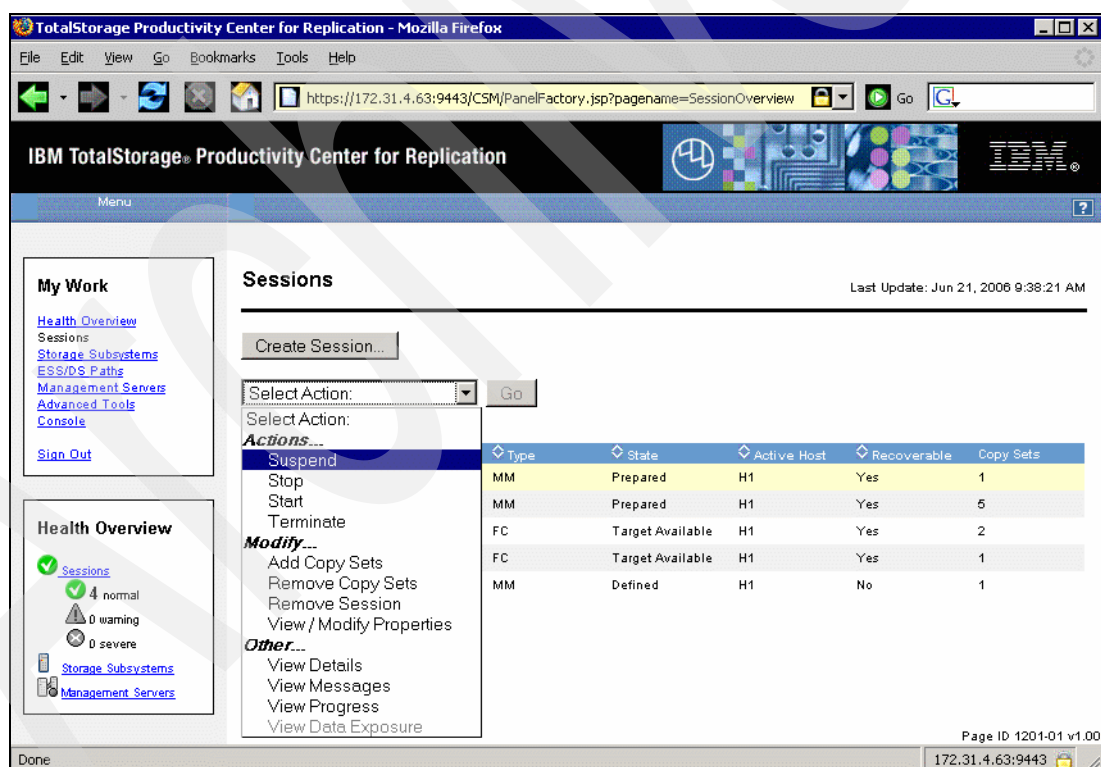


Figure 5-75 TPC for Replication Suspend Metro Mirror Single Direction Session

The selected session will enter in suspended state as shown in Figure 5-76 on page 128.



Figure 5-76 TPC for Replication Suspended Metro Mirror Single Direction Session

Suspend action will cause all target volumes in relationship to be left in data consistent point.

The suspend command can be used anytime during the life span of the session.

5.2.16 Suspend a Metro Mirror Session using the CLI

In this instance we will suspend a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we created and prepared earlier.

We can suspend session with the `cmdsess` command as shown in Figure 5-77. You can see that we have had to reply `y` to the prompt to confirm our desire to suspend the session. To turn this function off, you would need to utilize the `-quiet` parameter as part of the command.

```

csmcli> cmdsess -action suspend MMFOFB2
Are you sure you want to suspend session MMFOFB2? [y/n]:y
IWNR1026I [Jun 21, 2006 11:19:29 AM] The runCommand for command Suspend in
session MMFOFB2 completed successfully.
csmcli>

```

Figure 5-77 MM FOFB suspend session

When we then check the session status again as shown in Figure 5-78 on page 129, we discover a *severe* status. This is due to the fact that the synchronization is suspended.


```

csmcli> showses MMFOFB2
CMMCI9013E Command: showses was not found.
Tip: Enter "help" for a list of available commands.
csmcli> showsess MMFOFB2
Name          MMFOFB2
Type          Metro Mirror Failover/Failback
State         Suspended
Status        Severe
Copy sets     5
Copying       No
Recoverable   Yes
Error count   0
Description   MMFOFB2

IWRNR1500I [Jun 21, 2006 11:20:07 AM] The getSessionInfo command for session
MMFOFB2 completed successfully.

```

Figure 5-78 MM FOFB show session after suspend

You can view the status of the consistency groups through the SVC master console as shown in Figure 5-79.

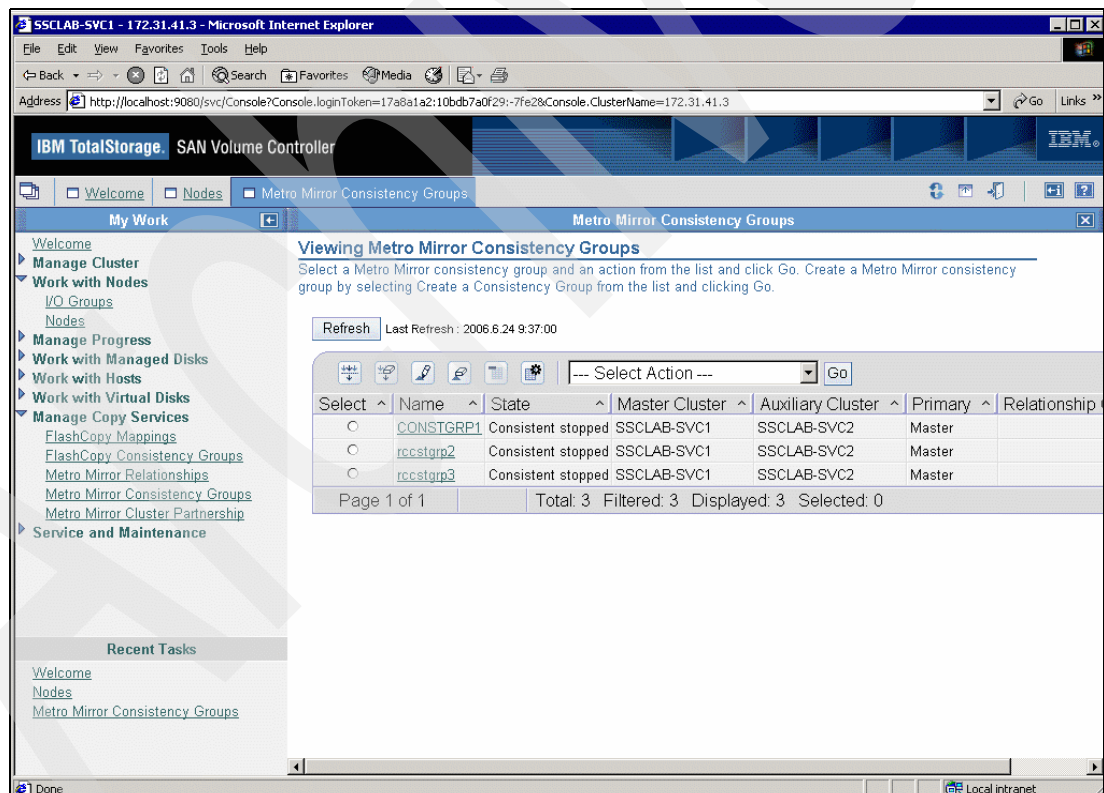


Figure 5-79 SVC suspended status

As we can see the consistency groups (sessions from TPC for Reapplication perspective) are in consistent stopped state.

After a session is suspended the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process
- ▶ Metro Mirror Failover/Failback
 - **Start H1 → H2** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process

5.2.17 Stopping a Metro Mirror Session using GUI

To stop the Metro Mirror process, select the session you want to stop from the Sessions panel. We will stop session *MMSD1*.

Note: A session can be terminated anytime.

From the pull-down Select Action menu, select **Stop** and click **Go**, as shown in Figure 5-80.

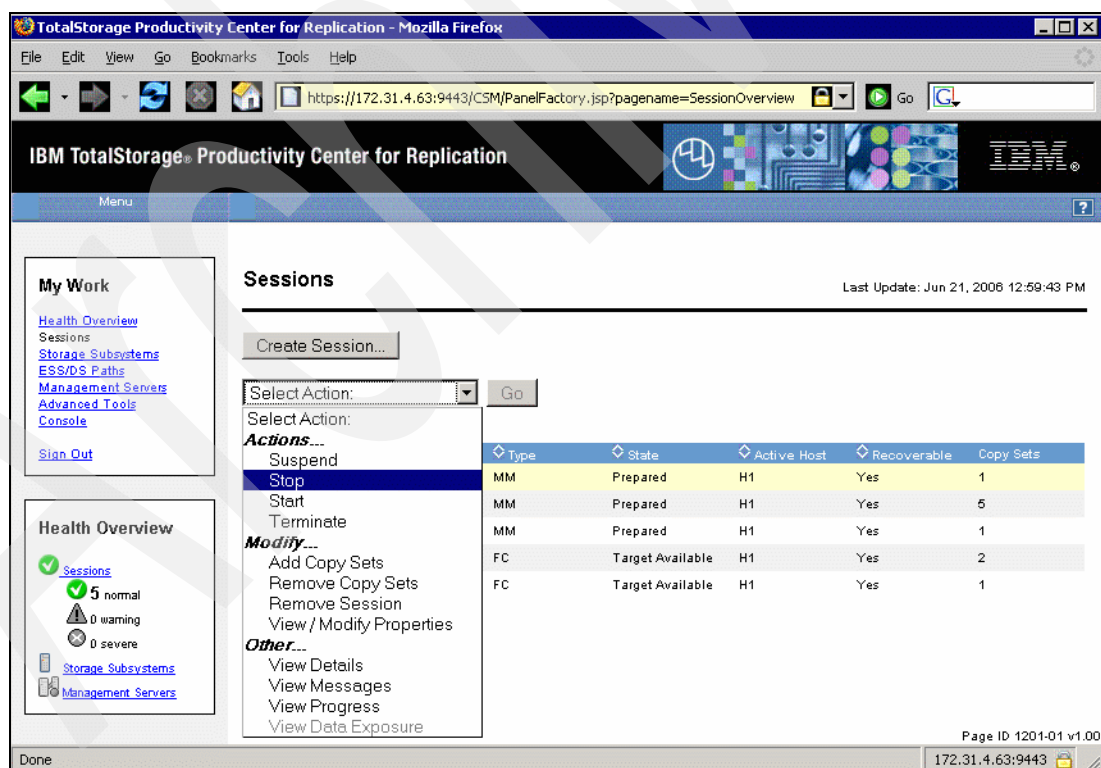


Figure 5-80 TPC for Replication Stop Metro Mirror Single Direction Session

Selected session will enter in suspended state as shown in Figure 5-81 on page 131.

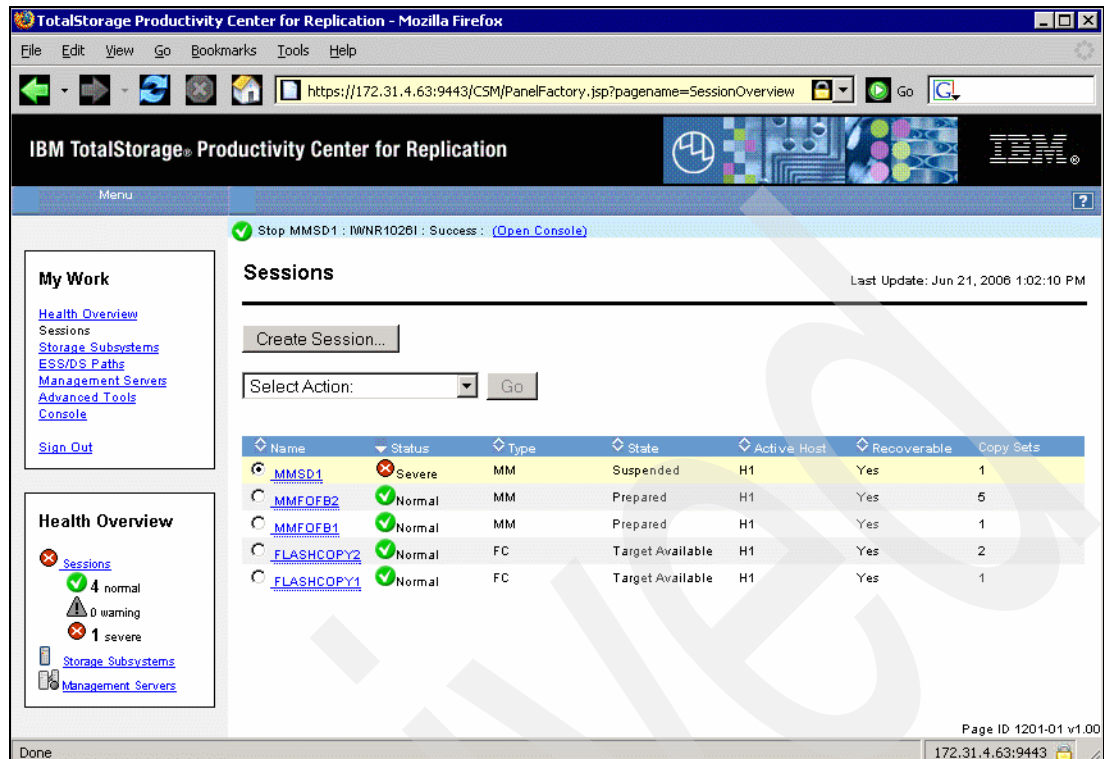


Figure 5-81 TPC for Replication Stopped Metro Mirror Single Direction Session

Stop action will cause all target volumes in relationship to be left in data inconsistent point.

The stop command can be used anytime during the life span of the session.

Stop a Metro Mirror Session using CLI

In this instance we will stop a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we created and prepared earlier.

We can stop session with the `cmdsess` command as shown in Figure 5-82. You can see that we have had to reply `y` to the prompt to confirm our desire to suspend the session. To turn this function off, you would need to utilize the `-quiet` parameter as part of the command.

```

csmcli> cmdsess -action stop MMFOFB2
Are you sure you want to stop session MMFOFB2? [y/n]:y
IWNR1026I [Jun 21, 2006 1:09:29 PM] The runCommand for command Stop in session
MMFOFB2 completed successfully.
csmcli>

```

Figure 5-82 MM FOFB stop session

When we then check the session status again as shown in Figure 5-83 on page 132, we discover a *severe* status. This is due to the fact that the synchronization is suspended.

```

csmcli> showsess MMFOFB2
Name      MMFOFB2
Type      Metro Mirror Failover/Failback
State     Suspended
Status    Severe
Copy sets 5
Copying   No
Recoverable Yes
Error count 0
Description MMFOFB2

IWN1500I [Jun 21, 2006 1:10:45 PM] The getSessionInfo command for session
MMFOFB2 completed successfully.

```

Figure 5-83 MM FOFB show session after stop

The status in SAN Volume Controller is shown in Figure 5-84.

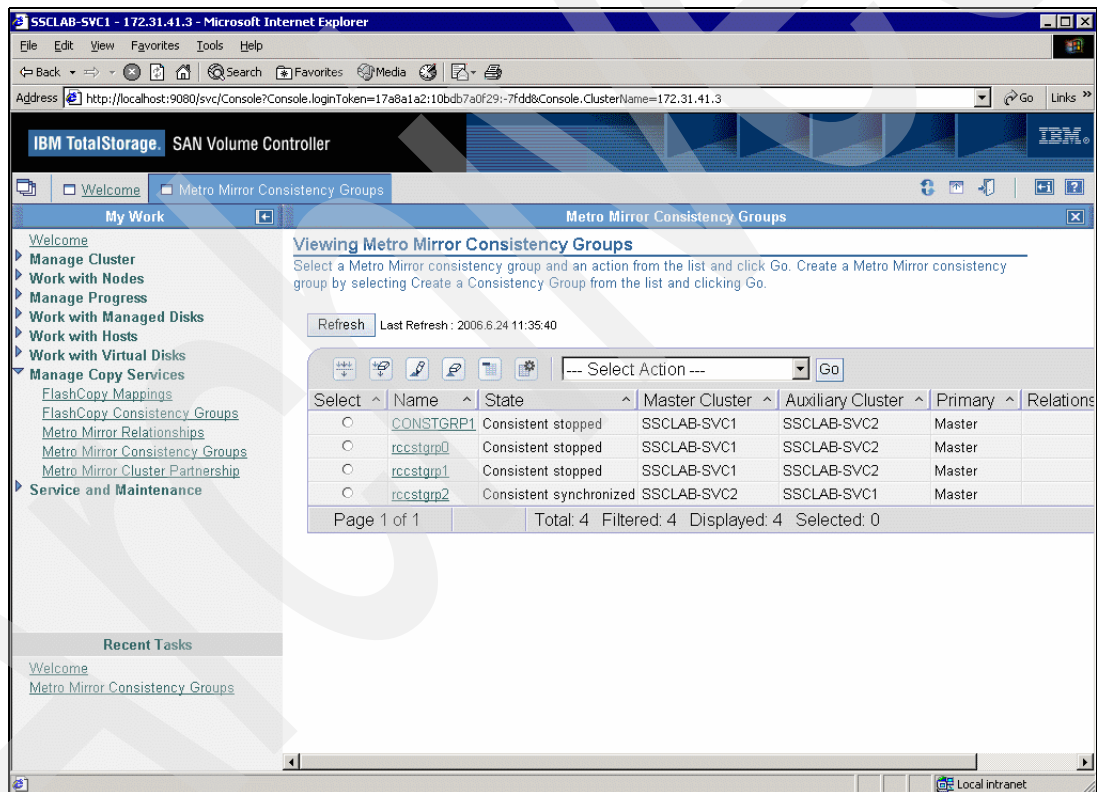


Figure 5-84 SVC stopped status

As we can see the consistency groups (sessions from TPC for Reapplication perspective) are in consistent stopped state.

After a session is stopped the following options are available:

- Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session

- **Recover** - this will make secondary volumes available for host access and stop the copy process
- ▶ Metro Mirror Failover/Failback
 - **Start H1 → H2** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process

Attention: In the case where the stop command was used to enter suspended states, target volumes are not consistent.

5.2.18 Recovering a Metro Mirror Session using GUI

To recover the Metro Mirror process, select the session you want to recover from the Sessions panel. We will recover session *MMSD1*.

Note: You can only recover suspended sessions.

From the Select Action pull-down menu, select **Recover** and click **Go**, as shown in Figure 5-85.

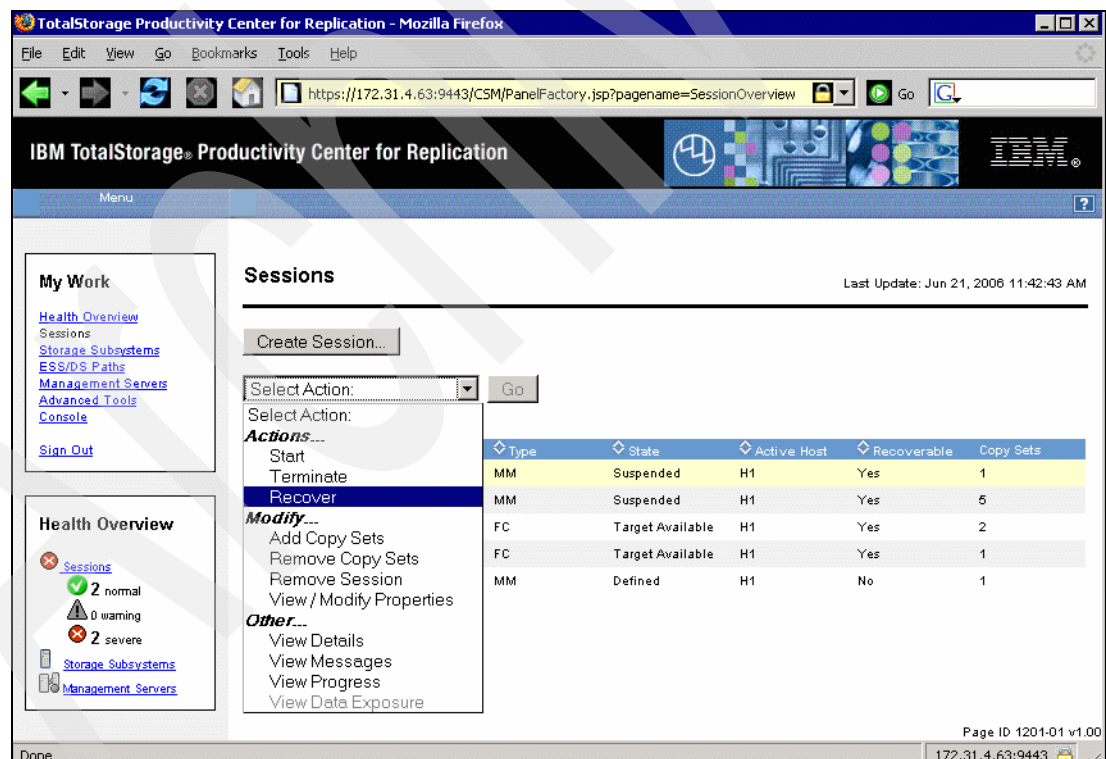


Figure 5-85 TPC for Replication Recover Metro Mirror Single Direction Session

The selected session will enter in target available state as shown in Figure 5-86 on page 134.

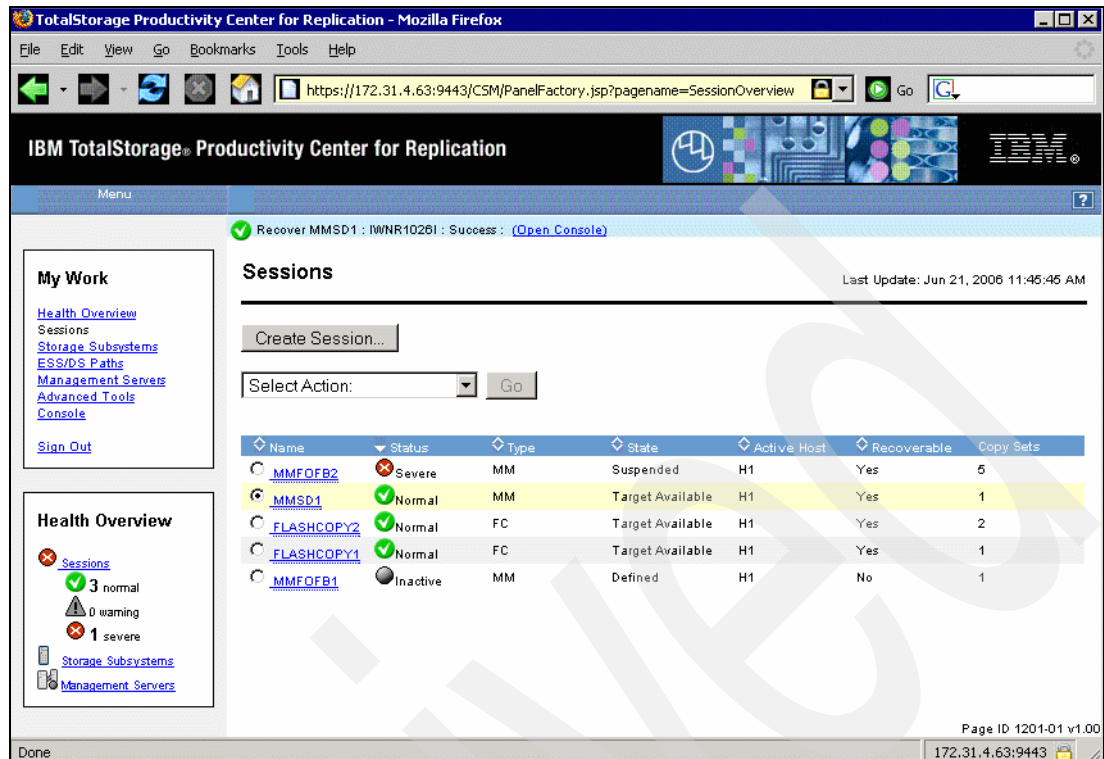


Figure 5-86 TPC for Replication Recovered Metro Mirror Single Direction Session

Once a session is in target available state the secondary volumes are available for host access in consistency state.

Note: By using recover operation, definitions of consistency groups and metro mirror relations on SAN Volume Controller will be deleted.

5.2.19 Recovering a Metro Mirror Session using CLI

In this instance we will recover a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we suspended earlier.

We can recover session with the **cmdsess** command as shown in Figure 5-87. You can see that we have had to reply y to the prompt to confirm our desire to recover the session. To turn this function off, you would need to utilize the **-quiet** parameter as part of the command.

```

csmcli> cmdsess -action recover MMFOFB2
Are you sure you want to recover session MMFOFB2? [y/n]:y
IWNR1026I [Jun 21, 2006 11:53:00 AM] The runCommand for command Recover in
session MMFOFB2 completed successfully.

```

Figure 5-87 MM FOFB recover session

When we then check the session status again as shown in Figure 5-88 on page 135, we discover a *normal* status. This is due to the fact that session is stopped and target volumes are available for host use.

```

csmcli> showsess MMFOFB2
Name          MMFOFB2
Type          Metro Mirror Failover/Failback
State         Target Available
Status        Normal
Copy sets     5
Copying       No
Recoverable   Yes
Error count   0
Description   MMFOFB2

IWNR1500I [Jun 21, 2006 11:53:45 AM] The getSessionInfo command for session
MMFOFB2 completed successfully.

```

Figure 5-88 MM FOFB show session after recover

Once a session is in target available state the secondary volumes are available for host access in consistency state.

Note: By using the recover operation, definitions of consistency groups and Metro Mirror relations on SAN Volume Controller will be deleted.

After session is recovered in target available state the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
- ▶ Metro Mirror Failover/Failback
 - **Start H2->H1** - this will reestablish copying in opposite direction, from secondary to primary location
 - **Start H1->H2** - this will reestablish copying in original direction, from primary to secondary location
 - **Terminate** - this will terminate the session

5.2.20 Terminate a Metro Mirror Session using GUI

To terminate the Metro Mirror process, select the session you want to terminate from the Sessions panel. We selected session *MMSD1*.

Note: A Session can be terminated anytime.

From the Select Action pull-down menu, select **Terminate** and click **Go**, as shown in Figure 5-89 on page 136.

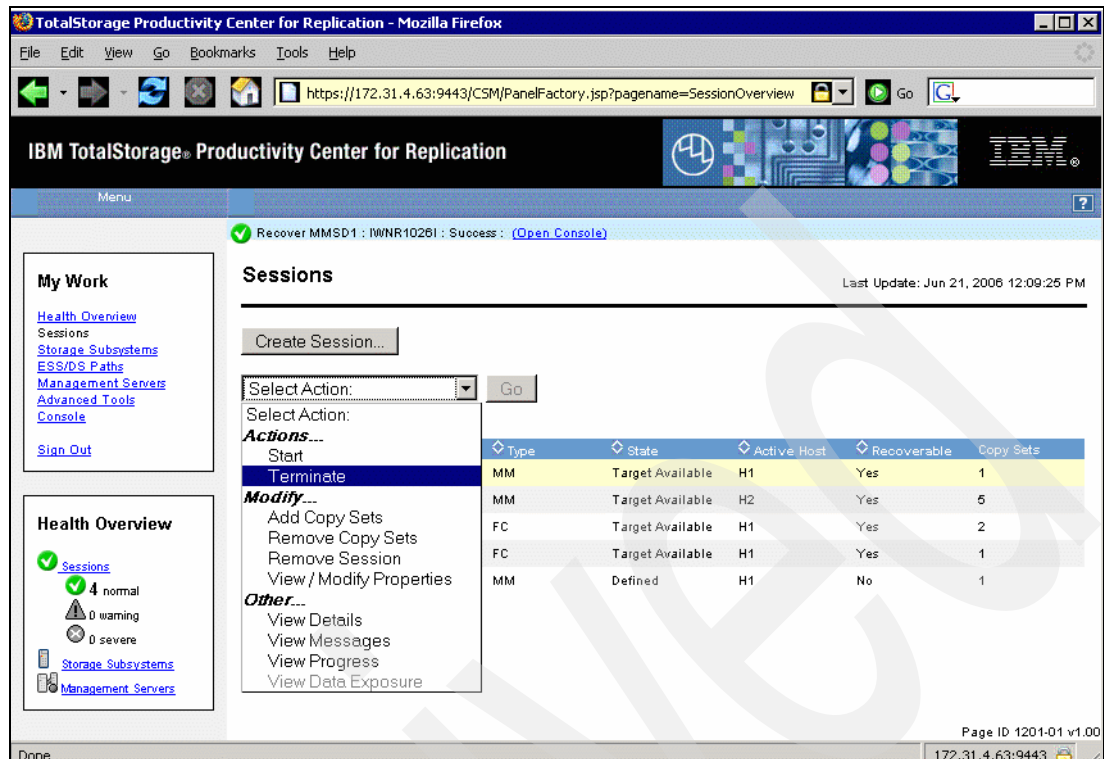


Figure 5-89 TPC for Replication Terminate Metro Mirror Single Direction Session

The selected session will enter in Defined state as shown in Figure 5-90.

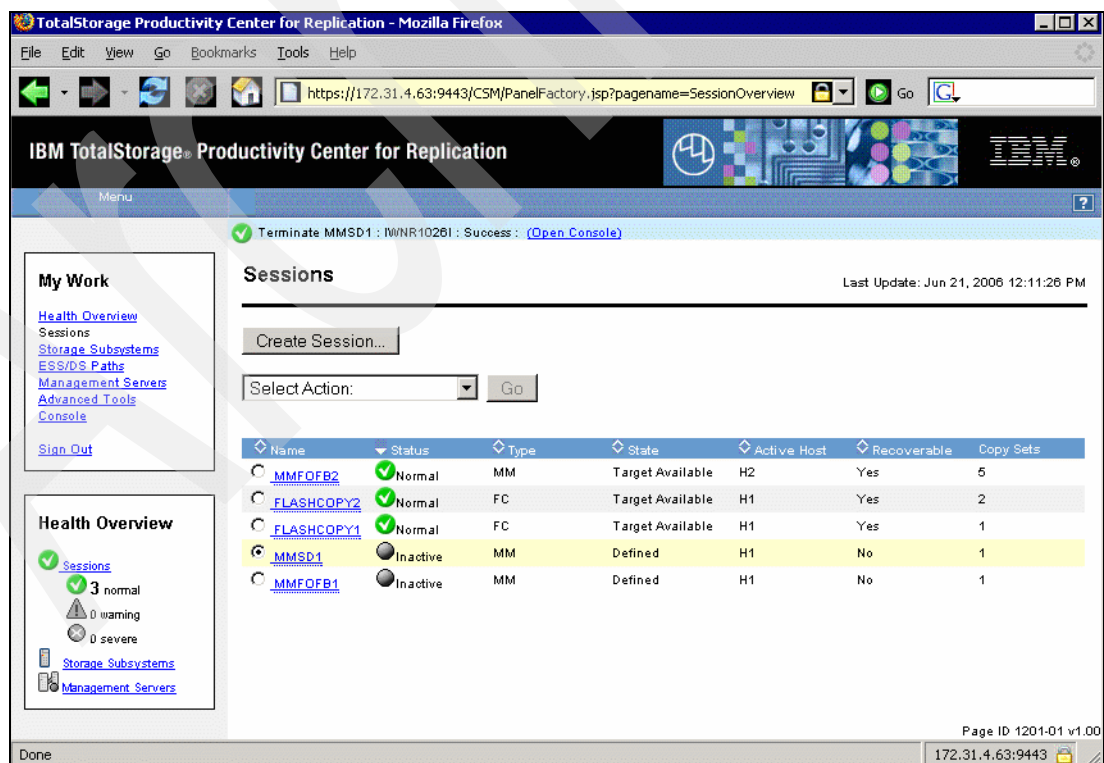


Figure 5-90 TPC for Replication Terminated Metro Mirror Single Direction Session

Note: By using terminate operation while session is in prepared or suspended state, definitions of consistency groups and Metro Mirror relation on SVC will be deleted.

Terminate a Metro Mirror Session using the CLI

In this instance we will terminate a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we recovered earlier.

We can terminate session with the **cmdsess** command as shown in Figure 5-91. You can see that we have had to reply y to the prompt to confirm our desire to terminate the session. To turn this function off, you would need to utilize the **-quiet** parameter as part of the command.

```
csmdi> cmdsess -action terminate MMFOFB2
Are you sure you want to terminate session MMFOFB2? [y/n]:y
IWNRI026I [Jun 21, 2006 12:15:49 PM] The runCommand for command Terminate in
session MMFOFB2 completed successfully.
```

Figure 5-91 MM FOFB terminate session

When we then check the session status again as shown in Figure 5-92, we discover a *inactive* status. This is due to the fact that the session is terminated and in defined state.

```
csmdi> showsess MMFOFB2
Name      MMFOFB2
Type      Metro Mirror Failover/Failback
State     Defined
Status    Inactive
Copy sets 5
Copying   No
Recoverable No
Error count 0
Description MMFOFB2

IWNRI500I [Jun 21, 2006 12:17:28 PM] The getSessionInfo command for session
MMFOFB2 completed successfully.
```

Figure 5-92 MM FOFB show session after terminate

Note: By using terminate operation while session is in prepared or suspended state, definitions of consistency groups and Metro Mirror relation on SVC will be deleted.

After session is terminated the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
- ▶ Metro Mirror Failover/Failback
 - **Start H1 → H2** - this will reestablish copying in original direction, from primary to secondary location

5.3 TPC for Replication and ESS 800

As we have seen in the planning section, the TPC for Replication tool communicates with the ESS 800 via CCW protocol. Communication goes directly to both ESS 800 clusters as shown in Figure 5-93.

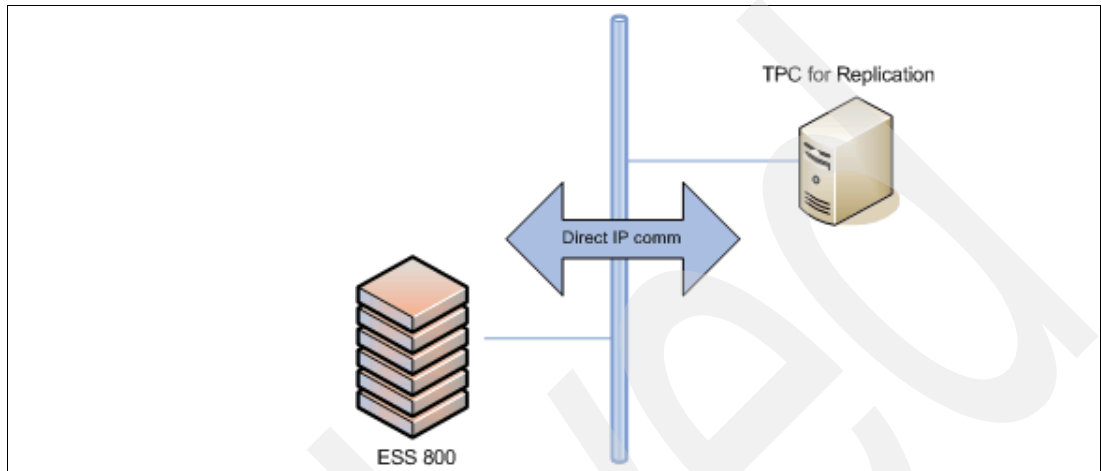


Figure 5-93 IP connectivity for TPC for Replication and ESS 800

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

- ▶ Add an ESS 800 to your TPC for Replication environment
- ▶ Create and delete ESS 800 Sessions
- ▶ Create and delete ESS 800 Copy Sets
- ▶ Manipulate the created sessions

Our lab setup can be seen in Figure 5-94.

