



## IBM Tivoli Storage Productivity Center V4.1 Release Guide

Exploit customized reports, Single Sign-On, and storage optimization

Learn the new features and functions in TPC V4.1

Implement TPC V4.1 on supported platforms

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International Technical Support Organization

#### IBM Tivoli Storage Productivity Center V4.1 Release Guide

February 2010

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

#### First Edition (February 2010)

This edition applies to Version 4, Release 1, Modification 0 of IBM Tivoli Storage Productivity Center (product numbers 5608-WB1, 5608-WC0, 5608-WC3, and 5608-WC4).

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### Preface

IBM® Tivoli® Storage Productivity Center is a storage infrastructure management software product that can centralize, automate, and simplify the management of complex and heterogeneous storage environments.

This IBM Redbooks® publication is intended for administrators or users who are installing and using IBM Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication. It describes the hardware and software requirements for installing the products and provides an overview of the installation procedures.

The new features and functions introduced in this version are also covered, as well as working scenarios showing how to take advantage of the product.

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## Tivoli Storage Productivity Center architecture and functional overview

In this chapter, we introduce Tivoli Storage Productivity Center. We provide a high-level technical introduction to IBM Tivoli Storage Productivity Center, its architecture, and base components.

We discuss these topics:

- Introduction to IBM Tivoli Storage Productivity Center
- Architecture
- What is new in Tivoli Storage Productivity Center since Version 3.1
- Functions no longer supported
- Product features

#### 1.1 Introduction to IBM Tivoli Storage Productivity Center

IBM Tivoli Storage Productivity Center is designed to provide a comprehensive storage management solution for heterogeneous storage environments across the enterprise. It is the primary IBM operational management product within the Tivoli Service Management architecture.

Tivoli Storage Productivity Center includes:

- Storage resource management (SRM):
  - Reporting of volumes and file systems on a server level
  - Reporting on NAS and NetWare file systems
  - Reporting of databases capacity and usage
  - Constraint and quota reporting
- Storage subsystem management:
  - Volume allocation and assignment (provisioning)
  - Asset reporting
  - Performance reporting
  - DS8000® element management
- Fabric management:
  - Zoning
  - Asset reporting
  - Performance reporting
- Replication management
- Basic tape library reporting

In addition to these basic functions, Tivoli Storage Productivity Center includes more advanced functions that provide you with a set of analytics functions such as:

- Topology Viewer
- ► Data Path explorer
- Configuration History
- Storage Optimizer
- SAN Planner
- Configuration Analytics

#### 1.1.1 History of Tivoli Productivity Center

Tivoli Storage Productivity Center started as a suite of individual products that focus on various storage management tasks across the enterprise.

In Tivoli Storage Productivity Center V3.x, the individual products were combined into one and a new product (Tivoli Storage Productivity Center for Replication) was added to the Tivoli Storage Productivity Center suite of products.

With Tivoli Storage Productivity Center V4.x, the integration of TPC for Replication (TPC-R) starts with both Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication being installed together. Also, a Navigation Tree item with launch points from TPC to TPC-R, as well as mapping of the TPC superuser role to the TPC-R administrator role, are the most obvious changes.

#### 1.1.2 IBM Tivoli Productivity Center licenses

In this section, we review the Licenses for Tivoli Storage Productivity Center.

#### IBM Tivoli Storage Productivity Center Basic Edition V4.1

IBM Tivoli Storage Productivity Center Basic Edition V4.1 provides basic storage management for SAN-attached storage devices and the networks to which they are connected. It provides device asset information, connectivity, capacity data, and health and status monitoring for the supported devices. If you have a license for Tivoli Storage Productivity Center Basic Edition installed, you can upgrade to advanced features by the simple procedure of installing a license file on the console where the software is running.

#### IBM Tivoli Storage Productivity Center for Data V4.1

IBM Tivoli Storage Productivity Center for Data V4.1 provides file-level capacity management for servers connected to a SAN infrastructure. It is designed to enable the administrator to create detailed reports on storage availability and utilization by server, operating system, user, and database application. Policy-based alerts can be configured to notify the administrator when the utilization of a selected volume exceeds a predefined threshold, and integration with Tivoli Storage Manager helps the administrator to reclaim space on the volume by deleting unneeded data or selecting it for archive.

#### IBM Tivoli Storage Productivity Center for Disk V4.1

Tivoli Storage Productivity Center for Disk V4.1 is designed to provide storage device configuration and management from a single console. It includes performance capabilities to help monitor and manage performance, and measure service levels by storing received performance statistics into database tables for later use. Policy-based automation enables event action based on customer policies. It sets performance thresholds for the devices based on selected performance metrics, generating alerts when those thresholds are exceeded. Tivoli Storage Productivity Center for Disk V4.1 helps simplify the complexity of managing multiple SAN-attached storage devices.

#### IBM Tivoli Storage Productivity Center for Replication V4.1

IBM Tivoli Storage Productivity Center for Replication V4.1 is designed to support hundreds of replication sessions across thousands of volumes, supporting both open and z/OS attached volumes. In addition, it helps monitor performance of all copy session types and reports on the amount of data exposed at the disaster recovery site (not in synchronization with the source site). The IBM Tivoli Storage Productivity Center for Replication Three-Site BC feature optionally provides three-site recovery management, supporting the IBM System Storage DS8000 Metro Global Mirror feature. The Three-Site feature is designed to support fast failover and failback, fast reestablishment of three-site mirroring, data currency at the remote site with minimal lag behind the local site, and quick resynchronization of mirrored sites using incremental changes only.

#### **IBM** Tivoli Storage Productivity Center Standard Edition V4.1

IBM Tivoli Storage Productivity Center Standard Edition V4.1 provides over 400 enterprise-wide reports, monitoring and alerts, policy-based action, and file-system capacity automation in a heterogeneous environment. You can address the challenges of an on demand environment with customizable storage-management policies that are designed to help manage key aspects of the storage infrastructure including capacity, assets, events, and availability. It provides a suite of tools to help enterprises identify, evaluate, control, and predict storage usage and growth. IBM Tivoli Storage Productivity Center Standard Edition V4.1 offers active, policy-based management for an automated, self-healing approach to storage resource management.

#### **IBM System Storage Productivity Center**

The IBM System Storage Productivity Center (SSPC) is an integrated offering designed to provide a consolidated focal point for managing IBM storage products as well as managing mixed-vendor storage environments. SSPC provides enhancements to daily storage administration by making available a broader set of configuration functions. SSPC provides the GUI and utilities to configure these devices and enhancements to provide a broader set of management functions. The SSPC combines the power of a customized IBM System x® server with preinstalled storage software that represents a significant point of centralized management. SSPC enhances several rudimentary device utilities for easier, more intuitive, context-based administration and, on the whole, lowers resource overhead.

The IBM System Storage Productivity Center comes pre-installed with IBM TotalStorage Productivity Center Basic Edition. However, the purchase of the SSPC does not include the software license or entitlement to this software.

#### 1.1.3 Main focus of TPC: Reporting

One of the main focus areas of IBM Tivoli Storage Productivity Center is reporting. TPC provides a wide range of reports, alerts, and policy-based action. Starting with Version 4.1, in addition to the possibility of customizing the provided reports (in terms of adding, removing, and changing columns), you can now also create your own reports by using SQL commands that use a special database schema called TPCREPORT. This feature enables enhanced customization as well as integration with other applications.

The standardized reports provide information about file systems, databases, and storage infrastructure. Depending on the type of manager or management function used, the following types of reports are available (see Table 1-1).

Туре	Data	Databases	Disk	Fabric	Таре
Asset	x	x	included in data manager	included in TPC System reports	
Availability	x				
Capacity	x	x			
Usage	x	x			
Usage violation	x	x			
Backup	x				
Performance			x	x	
Special reports			subsystem details		tape library overview

Table 1-1 Report types by manager

From a high level perspective, TPC reporting consists of ways to import information into its database as well as ways to extract data from this repository. The diagram in Figure 1-1 provides a brief overview of the information gathering and extracting with TPC. We explain the functions and jobs later in this book.



Figure 1-1 TPC repository report gathering and types

This diagram does not differentiate between the various sources of the data such as agents, CIMOMs, hypervisor, or other TPC servers. Instead, this diagram shows the information gathering and extracting from a functional point of view.

#### **1.2 Architecture**

The basic architecture of TPC has not changed dramatically since Version 3, but the infrastructure that TPC is using, and is integrated with, has changed in Version 4.

#### 1.2.1 Data Server and Device Server

The main components of TPC are the Data Server and the Device Server, which work together and act as the TPC server. Both the Data Server and the Device Server run as a separate process and access the TPC database that is running inside a DB2 instance.

#### 1.2.2 Tivoli Integrated Portal

Because Tivoli Storage Productivity Center V4 is integrated into the Tivoli Integrated Portal (TIP), the TIP provides the following optional services to TPC:

- ► Single Sign-On
- Tivoli Common Reporting

#### 1.2.3 Tivoli Storage Productivity Center for Replication

With TPC Version 4.1, the IBM Tivoli Storage Productivity Center for Replication product is starting to get integrated into TPC, even though currently the integration limited to basic functions such as providing Launch in Context links in the TPC GUI, as well as crosschecks when a volume is deleted with TPC and mapping of user roles.

#### 1.2.4 Information sources

Outside of the server, there are several interfaces that are used to gather information about the environment. The most important sources of information are the TPC agents (Data agent, Fabric agent, and the new Storage Resource agent) as well as SMI-S enabled storage devices that use a CIMOM agent (either embedded or as a proxy agent).

#### Agents

In addition to TIP, TPC uses the Tivoli Agent Manager for a certificate based authentication between the Common Agent based TPC agents (the Data agent and Fabric agent) and the TPC server itself using the Secure Sockets Layer (SSL) protocol. The Storage Resource agents do not use the Tivoli agent framework.



Figure 1-2 illustrates an architectural overview for IBM Tivoli Storage Productivity Center.

Figure 1-2 IBM Tivoli Storage Productivity Center Version 4.1 - Architecture Overview

The architectural diagram provides a logical overview of the main conceptual elements and relationships in the architecture, components, connections, users, and external systems. The diagram also shows the various methods used to collect information from multiple systems to give an administrator the necessary views on the environment, for example:

- Agent Manager with its registry repository
- Software clients (agents)
- Standard interfaces and protocols (for example, Simple Network Management Protocol)
- Common Information Model (CIMOM agent)
- Repository

#### 1.2.5 Data Manager and Device Manager

The server is the center of TPC's architecture and directs all of the activities related to the monitoring performed on the monitored agent computers and the reporting performed on the client GUI computers. As mentioned earlier, the server consists of the two managers: the Data Manager and the Device Manager. The server interacts with the enterprise repository, job scheduler, agents, and agent manager (for authorization and authentication of agents).

#### Database repository: DB2

The managers receive information from the agents and save that information in the repository. The repository is where all of your storage information and usage statistics are stored. All agent and user interface access to the central repository is done through a series of calls and requests made to the server.

All database access is done using the server component to maximize performance and to eliminate the need to install database connectivity software on your agent and UI machines.

#### 1.2.6 User interfaces

As TPC gathers information from your storage (servers, subsystems, and switches) across your enterprise, it accumulates a repository of knowledge about your storage assets and how they are used. You can use the reports provided in the user interface view and analyze that repository of information from various perspectives to gain insight into the use of storage across your enterprise.

The user interfaces (UI) enables users to request information and then generate and display reports based on that information. Certain user interfaces can also be used for configuration of TPC or storage provisioning for supported devices.

The following interfaces are available for TPC:

► TPC GUI:

This is the central point of TPC administration. Here you have the choice of configuring TPC after installation, define jobs to gather information, initiate provisioning functions, view reports, and work with the advanced analytics functions.

► Java<sup>™</sup> Web Start GUI:

When you use Java Web Start, the regular TPC GUI will be downloaded to your workstation and started automatically, so you do not have to install the GUI separately. The main reason for using the Java Web Start is that it can be integrated into other products (for example, TIP). By using Launch in Context from those products, you will be guided directly to the select panel. The Launch in Context URLs can also be assembled manually and be used as bookmarks.

► TPCTOOL:

This is a command line (CLI) based program which interacts with the TPC Device Server. Most frequently it is used is to extract performance data from the TPC repository database in order to create graphs and charts with multiple metrics, with various unit types and for multiple entities (for example, Subsystems, Volumes, Controller, Arrays) using charting software. Commands are entered as lines of text (that is, sequences of types of characters) and output can be received as text.

Furthermore, the tool provides queries, management, and reporting capabilities, but you cannot initiate Discoveries, Probes and performance collection from the tool.

Database access (for example JDBC):

Starting with TPC V4.1, the TPC database provides views that provide access to the data stored in the repository, which allows you to create customized reports. The views and the required functions are grouped together into a database schema called TPCREPORT. For this, you need to have sufficient knowledge about SQL. To access the views, DB2 supports various interfaces, for example, JDBC and ODBC.

#### 1.2.7 Tivoli Integrated Portal (TIP)

Tivoli Integrated Portal is a standards-based architecture for Web administration. Tivoli Integrated Portal enables developers to build administrative interfaces for IBM and independent software products as individual plug-ins to a common console network. The installation of Tivoli Integrated Portal is required to enable Single Sign-On for Tivoli Storage Productivity Center.

#### Single Sign-On

Single Sign-On is an authentication process that enables you to enter one user ID and password to access multiple applications. Single Sign-On integrates with the Launch in Context feature to enable you to move smoothly from one application to a specific location in a second application.

#### **Tivoli Common Reporting**

Tivoli Common Reporting (TCR) is a component provided by TIP. It is one possible option to implement customized reporting solutions using SQL database access, providing output in HTML, PDF or Microsoft® Excel.

Note that Tivoli Common Reporting is intended to provide a platform to reproduce custom reports in an easy way or for reports that are to be run repeatedly—typically on a daily, weekly, or monthly basis. It does not provide any online report creation or report customization features.

#### 1.2.8 IBM Tivoli Storage Productivity Center for Replication

TPC for Replication (TPC-R) 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 the progress of all key tasks. Your IT experts can use a single integrated tool for advanced copy management of IBM storage subsystems, in order to save administrators time and effort.

The basic functions of TPC for Replication provide management of FlashCopy®, Metro Mirror, and Global Mirror capabilities for the IBM ESS Model 800, IBM DS6000<sup>™</sup>, and IBM DS8000. It also manages FlashCopy and MetroMirror for IBM System Storage SAN Volume Controller (SVC).

IBM Tivoli Storage Productivity Center for Replication for System z® provides all the functions as the two Tivoli Storage Productivity Center for Replication open systems products. It is packaged to run on System z, using a mixture of FICON® and TCP/IP communications, to provide replication management of DS8000, DS6000, and ESS 800, regardless of the type of data on them (ECKD<sup>™</sup> or FBA).

#### 1.2.9 Tivoli Storage Productivity Center agents

Agents are used to collect statistics about your storage and send that information to the centralized Data Manager component. Depending the information required and the target device TPC uses various types of agents:

- Data agent
- Fabric agent
- Storage Resource agent
- CIM agents
- SNMP agents
- Universal Agent

In general, agents receive jobs to run from a server's scheduling service and then contact the server for the job definition. After this has successfully completed, no further communication to the server is required until the job completes.

#### Data agents

An agent is installed on each machine containing storage that must be monitored. These agents can perform various tasks that include probes, file system scans, and batch job processing.

The most important functions of the agents are:

- Keeping track of information, such as the uptime and downtime of the machine on which the agent is running
- Returning information to the server from the Scans and Probes on file systems
- Returning information to the server from the Scans and Probes on databases

#### **Fabric agents**

A special in-band Fabric agent collects information about the SAN and sends that information to the IBM Tivoli Storage Productivity Center server. The in-band Fabric agent is capable of gathering topology information for the entire fabric. To gather host-level and detailed Host Bus Adapter (HBA) information, the agent must be installed on each host where that information is desired.

#### Storage Resource agent (SRA)

Storage Resource agents can collect information from computer systems (host systems) on which they are installed. Information is collected through Probe jobs. These agents are designed to be more lightweight and easier to install or deploy than the Data agents.

In contrast to the Data agents a SRA cannot perform any more functions than a Probe, for example, Scans or Batch Reports are not possible with the SRAs delivered in TPC Tivoli Storage Productivity Center V4.1.

#### **CIM** agent

TPC uses a Common Information Model - Object Manager (CIMOM) agent to gather information about storage subsystem controllers and switches. The communication is based on the Storage Management Interface specification (SMI-S), which standardizes the type of information and the communication between TPC and the CIM agent.

A CIM agent can run either as en embedded service in a storage device (disk, tape or switch) or it can run as a proxy-agent on a server, and establish the communication between the storage device and TPC. The CIM agents are referred to by a variety of names, including CIMOM agent, SMI-S Provider, and so on.

The CIM agents are provided by the vendor of the storage device, fabric switch, or tape library. For storage subsystems, the CIM agents are needed for storage asset information, provisioning, alerting, and performance monitoring. For tape libraries, the CIM agents are used for asset and inventory information. The CIM agents conform to the SNIA SMI-S specification to provide a communication transport between IBM Tivoli Storage Productivity Center and the managed devices.

For fabric switches (all switch vendors), the CIM agents are used for performance monitoring. For a subset of switch vendors, the CIM agents are also used to collect complete topology and zoning information, to receive and handle fabric events represented by "CIM Indications," and for zone control.

The CIM agents perform the following functions:

- Discovering the existence of fabrics and switches
- Gathering switch port information needed for performance monitoring

- Gathering statistics for performance monitoring
- ► Gathering information about SAN topology (for Brocade and McDATA only)
- ► Gathering zoning information and allows zone control (for Brocade and McDATA only)
- Gathering event information sent by CIM Indications from the CIM agent (for Brocade and McDATA only)

CIM agents are typically implemented by fabric vendors in the following ways:

- One SMI-S CIM agent can manage the whole fabric. These are referred to as "Fabric CIMOMs".
- ► Each SMI-S CIM agent manages one switch in the fabric. These are referred to as "switch CIMOMs". A switch CIMOM can be imbedded in the switch.

#### SNMP out-of-band agents

IBM Tivoli Storage Productivity Center uses SNMP queries to discover information about the SAN Management Information Base (MIB) information is collected from the switches and directors by the out-of-band Fabric agent. Switches and directors are added as out-of-band Fabric agents and contacted from the IBM Tivoli Storage Productivity Center Device Server by SNMP.

The out-of-band Fabric agent performs the following functions:

- Gathers information about the fabric by querying the switch or director for topology information.
- Gathers information about the zoning and allows zone control (Brocade switch only) of the fabric.
- Gathers virtual SAN information for Cisco switch

#### **Universal Agent**

IBM Tivoli Storage Productivity Center Universal Agent collects information about the Tivoli Storage Productivity Center Health, Data Server, and Data Server services information, Device information, alert information, and job information.

The collected data is used to reflect the information in IBM Tivoli Monitoring / Tivoli Enterprise Portal (ITM/TEP). One or more TPC Servers can be set up in ITM/TEP to be monitored. For more information about ITM/TEP, go to:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc/itm6
10usersguide.htm

#### Importing data in TEP

There are two ways to import data in TEP: direct connection to the API of the programs or data import from CSV files, where only the status information about the TPC Data Server and Device Server is transferred between TPC and ITM/TEP.

#### **TPC** Health, Data Server, and Data Server services information (API and CSV)

The Tivoli Productivity Center information and the source are listed here:

- Data Server status (API)
- Device Server status (API)
- Services status (API)
- CIMOM connection status (CSV)
- CIMOM information such as last Discovery, Managed devices (CSV)
- Agent connection status (CSV)
- ► Agent information such as last Discovery and Probe, Managed devices (CSV)

- Equivalent information about other TPC servers defined as data sources for Rollup Reporting (CSV)
- VMware (CSV)

#### Alert information

Alert information (CSV) includes:

- Amount of all alerts
- Alerts per component such as Computer, Data, Disk, Fabric, and so on

#### Job Information

Job Information (CSV) includes:

- Amount of Jobs, such as Discovery, Probe, Scans, PM
- Job Status and Details, For example: Start Time, Finish Time, Status, Log File
- ► Name
- Scheduled Jobs and Details, For example: Intervals, Creator, Name

For more information, in the Tivoli Storage Productivity Center installation media, you can view the README.txt file located in the TPCUA.zip file (TPCUA.tar on UNIX platforms), in the Tool folder of Disk 1.

#### Other ways to gather information

For certain environments (especially file servers), there are no supported agents available. Here we explain two alternative methods for data gathering:

- ► For NetWare servers: Install and license an agent on a machine that:
  - Is running a supported Windows platform. To use Data Manager for retrieving storage information from the servers and volumes within NDS trees, you must install its agent on a Windows machine where a Novell NetWare client is already located. Data Manager gathers detailed storage information about NetWare servers and volumes using native NetWare calls from these Windows machines.
  - Has an installed NetWare Client.
  - Has access to the Novell NetWare servers and volumes within your environment.
- For NAS support, install and license an agent on Windows or UNIX machines from which the NAS filers you want to scan are visible. You do not install agents to the NAS filers themselves—rather, you install them to Windows, UNIX, and Linux machines that have access to those NAS filers (for example, install agents to Windows machines that can access your NAS filers, or install agents to UNIX/Linux machines that have imports for the file systems within the NAS filers).

See the *IBM Tivoli Storage Productivity Center: Installation and Configuration Guide Version 4.1*, GC32-1774 for more information.

#### 1.2.10 Tivoli Common Agent Services

Tivoli Common Agent Services provides a way to deploy multiple agent code across multiple user machines or application servers throughout your enterprise. The deployed agent code collects data from managed resources and performs operations on them, on behalf of a management application.

The Tivoli Common Agent Services includes an Agent Manager that provides authentication and authorization, and maintains a registry of configuration information about the agents and resource managers in your environment. The Resource Manager is a part of the Tivoli Common Agent Services and is the server component of products that manage subagents deployed on the Common Agent. The Tivoli Common Agent Services also provide Common Agents to act as containers to host product subagents and common services. The Common Agent provides remote deployment capability, shared machine resources, secure connectivity, and a single-entry point on the client computers on which the agents reside.

#### Agent Manager

The Tivoli Agent Manager provides authentication and authorization using X.509 certificates and the Secure Sockets Layer (SSL) protocol. Agent Manager processes queries about its registry of configuration information about the agents and management applications.

Data Manager and agents must register with the Agent Manager before they can use its services to communicate with each other. Registration is password-protected, with separate passwords for agent registration and Resource Manager registration. The registry is a database that contains the current configurations of all known agents and resource managers. The registry is in a DB2 database (either remote or local).

The Agent Manager also provides an agent recovery service, which is a network service for error logging for agents that cannot communicate with other Agent Manager services. Agents use an unsecured HTTP connection to communicate with the agent recovery service on the port number. Because the connection is unsecured, an agent can always communicate with the agent recovery service, even if the agent is incorrectly configured or has expired or revoked certificates.

The agent recovery service is a WebSphere servlet container. Agents locate the agent recovery service using the unqualified host name TivoliAgentRecovery and port 80. The agent recovery service runs on the Agent Manager server. There must be an entry on your Domain Name System (DNS) server that maps the host name TivoliAgentRecovery to the computer system where you installed the Agent Manager.

**Note:** Agent Manager is optional, and is only required when you plan to deploy Data agents or Fabric agents. You can install Tivoli Storage Productivity Center with or without Agent Manager registration.

If you intend to install and use the Data agent or Fabric agent (or both), you must first install an Agent Manager and register your Tivoli Storage Productivity Center server with the Agent Manager before you install your Data agent or Fabric agent (or both). A check box is provided at installation for registering the Tivoli Storage Productivity Center server with Agent Manager.

#### 1.2.11 Integration points with other applications

In this section, we describe IBM Tivoli Storage Productivity Center integration points with IBM Tivoli Storage Manager for backup or archival of files, IBM Tivoli Enterprise Console (TEC) or any other SNMP manager for alert notification

#### Integration with Tivoli Storage Manager

Integration between IBM Tivoli Storage Productivity Center for Data and IBM Tivoli Storage Manager can provide support for the following capabilities:

The definition of a constraint violation is a means by which an administrator can enforce a request to have IBM Tivoli Storage Manager archive or back up the *n* largest violating files. Another kind of constraint violation is to define acceptable and unacceptable uses of storage systems. For example, a constraint can be defined to prohibit storing MP3 files on a file server. Productivity Center for Data currently reports on the *n* largest of the files that violate the constraint (where *n* is configured by the administrator).

Even the regularly run file reports can be modified to allow administrators to archive or back up selected files directly as an outcome of the reports. These file reports can identify, for example, a file system's largest files, orphaned files, and duplicate files. A storage administrator can use this feature to quickly free storage by archiving and deleting selected files.

The results of the IBM Tivoli Storage Manager backup-archive commands are viewable through the graphical user interface (GUI). In the case of constraints configured to archive-backup violating files, the results are included in the agent scan job logs (scans are responsible for enforcing constraints). In the case of file report driven archive-backup operations, a new type of job (archive-backup job) is created. The results of the backup operations in this case are found in archive-backup job logs.

#### Alert notification

The main purpose of Data Manager's alerting facility is to alert you to storage-related events that occur within your environment. After you have defined the events or conditions for which you want to be alerted, you can let Data Manager monitor your storage automatically.

#### SNMP

For users planning to use TPC's SNMP trap alert notification capabilities, SNMP Management Information Base (SNMP MIB) files are included on the installation media.

The MIB is provided for use by your SNMP management console software (for example, IBM Tivoli NetView® or HP Openview). This will allow you to better view TPC-generated SNMP traps from within your management console software.

#### Integration with Tivoli Enterprise Console Netcool/OMNIbus

IBM Tivoli Storage Productivity Center can use the Event Integration Facility (EIF) to send messages to the IBM Tivoli Enterprise Console (TEC) or the follow-on product Netcool/OMNIbus. This can allow one of the two central monitoring applications to consider IBM Tivoli Storage Productivity Center alerts in causal analysis for problems. TEC/OMNIbus is added as a destination for alerts, in addition to Simple Network Management Protocol (SNMP) Trap and Windows Event Log. The event definitions are specified in the tivoliSRM.baroc file, which is provided on the TPC installation media. It must be loaded to the active rule base running on the TEC/OMNIbus server. Based on that, the TEC/OMNIbus administrator can write its own correlation and automation rules for events sent by Data Manager. You have to provide the TEC/OMNIbus server.

#### Advanced provisioning

IBM Tivoli Storage Productivity Center supports Tivoli Provisioning Manager 5.1 for storage workflows. For information about how to use storage workflows, see *IBM Tivoli Storage Productivity Center Workflow User's Guide*, SC27-2341.

#### Additional IBM Tivoli applications

There are more applications in the IBM Tivoli portfolio that can be integrated with Tivoli Storage Productivity Center. Usually all these applications use Tivoli Storage Productivity Center as a tool to gather data about the storage environment. By using Tivoli Storage Productivity Center, they can abstract storage on a higher level and get the data in a kind of normalized relational database. Only a few applications also use Tivoli Storage Productivity Center as an interface to execute commands against storage devices, but Tivoli Storage Productivity Center's command line interface TPCTOOL can do this, so these applications interfacing with Tivoli Storage Productivity Center do not have to deal with a huge number of storage devices from various vendors.