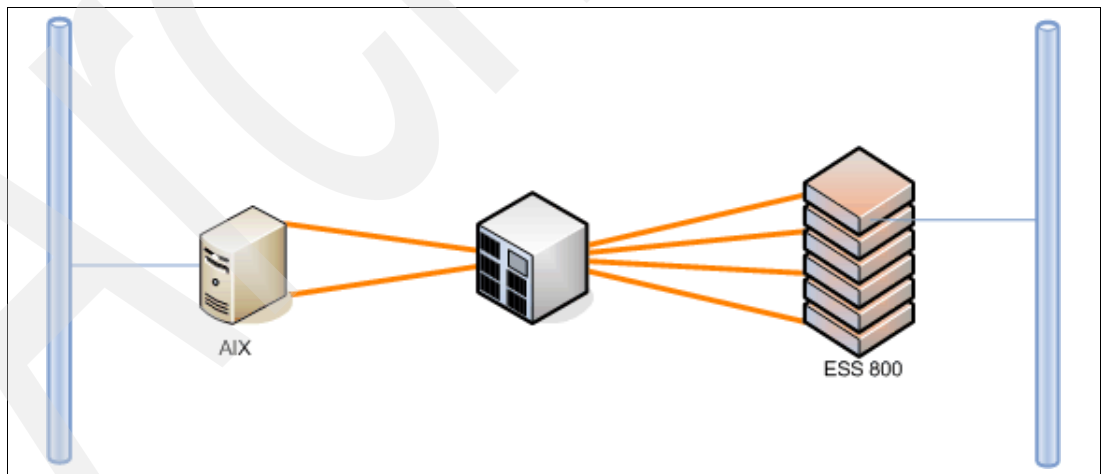


Figure 5-94 ITSO Linux Lab setup

5.3.1 Adding the ESS 800 using 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 5-95.

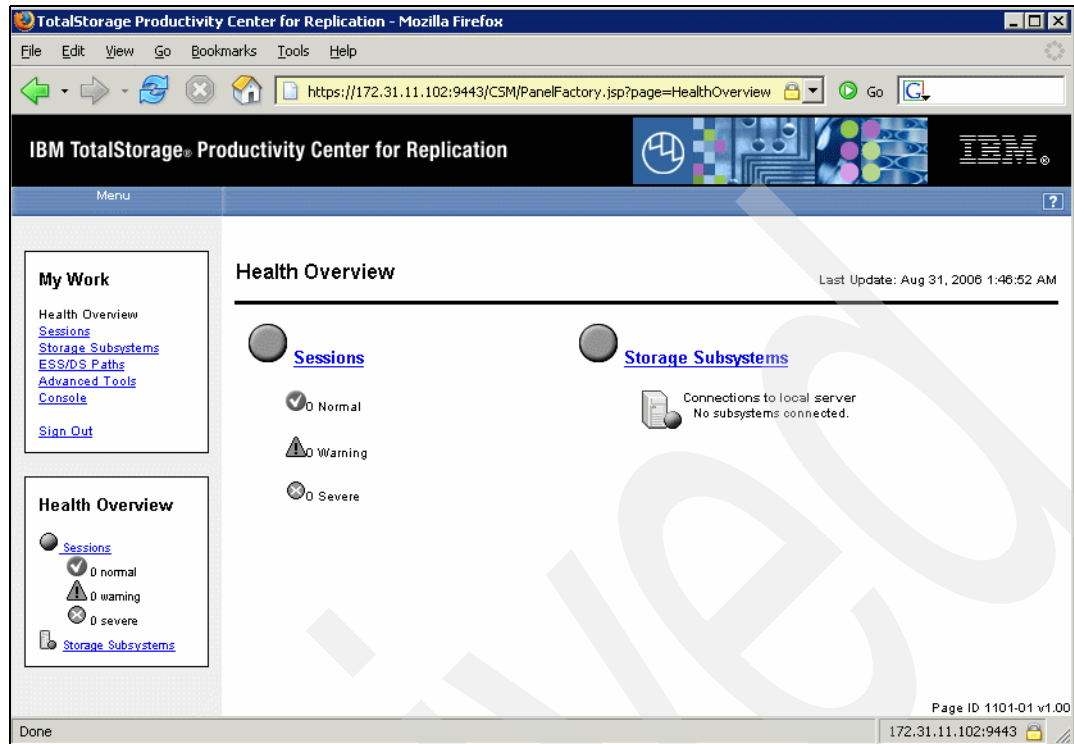


Figure 5-95 TPC for Replication Health Overview

The window similar to Figure 5-96 on page 139 will be displayed. Click the **Add Subsystem** button to continue.

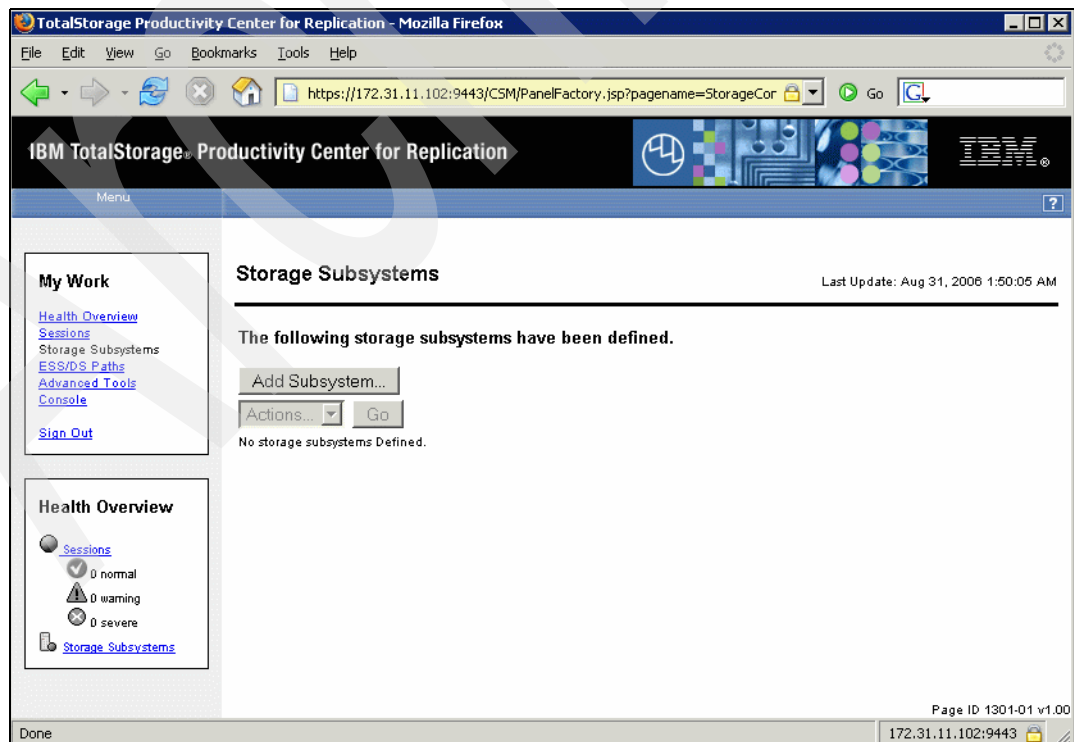


Figure 5-96 TPC for Replication Storage Subsystems

In the panel shown in Figure 5-97 choose the **ESS (Enterprise Storage Server) / DS (Data Server)** radio button and click **OK** to continue.

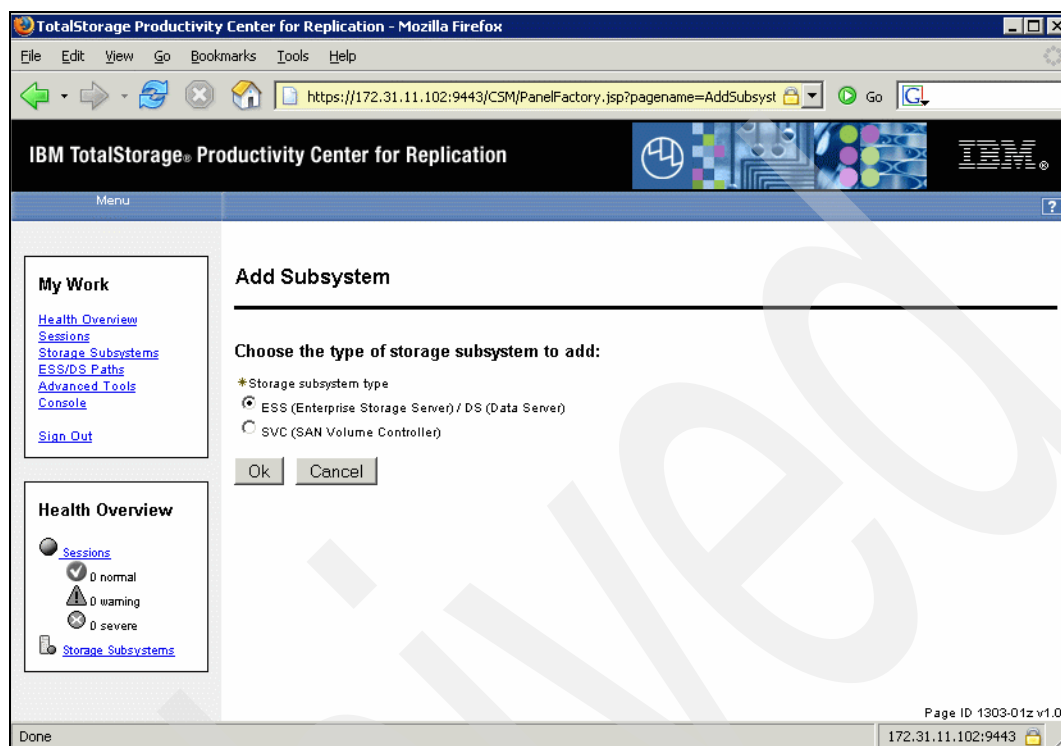


Figure 5-97 TPC for Replication Add Subsystem

In the panel shown in Figure 5-98, enter the IP address (or the fully qualified name) of the ESS clusters as well as the defined user account and password for TPC for Replication's use. Leave port at default value 2433. Click **OK** to continue.

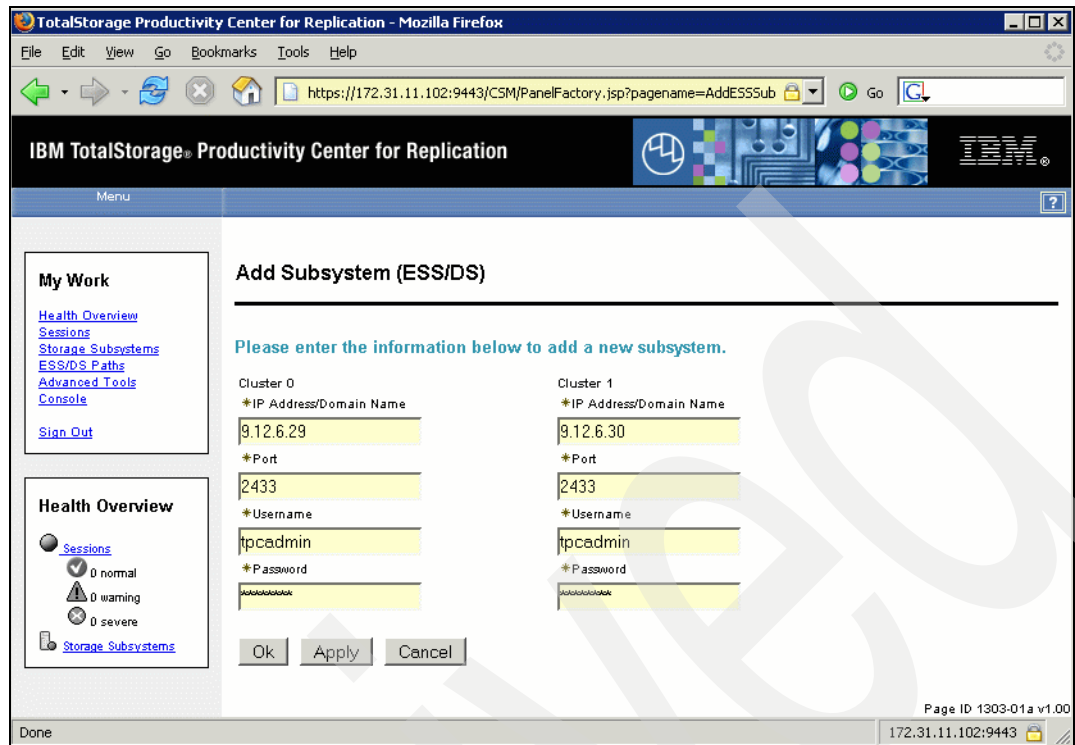


Figure 5-98 TPC for Replication Add Subsystem (ESS/DS)

The next window is shown in Figure 5-99 indicating the ESS is connecting.

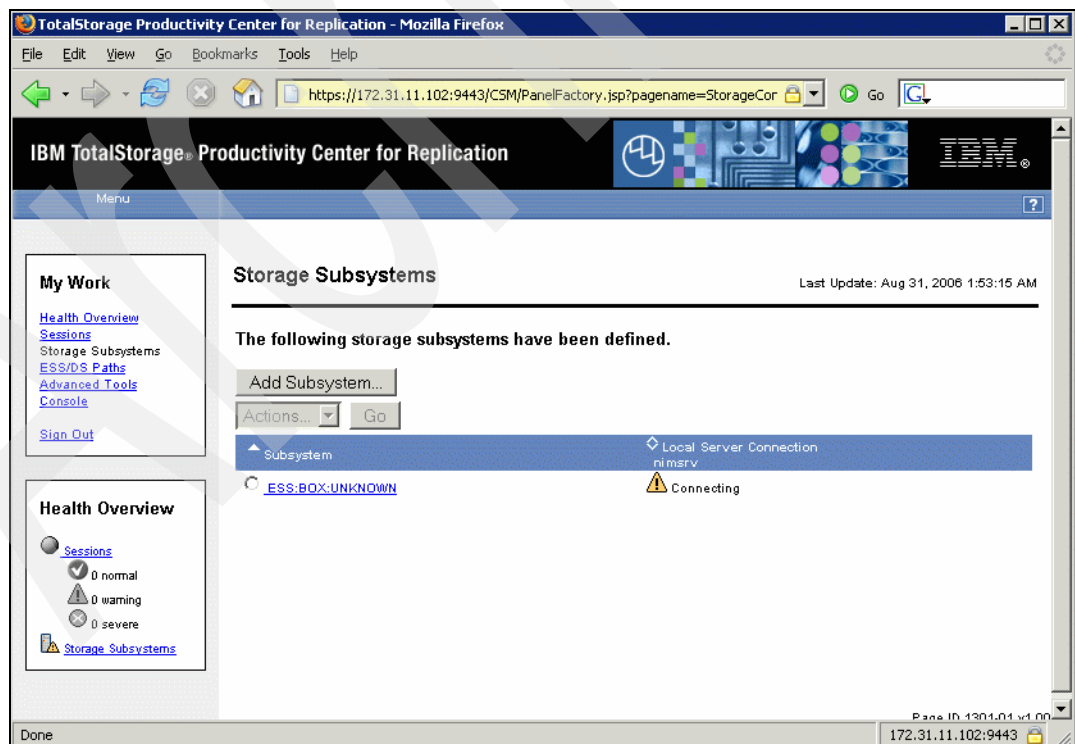


Figure 5-99 TPC for Replication ESS Subsystem Added

Once the ESS 800 will be successfully connected this will be shown in the **Health Overview** panel as shown in Figure 5-100.

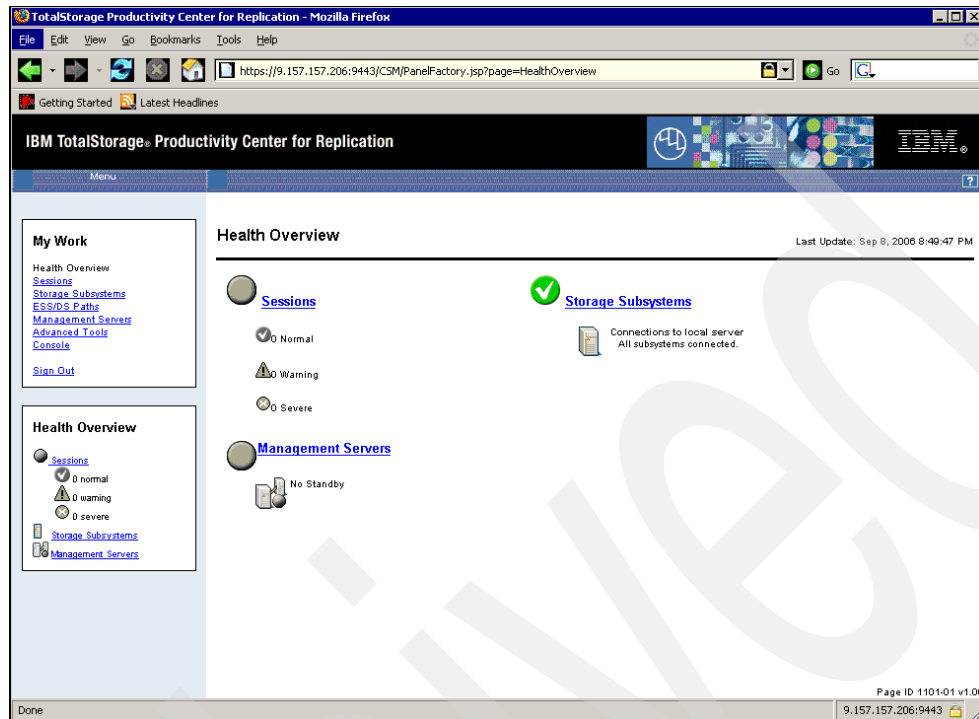


Figure 5-100 TPC for Replication ESS Subsystem Connected

The green checkmark besides **Storage Subsystems** means that our ESS 800 Subsystem is successfully connected.

5.3.2 Adding the ESS 800 using the 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 5-101

```
# cat /tpcrm/address.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Replication
#
setoutput -fmt delim -v on
adddevice -devtype ESS -ip 9.12.6.29;9.12.6.30 -username tpcadmin;tpcadmin
lsdevice -devtype ESS
```

Figure 5-101 Add ESS Subsystem script

While we can setup a script to perform this, since the **adddevice** command requires a password, it must be added interactively as can be seen in Figure 5-102.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/address.txt
Please enter a password for the device userid of tpcadmin:

Please enter a password for the device userid of tpcadmin:
```

Figure 5-102 Add Subsystem script

Once the password is entered correctly we see the result as shown in Figure 5-103.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/address.txt
Please enter a password for the device userid of tpcadmin:

Please enter a password for the device userid of tpcadmin:

IWNH1000I [Sep 2, 2006 1:29:50 AM] The command completed successfully.
Device ID,Device type
=====
ESS:BOX:UNKNOWN,ESS
```

Figure 5-103 CLI result

5.3.3 Adding a FlashCopy Session using GUI

Now that we have a subsystem to use, we can create a session to meet our copy services requirements. Remember that a Session is the highest order component. As such, it represents a consistency group for all copy sets defined within it.

In this instance, we will create a FlashCopy Session as we can see in Figure 5-104.

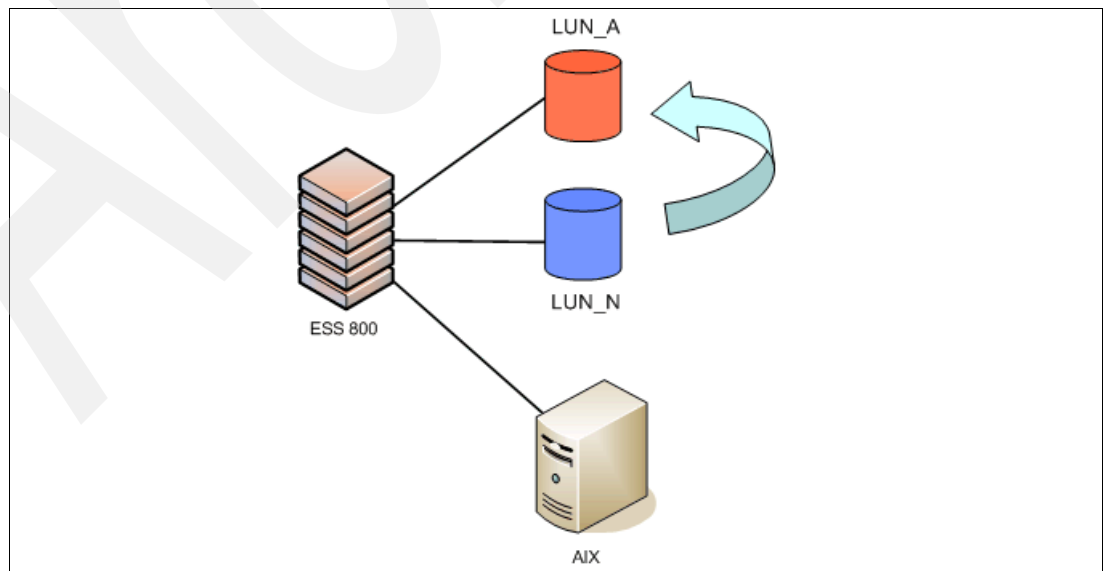


Figure 5-104 Flashcopy ITSO Linux lab setup

The first step is to select the **Create Session** button from the Sessions panel, as shown in Figure 5-105.

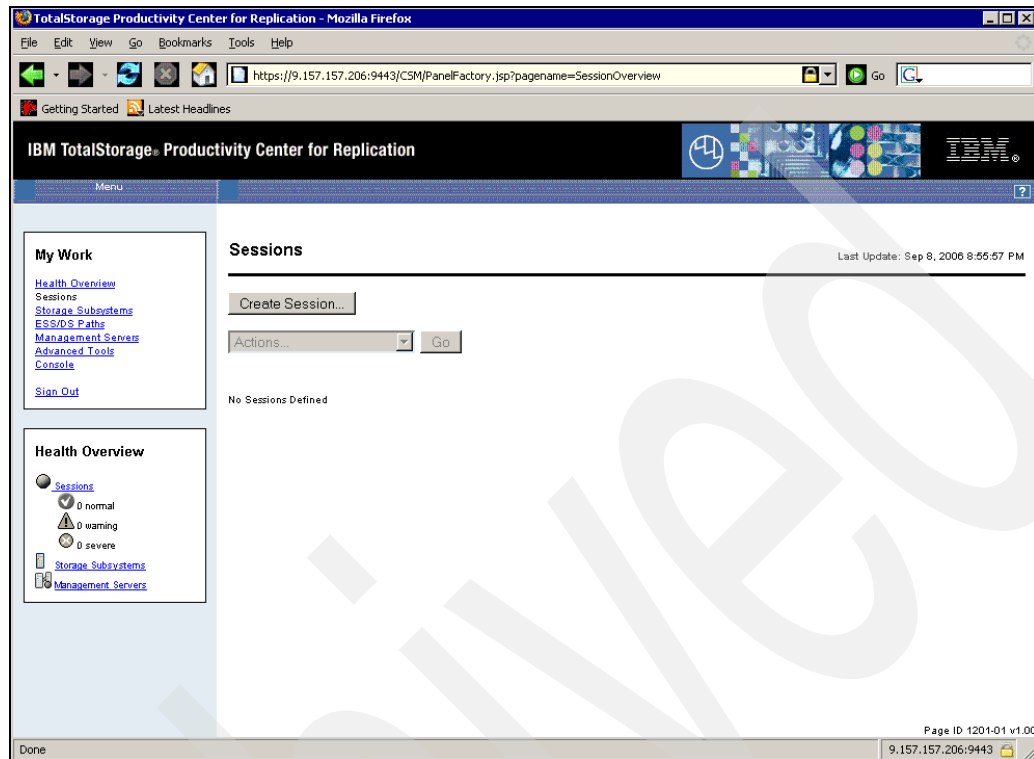


Figure 5-105 TPC for Replication Sessions

This will open a new window where you can add session details such as copy type, as shown in Figure 5-106.

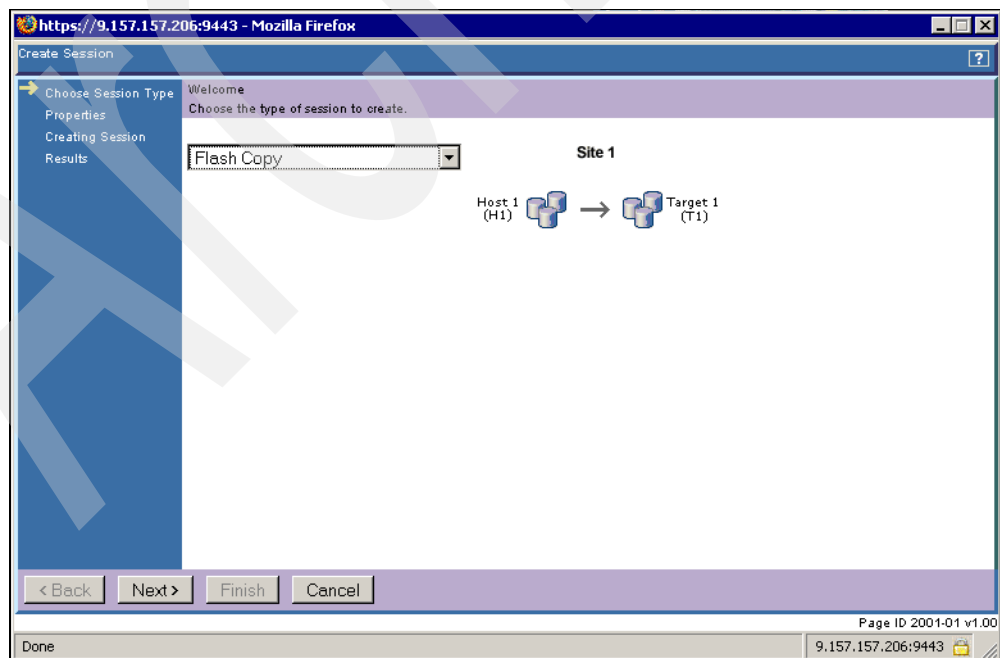


Figure 5-106 TPC for Replication Create Session

Select your copy type, in our example *Flash Copy*, and click the **Next** button. The window similar to Figure 5-107 will be displayed. Type in a meaningful name for the session in the **Session name** box as well as any informational text in the **Description** box. Click **Next** to create the session.

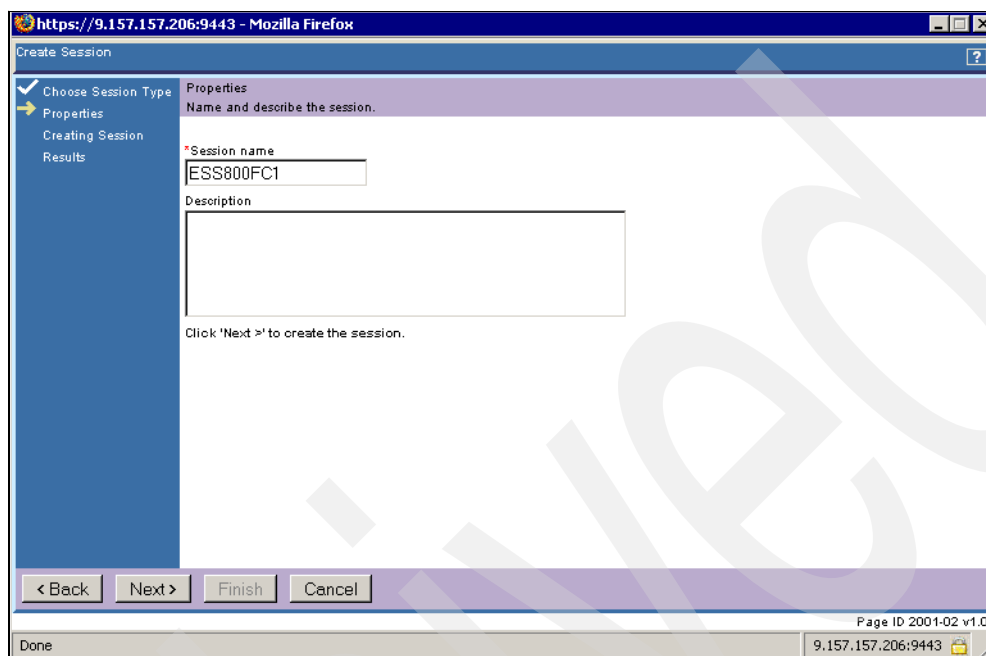


Figure 5-107 TPC for Replication Create Session Properties

The window in Figure 5-108 will be displayed next. In our case the session was successfully created.

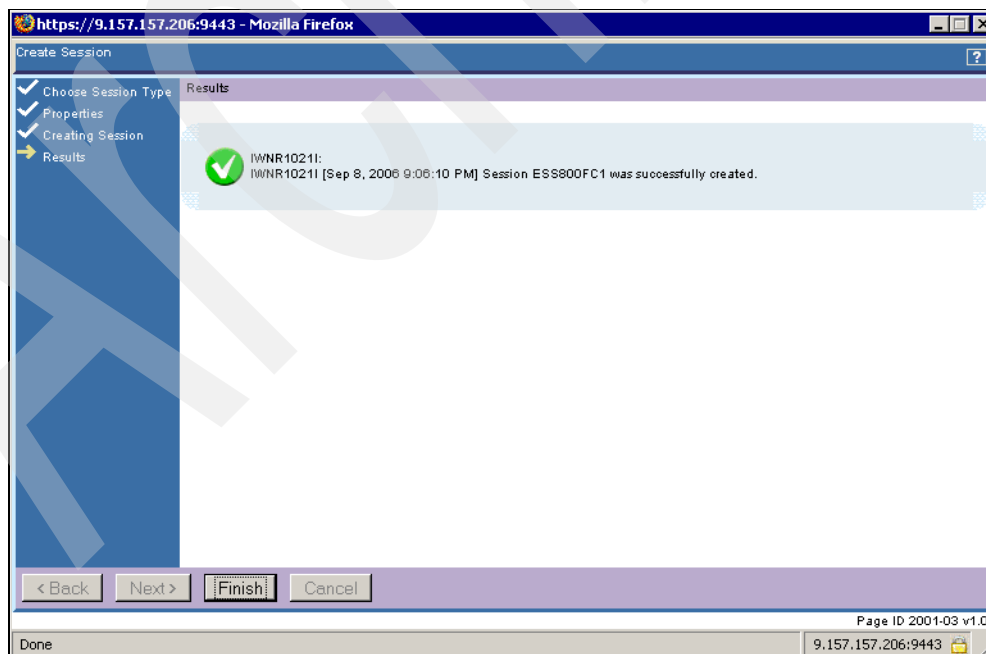


Figure 5-108 TPC for Replication Session Created

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

5.3.4 Adding a FlashCopy Session using CLI

Once again using the command line interface, we can achieve the same result. For this effort we have created another script file which can be seen in Figure 5-109 (note that we have added a list session command (*lssess -l*) to display the defined sessions once our new one has been created).

```
# cat createfcsession.txt
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mksess -cptype fc -desc ESS800FC2 ESS800FC2
lssess -l
```