Examples of such software applications are as follows:

- IBM Tivoli Monitoring
- IBM Tivoli Enterprise Portal
- ► IBM Tivoli Configuration and Change Management Database (CCMDB)
- IBM Tivoli Usage and Accounting Manager

These applications can use various interfaces that TPC provides:

- Access to the TPCREPORT database schema
- Tivoli Discovery Library Adapter (DLA)
- ► TEP or Universal Agent

#### 1.3 What is new in Tivoli Storage Productivity Center since Version 3.1

In this section, we list all the new functions and changes that have been introduced in the TotalStorage Productivity Center releases since V3. The purpose of this list is to provide a quick recap of the evolution that Tivoli Storage Productivity Center has gone through.

#### 1.3.1 New functions and features in 3.3.1

This topic provides information about new features, functions, and enhancements in IBM TotalStorage Productivity Center release 3.3.1:

IBM System Storage Productivity Center:

TotalStorage Productivity Center now supports the IBM System Storage Productivity Center. The goal of IBM System Storage Productivity Center is to consolidate IBM storage administration and configuration utilities into a single console.

IBM System Storage Productivity Center contains preinstalled software on a Windows System x machine.

The IBM System Storage Productivity Center provides these preinstalled components:

- IBM DB2 V9.1 with Fix Pack 2
- IBM TotalStorage Productivity Center Basic Edition 3.3.1
- IBM SAN Volume Controller Console

You can also install all the components for IBM System Storage Productivity Center on your own server machine.

You can optionally install Agent Manager and agents and TotalStorage Productivity Center for Replication 3.3.1.

- Installation changes:
  - DB2 Version 9.1:

IBM TotalStorage Productivity Center supports DB2 version 9.1 Fix Pack 2 as a database repository. If you have DB2 version 8.1 with Fix Pack 14, you do not have to upgrade to DB2 version 9.1. TotalStorage Productivity Center supports both versions of DB2.

- Optional Agent Manager installation:

With this release, you no longer need to install the Agent Manager before you install TotalStorage Productivity Center. If you decide to add Agent Manager and agents at a later time, you can do so. If you do not install the Agent Manager, you will not be able to deploy the agents. ► Launch in Context:

A script is provided that allows you to pass parameters to the TotalStorage Productivity Center GUI. Based on the parameters you pass to the GUI, this will allow you to automatically log on to the specified TotalStorage Productivity Center server and navigate to a specific panel.

Improved TotalStorage Productivity Center server stability:

To improve TotalStorage Productivity Center server stability, performance improvements have been made to the Topology Viewer and performance monitoring jobs. DB2 has also been tuned to improve performance and scalability.

- Storage subsystem support:
  - CIM agent Version 5.3:

TotalStorage Productivity Center supports CIM agent Version 5.3 for ESS and DS storage subsystems. This updated version of the CIM agent introduces a number of new features, most of which are designed to allow access to new features of the DS8000 R3, such as support for SMI-S 1.2, dynamic volume expansion and space-efficient FlashCopy. This release of TotalStorage Productivity Center "tolerates" this version of the DS CIM agent, meaning that TotalStorage Productivity Center can operate with a 5.3 DS CIM agent in the same way as previous versions of TotalStorage Productivity Center operated with previous versions of the agent. TotalStorage Productivity Center does not show configuration information or performance data for space efficient volumes.

 DS8000 Element Manager perspective is integrated with TotalStorage Productivity Center GUI:

The DS8000 Element Manager perspective is integrated with the TotalStorage Productivity Center GUI. This allows users to manage multiple DS8000 Element Managers within the TotalStorage Productivity Center GUI.

SAN Volume Controller CIM agent 4.2.1:

The CIM agent 4.2.1 for SAN Volume Controller is a major upgrade from Version 4.2.0. This CIM agent supports SMI-S 1.2 which includes the Storage Virtualizer profile instead of the In-Band Virtualization profile. Also, the LUN Masking and Mapping subprofile has been replaced by the Masking and Mapping subprofile in SMI-S 1.2. Do not manage the same SAN Volume Controller cluster with two or more SAN Volume Controller CIM agents that are at various release versions. Mixing SAN Volume Controller CIM agent releases causes failures in TotalStorage Productivity Center.

Tivoli Enterprise Portal:

A Universal Agent for TotalStorage Productivity Center is available to report TotalStorage Productivity Center asset information to IBM Tivoli Monitoring. This data is available for display in the Tivoli Enterprise Portal for reporting, charting and establishing situations in Tivoli Monitoring. For more information about IBM Tivoli Monitoring and Tivoli Enterprise Portal, see:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp?toc==/com.ibm. itm.doc/toc.xml.

#### 1.3.2 New functions and features in 3.3.2

You can use the following information to learn about new features and enhancements provided in IBM TotalStorage Productivity Center release 3.3.2:

Internet Protocol Version 6:

IBM TotalStorage Productivity Center now supports Internet Protocol Version 6 (IPv6). This expands the IP address from 32 bits to 128 bits. There are special considerations for supporting IPv6 in TotalStorage Productivity Center.

See the TotalStorage Productivity Center Information Center and the Installation and Configuration Guide Version 3.3.2, GC32-1774.

Virtual I/O Server:

TotalStorage Productivity Center supports the installation of Data agents and Fabric agents on the Virtual I/O Server for AIX. You must use the padmin user ID to install and configure the agents. For information about planning for installing the agents on the Virtual I/O Server, go to the Information Center at the following URL:

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

Then click TotalStorage Productivity Center  $\rightarrow$  Planning  $\rightarrow$  Planning for the Virtual I/O Server.

► AIX 6.1:

TotalStorage Productivity Center now supports AIX 6.1 for the TotalStorage Productivity Center server and agents. To run with AIX 6.1, you must have DB2 9.1 with fix pack 4 or DB2 8.1 with fix pack 16 installed.

TotalStorage Productivity Center Universal Agent:

The instructions for retrieving the TotalStorage Productivity Center Universal Agent included with 3.3.1 has been changed. You no longer retrieve the Universal Agent from Open Process Automation Library (OPAL).

The Universal Agent package is located in one of the following TotalStorage Productivity Center directories:

- For Microsoft Windows: <TPC\_install\_dir>\tool\TPCUA.zip
- For UNIX and Linux: /<opt or usr>/tool/TPCUA.tar

The zip file or tar file contains a readme file that describes how to configure the Universal Agent.

Hitachi Data Systems TagmaStore:

IBM TotalStorage Productivity Center now supports the Hitachi Data Systems TagmaStore Common Information Model (CIM) agent 5.8. This version of the CIM agent supports only the Array Profile and not the Virtualizer Profile. However, IBM TotalStorage Productivity Center supports the TagmaStore as a Storage Virtualizer. IBM TotalStorage Productivity Center can display information for virtual disks and local disks.

VMware Virtual Infrastructure:

TotalStorage Productivity Center supports VMware ESX Server 3.5, VMware ESX Server 3.5 3i, and VMware VirtualCenter 2.5. reports now show the logical unit number (LUN) correlation. The ESX Server 3.5 3i is the hardware-integrated hypervisor. TotalStorage Productivity Center also supports ESX Server 3.0 and VirtualCenter 2.0 but does not support the LUN correlation for these releases.

Launch in Context feature:

The Launch in Context feature can be used to download the latest version of the IBM TotalStorage Productivity Center graphical user interface (GUI) on the local workstation using Java Web Start. The IBM TotalStorage Productivity Center GUI must have been previously installed on the local workstation. The Launch in Context feature downloads the latest version of IBM TotalStorage Productivity Center GUI on the local workstation if an older version has been downloaded or if the IBM TotalStorage Productivity Center GUI

has not been previously downloaded. If the latest version exists on the local workstation at the Java Web Start download location, the IBM TotalStorage Productivity Center GUI is not downloaded.

The feature can be run in the following ways:

- From a URL with Java Web Start. You can remotely download and launch the TotalStorage Productivity Center GUI, using the Launch in Context feature, and perform a certain number of actions on a remote system.
- From the command line with Windows, Linux, or UNIX. (The IBM TotalStorage Productivity Center GUI must have been previously installed on the local workstation if it is to be launched through the command line.)
- From the Windows Start menu.
- From the Tivoli Enterprise Portal GUI.

The additional functions that can be launched on the remote system are (this is in addition to the functions supported in the previous release):

- Create Volume
- Create VDisk
- Launch SAN Planner
- Launch Wasted Space report
- High-Availability Cluster Multi-Processing support on AIX:

IBM TotalStorage Productivity Center supports Data agents and Fabric agents installed on High-Availability Cluster Multi-Processing (HACMP<sup>™</sup>) nodes. You will be able to monitor the cluster resource groups. You can probe the HACMP cluster to get cluster reports and produce alerts when changes occur in the HACMP cluster.

The HACMP software supports both the non-concurrent and concurrent cluster resource groups. TotalStorage Productivity Center does not support concurrent cluster resource groups.

DS8000 space-efficient volumes:

IBM TotalStorage Productivity Center supports the DS8000 space-efficient volumes. Using space-efficient volumes, you can copy only those blocks (which have been written to) to a target. Information about space-efficient volumes and their relationship to extent pools is collected. Information about virtual pools is collected but does not persist in the database. You can identify space-efficient volumes in the Topology Viewer and in reports. You cannot use Disk Manager to create or delete space-efficient volumes.

When you use space-efficient volumes, you cannot see the real allocated space, but you can see the consumable space, so you cannot create a report using summarized volume capacity.

SMI-S support as the single standard interface for managing Brocade and McDATA:

TotalStorage Productivity Center now supports Storage Management Initiative Specification (SMI-S) as the single standard interface for managing Brocade and McDATA storage area networks (SANs). For these switch vendors, you no longer need the in-band agents for zone discovery and zone control operations. TotalStorage Productivity Center uses the SMI-S fabric profile and related subprofiles for inventory collection of SAN topology and zoning, for active configuration of zoning, and for fabric and switch alerts for Brocade and McDATA switches.

The use of the software interfaces for discovery of topology information (SNMP and GS-3), for zone inquiry (Brocade API and GS-3), and for zone control (Brocade API and GS-3) are still supported for these vendors to provide a choice. However, the SMI-S interface is the preferred mechanism for these vendors. The interfaces (SNMP and GS-3) are still necessary for QLogic and Cisco switches and SANs.

Automount maps in Sun Solaris:

You can skip automount maps (automaps) for a discovery job on Sun Solaris. To skip automount maps, specify the skipAutoFS=1 parameter in the server section of the TPCD.config file.

#### 1.3.3 New functions and features in V4.1

You can use this information to learn about new features and enhancements in IBM Tivoli Storage Productivity Center Version 4.1. This section highlights the changes since IBM TotalStorage Productivity Center 3.3.2.

For more information about each of the features, go to the Tivoli Storage Productivity Center Information Center and search for Planning for the IBM Tivoli Storage Productivity Center family. For information about how to use the features, see the *IBM Tivoli Storage Productivity Center User's Guide Version 4.1*, SC27-2338.

Tivoli Storage Productivity Center V4.1 adds the following new features, functions, and enhancements:

Name change:

TPC has been renamed from IBM TotalStorage Productivity Center to IBM Tivoli Productivity Center. All user interfaces, documentation, online help, and messages have also been changed to reflect the name change.

**Note:** Although great effort has been invested to change the name of the product Web pages, the manuals, and GUI, you can still find the old name. In most instances, the old name is still being used to point out a release prior to Version 4. In certain rare cases, the name changes have not been applied yet.

#### ► Licensing changes:

These are the licenses available for IBM Tivoli Storage Productivity Center:

- IBM Tivoli Storage Productivity Center Basic Edition
- IBM Tivoli Storage Productivity Center Standard Edition
- IBM Tivoli Storage Productivity Center for Disk
- IBM Tivoli Storage Productivity Center for Data

**Note:** There is no TPC for Fabric licence orderable anymore. Because the functionality of TPC for Fabric is now included in TPC Standard Edition, we typically refer to this part of the product simply as fabric management or as Fabric Manager.

The TPC Standard Edition includes TPC for Data and TPC for Disk as well as Fabric Manager functions of TPC (which can no longer be ordered separately).

If you have an IBM TotalStorage Productivity Center for Fabric license only, you can upgrade to IBM Tivoli Storage Productivity Center Standard Edition.

If you have an IBM TotalStorage Productivity Center for Basic Edition license only, you can upgrade to IBM Tivoli Storage Productivity Center for Disk, IBM Tivoli Storage Productivity Center for Data, or IBM Tivoli Storage Productivity Center Standard Edition.

If you have an IBM TotalStorage Productivity Center for Data license only, you can upgrade to IBM Tivoli Storage Productivity Center for Data or IBM Tivoli Storage Productivity Center Standard Edition. If you have an IBM TotalStorage Productivity Center for Disk license only, you can upgrade to IBM Tivoli Storage Productivity Center for Disk, IBM Tivoli Storage Productivity Center for Data (Disk plus Data), or IBM Tivoli Storage Productivity Center Standard Edition.

If you have an IBM TotalStorage Productivity Center Standard Edition license, you can upgrade to IBM Tivoli Storage Productivity Center Standard Edition.

For more information about which features are available for each license, see "License considerations" on page 40.

Integration features:

Tivoli Storage Productivity Center provides these integration features.

 Integration of Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication

Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication, previously separated products, are now integrated. You can start the IBM Tivoli Storage Productivity Center for Replication user interface from within the Tivoli Storage Productivity Center user interface.

The *IBM Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication Installation and Configuration Guide* Version 4.1, SC27-2337 also includes the installation, upgrade, and uninstallation information for IBM Tivoli Storage Productivity Center for Replication.

This integration enables you to:

- Start the IBM Tivoli Storage Productivity Center for Replication user interface from within the Tivoli Storage Productivity Center user interface.
- Use the Tivoli Storage Productivity Center GUI to set up IBM Tivoli Storage Productivity Center for Replication SNMP alerts and IBM Tivoli Enterprise Console events.
- Provide a Tivoli Storage Productivity Center superuser role that has authority over all Tivoli Storage Productivity Center commands. IBM Tivoli Storage Productivity Center for Replication includes a replication administrator role that has authority to all IBM Tivoli Storage Productivity Center for Replication commands. IBM Tivoli Storage Productivity Center for Replication will honor the Tivoli Storage Productivity Center superuser role, giving the superuser role authority over all Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication commands.

- Integration of Tivoli Storage Productivity Center and IBM Tivoli Integrated Portal:

Tivoli Integrated Portal is a standards-based architecture for Web administration. Tivoli Integrated Portal (TIP) enables developers to build administrative interfaces for IBM and independent software products as individual plug-ins to a common console network. The installation of Tivoli Integrated Portal is required to enable Single Sign-On for Tivoli Storage Productivity Center.

Single Sign-On is an authentication process that enables you to enter one user ID and password to access multiple applications. Single Sign-On integrates with the Launch in Context feature to enable you to move smoothly from one application to a specific location in a second application.

Tivoli Common Reporting is a runtime environment for reports developed with the Business Intelligence Reporting Tool (BIRT) report designer (not included). Reports can be created and integrated into TIP for repeated use. The user role management of TIP provides a way to limit access to information gathered by TPC on a individual report basis.

Launch in Context feature

The Launch in Context feature enables you to access external applications from the Tivoli Storage Productivity Center GUI. Element managers are the most prevalent external applications that use the Launch in Context feature. An element manager is usually the vendor-specific software that is used to administer a particular storage device. The Launch in Context feature provides starting points in the Tivoli Storage Productivity Center GUI so you can click a button or select a menu item to start an element manager.

When you install Tivoli Storage Productivity Center, Tivoli Integrated Portal, and Tivoli Storage Productivity Center for Replication, the components are automatically configured to use Launch in Context. You can access Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication from the Tivoli Integrated Portal GUI and you can access Tivoli Storage Productivity Center GUI.

There are three levels of Launch in Context ability:

• Simple launch:

This level exists in TotalStorage Productivity Center 3.3.2. Tivoli Storage Productivity Center discovers basic information about the device and the management of the device.

• Launch with parameters:

You can specify additional parameters in the URL or command-line interface when starting an application. The parameters that are passed enable you to navigate to a particular panel or state of the application that was started. You can also identify objects to operate on and possibly provide values to use in the operation.

• Launch with Single Sign-On:

You can enhance the Launch in Context feature to include Single Sign-On. Single Sign-On can be used when an external application can perform authentication against the same user repository as Tivoli Storage Productivity Center. A directory that is Lightweight Directory Access Protocol (LDAP) compliant is a common example of such a user repository.

External applications that do not include the WebSphere Application Server (WAS), require the authentication service that is provided by Tivoli Integrated Portal. For example, the element manager for IBM System Storage DS8000, DS8000 Storage Manager, uses the authentication service to handle Launch in Context with Single Sign-On from the Tivoli Storage Productivity Center GUI.

- Single Sign-On:

Single Sign-On is an authentication process that enables you to enter one user ID and password to access multiple applications. Single Sign-On enables you to access:

- Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication from the Tivoli Integrated Portal GUI.
- Tivoli Storage Productivity Center for Replication from the Tivoli Storage Productivity Center GUI.
- External applications such as element managers from the Tivoli Storage Productivity Center GUI.

The Single Sign-On feature requires a centralized user and group repository, such as an LDAP-compliant directory, that all participating applications can access.

Tivoli Storage Productivity Center uses Lightweight Third Party Authentication (LTPA) tokens to pass the user information between applications. To use LTPA tokens for Single Sign-On, each participating application must possess the same set of keys to encode and decode the user information contained in the token. As an additional security feature, the LTPA tokens expire after a determined amount of time. When the tokens expire, you must re-enter your user ID and password information.

If you select operating system authentication, then the use of the Single Sign-On feature is limited. Operating system authentication does not support Single Sign-On for element managers, even when the element manager is installed on the same machine as Tivoli Storage Productivity Center.

Storage Resource agents:

Tivoli Storage Productivity Center now supports Storage Resource agents on Microsoft Windows, AIX, and Linux. The Storage Resource agent probe is equivalent to the information that is collected by probes using the Data agent.

The Storage Resource agents do not require the Agent Manager and can be deployed to other systems using the Tivoli Storage Productivity Center GUI on the server system.

You can use the following functions:

- Asset reports (including HBA)
- Capacity reports
- Subsystem to host storage correlation including multipathing information
- Topology and Data Path Explorer functions

This support does not include file system scans, NAS discovery or topology, zoning and zone control functions, or subsystem device driver configuration. You can still use the Data agent and Fabric agent for this information.

SQL access to Tivoli Storage Productivity Center database:

Tivoli Storage Productivity Center will provide a set of DB2 views within a separate schema that represent key information that has been collected by monitoring jobs and stored in the database repository. A view is a way of describing data that exists in one or more tables within the database repository. It does not contain data but, instead, is a stored set of SQL commands that define a subset of rows and columns in the base tables.

You can use the Structured Query Language (SQL) to retrieve the information from the views and create reports using your own tools, such as Business Intelligence and Reporting Tools (BIRT) or Microsoft Excel. Other applications can also use these views to gather and import information that is collected by Tivoli Storage Productivity Center.

The following categories of views in the report schema will contain information collected by Tivoli Storage Productivity Center:

- Storage entity views:

These views include information about the properties of the entity, for example, the name, capacity, and freespace.

- Entities defined by Tivoli Storage Productivity Center:

These entities include Data agents, Fabric agents, alert log, Tivoli Storage Productivity Center server, computer groups, storage subsystem groups, file system groups, storage resource groups, and so forth.

- Aggregated views:

These views provide summary information for the database history, data in a database instance, and the Data agent file system.

- Reporting views:

These views combine several entities in one view for a report.
- Rollup views:

These views include rollup report information from the master and subordinate Tivoli Storage Productivity Center servers, Data agents and Fabric agents, host cluster data, computer groups, host, database computer groups, fabric SAN assets, switch assets, storage subsystem groups, storage subsystems, and Tivoli Storage Productivity Center for Databases.

Storage Optimizer:

The Storage Optimizer is a tool to help you analyze your storage networks to identify hot spots or bottlenecks, plan for storage growth, improve performance, and help develop storage migration or storage consolidation plans. Using the data in the Tivoli Storage Productivity Center database, the Storage Optimizer enables you to create an analysis report and an optimization report. The analysis report analyzes your data storage environment and recommends changes to improve your environment. Based on the analysis report, the optimization report includes storage migration or storage consolidation recommendations.

This feature requires a Tivoli Storage Productivity Center Standard Edition license.

Storage resource groups:

Storage resource groups are new objects provided to help storage administrators plan, monitor, and report on the managed environment.

A storage resource group is a set of entities managed by Tivoli Storage Productivity Center. These entities can be servers, switches, storage subsystems, fabrics, storage pools, and storage volumes. Storage resource groups can be a group of heterogeneous objects and can also contain other storage resource groups without any connectivity.

Policies for provisioning (volume creation and selection, profiles, zoning and multipathing configuration) can be specified and associated with storage resource groups. These policies are used by the SAN Planner to populate default settings.

Storage resource groups are used primarily for planning functions but is also available with the Tivoli Storage Productivity Center Basic Edition license. With the basic license, you can create and view storage resource groups in the Topology Viewer. When you have TPC for Disk, you can define and change the profiles. With the Standard Edition license, the planner function is enabled and you can use storage resource groups as input.

Storage resource groups also work with these profiles:

Provisioning profiles:

These profiles describe the requirements such as total capacity, number of volumes, Redundant Array of Independent Disks (RAID) level, the Workload Profile, volume name prefix, multipathing options, zoning options, and so forth.

Workload profiles:

These profiles describe the requirements that define the performance characteristics of newly provisioned capacity.

IBM General Parallel File System:

Tivoli Storage Productivity Center supports the monitoring of the IBM General Parallel File System (GPFS<sup>™</sup>) 3.2 on AIX. GPFS provides access to critical file data. GPFS also provides concurrent high-speed file access to applications that are running on multiple nodes of an AIX cluster, a Linux cluster, or a heterogeneous cluster of AIX and Linux nodes. In addition to providing file storage capabilities, GPFS provides storage management, information life cycle tools, and centralized administration, and allows for shared access to file systems from remote GPFS clusters.

- Installation changes:
  - Installation of IBM Tivoli Integrated Portal:

Tivoli Storage Productivity Center now installs IBM Tivoli Integrated Portal along with Tivoli Storage Productivity Center.

- IBM Tivoli Storage Productivity Center for Replication:

The *IBM Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication Installation and Configuration Guide* SC27-2337 also includes the installation, upgrade, and uninstallation information for IBM Tivoli Storage Productivity Center for Replication. IBM Tivoli Storage Productivity Center for Replication is now installed with IBM Tivoli Storage Productivity Center.

- IBM DB2 Database for Linux, UNIX, and Windows:

Tivoli Storage Productivity Center now supports DB2 9.5. You will be able to migrate your Tivoli Storage Productivity Center databases from DB2 9.1 or DB2 8.2 to DB2 9.5. DB2 9.5 is optional. Tivoli Storage Productivity Center still supports DB2 9.1.

- Embedded WebSphere 6.1 and JRE 1.5:

The Device Server is upgraded to run under Embedded WebSphere 6.1 (from Embedded WebSphere 6.0.2). The Data Server, GUI, and CLI are upgraded to use JRE version 1.5. The InstallShield uses JRE 1.5 during the installation and uninstallation process when Tivoli Storage Productivity Center is installed using the disk1 image. The image to perform local agent installations uses JRE version 1.4.2.

- Silent installation:

Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication do not support silent installation except for the Data agents and Fabric agents.

- New device and application support:
  - IBM System Storage DS8000 4.2.
  - IBM System Storage SAN Volume Controller 4.3.1.
  - Microsoft SQL Server 2005 and Microsoft SQL Server 2008 databases

Tivoli Storage Productivity Center can now monitor the Microsoft SQL Server 2005 and Microsoft SQL Server 2008 databases. You must configure Microsoft SQL Server before you can monitor the database. For information about configuration, see the Information Center. Search for Configuring Microsoft SQL Server 2005 or 2008.

– EMC PowerPath:

With Tivoli Storage Productivity Center, you can now use EMC PowerPath storage systems such as CLARiiON and Symmetrix. Using these storage systems, you can discover host volume information and display detailed information for the volume for capacity planning purposes. Connection reports can show the connectivity from the host to the storage subsystems.

EMC PowerPath Version 4.0 or later is supported.

Network Appliance<sup>™</sup> (NetApp<sup>®</sup>):

With Tivoli Storage Productivity Center, you can use the Network Appliance SMI-S agent to support block storage devices (see "Planning for IBM N Series/NetApp and EMC PowerPath" on page 48). The SMI-S agent supports the SMI-S 1.2 array profile.

- IBM XIV® Storage System:

**Important:** The XIV Storage System information provided in the Tivoli Storage Productivity Center 4.1 documentation is only for planning purposes until the supported XIV Storage System software (CIMOM) is available. Tivoli Storage Productivity Center support is targeted for a future XIV Storage System software release. A flash will be issued when Tivoli Storage Productivity Center support for XIV Storage System is available.

XIV Storage System will have an embedded CIM agent that Tivoli Storage Productivity Center will use to run discovery and probe jobs.

You will be able to start the XIV Storage System GUI from within Tivoli Storage Productivity Center if the GUI is installed on the same system as the Tivoli Storage Productivity Center GUI. The XIV Storage System GUI will be supported on Windows and Linux.

Both Data agent and Storage Resource agent will support the XIV Storage System.

For more information about XIV Storage System planning, see the *Installation and Configuration Guide Version 4.1*, SC27-2337.

- Multipath subsystem device drivers:

Tivoli Storage Productivity Center supports these subsystem device drivers (SDD):

- AIX SDD
- Windows SDD
- Windows SDD DSM
- Linux SDD
- HP SDD
- Solaris SDD
- Novell SDD (reporting only)
- AIX SDD PCM
- Linux DM\_Multipath

- IBM System Storage N Series Gateway servers:

IBM Tivoli Storage Productivity Center supports IBM System Storage N Series Gateway servers as Other NAS. This support allows you to monitor and report on file systems through the Windows CIFS or UNIX NFS shares that are accessible to the scan or probe jobs for the Data agent. No back-end storage information such as controllers, disks, and logical volumes is collected or reported.

High-Availability Cluster Multi-Processing:

This release provides additional support for High-Availability Cluster Multi-Processing version 5.5.

Tivoli Enterprise Portal:

A Universal Agent for Tivoli Storage Productivity Center that utilizes a set of Tivoli Storage Productivity Center Web services calls to gather information and provide results files that will display enhanced information such as job status and Tivoli Storage Productivity Center status in the IBM Tivoli Integrated Portal.

Terminology changes:

The Tivoli Storage Productivity Center documentation uses the term "storage subsystem" and the Tivoli Storage Productivity Center for Replication documentation uses the term "storage system". Both terms refer to the devices used for storage management.

You can access the frequently-asked questions under the Reference section in the information center or in Appendix B of the *IBM Tivoli Storage Productivity Center User's Guide Version 4.1*, SC27-2338.

# 1.4 Functions no longer supported

The following functions are no longer supported:

Starting the GUI as a Java applet is not supported:

Starting the TotalStorage Productivity Center GUI as a Java applet is no longer supported. To start the TotalStorage Productivity Center GUI remotely, use the Java Web Start support, as documented in the *Installation and Configuration Guide Version 4.1*.

This support for starting the GUI as a Java applet was removed in TPC Version 3.3.1.

► TotalStorage Productivity Center Assistant is no longer supported:

TotalStorage Productivity Center Assistant is no longer available as a separate tool. The links that were previously provided by this tool have been merged into the user interface under the Help menu. This includes links to the Tivoli Storage Productivity Center Information Center, supported products matrixes, and product demonstration Web pages.

The TPC Assistant was removed in Version 3.3.2.

Servers with less than 4 GB of RAM cannot install TPC:

TPC will no longer install on systems with less than 4 GB of RAM. If the system has between 4 GB and 8 GB, the installer will issue a warning message. This raised prerequisite is due to the fact that with the installation of TIP and TPC-R, more resources will be needed.

The memory requirements have been changed with TPC Version 4.1.

Support is dropped for DB2 Version 8:

DB2 Version 8 is no longer supported as the database for TPC. From TPC Version 4.1 onwards, only DB2 version 9.1 and 9.5 is supported.

SSPC changes regarding performance upgrade:

Starting with the new model MC3 of the SSPC (type 2805) there is no performance upgrade kit available anymore. The system is already equipped with 8 GB of RAM and two CPUs.

# 1.5 Product features

This section describes significant features of Tivoli Storage Productivity Center.

# 1.5.1 Topology Viewer

The Topology Viewer is designed to provide an extended graphical topology view; that is, a graphical representation of the physical and logical resources (such as computers, fabrics, and storage subsystems) that have been discovered in your storage environment (see Figure 1-3). In addition, the Topology Viewer depicts the relationships among resources; for example, the disks comprising a particular storage subsystem, as well as connections between entities with the Data Path Explorer. Detailed, tabular information, such as the attributes of a disk, is also provided.



Figure 1-3 Topology Viewer

The overall goal of the Topology Viewer is to provide a central location to view a storage environment, quickly monitor and troubleshoot problems, and gain access to additional tasks and functions within the TPC User Interface as well as start external element managers without users loosing their orientation to the environment. This kind of flexibility through the Topology Viewer User Interface displays better cognitive mapping between the entities within the environment, and provides data about entities and access to additional tasks and functionality associated with the current environmental view and the user's role.

When you use the User Defined Property (UDP) fields for computers, devices, Storage Resource Groups the Topology Viewer can use the related information to group the objects in multiple ways. For example, use UDP1 for describing the location (datacenter) of the entity and have the Topology Viewer group the entities by UPD1 so that all entities are grouped by data center (you might want to turn off the grouping by health status for this).

# 1.5.2 Policy-based management for file systems and databases

Tivoli Storage Productivity Center can enable you to define and enforce storage policies through user-defined alerts, quotas, and constraints, notifying the user by e-mail, pager, or

the event log, or a systems management console for events such as when a quota has been exceeded or a constraint violated. This function is available with TPC for Data or TPC Standard Edition.

The aim is not be just to find a problem; you need a way to fix problems. Tivoli Storage Productivity Center for Data can provide automated solutions through event management. For example, if Tivoli Storage Productivity Center for Data discovers data that has not been accessed in more than a year, it can trigger Tivoli Storage Manager to archive this data.

This feature allows you to effectively manage your storage. Benefits include the consistent implementation of storage resource management policies across platforms, automated scheduled reporting, and automated file system extension.

# 1.5.3 Storage provisioning and zoning (SAN Planner and wizard)

Tivoli Storage Productivity Center allows you to create volumes on attached storage subsystems, and by that it provides a single interface for many and various storage subsystems. The prerequisite is that the subsystem has already been set up and formatted, so that storage volumes can be allocated from the pools and assigned to servers.

If Fabric management is configured, the volume creation wizard will also perform any necessary zone changes for you. This function is great for heterogeneous environment. An operator or administrator cannot be an expert in using all the various switch and storage vendors element management tools.

With the SAN Planner tool, you can do more advance planning for creating new volumes, because it allows you to specify workload profiles, multipath driver options, and zoning details.

# 1.5.4 Subsystem reporting

Tivoli Storage Productivity Center gathers and reports on disk subsystems. Information includes physical characteristics, such as the drive's manufacturer, model, serial number, capacity, and rotational speed. Also included is how that drive's storage is allocated to logical volumes, snapshot copy volumes, and free space. This feature provides asset and capacity reporting. Information available includes:

- > Displaying the physical disks behind what the host sees as a disk drive
- Showing the allocated and free capacity of subsystems in the network
- Showing which hosts have access to a given subsystem volume
- Showing which hosts have access to a given disk drive (within the subsystem)
- ► Showing which subsystem volumes (and disks) a host has access to
- Showing detailed characteristics of storage subsystems, such as disks, volumes, storage pools, and more
- Obtaining SAN Volume Controller specific reporting, such as volume to back-end volume

The extent of the information available is subject to the vendor's implementation of Storage Management Initiative Specification (SMI-S.

# 1.5.5 Performance reporting of storage subsystems and switches

Tivoli Storage Productivity Center provides the ability to collect performance data for storage subsystems and switches. The data is stored and aggregated within the TPC databases well as expired over time. The intervals of performance data collection and inserting data into the database are specified in the performance data collection jobs individual configuration panel.

After being recorded in its database, the user can bring up predefined performance reports or create individual reports. The reporting function provides filtering, sorting and basic charting capability. In addition the tabular report allow to drill-up and down form entity to entity.

The three main TPC performance management functions (performance monitoring, performance threshold/alerts, and performance reports) together give you a comprehensive Performance Management environment on the entire SAN infrastructure, from the HBA, through the Fibre Channel switches and storage subsystems and volumes as well.

# 1.5.6 Monitoring and alerts

In IBM Tivoli Storage Productivity Center you can define alerts that monitor storage assets, discover newly added storage resources on your network, set up thresholds, and more. Alerts triggered based of your specification can than send notifications by e-mail, an SNMP trap, Tivol TEC/OMNIBUS or a UNIX or Microsoft Windows Event log. application. TPC generates these type of alerts based on its regular discoveries, probes, and scans, and provides input to an enterprise monitoring solution.

## 1.5.7 Additional functions

In this section, we discuss function provided in Tivoli Storage Productivity Center for Data.

#### Automatic file system extension: TPC for Data

Through monitoring, Tivoli Storage Productivity Center for Data (TPC for Data) detects when a file system has exceeded a user-defined threshold and automatically extends the file system to prevent an out of space condition. When used in conjunction with certain IBM storage devices, a LUN is created and provisioned to the file system automatically.

A probe runs on agents and sends file system statistics to the server. The server compares the current file system state against the policy and invokes provisioning and extension as necessary.

#### **Chargeback support: TPC for Data**

Tivoli Storage Productivity Center for Data offers an end-to-end system for invoicing your cost centers based on their storage usage. Tivoli Storage Productivity Center for Data makes your data owners aware of and accountable for their data usage, helping to keep storage costs distributed accurately across an organization.

#### NAS support: TPC for Data

Tivoli Storage Productivity Center for Data can enable storage administrators to monitor, report on, and manage NAS resources. Tivoli Storage Productivity Center for Data is designed to provide a universal view of direct-attached and network-attached storage, from a file system or application perspective. For Network Appliance files, Tivoli Storage Productivity Center for Data monitors, reports on, and manages physical disk information, such as total disk capacity and disk usage information.

By providing this information as part of a universal view of enterprise storage, storage administrators can manage storage from a logical (file system) perspective as well as a physical (disk) perspective. Administrators can also view information for a single filer, a group of filers, a user or group of users, or all filers enterprise-wide, enabling them to manage all enterprise storage resources from a single Web-based interface, to help them reduce costs and increase availability by pinpointing and solving problems more effectively.



# Planning for installation of Tivoli Storage Productivity Center

In this chapter, we discuss the hardware and software requirements for the installation of Tivoli Storage Productivity Center. Special considerations that you have to be aware of during the installation are included.

# 2.1 Planning for installation

Before installing, we recommend that you check the Tivoli Storage Productivity Center support site for any available Flashes or Technotes. To do so, visit the following URL:

http://www-01.ibm.com/software/sysmgmt/products/support/IBMTotalStorageProductivit
yCenterStandardEdition.html

Then click **Troubleshoot** in the top-right table, and click **Browse by document type**  $\rightarrow$  **Flashes** and **Browse by document type**  $\rightarrow$  **Technotes** to search for the latest available support information.

## 2.1.1 Integration of Tivoli Integrated Portal

Tivoli Integrated Portal is a standards-based architecture for Web administration. Tivoli Integrated Portal enables developers to build administrative interfaces for IBM and independent software products as individual plug-ins to a common console network. With Tivoli Storage Productivity Center V4.1, the installation includes Tivoli Integrated Portal. Tivoli Integrated Portal is required to enable Single Sign-On for Tivoli Storage Productivity Center.

# 2.1.2 Integration of Tivoli Storage Productivity Center for Replication

With Tivoli Storage Productivity Center V4.1, Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication, which were previously separated products, are now integrated. You can start the IBM Tivoli Storage Productivity Center for Replication user interface from within the Tivoli Storage Productivity Center user interface.

#### 2.1.3 Hardware and software requirements

The IBM Tivoli Storage Productivity Center server can require a large amount of memory, network bandwidth, and processor resources. In many cases, the server performs best when other applications are not installed on the same system.

Refer to the following URL for the latest version of the list of supported platforms:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&context=SSMN28&conte xt=SSMMUP&context=SS8JB5&context=SS8JFM&uid=swg21384678&loc=en\_US&cs=utf=8&lang=en

**Important**: The Tivoli Storage Productivity Center server must be a dedicated computer and not be shared with other applications.

#### **Processor requirements**

This section provides information about the minimum processor hardware requirements needed for the Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication servers.

For Tivoli Storage Productivity Center:

- Intel® Dual processor 3.2 GHz
- System p<sup>®</sup> Dual POWER5<sup>™</sup>

For Tivoli Storage Productivity Center for Replication:

- For Windows or Linux: 1 x Intel Quad-Core Xeon or greater
- For AIX: System p: IBM POWER4<sup>™</sup> or IBM POWER5 processor, 1 GHz

**Note:** For large environments, the *Tivoli Storage Productivity Center GUI* must be installed on a separate system from the Tivoli Storage Productivity Center server.

For a stand-alone GUI, a minimum of 2 GHz processor (single) and up to 2 GB of RAM is required if a large server is used.

#### **Memory requirements**

This section provides information about the minimum memory hardware requirements needed for the Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication servers.

The Tivoli Storage Productivity Center server requires 8 GB of RAM. If you have at least 4 GB but less than 8 GB of RAM, you can still install Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication. However, you will get a warning message during installation.

If you have less than 8 GB of RAM, you have to run only Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication on a single server because of system load. For information about how to disable Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication after installation, see "Disabling Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication.

**Note:** To run Tivoli Storage Productivity Center on AIX requires at least 6 GB of RAM. If you cannot run with 6 GB of RAM, increase your paging swap space. For information about paging swap space, see the man pages **mkps** or **chps**.

#### **Disk space requirements**

This section provides information about the minimum disk space requirements needed for the Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication servers.

- For installations on Windows, you need 6 GB of available disk space and 500 MB in the Windows temporary directory.
- ► For installations on AIX or Linux, you need a total of 6 GB of free disk space:
  - 2.25 GB for the /tmp directory
  - 3 GB for the /opt directory
  - 250 MB in the /home directory
  - 10 KB of free space in /etc directory
  - 200 MB in the /usr directory
  - 50 MB in the /var directory
- Additional disk space will be required for installation of the prerequisite components (IBM DB2® and Agent Manager).
- On AIX, the paging space must be increased to 1 GB. For information about paging swap space, go to the AIX documentation site for information about the mkps or chps commands.

http://publib.boulder.ibm.com/infocenter/systems/scope/aix/index.jsp

Note that after you have installed Tivoli Storage Productivity Center and start collecting data, you will need a large amount of disk space for the database repository. The amount of data collected depends on many factors, including how many devices you have, how long you keep the data, and how frequently you collect data. Various users have experienced disk space usage of about 40 GB to 80 GB.

**Tip**: The database repository must be installed across multiple physical disks, either through operating system striping or hardware RAID, to ensure adequate performance of Tivoli Storage Productivity Center operations that involve database queries.

We recommend using a minimum of three disks that are separate from the Tivoli Storage Productivity Center server's host operating system location and Tivoli Storage Productivity Center product installation directory location.

#### Supported operating systems

Before installing, be sure to check the support site for the latest platform support:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&context=SSMN28&context xt=SSMMUP&context=SS8JB5&context=SS8JFM&uid=swg21384678&loc=en US&cs=utf-8&lang=en

For additional information, refer to *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337, Chapter 1. Planning for the IBM Tivoli Storage Productivity Center family.

Tivoli Storage Productivity Center supports the following operating systems:

- IBM AIX 5.3:
  - POWER4 or later
  - Requires AIX 5300-01 maintenance level and APAR IY70336
  - 32-bit or 64-bit
  - 64-bit environment runs in 32-bit compatibility mode
- IBM AIX 6.1:
  - POWER5 or later
  - Requires DB2 9.1 fix pack 4 or later; for IPV6–only machines, needs DB2 9.1 with fix pack 2 or later
  - Requires a C++ run time library level of xIC.aix50.rte.9.0.0.5 or later
  - 32-bit or 64-bit
  - 64-bit environment runs in 32-bit compatibility mode
- Windows 2003 Standard Edition or Enterprise Edition, Release 1 or Release 2:
  - Release 2 on x346 hardware (Intel Dual Xeon 64-bit processors)
  - 32-bit or 64-bit
  - 64-bit environment runs in 32-bit compatibility mode
- Windows 2008 Standard Edition or Enterprise Edition:
  - Requires DB2 9.1 with fix pack 5 or later
  - 32-bit or 64-bit
  - 64-bit environment runs in 32-bit compatibility mode
- Red Hat® Enterprise Linux AS Version 4.0:
  - x86 only
  - 32-bit or 64-bit
- Red Hat Enterprise Linux AS Version 5.x:
  - x86 only
  - 32-bit or 64-bit
  - Requires 32-bit version of libXp.so.6, which is available on the Red Hat installation media: <DVD>/Server/libXp-1.0.0-8.1.el5.i386.rpm

- ► VMware® v2.5x, 3.0.x, 3.5.x
  - Windows 2003 Guest
  - Red Hat Enterprise Linux AS 3.0 Guest
  - Red Hat Enterprise Linux AS 4.0 Guest

#### Supported database repositories

Tivoli Storage Productivity Center supports DB2 as the database repository:

- ► DB2 Enterprise Server Edition version 9.1 with fix pack 2 or later
- DB2 Enterprise Server Edition version 9.5 with fix pack 3a or later

For additional information, refer to Chapter 1. "Planning for the IBM Tivoli Storage Productivity Center family" in the *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337.

#### **Graphical installation**

A console or remote-connectivity application such as KDE, Remote Desktop, or VNC is required during installation of Tivoli Storage Productivity Center. The installation program is interactive (as opposed to silent).

If you plan to install a TPC instance running on AIX or Linux, you have to ensure that you have a correctly set-up X11environment. For details on how to set up an X11 environment, refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

**Note:** The AIX and Linux install/upgrade programs can be run only in graphical mode. At the time of publishing this book, the console mode and the silent mode are not supported installation types.

# 2.1.4 Considerations for 64-bit environments

This section provides information about running IBM Tivoli Storage Productivity Center in a 64-bit environment. If you are running Tivoli Storage Productivity Center in a 64-bit environment, note the following considerations:

- All Tivoli Storage Productivity Center programs running in a 64-bit environment will be run in 32-bit compatibility mode.
- The database that Tivoli Storage Productivity Center uses can be running in a 64-bit instance if DB2 v9 is used.
- The Tivoli Storage Productivity Center agents must be running in a 32-bit native mode or compatibility mode environment.
- The databases to be monitored by Tivoli Storage Productivity Center must be in a 32-bit native mode or compatibility mode environment.
- Tivoli Storage Productivity Center can monitor DB2 in 64-bit native mode on Windows and AIX as long as the DB instance is created in 32-bit mode.
- When installing Tivoli Storage Productivity Center on a 64-bit Windows machine, the default directory will be shown as:

C:\Program Files (x86)\IBM\TPC

This default location must be changed for the installation to be successful. The suggested installation folder name is one of these:

C:\IBM\TPC C:\Program files\IBM\TPC When installing DB2 on a 64-bit Windows machine, change the default installation path so that it is not either of these:

C:\Program Files (x86)\IBM\SQLLIB C:\Program Files\IBM\SQLLIB

The Windows installer puts back the (x86) into the directory path and this prevents the TPC Device Server from starting.

After being installed, the Tivoli Storage Productivity Center program will run in Windows 32-bit compatibility mode.

## 2.1.5 Network considerations

This section provides information about the minimum disk space requirements needed for the Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication servers.

It is strongly recommended to use fully qualified host names wherever possible during the installation and configuration of TPC. Be sure that name resolution is properly set up before installing Tivoli Storage Productivity Center . Especially check these requirements:

- The TPC server needs a static IP address—do not use DHCP.
- The TPC server's IP address needs to be mapped to its fully qualified host name:
  - Either by an appropriate DNS entry
  - Or by an appropriate entry in the following file:
    - On Windows: C:\WINDOWS\system32\drivers\etc
    - On Linux / UNIX®: /etc/hosts
    - · An appropriate entry has the following format:

<IP-Address> <fully qualified hostname> <short hostname>

Here, <IP-Address> is the server's static IP address, <fully qualified hostname> is the server's "long" host name, including its suffix, and <short hostname> is the host name without its suffix.

- The TPC server's host name as returned by the hostname command must be the same as the host name that is mapped to its IP address (use the nslookup command to verify).
- ► Refer to your operating system documentation for additional information.

Multiple NIC cards are not supported on the Tivoli Storage Productivity Center server. If you do have multiple NIC cards, you must make sure that the first NIC card in the list is the one that all the agents can communicate with.

# Firewall considerations

The TCP/IP ports shown in Table 2-1 are used by the Tivoli Storage Productivity Center server—be sure to grant appropriate access when using firewalls.

Table 2-1 Required TCP/IP ports

Component	Default Port	Inbound / Outbound (server perspective)
Data Server	9549, 9559	Both
Device Server	9550	Both
Common Agent	9510, 9514, 9515	Outbound
Agent Manager	80, 9511, 9513	Inbound
Agent Manager	9512	Both
Remote installation of UNIX agent	22, 512, 514	Outbound
Remote installation of UNIX agent	601	Inbound
Remote installation of Windows agent	139	Outbound
Device Server to CIM agent	5988, 5989, 6989, 6989	Outbound
VMware VI Data Source to VirtualCenter or ESX server	80, 443	Outbound
Tivoli Integrated Portal to LDAP Authentication	389	Outbound
DB2	50000	Inbound
Tivoli Storage Productivity Center with DS8000® GUI	8451, 8452	Outbound
Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication	162	Inbound
Tivoli Storage Productivity Center for Replication	3080, 3443, 5110, 5120	Inbound
Tivoli Storage Productivity Center for Replication	2433, 1750, 22	Outbound
Tivoli Integrated Portal	16310, 16311, 16312, 16313, 16315, 16316, 16318, 16320, 16322, 16323	Inbound

### **Considerations for Internet Protocol Version 6**

IBM Tivoli Storage Productivity Center supports Internet Protocol Version 6 (IPv6) for communication between its components. The key IPv6 enhancement is the expansion of IP address spaces from 32 bits (up to 15 characters in length) to 128 bits (up to 45 characters in length).

You can install and run Tivoli Storage Productivity Center on computers that are enabled for IPv4, IPv6, or dual stack. Dual stack indicates that a machine has both the IPv4 and IPv6 stacks enabled and both addresses configured.

For installation considerations regarding IPv6, refer to Chapter 1. "Planning for the IBM Tivoli Storage Productivity Center family", section "Planning for Internet Protocol Version 6" in the *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337,

Note that not all components and their related functions of Tivoli Storage Productivity Center are enabled for IPv6. Any functions that are not enabled for IPv6 will be unavailable through the user interface when you install Tivoli Storage Productivity Center on an IPv6-only system.

#### 2.1.6 Security considerations

This section provides information about the user IDs and user rights required to install IBM Tivoli Storage Productivity Center.

Before installation, identify or create one unique Windows administrator user ID or UNIX user ID with root authority to be used for installing all Tivoli Storage Productivity Center products. To create the database schema, the user ID also needs database administrator authority. This user ID is required only to install the product and is not required to run the product.

To install Tivoli Storage Productivity Center on Windows, the user ID must belong to the administrators and DB2ADMNS group and have the user rights described next. This user ID can be for a local account or domain account.

On UNIX or Linux, the user must have root authority.

The following user rights are required on Windows 2003 and 2008 for installation:

- For Device Server or Data Server:
  - Log on as a service
  - Act as part of the operating system
  - Adjust memory quotas for a process
  - Create a token object
  - Debug programs
  - Replace a process-level token

Note that this user ID is automatically given the appropriate user rights when you install DB2.

- For Data agent or Fabric agent:
  - Act as part of the operating system
  - Log on as a service
- For GUI or CLI:
  - None
- For Database schema:
  - Needs to be in DB2ADMNS group and Administrators group.

#### Lightweight Directory Access Protocol

For information about the usage and setup steps to use a Lightweight Directory Access Protocol (LDAP) server for authentication in TPC and how it can enable the Single Sign-On functionality, refer to "LDAP authentication" on page 336.

# 2.1.7 Installation components

This section provides information about the installable components of IBM Tivoli Storage Productivity Center. Remember that with Tivoli Storage Manager V4.1, it is not required that you install Agent Manager.

#### Installation images

If you are installing IBM Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication using the electronic images, there are two installation images:

 disk1: Contains all the Tivoli Storage Productivity Center components. Also contains the files to perform remote Data agent installations.

The disk1 image is in two parts. Both parts must be downloaded to the same directory.

For Storage Resource agents, the image is located in the following location:

<DVD>/data/sra/<operating\_system\_name>

The supported operating systems for the Storage Resource agents are listed in Table 2-2.

Table 2-2 Storage Resource agent supported platforms

Operating system	Operating system name
AIX	aix_power
Linux x86	linux_ix86
Linux Power	linux_power
Linux s390	linux_s390
Windows	windows

disk 2: Contains the files to perform local agent installations. This image also contains the installation script for the Virtual I/O server. Download the file for the platform you want the agent to reside on.

The disk2 location and operating system file name is the same as the disk1.

If you are installing Tivoli Storage Productivity Center using DVD and CD, note the contents of the media:

- ► DVD: Contains all the components for Tivoli Storage Productivity Center.
- CD: Contains the disk2 image for local agent installations.

# 2.1.8 Agent Manager

Agent Manager is optional, and is only required when you plan to deploy Data agents or Fabric agents.

You can install Tivoli Storage Productivity Center (Tivoli Storage Productivity Center server) with or without Agent Manager registration.

#### With Agent Manager registration

If you intend to install and use the Data agent or Fabric agent (or both), you must first install an Agent Manager and register your Tivoli Storage Productivity Center server with the Agent Manager before you install your Data agent or Fabric agent (or both). A check box is provided at installation for registering the Tivoli Storage Productivity Center server with Agent Manager.

#### Without Agent Manager registration

If you do not intend to install or use the Data agent or Fabric agent (or both), you do not need to install an Agent Manager and there is no need to check the check box to register the Tivoli Storage Productivity Center server with Agent Manager at the time of installation.

You need to install the Data agent and Agent Manager if you want to run Tivoli Storage Productivity Center batch reports.

# 2.1.9 Tivoli Storage Productivity Center for Replication

The installation for Tivoli Storage Productivity Center for Replication has changed with TPC V4.1 release. You must now install Tivoli Storage Productivity Center with Tivoli Storage Productivity Center for Replication.

If you do not want the options available with Tivoli Storage Productivity Center, the quickest way to install Tivoli Storage Productivity Center for Replication is to use typical installation, without Agent Manager registration.

Tivoli Storage Productivity Center for Replication uses an internal database repository and does not use DB2. However, you must still install DB2 because Tivoli Storage Productivity Center requires the use of DB2 for the database repository.

These are the general steps to install Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication. Refer to the installation chapters, "Tivoli Storage Productivity Center installation and upgrade on AIX" on page 179, "Tivoli Storage Productivity Center installation and upgrade on Windows" on page 53, and "Tivoli Storage Productivity Center installation on Linux" on page 263 for installation specifics.

- 1. Install DB2.
- Install Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication.

The minimum components to install (without Agent Manager and agents) are:

- Data Server
- Device Server
- Tivoli Integrated Portal
- Tivoli Storage Productivity Center for Replication

For information about configuration and usage information for Tivoli Storage Productivity Center for Replication, see the Information Center at:

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

Click Tivoli Storage Productivity Center for Replication.

## 2.1.10 License considerations

In this section, we list the functions of Tivoli Storage Productivity Center and the license that is required to perform them (see "TPC package comparison" on page 41 and "TPC feature matrix" on page 42).

Note that there is no separate license for Tivoli Integrated Portal and Tivoli Common Reporter. It is included in the TPC license.

Tivoli Storage Productivity Center for Replication does not come in the package with a license. To use the functions of Two Site and Three Site BC, a license is required.