Figure 5-109 Add FC Session script file

The result of the execution of this script can be seen in Figure 5-110.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/createfcsession.txt
IWNRI021I [Sep 2, 2006 2:05:20 AM] Session ESS800FC2 was successfully created.
Name      Status   State   Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Inactive Defined Flash Copy No          No          0 No
ESS800FC1 Inactive Defined Flash Copy No          No          0 No
```

Figure 5-110 FC Session CLI result

5.3.5 Adding Copy Sets to a FlashCopy Session using GUI

Now that we have a session created, we can begin to create copy sets within the session. First you need to select the session, in our example *ESS800FC1*, to which you want to add copy sets. From the Sessions panel, select the **Add Copy Sets** option from the drop-down menu, as shown in Figure 5-111.

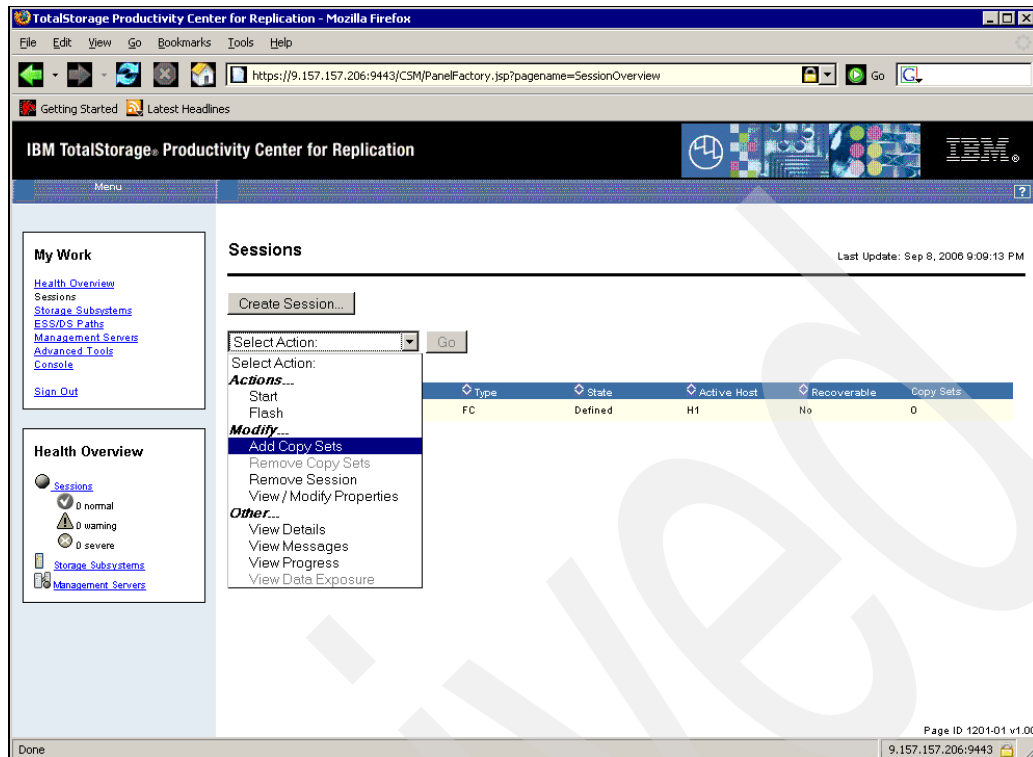


Figure 5-111 TPC for Replication Add Copy Sets

Click the **Go** button to continue. This will open a new window where we will define the copy sets as shown in Figure 5-112. In this window we define the source subsystems via the first drop-down menu.

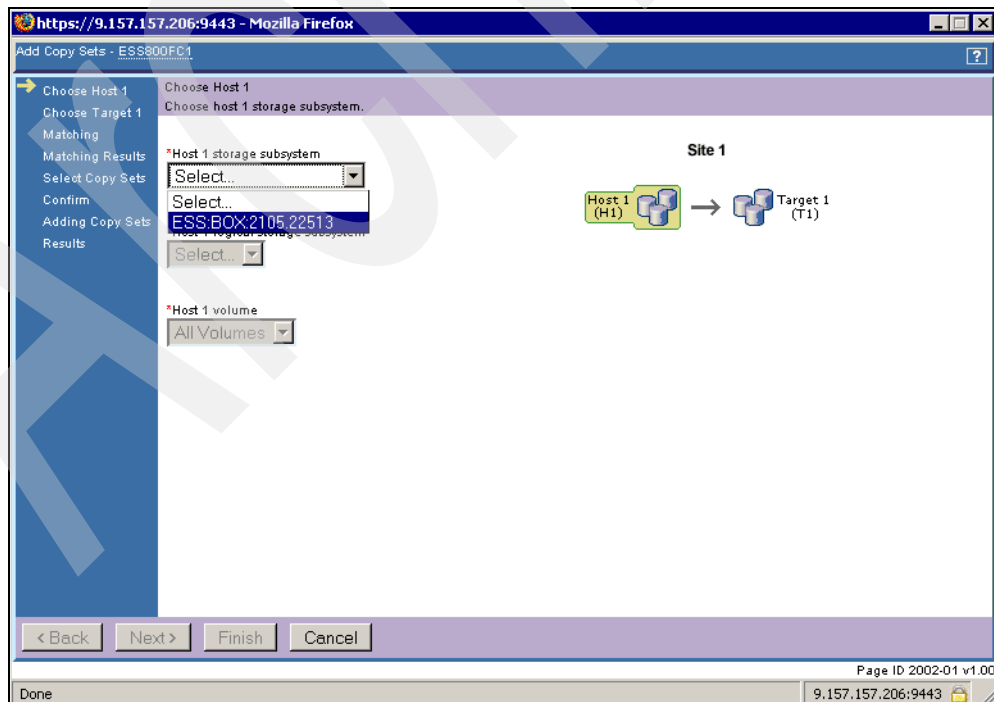


Figure 5-112 TPC for Replication Source ESS

Select your source ESS 800. In our example we selected *ESS:BOX:2105:22513*. The **Host 1 logical storage subsystem** pull-down menu will become available as shown in Figure 5-113.

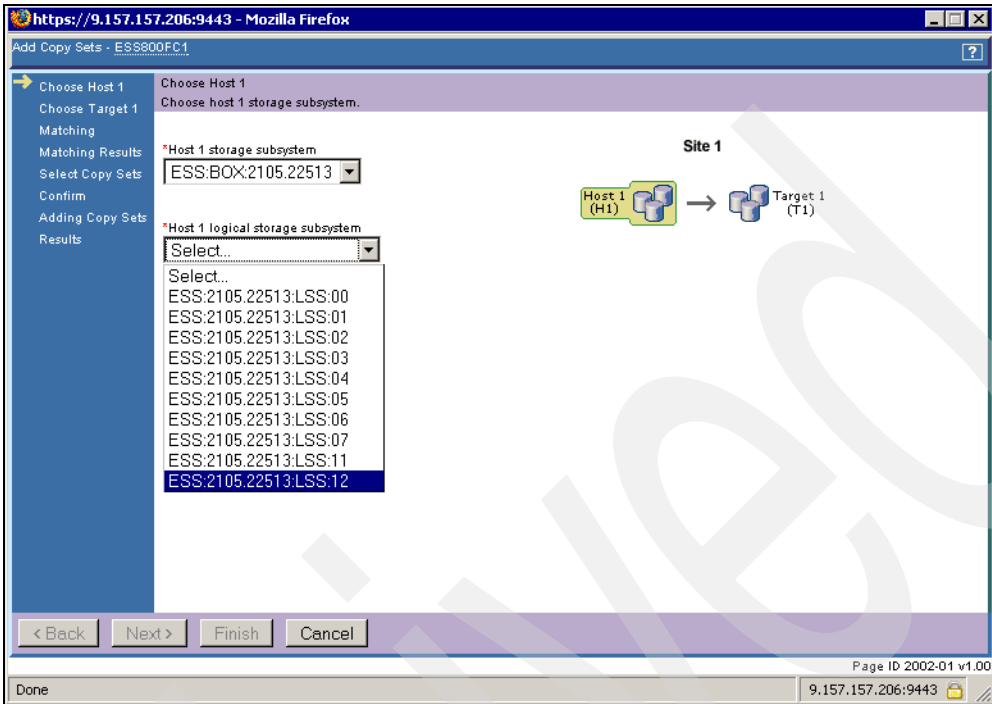


Figure 5-113 TPC for Replication Source ESS LSS

Select your source ESS Logical Subsystem (LSS), in our example we selected *ESS:2105.22513:LSS:12*. The **Host 1 volume** pull-down menu will become available as shown in Figure 5-114 on page 148.

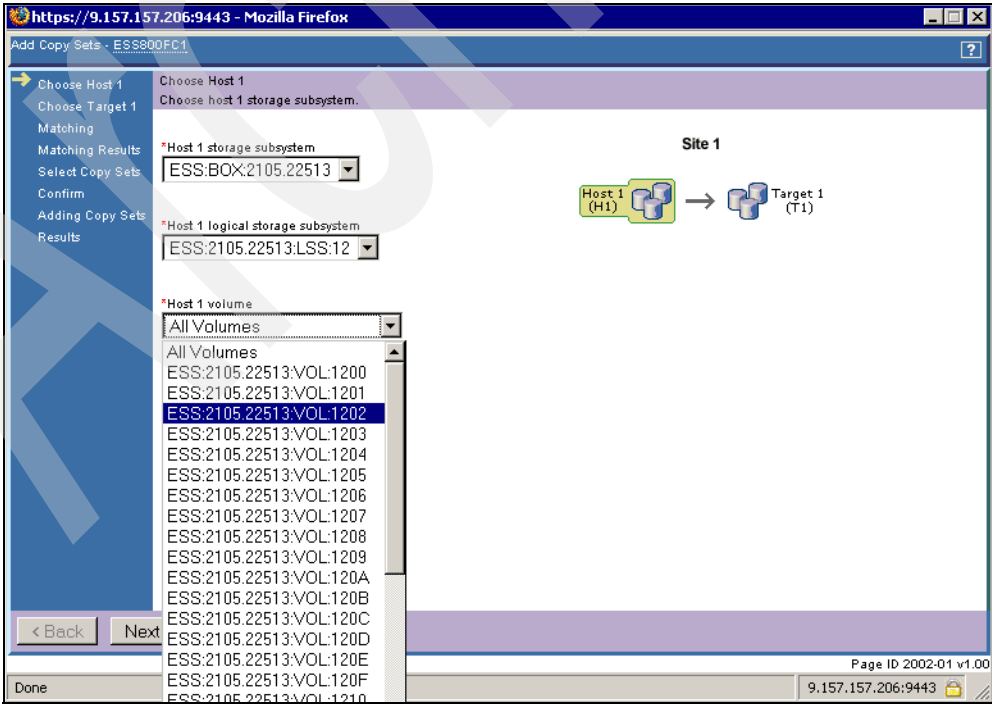


Figure 5-114 TPC for Replication ESS Source Volume

Select your source volume, in our example we selected *ESS:2105.22513:VOL:1202* volume. Once the source volume is selected, click the **Next** button to proceed to the Target definitions as shown in Figure 5-115.

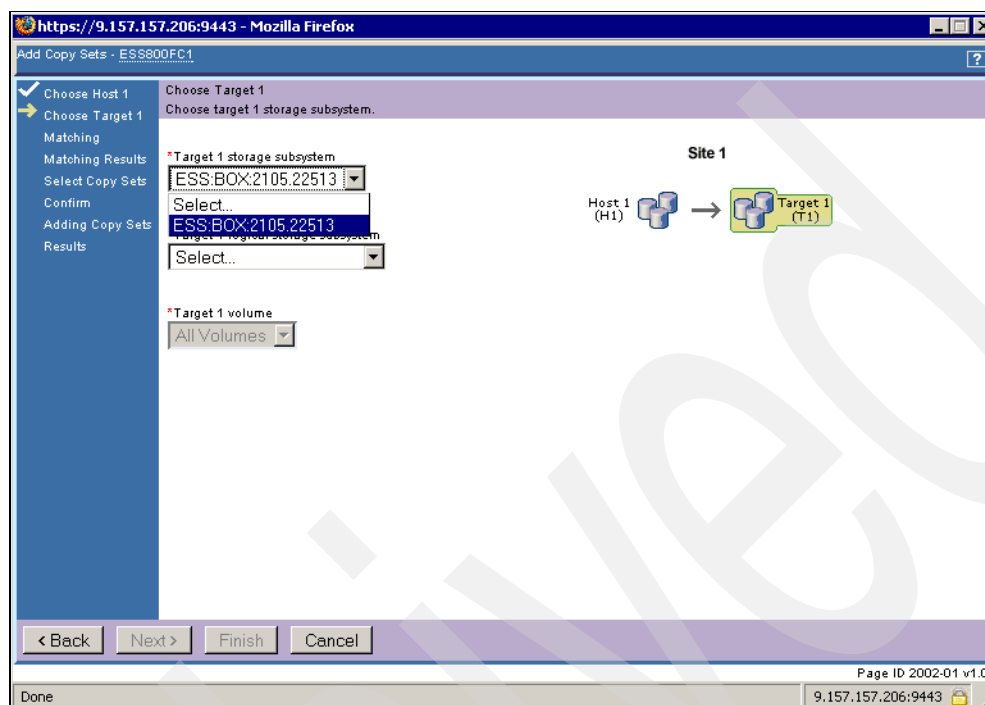


Figure 5-115 TPC for Replication Target ESS

Select your target ESS 800, in our example we selected *ESS:BOX:2105:22513*. The **Target 1 logical storage subsystem** pull-down menu will become available as shown in Figure 5-116.

Note: As you can see in our example only one ESS 800 is available for target selection. The reason for this is that FlashCopy operation can only be performed within the same ESS 800.

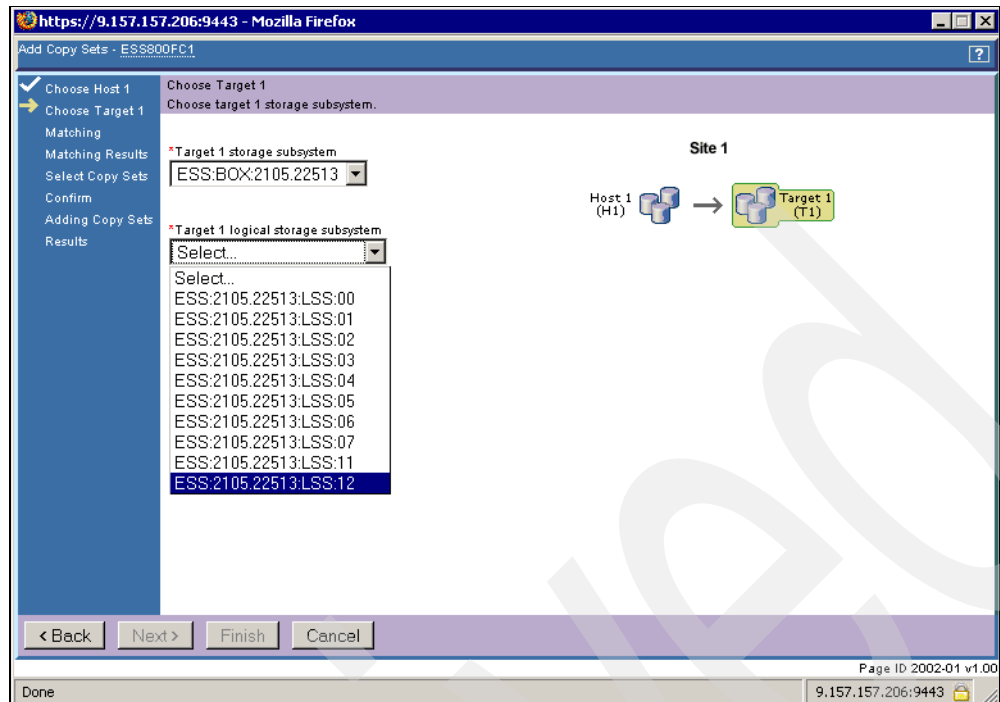


Figure 5-116 TPC for Replication Target ESS LSS

Select your target ESS LSS, in our example we selected *ESS:2105.22513:LSS:12*. The **Target 1 volume** pull-down menu will become available as shown in Figure 5-117 on page 150.

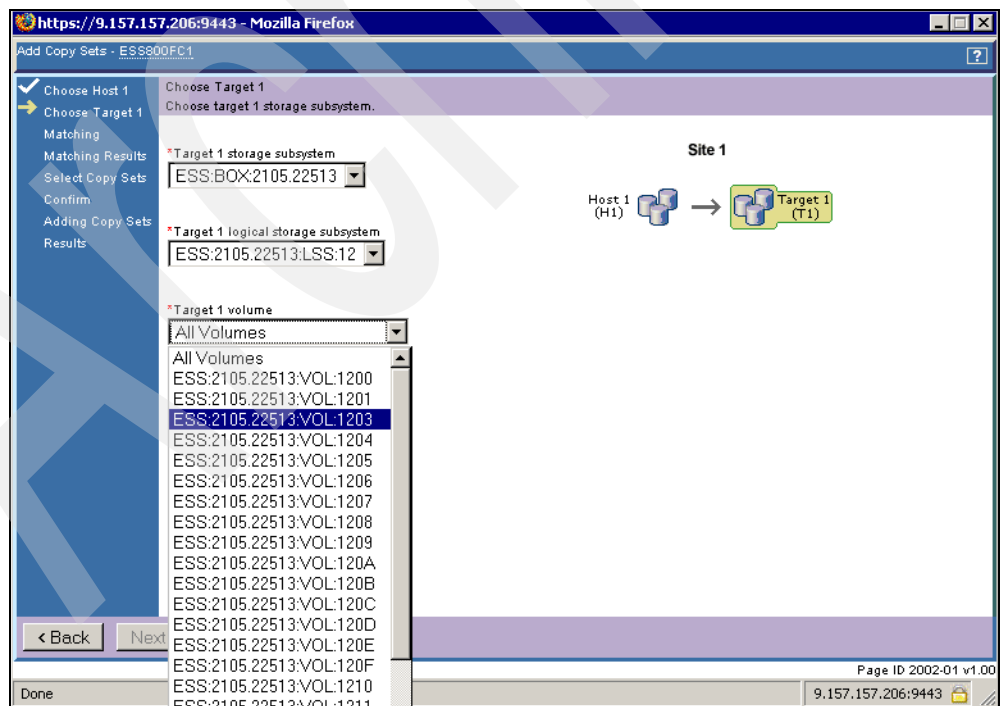


Figure 5-117 TPC for Replication ESS Target Volume

Select your target volume, in our example we selected *ESS:2105.22513:VOL:1202* volume.

Note: Only volumes fulfilling the requirements to be a FlashCopy target will be displayed.

Once the source volume is selected, click the **Next** button to continue. The TPC for Replication will now perform a check to confirm the volume attributes match. This checking process can be seen in Figure 5-118 on page 151.

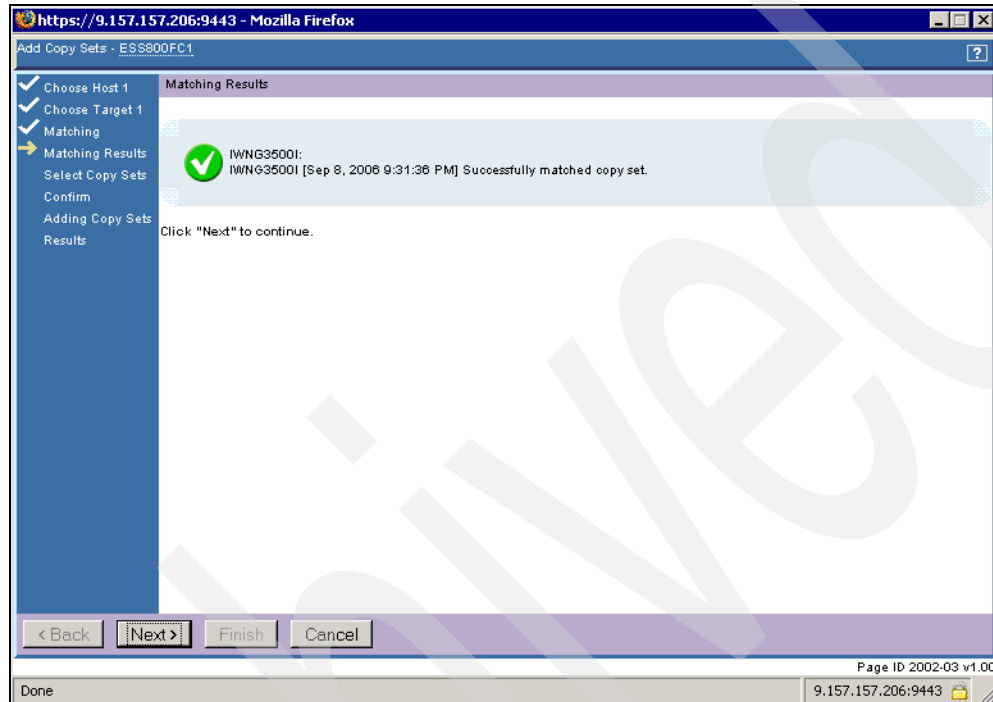


Figure 5-118 TPC for Replication Volume Match OK

You can see that TPC for Replication has matched the volumes, so you can proceed by clicking the **Next** button. A window similar to Figure 5-119 will be displayed.

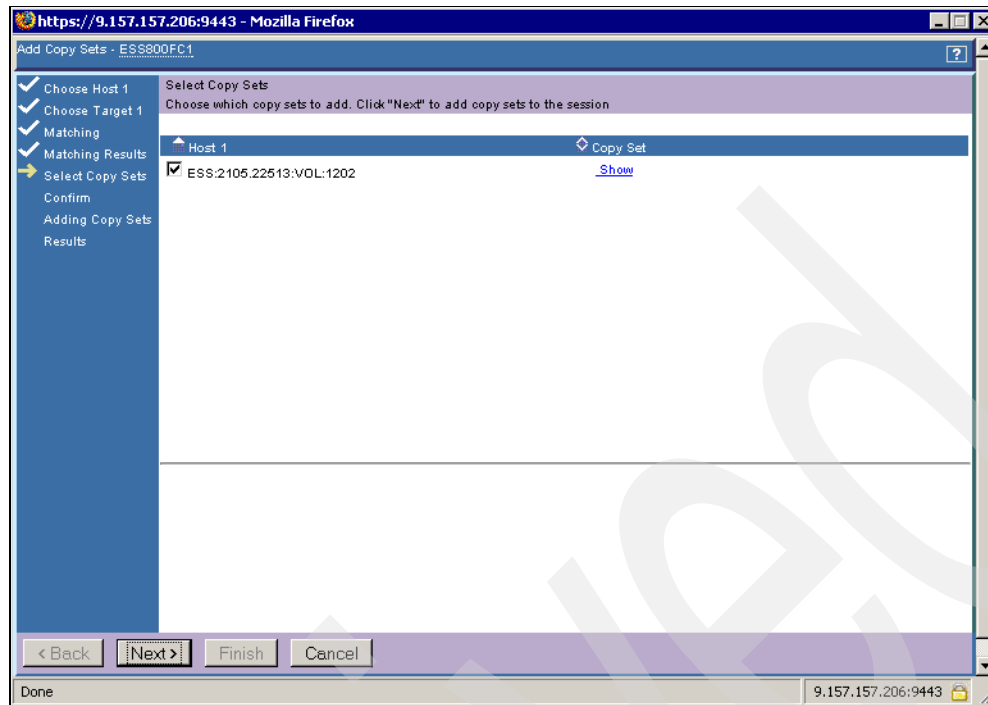


Figure 5-119 TPC for Replication Select Copy Set

The Copy Set is preselected. Click **Next** to continue and a window similar to Figure 5-120 will be displayed.

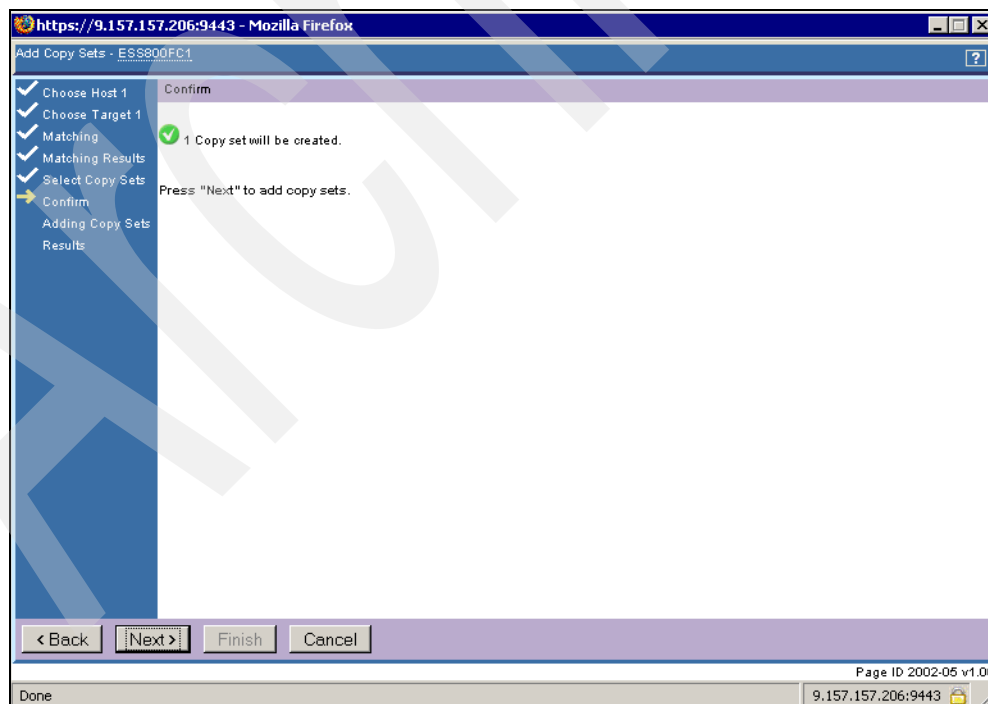


Figure 5-120 TPC for Replication Copy Set Confirm

TPC for Replication requires you confirm your configuration as shown in Figure 5-120. From here we just click the **Next** button. A window similar to Figure 5-121 will be displayed.

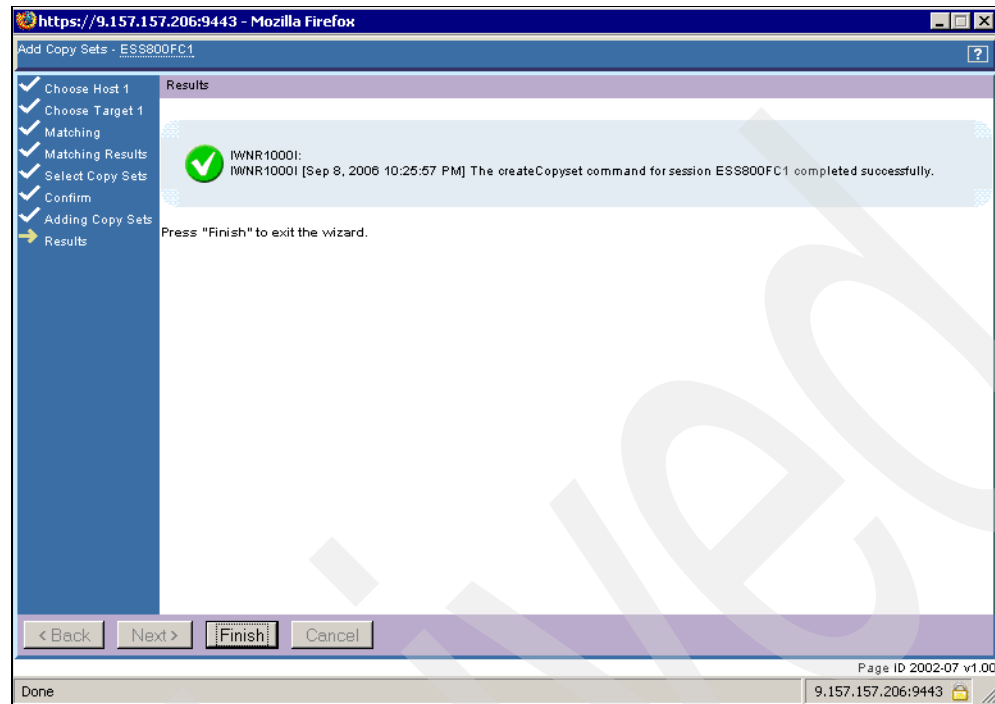


Figure 5-121 TPC for Replication Finish Adding Copy Sets

Finally, once you have achieved a successful add, click the **Finish** button to complete the task.

5.3.6 Adding Copy Sets to a FlashCopy Session using CLI

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 5-123, 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 as seen in Figure 5-122.

```
# ./csmcli.sh lsvol -l -devtype ess | grep VOL:12
```

ESS:2105.22513:VOL:121C	ESS:2105.22513:VOL:121C	2105-22513-IBM ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:121B	ESS:2105.22513:VOL:121B	2105-22513-IBM ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:121A	ESS:2105.22513:VOL:121A	2105-22513-IBM ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:1219	ESS:2105.22513:VOL:1219	2105-22513-IBM ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:1218	ESS:2105.22513:VOL:1218	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1217	ESS:2105.22513:VOL:1217	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1216	ESS:2105.22513:VOL:1216	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1215	ESS:2105.22513:VOL:1215	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1214	ESS:2105.22513:VOL:1214	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1213	ESS:2105.22513:VOL:1213	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1212	ESS:2105.22513:VOL:1212	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1211	ESS:2105.22513:VOL:1211	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1210	ESS:2105.22513:VOL:1210	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120F	ESS:2105.22513:VOL:120F	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120E	ESS:2105.22513:VOL:120E	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120D	ESS:2105.22513:VOL:120D	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120C	ESS:2105.22513:VOL:120C	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120B	ESS:2105.22513:VOL:120B	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120A	ESS:2105.22513:VOL:120A	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1209	ESS:2105.22513:VOL:1209	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1208	ESS:2105.22513:VOL:1208	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1207	ESS:2105.22513:VOL:1207	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1206	ESS:2105.22513:VOL:1206	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1205	ESS:2105.22513:VOL:1205	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1204	ESS:2105.22513:VOL:1204	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1203	ESS:2105.22513:VOL:1203	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1202	ESS:2105.22513:VOL:1202	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1201	ESS:2105.22513:VOL:1201	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1200	ESS:2105.22513:VOL:1200	2105-22513-IBM ESS	FIXEDBLK	12	FB	4.657 GB

Figure 5-122 List of possible volumes

Some of those volumes were used as part of the **mkcpset** command as shown in Figure 5-123.

```
# cat essfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mkcss -cptype fc -desc ESS800FC2 ESS800FC2
lssess -l
lsvol -l -devtype ess
mkcpset -h1 ESS:2105.22513:VOL:1206 -t1 ESS:2105.22513:VOL:1207 ESS800FC2
mkcpset -h1 ESS:2105.22513:VOL:121B -t1 ESS:2105.22513:VOL:121C ESS800FC2
lscps -l ESS800FC2
```

Figure 5-123 ESS FC script

The result of the execution of this script is shown in Example 5-1 on page 101. Note that we have formatted the output to fit the page.

Example 5-3 ESS FC script output

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/essfc.txt
IWNRI021I [Sep 2, 2006 2:51:42 AM] Session ESS800FC2 was successfully created.
Name      Status   State   Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Inactive Defined Flash Copy No          No          0 No
ESS800FC1 Inactive Defined Flash Copy No          No          0 No
Name      ID          Dev          Dev Type Vol format LSS/IO Group Vol Type Size   Size
Unit
=====
===
```



```

ESS:2105.22513:VOL:121C ESS:2105.22513:VOL:121C 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121B ESS:2105.22513:VOL:121B 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121A ESS:2105.22513:VOL:121A 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:1219 ESS:2105.22513:VOL:1219 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:1218 ESS:2105.22513:VOL:1218 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1217 ESS:2105.22513:VOL:1217 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1216 ESS:2105.22513:VOL:1216 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1215 ESS:2105.22513:VOL:1215 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1214 ESS:2105.22513:VOL:1214 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1213 ESS:2105.22513:VOL:1213 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1212 ESS:2105.22513:VOL:1212 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1211 ESS:2105.22513:VOL:1211 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1210 ESS:2105.22513:VOL:1210 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120F ESS:2105.22513:VOL:120F 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120E ESS:2105.22513:VOL:120E 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120D ESS:2105.22513:VOL:120D 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120C ESS:2105.22513:VOL:120C 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120B ESS:2105.22513:VOL:120B 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120A ESS:2105.22513:VOL:120A 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1209 ESS:2105.22513:VOL:1209 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1208 ESS:2105.22513:VOL:1208 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1207 ESS:2105.22513:VOL:1207 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1206 ESS:2105.22513:VOL:1206 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1205 ESS:2105.22513:VOL:1205 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1204 ESS:2105.22513:VOL:1204 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1203 ESS:2105.22513:VOL:1203 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1202 ESS:2105.22513:VOL:1202 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1201 ESS:2105.22513:VOL:1201 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1200 ESS:2105.22513:VOL:1200 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
IWNR2001I [Sep 2, 2006 2:51:50 AM] The pair was successfully created in session ESS800FC2 for copy set
ESS:2105.22513:VOL:1206 with source ESS:2105.22513:VOL:1206 and target ESS:2105.22513:VOL:1207.
IWNR2001I [Sep 2, 2006 2:51:51 AM] The pair was successfully created in session ESS800FC2 for copy set
ESS:2105.22513:VOL:121B with source ESS:2105.22513:VOL:121B and target ESS:2105.22513:VOL:121C.
H1 Volume Session Volumes
=====
ESS:2105.22513:VOL:1206 ESS800FC2 2
ESS:2105.22513:VOL:121B ESS800FC2 2

```

Now that the session is created and has valid Copy Set, we can start using it.

5.3.7 Preparing a FlashCopy Session using GUI

To start using a FlashCopy session that you previously defined, go to the Sessions panel, as shown in Figure 5-124 on page 156.

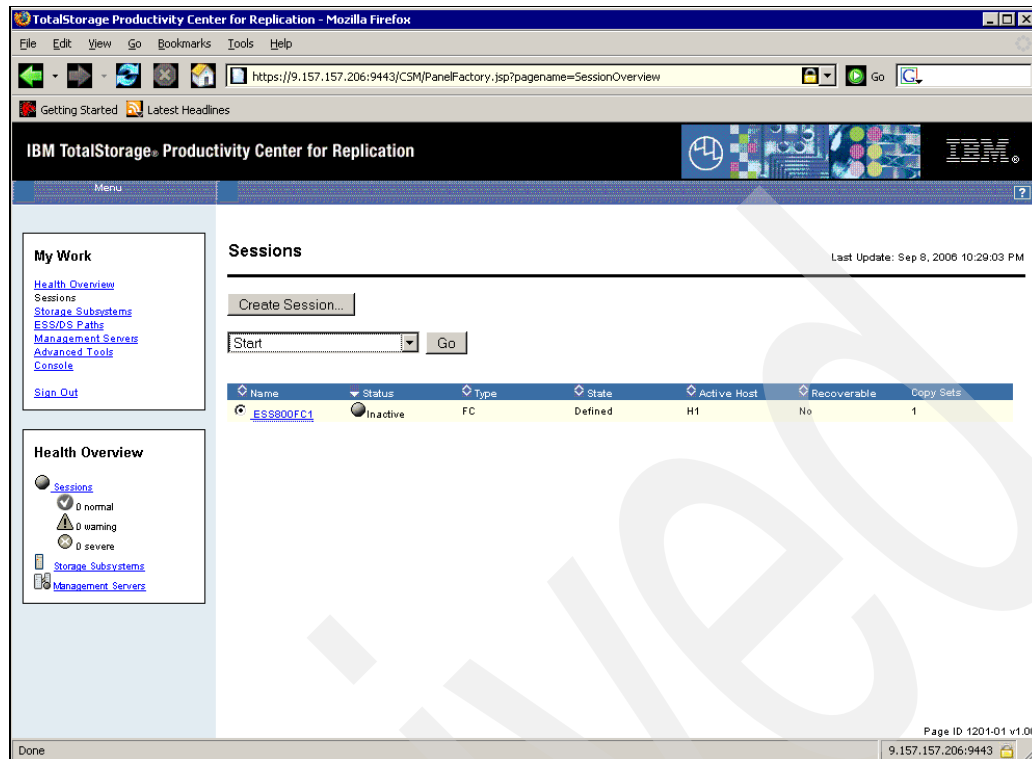


Figure 5-124 TPC for Replication Start FlashCopy Session

Before executing the FlashCopy session it needs to be Prepared. To prepare a session, select the session you want to prepare, in our example *ESS800FC1*. From the pull-down menu select **Start** and click **Go**. The selected session will enter into preparing state. Once the session is Prepared you will see window similar to Figure 5-125 on page 157.

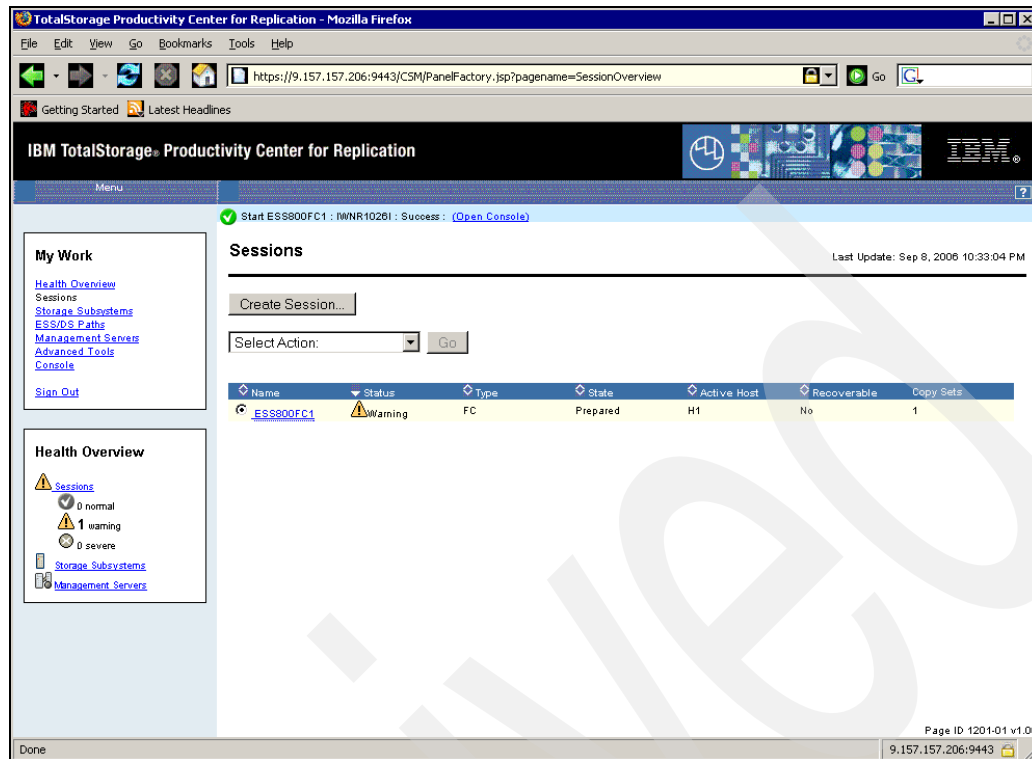


Figure 5-125 TPC for Replication Start FlashCopy Session Prepared

5.3.8 Preparing FlashCopy Session using CLI

In this instance we will prepare a session as part of a single script.

As you can see in Figure 5-31 on page 101, the script file contains multiple commands to display the session status before and after the Start command, and to prepare the session. The script is shown in Figure 5-126.

```
# cat essprepfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lsess -l ESS800FC2
cmdsess -quiet -action Start ESS800FC2
lsess -l ESS800FC2
```

Figure 5-126 ESS FC prepare script

The output of the script is shown in Figure 5-127 on page 158.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/essprepfc.txt
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
ESS800FC2	Inactive	Defined	Flash Copy	No	No	2	No

```
IWNR1026I [Sep 2, 2006 3:10:50 AM] The runCommand for command Start in session
ESS800FC2 completed successfully.
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
ESS800FC2	Warning	Prepared	Flash Copy	No	Yes	2	No

Figure 5-127 ESS FC prepare script output

The `-quiet` option is used to run script without needing to answer to the execution of prepare command as shown in Figure 5-128.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/essprepfcnq.txt
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
ESS800FC2	Warning	Prepared	Flash Copy	No	Yes	2	No

```
Are you sure you want to start session ESS800FC2? [y/n]:y
IWNR1026I [Sep 2, 2006 3:13:34 AM] The runCommand for command Start in session
ESS800FC2 completed successfully.
```

Name	Status	State	Copy type	Recoverable	Copying	Copy sets	Error
ESS800FC2	Warning	Prepared	Flash Copy	No	Yes	2	No

Figure 5-128 ESS FC prepare script output without `-quiet`

5.3.9 Starting a FlashCopy Session using GUI

To start the FlashCopy process, select the session you want to copy, from the Sessions panel. We selected *ESS800FC1*. From the Select Action pull-down menu, select **Flash** and click **Go**.

Tip: The session has to be in Prepared state to start the **Flash** command.

The selected session will enter in target available state as shown in Figure 5-129 on page 159.

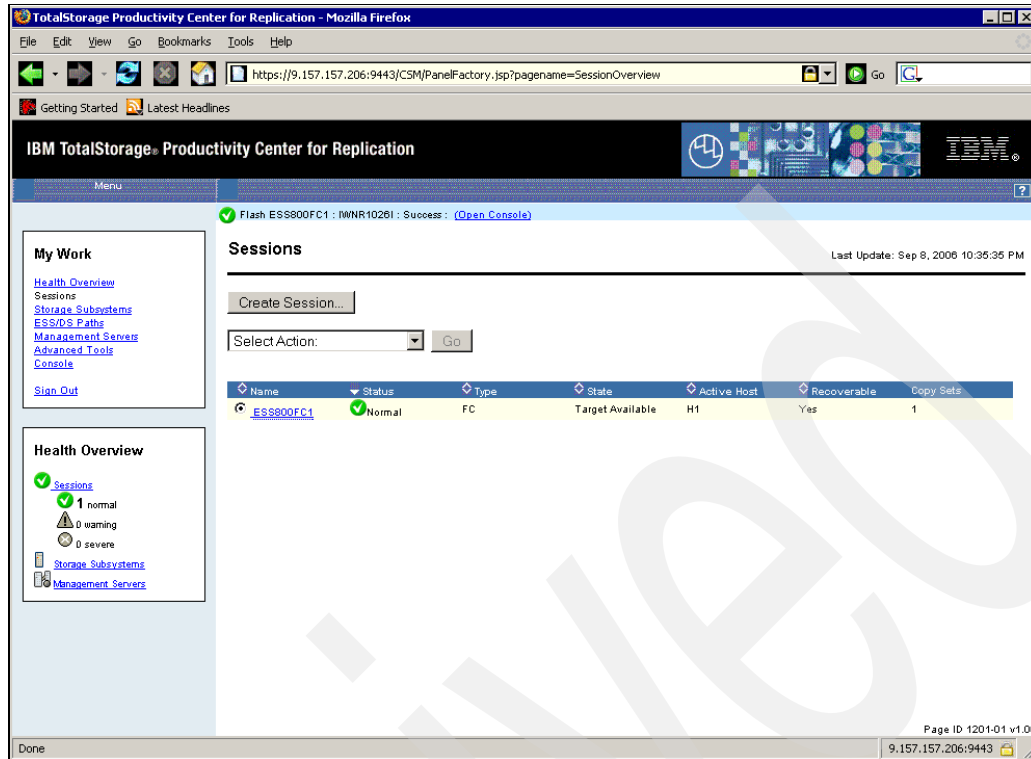


Figure 5-129 TPC for Replication Start FlashCopy Session Target Available

This means that now the target volume, which is in fact a point in time copy of the source volume, is available to be used on the host. You can now map this volume to the host using ESS Storwatch Specialist.

You can make a point in time copy for the session as many times as you like.

Note: You can execute the **Flash** command directly on unprepared (defined) session and this will case the session to be Prepared before flashing.

5.3.10 Starting a FlashCopy Session using CLI

In this instance we will flash a session as part of a single script.

The script file contains multiple commands to display the session status before and after the Flash command, and to flash the session. You can see the script in Figure 5-130.

```
# cat essflashfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lsess -l ESS800FC2
cmdsess -quiet -action Flash ESS800FC2
lsess -l ESS800FC2
```

Figure 5-130 ESS FC flash script

The output of the script is shown in Figure 5-131.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/essflashfc.txt
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Warning Prepared Flash Copy No          Yes          2 No
IWNRI026I [Sep 2, 2006 3:22:04 AM] The runCommand for command Flash in session ESS800FC2
completed successfully.
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Normal Target Available Flash Copy Yes          Yes          2 No
```

Figure 5-131 ESS FC flash script output

The *-quiet* option is used to run script without needing to answer the prompt for execution of the Flash command as shown in Figure 5-132.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/essflashfcng.txt
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Warning Prepared Flash Copy No          Yes          2 No
Are you sure you want to flash session ESS800FC2? [y/n]:y
IWNRI026I [Sep 2, 2006 3:24:28 AM] The runCommand for command Flash in session ESS800FC2
completed successfully.
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Normal Target Available Flash Copy Yes          Yes          2 No
```

Figure 5-132 ESS FC flash script output without *-quiet*

5.3.11 Terminating a FlashCopy Session using GUI

To terminate the FlashCopy process, select the session you want to terminate from the Sessions panel. We selected *ESS800FC1*. From the pull-down menu, select **Terminate** and click **Go**. The selected session will terminate and enter in defined state, as shown in Figure 5-133 on page 161.

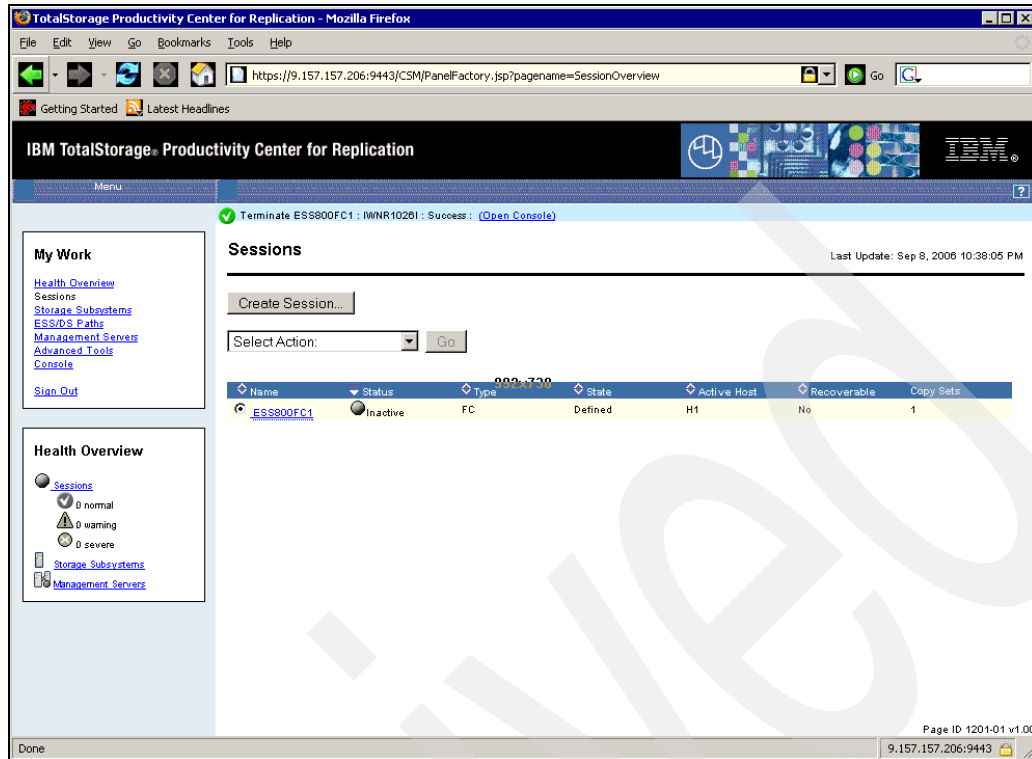


Figure 5-133 TPC for Replication Terminate FlashCopy Session Defined

The session can be terminated anytime. Terminating a session will actually terminate copy relationships on ESS.

5.3.12 Terminating FlashCopy Session using CLI

In this instance we will terminate a session as part of a single script.

The script file contains multiple commands to display the session status before and after the Terminate command, and to terminate the session. You can see the script in Figure 5-134.

```
# cat esstermfc.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lsess -l ESS800FC2
cmdsess -quiet -action Terminate ESS800FC2
lsess -l ESS800FC2
```

Figure 5-134 ESS FC terminate script

The output of the script is shown in Figure 5-135 on page 162.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/esstermfc.txt
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Normal Target Available Flash Copy Yes      Yes      2 No
IWNRI026I [Sep 2, 2006 3:31:00 AM] The runCommand for command Terminate in session
ESS800FC2 completed successfully.
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Inactive Defined Flash Copy No      No      2 No
```

Figure 5-135 ESS FC terminate script output

The *-quiet* option is used to run the script without needing to answer the prompt for execution of the Terminate command as shown in Figure 5-136.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/esstermfcq.txt
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Normal Target Available Flash Copy Yes      Yes      2 No
Are you sure you want to terminate session ESS800FC2? [y/n]:y
IWNRI026I [Sep 2, 2006 3:33:02 AM] The runCommand for command Terminate in session
ESS800FC2 completed successfully.
Name      Status State      Copy type Recoverable Copying Copy sets Error
=====
ESS800FC2 Inactive Defined Flash Copy No      No      2 No
```

Figure 5-136 ESS FC terminate script output without *-quiet*

5.3.13 Adding a Metro Mirror Session using GUI

In this instance we will set up an ESS based Metro Mirror Single Direction and Failover/Failback session with a single volume pair as can be seen in Figure 5-137. In our example we used the Metro Mirror function inside ESS 800.

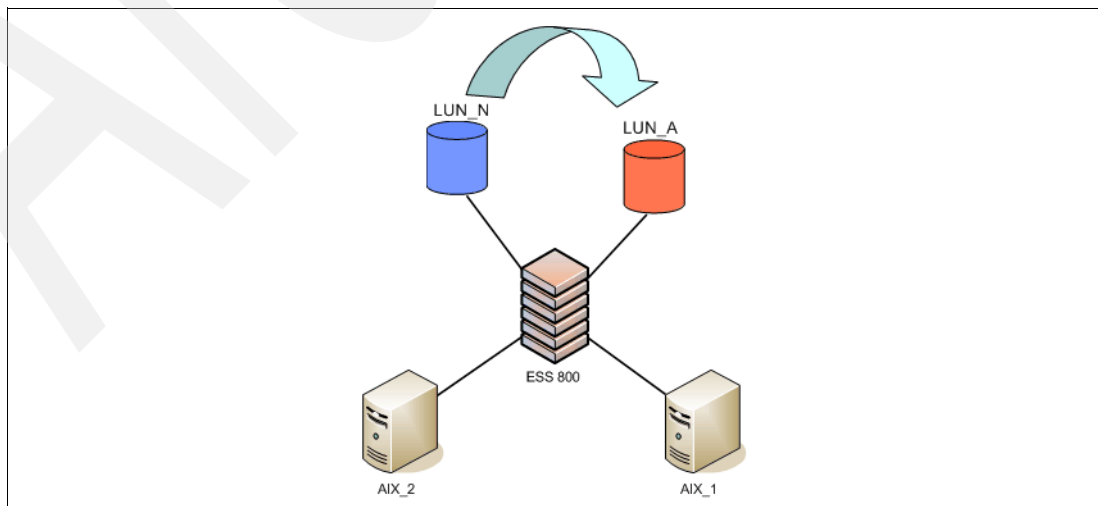


Figure 5-137 ESS based Metro Mirror setup

The first step is to select the **Create Session** button from the Sessions panel, as shown in Figure 5-138.

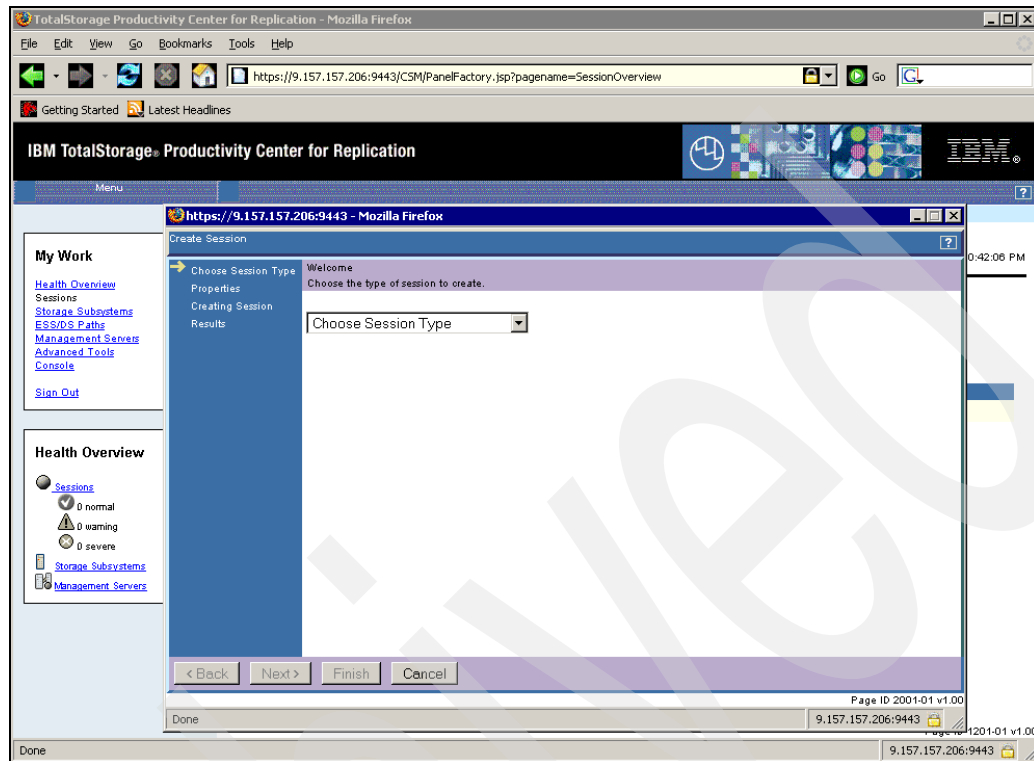


Figure 5-138 TPC for Replication Sessions

This will open a new panel where you can add session details such as copy type, as you can see in Figure 5-139.

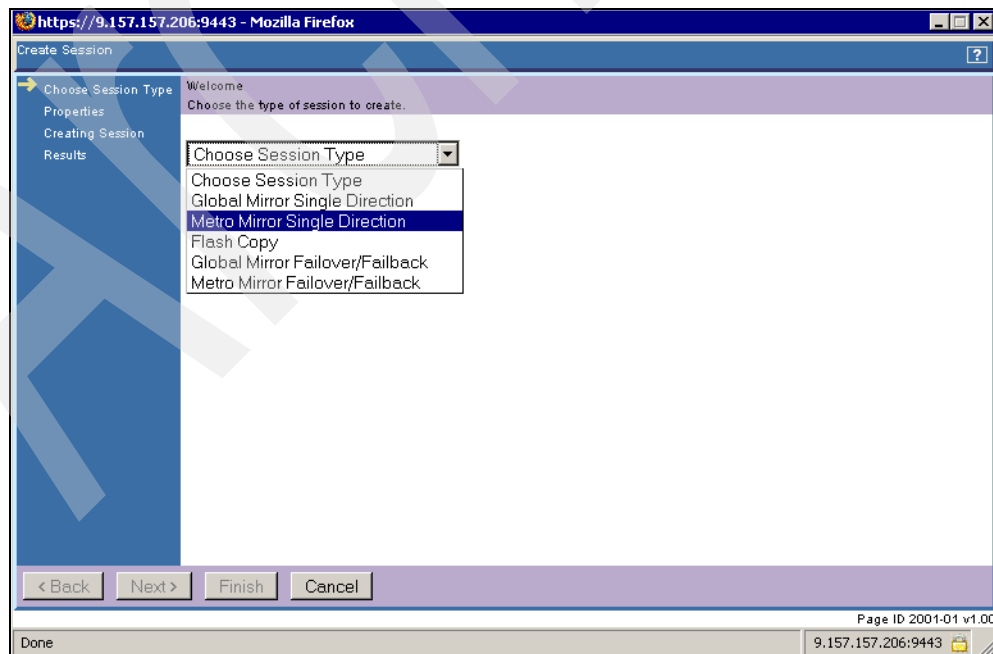


Figure 5-139 TPC for Replication MM Create Session

Select your copy type, in our example *Metro Mirror Single Direction*, and click the **Next** button. The window similar to Figure 5-140 will be displayed. Type in a meaningful name for the session in the **Session name** box as well as any informational text in the **Description** box. Click **Next** to continue.

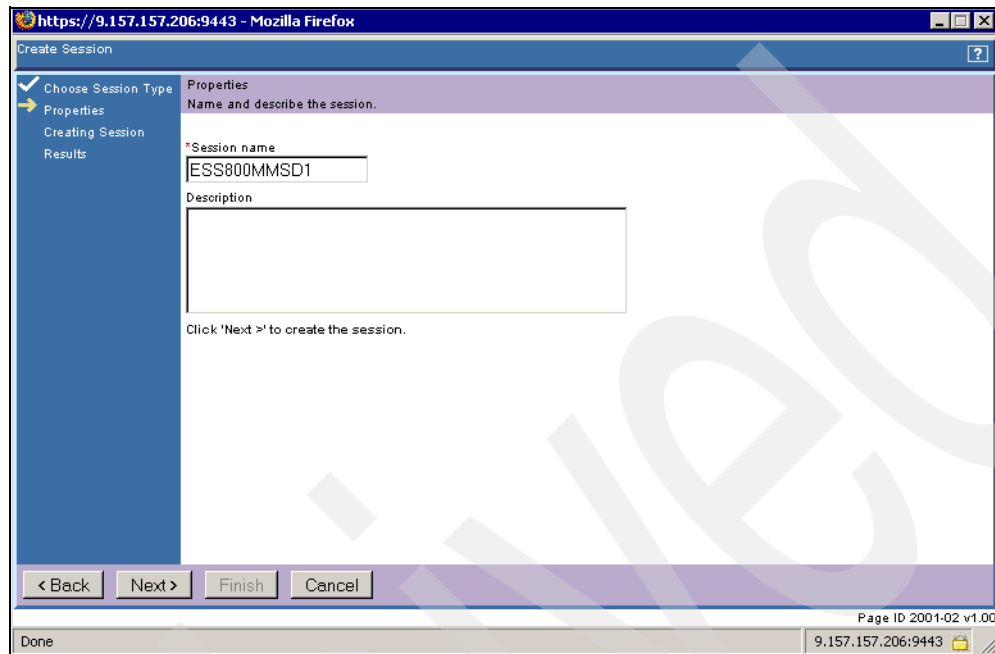


Figure 5-140 TPC for Replication MM Create Session Properties

The session will be created and the window similar to Figure 5-141 will be displayed.

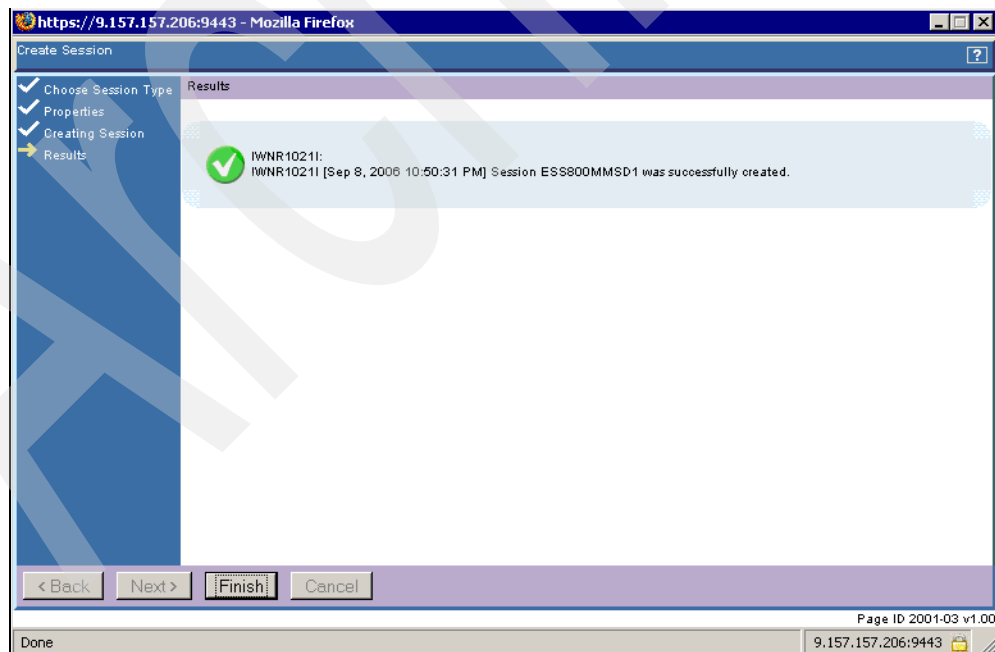


Figure 5-141 TPC for Replication MM Create Session Created

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

Adding a Metro Mirror Session using CLI

Once again using the command line interface, we can achieve the same result. For this effort we have created another script file which can be seen in Figure 5-142. Note that we have added a list session command (`lssess -l`) to display the defined sessions once our new one has been created. In this example we will create *Metro Mirror Failover/Failback* type of a session.

```
# cat createmmfobsession.txt
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mkssess -cptype mmfob -desc ESS800MMFB1 ESS800MMFB1
lssess -l
```

Figure 5-142 Add MM session script file

The result of the execution of this script can be seen in Figure 5-143.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/createmmfobsession.txt
IWNRI021I [Sep 3, 2006 2:54:21 AM] Session ESS800MMFB1 was successfully created.
Name      Status  State      Copy type      Recoverable Copying Copy sets Error
=====
ESS800FC1 Normal   Target Available Flash Copy      Yes      No      1 No
ESS800MMSD1 Inactive Defined      Metro Mirror Single Direction No      No      0 No
ESS800MMFB1 Inactive Defined      Metro Mirror Failover/Failback No      No      0 No
```

Figure 5-143 MM session CLI result

5.3.14 Adding Copy Sets to a Metro Mirror Session

Now that we have a session created, we can begin to create Copy Sets within the session. First you need to select the session, in our example *ESS800MMSD1*, to which you want to add Copy Sets. From the Sessions panel, select the **Add Copy Sets** option from the drop-down menu, as shown in Figure 5-144 on page 166.

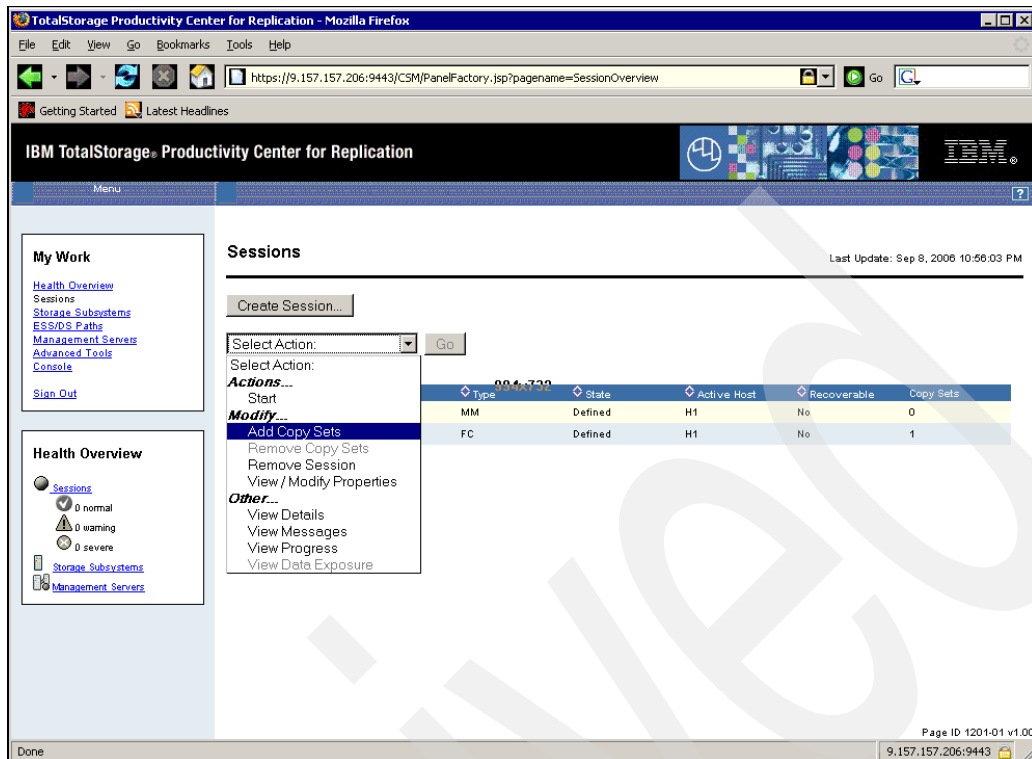


Figure 5-144 TPC for Replication MM Add Copy Sets

Click the **Go** button to continue. This will open a new window where we will define the copy sets as shown in Figure 5-145. In this window we define the source subsystems via the Select Action drop-down menu.

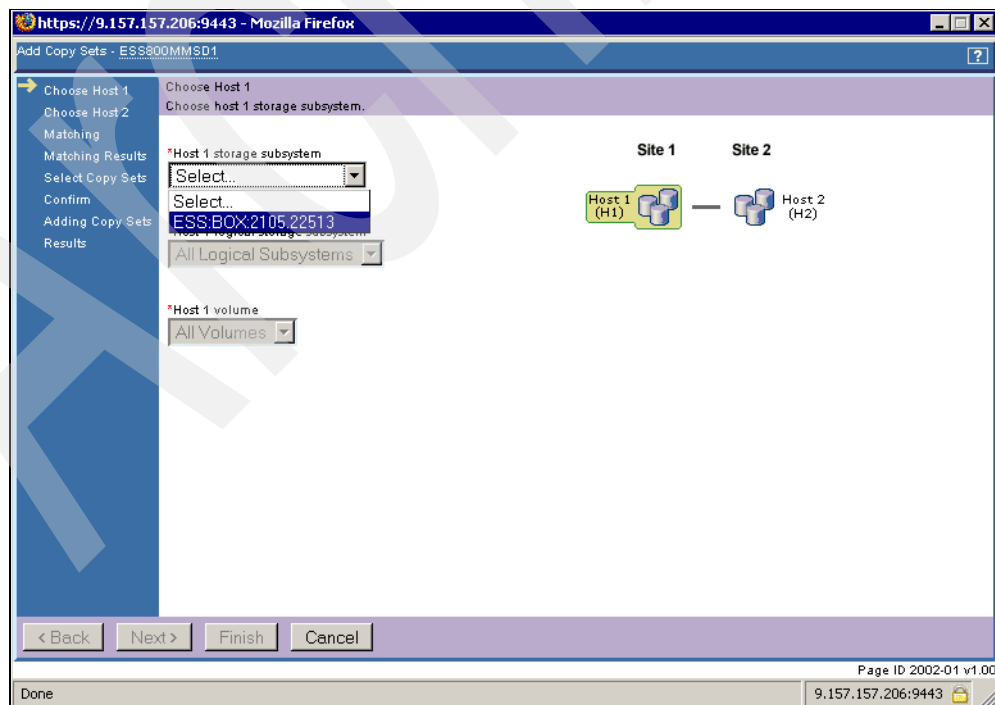


Figure 5-145 TPC for Replication MM Source ESS

Select your source ESS 800, in our example we selected *ESS:BOX:2105:22513*. The **Host 1 logical storage subsystem** pull-down menu will become available as shown in Figure 5-146.

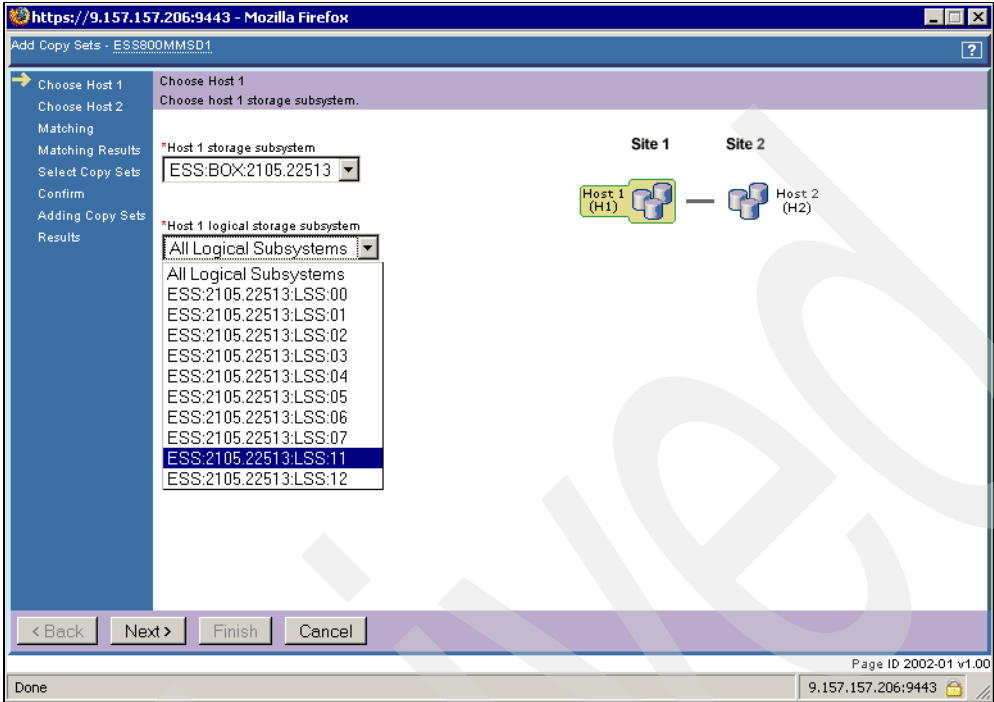


Figure 5-146 TPC for Replication MM Source ESS LSS

Select your source ESS Logical Subsystem (LSS). In our example we selected *ESS:2105.22513:LSS:11*. The **Host 1 volume** pull-down menu will become available as shown in Figure 5-147.

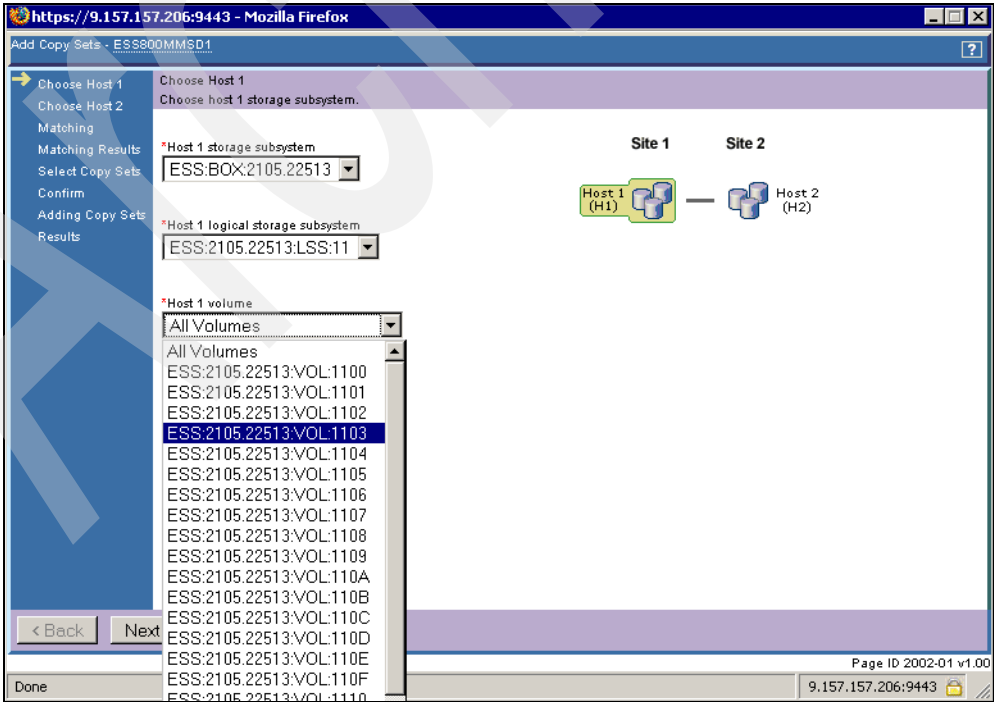


Figure 5-147 TPC for Replication MM ESS Source Volume

Select your source volume, in our example we selected *ESS:2105.22513:VOL:1103* volume. Once the source volume is selected, click the **Next** button to proceed to the Target definitions as shown in Figure 5-148.

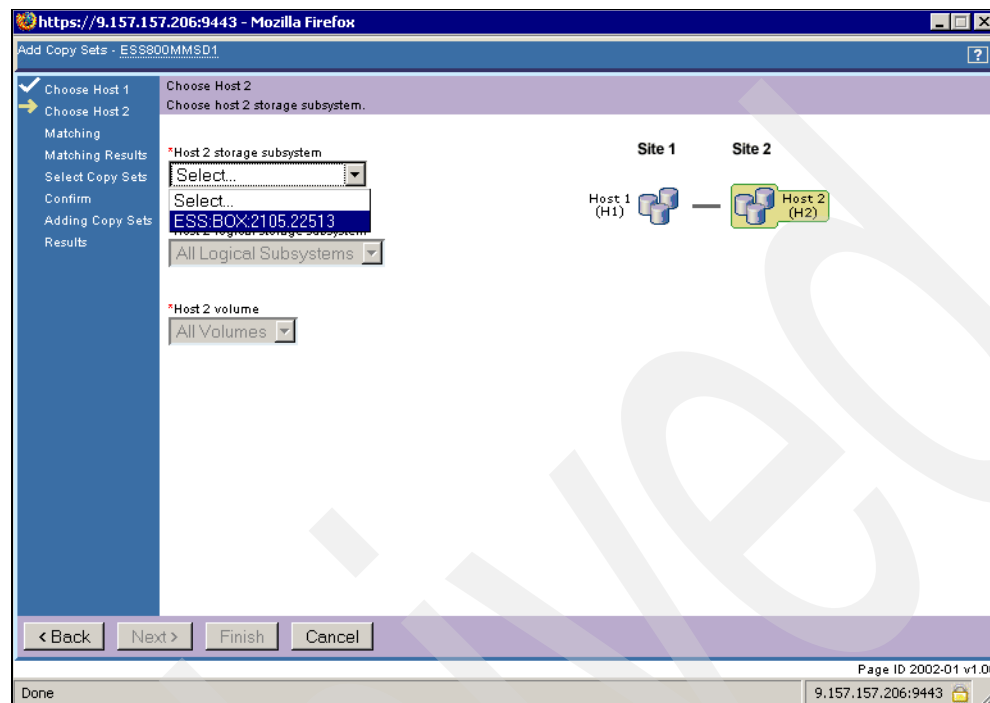


Figure 5-148 TPC for Replication MM Target ESS

Select your source ESS 800, in our example we selected *ESS:BOX:2105:22513*. The **Host 2 logical storage subsystem** pull-down menu will become available as shown in Figure 5-149.

Note: As you can see in our example only local ESS 800 is available for target selection, as we only have setup for Metro Mirror inside ESS 800. The Metro Mirror operation can be performed within the same ESS 800 or between two ESS 800s.

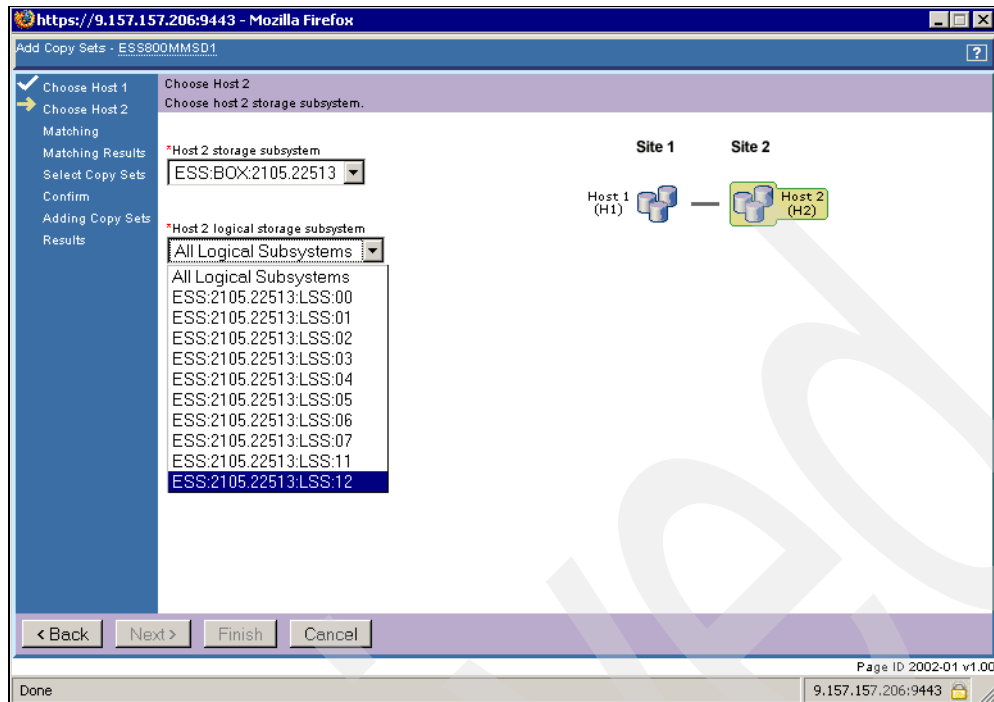


Figure 5-149 TPC for Replication MM Target ESS LSS

Select your source ESS Logical Subsystem (LSS), in our example we selected *ESS:2105.22513:LSS:12*. The **Host 2 volume** pull-down menu will become available as shown in Figure 5-150.

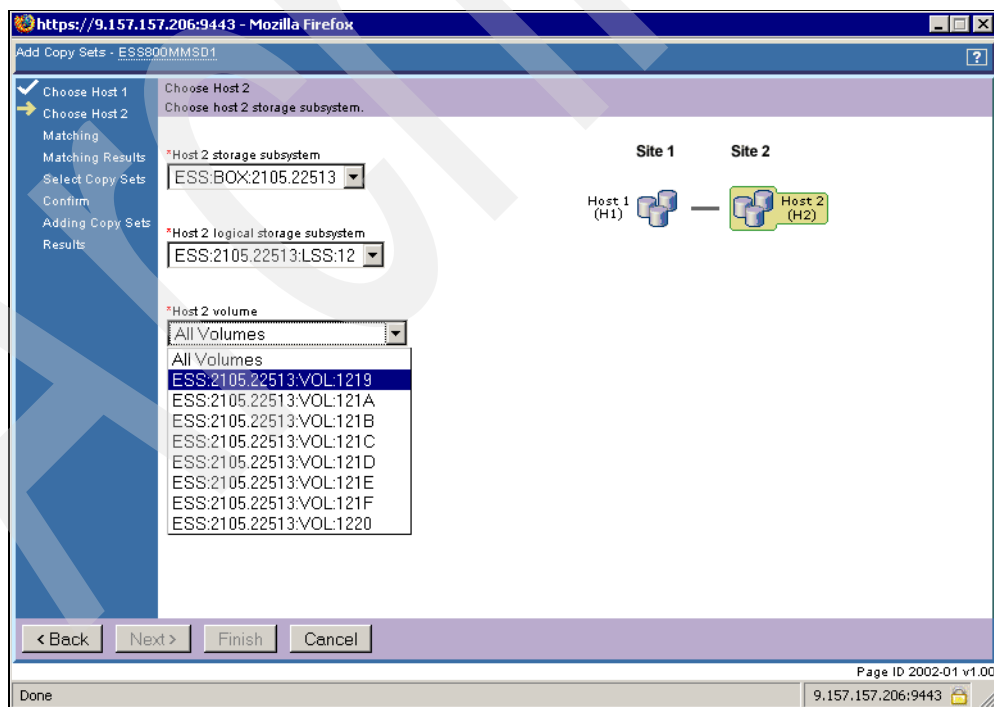


Figure 5-150 TPC for Replication MM ESS Target Volume

Select your target volume, in our example we selected *ESS:2105.22513:VOL:1219* volume.

Note: Only volumes fulfilling the requirements to be a Metro Mirror target will be displayed.

Once the source volume is selected, click the **Next** button to continue. The TPC for Replication will now perform a check to confirm the volume attributes match. This checking process can be seen in Figure 5-151.

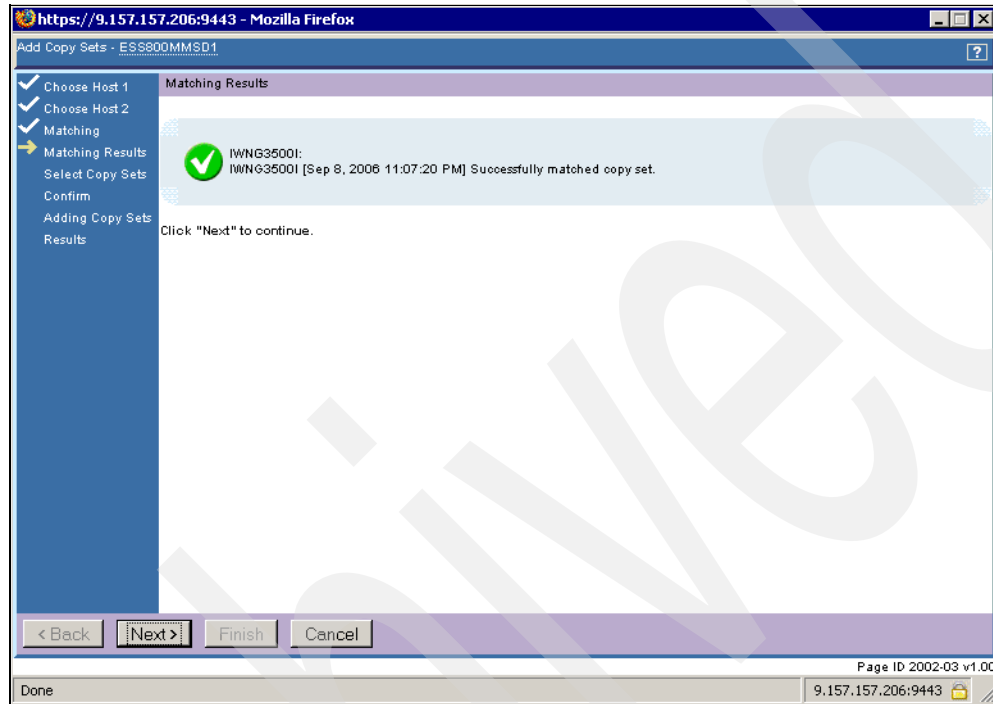


Figure 5-151 TPC for Replication MM Volume Match OK

You can see that TPC for Replication has matched the volumes, so you can proceed by clicking the **Next** button. A window similar to Figure 5-152 will be displayed.