Data Source	Functionality	Required TPC License
Hypervisor	·	
	Probe	Data Edition
Storage Resource agent	t	
	Host Probe	Basic Edition
Storage Resource agent	t / Fabric agent	
	Fabric Probe	Basic Edition
	Fabric Provisioning	Basic Edition
	Fabric Health Monitoring	Basic Edition
Data agent		
	NetApp/NAS Probe	Data Edition
	Database Probe	Data Edition
	Deep File System Scans	Data Edition
	Batch Reporting	Data Edition
Storage Resource agent	t / Data agent	
	Planning	Standard Edition
	Analytics	Standard Edition
Fibre Channel Switch		•
	Probe	Basic Edition
	Provisioning	Basic Edition
	Health Monitoring	Basic Edition
	Performance Monitoring	Standard Edition
	Planning	Standard Edition
	Analytics	Standard Edition
Storage Subsystem		
	Probe	Basic Edition
	Provisioning	Basic Edition
	Health Monitoring	Basic Edition
	Performance Monitoring	Disk Edition
	Planning	Standard Edition
	Analytics	Standard Edition

#### Table 2-3 TPC package comparison

TPC 4.1 feature	Basic Edition	Disk Edition	Data Edition	Standard Edition
Device Discovery / Configuration	Х	х	х	х
Topology Viewer and Storage Health Management	х	x	х	х
Launch of Device Element Managers	Х	х	х	Х
Basic Asset & Capacity Reporting	х	х	x	х
Storage System Event Management	х	х	X	х
Consolidated view of storage infrastructure (Disk / SAN / Capacity)	х	x	x	x
Manage IBM and heterogeneous storage from a single management tool	x	X	x	x
Multiple DS machines, can see environment side-by-side not available with DS8000 storage manager	X	x	x	x
New subsystem reports (asset) not available with DS GUI	x	x	x	х
Storage subsystem alerts (capacity change, volume change, online/offline, and so on.)	X	x	X	х
Switch zoning	x	x	х	Х
Topology view of SAN environment	X	x	х	Х
Provisioning automation (TPM needed)	x	х	х	х
SAN asset reporting	X	х	х	х
Provisioning of storage (both IBM and heterogeneous) / Storage allocation	x	Х	х	х
Host Capacity Utilization (requires SRA)	х	х	х	х
Host Asset Information (requires SRA)	х	х	х	х
Unallocated space reporting	х	х	х	х
LUN capacity reporting	х	х	Х	Х
HBA / Fabric Connectivity (requires Fabric agent or SRA)	х	x	х	х
Fabric Configuration (requires Fabric agent for Cisco only)	х	X	х	х
Fabric Event Management	х	х	х	Х
Fabric Discovery	х	х	х	х
Switch Port Error Reports	х	х	х	Х
Measure and forecast storage growth	х	Х	х	х
Storage System performance management		х		х
Virtual Storage (SVC) performance management		Х		Х

TPC 4.1 feature	Basic Edition	Disk Edition	Data Edition	Standard Edition
Performance table and graphical reports		Х		Х
Storage subsystem controller performance		х		Х
Storage system Controller cache performance		х		х
Storage System I/O Group performance		х		х
Storage System Array performance		х		х
Storage System Managed disk group performance		x		x
Storage System Port performance		х		X
Storage System Performance Threshold alerts		Х		х
Top 25 Storage System volume performance rates: I/O, Data Rate, Cache Hit, Response Time		x		x
Manage file systems, users, user groups, directories			x	x
Manage databases - DB2, Oracle®, SQL Server®, and Sybase			x	х
Manage Network Attached Storage (NAS)			х	х
Manage storage for virtualized machines (VMware)			х	х
Data Categorization (aged files, orphan files, files by file type)			х	х
Data classification and migration using TSM to enable storage space optimization and ILM practices			х	х
File system grouping			х	Х
Quota management			х	х
Reports that show file system groupings, file analysis and storage subsystem analysis from host perspective			х	х
File system analysis - filename, file type, file size, date attributes, who owns, last accessed, last modified			х	х
Detailed Capacity Reporting (including chargeback and database reporting - consolidates multiple reports from multiple TPC servers)			x	x
Roll-up Reporting - consolidates multiple reports from multiple TPC servers				х
Fabric performance reporting and monitoring				х
SAN Switch Performance Reports				x
Top 25 Switch Ports Ops Rate Report				Х

TPC 4.1 feature	Basic Edition	Disk Edition	Data Edition	Standard Edition
Top 25 Switch ports data rate reports				Х
Historical Switch Performance Trending				Х
Storage Performance Optimization				х
Configuration Change Management				Х
SAN Configuration Best Practices				х
SAN Storage Planners (Best practice configuration guidance & analysis)				х
Manage cumbersome tasks - provisioning, zoning, configuration, monitoring, and problem determination				X
Bottle Neck Analysis - view performance information across the entire data path from computer to array				x
Volume performance advisor (SAN Planner)				х
Manage SAN switch configuration, availability and performance				х

# 2.2 Upgrade planning and considerations

You can upgrade TotalStorage® Productivity Center V3.1.3 or later releases to Tivoli Storage Productivity Center V 4.1. You can also migrate previous TotalStorage Productivity Center for Replication V3.x to Tivoli Storage Productivity Center V4.1. This section provides information about what must be considered before upgrading and migrating.

For the latest information about PTFs, patches, and flashes, check the information available at the following address:

http://www.ibm.com/systems/support/storage/software/tpc/

# 2.2.1 General considerations

Before starting the upgrade, you have to ensure that your system meets the hardware and software requirements of TPC V4.1. You can check these at the following location:

http://www-01.ibm.com/software/sysmgmt/products/support/IBMTotalStorageProductivit
yCenterStandardEdition.html

TPC for Replication is no longer a stand-alone application. TPC V4.1 now installs Tivoli Integrated Portal and TPC for Replication V4.1 when going through an upgrade process as well. If TPC exists, but TPC for Replication does not, then the upgrade process will consist of a fresh installation of TPC for Replication and an upgrade of TPC. If TPC for Replication exists on the server and TPC does not, then this upgrade will be a fresh installation of TPC and an upgrade of TPC for Replication. I

#### Interrupted upgrade

If you do not plan to use TPC for Replication, do not interrupt the installation by clicking the **Cancel** button. Complete the upgrade and then disable TPC for Replication.

**Note:** All PTFs and patches use the upgrade procedure to install. This implies that if you cancel the TPC for Replication install during the upgrade procedure, every time you apply a new patch, the installation program will prompt you to install it again.

#### Failed upgrade

When you upgrade TPC and TPC for Replication, if a component fails to upgrade, then just the component will not be upgraded. If a failure occurs, an error message will be displayed but there will be no complete rollback. As an example, if there is a failure in the TPC installation, a rollback will occur of TPC but TPC for Replication will still remain. This differs from the installation process where if a component installation fails, the entire installation is rolled back.

#### License

You must have a valid TPC license to use the upgrade procedure. If you are upgrading from one license to a higher-level license, for example, if you have TPC Basic Edition installed and want to upgrade to TPC Standard Edition, you must first install the TPC Standard Edition license, then you can upgrade the product.

#### IPv6

You can upgrade an existing version of TPC on an IPv4-only computer for use on a computer that is configured for both IPv4 and IPv6 (dual stack). You cannot upgrade TPC on an IPv4-only computer for use on a computer that is configured for IPv6 only. If you want to use TPC on an IPv6-only computer, you must perform a new install of the product on that computer.

#### **Graphical upgrade**

If you plan to upgrade a TPC instance running on AIX or Linux, you have to ensure that you have a correctly set-up X11environment. For details on how to set up an X11 environment, check Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

**Note:** The AIX and Linux install/upgrade program can be run only in graphical mode. At the time of publishing this book, the console mode and the silent mode are not supported installation types.

# 2.2.2 Upgrading and migrating Tivoli Storage Productivity Center from 3.x

To upgrade from TPC Version 3.x, here are the general steps to follow with the related considerations:

1. If you are using DB2 version 8, you must migrate to DB2 version 9.5.

TPC V4.1 requires one of the following DB2 versions:

- IBM DB2 UDB Enterprise Server Edition v9.1 Fix Pack 2 or later
- IBM DB2 UDB Enterprise Server Edition v9.5 Fix Pack 3a or later

Depending on the version of DB2 currently available in your environment, you might need to upgrade it or install the required fix pack level. Table 2-5 reports the suggested action for each current DB2 version installed and an alternate action if available.

Table 2-5	DB2	Upgrade	paths
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Current DB2 version	Suggested action	Alternate action
DB2 v8.1	Upgrade to DB2 v9.5 Fix Pack 3	
DB2 v9.1 Fix Pack 2 or lower	Apply DB2 v9.1 Fix Pack 5	Upgrade to DB2 v9.5 Fix Pack 3
DB2 v9.5	Apply DB2 v9.5 Fix Pack 3	

**Note:** On Windows 2003, there is a known issue with the maximum size of environment variables such as the PATH variable. You need to install a hot fix from Microsoft®. For information about the hot fix, go to:

http://support.microsoft.com/kb/906469

If you are running a 32-bit instance of DB2 8.1 on a Windows 64-bit and you are willing to use a 64-bit instance of DB2 9.5, the direct migration of DB2 is not supported. The migration must be performed in two separate steps, and there are two possible paths that can be followed:

- From DB2 v8.1 32-bits → Upgrade to DB2 v8.1 64-bits → Migrate to DB2 v9.5 64-bit
- From DB2 v8.1 32-bits → Migrate to DB2 v9.5 32-bits → Upgrade to DB2 v9.5 64-bit
- 2. Upgrade the Agent Manager:

Agent Manager version 1.3.2 is available for use with TPC V4.1. If you have Agent Manager 1.2 installed, it is optional to upgrade to V1.3.2. Note that the Common Agents remain at release 1.2 and are compatible with Agent Manager 1.3.2. If this is a new installation of TPC (for example, you are upgrading a TPC for Replication instance), then you can optionally install Agent Manager version 1.3.2 as part of the new TPC environment.

**Warning:** If your Agent Manager 1.2 is running fine, you do not need to upgrade. Nevertheless this version of Agent Manager runs within an unsupported version of WebSphere® Application Server. For this reason, if you experience any problem with the Agent Manager, you will be requested to upgrade to V1.3.2 and verify if the problem persists.

3. Upgrade TPC or TPC for Replication components to V4.1.

During the upgrade process, you might see several windows prompting you with the text, Replace Existing File. Reply **Yes** to All to these prompts.

As already mentioned, additional components will be installed during the upgrade, or additional options are made available.

#### TIP considerations

If not already present on the system, during the upgrade process the TIP will be installed. This component requires additional network ports available on the system in order to work correctly. TIP will use 10 port numbers starting from one port, called Base Port:

- base port
- base port+1

- base port+2
- base port+3
- base port+5
- base port+6
- base port+8
- base port+10
- base port+12
- base port+13

Before selecting a base port, ensure that all the required ports are available on the system.

Furthermore, the user ID currently administering the WebSphere instance of the TPC Device Server will also be given administrative rights to TIP.

#### TPC for Replication:

- If TPC for Replication is going to be installed on the system, you will be prompted for two additional network ports: a Default Port and a Default SSL port. Ensure that the ports you are providing to the installation programs are available on the system.
- If you are installing TPC for Replication for the first time, you will be also prompted for the user ID and the password of the user with administrative authority on the TPC for Replication server. Ensure that the user exists on the system (or on the LDAP server) before starting the upgrade program.
- If you are upgrading from a previous version of TPC for Replication that makes use of DB2 as database repository, you will be asked to provide the DB2 user ID and password. If you are upgrading from a previous version of TPC for Replication using its internal database repository, the previous version will be upgraded to the latest version.

#### LDAP:

- During the upgrade process, you are given the chance to change the authentication method used by TPC. The program allows you to set up your environment to use the new LDAP support functionality. You can change the authentication method also after having completed the upgrade process; nevertheless we strongly suggest that you decide on the authentication method that TPC must use before starting the upgrade procedure. For additional details about what must be considered when planning for LDAP server usage for authentication, see 2.3.2, "Planning for LDAP" on page 50.
- 4. Migrate the TPC database.

After you perform the upgrade operation, you must migrate the TPC database using the database migration tool (partitiontables.bat or partitiontables.sh). The TPC V4.1 database has been changed to improve performance of certain queries by either partitioning the databases or including multidimensional clustering. These changes are automatically included when you install TPC (but the TPC V3.x database is not migrated at this time).

Because the database migration tool can take a long time to run (depending on the size of the database to be migrated), you can run the migration tool at a time that is convenient for you. You only have to run the database migration tool one time. You must run the database migration tool before you apply any patches or PTFs for TPC. The database migration tool can be run more than once if an error occurred during execution. Tables that were migrated during previous attempts will not be migrated in subsequent runs.

5. Upgrade TPC Agents

You do not need to upgrade the agents at the same time as you upgrade the other TPC components. You can plan to upgrade them at a time that is convenient for you and with the methodology that best suites your needs (local/remote, scheduled/assisted).

If you plan to use the new Storage Resource agents and you have Data/Fabric agent installed on your systems, we suggest that you uninstall the old Common Agent based agents before installing the new Storage Resource agents.

# 2.3 General planning

In this section, we provide planning information for various platform upgrades.

# 2.3.1 Planning for IBM N Series/NetApp and EMC PowerPath

Next, we list the planning considerations for N Series and EMC PowerPath.

#### Planning for IBM N Series and NetApp systems

TPC provides the following support for NetApp® devices:

- Supports NetApp Data ONTAP® SMI-S Agent 3.0
- Supports the SMI-S 1.2 Array profile implemented by the NetApp SMI-S agent
- Supports all filer models running NetApp Data ONTAP version 7.2 and 7.3

NAS Gateway and V Series are not supported with the Array profile.

The supported OS platforms for the Data agent are:

- Windows 32–bit
- Red Hat Linux 32–bit and 64–bit
- SuSE Linux 32-bit and 64-bit (9.0, 10.0, SLES 9)
- VMWare ESX Server Version 3.5

The following licenses are required:

- For performance monitoring, a TPC for Disk license is required.
- ► For SNMP discovery, a TPC Standard Edition license is required.

The way you use TPC to interact with NetApp devices, and the data you can collect for NetApp devices, depends on how you configure your NetApp devices. For example:

- If you configure a Data Manager agent to be a Scan/Proxy agent, you use Data Manager to work with NetApp devices. The Data Manager user interface displays a NetApp filer as a "computer". For NetApp devices configured this way, TPC collects file storage information.
- If you configure a NetApp SMI-S agent (CIMOM), you use Disk Manager to work with NetApp devices. The Disk Manager user interface displays a NetApp device as a "subsystem". For NetApp devices configured this way, TPC collects block storage information.
- If you configure a NetApp device as both a filer and a subsystem, TPC collects both file and block storage information. You can use Disk Manager and Data Manager to work with the NetApp device. Keep in mind that the Data Manager user interface displays a NetApp filer as a "computer" and the Disk Manager user interface displays a NetApp device as a "subsystem".

If you initially configure a NetApp device using a Data agent, you will not lose any functionality if you later decide to also configure the NetApp device using a CIM agent.

The general steps to install and configure a NetApp device in order to enable the new Disk Manager functionality are as follows:

- 1. Install TPC or upgrade to Version 4.1.
- Install the NetApp SMI-S agent and add filers to its configuration using the NetApp SMI-S agent utility.
- Add the NetApp CIMOM by using the TPC GUI. Go to Administrative Services → Data Sources → CIMOM agents and add it by clicking the Add CIMOM button and filling in the fields with the required data. To automatically discover the NetApp SMI-S agent using SLP, skip this step.
- 4. Run a CIMOM discovery.
- 5. If you want to use SLP to discover the NetApp SMI-S agent, make sure that your SLP directory agents are configured or the Scan local subnet box is checked on the Administrative Services → Discovery → CIMOM → Option tab panel before you run the discovery.
- 6. Create and run a probe job for the configured filers to collect Disk Manager information.
- If desired, use the command-line interface (CLI) tpctool command to view information for NetApp storage subsystems.

#### Limitations

Keep in mind the following limitations for NetApp support:

- The NetApp Data ONTAP SMI-S Agent 3.0 implements the Block Server Performance subprofile. It provides volume performance data but, for now, does not provide performance data at the storage subsystem level.
- TPC supports only the SMI-S Array profile of the NetApp Data ONTAP SMI-S Agent. Other SMI-S profiles, including the self-contained NAS profile and the NAS Head profile, are not supported.
- ► For the Data ONTAP SMI-S 3.0 agent, if a volume is offline, the performance monitor might fail with the message: PM HWNPM2132W Performance data could not be collected for device <device>.
- ► To work with Network Appliance<sup>™</sup> quotas (using Data Management → Policy Management → Network Appliance Quotas), the NetApp device must be configured as a filer. This functionality is not available if the NetApp device is configured only as a CIMOM.

The locations in the user interface where the NetApp device will either be represented as a "computer" or a "subsystem", or both, depending on how you have configured the NetApp device, are:

- Dashboard
- My Reports
- Topology Viewer
- Alerting
- Data Manager
- Disk Manager

For further details, refer to 10.3.6, "New IBM N Series and NetApp reports" on page 514 and 9.4.2, "Monitoring IBM N Series and NetApp devices" on page 502.

# Planning for EMC PowerPath Multipathing

TPC supports EMC PowerPath Multipathing. EMC PowerPath Multipathing supports a wide range of servers including cluster servers connected to EMC storage systems. It tunes your storage area network and selects alternate paths for your data if necessary. It also integrates multiple path I/O capabilities, automatic load balancing, and path failover functions. For more information about EMC PowerPath Multipathing, see:

#### http://www.emc.com

TPC supports basic EMC PowerPath Multipathing Version 4.0 or later. Disks provided by the EMC PowerPath driver are detected by TPC Data agents and Storage Resource agents. The disks will be visible in the topology viewer and in Data Manager asset reports. The correlation of EMC PowerPath provided hdisks to EMC storage systems is supported and the relation is visible in the Topology Viewer:

- Multipathing information is not available for those disks.
- The data reports are accurate because they do not double-count capacities.
- ► The Data Path Explorer does not show multipathing.
- The SAN Planner does not support configuring multipathing on hosts using EMC PowerPath Multipathing.

# 2.3.2 Planning for LDAP

Starting with the TPC V4.1 release, TPC allows you to use Microsoft Active Directory® or an LDAP user registry for authentication. TPC V4.1 uses the TIP infrastructure and its underlying WebSphere Application Server capabilities to use an LDAP registry. For this reason, TPC's support of LDAP server types matches whatever WebSphere supports. The following Web site lists the various types of LDAP that WebSphere Application Server supports:

http://www-1.ibm.com/support/docview.wss?rs=180&uid=swg27007642

If you want to configure TPC so that it uses an LDAP-compliant directory for user authentication and group authorization, then you need to gather the following information regarding your directory configuration from the LDAP administrator:

- The fully-qualified domain name of the system that is running your LDAP-compliant directory
- ► The network port that the LDAP-compliant directory listen to for communications
- ► Whether the LDAP-compliant directory allows for anonymous binding when performing user and group searches—and if the answer is no, then what are the Bind Distinguished Name and Password to use when binding to the LDAP server.

**Note:** If you want the ability to create or modify LDAP users and groups from the TIP administrative panel, then the Bind Distinguished Name and Password are required. Nevertheless, at the time of publishing this book, a known problem prevents creating users and groups in the LDAP repository from TIP.

- The Relative Distinguished Name (RDN®) for TPC users in your LDAP server. All TPC users must have the same RDN (all TPC users must be in the same branch of the LDAP directory tree).
- ► The Relative Distinguished Name (RDN) for the TPC groups in your LDAP server. All TPC groups must have the same RDN (all TPC groups must be in the same branch of the LDAP directory tree). TPC groups do not have to be in the same branch of the LDAP directory tree as the TPC users.

- ► The Naming Attribute for the TPC users. All TPC users must use the same naming attribute. In most cases, the value is *uid*.
- ► The Naming Attribute for the TPC groups. All TPC groups must use the same naming attribute. In most cases this value is *cn*.

There are additional conditions that must be met in order to allow TPC to use an LDAP server for authentication:

- If you plan to use LDPA for authentication, the LDAP services must be available in order to log on TPC. You must set up the LDAP environment to ensure a high availability of the service. As an example, you can set up the LDAP environment so that you have clustered servers for this purpose.
- On Windows, the LDAP TPC Administrator user name must not contain spaces in it. This is due to the WebSphere Application Server APAR PK77578.
- All of the LDAP attributes (for example, uid, cn, ou, o, and c) are configured to be case-insensitive within the LDAP-based repository. These attributes are used in the user and group Distinguished Names or as the user or group naming attribute. For example, in IBM Tivoli Directory Server Version 6, you can adjust the attribute case-sensitivity through the Equality Matching Rule for each attribute. By default, the Equality Matching Rule for most attributes in IBM Tivoli Directory Server is *caseIgnoreMatch* or *caseIgnoreIA5Match*. Both of these settings are usable for integration with TPC.

## 2.3.3 Planning for Single Sign-On and Launch in Context

Single Sign-On is an authentication process that enables you to enter one user ID and password to access multiple applications. For example, you can access TIP and then access TPC and TPC for Replication from TIP using a single user ID and password. Single Sign-On integrates with the Launch in Context feature to enable you to move smoothly from one application to a functionally-related location in a second application.

A Single Sign-On environment requires a centralized authentication repository that is accessed by all applications within the environment. The user ID and other authentication information are passed between applications using Lightweight Third-Party Authentication (LTPA) tokens. To use LTPA tokens for Single Sign-On, each participating application must be able to handle an LTPA token and possess the same set of keys to encode and decode the user information contained in the token.

TPC and TPC for Replication use their respective WebSphere Application Server instances to authenticate LTPA tokens. However, other applications, such as the IBM System Storage™ DS8000 element manager and other element managers that do not run within a WebSphere Application Server instance, use the authentication service that is provided with Tivoli Integrated Portal. The authentication service client is typically embedded in these other applications and the client communicates with the authentication service server in Tivoli Integrated Portal for all authentication requests.

As an additional security feature, the LTPA tokens expire after 24 hours by default. See 6.2.5, "Changing the LTPA token expiration time" on page 370 for details about changing this setting.

During the installation of TPC, you can specify whether to use LDAP or the operating system as the authentication and authorization repository. If OS authentication is selected, the use of the Single Sign-On feature is limited. OS authentication does not support Single Sign-On for element managers, even when the element manager is installed on the same computer as TPC. LDAP or Microsoft Active Directory authentication supports Single Sign-On for element managers regardless of where they are installed.

The Single Sign-On feature is not supported by the TPC command-line interface (CLI).

During the upgrade from a previous version of TPC for Replication, you cannot change the method used for user authentication nor the TPC for Replication administrator user ID. Users and groups will be kept as in the previous version. If you are not currently using the same users and groups to log on to TIP, TPC, and TPC for Replication, the SSO feature is not enabled. In order to have the SSO enabled, you need to log on to TPC for Replication with the user having administrative privileges, and change the users/groups and roles accordingly.

# 2.3.4 Planning for TPC and TPC for Replication integration

TPC and TPC for Replication, previously separate products, are now integrated. During the installation of TPC V4.1, both will be installed.

If you install TPC V4.1 on a system with at least 4 GB but less than 8 GB of RAM you will get a message warning you that 8 GB is the minimum amount of memory required to run both TPC and TPC for Replication on the same system. In this case you are advised to complete the installation and then disable TPC or TPC for Replication.

If you do not plan to use TPC for Replication, do not interrupt its installation flow by clicking the **Cancel** button. This will result in a interruption in the overall TPC installation process with a subsequent complete TPC installation rollback. We suggest that you complete the TPC for Replication installation and then disable TPC for Replication.

As already mentioned, TPC V4.1 adds multiple integration points between TPC and TPC for Replication. For details about these additional integration points, refer to 6.2.3, "SSO and LIC from TPC to TPC for Replication" on page 364 and 9.2, "TPC for Replication monitoring and alerting" on page 493. Nevertheless, you will be able to fully use this integration between TPC and TPC for Replication only if they are installed and running on the same system. No integration is provided if TPC and TPC for Replication are running on separate systems.

Also, TPC for Replication can use an LDAP-compliant directory for the authorization of users and groups. During the installation process you are prompted to select the authentication repository that all the TPC components will use: OS based or LDAP based. If you select LDAP on the panel shown in Figure 3-71 on page 108, you can indicate an LDAP user as TPC for Replication administrator. The authentication method can also be changed afterward by following the procedures indicated in 6.1, "LDAP authentication" on page 336.

**Note:** During the upgrade of a previous version of TPC for Replication, you cannot change the method used for user authentication. Users and groups will be kept as before. After the upgrade, you can log on with the previous TPC for Replication administrator and change it.

#### **Disaster Recovery**

When planning for disaster recovery, the TPC for Replication server must be accessible in the event of a disaster. Even if there is a TPC for Replication standby server for recovery purposes, the server still requires authentication. If you use LDAP authentication, the LDAP services must be available in the event of a disaster. You can set up the LDAP environment so that you have clustered servers for this purpose.

# Tivoli Storage Productivity Center installation and upgrade on Windows

In this chapter, we show the step-by-step installation of the Tivoli Storage Productivity Center (TPC) V4.1 on the Windows platform. Of the available installation paths, Typical and Custom, we describe the Custom installation in our environment. We also show how to upgrade from a previous version of TPC, depicting all the required steps.

# 3.1 Tivoli Storage Productivity Center installation

Tivoli Storage Productivity Center uses several installation wizards that guide you through the installation of the Tivoli Storage Productivity Center servers and agents. In this chapter, we describe the installation of the Tivoli Storage Productivity Center Standard Edition. The prerequisite components are installed prior to invoking the installation wizard.

# 3.1.1 Installation overview

In order to get Tivoli Storage Productivity Center V4.1 to work, you need to follow the following steps:

- Check that the system meets the prerequisites. See 3.2, "Preinstallation steps for Windows" on page 55.
- Install the prerequisite components. See 3.3, "Installing TPC prerequisites" on page 64.
- Install Tivoli Storage Productivity Center components. See 3.4, "Installing Tivoli Storage Productivity Center components" on page 93.
- Install Tivoli Storage Productivity Center agents. See 3.4.3, "Agent installation" on page 119.

You can install all the Tivoli Storage Productivity Center components using Typical installation or Custom installation.

## **Typical installation**

The Typical installation allows you to install all the components of the Tivoli Storage Productivity Center on the local server in one step. Our recommendation is *not* to use the Typical installation, because the control of the installation process is much better when you use the Custom installation method.

# **Custom installation**

The Custom installation allows you to install each component of the Tivoli Storage Productivity Center separately and deploy remote Fabric agents or Data agents on various computers. Additional panels are presented allowing you to control the installation sequence of the components and specify additional TPC parameters. This is the installation method that we recommend.

**Note:** Tivoli Storage Productivity Center for Replication is no longer a stand-alone application. Tivoli Storage Productivity Center Version 4.1 now installs Tivoli Integrated Portal and Tivoli Storage Productivity Center for Replication Version 4.1 during the component installation process.

When you install Tivoli Storage Productivity Center, you have these installable components:

- Database Schema
- Data Server and Device Server
- Graphical User Interface (GUI)
- Command Line Interface (CLI)
- Data agent
- Fabric agent

After Tivoli Storage Productivity Center is installed, the installation program will start the Tivoli Storage Productivity Center for Replication installation wizard.

The approximate time to install Tivoli Storage Productivity Center, including Tivoli Integrated Portal, is about 60 minutes. The approximate time to install Tivoli Storage Productivity Center for Replication is about 20 minutes.

## 3.1.2 Product code media layout and components

In this section, we describe the contents of the product media at the time of writing. The media content will differ depending on whether you are using the Web images or the physical media shipped with the TPC V4.1 package.

#### Passport Advantage and Web media content

The Web media consists of two disk images:

- Disk1 contains all Tivoli Productivity Center components:
  - Database Schema
  - Data Server
  - Device Server
  - GUI
  - CLI
  - Data agent
  - Fabric agent
  - Storage Resource agent
  - Tivoli Integrated Portal
  - Tivoli Storage Productivity Center for Replication

**Note:** The Disk1 image is in two parts. Both parts must be downloaded in the same directory.

- Disk2 contains the local agent installation components:
  - Data agent
  - Fabric agent
  - Storage Resource agent
  - Installation scripts for the Virtual I/O server

**Note:** On Windows, ensure that the directory name where the installation images reside has no spaces or special characters. This will cause the Tivoli Storage Productivity Center installation to fail. For example, this happens if you have a directory name such as:

C:\tpc 41 standard edition\disk1

#### Physical media

The physical media shipped with the TPC V4.1 product consists of a DVD and a CD. The DVD contains the Disk1 part 1 and Disk1 part 2 content described in "Passport Advantage and Web media content" on page 55. The physical media CD is the same as the Web Disk2 media.

# 3.2 Preinstallation steps for Windows

Certain prerequisite components need to be installed before proceeding with the Tivoli Storage Productivity Center V4.1 storage installation. They are:

 IBM DB2 UDB Enterprise Server Edition v9.1 Fix Pack 2 or later, or v9.5 Fix Pack 3a or later Tivoli Agent Manager 1.3.2

**New in TPC V4.1:** Starting from TPC V4.1, the installation of Tivoli Agent Manager is optional. You are required to install it only if you plan to use Data agents or Fabric agents.

#### Order of prerequisite component installation

The order to follow when installing the prerequisite components is:

- 1. DB2 UDB
- 2. Tivoli Agent Manager

#### 3.2.1 Verifying system hardware and software prerequisites

For the hardware and software prerequisites, refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31.