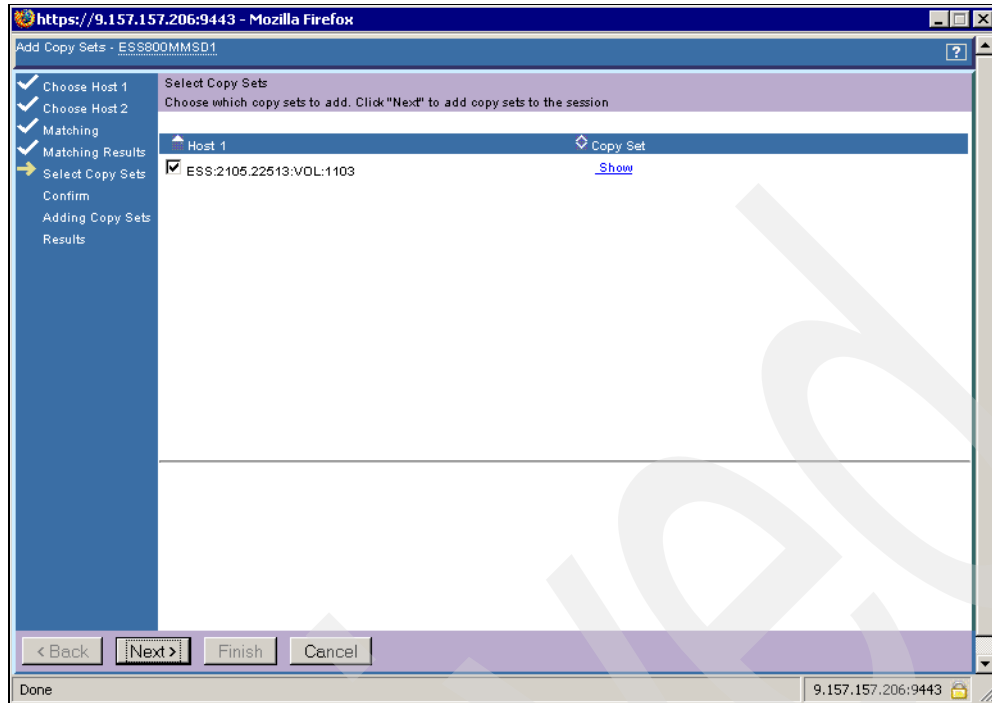


Figure 5-152 TPC for Replication MM Select Copy Set

The Copy Set is preselected, you just click **Next** to continue. A window similar to Figure 5-153 will be displayed.

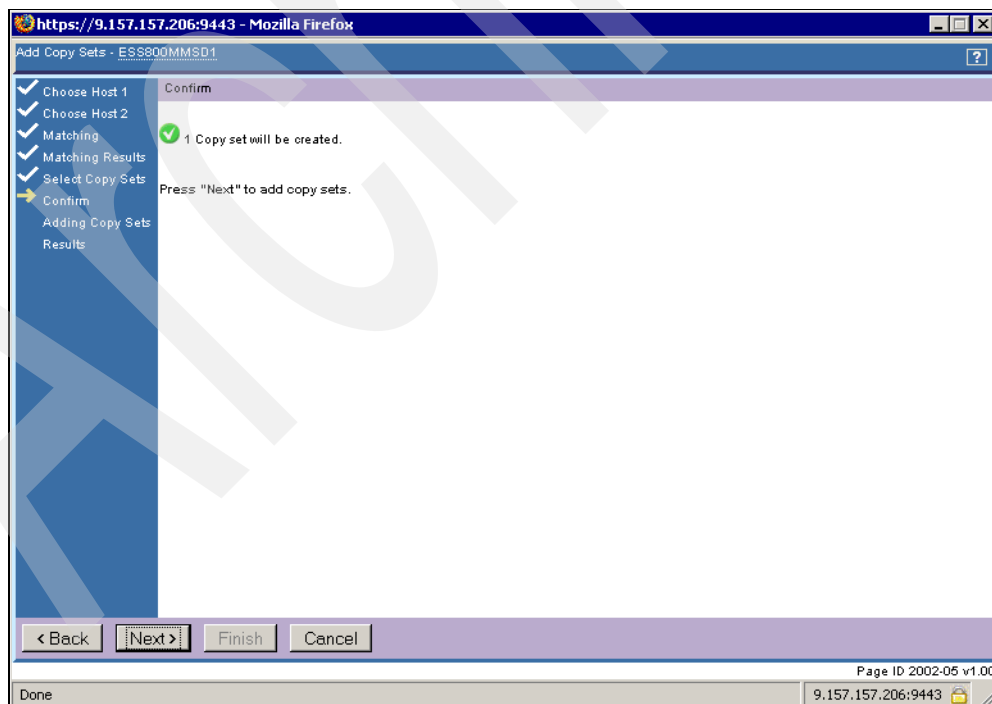


Figure 5-153 TPC for Replication MM Copy Set Confirm

TPC for Replication requires you confirm your configuration as we can see in Figure 5-153. From here we just click the **Next** button. A window similar to Figure 5-154 will be displayed.

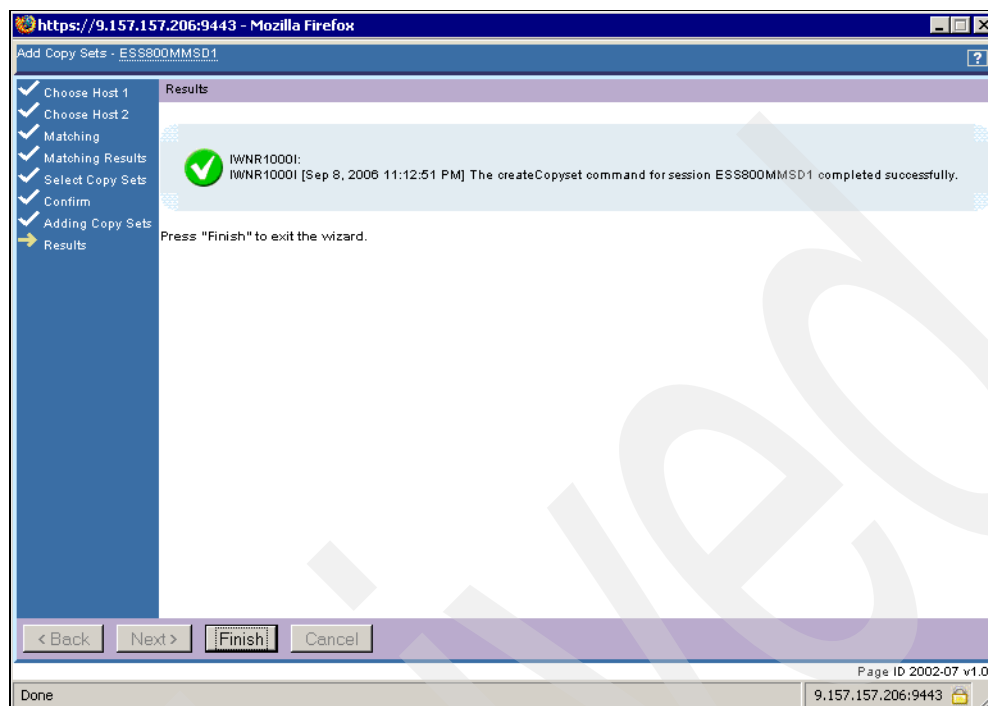


Figure 5-154 TPC for Replication MM Finish Adding Copy Sets

Finally, once you have achieved a successful add, click the **Finish** button to complete the task.

5.3.15 Adding Copy Sets to a Metro Mirror Session using CLI

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 5-157 on page 174, 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 as seen in Figure 5-155 for source Metro Mirror volumes,

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh lsvol -l -devtype ess | grep VOL:11
ESS:2105.22513:VOL:1114 ESS:2105.22513:VOL:1114 2105-22513-IBM ESS FIXEDBLK 11 FB 4.657 GB
ESS:2105.22513:VOL:1113 ESS:2105.22513:VOL:1113 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1112 ESS:2105.22513:VOL:1112 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1111 ESS:2105.22513:VOL:1111 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1110 ESS:2105.22513:VOL:1110 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:110F ESS:2105.22513:VOL:110F 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:110E ESS:2105.22513:VOL:110E 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:110D ESS:2105.22513:VOL:110D 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:110C ESS:2105.22513:VOL:110C 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:110B ESS:2105.22513:VOL:110B 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:110A ESS:2105.22513:VOL:110A 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1109 ESS:2105.22513:VOL:1109 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1108 ESS:2105.22513:VOL:1108 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1107 ESS:2105.22513:VOL:1107 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1106 ESS:2105.22513:VOL:1106 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1105 ESS:2105.22513:VOL:1105 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1104 ESS:2105.22513:VOL:1104 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1103 ESS:2105.22513:VOL:1103 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1102 ESS:2105.22513:VOL:1102 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1101 ESS:2105.22513:VOL:1101 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
ESS:2105.22513:VOL:1100 ESS:2105.22513:VOL:1100 2105-22513-IBM ESS FIXEDBLK 11 FB 9.313 GB
```

Figure 5-155 List of possible volumes for MM source

Figure 5-156 shows the target Metro Mirror volumes.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh lsvol -l -devtype ess | grep VOL:12
ESS:2105.22513:VOL:121E ESS:2105.22513:VOL:121E 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121D ESS:2105.22513:VOL:121D 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121C ESS:2105.22513:VOL:121C 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121B ESS:2105.22513:VOL:121B 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121A ESS:2105.22513:VOL:121A 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:1219 ESS:2105.22513:VOL:1219 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:1218 ESS:2105.22513:VOL:1218 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1217 ESS:2105.22513:VOL:1217 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1216 ESS:2105.22513:VOL:1216 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1215 ESS:2105.22513:VOL:1215 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1214 ESS:2105.22513:VOL:1214 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1213 ESS:2105.22513:VOL:1213 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1212 ESS:2105.22513:VOL:1212 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1211 ESS:2105.22513:VOL:1211 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1210 ESS:2105.22513:VOL:1210 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120F ESS:2105.22513:VOL:120F 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120E ESS:2105.22513:VOL:120E 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120D ESS:2105.22513:VOL:120D 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120C ESS:2105.22513:VOL:120C 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120B ESS:2105.22513:VOL:120B 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120A ESS:2105.22513:VOL:120A 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1209 ESS:2105.22513:VOL:1209 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1208 ESS:2105.22513:VOL:1208 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1207 ESS:2105.22513:VOL:1207 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1206 ESS:2105.22513:VOL:1206 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1205 ESS:2105.22513:VOL:1205 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1204 ESS:2105.22513:VOL:1204 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1203 ESS:2105.22513:VOL:1203 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1202 ESS:2105.22513:VOL:1202 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1201 ESS:2105.22513:VOL:1201 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1200 ESS:2105.22513:VOL:1200 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
```

Figure 5-156 List of possible volumes for MM target

Some of those volumes were used as part of the **mkcpset** command as shown in Figure 5-157. We have also specified that the Metro Mirror session type is **mmfofb** or Metro Mirror Failover/Failback.

```
# cat essmmfofb.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mkssess -cptype mmfofb -desc ESS800F0FB2 ESS800F0FB2
lssess -l
#lsvol -l -devtype ess
mkcpset -h1 ESS:2105.22513:VOL:1105 -h2 ESS:2105.22513:VOL:121D ESS800F0FB2
mkcpset -h1 ESS:2105.22513:VOL:1104 -h2 ESS:2105.22513:VOL:121A ESS800F0FB2
lscpset -l ESS800F0FB2
```

Figure 5-157 ESS MM script

Invocation of this script results in the output as in Example 5-4.

Example 5-4 ESS MM script output

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/essmmfofb.txt
IWN1021I [Sep 4, 2006 2:08:24 AM] Session ESS800F0FB2 was successfully created.
Name      Status   State      Copy type      Recoverable Copying Copy sets Error
=====
ESS800F0FB2 Inactive Defined      Metro Mirror Failover/Failback No      No      0 No
ESS800FC1   Normal Target Available Flash Copy      Yes      No      1 No
ESS800MMSD1 Inactive Defined      Metro Mirror Single Direction No      No      1 No
ESS800MMFB1 Inactive Defined      Metro Mirror Failover/Failback No      No      0 No
IWN2001I [Sep 4, 2006 2:08:26 AM] The pair was successfully created in session ESS800F0FB2 for copy set
ESS:2105.22513:VOL:1105 with source ESS:2105.22513:VOL:1105 and target ESS:2105.22513:VOL:121D.
IWN2001I [Sep 4, 2006 2:08:27 AM] The pair was successfully created in session ESS800F0FB2 for copy set
ESS:2105.22513:VOL:1104 with source ESS:2105.22513:VOL:1104 and target ESS:2105.22513:VOL:121A.
H1 Volume      Session      Volumes
=====
ESS:2105.22513:VOL:1104 ESS800F0FB2      2
ESS:2105.22513:VOL:1105 ESS800F0FB2      2
```

From the CSMCLI interface we can interrogate the session via the **showsess** command as shown in Figure 5-158.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> showsess ESS800F0FB2
Name      ESS800F0FB2
Type      Metro Mirror Failover/Failback
State     Defined
Status    Inactive
Copy sets 2
Copying   No
Recoverable No
Error count 0
Description ESS800F0FB2

IWN1500I [Sep 4, 2006 2:10:31 AM] The getSessionInfo command for session
ESS800F0FB2 completed successfully.
```

Figure 5-158 The showsess command

Now that we have a session with valid Copy Sets, we can start using it.

5.3.16 Starting a Metro Mirror Session using the GUI

To start the Metro Mirror process, select the session you want to start from the Sessions panel - in our example *MMSD1*. From the pull-down menu, select **Start** and click **Go**, as shown in Figure 5-159.

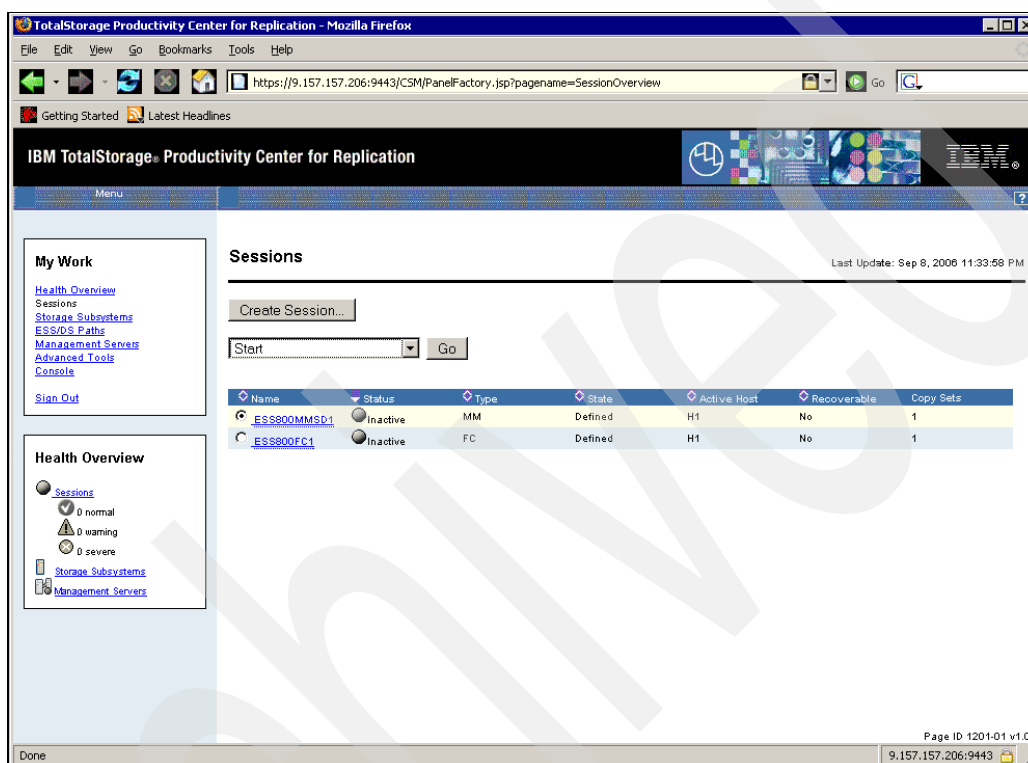


Figure 5-159 TPC for Replication Start Metro Mirror Single Direction Session

The selected session will enter in preparing state as shown in Figure 5-160.

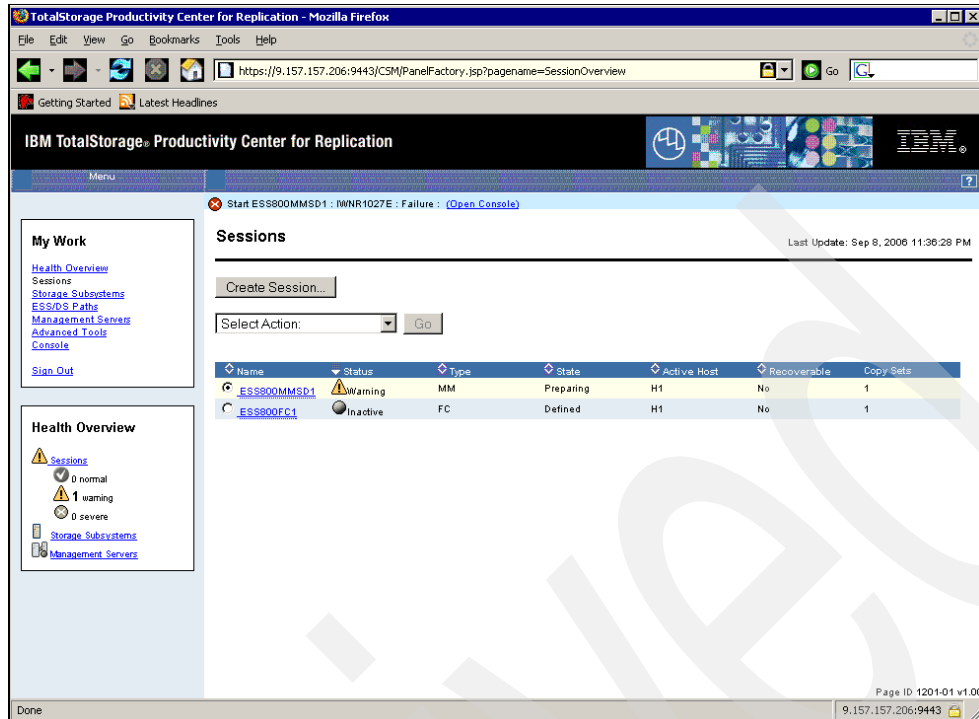


Figure 5-160 TPC for Replication Start Metro Mirror Single Direction Session Preparing

Note that the status for the Start command will appear as *Failure*, however, in this case, it does not mean that the session failed to start. The session started, but the *Failure* is indicating that the heartbeat function is not supported for the ESS 800. You can see the details about the outcome of the commands you run by clicking on the **Open Console** hyperlink next to the status on top of the main page. You can also access the console logs by clicking **Console** under the *My Work* menu as described in 6.8, “TPC for Replication logging” on page 222.

After preparation the session will be in prepared state as shown in Figure 5-161 on page 177.

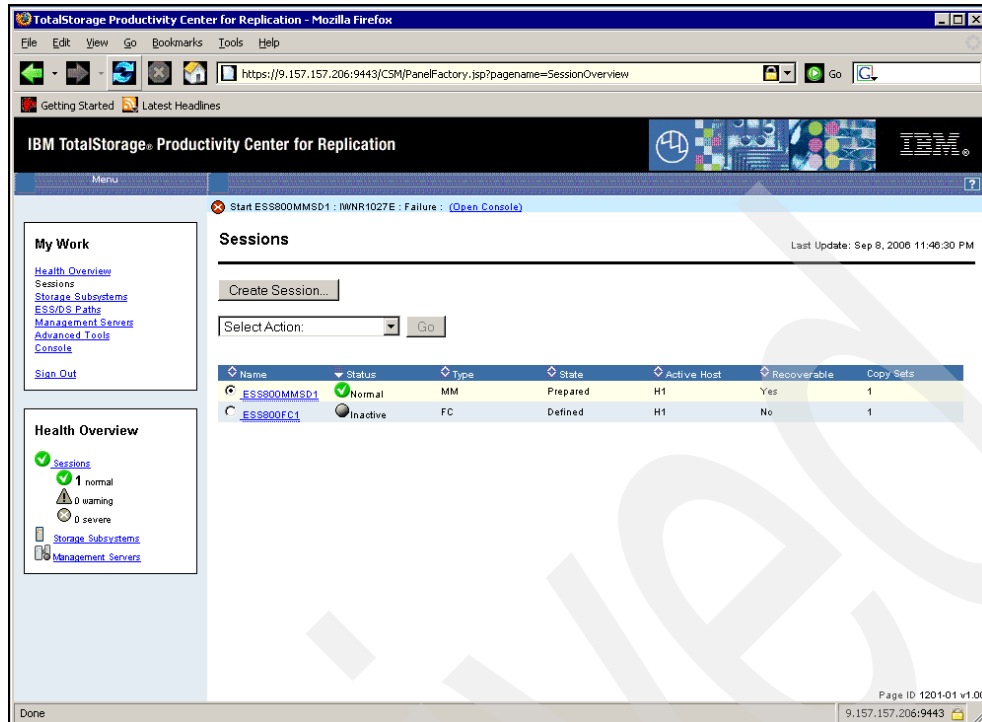


Figure 5-161 TPC for Replication Start Metro Mirror Single Direction Session Prepared

Once the session is prepared this would mean that the initial copy was completed and that copy set volumes are synchronized and online. In this state all application I/O on primary site will be synchronously copied to secondary site.

You can make use Start session as many times as you like.

5.3.17 Starting a Metro Mirror Session using the CLI

In this instance we will start a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we created earlier.

We can start session with the `cmdsess` command as shown in Figure 5-162. You can see that we have had to reply `y` to the prompt to confirm our intent to start the session. To turn this function off, you would need to utilize the `-quiet` parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action start_h1:h2 ESS800FOFB2
Are you sure you want to start_h1:h2 session ESS800FOFB2? [y/n]:y
IWRN0003E [Sep 4, 2006 4:27:39 AM] Command failed; message text for IWRN1027E
was not found.
```

Figure 5-162 MM FOFB start session

When we then check the session status as shown in Figure 5-163 on page 178, we discover a *warning* status. This is due to the fact that the volumes are not yet synchronized.

```

csmcli> showsess ESS800F0FB2
Name          ESS800F0FB2
Type          Metro Mirror Failover/Failback
State         Preparing
Status        Warning
Copy sets     2
Copying       Yes
Recoverable   No
Error count   0
Description   ESS800F0FB2

IWNR1500I [Sep 4, 2006 4:27:48 AM] The getSessionInfo command for session
ESS800F0FB2 completed successfully.

```

Figure 5-163 MM FOFB show session after start

Since the synchronization process can take time, you could sign into the ESS Storwatch Specialist - Copy Services to check the progress. As we can see in Figure 5-164, the copy is progressing.

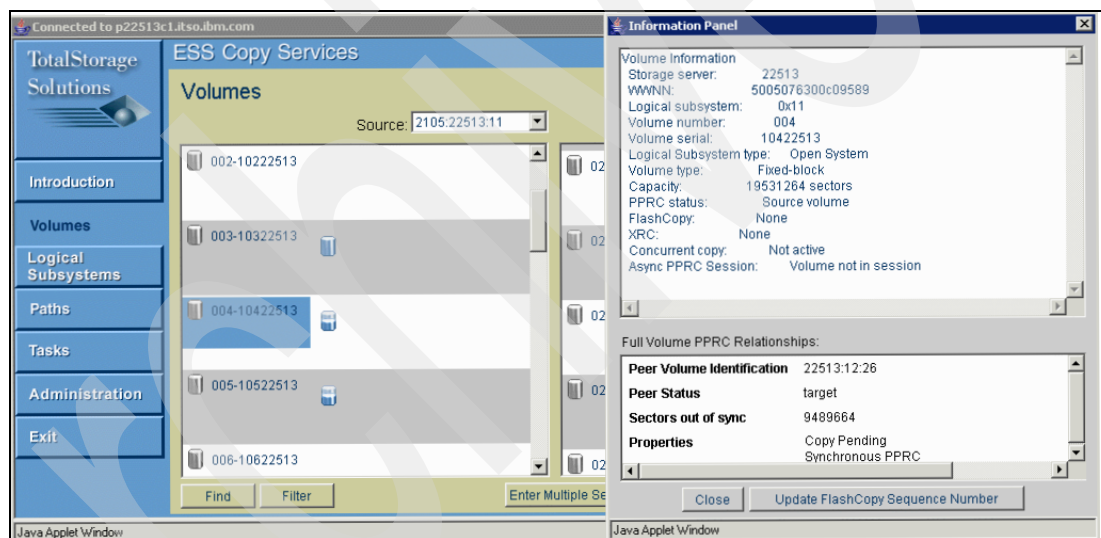


Figure 5-164 ESS copy progress

Once the copy is complete we re-issue the showsess command and find the results as shown in Figure 5-165 on page 179.


```

csmcli> showsess ESS800FOFB2
Name          ESS800FOFB2
Type          Metro Mirror Failover/Failback
State         Prepared
Status        Normal
Copy sets     2
Copying       Yes
Recoverable   Yes
Error count    0
Description   ESS800FOFB2

IWNR1500I [Sep 4, 2006 4:35:46 AM] The getSessionInfo command for session
ESS800FOFB2 completed successfully.

```

Figure 5-165 MM FOFB session established and synchronized

Once the session is prepared this means that the initial copy was completed and that copy set volumes are synchronized and online. In this state all application I/O on primary site will be synchronously copied to secondary site.

You can make use start session as many times as you like.

After session is prepared the following options are available:

- ▶ Metro Mirror Single Direction
 - **Suspend** - this will stop copying with consistent secondary volumes
 - **Stop** - this will stop copying with inconsistent secondary volumes
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
- ▶ Metro Mirror Failover/Failback
 - **Suspend** - this will stop copying with consistent secondary volumes
 - **Stop** - this will stop copying with inconsistent secondary volumes
 - **Start H1- → H2** - this will reestablish copying in original direction, from primary to secondary location
 - **Terminate** - this will terminate the session

5.3.18 Suspending a Metro Mirror Session using GUI

To suspend the Metro Mirror process, select the session you want to suspend from the Sessions panel - in our example *ESS800MMSD1*. From the Select Action pull-down menu, select **Suspend** and click **Go**, as shown in Figure 5-166 on page 180.

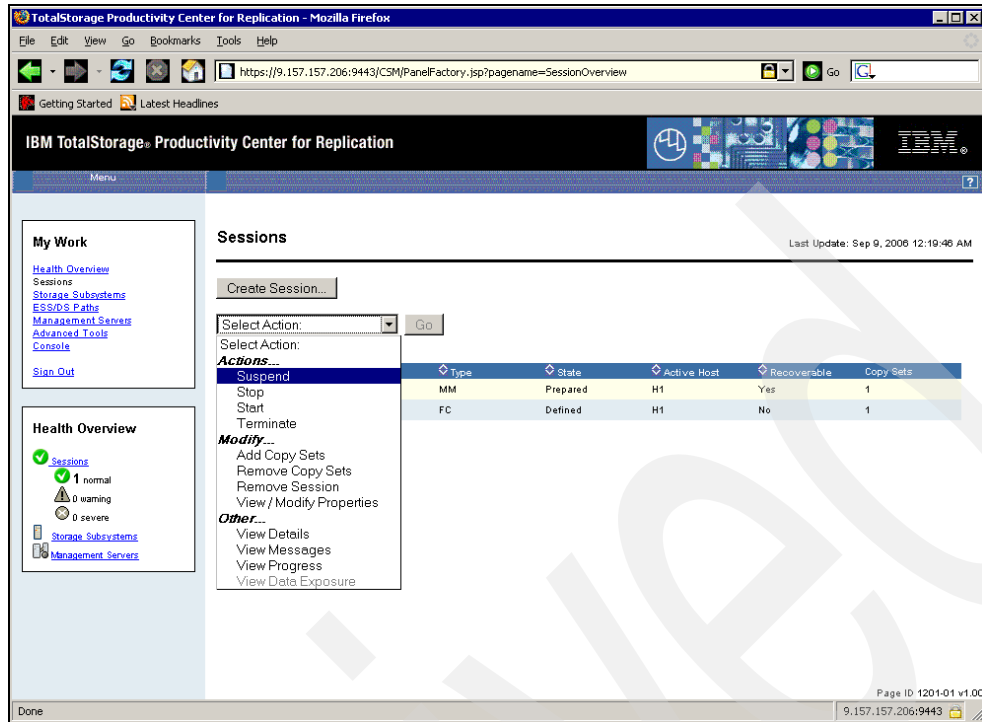


Figure 5-166 TPC for Replication Suspend Metro Mirror Single Direction Session

The selected session will enter in suspended state as shown in Figure 5-167.

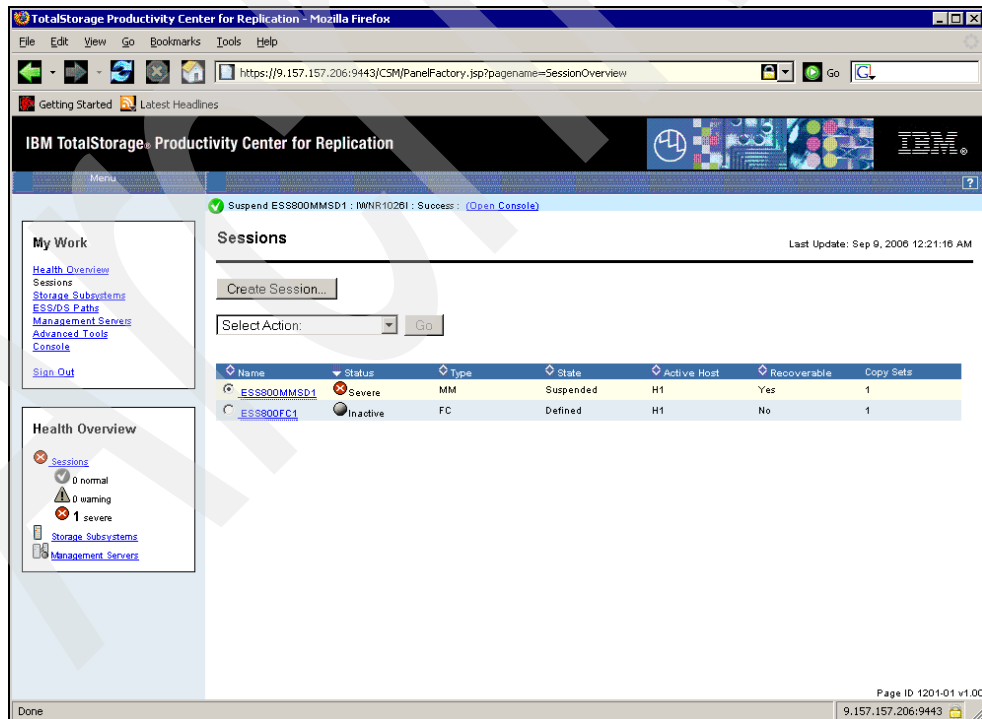


Figure 5-167 TPC for Replication Suspended Metro Mirror Single Direction Session

Suspend action will cause all target volumes in relationship to be left in data consistent point.

The Suspend command can be used anytime during the life span of the session.

Suspending Metro Mirror Session using CLI

In this instance we will suspend a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we created and prepared earlier.

We can suspend the session with the **cmdsess** command as shown in Figure 5-168. You can see that we have had to reply y to the prompt to confirm our request to suspend the session. To turn this function off, you need to utilize the **-quiet** parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action suspend ESS800F0FB2
Are you sure you want to suspend session ESS800F0FB2? [y/n]:y
IWNRI026I [Sep 4, 2006 6:18:50 AM] The runCommand for command Suspend in
session ESS800F0FB2, ESS800MMSD1 completed successfully.
```

Figure 5-168 MM FOFB suspend session

When we then check the session status again as shown in Figure 5-169, we discover a *severe* status. This is due to the fact that the synchronization is suspended.

```
csmcli> showses ESS800F0FB2
CMMCI9013E Command: showses was not found.
Tip: Enter "help" for a list of available commands.
csmcli> showsess ESS800F0FB2
Name          ESS800F0FB2
Type          Metro Mirror Failover/Failback
State         Suspended
Status        Severe
Copy sets     2
Copying       No
Recoverable   Yes
Error count   0
Description   ESS800F0FB2

IWNRI500I [Sep 4, 2006 6:19:59 AM] The getSessionInfo command for session
ESS800F0FB2 completed successfully.
```

Figure 5-169 MM FOFB show session after suspend

The status in ESS Storwatch Specialist - Copy Services is shown in Figure 5-170 on page 182.

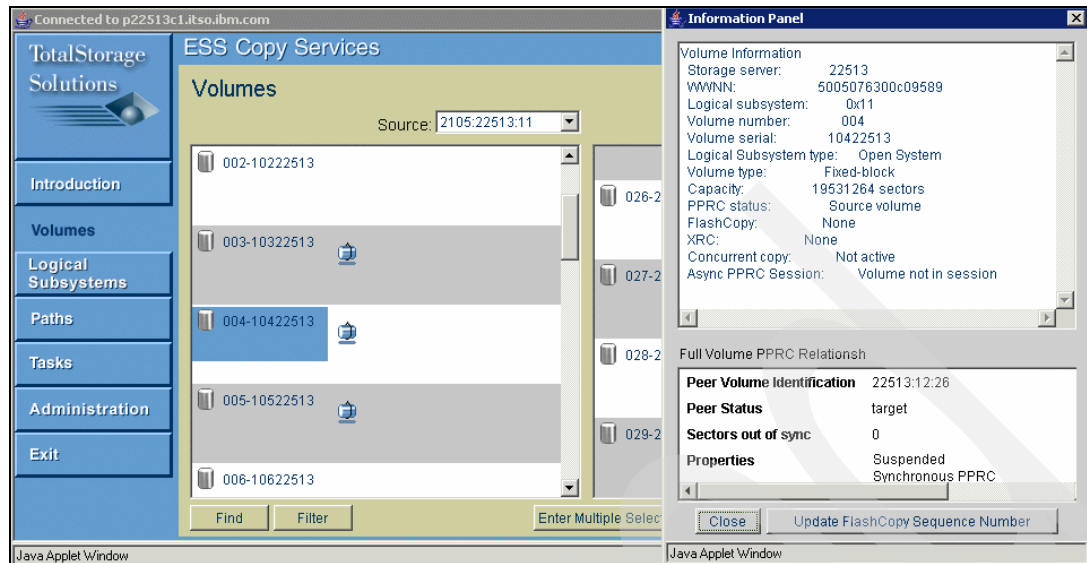


Figure 5-170 ESS suspended status

As we can see that all volumes (members of copy sets from TPC for Replication perspective) are in suspended state.

After session is suspended the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process
- ▶ Metro Mirror Failover/Failback
 - **Start H1 → H2** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process

5.3.19 Stopping a Metro Mirror Session using GUI

To stop the Metro Mirror process, select the session you want to stop from the Sessions panel. In our example the session is *ESS800MMSD1*. From the pull-down menu, select **Stop** and click **Go**, as shown in Figure 5-171 on page 183.

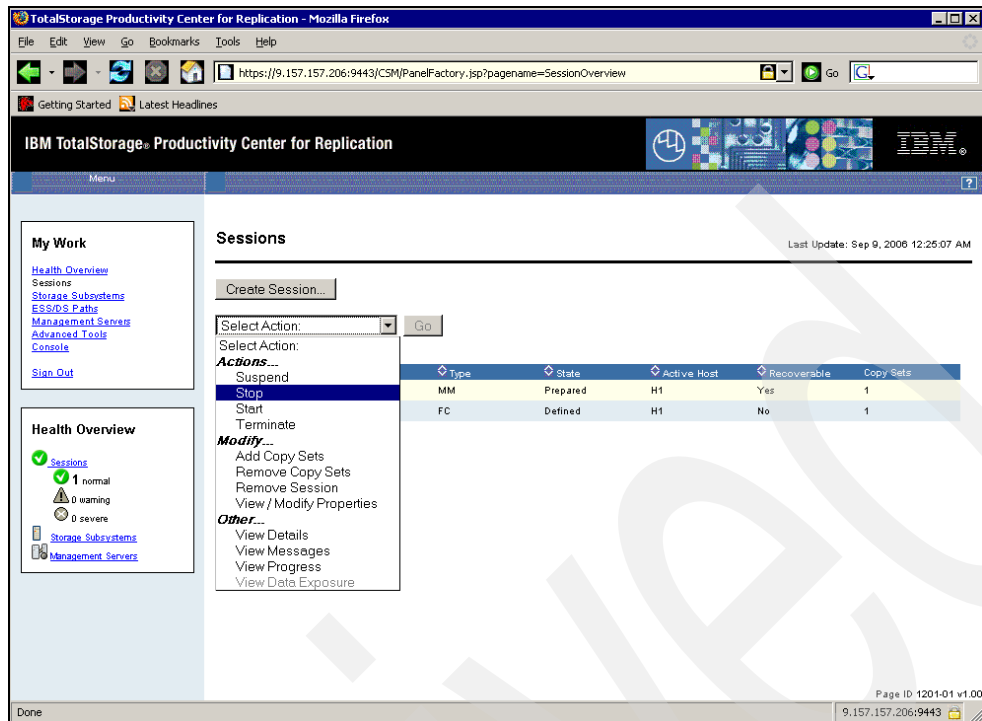


Figure 5-171 TPC for Replication Stop Metro Mirror Single Direction Session

The selected session will enter in suspended state as shown in Figure 5-172.

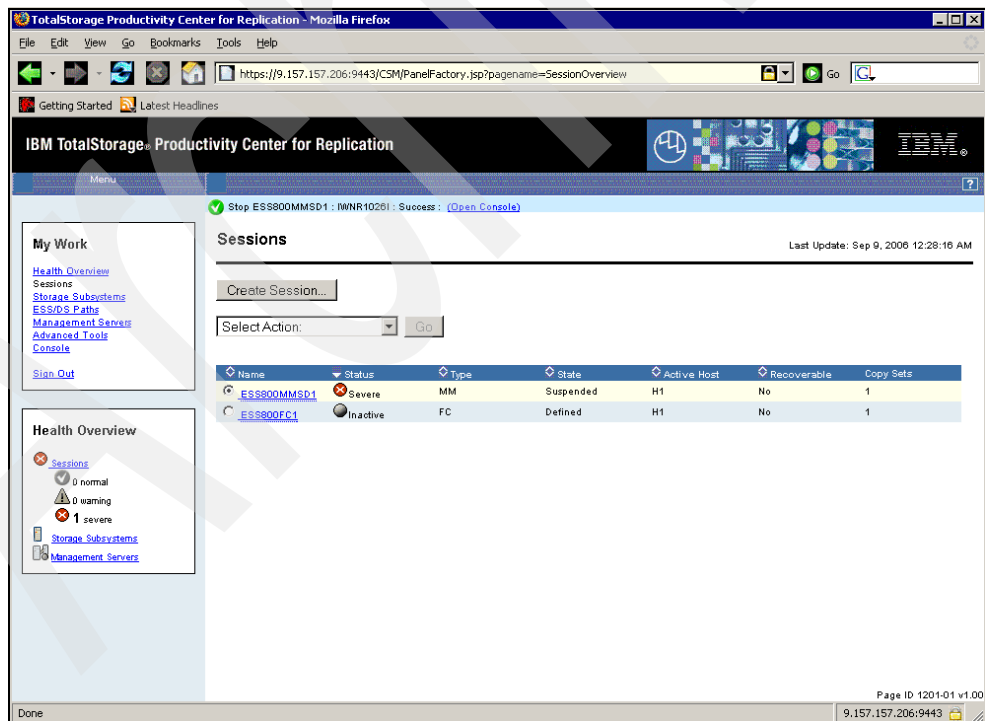


Figure 5-172 TPC for Replication Stopped Metro Mirror Single Direction Session

The Stop action will cause all target volumes in relationship to be left in data inconsistent point.

The Stop command can be used anytime during the life span of the session.

5.3.20 Stopping a Metro Mirror Session using CLI

In this instance we will stop a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we created and prepared earlier.

We can stop session with the **cmdsess** command as shown in Figure 5-173. You can see that we have had to reply y to the prompt to confirm our desire to suspend the session. To turn this function off, you would need to utilize the *-quiet* parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action stop ESS800F0FB2
Are you sure you want to stop session ESS800F0FB2? [y/n]:y
IWNR1026I [Sep 4, 2006 6:35:16 AM] The runCommand for command Stop in session
ESS800F0FB2 completed successfully.
```

Figure 5-173 MM FOFB stop session

When we then check the session status again as shown in Figure 5-174, we discover a *severe* status. This is due to the fact that the synchronization is suspended.

```
csmcli> showsess ESS800F0FB2
Name          ESS800F0FB2
Type          Metro Mirror Failover/Failback
State         Suspended
Status        Severe
Copy sets     2
Copying       No
Recoverable   No
Error count   0
Description   ESS800F0FB2

IWNR1500I [Sep 4, 2006 6:36:07 AM] The getSessionInfo command for session
ESS800F0FB2 completed successfully.
```

Figure 5-174 MM FOFB show session after stop

The status in ESS Storwatch Specialist - Copy Services is shown in Figure 5-175 on page 185.

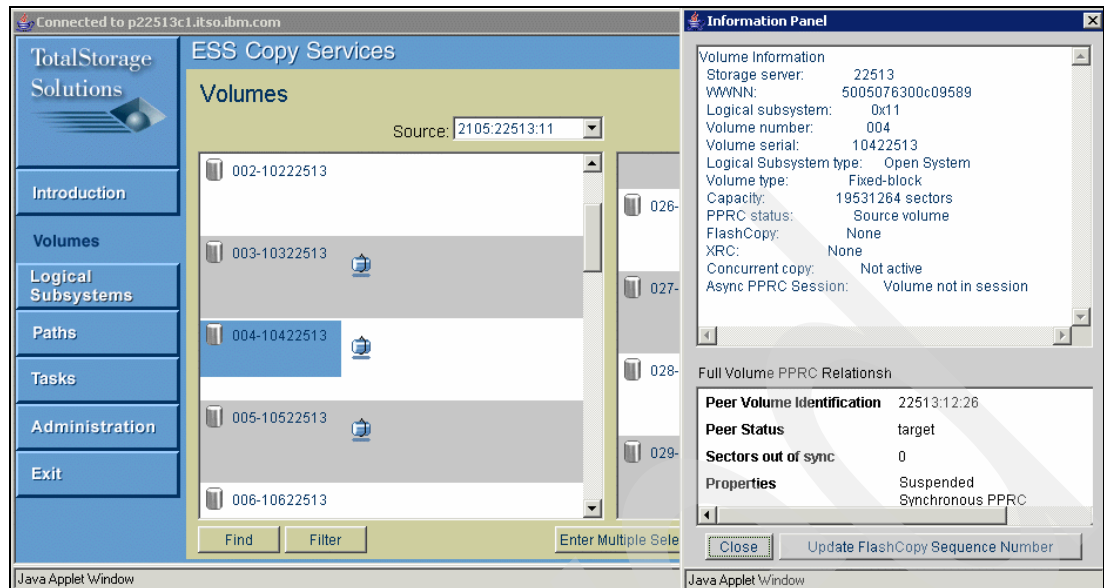


Figure 5-175 ESS stopped status

As we can see that all volumes (members of copy sets from TPC for Replication perspective) are in suspended state.

After the session is stopped the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process
- ▶ Metro Mirror Failover/Failback
 - **Start H1 → H2** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process

Attention: In case the Stop command was used to enter suspended states, target volumes are not consistent.

5.3.21 Recovering a Metro Mirror Session using GUI

To recover the Metro Mirror process, select the session you want to recover from the Sessions panel - in our example *ESS800MMSD1*.

Note: You can only recover suspended session. Suspended state is achieved by suspending session (consistent targets) or stopping session (inconsistent targets).

From the pull-down menu, select **Recover** and click **Go**, as shown in Figure 5-176 on page 186.

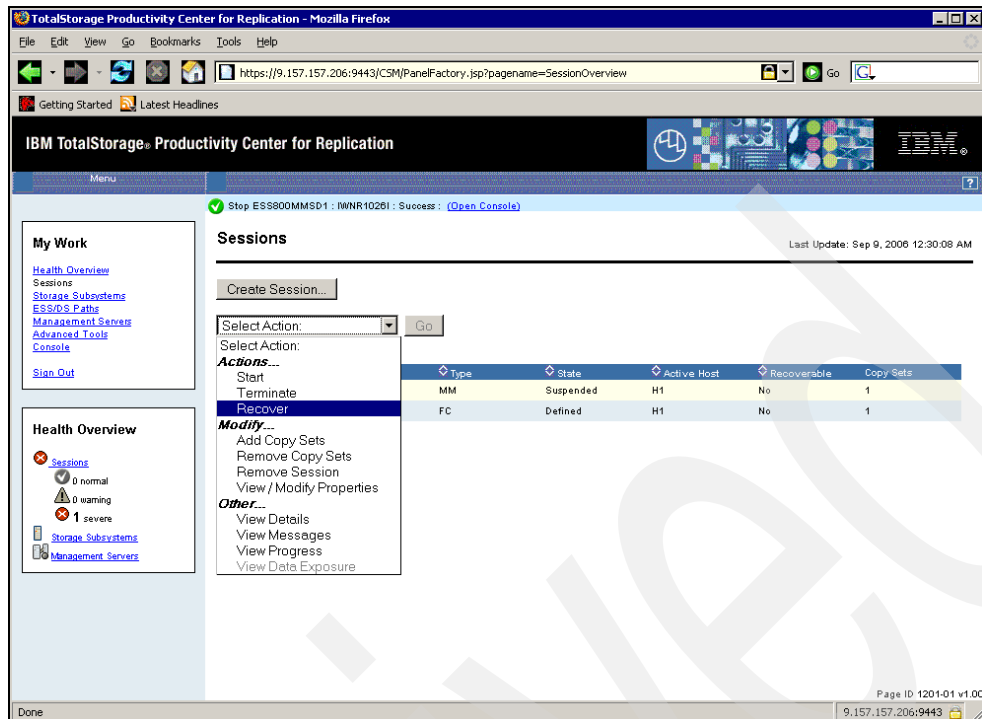


Figure 5-176 TPC for Replication Recover Metro Mirror Single Direction Session

The selected session will enter in target available state as shown in Figure 5-177.

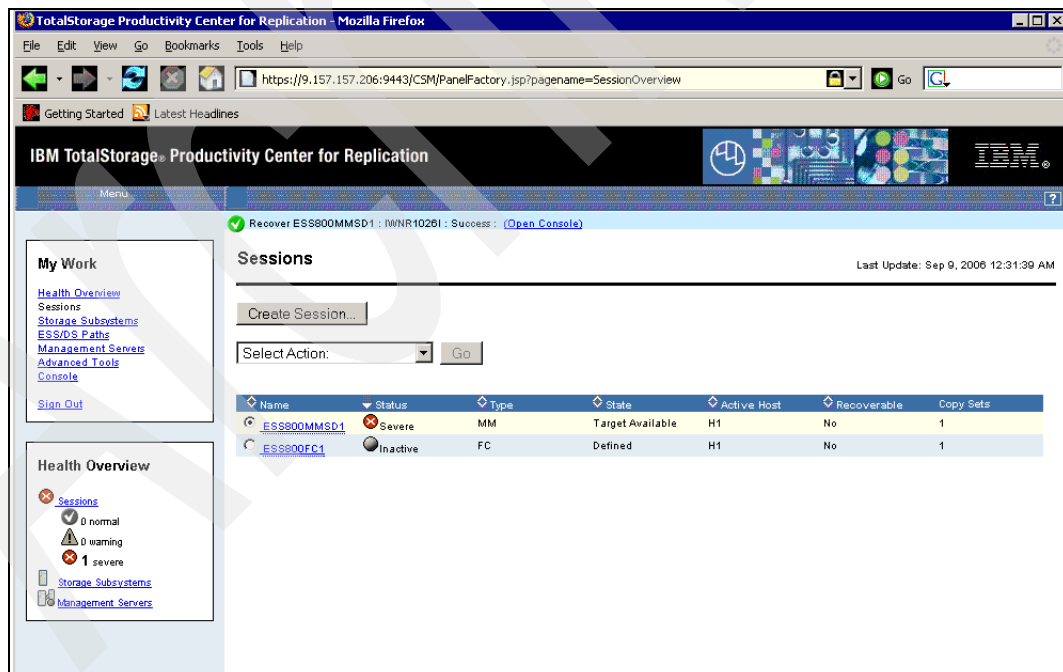


Figure 5-177 TPC for Replication Recovered Metro Mirror Single Direction Session

Once session is in target available state the secondary volumes are available for host access in consistency state.

Note: By using recover operation, target volume on ESS 800 will become source volume.

5.3.22 Recovering a Metro Mirror Session using CLI

In this instance we will recover a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we suspended earlier.

We can recover session with the **cmdsess** command as shown in Figure 5-178. You can see that we have had to reply y to the prompt to confirm our request to Recover the session. To turn this function off, you would need to utilize the **-quiet** parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action recover ESS800F0FB2
Are you sure you want to recover session ESS800F0FB2? [y/n]:y
```

Figure 5-178 MM FOFB recover session

When we then check the session status again as shown in Figure 5-179, we discover a *normal* status. This is due to the fact that session is stopped and target volumes are available for host use.

```
csmcli> showsess ESS800F0FB2
Name          ESS800F0FB2
Type          Metro Mirror Failover/Failback
State         Target Available
Status        Severe
Copy sets     2
Copying       No
Recoverable   No
Error count   0
Description   ESS800F0FB2

IWNR1500I [Sep 4, 2006 6:50:38 AM] The getSessionInfo command for session
ESS800F0FB2 completed successfully.
```

Figure 5-179 MM FOFB show session after recover

Once session is in target available state the secondary volumes are available for host access in consistency state.

Note: By using recover operation, target volume on ESS 800 will become source volume.

After session is recovered in target available state the following options are available:

- Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session

- Metro Mirror Failover/Failback
 - **Start H2 → H1** - this will reestablish copying in opposite direction, from secondary to primary location
 - **Start H1 → H2** - this will reestablish copying in original direction, from primary to secondary location
 - **Terminate** - this will terminate the session

5.3.23 Terminating a Metro Mirror Session using GUI

To terminate the Metro Mirror process, select the session you want to terminate from the Sessions panel - in our example *ESS800MMSD1*.

Note: The session can be terminated anytime.

From the pull-down menu, select **Terminate** from the Select Action pull-down menu and click **Go**, as shown in Figure 5-180.

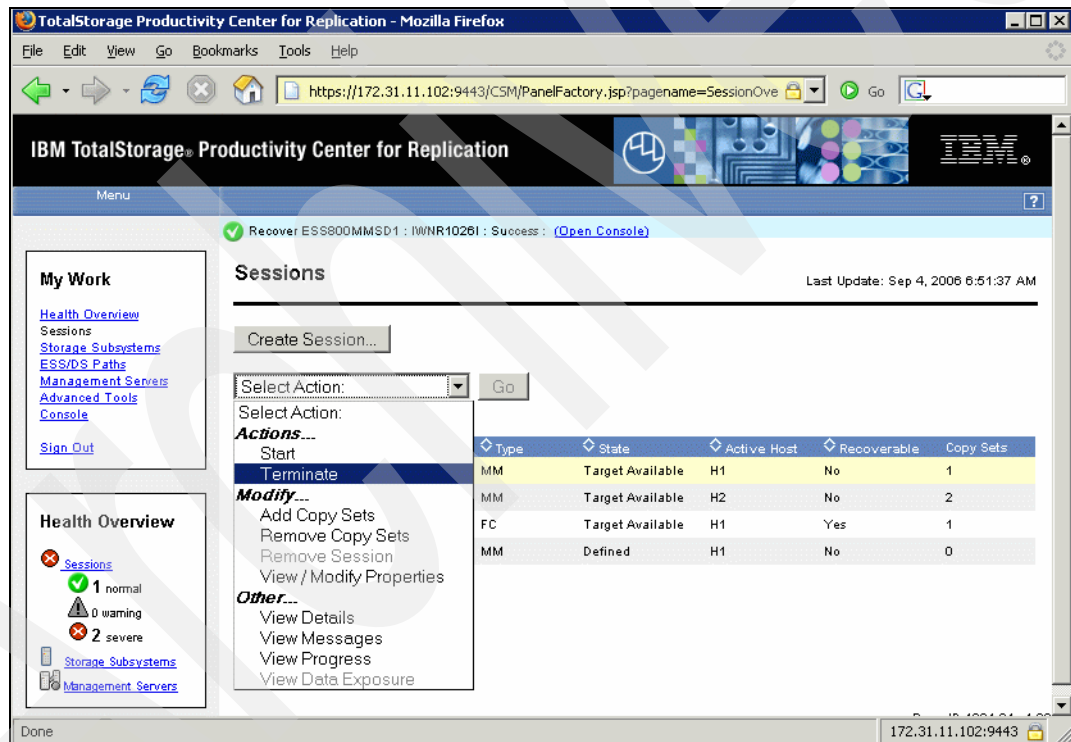


Figure 5-180 TPC for Replication Terminate Metro Mirror Single Direction Session

The selected session will enter in defined state as shown in Figure 5-181 on page 189.

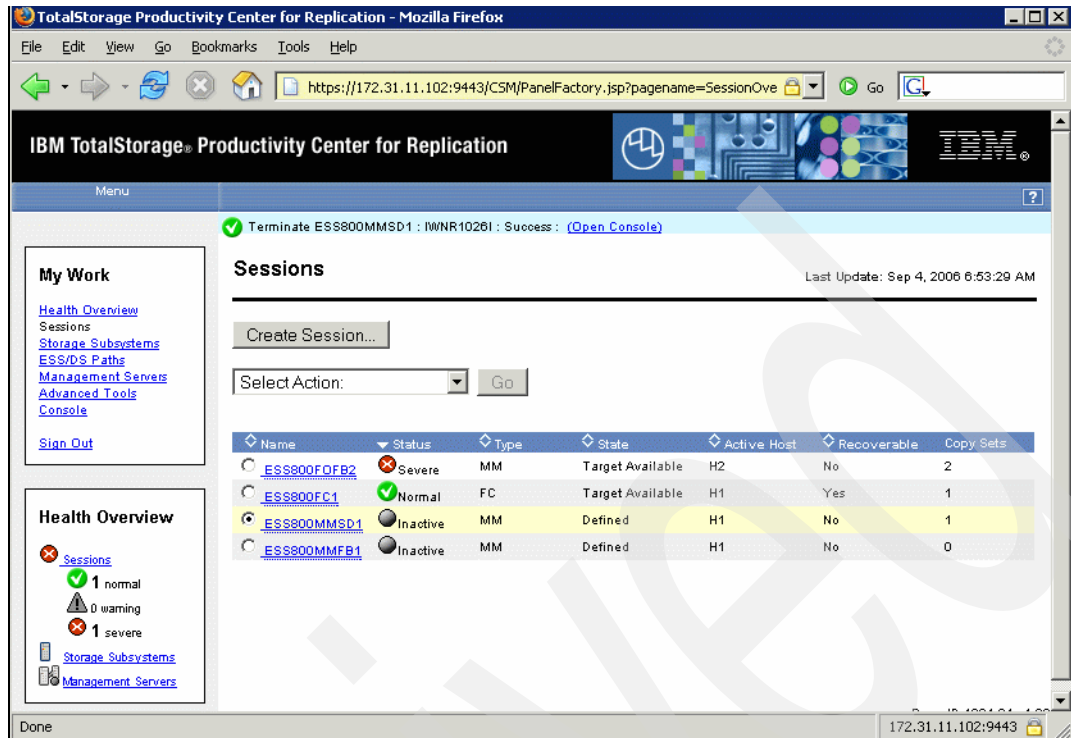


Figure 5-181 TPC for Replication Terminated Metro Mirror Single Direction Session

Note: By using terminate operation while session is in prepared or suspended state, PPRC relationships will be terminated.

5.3.24 Terminating a Metro Mirror Session using CLI

In this instance we will terminate a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we recovered earlier.

We can terminate session with the `cmdsess` command as shown in Figure 5-182. You can see that we have had to reply `y` to the prompt to confirm our request to terminate the session. To turn this function off, you would need to utilize the `-quiet` parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action terminate ESS800FOFB2
Are you sure you want to terminate session ESS800FOFB2? [y/n]:y
IWNR1026I [Sep 4, 2006 6:58:09 AM] The runCommand for command Terminate in
session ESS800FOFB2 completed successfully.
```

Figure 5-182 MM FOFB terminate session

When we then check the session status again as shown in Figure 5-183 on page 190, we discover an *inactive* status. This is due to the fact that session is terminated and in defined state.

```

csmcli> showsess ESS800FOFB2
Name          ESS800FOFB2
Type          Metro Mirror Failover/Failback
State         Defined
Status        Inactive
Copy sets     2
Copying       No
Recoverable   No
Error count   0
Description   ESS800FOFB2

IWNR1500I [Sep 4, 2006 6:58:51 AM] The getSessionInfo command for session
ESS800FOFB2 completed successfully.

```

Figure 5-183 MM FOFB show session after terminate

Note: By using terminate operation while session is in prepared or suspended state, PPRC relationships will be terminated.

After session is terminated the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
- ▶ Metro Mirror Failover/Failback
 - **Start H1- → H2** - this will reestablish copying in original direction, from primary to secondary location

5.3.25 Adding a Global Mirror Session using GUI

In this instance we will set up an ESS based Global Mirror Single Direction and Failover/Failback session with a single volume pair as can be seen in Figure 5-184. In our example we used Global Mirror function inside ESS 800.

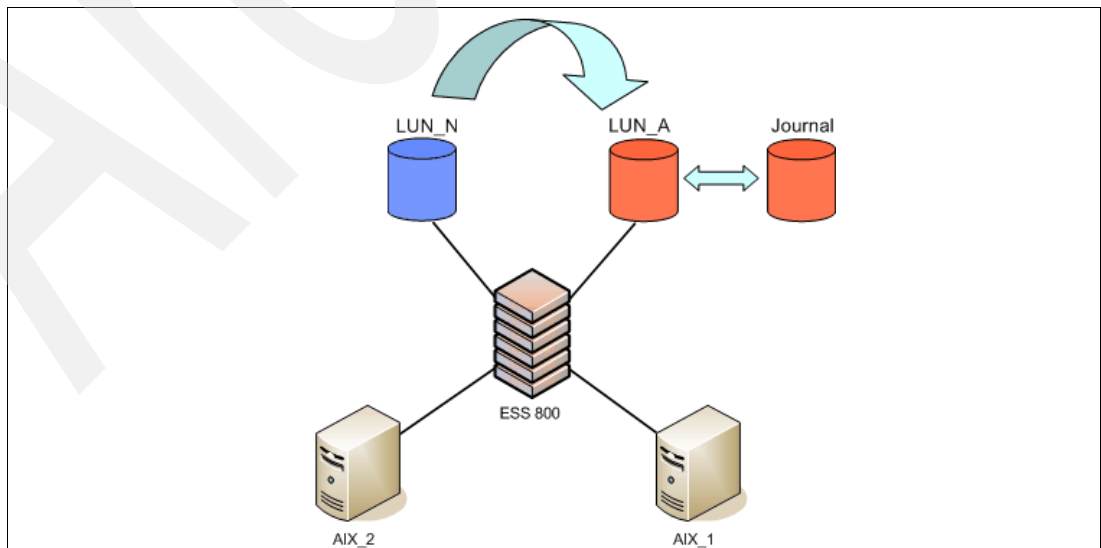


Figure 5-184 ESS based Global Mirror setup

The first step is to select the **Create Session** button from the Sessions panel as shown in Figure 5-185.

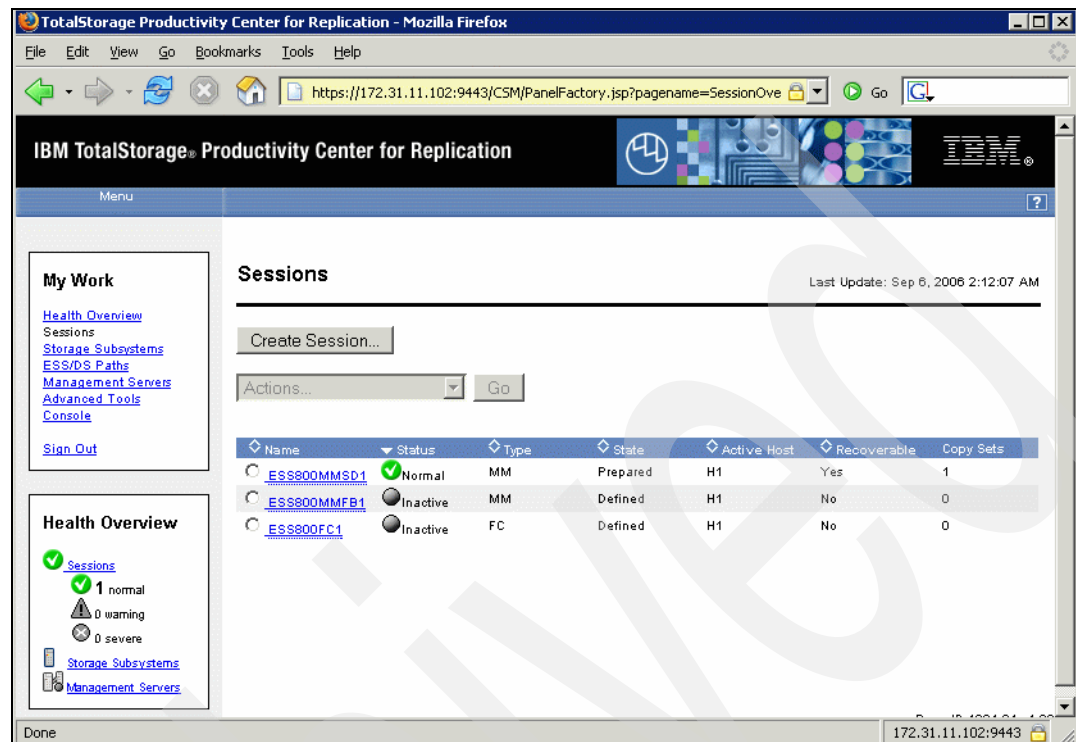


Figure 5-185 TPC for Replication Sessions

This will open a new window where you can select session details such as copy type, as shown in Figure 5-186. Select your copy type, in our example Global Mirror Single Direction and click the **Next** button.

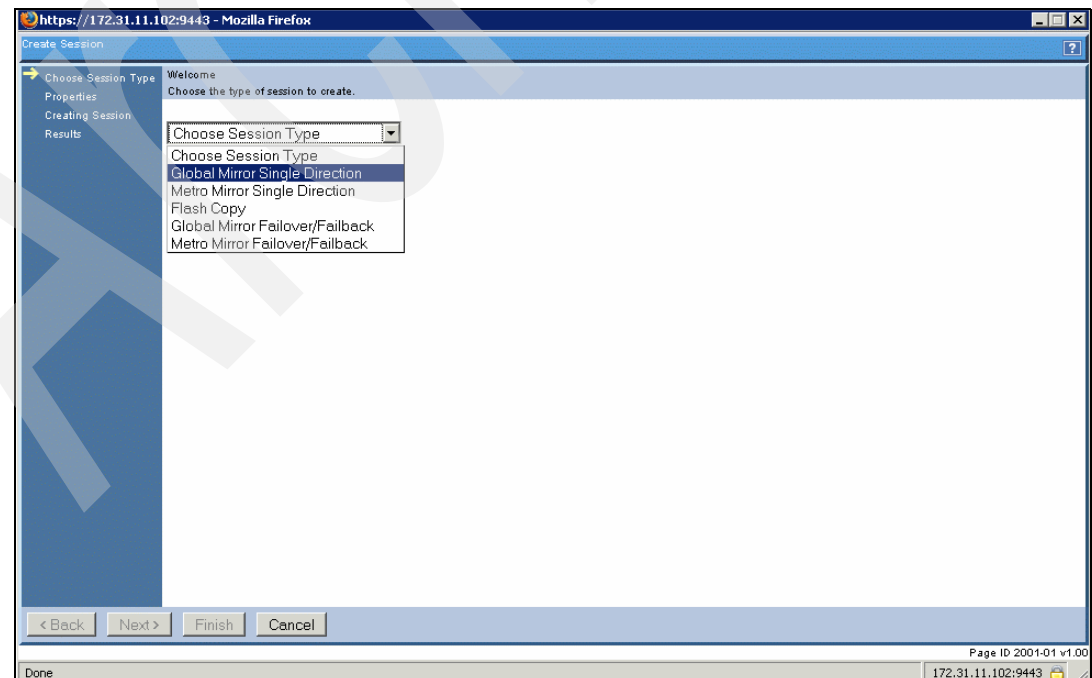


Figure 5-186 TPC for Replication GM Create Session

The window similar to Figure 5-187 will be displayed. Type in a meaningful name for the session in the **Session name** box as well as any informational text in the **Description** box. Click **Next** to continue.

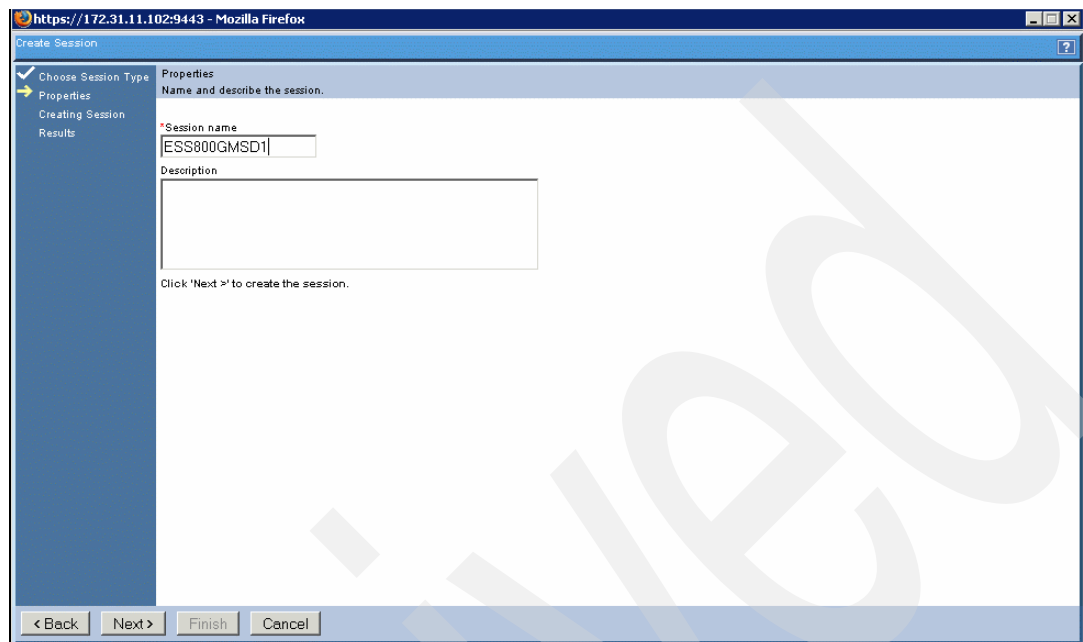


Figure 5-187 TPC for Replication GM Create Session Properties

The session will be created and a window similar to Figure 5-188 will be displayed.

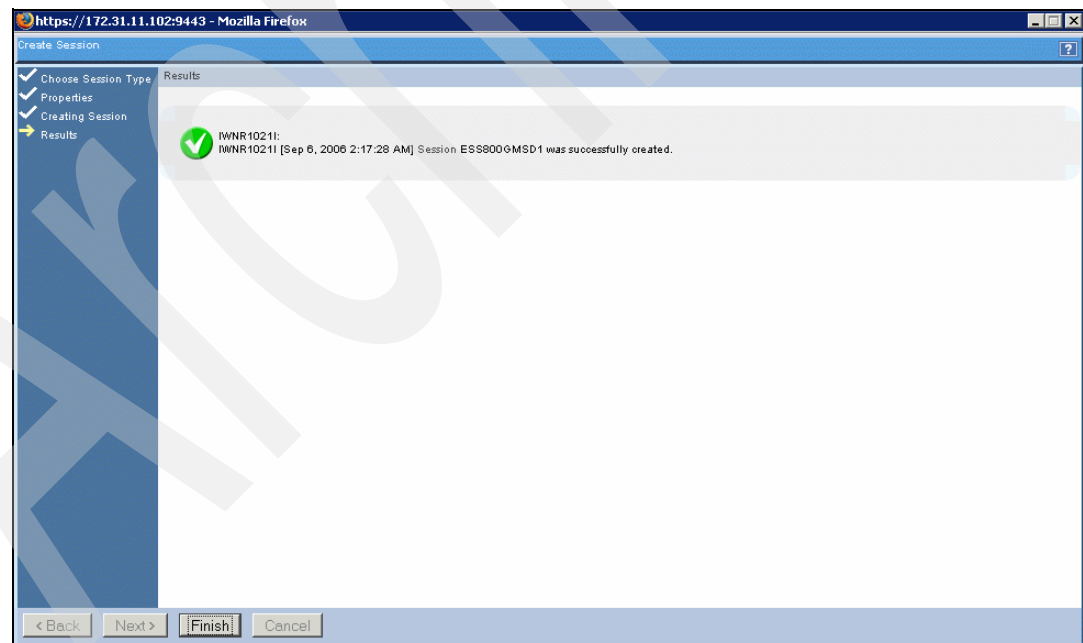


Figure 5-188 TPC for Replication GM Create Session Created

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

5.3.26 Adding a Global Mirror Session using CLI

Once again using the command line interface, we can achieve the same result. For this effort we have created another script file which can be seen in Figure 5-189 (note that we have added a list session command `lssess -l` to display the defined sessions once our new one has been created). In this example we will create *Global Mirror Failover/Failback* type of a session.

```
# cat creategmfofbsession.txt
#
# This is a script file
# Using commands to interrogate TPC 4 R
#
setoutput -v on
mksess -cptype gmfofb -desc ESS800GMFB1 ESS800GMFB1
lssess -l
```

Figure 5-189 Add GM session script file

The result of the execution of this script can be seen in Figure 5-190.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/creatgmfofbsession.txt
IWNRI021I [Sep 6, 2006 2:29:13 AM] Session ESS800GMFB1 was successfully created.
Name      Status  State  Copy type      Recoverable Copying Copy sets Error
=====
ESS800GMSD1 Inactive Defined Global Mirror Single Direction No      No      0 No
ESS800FC1  Inactive Defined Flash Copy      No      No      0 No
ESS800MMSD1 Normal  Prepared Metro Mirror Single Direction Yes     Yes     1 No
ESS800GMFB1 Inactive Defined Global Mirror Failover/Failback No      No      0 No
ESS800MMFB1 Inactive Defined Metro Mirror Failover/Failback No      No      0 No
```

Figure 5-190 GM session CLI result

5.3.27 Adding Copy Sets to a Global Mirror Session using GUI

To add copy sets to Global Mirror Single Direction session follow the steps shown in 5.3.14, “Adding Copy Sets to a Metro Mirror Session” on page 165 until step **Choose Journal 2**. The subsequent steps are explained further on.

Linux GUI

In the **Choose Journal 2** step you need to select journal volume. In this window we define the journal subsystems via the first drop-down menu as shown in Figure 5-191 on page 194.

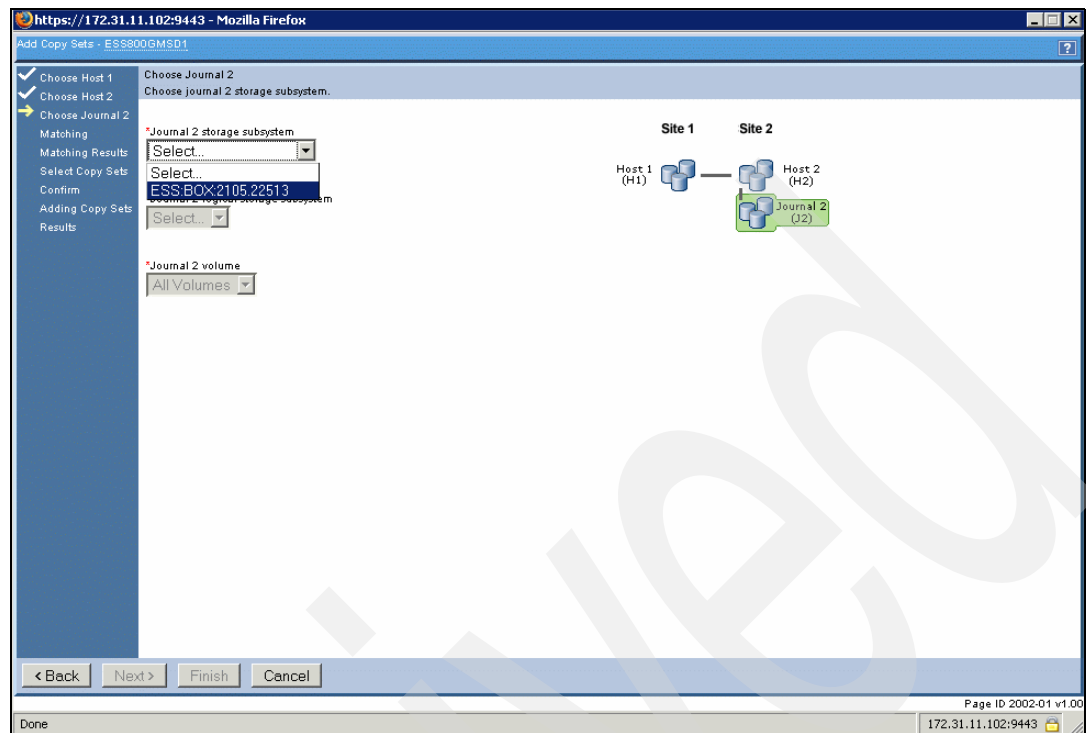


Figure 5-191 TPC for Replication GM Journal Source ESS

First select your journal ESS 800, in our example we selected *ESS:BOX:2105:22513*, and **Journal 2 logical storage subsystem** pull-down menu will become available as shown in Figure 5-192.

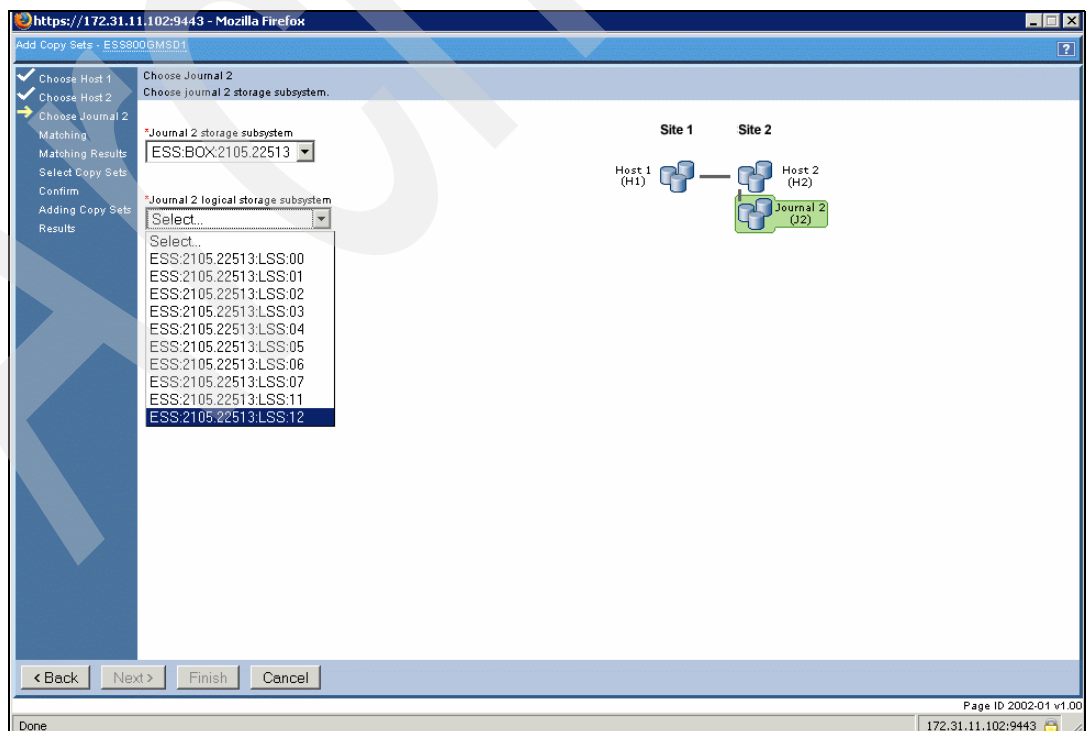


Figure 5-192 TPC for Replication GM Journal Source ESS LSS

Select your journal ESS Logical Subsystem (LSS), in our example we selected *ESS:2105.22513:LSS:12*, and **Journal 2 volume** pull-down menu will become available as shown in Figure 5-193.