#### 3.2.2 Verifying primary domain name systems

Before you start the installation, we recommend that you verify if a primary domain name system (DNS) suffix is set. This can require a computer restart.

To verify the primary DNS name, follow these steps:

- 1. Right-click My Computer on your desktop.
- 2. Click **Properties**.

The System Properties panel is displayed as shown in Figure 3-1.

3. Click the Computer Name tab. On the panel that is displayed, click Change.

System Properties		? 🗙
Advanced General	Automatic Updates Computer Name	Remote Hardware
Windows uses on the network	the following information to idea <	ntify your computer
Computer description:		
	For example: "IIS Production 9 "Accounting Server".	Server" or
Full computer name:	tpcsrv.itsosj.sanjose.ibm.com	
Workgroup:	WORKGROUP	
To rename this computer	or join a domain, click Change.	Change
	OK Ca	ncel <u>Apply</u>

Figure 3-1 System Properties

4. Enter the host name in the Computer name field. Click More to continue (see Figure 3-2).

Computer Name Changes	? ×
You can change the name and the membership of this computer. Changes may affect access to network reso	urces.
<u>C</u> omputer name:	
tposrv	
Full computer name: tpcsrv.itsosj.sanjose.ibm.com	
	ore
Member of	- 43
C Domain:	
• Workgroup:	
WORKGROUP	_
OK C	ancel

Figure 3-2 Computer name

5. In the next panel, verify that Primary DNS suffix field displays the correct domain name. Click **OK** (see Figure 3-3).

DNS Suffix and NetBIOS Computer Name 🛛 🔋 🗙
Primary DNS suffix of this computer: itsosj.sanjose.ibm.com
Change primary DNS suffix when domain membership changes
NetBIOS computer name: TPCSRV
This name is used for interoperability with older computers and services.
OK Cancel

Figure 3-3 DNS domain name

6. If you made any changes, you must restart your computer for the changes to take effect (see Figure 3-4).

Computer Name Changes		
(i)	You must restart this computer for the changes to take effect.	
	OK	

Figure 3-4 You must restart the computer for changes to take effect

# 3.2.3 Activating NetBIOS settings

If NetBIOS is not enabled on Microsoft Windows 2003, then GUID is not generated. You must verify and activate NetBIOS settings.

On your Tivoli Storage Productivity Center Server, go to Start  $\rightarrow$  Control Panel  $\rightarrow$  Network Connections. Select your Local Area Connections. From the Local Area Connection Properties panel, double-click Internet Protocol (TCP/IP). The next panel is the Internet Protocol (TCP/IP) Properties. Click Advanced as shown in Figure 3-5.

Internet Protocol (TCP/IP) Propertie	25 <b>? X</b>
General	
You can get IP settings assigned autor this capability. Otherwise, you need to for the appropriate IP settings.	matically if your network supports o ask your network administrator
O Obtain an IP address automatical	lly
• Use the following IP address:	
IP address:	9 . 43 . 85 . 29
S <u>u</u> bnet mask:	255 . 255 . 252 . 0
Default gateway:	9 . 43 . 85 . 1
C Obtain DNS server address autor	matically
${ar{\frown}}$ Use the following DNS server add	dresses:
Preferred DNS server:	9 . 43 . 85 . 11
<u>Alternate DNS server:</u>	
	Advanced
	OK Cancel

Figure 3-5 TPC/IP properties
On the WINS tab, select Enable NetBIOS over TCP/IP and click OK (see Figure 3-6).

IP Settings DNS WINS Options				
WINS addresses, in order of use:				
	Ţ			
<u>A</u> dd	Remo <u>v</u> e			
If LMHOSTS lookup is enabled, it applies to all TCP/IP is enabled.	connections for which			
Enable LMHOSTS lookup	Import LMHOSTS			
NetBIOS setting Default: Use NetBIOS setting from the DHCP server. If static IP address is used or the DHCP server does not provide NetBIOS setting, enable NetBIOS over TCP/IP.				
-				
Enable NetBIOS over TCP/IP				
<ul> <li>Enable NetBIOS over TCP/IP</li> <li>Disable NetBIOS over TCP/IP</li> </ul>				
<ul> <li>Enable NetBIOS over TCP/IP</li> <li>Disable NetBIOS over TCP/IP</li> </ul>				

Figure 3-6 Advanced TCP/IP properties

#### 3.2.4 Internet Information Services

On systems running Internet Information Services (IIS), port 80 can already be in use. Port 80 is also used by the Agent Manager for the recovery of agents that can no longer communicate with the manager, because of lost passwords or certificates. If any service is using port 80, then Agent Recovery Service installs, but it does not start.

Before beginning the installation of Tivoli Storage Productivity Center, you must do one of the following actions:

- Uninstall IIS.
- Disable IIS.
- Change the IIS port to something other than 80, for example, 8080.

To uninstall IIS, use the following procedure:

- 1. Click Start  $\rightarrow$  Control Panel  $\rightarrow$  Add/Remove Programs.
- 2. In the Add or Remove Programs window, click Add/Remove Windows Components.
- 3. In the Windows Components panel, select Application Server and click Details...
- 4. In the Application Server panel, deselect Internet Information Services (IIS), click OK.

In our installation, we disabled IIS to avoid any port conflicts.

To disabled IIS, use the following procedure:

- 1. Click Start  $\rightarrow$  Control Panel  $\rightarrow$  Administrative Tools  $\rightarrow$  Services.
- 2. Right-click World Wide Web Publishing Service, and choose Stop.

To change the IIS port to another value, refer to the IIS documentation.

### 3.2.5 User IDs and passwords to be used and defined

In this section, we describe the user IDs and passwords that you need to define or set up during Tivoli Storage Productivity Center installation.

In order to install Device Server and Data Server, you must have a Windows user ID with all the proper required rights. We created a unique user ID, as described in Table 3-3.

**Note**: It is a good practice to use the worksheets in Appendix C, "Worksheets" on page 641 to record the user IDs and passwords used during the installation of Tivoli Storage Productivity Center.

Table 3-1 points you to the appropriate table that contains the user IDs and passwords used during the installation of Tivoli Storage Productivity Center.

Item	Table
Installing DB2 and Agent Manager	Table 3-2 on page 61
Installing Device Server or Data Server	Table 3-3 on page 61
Installing Data agent or Fabric agent	Table 3-4 on page 61
DB2 administration server user	Table 3-5 on page 61
Certificate authority password	Table 3-6 on page 62
Common Agent registration	Table 3-7 on page 63
Common Agent service logon user ID and password	Table 3-8 on page 63
Host authentication password	Table 3-9 on page 63
Data Server account password	Table 3-10 on page 63
Resource manager registration user ID and password	Table 3-11 on page 64
WebSphere Application Server administrator user ID and password	Table 3-12 on page 64
TPC for Replication server administrator	Table 3-13 on page 64

Table 3-1 Index to tables describing required user IDs and passwords

Table 3-2 on page 61 through Table 3-12 on page 64 contain information about the user IDs and passwords used during the installation of the Tivoli Storage Productivity Center prerequisites and components.

Table 3-2 Installing DB2 and Agent Manager

ltem	Description	Group	Created when	Used when
Installing DB2	Log on Windows	Administrators		Used to log on
Manager	Administrator	User ID	Password	DB2 and Agent
		User ID used to log on	Used to log on	Manager

Table 3-3 Installing Device, Data, or TPC for Replication server

Item	Description	Group	Created when	Used when
Installing the Device Server, Data Server, and TPC for	Add user ID to DB2 Admin group or assign the user rights: - Log on as a service - Act as part of the operating system - Adjust memory quotas for a process - Create a token object - Debug programs - Replace a process level token	Administrators	It has to be created before starting Device Server installation	Used to log on Windows to install Device Server or Data Server and TPC
Replication Server		User ID	Password	for Heplication server
		New user ID used to log on Windows	New password used to log on Windows	

Table 3-4 Installing Data agent or Fabric agent

item	Description	Group	Created when	Used when
Installing Data agent or fabric agent - Log on as a service. On Linux or UNIX, give root authority	User rights: - Act as part of the operating system - Log on as a service. On Linux or UNIX,	Administrators	Has to be created before starting Data agent or Fabric agent installation	Used to logon Windows to install Data agent or Fabric agent
	User ID	Password		
		New user ID used to log on Windows	New password used to log on Windows	

Table 3-5 DB2 administration server

item	Description	Group	Created when	Used when
DB2 administration	ser Used to run the DB2 administration server on your system. Used by the DB2 GUI tools to perform administration tasks. See rules in the following section.		Specified when DB2 is installed	Used by the DB2 GUI tools to
server user		User ID	Password	administration tasks.
		New user ID	New password	

To install a GUI or CLI, you do not need any particular authority or special user ID.

#### DB2 user ID and password rules

DB2 user IDs and passwords must follow these rules:

- ▶ Windows 32-bit user IDs and passwords can contain 1 to 20 characters.
- Group and instance names can contain 1 to 8 characters.
- User IDs cannot be any of the following words:
  - USERS
  - ADMINS
  - GUESTS
  - PUBLIC
  - LOCAL
- User IDs cannot begin with:
  - IBM
  - SQL
  - SYS
- User IDs cannot include accented characters.
- ► Windows 32-bit users, groups, or instance names can be any case.

DB2 creates a user group with the following administrative rights:

- Act as a part of an operating system
- Create a token object
- Increase quotas
- Replace a process-level token
- Log on as a service.

**Note:** Adding the user ID used to install Tivoli Storage Productivity Center to the DB2 Admin group gives the user ID the necessary administrative rights.

Table 3-6	Certificate	authority	password
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item	Description	Group	Created when	Used when
Certificate authority password	This password locks the file, CARootKeyRing.jks. Specifying a value for this password is		Specified when you install Agent Manager	Used when you need to unlock the certificate
		User ID	Password	aumonty lifes
	optional. You need to specify this password only if you want to be able to unlock the certificate authority files. <i>We recommend that</i> <i>you create a</i> <i>password</i> .		No default, if not specified one is generated automatically	

**Important:** Do not change the Agent Registration password under any circumstances. Changing this password will render the certificates unusable.

Table 3-7 Common Agent registration passwords

Item	Description	Group	Created when	Used when
Common Agent registration password	This is the password required by the Common Agent to		Specified when you install Agent Manager	Used during Common Agent, Data agent and
	register with the Agent Manager	User ID	Password	Fabric agent installation
			Must be provided	

Table 3-8 Common Agent service logon user ID and password

item	Description	Group	Created when	Used when
Common Agent service logon user ID and password	This creates a new service account for the Common Agent	Administrators	Specified when you install Data agent or Fabric agent (only local).	Used when running the Common Agent locally
	to run under.	User ID	Password	
		If you do not specify anything, <i>itcauser</i> is created by default		

Table 3-9 Host authentication password

item	Description	Group	Created when	Used when
Host authentication password	lost uthentication asswordPassword to authenticate the Fabric agents with the Device Server		Specified when you install the Device Server	Used when you install Fabric agent, to communicate
		User ID	Password	Server.
			Must be provided	

Table 3-10 Data Server account password

item	Description	Groups	Created when	Used when
Data Server account	This creates a new service account for running the Data	Administrators	Specified when installing the Data Server	Used when the OS runs the Data Server
password	Server.	User ID	Password	
		TSRMsrv1	Must be provided	

Table 3-11	Resource manager	registration user	ID and	password
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item	Description	Group	Created when	Used when
Resource manager registration user ID and password			Specified when you install Device Server and Data Server	Used when Device Server and Data Server have to register to Agent
		User ID	Password	Manager
		Manager (by default)	Password (by default)	

Table 3-12	WebSphere	Application	Server	administrator	user ID	and password

item	Description	Group	Created when	Used when
WebSphere Application Server	It is the User ID with administrative		Specified when you install Device Server	Used to administer the Device Server WebSphere
administrator user ID and	rights for the Device Server	User ID	Password	used as TIP
password	d and TIP WebSphere Instances	Must be provided	Must be provided	WebSphere instance administrator

Table 3-13 Administering TPC for Replication server

Item	Description	Group	Created when	Used when
TPC for Replication server administrator	It is the User ID with administrative rights for the TPC for Replication	Administrators	It has to be created before starting TPC for Replication server installation	Used to log on to TPC for Replication server. It can be the same user used for WebSphere Application server
	Instance.	User ID	Password	administration.
		Must be provided	Must be provided	

# 3.3 Installing TPC prerequisites

In this section, we show how to install the Tivoli Storage Productivity Center prerequisites on Windows. We perform a typical installation of DB2 9.5 Fix Pack 3a and an Agent Manager installation.

Before beginning the installation, it is important that you log on to your system as a local administrator with Administrator authority (see Table 3-2 on page 61).

## 3.3.1 DB2 installation

To begin the installation of DB2, follow these steps:

1. Insert the IBM DB2 Installer CD into the CD-ROM drive.

If Windows autorun is enabled, the installation program ought to start automatically. If it does not, open Windows Explorer and go to the DB2 Installation image path and double-click **setup.exe**. You will see the Welcome panel, as shown in Figure 3-7. Select **Install a Product** to proceed with the installation.

DB2 Setup Launchpad	
Information Management software	
Welcome	Welcome to DB2 Version 9.5 Fix Pack 3
Installation Prerequisites	The DB2 Setup Launchpad gives you access to all of the information that you need to install your DB2 products and features for Linux LINIX and Windows operating systems
Release Notes	
Migration Information	To access more information about the DB2 products available for installation or to perform an installation, select from the tabs provided. You can find more product information by searching the
Install a Product +	Information Center.
Exit	Search Information Center
	③ Copyright International Business Machines Corporation, 1993, 2007. All rights reserved.

Figure 3-7 DB2 Setup Welcome panel

 The next panel allows you to select the DB2 product to be installed. Select the DB2 Enterprise Server Edition Version 9.5 Fix Pack 3 by clicking Install New to proceed as shown in Figure 3-8.



Figure 3-8 Select product

3. The DB2 Setup wizard panel is displayed, as shown in Figure 3-9. Click Next to proceed.



Figure 3-9 Setup wizard

4. The next panel displays the license agreement; click **I accept the terms in the license agreement** (Figure 3-10).

🖶 DB2 Setup - DB2 Enterprise Server Edition - DB2COPY1				
Software License Agreement Please read the following license agreement carefully.				
Two license agreements are presented below.				
1. IBM International License Agreement for Evaluation of Programs 2. IBM International Program License Agreement				
If you are obtaining the Program for purposes of productive use (other than evaluation, testing, trial "try or buy," or demonstration): By clicking on the "Accept" button below, You accept the IBM International Program License Agreement, without modification.				
If you are obtaining the Program for the purpose of evaluation, testing, trial "try or buy," or demonstration (collectively, an "Evaluation"): By clicking on the "Accept" button below, You accept both (i) the IBM International License Agreement for Evaluation of Programs (the "Evaluation License"), without				
David ever TDM harms				
S i accept the terms in the license agreement				
InstallShield				

Figure 3-10 License agreement

5. To select the installation type, accept the default of **Typical** and click **Next** to continue (see Figure 3-11).

🖶 DB2 Setup - DB2 Enterprise Se	rver Edition - DB2COPY1	
Select the installation typ	ne	
<ul> <li>Iypical:</li> <li>Compact:</li> <li>Custom:</li> <li>Information about the instational of the typical setup includ features and functional To add features for app Custom.</li> </ul>	Approximately 590 - 800 MB Approximately 340 - 550 MB Approximately 340 - 990 MB Illation type es basic database server function, database administration l ty.	tools, and most product 1 the setup process, click View Features
InstallShield	< Back	Cancel Help

Figure 3-11 Typical installation

6. Select Install DB2 Enterprise Server Edition on this computer and save my settings in a response file (see Figure 3-12). Specify the path and the file name for the response file in the Response file name field. The response file will be generated at the end of the installation flow and it can be used to perform additional silent installations of DB2 using the same parameters specified during this installation. Click Next to continue.

🖞 DB2 Setup - DB2 Enterprise Server Edition - DB2COPY1	×					
Select the installation, response file creation, or both	2					
The DB2 Setup Wizard can install DB2 Enterprise Server Edition on this computer, create a response file that you can use to install this product on a computer later, or both.						
If you are setting up a DB2 Enterprise Server Edition (ESE) partitioned database environment, you can also create a response file to install DB2 on the other computers that will act as database partition servers.						
C Install DB2 Enterprise Server Edition on this computer						
C Save my installation settings in a response file						
No software will be installed on this computer.						
• Install DB2 Enterprise Server Edition on this computer and save my settings in a response file						
Response file name C:\DB28KP\DB295Installation.rsp						
InstaliShield	_					
< <u>Back</u> Next > Cancel Help						

Figure 3-12 Installation action

7. The panel shown in Figure 3-13 shows the default values for the drive and directory to be used as the installation folder. You can change these or accept the defaults, then click **Next** to continue. In our installation, we decide to install on the E: drive.

🔂 DB2 Setup - DB2 B	interprise Server Editi	ion - DB2COP¥1			
Select the inst	allation folder				
The DB2 Setup w Change or type a	vizard installs DB2 Enterpr a directory.	ise Server Edition in th	e following folder. To se	lect a different fold	er, click
Directory	E:\Program Files\IBM	(SQLLIB)		Change	B
	Space required:	909 MB		<u>D</u> isk spa	ce
InstallShield		< <u>B</u> ack	Next >	Cancel	Help

Figure 3-13 Installation folder

 The next panel requires user information for the DB2 Administration Server; it can be a Windows domain user. If it is a local user, select None - use local user account for the Domain field.

The user name field is prefilled with a default user name. You can change it or leave the default and type the password of the DB2 user account that you want to create (see Figure 3-14). You can refer to Table 3-5 on page 61. Leave the check-box **Use the same user name and password for the remaining DB2 services** checked and click **Next** to continue.

DB2 creates a user with the following administrative rights:

- Act as a part of an operating system.
- Create a token object.
- Increase quotas.
- Replace a process-level token.
- Log on as a service.

🔀 DB2 Setup - DB2 Enterprise Server Edition - DB2					
Set user information for the DB2 Adminis	tration Server				
The DB2 Administration Server (DAS) runs on your computer to provide support required by the DB2 tools. Specify the required user information for the DAS.					
User information					
Domain	None - use local user account				
User name	db2admin				
Password	*****				
Confirm password	*****				
☑ Use the same user name and password for the remaining DB2 services					
InstallShield					
	< Back Next > Cancel Help				

Figure 3-14 User Information

9. In the Configure DB2 instances panel, accept the default and click **Next** to continue (see Figure 3-15).

健 DB2 Setup - DB2 Enterprise Server Edition - DB2COPY1	×
Configure DB2 instances	
The following instances will be created during installation. You can customize the configurations by clicking on the Configure button.	
DB2 Instances:	
D62	
Instance description The default instance, DB2, stores application data. You can build a partitioned database environment by installing DB2 Enterprise Server Edition on other computers, and specify that these computers participate in the default instance.	
InstallShield < <u>Back</u> <u>Next</u> Cancel Help	

Figure 3-15 Configure DB2 instances

10. The next panel allows you to specify options to prepare the DB2 tools catalog. Accept the defaults, as shown in Figure 3-16. Verify that Prepare the DB2 tools catalog on this computer is not selected. Click Next to continue.

🚰 DB2 Setup - DB2 Enterprise Server Editio	on - DB2COPY1			
Prepare the DB2 tools catalog				
The DB2 tools catalog must be created schedule common tasks such as backup	in order to use the Tas os. The DB2 tools catalo	k Center and schedu og must be stored in a	ler. These tools allow a DB2 database.	you to
Prepare the DB2 tools catalog				
Instance	DB2	T		
Database				
C New	TOOLSDB			
C Existing				
Schema				
© Ne <u>w</u>	SYSTOOLS			
C Existing				
InstallShield				
	< <u>B</u> ack	<u>N</u> ext >	Cancel	Help

Figure 3-16 Prepare db2 tools catalog

11. The next panel, shown in Figure 3-17, allows you to set the DB2 server to send notifications when the database needs attention. Ensure that the check-box Set up your DB2 server to send notification is unchecked and then click Next to continue.

DB2 Setup - DB2 Enterprise Server Edition - DB2COPY1	
Set up notifications	
You can set up your DB2 server to automatically send e-mail or pager notifications to alert administrators when a database needs attention. The contact information is stored in the administration contact list. You need an unauthenticated SMTP server to send these notifications.	
If you do not set up your DB2 server to send notifications at this time, the health alerts are still recorded in the administration notification log.	
🔽 Set up your DB2 server to send notifications	
Sotification SMTP server	
Administration contact list location	
© Local - Create a contact list on this computer	
C Remote - Use an existing contact list on another DB2 server	
Remote DB2 server	
schallshield	
< Back Next > Cancel	Help
- Educi - Caucos	

Figure 3-17 Health Monitor

12. Accept the defaults for the DB2 administrators group and DB2 users group in the Enable operating system security for DB2 objects panel shown in Figure 3-18 and click **Next** to proceed.

		_
🗑 DB2 Setup - DB2 Enterprise Server Edition - DB2COP	Y1	×
Enable operating system security for DB2 ob	ojects	
Specify if you would like to enable operating system s objects on your computer. If you enable this security the groups specified below.	security for DB2 files, folders, registry keys, and other , operating system access to DB2 objects will be limited to	
Enable operating system security		
Information on the DB2 administrators grou	p and DB2 users group is available by clicking Help.	
DB2 administrators group		
Domain	None - use local group	
Group name	DB2ADMN5	
DB2 users group		
Domain	None - use local group	
Group name	DB2USERS	
InstallShield		_
<u>&lt; B</u> a	ick Next > Cancel Help	

Figure 3-18 Enable operating system security for DB2 objects

13. Figure 3-19 shows the summary panel about what is going to be installed, based on your input. Review the settings and click **Finish** to continue.

👘 DB2 Se	tup - DB2 Enterprise Server Edition	- DB2COPY1	×
Start	copying files and create respo	nse file	
	The D82 Setup wizard has enough informa If you want to review or change any setti response file name and click Finish to begir	ation to create the response file and start copying the program ngs, click Back. If you are satisfied with the settings, type the n copying files.	n files. 9
	Current settings:		
	Product to install: Installation type:	DB2 Enterprise Server Edition - DB2COPY1 Typical	-
	DB2 copy name: Set as default DB2 copy: Set as default IBM database cl	DB2COPY1 Yes ient interface copy: Yes	-12
	Selected features: XML Extender DB2 WMI Provider DB2 Text Search SQLJ Support Samole database source		
	Replication tools		•
InstallShield	l	< <u>B</u> ack [inish] Cancel	Help

Figure 3-19 Summary panel

The DB2 installation proceeds and you see a progress panel similar to the one shown in Figure 3-20.

🙀 DB2 Setup - DB2	2 Enterprise Server Edition - DB2COPY1				
Installing DB2 E	nterprise Server Edition - DB2COPY1				
1					
	Status:				
	Copying new files				
	888				
InstallShield					
		<	Back	<u>N</u> ext >	Cancel

Figure 3-20 DB2 Enterprise Server Edition installation progress

14. When the setup completes, click **Next**, as shown in Figure 3-21.



Figure 3-21 DB2 setup summary panel

15. The next panel allows you to install additional products. In our installation, we clicked **Finish** on the panel shown in Figure 3-22 to exit the DB2 setup wizard.



Figure 3-22 DB2 setup final panel

16. Click Exit on the First Steps panel (Figure 3-23) to complete the installation.

DB2 First Steps		1 × I
	DB2 Database for Linux, UNIX, and Windows	
	version a.v	
Welcome to First Steps	Welcome to First Steps for DB2 Database for Linux, UNIX, and	
Database Creation	Windows	
Database Administration	First Steps introduces some of the key database functions that you can perform using DB2	
Application Development	database systems. These include accessing and managing data objects, maintaining databases automatically by taking advantage of autonomic capabilities, and protecting data using access	
Technical Resources	control techniques. First Steps also points you to additional sources of information about DB2 database systems and its features	
Product Updates		
Exit	The Control Center is set of tools that you can use to manage and administer your data servers and databases. The Command Line Processor (CLP) is a text-based interface that you can use to run DB2 commands, SQL statements, and database utilities. These interfaces are included with the IBM Data Server Client.	
	In addition to the CLP and the Control Center, you may want use the IBM Data Studio Administration Console, a Web-based application to manage your DB2 data servers. It helps you maintain required levels of performance by reducing the time to resolve problems and ultimately avoid problems altogether. Data Studio Administration Console is a separate application that you can obtain from the IBM Data Studio Web site.	
	Details on all product features and licensing terms included with DB2 database products are available in the DB2 Version 9.5 product licensing information technote.	
	First Steps helps you perform the following tasks:	
	Create the SAMPLE database	
	Create your own database	
	View and administer your databases	
	<ul> <li>Create an application using various development environments, including the data server developer tool, IBM Rational development tools, and Microsoft<sup>®</sup> Visual Studio 2005</li> </ul>	
	Find DB2 information from a wide range of sources	
	<ul> <li>Check for product updates to find out about available DB2 product updates and to install them</li> </ul>	
	To make full use of the resources provided by First Steps, you must have access to the online DB2 Information Center.	
		~

Figure 3-23 DB2 First Steps panel

## Verifying the installation

Follow these steps to verify the DB2 installation:

1. Launch a DB2 Command window: Start  $\rightarrow$  IBM DB2  $\rightarrow$  DB2COPY1 (Default)  $\rightarrow$  Command Line Tools  $\rightarrow$  Command Window (see Figure 3-24).



Figure 3-24 DB2 Command Windows

2. Create the SAMPLE database, entering the db2samp1 command as shown in Figure 3-25.



Figure 3-25 Create the SAMPLE database

3. Enter the following DB2 commands. Connect to the SAMPLE database, issue a simple SQL query, and reset the database connection:

```
db2 connect to sample
db2 "select * from staff where dept = 20"
db2 connect reset
```

The result of these commands is shown in Figure 3-26.

🔍 DB2 C	LP - DB2COPY1	L								
E:\Prog Data Databa SQL au Local	gram Files abase Conn ase server ithorizati database	\IBM\SQ] ection ] on ID alias	LLIB\B] [nforma = DB2/ = ADM] = SAM]	N>db2 Ation NT 9.5 NIST PLE	connect to .3	sample				
E:\Prog	gram Files		LLIB\B	N>db2	"select *	from staff	where	dept =	20"	
ID	NAME	DEPT	JOB	YEARS	SALARY	COMM				
10 20 80 190	Sanders Pernal James Sneider	20 20 20 20	Mgr Sales Clerk Clerk	7 8 - 8	98357.50 78171.25 43504.60 34252.75	612.45 128.20 126.50				
4 rec	cord(s) se	lected.								
E:\Prog DB2000 E:\Prog	gram Files DI The SQ gram Files	\IBM\SQ] L commar \IBM\SQ]	LLIB\B] nd comj LLIB\B]	[N>db2 o pleted s [N>_	connect re: successful	set ly.				
							_			

Figure 3-26 DB2 commands results

#### 3.3.2 Agent Manager installation for Windows

In this section, we describe a typical installation of Agent Manager 1.3.2.

When you install the Agent Manager, you will also be installing the Embedded version of IBM WebSphere Application Server (WebSphere Express).

Agent Manager requires a DB2 Database repository to install. In this case, we use the DB2 instance installed in the previous section.

**Note:** The following steps show an Agent Manager installation using a 32-bit DB2 instance. If you want to use a 64-bit DB2 instance, additional steps might be required. Refer to the product manual for additional details.

To install the Agent Manager, follow this procedure:

1. From the EmbeddedInstaller directory, run the program specified in Table 3-14. You must have a Java<sup>™</sup> Virtual Machine installed. If you want to designate a JVM<sup>™</sup> located in a specific path, use the command shown in the third column of this table.

Table 3-14 Embedded Installer directory command
---

Operating system	Command	Java alternate command
Microsoft Windows	setupwin32.exe	setupwin32.exe -is:javahome <jvm path=""></jvm>

**Note:** Before launching the installation, ensure that the user ID under which you are logged into the system has administrative authority.

2. The Installation Wizard starts; you can see a panel similar to the one in Figure 3-27.



Figure 3-27 Install wizard panel

3. The panel, *Choose the runtime container for Agent Manager:* is displayed as in Figure 3-28 with its default option already selected, *The WebSphere Application Server. Make sure that the WebSphere Application Server is already installed.* 

However, *do not* select this option, because we do not have WebSphere installed. Moreover, Tivoli Storage Productivity Center only supports an Agent Manager configured to run in an embedded version of the IBM WebSphere Application Server.

Rather, choose **The embedded version of the IBM WebSphere Application Server delivered with the Agent Manager installer** and click **Next** to continue.

凿 InstallShield Wizard fo <u>r Installi</u>	ng the Agent Manager
	The embedded version of the IBM WebSphere Application Server delivered with the Agent Manager insta The WebSphere Application Server. Make sure that the WebSphere Application Server is already installer
InstallShield	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel

Figure 3-28 Install wizard panel

4. Figure 3-29 shows the Directory Name for the installation. Click **Next** to accept the default or click **Browse** to install to another directory. In our case, we accepted the default.

省 InstallShield Wizard for Ins	talling the Agent Manager
TinstallShield Wizard for Inst IEM.	Click Next to install "Tivoli Agent Manager" to this directory, or click Browse to install to a different directory.         Directory Name:         C:\Program Files\IBMVAgentManager         Browse
InstallShield	< Back Next> Qancel

Figure 3-29 Directory Name panel

5. The Type and Location of Registry panel is displayed, as shown in Figure 3-30. Choose **32-bit DB2 local database**, which is the default, and click **Next** to continue.

🎽 InstallShield Wizard for Installing t	the Agent Manager 📃 🗆 🗙
Type a	and Location of Registry
Туре	e and Location of the Database for the Registry
	32-bit DB2 local database 64-bit DB2 local database or DB2 remote database (without DB2 Administrator Client) Local alias to a DB2 database on another computer (using DB2 Administration Client) Oracle database on this computer Oracle database on another computer (using Oracle Database Client) Derby database on this computer
InstallShield	< <u>B</u> ack <u>Next&gt;</u> <u>C</u> ancel

Figure 3-30 Type and Location of Registry panel

- 6. In the next DB2 Universal Database<sup>™</sup> Connection Information panel shown in Figure 3-31, enter the following database information:
  - Database Software Directory:

Enter the directory where DB2 is installed on your system. The default directory is:

C:\Program Files\IBM\SQLLIB

In our case we installed DB2 in the E: drive.

Database Name:

A default database called IBMCDB will be created for the Agent Manager. This value is already present in the panel. You can accept the default.

After entering the information, click **Next** to continue.

🍟 InstallShield Wizard for Insta	alling the Agent Manager	
	DB2 Universal Database Connection Information	
	Database Software Directory	
IBM.	E:\Program Files\IBM\SQLLIB	
		Browse
	If the database aiready exists, it will be reused. If it does not exist, it will be created for you.	
InstallShield		
	< Back Next >	Cancel

Figure 3-31 DB2 Universal Database Connection Information panel

7. The Database User Information panel is shown in Figure 3-32. A default user ID is already present in the user field. You can enter another database user name and type the corresponding password. This must be a DB2 administrator user ID that is in the DB2ADMNS group and Administrator group.

If you want to use a separate user ID for the installation of Agent Manager only, you can select **Use a different user ID during the installation**, and enter the user ID and password. Note that if you do not select the check box, the following Database Administrator User ID and Password will not be used.

We recommend that you use the DB2 ID and password from the DB2 installation if you use the DB2 only for TPC. This user ID and password are those created in step 8 on page 69.

You can refer to Table 3-5 on page 61 for the ID and password. In our installation, we use the DB2 ID and password from the DB2 installation. Click **Next** to continue.

省 InstallShield Wizard for Insta	alling the Agent Manager	C
	Database User Information	
	Specify the user ID and password for accessing the database	
IBM.	Database Runtime User ID	
	db2admin	
	Password	
	******	
	Use a different user ID during the installation	
	Specify a separate user ID for installing the agent manager. This user must have the authority to create a database and tables. This lets you limit the authority you give the runtime user ID because it does not need the authority to create objects.	
	Database Administrator User ID	
	db2admin	
	Password	
	******	
		J
		1
InstallShield		
	< Back Cancel	

Figure 3-32 Database User Information panel

- 8. The WebSphere Application Server Connection Information panel is shown in Figure 3-33. Enter the following information, and click **Next** to continue:
  - Host Name or Alias of Agent Manager:

Review the preinstallation task mentioned in 3.2.2, "Verifying primary domain name systems" on page 56. Use the fully qualified host name. For example, specify colorado.itso.ibm.com. This value is used for the URLs for all Agent Manager services. We recommend that you specify the fully qualified host name rather than an IP address.

If you specify an IP address, you will see the warning panel shown in Figure 3-34 on page 82.

Registration Port:

Use the default port of 9511 for the server-side SSL.

Secure Port:

Use the default port of 9512 for client authentication, two-way SSL.

Public Port and Alternate Port for the Agent Recovery Service:

Use the public communication port default of 9513.

Do not use port 80 for the agent recovery service:
 Accept the default and do not check this box.

**Note:** If you want to check this box to have the Agent Recovery Service running on this port, make sure that port 80 is not being used by another application. If any service is using port 80, Agent Recovery Service installs, but does not start. To check for other applications that are using port 80, run this command:

```
netstat -an
```

🍟 InstallShield Wizard for Inst	alling the Agent Manager
	WebSphere Application Server Connection Information
	Host Name or Alias of Agent Manager
IBM.	colorado.itso.ibm.com
	Tip: This is the network name that common agents and resource managers use to connect to the agent manager. Use a host name that can be resolved by those systems. For example, use a network alias such as AgentManagerServer or a fully qualified host name such as agman.mycompany.com.
	Registration Port
	9511
	Secure Port
	9512
	Public Port and Alternate Port for the Agent Recovery Service
	9513
	Do not use port 80 for the agent recovery service
la stallOhiald	
installShleid -	
	< <u>B</u> ack <u>Next &gt;</u> <u>C</u> ancel

Figure 3-33 WebSphere Application Server Connection Information panel

9. If you specify an IP address instead of a fully qualified host name for the Host Name or Alias of Agent Manager, you see the panel shown in Figure 3-34. We recommend that you click the **Back** button and specify a fully qualified host name.

you really want to use the value 9.12.6.75 for the agent manager server?
mmon agents and resource managers use the value of this field to connect to the agent manager services.
e preferred value for this field is a network alias for the host name, which allows common agents and resource anagers to use a host name that is defined on the DNS server and will not change, even if the agent manager is aved to a different IP address or host.
ou specify an IP address, then computer systems will not be able to contact the agent manager if its IP address anges. This can occur in a DHCP environment, where dynamic IP addresses are assigned and a machine might quire a new address periodically, or after rebooting.
ou specify a short host name, then computer systems outside the agent manager's subnet must be configured to solve addresses in the agent manager subnet. If they are not correctly configured, a common agent or resource anager on those systems cannot contact the agent manager. Therefore, use a short host name only if your vironment contains a single IP domain, or if all the computer systems are configured with the correct domain arch information.
e default value for the agent manager host name in the wizard window was an IP address instead of a fully alified host name, then the computer on which you are installing the agent manager is not configured with the rrect domain search information.
ck Back to specify a host name alias or a fully qualified host name.
ck Next to accept the current value and continue, although common agents and resource managers might not be le to connect to the agent manager.
< <u>B</u> ack <u>V</u> ext > <u>C</u> ancel
r enn oag oand oan

Figure 3-34 Warning IP specified panel

10. In the WebSphere Application Server Connection Information panel shown in Figure 3-35, accept the defaults and click **Next** to continue.

凿 InstallShield Wizard for Instal	ling the Agent Manager	_ 🗆 X
InstallShield	WebSphere Application Server Connection Information         Application Server Name         AgentManager         Use this name to start and stop the application server and to locate the agent manager files in the WebSphere directory.         Context Root of Application Server         //AgentMgr         The context root is part of the URL that common agents and resource manages use to contact the agent manager. The underly string in the following URL, including the forward slash, is the context root: http://colorado.itso.ibm.com/9613//AgentMar         Image: Provide the agent manager each time the system restarts	ined
	< <u>B</u> ack <u>Next &gt; C</u> an	cel

Figure 3-35 WebSphere Application Server Connection Information for Application Server Name

11. In the Security Certificates panel (see Figure 3-36), we highly recommend that you accept the defaults to generate new certificates for a secure environment.

Click **Next** to continue.

🍟 InstallShield Wizard for Inst	alling the Agent Manager 📃 🛛 🗙
	Security Certificates
	Do you want to create certificates that are specific to this installation of the agent manager, or use the demonstration certificates?
	Create certificates for this installation
	O Use the demonstration certificates
	Demonstration certificates are publicly available and do not provide the level of security required by a typical IT environment. They are provided for testing or demonstration environments only.
InstallShield	
	< <u>B</u> ack <u>Next</u> ≥ <u>C</u> ancel

Figure 3-36 Create security certificates

12. In the panel shown in Figure 3-37, specify the Security Certificate settings. To create Certificates, you must specify a Certificate Authority Password. You must specify this password to look at the certificate files after they are generated. Make sure that you record this password in the worksheets in Appendix C, "Worksheets" on page 641.

The values in the Certificate Authority Name and in the Security domain are already propagated. After entering the passwords, click **Next** to continue.

省 InstallShield Wizard for Inst	alling the Agent Manager
InstallShield Wizard for Inst	alling the Agent Manager         Define the Certificate Authority         Certificate Authority Name         TivoliAgentManagerCA         Security Domain         Itso.ibm.com         Certificate Authority Password         This password locks the certificate authority truststore. The CA password is typically used only by the agent manager.         If your security policies do not require you to examine the contents of the CA truststore you can leave this field blank to generate a randomized password.         Password         re******         Confirm Password
InstallShield	
	< <u>B</u> ack <u>N</u> ext ≥ <u>C</u> ancel

Figure 3-37 Define the Certificate Authority

- 13.In the Agent Manager Set Passwords panel shown in Figure 3-38, enter the following information and click **Next** to continue:
  - Agent Manager Password:

This is the resource manager registration password. This password is used to register the Data Server or Device Server with the Agent Manager. Enter the password twice.

We recommend that you record it in the worksheets provided in Appendix C, "Worksheets" on page 641.

- Agent registration Password:

This is the password used to register the Common Agents (for Fabric agent and Data agent). You must supply this password when you install the agents. This password locks the agentTrust.jks file. Enter the password twice.

You specify a unique password and record it in the worksheets provided in Appendix C, "Worksheets" on page 641. You must provide a password here, otherwise you cannot continue the installation.

凿 InstallShield Wizard for Insta	alling the Agent Manager
	Set Passwords
	Agent Manager Password
	This password locks the agent manager truststore file (AgentManagerTrust.jks) and keystore file (agentManagerKeys.jks).
	This password is used internally by the agent manager.
	Password *******
	Confirm Password
	Agent Registration Password
	A common agent must provide this password to register with the agent manager.
	This password also looks the agentTrust.jks truststore file. A common agent or resource manager compares the certificate in its copy of the agentTrust.jks file with the certificate presented by the agent manager to make sure that it registers with the correct agent
	manager.
	This password is required to install a common agent or a resource manager.
	Password
	Confirm Password
InstallShield	
	< <u>B</u> ack <u>N</u> ext≻ <u>C</u> ancel

Figure 3-38 Agent Manager Set Passwords panel

14. The User Input Summary panel is displayed (see Figure 3-39). If you want to change any settings, click **Back** and return to the window where you set the value. If you do not need to make any changes, click **Next** to continue.



Figure 3-39 Input summary

The next panel is the WebSphere Application Server installation panel shown in Figure 3-40. The installation can take time, so be patient.

凿 InstallShield Wizard for Ins	talling the Agent Manager			
	Wait while the installation and configuration of the em Server completes.	bedded version of	T the IBM WebSphe	re Application
		< <u>B</u> ack	<u>N</u> ext ≻	<u>C</u> ancel

Figure 3-40 WebSphere Application Server installation panel

15. When the WebSphere Application Server installation is complete, you will see the summary information panel. Review the summary information panel (see Figure 3-41) and click **Next** to continue.

🍟 InstallShield Wizard for Inst	alling the Agent Manager	_ 🗆 ×
	Please read the summary information below.	
	Twoli Agent Manager will be installed in the following location: E:\Program Files\UBM\AgentManager with the following features: Tivoli Agent Manager for a total size: 135.9 MB	
InstallShield	< Back Next> Can	zel

Figure 3-41 Summary information panel

The Agent Manager installation starts and you see several messages indicating the installation process. Wait until you get to the panel shown in Figure 3-42. This normally will take about 5 minutes.

🍟 InstallShield Wizard for Ins	stalling the Agent Manager	
	Checking the status of the running WebSphere applications.	
InstallShield		
	< <u>B</u> ack <u>N</u> ext > <u>C</u> a	ncel

Figure 3-42 Agent Manager Installation progress

16. The panel, Start the AgentManager Application Server, is shown in Figure 3-43. Choose **Yes, start AgentManager now** and click **Next** to continue.

Figure 3-43 Start the AgentManager Application Server

You will see the panel in Figure 3-44, indicating that the WebSphere server is starting the Agent Manager.

쓀 InstallShield Wizard for Installing the Agent Manager	_ 🗆 🗙
Starting the WebSphere server AgentManager.	
InstallShield< <u>B</u> ack <u>N</u> ext ≽ <u>C</u> an	cel

Figure 3-44 Starting WebSphere of AgentManager

17. The Summary of Installation and Configuration Results panel is displayed in Figure 3-45. Verify that the Agent Manager has successfully installed all of its components. Review the panel and click **Next** to continue.

🍟 InstallShield Wizard for Ins	talling the Agent Manager	
IBM.	Summary of Installation and Configuration Results The embedded version of the IBM WebSphere Application Server installation: Successful. Validating the WebSphere Cell Name: Successful. AgentManager registry installation: Successful. Twoli GUID application installation: Successful. WebSphere Virtual Host configuration: Successful. WebSphere SSL configuration: Successful. WebSphere Agent Manager application server configuration: Successful. Installation of agent manager applications in WebSphere: Successful Security certificates creation: Successful. Encrypting passwords in AgentManager.properties: Successful. Start Agent Manager Server: Successful	
InstallShield	< Back C:	ancel

Figure 3-45 Summary of Agent Manager configuration options summary

18. The last panel (Figure 3-46) shows that the Agent Manager has been successfully installed. Click **Finish** to complete the Agent Manager installation.



Figure 3-46 Finish the Agent Manager install

#### Verifying the installation

You can verify the installation by running the HealthCheck utility from a command-prompt.

From a command prompt, navigate to the directory, <InstallDir>\toolkit\bin and run **Hea1thCheck**. In our case E:\Program Files\IBM\AgentManager\toolkit\bin.

Refer to the *HealthCheck.readme* file located in this directory for the **HealthCheck** usage.

In our installation, we use **itso13sj** as the agent registration password, so we specify it as part of the RegistrationPW parameter. The default value for this password is *changeMe*. See Figure 3-47.

📧 Command Prompt			
S:\Program Files\IBM\AgentManager\toolkit\bin>HealthCheck.bat -RegistrationPw itso13sj 1 file(s) copied. Tool Laurcher is trying to instantiate Command line tool com.tiunli.cas.manager.tools.Heal			
thCheck			
Command Line Tool com.tivoli.cas.manager.too Apr 22, 2009 9:33:41 PM PDT Arguments passe Institute Publication Statements and Arguments a	ols.HealthCheck succesfully instantiatied. ed to Command Line Tool: -HOST localhost -Regi		
Apr 22, 2009 9:33:43 PM PDT Initializing contained and the second statement of the second sec	onfiguration with file:E:\Program Files\IBM\Age rties		
Apr 22, 2009 9:33:45 PM com.tivoli.agentmgr.	.client.proxy.WSDLClient\$AddressCacheItem_tryCo		
INFC: NOTE ==>Connected to host=localhost of Apr 22, 2009 9:33:45 PM com.tivoli.agentmgr. tConnect	on port=9513 .client.proxy.WSDLClient\$AddressCacheItem direc		
INFO: Directly connected Apr 22, 2009 9:33:45 PM com.tivoli.agentmgr.	.client.proxy.WSDLClient\$AddressCacheItem tryCo		
INFOC: NOTE ==>Connected to host=localhost of Apr 22, 2009 9:33:45 PM com.tivoli.agentmgr. tConnect	on port=9511 .client.proxy.WSDLClient\$AddressCacheItem direc		
INFO: Directly connected			
Agent Manager Name: ibm-cdm:///CDM-Managemer 2000255AC86A1,InstallPath=filex3Ax2Fx2Fx2FE	ntSoftwareSystem/TivoliGUID=480062A16D7C11DDACB x3Ax2FProgramx20Filesx2FIBMx2FAgentManager,Feat		
ure=CIGEM			
Kegistration.domain	= 1tso.1Dm.com		
Ch.Keyning.name	- CEPTS/GHNOULNEYNING.JKS		
CA Key Root Alias	= postkey		
CA CRL TimeToLiue	= 24		
CA.CRL.filename	= certs/CertificateRevocationList		

Figure 3-47 Healthcheck utility

Verify that the *ARS*.version field shows the level you have installed (in our case, it is 1.3.2.30), and that at the end, you see the message, Health Check passed, as shown in Figure 3-48.

cv Command Prompt	
ARS.directory	= E:/Program Files/IBM/AgentManager
ARS.port.base	= 9511
ARS.port.secure	= 9512
ARS.port.public	= 9513
ARS.URI.root	= /AgentMgr
ARS.security.enabled	= true
Status Authorization Required	= true
Access.restriction.revocation	= true
Access.restriction.Configuration	= true
Query.Agent.Max.Return	= -1
Query.Database.Type	= db2
ARS.version	= 1.3.2.30
Key.Algorithm.Name	= RSA
Config.Listener.Manager	= com.tivoli.agentmgr.spi.providers.makeAgentR
egistryUpdate, com.tivoli.agentmgr.cert.Ag	rentStatusChangeListener
Config.Listener.Agent	= com.tivoli.agentmgr.spi.providers.makeAgentR
egistryUpdate	
Registration.Listeners.Manager.Request	= com.tivoli.agentmgr.registration.Authorizati
onValidator, com.tivoli.agentmgr.registrat	ion.AuthorizationTestÖnly, com.tivoli.agentmgr.r
egistration.AgentReregistrationTest	
Registration.Listeners.Manager.Issue	= com.tivoli.agentmgr.registration.StoreCertif
icateListener	
Registration.Listeners.Agent.Request	= com.tivoli.agentmgr.registration.SimplePWReq
uestUalidator, com.tivoli.agentmgr.registr	ation.AuthorizationTestOnly, com.tivoli.agentmgr
.registration.AgentReregistrationTest	<i>y</i> . <b>v v</b>
Registration.Listeners.Agent.Issue	= com.tivoli.agentmgr.registration.StoreCertif
icateListener	
Apr 22, 2009 9:33:46 PM PDT Health Check	passed.
Apr 22, 2009 9:33:46 PM PDT Command Line	Tool execution successful.
F:\Pwogwam_Files\IBM\AgentManagew\toolkit\	hin >

Figure 3-48 Healthcheck utility result

After the Agent Manager installation complete, you can also verify the a connection to the agent manager database can be established. From a command-prompt, enter:

db2cmd $\rightarrow$  db2 $\rightarrow$  connect to IBMCDB user <db2 user ID> using <db2 password>

Change the *<db2 user ID>* and the *<db2 password>* with the values that you have used during the installation. In our case, both these parameters have the value db2admin as shown in Figure 3-49.



Figure 3-49 DB2 command line CONNECT

## 3.4 Installing Tivoli Storage Productivity Center components

Now that all the prerequisites have been installed, we can install the Tivoli Storage Productivity Center components, keeping in mind that with Tivoli Storage Productivity Center V4.1 both Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication are installed.

We split the installation in two separate stages: we install the Database Schema first and, after that, we install the Data Server and the Device Server.

This is because if you install all the components in one step and any part of the installation fails for any reason (for example, space or passwords), the installation suspends and rolls back, uninstalling all the previously installed components.

#### 3.4.1 Creating the Database Schema

Before starting the installation, verify that a supported version of DB2 Enterprise Server Edition has been installed and it has been started.

**Important:** Log on to your system as a local administrator with database authority.

Follow these steps:

- If Windows autorun is enabled, the installation program ought to start automatically. If it does not, open Windows Explorer and go to the Tivoli Storage Productivity Center CD–ROM drive or directory. Double-click setup.exe.
- 2. Choose your language and click **OK** (see Figure 3-50).

🕲 Installer 📃 🗆 🗙
Select a language to be used for this wizard.
English
<u>O</u> K <u>C</u> ancel

Figure 3-50 Language selection panel

3. The License Agreement panel is displayed. Read the terms and select I accept the terms of the license agreement. Then click Next to continue (see Figure 3-51).

🕲 IBM Tivoli Storage Productivity Center - Installer 📃 🔲 🗙				
	IBM Tivoli Storage Productivity Center V4.1.0.97			
	International Program License Agreement Part 1 - General Terms By DowNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS, - DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM, AND - PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE PROGRAM, CONTACT THE PARTY FROM WHOM YOU ACQUIRED IT. "IBM" is International Business Machines Corporation or one of its subsidiaries.  © I accept the terms of the licens agreement			
ALL	C I do not accept the terms of the license agreement.			
	<u>N</u> ext ≽ <u>C</u> ancel			

Figure 3-51 License panel

- 4. Figure 3-52 shows how to select typical or custom installation. You have the following options:
  - Typical installation:

This selection allows you to install all of the components on the same computer by selecting **Servers**, **Agents**, and **Clients**.

- Custom installation:

This selection allows you to install each component separately.

#### Installation licenses:

This selection installs the Tivoli Storage Productivity Center licenses. The Tivoli Storage Productivity Center license is on the CD. You only need to run this option when you add a license to a Tivoli Storage Productivity Center package that has already been installed on your system.

For example, if you have installed Tivoli Storage Productivity Center for Data package, the license will be installed automatically when you install the product. If you decide to later enable Tivoli Storage Productivity Center for Disk, run the installer and select Installation licenses. This option will allow you to install the license key from the CD. You do not have to install the Tivoli Storage Productivity Center for Disk product.

In this chapter, we document **Custom Installation**. Select also the directory where you want to install Tivoli Storage Productivity Center. A default install directory is suggested; you can accept it or change it and then click **Next** to continue.


Figure 3-52 Custom installation

5. In the Custom installation, you can select all the components in the panel shown in Figure 3-53. By default, all components (except the Remote Data agent and Remote Fabric agent) are checked. Because in our scenario, we show the installation in stages, we only select the option to **Create database schema**, and click **Next** to proceed (see Figure 3-53).

(1) IBM Tiyoli Storage Pro	ductivity Center - Installer		
IEM。	Select one or more components to This program will install or upgra example, if version number 3.1.0, that the version of the component installation, all installed compone software. You can choose to insta	e install on the local or remote de various components displa 39 is displayed next to the con is already installed on this co nts will be ungraded to the cu all additional components which	computer. wed below. For mponent, this means, mputer. In this rrent version of ch are not installed.
	Create database schema Tivoli Storage Productivity Cer GUI Data Agent	ter Servers CLI Fabric Agent	
	Remote Data Agent     Register with the agent mana     Register Launch Information V	Remote Fabric Ag ger Vith Other Applications	ent
	< <u>B</u> ack	Next >	Cancel

Figure 3-53 Custom installation component selection

 To start the Database creation, you must specify a DB2 user ID and password. We suggest that you use the same DB2 user ID that you created when you installed DB2 (see Table 3-5 on page 61). Click Next, as shown in Figure 3-54.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer		
	Database administrator inform		
IBM.	Enter the database administ database during installation	rator user ID and password to con and uninstallation.	nect to the
	Database administrator	db2admin	
	Password	******	
1/1/			
	< <u>B</u> ack	Next >	<u>C</u> ancel

Figure 3-54 DB2 user and password

 Enter your DB2 user ID and password again (see Table 3-5 on page 61). Make sure that you have the option Create local database selected. By default, a database named TPCDB is created. Click Database creation details... to continue (see Figure 3-55).

(UIBM Tivoli Storage Pro	ductivity Center - In	staller			
IBM.	New database sche Enter the database with the instance ar DB user ID	ma information information that the p nd creating the requir db2admin	oroduct will use who ed repository tables Password	en communicating s. *******	]
	Port 50000 50000	ASE Database SAMPLE TOOLSDB	Path EXDB2 EXDB2	Instance DB2 A DB2 ¥	
	O Use remote data Host name	Ibase Iocalhost IBM\SQLLIB\java\db2	Database Port	name TPCDB 50000 JDBC driver	1
1/1/2	<ul> <li>Create local data</li> <li>Create local data</li> </ul>	abase	Database Database crea	name TPCDB	
King					
		< Back	<u>N</u> ext >	<u>C</u> ancel	

Figure 3-55 DB2 user and create local database

The panel in Figure 3-56 allows you to change the default space assigned to the database. Review the defaults and make any changes. In our installation we accepted the defaults.

For better performance, we recommend that you:

- Allocate TEMP DB on a separate physical disk from the Tivoli Storage Productivity Center components.
- Create larger Key and Big Databases.

Select **System managed (SMS)** and click **OK** and then **Next** to proceed (Figure 3-56). To understand the advantage of an SMS database versus a DMS database or the Automatic Storage, refer to the section entitled, "Selecting an SMS or DMS table space" in Appendix B, "DB2 table space considerations" on page 637.

🕲 IBM Tivoli Storage Pro	oductivity Center - Installer	r		_		
IEM.	Database schema creation information Enter the information to create the database schema on the specified (local or remote) computer.					
10	Schema name	TPC				
	Database Drive	E:	Browse	200 MB 💌		
	Tablespace	Container directory		Size		
	Normal	E:\DB2\TPCDB\TPC	Browse	200 MB 💌		
and part in the second	Key	E:\DB2\TPCDB\TPC	Browse	200 MB 👻		
	Big	E:\DB2\TPCDB\TPC	Browse	350 MB 🔽		
	Temp	E:\DB2\TPCDB\TPC	Browse	200 MB 🗸		
1 Walt	Temporary user	E:\DB2\TPCDB\TPC	Browse	200 MB 🔻		
IVE	• System managed (S	MS) C Database n C Automatic Storage	nanaged (DMS	5)		
AND BH	Log location					
	E:\DB2\TPCDB\TPC	Browse	Size	20 MB 💌		
		<u>0</u> K		<u>C</u> ancel		

Figure 3-56 DB schema space

Note: The TPC schema name cannot be longer than eight characters.