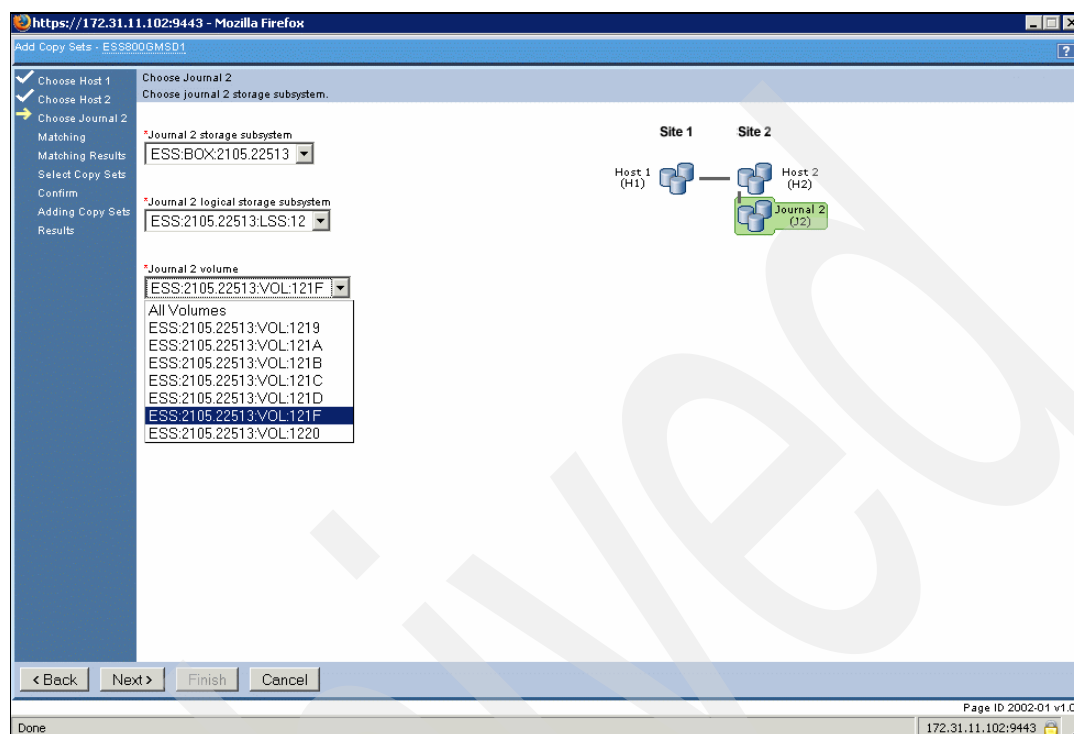


Figure 5-193 TPC for Replication GM ESS Journal Source Volume

Select your journal volume, in our example we selected *ESS:2105.22513:VOL:1103* volume. Once the journal volume is selected, click the **Next** button to proceed. The TPC for Replication will now perform a check to confirm the volume attributes match. The ongoing steps are described in 5.2.11, “Adding Copy Sets to a Metro Mirror Session using GUI” on page 112 from the Volume Match window.

5.3.28 Adding Copy Sets to a Global Mirror Session using CLI

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 5-197 on page 197, 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 as seen in Figure 5-194 on page 196 for source Global Mirror volumes.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh lsvol -l -devtype ess | grep VOL:11
```

ESS:2105.22513:VOL:1114	ESS:2105.22513:VOL:1114	2105-22513-IBM	ESS	FIXEDBLK	11	FB	4.657 GB
ESS:2105.22513:VOL:1113	ESS:2105.22513:VOL:1113	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1112	ESS:2105.22513:VOL:1112	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1111	ESS:2105.22513:VOL:1111	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1110	ESS:2105.22513:VOL:1110	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:110F	ESS:2105.22513:VOL:110F	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:110E	ESS:2105.22513:VOL:110E	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:110D	ESS:2105.22513:VOL:110D	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:110C	ESS:2105.22513:VOL:110C	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:110B	ESS:2105.22513:VOL:110B	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:110A	ESS:2105.22513:VOL:110A	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1109	ESS:2105.22513:VOL:1109	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1108	ESS:2105.22513:VOL:1108	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1107	ESS:2105.22513:VOL:1107	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1106	ESS:2105.22513:VOL:1106	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1105	ESS:2105.22513:VOL:1105	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1104	ESS:2105.22513:VOL:1104	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1103	ESS:2105.22513:VOL:1103	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1102	ESS:2105.22513:VOL:1102	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1101	ESS:2105.22513:VOL:1101	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB
ESS:2105.22513:VOL:1100	ESS:2105.22513:VOL:1100	2105-22513-IBM	ESS	FIXEDBLK	11	FB	9.313 GB

Figure 5-194 List of possible volumes for GM source

Figure 5-195 shows target Global Mirror volumes.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh lsvol -l -devtype ess | grep VOL:12
```

ESS:2105.22513:VOL:121E	ESS:2105.22513:VOL:121E	2105-22513-IBM	ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:121D	ESS:2105.22513:VOL:121D	2105-22513-IBM	ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:121C	ESS:2105.22513:VOL:121C	2105-22513-IBM	ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:121B	ESS:2105.22513:VOL:121B	2105-22513-IBM	ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:121A	ESS:2105.22513:VOL:121A	2105-22513-IBM	ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:1219	ESS:2105.22513:VOL:1219	2105-22513-IBM	ESS	FIXEDBLK	12	FB	9.313 GB
ESS:2105.22513:VOL:1218	ESS:2105.22513:VOL:1218	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1217	ESS:2105.22513:VOL:1217	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1216	ESS:2105.22513:VOL:1216	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1215	ESS:2105.22513:VOL:1215	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1214	ESS:2105.22513:VOL:1214	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1213	ESS:2105.22513:VOL:1213	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1212	ESS:2105.22513:VOL:1212	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1211	ESS:2105.22513:VOL:1211	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1210	ESS:2105.22513:VOL:1210	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120F	ESS:2105.22513:VOL:120F	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120E	ESS:2105.22513:VOL:120E	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120D	ESS:2105.22513:VOL:120D	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120C	ESS:2105.22513:VOL:120C	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120B	ESS:2105.22513:VOL:120B	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:120A	ESS:2105.22513:VOL:120A	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1209	ESS:2105.22513:VOL:1209	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1208	ESS:2105.22513:VOL:1208	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1207	ESS:2105.22513:VOL:1207	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1206	ESS:2105.22513:VOL:1206	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1205	ESS:2105.22513:VOL:1205	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1204	ESS:2105.22513:VOL:1204	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1203	ESS:2105.22513:VOL:1203	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1202	ESS:2105.22513:VOL:1202	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1201	ESS:2105.22513:VOL:1201	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB
ESS:2105.22513:VOL:1200	ESS:2105.22513:VOL:1200	2105-22513-IBM	ESS	FIXEDBLK	12	FB	4.657 GB

Figure 5-195 List of possible volumes for GM target

Figure 5-196 on page 197 shows possible journal Global Mirror volumes.

```
# pwd
/opt/IBM/TPC-RM
# ./csmccli.sh lsvol -l -devtype ess | grep VOL:12
ESS:2105.22513:VOL:121E ESS:2105.22513:VOL:121E 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121D ESS:2105.22513:VOL:121D 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121C ESS:2105.22513:VOL:121C 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121B ESS:2105.22513:VOL:121B 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:121A ESS:2105.22513:VOL:121A 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:1219 ESS:2105.22513:VOL:1219 2105-22513-IBM ESS FIXEDBLK 12 FB 9.313 GB
ESS:2105.22513:VOL:1218 ESS:2105.22513:VOL:1218 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1217 ESS:2105.22513:VOL:1217 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1216 ESS:2105.22513:VOL:1216 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1215 ESS:2105.22513:VOL:1215 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1214 ESS:2105.22513:VOL:1214 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1213 ESS:2105.22513:VOL:1213 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1212 ESS:2105.22513:VOL:1212 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1211 ESS:2105.22513:VOL:1211 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1210 ESS:2105.22513:VOL:1210 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120F ESS:2105.22513:VOL:120F 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120E ESS:2105.22513:VOL:120E 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120D ESS:2105.22513:VOL:120D 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120C ESS:2105.22513:VOL:120C 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120B ESS:2105.22513:VOL:120B 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:120A ESS:2105.22513:VOL:120A 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1209 ESS:2105.22513:VOL:1209 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1208 ESS:2105.22513:VOL:1208 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1207 ESS:2105.22513:VOL:1207 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1206 ESS:2105.22513:VOL:1206 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1205 ESS:2105.22513:VOL:1205 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1204 ESS:2105.22513:VOL:1204 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1203 ESS:2105.22513:VOL:1203 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1202 ESS:2105.22513:VOL:1202 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1201 ESS:2105.22513:VOL:1201 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
ESS:2105.22513:VOL:1200 ESS:2105.22513:VOL:1200 2105-22513-IBM ESS FIXEDBLK 12 FB 4.657 GB
```

Figure 5-196 List of possible volumes for GM journal

Some of those volumes were used as part of the **mkcpset** command as shown in Figure 5-197. We have also specified that the Global Mirror session type is *gmfofb* or Global Mirror Failover/Failback.

```
# cat essgmfofb.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
mkssess -cptype gmfofb -desc ESS800GMFB2 ESS800GMFB2
lssess -l
#lsvol -l -devtype ess
mkcpset -h1 ESS:2105.22513:VOL:1105 -h2 ESS:2105.22513:VOL:121D -j2
ESS:2105.22513:VOL:121C ESS800GMFB2
mkcpset -h1 ESS:2105.22513:VOL:1104 -h2 ESS:2105.22513:VOL:121A -j2
ESS:2105.22513:VOL:121B ESS800GMFB2
lscpset -l ESS800GMFB2
```

Figure 5-197 ESS GM script

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

Example 5-5 ESS GM script output

```
# pwd
/opt/IBM/TPC-RM
# ./csmccli.sh -script /tpcrm/essgmfofb.txt
IWNRR1021I [Sep 6, 2006 9:57:27 PM] Session ESS800GMFB2 was successfully created.
Name      Status  State    Copy type                      Recoverable Copying Copy sets Error
=====
```

```

ESS800GMSD1 Inactive Defined Global Mirror Single Direction No No 1 No
ESS800FC1 Inactive Defined Flash Copy No No 0 No
ESS800GMFB2 Inactive Defined Global Mirror Failover/Failback No No 0 No
ESS800MMSD1 Normal Prepared Metro Mirror Single Direction Yes Yes 1 No
ESS800GMFB1 Inactive Defined Global Mirror Failover/Failback No No 0 No
ESS800MMFB1 Inactive Defined Metro Mirror Failover/Failback No No 0 No
IWRN2001I [Sep 6, 2006 9:57:28 PM] The pair was successfully created in session ESS800GMFB2 for copy set
ESS:2105.22513:VOL:1105 with source ESS:2105.22513:VOL:121D and target ESS:2105.22513:VOL:121C.
IWRN2001I [Sep 6, 2006 9:57:28 PM] The pair was successfully created in session ESS800GMFB2 for copy set
ESS:2105.22513:VOL:1105 with source ESS:2105.22513:VOL:1105 and target ESS:2105.22513:VOL:121D.
IWRN2001I [Sep 6, 2006 9:57:28 PM] The pair was successfully created in session ESS800GMFB2 for copy set
ESS:2105.22513:VOL:1105 with source ESS:2105.22513:VOL:1105 and target ESS:2105.22513:VOL:121C.
IWRN2001I [Sep 6, 2006 9:57:29 PM] The pair was successfully created in session ESS800GMFB2 for copy set
ESS:2105.22513:VOL:1104 with source ESS:2105.22513:VOL:121A and target ESS:2105.22513:VOL:121B.
IWRN2001I [Sep 6, 2006 9:57:29 PM] The pair was successfully created in session ESS800GMFB2 for copy set
ESS:2105.22513:VOL:1104 with source ESS:2105.22513:VOL:1104 and target ESS:2105.22513:VOL:121A.
IWRN2001I [Sep 6, 2006 9:57:29 PM] The pair was successfully created in session ESS800GMFB2 for copy set
ESS:2105.22513:VOL:1104 with source ESS:2105.22513:VOL:1104 and target ESS:2105.22513:VOL:121B.
H1 Volume Session Volumes
=====
ESS:2105.22513:VOL:1104 ESS800GMFB2 3
ESS:2105.22513:VOL:1105 ESS800GMFB2 3

```

From the CSMCLI interface we can interrogate the session via the **showsess** command, as shown in Figure 5-198.

```

# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> showsess ESS800GMFB2
Name          ESS800GMFB2
Type          Global Mirror Failover/Failback
State         Defined
Status        Inactive
Copy sets     2
Copying       No
Recoverable   No
Error count   0
Description   ESS800GMFB2

IWRN1500I [Sep 6, 2006 10:06:53 PM] The getSessionInfo command for session
ESS800GMFB2 completed successfully.

```

Figure 5-198 The **showsess** command

Now that we have a session with valid copy sets, we can start using it.

5.3.29 Starting a Global Mirror Session

Linux GUI

To start the Global Mirror process follow the steps from 5.2.13, “Starting a Metro Mirror Session using the GUI” on page 123.

Linux CLI

In this instance we will start a session using interactive command line interface. In this example we will use Global Mirror Failover/Failback session we created earlier.

We can start the session with the **cmdsess** command as shown in Figure 5-199 on page 199. You can see that we have had to reply **y** to the prompt to confirm our request to start the

session. To turn this function off, you would need to utilize the *-quiet* parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action start_h1:h2 ESS800GMFB2
Are you sure you want to start_h1:h2 session ESS800GMFB2? [y/n]:y
IWNR1026I [Sep 6, 2006 10:23:39 PM] The runCommand for command Start H1->H2 in
session ESS800GMFB2 completed successfully.
```

Figure 5-199 GM FOFB start session

When we then check the session status as shown in Figure 5-200, we discover a *prepared* status.

```
csmcli> showsess ESS800GMFB2
Name      ESS800GMFB2
Type      Global Mirror Failover/Failback
State     Prepared
Status    Normal
Copy sets 2
Copying   Yes
Recoverable Yes
Error count 0
Description ESS800GMFB2

IWNR1500I [Sep 6, 2006 10:26:26 PM] The getSessionInfo command for session
ESS800GMFB2 completed successfully.
```

Figure 5-200 GM FOFB show session after start

You can check the status of the copy set volumes by signing into the ESS Storwatch Specialist - Copy Services as shown in Figure 5-201.

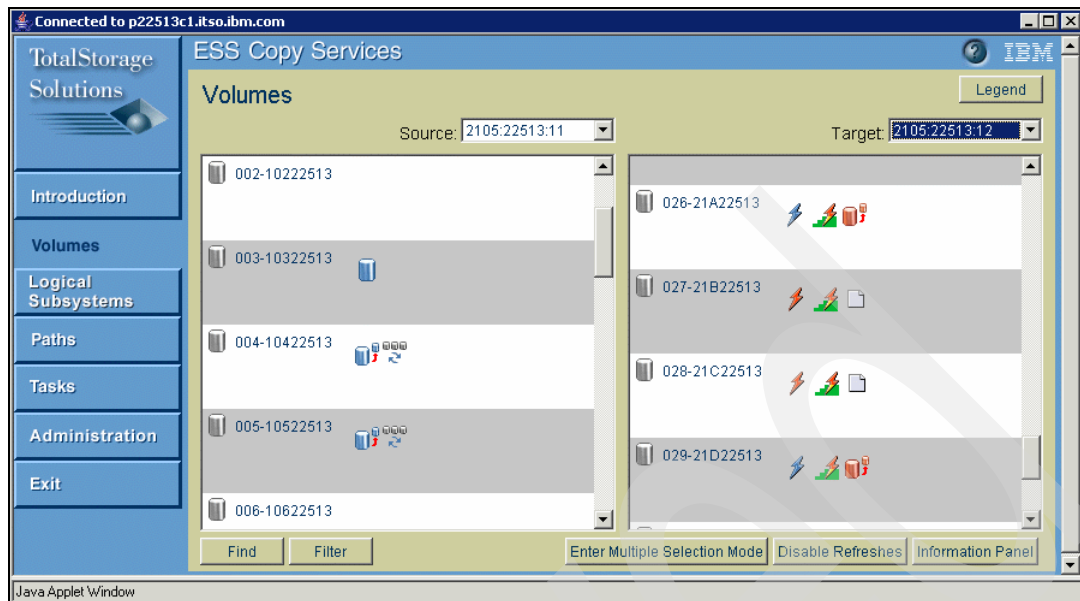


Figure 5-201 ESS Copy Services view

Note: At this time you can only start one Global Mirror session at once.

You can make use start session as many times as you like.

After session is prepared the following options are available:

- ▶ Global Mirror Single Direction
 - **Suspend** - this will stop copying with consistent secondary volumes
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
- ▶ Global Mirror Failover/Failback
 - **Suspend** - this will stop copying with consistent secondary volumes
 - **Start H1 → H2** - this will reestablish copying in original direction, from primary to secondary location
 - **Terminate** - this will terminate the session

5.3.30 Suspending a Global Mirror Session

Linux GUI

To suspend the Metro Mirror process follow the steps from 5.2.15, “Suspend a Metro Mirror Session using the GUI” on page 127.

Linux CLI

In this instance we will suspend a session using interactive command line interface. In this example we will use Global Mirror Failover/Failback session we created and prepared earlier.

We can suspend session with the `cmdsess` command as shown in Figure 5-202. You can see that we have had to reply `y` to the prompt to confirm our request to suspend the session. To turn this function off, you would need to utilize the `-quiet` parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action suspend ESS800GMFB2
Are you sure you want to suspend session ESS800GMFB2? [y/n]:y
IWNRI026I [Sep 6, 2006 11:08:33 PM] The runCommand for command Suspend in
session ESS800GMFB2 completed successfully.
```

Figure 5-202 GM FOFB suspend session

When we then check the session status as shown in Figure 5-203 on page 201, we discover a *severe* status. This is due to the fact that the synchronization is suspended.

```
csmcli> showsess ESS800GMFB2
Name      ESS800GMFB2
Type      Global Mirror Failover/Failback
State     Suspended
Status    Severe
Copy sets 2
Copying   Yes
Recoverable Yes
Error count 0
Description ESS800GMFB2

IWNRI500I [Sep 6, 2006 11:10:22 PM] The getSessionInfo command for session
ESS800GMFB2 completed successfully.
```

Figure 5-203 GM FOFB show session after suspend

After session is suspended the following options are available:

- ▶ Global Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process
- ▶ Global Mirror Failover/Failback
 - **Start H1->H2** - this will reestablish copying
 - **Terminate** - this will terminate the session
 - **Recover** - this will make secondary volumes available for host access and stop the copy process

5.3.31 Recovering a Global Mirror Session

In this section we discuss how to recover a Global Mirror Session for both GUI and CLI.

Linux GUI

To recover the Global Mirror process follow the steps from 5.3.21, “Recovering a Metro Mirror Session using GUI” on page 185.

Note: You can only recover suspended session. Suspended state is achieved by suspending session (consistent targets).

By using the recover operation, the target volume on ESS 800 will become source volume.

Linux CLI

In this instance we will recover a session using interactive command line interface. In this example we will use Global Mirror Failover/Failback session we suspended earlier.

We can recover session with the `cmdsess` command as shown in Figure 5-204 on page 202. You can see that we have had to reply y to the prompt to confirm our request to recover the session. To turn this function off, you would need to utilize the `-quiet` parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action recover ESS800GMFB2
Are you sure you want to recover session ESS800GMFB2? [y/n]:y
IWNRI026I [Sep 6, 2006 11:40:22 PM] The runCommand for command Recover in
session ESS800GMFB2 completed successfully.
```

Figure 5-204 GM FOFB recover session

When we then check the session status again as shown in Figure 5-205, we discover a *normal* status. This is due to the fact that session is stopped and target volumes are available for host use.

```
csmcli> showsess ESS800GMFB2
Name      ESS800GMFB2
Type      Global Mirror Failover/Failback
State     Target Available
Status    Normal
Copy sets 2
Copying   Yes
Recoverable Yes
Error count 0
Description ESS800GMFB2

IWNRI500I [Sep 6, 2006 11:41:57 PM] The getSessionInfo command for session
ESS800GMFB2 completed successfully.
```

Figure 5-205 GM FOFB show session after recover

Once session is in target available state the secondary volumes are available for host access in consistency state.

Note: By using recover operation, the target volume on ESS 800 will become the source volume.

After a session is recovered in target available state the following options are available:

- ▶ Metro Mirror Single Direction
 - **Start** - this will reestablish copying
 - **Terminate** - this will terminate the session
- ▶ Metro Mirror Failover/Failback
 - **Start H2 → H1** - this will reestablish copying in opposite direction, from secondary to primary location
 - **Start H1 → H2** - this will reestablish copying in original direction, from primary to secondary location
 - **Terminate** - this will terminate the session

5.3.32 Terminating a Metro Mirror Session

In this section we discuss how to terminate a Global Mirror Session through the Linux GUI and CLI.

Linux GUI

To terminate the Metro Mirror process follow the steps from 5.2.20, “Terminate a Metro Mirror Session using GUI” on page 135.

Note: Session can be terminated anytime.

Linux CLI

In this instance we will terminate a session using the interactive command line interface. In this example we will use Metro Mirror Failover/Failback session we recovered earlier.

We can terminate session with the **cmdsess** command as shown in Figure 5-206. You can see that we have had to reply y to the prompt to confirm our request to terminate the session. To turn this function off, you would need to utilize the *-quiet* parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> cmdsess -action terminate ESS800GMFB2
Are you sure you want to terminate session ESS800GMFB2? [y/n]:y
IWNR1026I [Sep 6, 2006 11:49:20 PM] The runCommand for command Terminate in
session ESS800GMFB2 completed successfully.
```

Figure 5-206 GM FOFB terminate session

When we then check the session status again as shown in Figure 5-183 on page 190, we discover an *inactive* status. This is due to the fact that session is terminated and in defined state.

```
csmcli> showsess ESS800GMFB2
Name      ESS800GMFB2
Type      Global Mirror Failover/Failback
State     Defined
Status    Inactive
Copy sets 2
Copying   No
Recoverable No
Error count 0
Description ESS800GMFB2

IWNr1500I [Sep 6, 2006 11:50:09 PM] The getSessionInfo command for session
ESS800GMFB2 completed successfully.
```

Figure 5-207 GM FOFB show session after terminate

Note: By using the terminate operation while session is in prepared or suspended state, PPRC and FlashCopy relationships will be terminated.

After session is terminated the following options are available:

- ▶ Global Mirror Single Direction
 - **Start** - this will reestablish copying
- ▶ Global Mirror Failover/Failback
 - **Start H1 → H2** - this will reestablish copying in original direction, from primary to secondary location

5.3.33 Removing Copy Sets

In this section we discuss how to remove a Global Mirror Session through the Linux GUI and CLI.

Linux GUI

A Session can have one or more copy sets. To remove a copy set you need to select the session, in our example *ESS800FC1*, from which you want to remove copy sets. From the Sessions panel, select the **Remove Copy Sets** option from the drop-down menu as shown in Figure 5-208.

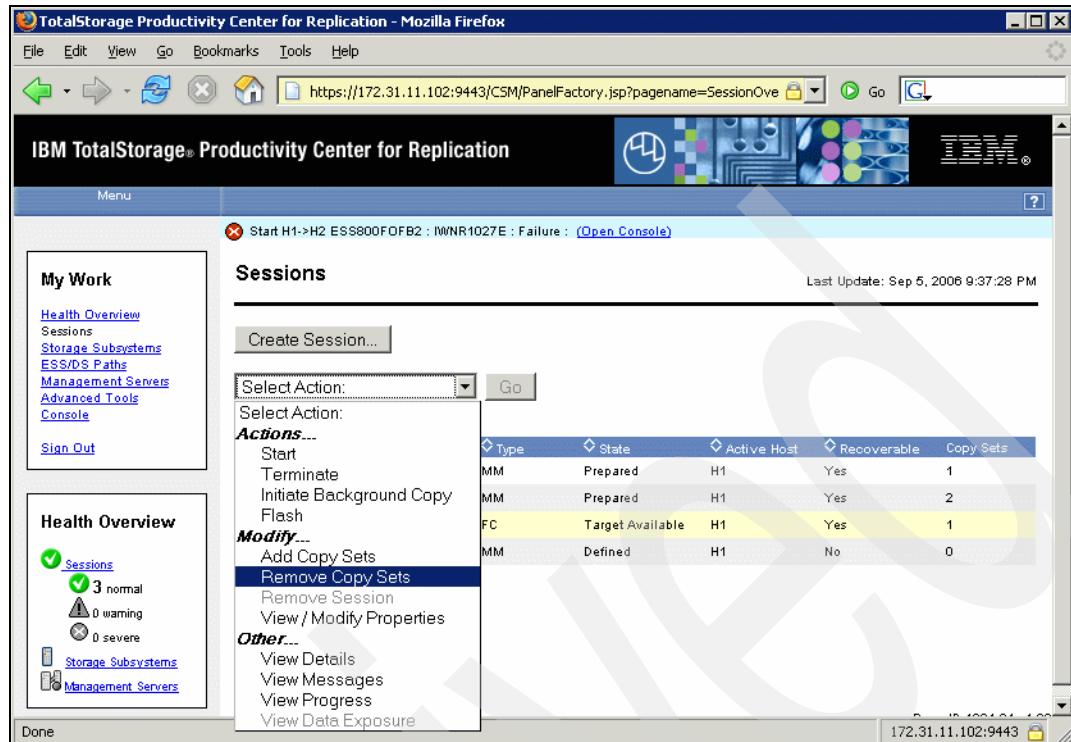


Figure 5-208 TPC for Replication Remove Copy Sets

Click the **Go** button to continue. This will open a new window where we will define which Copy Sets you want to remove as shown in Figure 5-209. In this window we define the source subsystems via the Select Action drop-down menu.

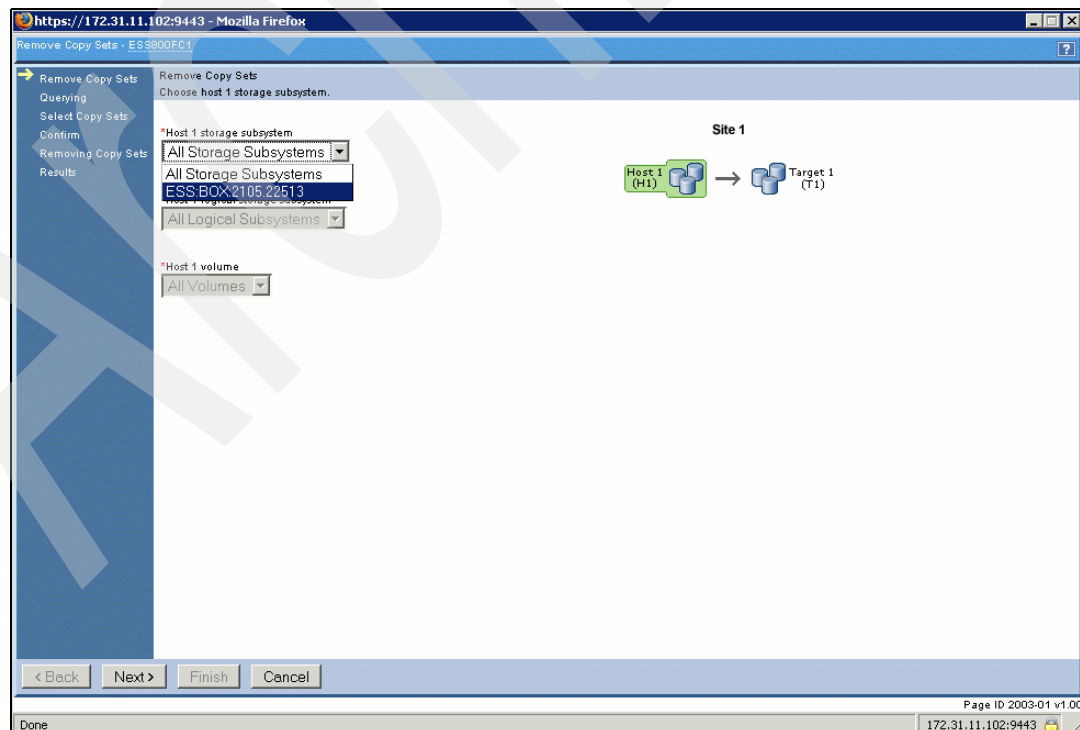


Figure 5-209 TPC for Replication Source ESS

Select your source ESS 800, in our example we selected *ESS:BOX:2105:22513*, and **Host 1 logical storage subsystem** pull-down menu will become available as shown in Figure 5-210.

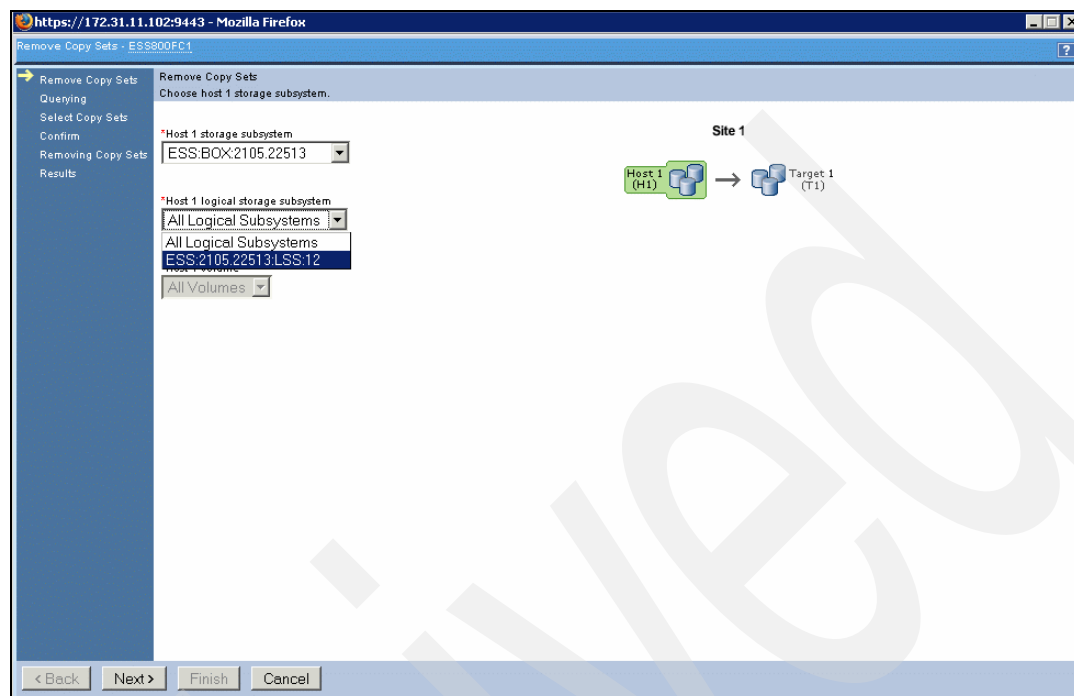


Figure 5-210 TPC for Replication Source ESS LSS

Only ESS Logical Subsystem (LSS) of the volumes from defined copy sets will be displayed. Select your source ESS Logical Subsystem (LSS), in our example we selected *ESS:2105.22513:LSS:12*, and **Host 1 volume** pull-down menu will become available as shown in Figure 5-211.

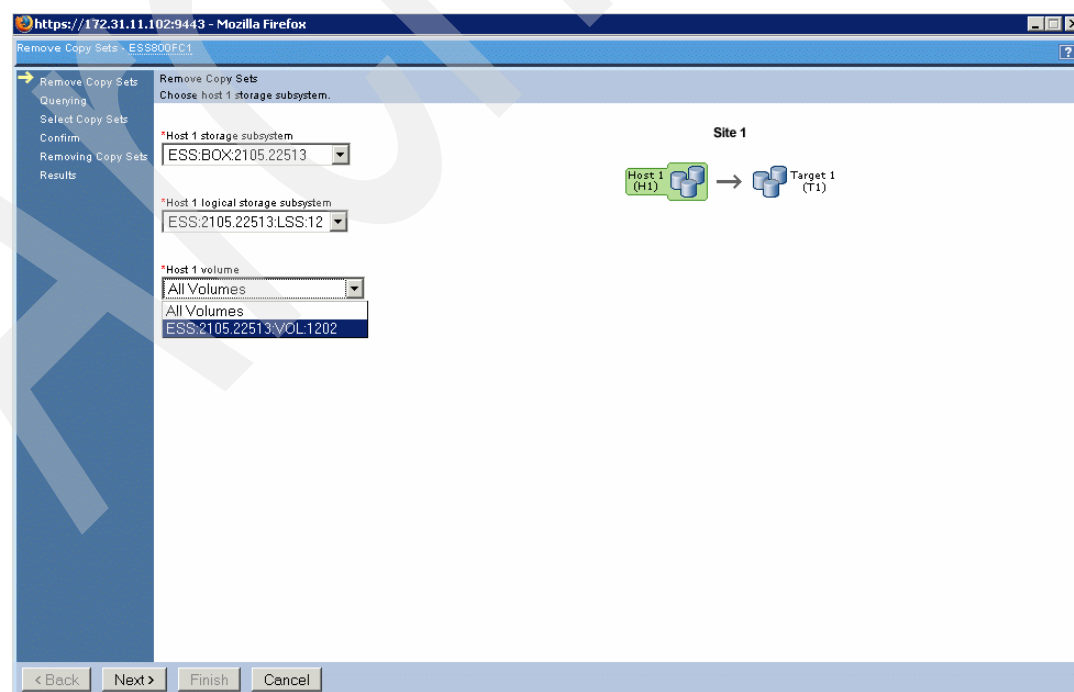


Figure 5-211 TPC for Replication ESS Source Volume

Only source volumes from defined copy sets will be displayed. Select your source volume, in our example we selected *ESS:2105.22513:VOL:1202* volume. Once the source volume is selected, click the **Next** button to proceed to the copy set selection. The window similar to Figure 5-212 will be displayed.

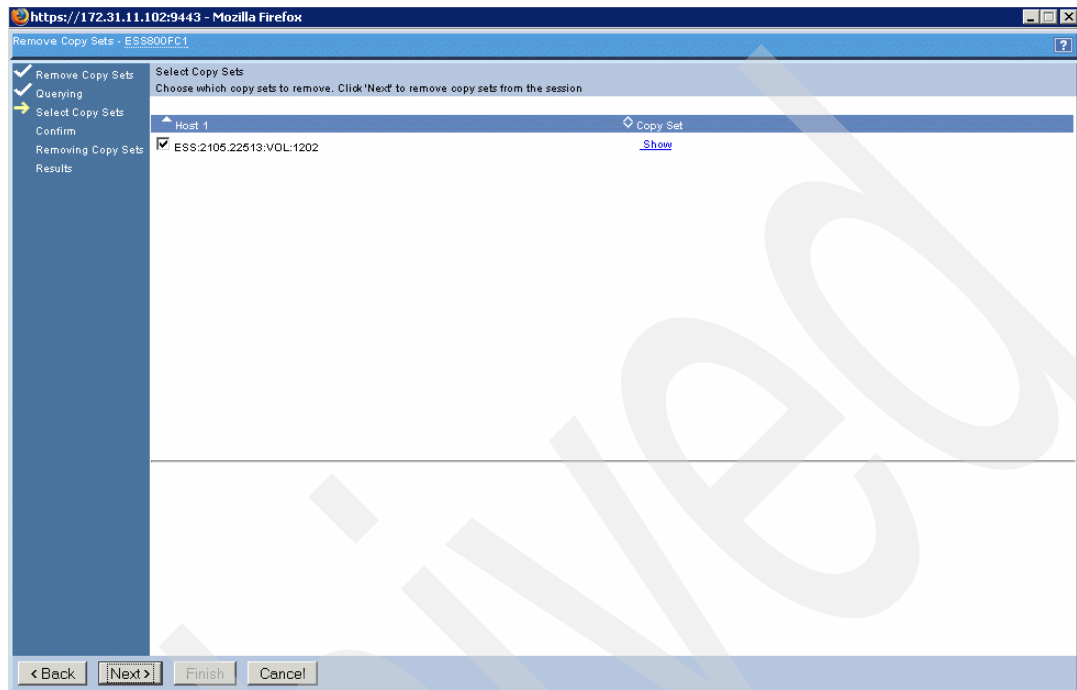


Figure 5-212 TPC for Replication Select Copy Set

The Copy Set is preselected, you just click **Next** to continue, the window similar to Figure 5-213 will be displayed.