8. You will see the TPC installation information that you selected as shown in Figure 3-57; click **Install** to continue.

🕲 IBM Tivoli Storage Prod	ıctivity Center - Installer
	Please read the summary information below.
	Please read the summary information below. IBM Tivoli Storage Productivity Center will be installed in the following location: E\Program Files\IBM\TPC with the following features: Database schema for a total size: 295.9 MB total space by filesystem: E\ 295.62 MB
	< <u>B</u> ack <u>I</u> nstall <u>C</u> ancel

Figure 3-57 TPC installation information

Figure 3-58 is the Database Schema installation progress panel. Wait for the installation to complete.

🕲 IBM TotalStorage Producti	vity Center - Installer	
IBM.	Installing DBSchema. Please wait Installing Database schema	
	2%	
1/11		
		<u>C</u> ancel

Figure 3-58 installing DB

9. Upon completion, the Successfully Installed panel is displayed. Click **Finish** to continue (Figure 3-59).



Figure 3-59 Installation summary information

# Verifying the installation

To check the installation, choose Start  $\rightarrow$  All Programs  $\rightarrow$  IBM DB2  $\rightarrow$  General Administration Tools  $\rightarrow$  Control Center, to start the DB2 Control Center. Under All Databases, verify that you have at least a database named TPCDB, as shown in Figure 3-60.

🐜 Control Center	
$\underline{C}ontrol\ Center\ \underline{S}elected\ \underline{E}dit\ \underline{V}iew\ \underline{T}ools\ \underline{H}elp$	
▙ ੀ 않 ॼ 늘  비 % 봄/ 및	₹ 💀 🖿 < 🕐
Dbject View	
Control Center	Control Center
È 🛅 All Systems	Name 👌
E-	All Systems
	🛅 All Databases
H. THOUS	
	2 of 2 items displayed ↓ Z S OF G F C C Default Vie View
	Control Center
	Actions: Current view of the Control Center: Advan
	Customize Control Center

Figure 3-60 Verifying DB2 installation

Attention: Do not edit or modify anything in the DB2 Control Center. This can cause serious damage to your table space. Simply use the DB2 Control Center to browse your configuration.

## Log files

Check for errors and Java exceptions in the log files at the following locations:

- <InstallLocation>\TPC.log
- <InstallLocation>\log\dbSchema\install For Windows, the default InstallLocation is c:\Program Files\IBM\TPC.

Check for the success message at the end of the log files for successful installation.

# 3.4.2 Installing TPC components

In this step we perform a custom installation to install the following components:

- Data Server
- Device Server
- ► GUI
- CLI
- Data agent
- Fabric agent

During this process two additional components will be also installed: the *Tivoli Integrated Portal* and the *Tivoli Storage Productivity Center for Replication*.

## Preinstallation tasks

To install Data Server and Device Server components, you must log on to the Windows system with a user ID that has the following rights:

- Log on as a service.
- Act as part of the operating system.
- Adjust memory quotas for a process.
- Create a token object.
- Debug programs.
- ► Replace a process-level token.

Be certain that the following tasks are completed:

- ► The Database Schema must be installed successfully to start the Data Server installation.
- An accessible Agent manager must be available to start the Device Server installation.
- ► The Data Server must be successfully installed prior to installing the GUI.
- ► The Device Server must be successfully installed prior to installing the CLI.

### **Custom installation**

To perform a custom installation, follow these steps:

- 1. Start the Tivoli Storage Productivity Center installer.
- 2. Choose the language to be used for installation.
- 3. Accept the terms of the License Agreement.
- 4. Select the Custom Installation.
- Select the components you want to install. In our scenario, we select the Servers, GUI, CLI, Data agent and Fabric agent as shown in Figure 3-61. Notice that the field, Create database schema, is grayed out. Click Next to continue.

**Note:** Because we selected to install also the Data agents and Fabric agents, the Register with the agent manager check box is selected and grayed out.



Figure 3-61 Installation selection

 If you are running the installation on a system with at least 4 GB but less than 8 GB of RAM, you will get the warning message shown in Figure 3-62. Click the OK button to dismiss it and proceed with the installation.



Figure 3-62 Memory warning panel

 In the Database administrator information, the DB2 user ID and password are filled in because we used them to create the Database Schema. See Figure 3-63. Click Next.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer		
TEM.	Database administrator inform Enter the database administ database during installation	nation rator user ID and password to connect to the and uninstallation.	
	Database administrator	db2admin	
	Password		
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> ance	

Figure 3-63 DB2 User ID and password

8. We want to use the database **TPCDB** we created in the previous section on the same machine. So we select **Use local database** and we click **Next** to continue (Figure 3-64).

🕲 IBM Tivoli Storage Pro	ductivity Center - Ir	staller				
	Existing database Enter the informa	schema informatior tion to use an existi	ng database so	hema for the r	repository.	
IBM •	DB user ID	db2admin	Passwo	rd 💀	******	
	🖸 Use local data	base				
	Port 50000	Database TPCDB TI	Schema C	Instance )B2	Version 9.5.301.436	
	O Use remote da	Itabase	Port	Le la	0000	
		liocamost		[2	0000	
1 Was -	Database name	TPCDB	Schema	name T	PC	
11.1.1	E:\PROGRA~11	IBM\SQLLIB\java\db	2jcc.jar		JDBC driver	
11125-						
MIL						
		< <u>B</u> ack	<u>N</u> ext ≻		<u>C</u> ancel	

Figure 3-64 Use local database selection

TPC can also run having the DB schema installed on another server. In this case you have to install the TPC schema on that server following the procedure documented in the previous section. Then, installing the other TPC components, you have to select the **Use remote database** option and specify the host name of the server running the DB2 Manager. The other fields must be prefilled as shown in Figure 3-65. Verify their values and click **Next**.

**Note:** If you have the TPC schema already installed locally, the option of using a remote database is disabled. You have to uninstall the local copy and rerun the installation program to enable the remote database option.

🕲 IBM Tivoli Storage Pro	🗓 IBM Tivoli Storage Productivity Center - Installer 📃 🗖 🗙					
	Existing database s Enter the informati	chema informatio ion to use an exis	n ting database :	schema for the	repository.	
LEM.	DB user ID	db2admin	Passw	rord 🛧	****	
	C Use local datab	ase				
	Port	Database	Schema	Instance	Version	
	<ul> <li>Use remote dat</li> <li>Host name</li> </ul>	abase	. Port	F		
	Database name	pc124039.rom	Schem	ia name	PC	
111	D:\IBM\SQLLIB\j	avaldb2jcc.jar			JDBC driver	
	<	Back	<u>N</u> ext	>	<u>C</u> ancel	

Figure 3-65 Remote database selection

If you selected to use a remote database, a warning message shown in Figure 3-66 is presented, reminding you to ensure that the remote DB2 instance is running before proceeding.

🕲 IBM Tivoli Storage Productivity Center - Installer	
Existing database schema information Enter the information to use an existing database schema for the m	epository.
IBM  OB user ID db2admin Password	*****
Remote database manager	×
The remote DB2 database manager must be active in order to successfully run Database schema installation.	ersion
Please ensure that remote DB2 instance is running before continue the installation process.	
Database name TPCDB Schema name TF	'C
D:\\BM\SQLLIB\java\\db2jcc.jar	JDBC driver
< <u>Back</u> <u>N</u> ext>	<u>C</u> ancel

Figure 3-66 Ensure that DB2 is running on the remote system

- 9. In the panel in Figure 3-67, enter the following information:
  - Data Server Name: Enter the fully qualified host name of the Data Server.
  - Data Server Port:

Enter the Data Server port. The default is 9549.

Device Server Name:

Enter the fully qualified host name of the Device Server.

- Device Server Port:

Enter the Device Server port. The default is 9550.

– TPC Superuser:

Enter the Administrators Group for the TPC Superuser. We are using a user ID that belongs to the existing Administrators group. See 3.2.5, "User IDs and passwords to be used and defined" on page 60 for more details.

**Note:** If you select LDAP authentication later in the Tivoli Storage Productivity Center installation, then the value that you enter for LDAP TPC Administrator group overrides the value that you entered here for the TPC superuser.

- Host Authentication Password:

This is the password used for the Fabric agents to communicate with the Device Server. Remember to record this password. See Table 3-9 on page 63.

Data Server Account Password:

For Windows only. TPC installer will create an ID called TSRMsrv1 with the password you specified here to run the Data Server service. The display name for the Data Server in Windows Services panel is:

IBM Tivoli Storage Productivity Center - Data Server

- WebSphere Application Server admin ID and Password:

This is the user ID and password required by the Device Server to communicate with the embedded WebSphere.

You can use the TPC Superuser here. In our case we used db2admin. If we install a new local copy of the TIP, this user will be also used for the TIP administrator ID. See Table 3-12 on page 64 for further details.

**Note:** If you select LDAP authentication later in the Tivoli Storage Productivity Center installation, then the value entered for the LDAP TPC Administrator group overrides the value you entered here for the WebSphere Application Server admin ID and password.

If you click the **Security roles...** button: The Advanced security roles mapping panel is displayed. You can assign a Windows OS group to a role group for each TPC role that you want to make an association with, so you can have separate authority IDs to do various TPC operations. The operating group must exist before you can associate a TPC role with a group. You do not have to assign security roles at installation time, you can assign these roles after you have installed TPC.

If you click the **NAS discovery...** button: The NAS discovery information panel is displayed. You can enter the NAS filer login default user name and password and the SNMP communities to be used for NAS discovery. You do not have to assign the NAS discovery information at installation time, you can configure it after you installed TPC.

Click Next to continue (Figure 3-67).

🕲 IBM Tivoli Storage Pro	ductivity Center - Instal	er				
	Data server, Device serv	er, Data agent, and Ag	ent Information			
IBM.	Enter the server name a communicate with the s	and port that the Data a erver.	agent and Fabric age	nt, and GUI will use to		
	Data server name	colorado.itso.ibm.c	ι Data server	port 9549		
A	Device server name	colorado.itso.ibm.c	Device serve	er port 9550		
	Enter an OS user group administrators group.	Enter an OS user group whose members will be TPC administrators in the administrators group.				
	TPC superuser	Administrators	Secu	ity roles		
	Enter a password that the Fabric agents will use to communicate with the Device server.					
	Host authentication pas	sword	****			
1 1115-	Enter a password that v	vill be used to create t	he Data Server Accou	unt.		
INST	Data Server Account Pa	ssword	****			
UP -	WAS admin ID	db2admin Pa	assword	*****		
AN LONG	NAS discovery					
			Data agent <u>o</u> ptio	ins		
	< <u>B</u> a	ck	Next >	<u>C</u> ancel		

Figure 3-67 Component information for installation

- 10.n the panel shown in Figure 3-68, enter the Agent Manager information. You must specify the following information:
  - Host name or IP address:

Fully qualified name or IP address of the agent manager server. For further details about the fully qualified name, refer to 3.2.2, "Verifying primary domain name systems" on page 56.

- Port (Secured):

Port number of the Agent Manager server. If acceptable (not in use by any other application), use the default port 9511.

– Port (Public):

The public communication port. If acceptable (not in use by any other application), use the default of 9513.

User ID:

This is the user ID used to register the Data Server or Device Server with the Agent Manager. You have to use the built-in ID manager because it is not allowed to specify it during the Agent Manager 1.3.2 installation (see Figure 3-38 on page 85).

Password:

This is the password used to register the Data Server or Device Server with the Agent Manager. You specified this password previously during the Agent Manager install (see Figure 3-38 on page 85).

**Warning:** Due to a Agent Manager installation problem, this password might not have been registered correctly during the Agent Manager installation process. If you are experiencing problems, try with the default value: *password*.

- Password - Common Agent registration password:

This is the password used by the Common Agent to register with the agent manager; it was specified when you installed the Agent Manager (see Figure 3-38 on page 85).

Click **Next** to continue.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer	
	Agent manager information	
IBM.	Enter the information that the pr server, Data agent, or Fabric ag	roduct will use to register its Data server, Device ent with the agent manager.
	Hostname or IP address	colorado.itso.ibm.com
A	Port (Secured)	9511
	Port (Public)	9513
	Enter the Data server and Devic the agent manager.	e server registration information as specified on
	User ID	manager
	Password	*****
1 Val-	Enter the common agent registi manager.	ration password as specified on the agent
	Password	*******
	< <u>B</u> ack	Next > Cancel

Figure 3-68 Agent Manager Information panel

11.Because we elected to install also the Data agent and the Fabric agent, we are required to select the directory and the port that the new Common Agent will use. See Figure 3-69.

🕲 IBM Tivoli Storage Pro	ductivity Center - In	staller			
	Common agent sele Select the installation agent already instal Install the new of EthProgram File Agent port	ction on of a new commo led on your comput common agent at th svIBM(TPC)ca 9510	n agent or choose er for the Data agei ie location listed be	an existing commo nt and Fabric ageni Iow Br	in t. owse
	O Select an existir	ng common agent fi	Window <u>s</u> service	info	
	Port	Version	Location	Data agent	Fabric agent
		Back	<u>N</u> ext >	<u>C</u>	ancel

Figure 3-69 Common Agent installation panel

- 12. The following panel lets us select an existing Tivoli Integrated Portal to use or install a new one. Because we are installing a new instance, we have to specify the installation directory and the port number. See Figure 3-70. TIP will use 10 port numbers starting from the one specified in the Port field (called Base Port). The 10 ports will be:
  - base port
  - base port+1
  - base port+2
  - base port+3
  - base port+5
  - base port+6
  - base port+8
  - base port+10
  - base port+12
  - base port+13

The TIP administrator ID and password are pre-filled with the WebSphere admin ID and password specified during the Device Server installation (see Figure 3-67 on page 105).

🕲 IBM Tivoli Storage Prod	luctivity Center - Installer
IBM.	Tivoli Integrated Portal (TIP) TIP provides TPC with the ability for Single Sign-On authentication, launch other applications in context, and reports to be viewed from Tivoli Common Reporting. Select an existing TIP install to be used with TPC or specify the install directory where TPC is to install TIP.
	Specify the location to install TIP      EXProgram Files\IBM\Tivolittip      Port      16310      Reuse an existing TIP install
1/1/	Existing TIP Installs:
	TIP Administrator ID db2admin Password *******
	< Back <u>N</u> ext > <u>C</u> ancel

Figure 3-70 Tivoli Integrated Portal panel

- 13. The next panel, shown in Figure 3-71, allows you to choose the authentication method that TPC will use to authenticate the users:
  - If you want to authenticate the users against the operating system, select this option and click Next.
  - If you want to use an LDAP or Active Directory, you need to have an LDAP server already installed and configured. If you decide to use this option, select the LDAP/Active directory radio button, click **Next**, and additional panels are displayed.



Figure 3-71 Authentication type Panel

a. If you selected the LDAP/Active Directory option, the panel shown in Figure 3-72 is displayed. Insert the LDAP Server host name and change the LDAP Port Number if it is not corresponding to the proposed default value. You also need to fill in the Bind Distinguished Name and the Bind Password only if the anonymous binds are disabled on your LDAP server. Then click **Next** to continue.

🕲 IBM Tivoli Storage Prod	luctivity Center - Installer	_ 🗆 🗙
IBM.	Lightweight Directory Access Protocol (LDAP) Specify the LDAP server information required for TPC to use LDAP authentication. The Distinguished Name and Bind Password options are optional if the LDAP server suppor anonymous binds and user or group creation from TIP is not required.	Bind orts
	LDAP Server Hostname	
	LDAP Port Number 389	
	The following are optional if anonymous binds are allowed:	
1/1/200	Bind Distinguished Name	
Upper -	Bind Password	
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel	

Figure 3-72 LDAP Server panels

b. In the panel shown in Figure 3-73, you are required to insert the LDAP RDN for users and groups and the attributes that must be used to search the directory. When you click **Next**, the TPC installation makes an attempt to connect to the LDAP server to validate

the provided parameters. If the validation is successful, you are prompted with the next panel; otherwise an error message is shown explaining the problem encountered.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer 📃 🛛 🗙
IBM.	Lightweight Directory Access Protocol (LDAP) Specify the LDAP user and group information required for TPC to use LDAP authentication.
	Relative Distinguished Name for usernames
	Attribute to use for usernames
	Relative Distinguished Name for groups
WEE	cn= I PC-realm,cn=itso,o=ibm  Attribute to use for groups cn
APAL -	
	< Back Next > Cancel

Figure 3-73 LDAP RDN details

c. In the panel shown in Figure 3-74, you are requested to specify the LDAP user ID and password corresponding to the TPC Administrator and the LDAP group that will be mapped to the TPC Administrator group. Also in this panel, after filling in the fields and clicking **Next**, the installation program will connect to the LDAP server to verify the correctness of the provided values. If the validation is successful, the next installation panel is shown.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer	
	Lightweight Directory Access Protocol (LDAP) Specify the LDAP TPC Administrator user and group that will have the TPC Administrator privileges. LDAP TPC Administrator username milko LDAP TPC Administrator password	
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel	

Figure 3-74 LDAP user and group for TPC administration

**Warning:** Due to the WebSphere Application Server APAR PK77578, the LDAP TPC Administrator user name value must not contain a space in it.

14. The Summary information panel is displayed. Review the information, then click **Install** to continue (see Figure 3-75).

🕲 IBM Tivoli Storage Prod	ductivity Center - Installer	
	Please read the summary information below.	
TRM.	IBM Tivoli Storage Productivity Center will be installed in the following location:	
1111 0	E:\Program Files\IBM\TPC	
0	with the following features:	
	Data server Device Server Data agent Fabric agent GUI CLI Tivoli Integrated Portal Replication Server for a total size: 3980.4 MB total space by filesystem: EA 3,313.52 MB CA 666.89 MB	
	< <u>B</u> ack <u>I</u> nstall <u>C</u> ancel	

Figure 3-75 Summary of installation

The installation starts. You might see several messages related to Data Server installation similar to Figure 3-76.



Figure 3-76 Installing Data Server

You might also see several messages about the Device Server installation, as shown in Figure 3-77 and after that, messages related to the TIP installation, similar to Figure 3-78.

(1) IBM TotalStorage Producti	ivity Center - Installer	×
	Installing Device Server. Please wait Deploying EAR Component on WebSphere Application Server 53%	

Figure 3-77 Installing Device Server

🕲 IBM Tivoli Storage Productivity Center - Installer	
Installing TIP. Please wait Installing TIVOII Integrated Portal 46%	
	<u>C</u> ancel

Figure 3-78 Installing TIP

**Note:** The installation of the Tivoli Integrated Portal can be a time consuming process, requiring more time than the other TPC components.

# **TPC for Replication installation**

15. Upon completion of the TIP installation, the TPC for Replication installation is launched. The TPC installation is temporarily suspended, and the panel in Figure 3-79 remains in the background while the TPC for Replication installation starts (see Figure 3-80.)

🕲 IBM Tivoli Storage Prod	uctivity Center - Installer
IBM.	Installing Replication Server. Please wait 85%
	<u>C</u> ancel

Figure 3-79 Installation panel launching the TPC for Replication

a. The Welcome panel is displayed. See Figure 3-80. Click Next to proceed.



Figure 3-80 TPC for replication Welcome panel

**Warning:** If you do not plan to use TPC for Replication, do not interrupt the installation by clicking the **Cancel** button. This will result in an interruption in the installation process with a subsequent complete TPC installation rollback. Complete the installation and then disable TPC for Replication.

b. The installation wizard checks on the system prerequisites to verify that the operating system is supported and the appropriate fix packs are installed (see Figure 3-81).

roductivity Center for Replication	- InstallShield Wizard		
System prerequisites check The Installation wizard checks yo whether the operating system is : Checking your system	ur system to determine wh at the appropriate fix pack (	ether a supported operating or update level.	; system is running and
	< Back	Next >	Cancel
	oductivity Center for Replication System prerequisites check The Installation wizard checks yo whether the operating system is Checking your system	oductivity Center for Replication - InstallShield Wizard System prerequisites check The Installation wizard checks your system to determine wh whether the operating system is at the appropriate fix pack o Checking your system Checking your system	oductivity Center for Replication - InstallShield Wizard         System prerequisites check         The Installation wizard checks your system to determine whether a supported operating whether the operating system is at the appropriate fix pack or update level.         Image: Checking your system         < Back       Next.>

Figure 3-81 System prerequisites check running

c. If the system pass the prerequisites check, the panel shown in Figure 3-82 is displayed. Click the **Next** button.



Figure 3-82 System prerequisites check passed

d. The license agreement panel is shown. Accept it and click **Next** as shown in Figure 3-83.

🔝 IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard	. 🗆 🗙
	International Program License Agreement Part 1 - General Terms BY DOWNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS, - DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM; AND - PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE  C Laccept the terms of the license agreement.	
InstallShield —		
	< Back Next > Cancel	

Figure 3-83 License Agreement Panel

e. On the panel shown in Figure 3-84, you can select the directory where TPC for Replication will be installed. A default location is displayed. You can accept it or change it based on your requirements. We decided to install TPC for Replication into the E: drive. When done, click **Next** to continue.

🐻 IBM Tivoli Storage	Productivity Center for Replication	n - InstallShield Wizard		
	Click Next to install "IBM Tivoli Stor install to a different directory.	age Productivity Center for F	Replication" to this directory,	or click Browse to
	Directory Name:			
	E:\Program Files\IBM\replication			
				Browse
InstallShield —				
		< Back	Next >	Cancel

Figure 3-84 Destination Directory panel.

f. In the panel shown in Figure 3-85 you can select the TPC for Replication user ID and Password. This ID is usually the system administrator user ID. If you are using Local OS Authentication and you want to enable the Single Sign-On feature for this user ID you have to provide the same credentials provided for the WebSphere Application Server Administrator (see step 9 on page 104).

IBM Tivoli Storage	e Productivity Center for Replication - InstallShield Wizard
	Enter the user name and password for IBM Tivoli Storage Productivity Center for Replication Administrator user. You must enter an existing user name and be sure the password is correct.
	TPC-R Administrator User Name
	Administrator
	Password
	*****
InstallShield	
	< Back Next > Cancel

Figure 3-85 TPC-R user ID and password

**Note:** If you want to use another user ID, you need to create it before beginning the installation and ensure that it has administrator rights.

g. The Default ports panel is displayed.Ensure that the selected ports are available on the server and then click **Next**. See Figure 3-86.

IBM Tivoli Storage Productivity Center for Replication uses WebSphere application server as its runtime environment. This will be automatically installed by this installation wizard. You are required to specify the port numbers needed by WebSphere application server. You can change any default port numbers that are already in use. Default Host Port 3080 Default Host Secure Port 3443	IBM Tivoli Storage P	roductivity Center for Replication -	- InstallShield Wizard		
		IBM Tivoli Storage Productivity Cente environment. This will be automatic numbers needed by WebSphere ap use. Default Host Port 3080 Default Host Secure Port 3443	er for Replication uses Wel ally installed by this installa plication server. You can c	bSphere application server : ation wizard. You are require hange any default port num	as its runtime ed to specify the port bers that are already in
< Back Next > Cancel			< Back	Next >	Cancel

Figure 3-86 TPC-R Ports panel

h. Review the settings shown in Figure 3-87 and click **Install** to start the installation.

🐻 IBM Tivoli Storage	ge Productivity Center for Replication - InstallShield Wizard	
	Installer has enough information to start installation. Please review the settings below and if you wish to change any setting, click Back. If you are satisfied with the settings, click Install to begin installation.	
	IBM Tivoli Storage Productivity Center for Replication will be installed in the following location: E:\Program Files\IBMTreplication with the following features: IBM Tivoli Storage Productivity Center for Replication for a total size: 276.1 MB	
InstallShield ——	< Back Install Cancel	

Figure 3-87 TPC-R Settings panel

i. The installation of TPC for Replication starts. Several messages about the installation process are shown, such as the one in Figure 3-88.

🕼 IBM Tivoli Storage Productivity Center for Replication - InstallShield Wizard		
Installing IBM Tivoli Storage Productivity Center for Re	plication. Please wait	
Extracting WebSphere installation media		
300	6	
InstallShield		
		Cancel

Figure 3-88 TPC-R installation running

j. After the completion of the TPC for Replication installation, a summary panel is shown reporting also the URL where the Web browser can be pointed to access the TPC-R Web-User Interface. By clicking the **Finish** button, this panel is closed and the installation flow goes back to the TPC installation panels (see Figure 3-89).



Figure 3-89 TPC-R Summary panel.

**Note:** Tivoli Storage Productivity Center for Replication is installed with no license. You must install the Two Site or Three Site Business Continuity (BC) license.

16. After the creation of the TPC uninstaller, you see the summary information panel (Figure 3-90). Read and verify the information and click **Finish** to complete the installation.



Figure 3-90 Component installation completion panel

# Verifying the installation

At the end of the installation, we can use the Windows Services panel to verify that the TPC services (see Figure 3-91) have been installed.

🚽 Computer Management	:					l.
🛃 File Action View W	indow <u>H</u> elp					1
← →   🛍 🖬 🖻	₿ 😫 🖬 🕨 ■ 🗉 🖦					
Computer Management (L	🍇 Services					
	IBM Tiyoli Common Agent -	Name	Description	Sta ∕	Startup Type	Log On As
Services and Applicati	'E:\Program Files\IBM\TPC\ca'	Help and Support	Enables	Started	Automatic	Local Syste
Telephony	Character and the	Service	Provides	Started	Automatic	Local Syste
WMI Control	Stop the service	BM Tivoli Common Agent - 'E:\Program Files\IBM\TPC\ca'		Started	Automatic	.\itcauser
Indexing Service	restare the service	🐝 IBM Tivoli Storage Productivity Center - Data Server		Started	Automatic	.\TSRMsrv1
E Midexing Service		🐝 IBM WebSphere Application Server V6.1 - CSM	Controls	Started	Automatic	Local Syste
		🗞 IBM WebSphere Application Server V6.1 - DeviceServer	Controls	Started	Automatic	Local Syste
		👋 IBM WebSphere Application Server V6.1 - Tivoli Agent Manager	Controls	Started	Automatic	Local Syste
		w IPSEC Services	Provides	Started	Automatic	Local Syste
		🐝 Logical Disk Manager	Detects	Started	Automatic	Local Syste
		Retwork Connections	Manages	Started	Manual	Local Syste
<b>↓</b>	Extended / Standard /					

Figure 3-91 Windows service

The following services are related to TPC:

- IBM Tivoli Storage Productivity Center Data Server
- IBM WebSphere Application Server v6.1 Device Server
- IBM WebSphere Application Server v6.1 CSM is the service related to TPC for Replication

Moreover, another process, shown Figure 3-92, is present in the Services list and it represents the Tivoli Integrated Portal.