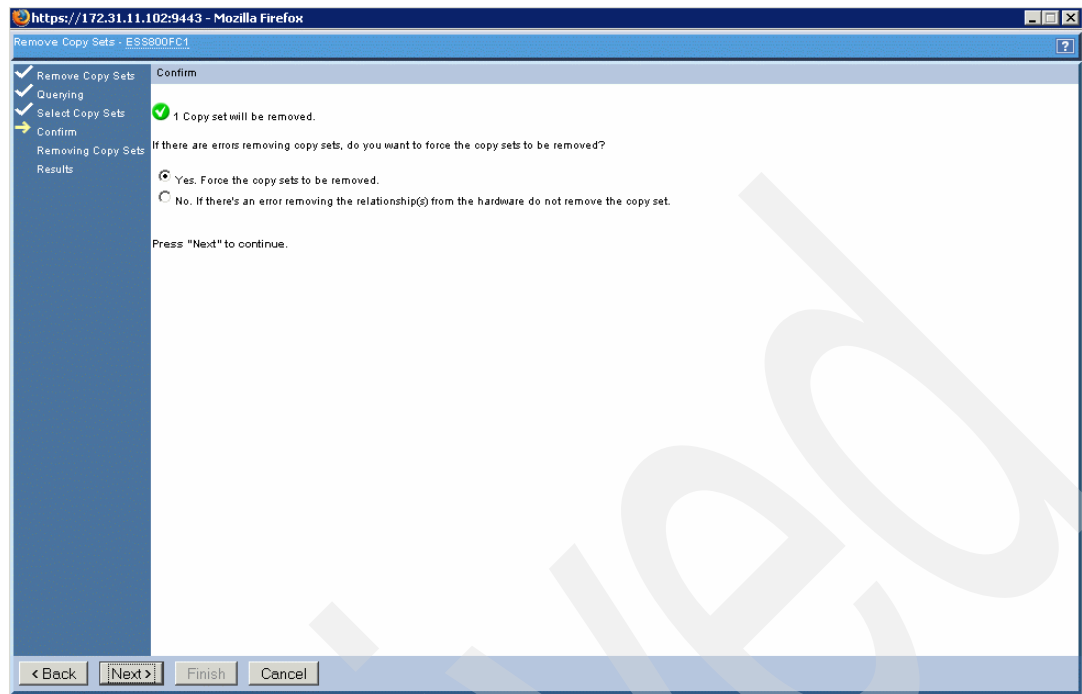


Figure 5-213 TPC for Replication Copy Set Confirm

On this window you have two options how to handle errors while removing the Copy Set:

- ▶ **Yes.** - Even if the copy sets were not removed because of hardware errors, it will be logically removed from session.
- ▶ **No.** - In case of hardware errors during copy sets removal, they will not be removed from session.

Once you selected your options click the **Next** button to continue. The window similar to Figure 5-214 on page 209 will be displayed.

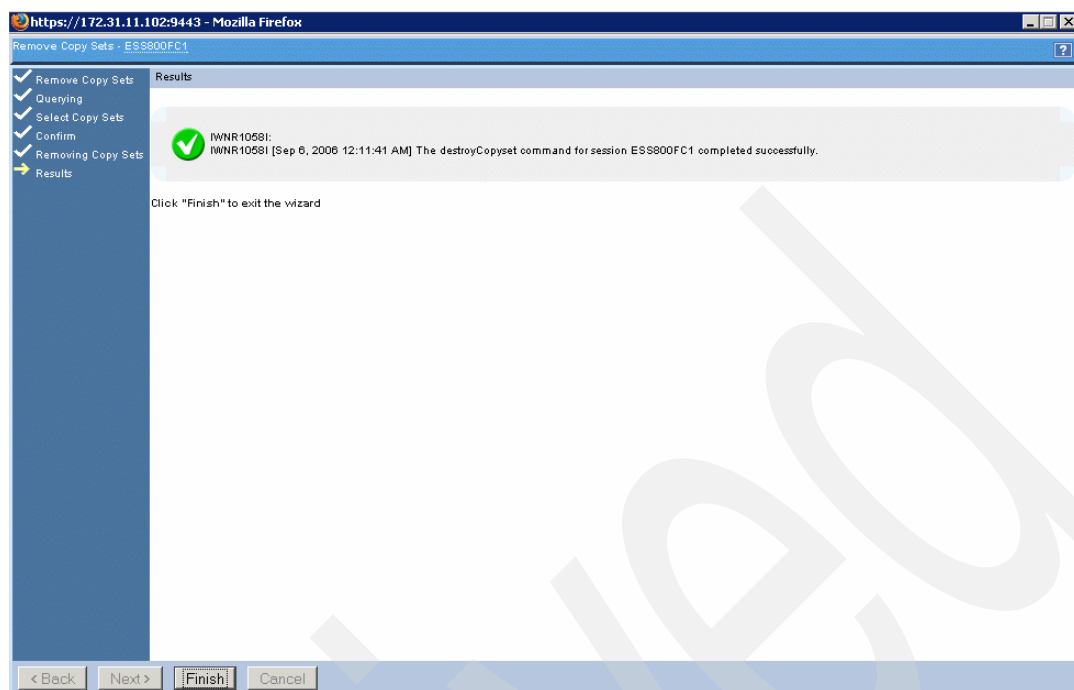


Figure 5-214 TPC for Replication Finish Adding Copy Sets

Finally, once you have achieved a successful add, click the **Finish** button to complete the task.

Linux CLI

In this instance we will remove the copy sets and list the session attributes as part of a single script. For this example we will use Metro Mirror Failover/Failback session we created earlier.

As we can see in Figure 5-216 on page 210, 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 of the copy sets in the session as seen in Figure 5-215, in our example we used session *ESS800FOFB2*.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> lscps -l ESS800FOFB2
H1 Volume          Session      Volumes
=====
ESS:2105.22513:VOL:1104 ESS800FOFB2  2
ESS:2105.22513:VOL:1105 ESS800FOFB2  2
```

Figure 5-215 List of session volumes

The volumes listed represent source volumes of the copy sets Metro Mirror Failover/Failback session *ESS800FOFB2*. In our example we have two copy sets in the session and volumes *ESS:2105.22513:VOL:1104* and *ESS:2105.22513:VOL:1105* as source volumes. We will remove copy set with *ESS:2105.22513:VOL:1104* as source volume using the **rmcpset** command as shown in Figure 5-216 on page 210.

```
# cat esscpremove.txt
#
# This is a script file
# Using commands to interrogate TPC 4 Rep
#
setoutput -v on
lscpset -l ESS800F0FB2
rmcpset -force -h1 ESS:2105.22513:VOL:1104 ESS800F0FB2
lscpset -l ESS800F0FB2
```

Figure 5-216 ESS remove copy set script

You can see that we have had to reply **y** to the prompt to confirm our request to remove the copy set from the session. To turn this function off, you would need to utilize the *-quiet* parameter as part of the command. We also used the **-force** flag to remove copy set even in the event of hardware error during removal. Output of the script is shown in Figure 5-217.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh -script /tpcrm/esscpremove.txt
H1 Volume                Session      Volumes
=====
ESS:2105.22513:VOL:1104 ESS800F0FB2      2
ESS:2105.22513:VOL:1105 ESS800F0FB2      2
Are you sure you want to remove copy set ESS:2105.22513:VOL:1104? [y/n]:y
IWNR2002I [Sep 6, 2006 1:23:03 AM] The pair was successfully deleted in session
ESS800F0FB2 for copy set ESS:2105.22513:VOL:1104 with source
ESS:2105.22513:VOL:1104 and target ESS:2105.22513:VOL:121A.
IWNR1095I [Sep 6, 2006 1:23:03 AM] Copy set ESS:2105.22513:VOL:1104 in session
ESS800F0FB2 was successfully deleted.
H1 Volume                Session      Volumes
=====
ESS:2105.22513:VOL:1105 ESS800F0FB2      2
```

Figure 5-217 ESS remove copy set script output

As you can see at the end of script output we only have one copy set left in the session.

5.3.34 Removing a session

In this section we show you how to add a FlashCopy and Metro Mirror Failover/Failback session using both the GUI and the CLI.

Linux GUI

To remove the session, select the desired session from Sessions panel - in our example *ESS800FC1*.

Note: The session can be removed when in it is terminated or in defined state.

From the Select Action pull-down menu, select **Remove session** and click **Go**, as shown in Figure 5-218 on page 211.

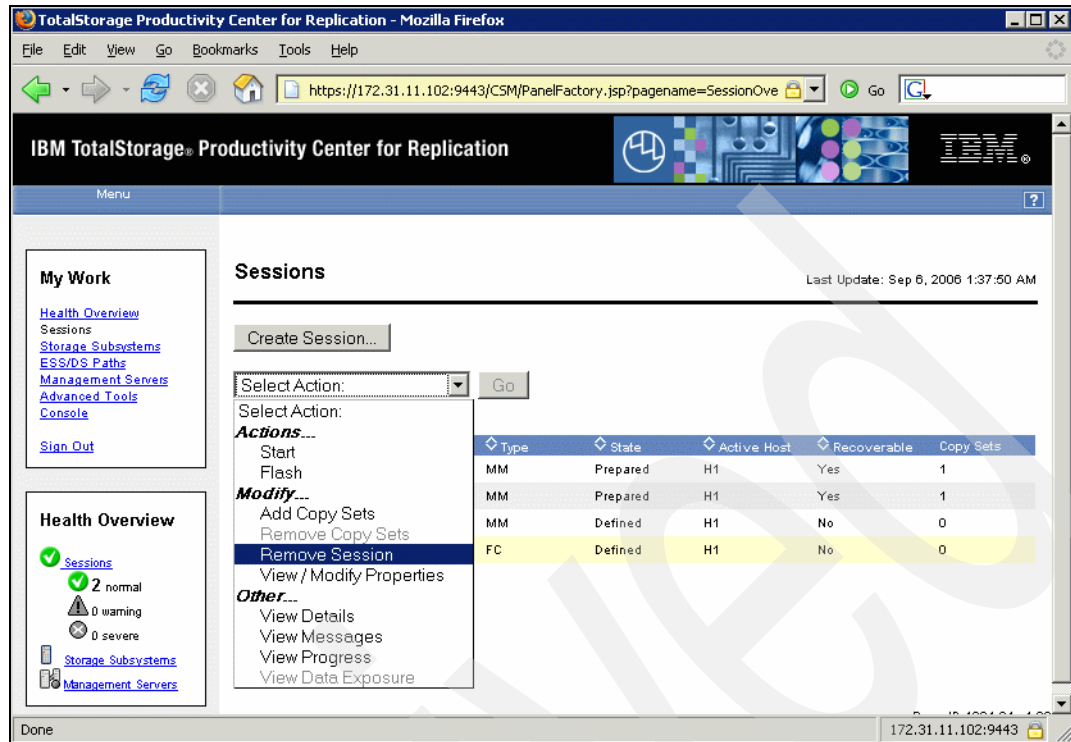


Figure 5-218 TPC for Replication Remove Session

The selected session will be removed as shown in Figure 5-219.

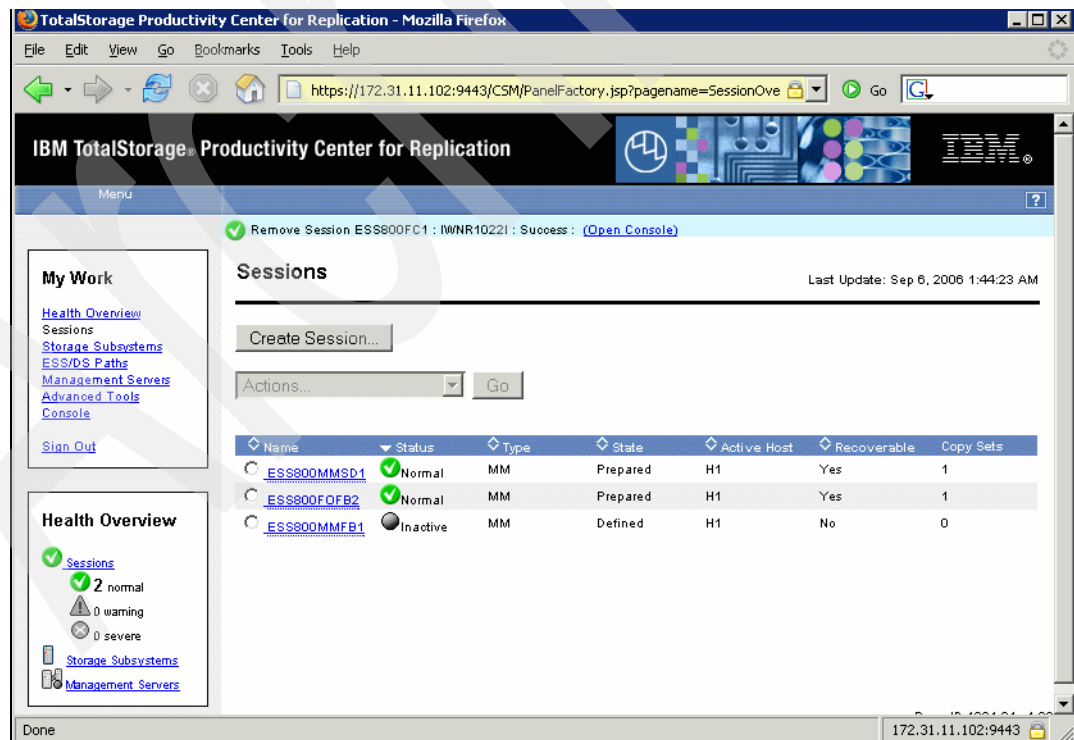


Figure 5-219 TPC for Replication Session Removed

Linux CLI

In this instance we will remove a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session *ESS800FOFB2* we defined earlier.

We can terminate session with the **rmsess** command as shown in Figure 5-220. You can see that we have had to reply y to the prompt to confirm our request to terminate the session. To turn this function off, you would need to utilize the *-quiet* parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> rmsess ESS800FOFB2
Are you sure you want to remove session ESS800FOFB2? [y/n]:y
IWNR1022I [Sep 6, 2006 1:54:40 AM] Session ESS800FOFB2 was successfully
deleted.
```

Figure 5-220 MM FOFB remove session

When we then check the session the list of sessions as shown in Figure 5-183 on page 190, we discover the *ESS800FOFB2* is not available.

```
csmcli> lsess -l
Name      Status  State  Copy type                Recoverable Copying Copy sets Error
=====
ESS800MMSD1 Normal   Prepared Metro Mirror Single Direction Yes      Yes      1 No
ESS800MMFB1 Inactive Defined  Metro Mirror Failover/Failback No       No       0 No
```

Figure 5-221 MM FOFB show session after remove

5.3.35 Viewing or modifying session properties

In this section we show how to View and Modify properties using the GUI and the CLI.

Linux GUI

To remove the session, select the desired session from the Sessions panel - in our example *ESS800FC1*.

Note: The session can be removed when in it is terminated or in defined state.

From the pull-down menu, select **Remove session** and click **Go**, as shown in Figure 5-218 on page 211.

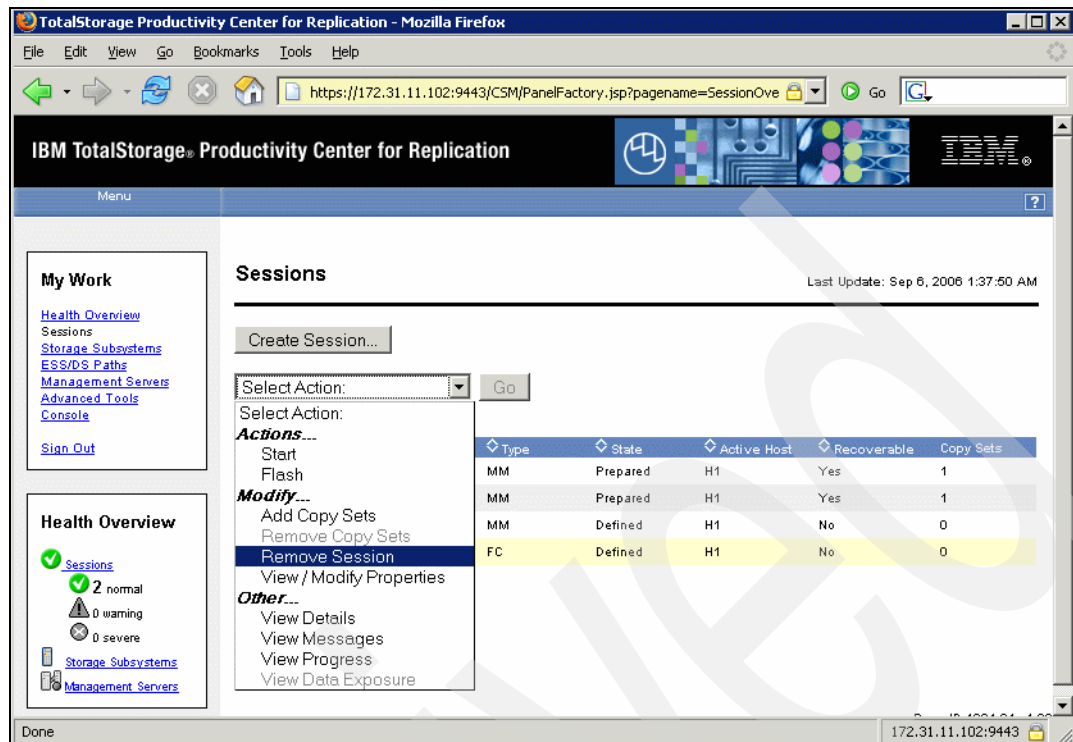


Figure 5-222 TPC for Replication remove session

The selected session will be removed as shown in Figure 5-223.

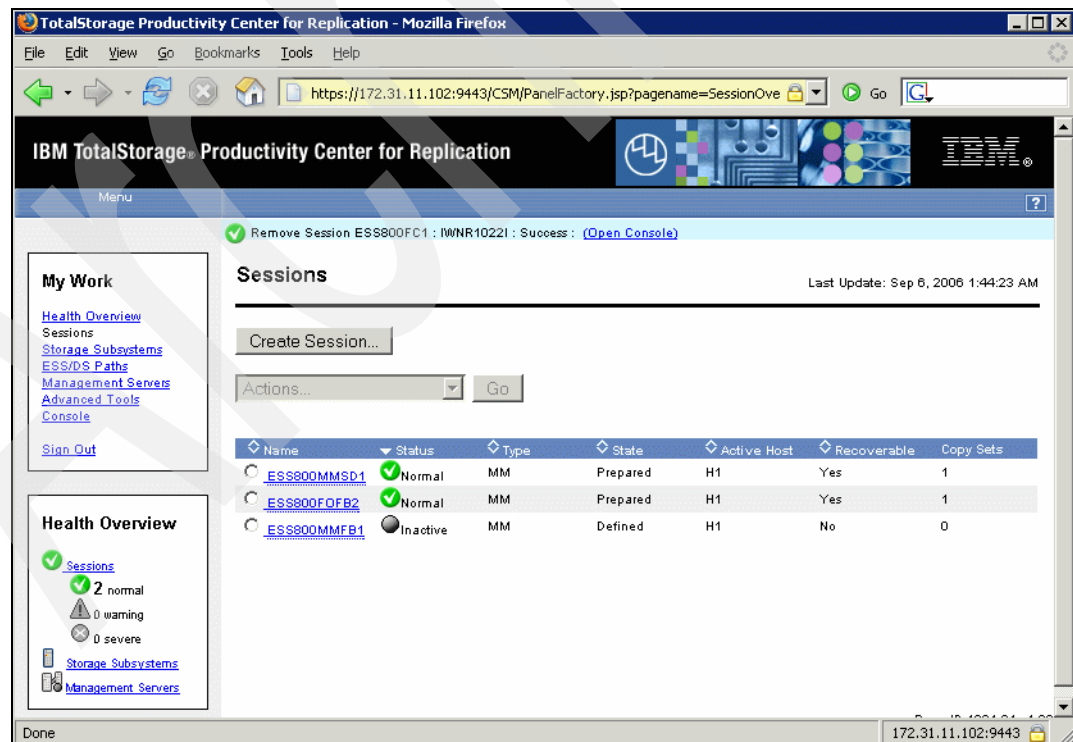


Figure 5-223 TPC for Replication session removed

Linux CLI

n this instance we will remove a session using interactive command line interface. In this example we will use Metro Mirror Failover/Failback session *ESS800FOFB2* we defined earlier.

We can terminate session with the **rmsess** command as shown in Figure 5-220 on page 212. You can see that we have had to reply y to the prompt to confirm our request to terminate the session. To turn this function off, you would need to utilize the *-quiet* parameter as part of the command.

```
# pwd
/opt/IBM/TPC-RM
# ./csmcli.sh
csmcli> rmsess ESS800FOFB2
Are you sure you want to remove session ESS800FOFB2? [y/n]:y
IWNR1022I [Sep 6, 2006 1:54:40 AM] Session ESS800FOFB2 was successfully
deleted.
```

Figure 5-224 MM FOFB remove session

When we then check the session the list of sessions as shown in Figure 5-183 on page 190, we discover the *ESS800FOFB2* is not available.

```
csmcli> lsess -l
Name      Status  State  Copy type      Recoverable Copying Copy sets Error
=====
ESS800MMSD1 Normal   Prepared Metro Mirror Single Direction Yes      Yes      1 No
ESS800MMFB1 Inactive Defined Metro Mirror Failover/Failback No       No       0 No
```

Figure 5-225 MM FOFB show session after remove



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.

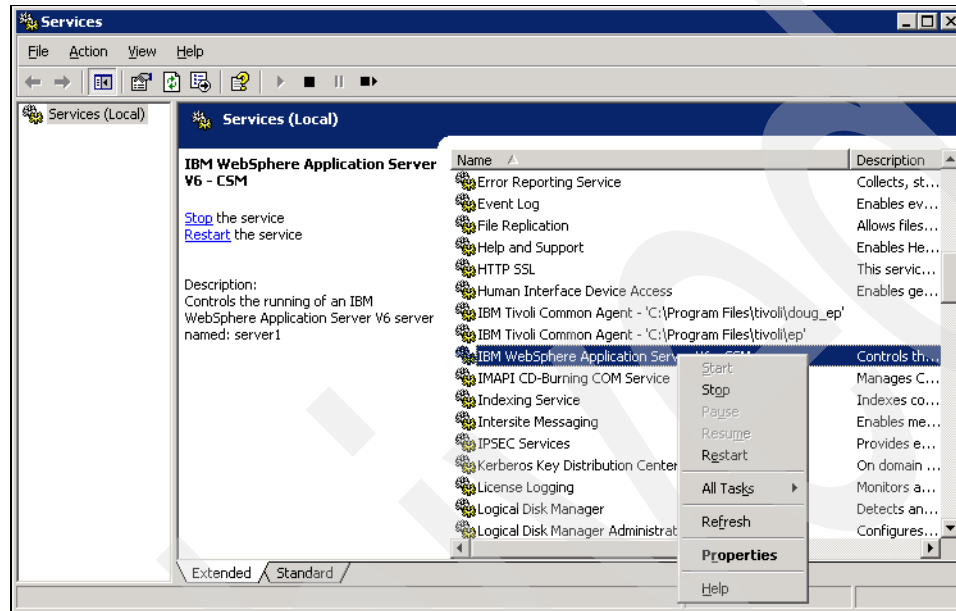


Figure 6-1 Stopping WebSphere

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 217.

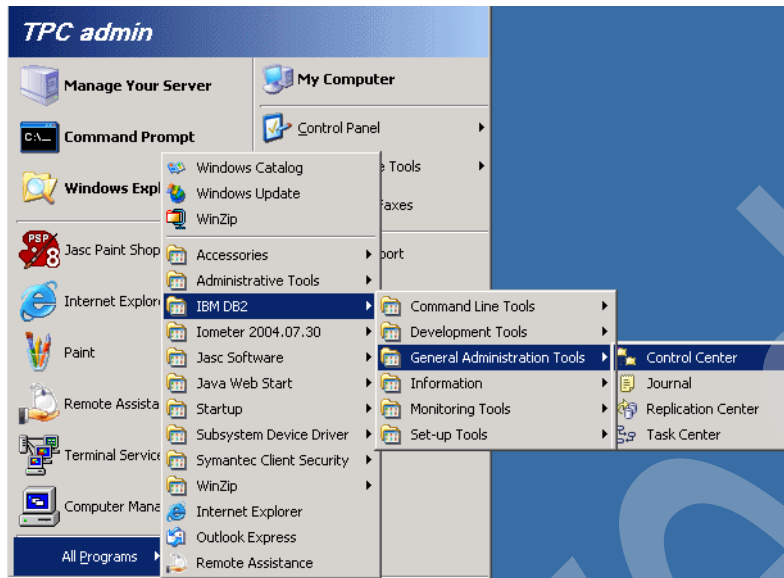


Figure 6-2 Starting DB2 Control Center

Accept the defaults and click **OK** on the Control Center View window, as shown in Figure 6-3.

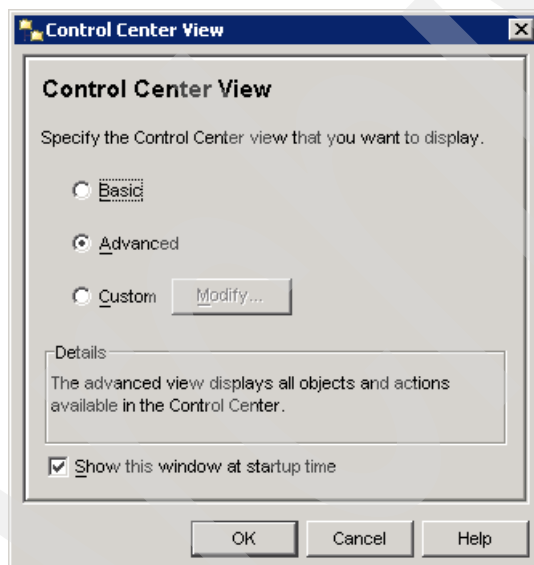


Figure 6-3 Control Center View

On the Control Center Panel, click **All Databases**, then right-click **TPCRM**, and select **Drop**, as shown in Figure 6-4 on page 218.

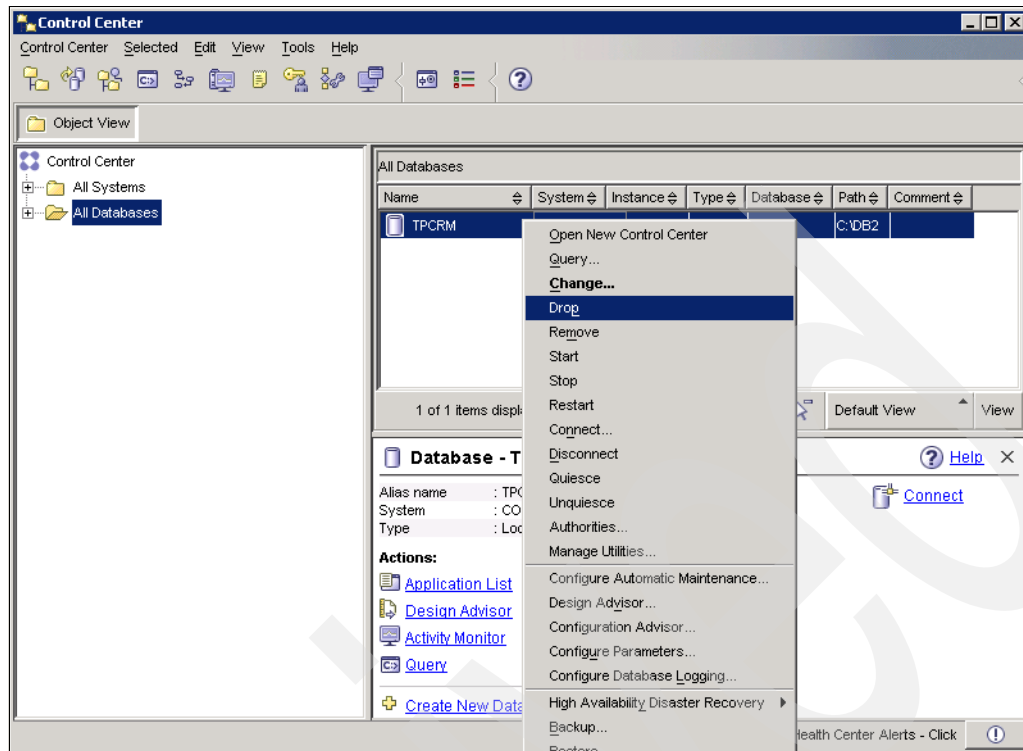


Figure 6-4 Dropping TPCRM database

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 219 and Example 6-8 on page 219. 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 219. 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.

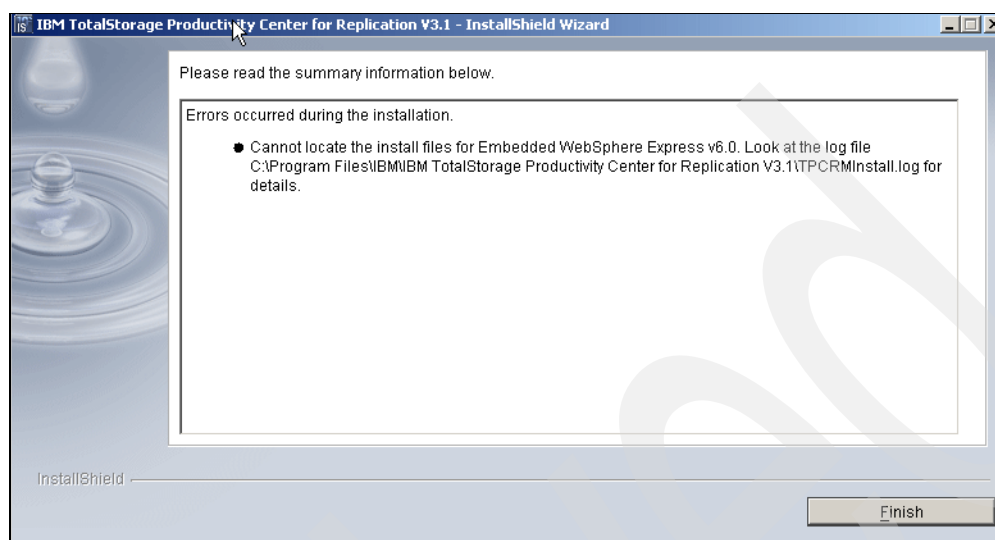


Figure 6-5 Installation failure message

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 versus TPC for Replication Two Site BC

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 224. 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.SnmNotification 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.

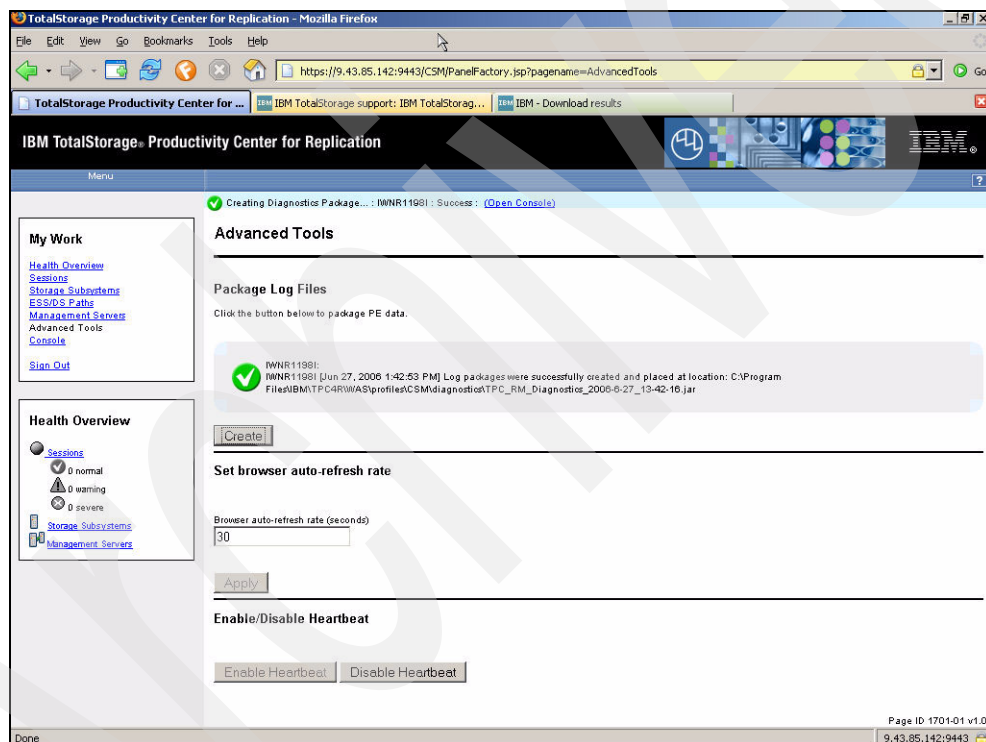


Figure 6-7 Log package creation

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.

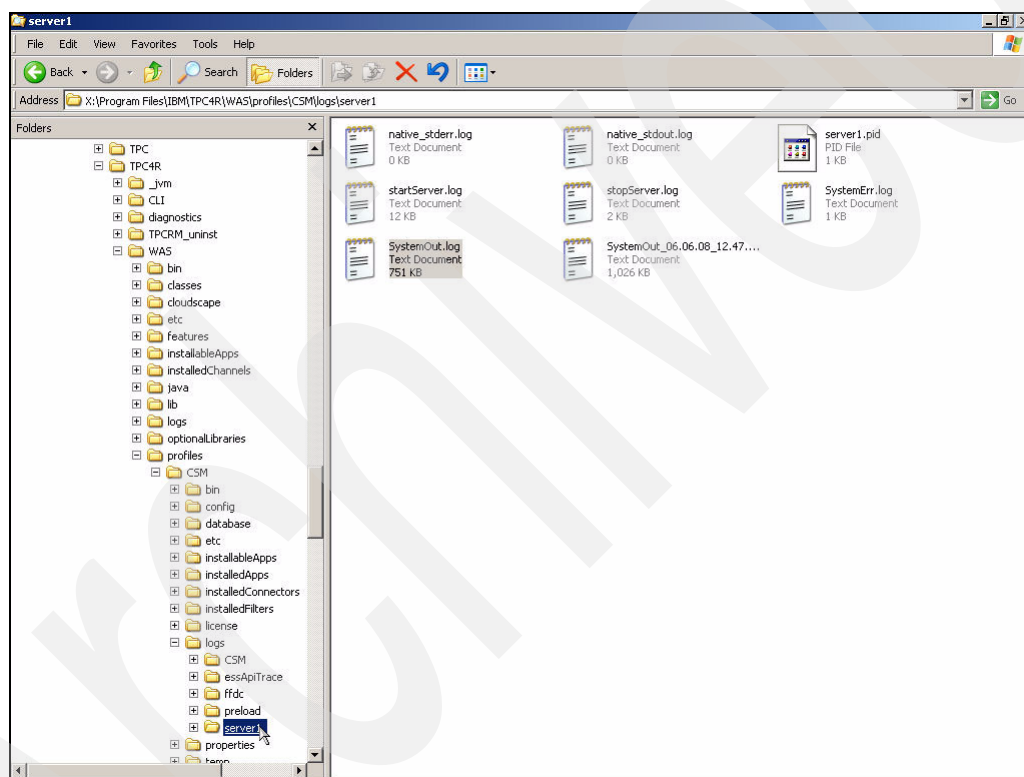


Figure 6-8 WAS logs

Additionally as shown in Figure 6-9 on page 224, the various CSM trace files provide a useful diagnostic tool.

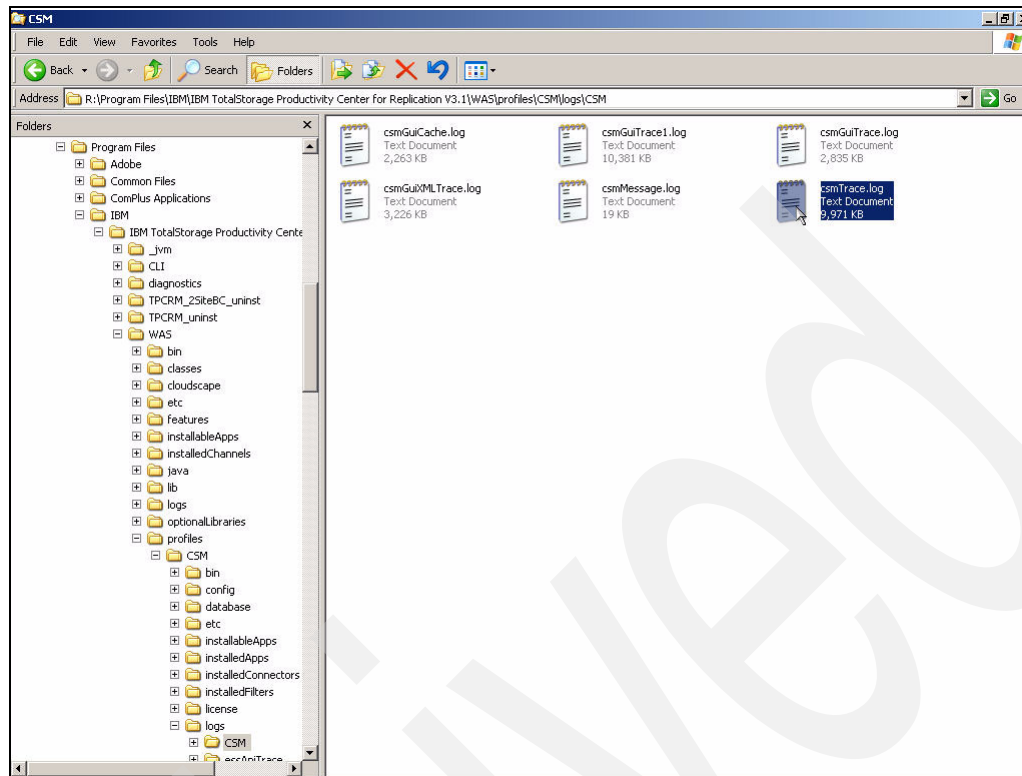


Figure 6-9 CSM trace files

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 book.

IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 225. 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 Windows 2003*, SG24-7250

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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**Effectively use
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for Replication**

**Manage replication
services from one
interface**

**Install and configure
on Linux**

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.

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