Computer Management				
🛃 Eile Action Yiew Wi	indow <u>H</u> elp			
← →   🗈 🖬 🖻 🖸	₿ 🔮 🖬 🕨 ■ 🗉 ■			
具 Computer Management (L 🕂 🌇 System Tools	Services			
🗄 🚞 Storage	Tivoli Integrated Portal -	Name	Description Sta 🛆	Startup Type Log On As
Services and Applicati	TIPProfile_Port_16310	System Event Notification	Monitors Started	Automatic Local Syste
		🐝 Task Scheduler	Enables Started	Automatic Local Syste
Services	Stop the service	TCP/IP NetBIOS Helper	Provides Started	Automatic Local Servic
Will Control	Kestart the service	Terminal Services	Allows us Started	Manual Local Syste
Indexing Service		🐝 Tivoli Integrated Portal - TIPProfile_Port_16310	Controls Started	Automatic Local Syste
	Description:	Survival Windows Management Instrumentation	Provides Started	Automatic Local Syste
	WebSphere Application Server V6.1	🖓 Windows Time	Maintains Started	Automatic Local Servic
	server named: server1	🐝 Wireless Configuration	Enables Started	Automatic Local Syste
		🎭 Workstation	Creates Started	Automatic Local Syste
	Extended / Standard /			

Figure 3-92 TIP Process

All of the following services have to be present and started.

### Log files for Data Server

Check the logs for any errors or Java exceptions. On Windows, the default installLocation is c:\Program Files\IBM\TPC. The log files for the Data Server are:

- <InstallLocation>\TPC.log
- <InstallLocation>\log\data\install
- <InstallLocation>\log\install
- <InstallLocation>\data\log

### Log files for Device Server

Check the log files for any errors. The log files for the Device Server are:

- <InstallLocation>\TPC.log
- <InstallLocation>\log\device\install
- <InstallLocation>\device\log

## Log files for GUI

Check the log files for any errors. The log files for the GUI are:

- <InstallLocation>\TPC.log
- <InstallLocation>\log\gui\install
- <InstallLocation>\gui\log

## Log files for CLI

Check the log files for any errors. The log files for the CLI are:

- <InstallLocation>\TPC.log
- <InstallLocation>\log\cli\install

# 3.4.3 Agent installation

In this section, we present how to locally install Tivoli Storage Productivity Center agents. Refer to "Information sources" on page 6 for a summary of the agents and their function.

### Data agent and Fabric agent installation

Follow these steps:

- 1. Start the TPC Agent installation program launching the **setup.exe** file in the root directory of TPC Installation Disk2 (see 3.1.2, "Product code media layout and components" on page 55)
- 2. The language selection panel is presented. Select the preferred language and click **OK** as shown in Figure 3-93.

🕲 Installer 📃 🗖 🗙
Select a language to be used for this wizard.
English
<u>O</u> K <u>Cancel</u>

Figure 3-93 Language Selection Panel

3. On the License Agreement panel, accept the License condition and then select **Next** (see Figure 3-94).

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer
	IBM Tivoli Storage Productivity Center V4.1.0.97
	International Program License Agreement Part 1 - General Terms BY DOWNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS, - DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM; AND - PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE PROGRAM, CONTACT THE PARTY FROM WHOM YOU ACQUIRED IT. "IBM" is International Business Machines Corporation or one of its subsidiaries. C I accept the terms of the license agreement.
	<u>N</u> ext > <u>C</u> ancel

Figure 3-94 License Agreement Panel

4. Select the **Custom Installation** option and specify the location where the Agent is to be installed.

🕲 IBM Tivoli Storage Pro	oductivity Center - Installer	_ 🗆 🗙
	Select the type of installation you want to run	
IBM.	C Typical installation This will install the TPC servers, TPC agents, Tivoli Integrated Portal (TIP), GUI, and CLI. A new database will be created, and the schema will be created on the database during installation. The database and schema will be reused for upgrade.	
	🗖 Servers 👘 Clients	
	Agents 🗖 Register with the agent manager	
	<ul> <li>Custom installation</li> <li>This will custom install the individual TPC components on this computer. Remote agents are installed on other computers. You can choose any server, agent, or client to be installed on this computer. You will have a choice to create the database and schema on this computer.</li> <li>C Installation licenses</li> </ul>	
	C:\Program Files\IBM\TPC TPC Installation Location	
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel	

Figure 3-95 Installation Type panel

5. In the panel shown in Figure 3-96, select the Data agent and the Fabric agent and click **Next** to continue.



Figure 3-96 Agent selection panel

6. In the Servers information panel shown in Figure 3-97, you must specify the Data Server name and port, the Device Server name and port, and the Host authentication password. The host authentication password was specified in the scenario shown on page 102.

🕲 IBM Tivoli Storage Pro	ductivity Center - Instal Data server, Device serv	ler ver. Data agent, and Agent	Information	_ 🗆 X
IBM.	Enter the server name a communicate with the s	and port that the Data ager server.	it and Fabric agent, and	GUI will use to
	Data server name	colorado.itso.ibm.cc	Data server port	9549
A	Device server name	colorado.itso.ibm.cc	Device server port	9550
	Enter an OS user group administrators group.	whose members will be <sup>-</sup>	FPC administrators in th	10
	TPC superuser	Administrators	Security roles	3
	Enter a password that t	he Fabric agents will use t	o communicate with the	Device server.
	Host authentication pas	ssword	***	
1. 11.11.	Enter a password that v	will be used to create the D	ata Server Account.	
INST	Data Server Account Pa	issword		
ALL .	WAS admin ID	Passy	vord	
W MARKAN			NAS discovery	
			Data agent <u>o</u> ptions	
	< <u>B</u> a	ck <u>N</u> e	xt >	<u>C</u> ancel

Figure 3-97 TPC Servers information panel

7. If there is a Storage Resource agent already installed on the system, it will be migrated to a Data agent. The warning message shown in Figure 3-98 is displayed. Notice the two separate locations: The first location is where the Common Agent will be installed, whereas the second location is where the other TPC related files will be installed.



Figure 3-98 Warning on an existing Storage Resource agent

8. If you click **Data Agent Options** in Figure 3-97, you will be able to select whether or not you want the agent to perform an initial scan when first brought up. You can also select whether or not the agent can run scripts sent by the server. We suggest that you keep the default values, leaving both check boxes selected. Then click **OK** to continue (see Figure 3-99.



Figure 3-99 Data agent panel

 Now you are prompted with the Agent Manager information panel shown in Figure 3-100. Host name and ports must be pre-filled. Insert the Common Agent registration password specified during the Agent Manager installation and click **Next** to proceed.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer	
	Agent manager information	
IBM.	Enter the information that the prod server, Data agent, or Fabric agen	uct will use to register its Data server, Device t with the agent manager.
	Hostname or IP address	colorado.itso.ibm.com
A	Port (Secured)	9511
	Port (Public)	9513
	Enter the Data server and Device s the agent manager.	server registration information as specified on
	User ID	
	Password	
Wast-	Enter the common agent registrati manager.	ion password as specified on the agent
UND+	Password	*****
APR :		
	< <u>B</u> ack	Next > Cancel

Figure 3-100 Agent Manager panel

10. If the system already has a Common Agent installed on it, the installation gives you the possibility to select this agent or install a new one, as shown in Figure 3-101.

IBM Tivoli Storage Pro	ductivit <mark>y Center - In</mark> Common agent sele Select the installati agent already insta	staller action on of a new commo lled on your comput	n agent or choose er for the Data age	an existing commo nt and Fabric agent	un t.
	Install the new i     c:\tpcsra\ca     Agent port	common agent at th	e location listed be	elow Br	owse
5000	O Select an existin	ng common agent fi	Windows service	info	
	Port	Version	Location	Data agent	Fabric agent
		< Back	<u>N</u> ext ≻	<u>c</u>	ancel

Figure 3-101 Common Agent selection panel

11. By clicking **Windows service info...** the optional panel in Figure 3-102 is shown. You can enter a Common Agent service name, user ID and password that the installation program will use to create a Windows service for the Common Agent. Enter the information and click **OK**.

🕲 IBM Tivoli Storage Proc	oductivity Center - Installer	
	Common agent service information (Optional)	
IBM.	Enter the information to create the Windows service for the common agent.	
	Common agent service name	
	Common agent service logon account information	
	UserID	
	Password	
1.1.1.2		
1 NACA+		
AN ASSAT		
	OK Canad	

Figure 3-102 Common Agent service information panel

**Note:** If you are using domains, you must enter the domain name for user ID in the format <domain>\<account>.

12.A summary panel is shown. See Figure 3-103.



Figure 3-103 Summary information panel

13. The installation of the agents start. During this process you might see messages as shown in Figure 3-104 or Figure 3-105.

🕲 IBM Tivoli Storage Prod	uctivity Center - Installer	×
IBM Tivoli Storage Product	uctivity Center - Installer	×
	<u>C</u> ancel	

Figure 3-104 Data agent installation process

🕲 IBM Tivoli Storage Produ	ctivity Center - Installer		
	Installing Fabric Agent. Please wait Deploying Tivoli Storage Productivity Center t 90%	for Fabric - Agent	
		<u> </u>	ncel

Figure 3-105 Fabric agent installation running

14. After the installation is complete, click the **Finish** button on the panel shown in Figure 3-106.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer
	Please read the summary information below.
	The InstallShield Wizard has successfully installed IBM Tivoli Storage Productivity Center. Choose Finish to exit the wizard.
	<u> </u>

Figure 3-106 Installation summary panel

To verify that the installation completed correctly, log on to the TPC GUI and go to **Administrative Services**  $\rightarrow$  **Data Sources**  $\rightarrow$  **Data/Storage Resource Agents**. The installed agent is now present in the list, as shown in Figure 3-107.

IBM Tivoli Storage Producti	vity	Center: colo	rado.itso	.ibm.c	om Data	A/Stora	age R		
File View Connection Preferences Wind	low H	elp							
Element Management	$ \mathbf{x} $	0							
Navigation Tree	Befre	sh Bate 1	Mins Las	t Befresh: 1	5:30:23				
Administrative Services									
B-Services	Viev		Tracing	Bead Config	Disable	Enable	Shutdov	vn l	Start
Benlication Server	Cha	nge Authentication	Add Storage	Resource Ad	jents Upgra	de Agents	Delete	Dir	sable Ar
⊡Data Sources									
CIMOM Agents	Data/Storage Resource Agents								
Data/Storage Resource Agents		Agent	IP Address	Version	Agent Type	State	OS Type	C	Man
Inband Fabric Agents		gallium	9.12.6.76	4.1.0.97	Data	💷 Up	Windows	IA32	IBM
Out of Band Fabric Agents		colorado.itso.ibm.com	9.12.6.75	4.1.0.97	Data	💷 Up	Windows	IA32	IBM
TPC Servers									
Mware VI Data Source									
CIMON     E-Out of Band Eabric									
	<		1111						>

Figure 3-107 Agents in TPC GUI

Note: The Agent Type column defines the agent we installed as Data agent.

## Storage Resource agent installation

You typically install the Storage Resource agent using the Tivoli Storage Productivity Center GUI. However, it is also possible to install it locally on a server through a command line.

Depending on the decision of running the agent as a daemon or non-daemon service (on-demand service) and on the communication protocol that must be used, other parameters might be required.

The images of the Storage Resource agent are located on both TPC images disks under <DiskImage>/data/sra/windows.

We navigate to the <DiskImage>/data/sra/windows/bin directory. In our environment the communication is between two Windows machines, so the default communication protocol used is Windows (SMB). We have also decided to run the agent as a non-daemon service. As a result, the command that we are issuing requires a minimum set of parameters and will look similar to these:

Agent -install -serverPort <serverport> -serverIP <serverIP> -installLoc <installLocation> -userID <userID> -password <password>

The meanings and the values of these parameters are specified in Table 3-15.

Parameter	Explanation	Value	
serverPort	The port of the TPC Data Server. The default value is 9549.	9549	
serverIP	IP address or fully qualified DNS name of the server.	colorado.itso.ibm.com	
installLoc	Location where the agent will be installed <sup>a</sup> .	c:\tpcsra	
userID	The user ID defined on the agent system. This is the user ID t.hat the server can use to connect to the agent system	Administrator	
password	Password for the specified User ID.	itso13sj	

 Table 3-15
 Storage Resource agent install parameters

a. Make sure that when you specify a directory to install the Storage Resource agent into, you do not specify an ending slash mark (\). For example, do not specify C:\agent1\ because this will cause the installation to fail.

Figure 3-108 shows a successful installation of the Storage Resource agent.



Figure 3-108 Successful Storage Resource agent installation

To verify that the installation completed correctly from the TPC GUI, log on to the TPC GUI and go to **Administrative Services**  $\rightarrow$  **Data Sources**  $\rightarrow$  **Data/Storage Resource Agents**. The installed agent is now present in the list as shown in Figure 3-109.



Figure 3-109 Agents in TPC GUI

**Note:** For the agent installed on server maryl.itso.ibm.com, the Agent Type column is Storage Resource and the Last Communication Type is Windows.

## 3.4.4 Disabling TPC or TPC for Replication

If you have installed TPC V4.1 on a machine with more than 4 GB of RAM but less than 8 GB we strongly suggest that you run only TPC or TPC for Replication on that machine. In this case you must disable one of the two products. Also, if you have a powerful server but you plan to use only one of the two products, you can disable the other with the procedure we document here.

#### **Disabling TPC for Replication**

To disable the TPC for Replication server, go to Start  $\rightarrow$  Settings  $\rightarrow$  Control Panel  $\rightarrow$  Administrative Tools  $\rightarrow$  Services. Right-click the following service:

IBM WebSphere Application Server V6.1 - CSM

Then select **Properties**, as shown in Figure 3-110.

🍇 Services (Local)					
IBM WebSphere Application Server	Name 🔺		Description	Status	Startup Type 🔺
¥6.1 - CSM	🏶 Event Log		Enables ev	Started	Automatic
	🍓 File Replication	Allows files		Manual	
Stop the service	🏶 FTP Publishing Service		Enables thi	Started	Automatic
Kestart the service	🏶 Help and Support		Enables He	Started	Automatic
	🏶 HTTP SSL		This servic	Started	Manual
Description:	🍓 Human Interface Device	Access	Enables ge		Disabled
WebSphere Application Server V6.1	🆓 IAS Jet Database Access	;	Configures		Manual
server named: server1	🍓 IBM ADE Service		Provides a	Started	Automatic
	🍓 IBM Tivoli Common Agen	t - 'D:\IBM\TPC\ca'		Started	Automatic
	🦓 IBM Tivoli Remote Contro	ol Agent	Enables Re		Manual
	🍓 IBM Tivoli Storage Produ	ctivity Center - Data Server		Started	Automatic
	BM WebSphere Applicat	ion Server V6.1 - CSM	Controls th	Started	Automatic
	🐝 IBM 🔨 Start	on Server V6.1 - DeviceServer	Controls th	Started	Automatic
	🖓 IBM Stop	on Server V6.1 - Tivoli Agent	Controls th	Started	Automatic
	🖓 IIS 👘 Payse		Enables thi	Started	Automatic
	🐝 IMA Resume	ervice	Manages C		Disabled
	🆓 Inde R <u>e</u> start		Indexes co		Disabled
	MI Taska	er	Provides s		Manual
			Enables me		Disabled
	🖏 IPSE Refresh		Provides e	Started	Automatic
	Kert .	Center	On domain		Disabled
	Lice Properties		Monitors a		Disabled
	🎭 Live Help		LiveUpdate		Manual
	Scar Disk Manager	1	Detects an	Started	Automatic
	🎭 Logical Disk Manager Adr	ministrative Service	Configures		Manual
	🎇 Messenger		Transmits		Disabled 👻
	•				

Figure 3-110 TPC for Replication service

On the panel shown in Figure 3-111, select **Disabled** under the **Startup type** menu and click the **Stop** button in the **Service Status** section. When the service has been stopped, click **OK** to close this panel.

IBM WebSphere A	pplication Server V6.1 - CSM Properties (Loca ? 🗙
General Log On	Recovery Dependencies
Service name:	IBMWAS61Service - CSM
Display <u>n</u> ame:	IBM WebSphere Application Server V6.1 - CSM
Description:	Controls the running of an IBM WebSphere Application Server V6.1 server named: server1
Path to executabl	e:
D:\IBM\replicati	on\eWAS\bin\wasservice.exe" "IBMWAS61Service - US
Startup typ <u>e</u> :	Automatic
Service status:	
<u>S</u> tart	Stop <u>P</u> ause <u>R</u> esume
You can specify t from here. Start parameters:	he start parameters that apply when you start the service
	OK Cancel Apply

Figure 3-111 Service properties panel

### **Disabling TPC**

To disable the TPC, go to Start  $\rightarrow$  Settings  $\rightarrow$  Control Panel  $\rightarrow$  Administrative Tools  $\rightarrow$  Services. Right-click the following service:

IBM WebSphere Application Server V6.1 - DeviceServer

Then select **Properties**, as shown in Figure 3-112.

🍇 Services (Local)	_					
IBM WebSphere Application Server	Name 🛆			Description	Status	Startup Type 🔺
¥6.1 - DeviceServer	🎭 Event Log			Enables ev	Started	Automatic
	Rile Replication			Allows files		Manual
Stop the service	FTP Publishing Service			Enables thi	Started	Automatic
Kester the service	🍓 Help and Sup	port		Enables He	Started	Automatic
	🎭 HTTP SSL			This servic	Started	Manual
Description: Controls the supplier of an IPM	🍓 Human Interf	ace Device Access		Enables ge		Disabled
WebSphere Application Server V6.1	🍓 IAS Jet Datab	ase Access		Configures		Manual
server named: server1	🍓 IBM ADE Serv	rice		Provides a	Started	Automatic
	🍓 IBM Tivoli Cor	nmon Agent - 'D:\IBN	1\TPC\ca'		Started	Automatic
	🍓 IBM Tivoli Rer	note Control Agent		Enables Re		Manual
	🍓 IBM Tivoli Sto	rage Productivity Ce	nter - Data Server		Started	Automatic
	BM WebSphere Application Server V6.1 - CSM			Controls th		Disabled
	🐐 IBM WebSph	Controls th	Started	Automatic		
	🏶 IBM WebSph	Start	V6.1 - Tivoli Agent	Controls th	Started	Automatic
	🆓 IIS Admin Se	St <u>o</u> p		Enables thi	Started	Automatic
	🆓 IMAPI CD-Bu	Pa <u>u</u> se		Manages C		Disabled
	🍓 Indexing Ser	Resu <u>m</u> e		Indexes co		Disabled
	🆓 InstallDriver	R <u>e</u> start		Provides s		Manual
	🎕 Intersite Mes	All Tasks 🕨		Enables me		Disabled
	🏶 IPSEC Servic			Provides e	Started	Automatic
	🍓 Kerberos Key	Re <u>f</u> resh		On domain		Disabled
	🍓 License Logg	Properties		Monitors a		Disabled
	🏶 LiveUpdate	Topercies		LiveUpdate		Manual
	🎨 Logical Disk N	Help		Detects an	Started	Automatic
	🎨 Logical Disk M	lanager Administrativ	e Service	Configures		Manual
	🎨 Messenger			Transmits		Disabled 🖉
	•					•

Figure 3-112 Services panel

On the panel shown in Figure 3-113, select **Disabled** under the **Startup type** menu and click the **Stop** button in the **Service Status** section. When the service has been stopped, click **OK** to close this panel.

IBM WebSphere A	pplication Server ¥6.1 - DeviceServer Propert ? 🗙
General Log On	Recovery Dependencies
Service name:	IBMWAS61Service - DeviceServer
Display <u>n</u> ame:	BM WebSphere Application Server V6.1 - DeviceServer
Description:	Controls the running of an IBM WebSphere Application Server V6.1 server named: server1
Path to executabl	e:
"D:\IBM\TPC\de	vice\apps\was\bin\wasservice.exe'' "IBMWAS61Servic
Startup typ <u>e</u> :	Automatic
	Automatic Manual
Service status:	Disabled State
<u>S</u> tart	Stop Pause Resume
You can specify t from here.	he start parameters that apply when you start the service
Start parameters:	
	,
	OK Cancel Apply

Figure 3-113 Service properties panel

Repeat the same procedure for the following services:

- ► IBM Tivoli Storage Productivity Center Data Server.
- ► IBM Tivoli Common Agent <*directory*> if a Common Agent is installed. <*directory*> is where the Common Agent is installed. The default is <TPC\_install\_directory>\ca.
- IBM Tivoli Storage Resource agent <*directory*> if a Storage Resource agent is installed.
   <*directory*> is where the Storage Resource agent is installed. The default is
   <TPC\_install\_directory>\agent.
- Tivoli Integrated Portal TIPProfile\_Port\_<xxxx> where <xxxx> indicates the port specified during installation. The default port is 16310.
- ► IBM ADE Service (Tivoli Integrated Portal registry).

**Note:** Stop Tivoli Integrated Portal and IBM ADE Service only if no other applications are using these services.

## 3.5 Migrating TotalStorage Productivity Center V3.x to V4.1

The procedure to migrate from TPC V3.x to TPC V4.1 can be summarized as follows:

- 1. Upgrade DB2 to a supported version. This step can be optional depending on the current version of DB2 installed.
- 2. Migrate the database repository.
- 3. Upgrade the Agent Manager. This step can be optional.
- 4. Upgrade the TPC components.
- 5. Upgrade the TPC Agents.

The steps presented in this chapter have been performed on a Windows 2003 Enterprise Edition x64 system with the following components installed on it:

- ▶ DB2 V8.2
- TPC V3.3.2
- Tivoli Agent Manager V1.2.3
- TPC for Replication V3.4.1

# **3.6 Upgrading DB2 and migrating the TPC database**

TPC V4.1 requires one of the following DB2 versions:

- ▶ IBM DB2 UDB Enterprise Server Edition v9.1 Fix Pack 2 or later
- IBM DB2 UDB Enterprise Server Edition v9.5 Fix Pack 3a or later

Depending on the version of DB2 currently available in your environment, you might need to upgrade it or install the required fix pack level. Table 3-16 reports the suggested action for each current DB2 version installed and an alternate action if available.

Table 3-16	DB2 upgrade paths
------------	-------------------

Current DB2 version	Suggested action	Alternate action
DB2 v8.1	Upgrade to DB2 v9.5 Fix Pack 3	
DB2 v9.1 Fix Pack 2 or lower	Apply DB2 v9.1 Fix Pack 5	Upgrade to DB2 v9.5 Fix Pack 3
DB2 v9.5	Apply DB2 v9.5 Fix Pack 3	

**Note:** On Windows 2003, there is a known issue with the maximum size of environment variables such as the PATH variable. You need to install a hot fix from Microsoft. For information about the hot fix, go to

http://support.microsoft.com/kb/906469

### 3.6.1 Preparing for DB2 upgrade

Before proceeding with the DB2 upgrade, there are various steps that must be performed in order to ensure a successful upgrade procedure. A database backup will also be performed to rollback in case of any failure during the process.

If you are running a 32-bit instance of DB2 v8.1 on a Windows 64-bit and you are willing to use a 64-bit instance of DB2 v9.5, the direct migration of DB2 is not supported. The migration must be performed in two separate steps and there are two possible paths to follow:

- 1. From DB2 v8.1 32-bits → Upgrade to DB2 v8.1 64-bits → Migrate to DB2 v9.5 64-bit
- 2. From DB2 v8.1 32-bits → Migrate to DB2 v9.5 32-bits → Upgrade to DB2 v9.5 64-bit

#### Preparing the DB2 server

Follow these steps:

- 1. Stop the TPC services. The services that must be stopped are shown in Figure 3-114. Right click each of the processes listed hereafter and select **Stop**:
  - IBM TotalStorage Productivity Center Data Server
  - IBM WebSphere Application Server v6 DeviceServer
  - IBM WebSphere Application Server v6.1 Tivoli Agent Manager
  - IBM WebSphere Application Server v6 CSM

Help				
) 🗟 😫 🕨 🗉 🗉 🖦				
🍇 Services (Local)				
IBM TotalStorage Productivity	Name	Description	Sta △	Startup Type
Center - Data Server	Service	Enables this se	Started	Automatic
	Help and Support	Enables Help a	Started	Automatic
Stop the service	HTTP SSL	This service im	Started	Manual
Restart the service	🐝 IBM Tivoli Common Agent - 'D:\IBM\TPC\ca'		Started	Automatic
	IBM TotalStorage Productivity Center - Data Server		Started	Automatic
	IBM WebSphere Application Server V6 - CSM	Controls the r	Started	Automatic
	🐝 IBM WebSphere Application Server V6 - DeviceServer	Controls the r	Started	Automatic
	🐝 IBM WebSphere Application Server V6.1 - Tivoli Agent Manager	Controls the r	Started	Automatic
	🖏 IIS Admin Service	Enables this se	Started	Automatic
	PSEC Services	Provides end-t	Started	Automatic
	🖏 Logical Disk Manager	Detects and m	Started	Automatic
	Network Connections	Manages obje	Started	Manual
	Network Location Awareness (NLA)	Collects and st	Started	Manual
	Network News Transfer Protocol (NNTP)	Transports net	Started	Automatic
	Plug and Play	Enables a com	Started	Automatic
	Print Spooler	Manages all lo	Started	Automatic
	Protected Storage	Protects stora	Started	Automatic
	۲ <b>۱</b>			
Extended Standard				

Figure 3-114 TPC Services

2. Open a DB2 Command Line Processor and stop the database manager. Issue the following command (see Figure 3-115):

db2stop force



Figure 3-115 DB2 stop command

**Note:** In the rest of this chapter, we assume that the names of the databases are the default names. Then we have *TPCDB* for the TPC database, *IBMCDB* for the Agent Manager database, and *TPCRM* for the TPC for Replication database. If you are unsure about the database names in your environment, you can verify them by issuing the following command from a DB2 CLP:

```
db2 list db directory
```

3. From a command line, move to the <DB2 9.5 image location>\db2\Windows\utilities directory. The db2ckmig command located in this directory can be used to verify that the databases are ready to be migrated. The result of this command is stored in a log file that can be checked for errors or warnings that must be solved before proceeding with the other migration steps. The commands to be issued are as follows:

db2ckmig TPCDB -1 d2chkTPC.log -u db2admin -p db2admin db2ckmig IBMCDB -1 d2chkCDB.log -u db2admin -p db2admin db2ckmig TPCRM -1 d2chkRM.log -u db2admin -p db2admin

Figure 3-116 shows the result of these commands.



Figure 3-116 db2ckmig command

On the log files produced, verify that no error or warning messages are present and that the following line is present:

Version of DB2CKMIG being run: VERSION 9.5.

#### Backing up the databases

Now we perform an offline full backup for each local database:

 Disconnect all application and users from the databases. From a DB2 CLP, issue the command:

db2 force application all

To verify that the command completed correctly, from a DB2 CLP, list the applications connected:

db2 list applications

The message shown in Figure 3-117 means that all applications have been correctly disconnected.



Figure 3-117 DB2 disconnect applications and users

Back up all the local databases with the backup database command. From a DB2 CLP, issue the following command:

db2 BACKUP DATABASE <Ddbname> USER <db2 user ID> USING <password> to <destination directory>

The database names, DB2 user ID, DB2 user password, and destination directory must be customized for your environment. In our case, the commands look similar to these:

db2 BACKUP DATABASE tpcdb USER db2admin USING password to d:\DBBCK db2 BACKUP DATABASE ibmcdb USER db2admin USING password to d:\DBBCK db2 BACKUP DATABASE tpcrm USER db2admin USING password to d:\DBBCK

Figure 3-118 shows a window with the result of these commands.



Figure 3-118 DB2 backup commands.

Figure 3-119 shows the tree created on the file system as result of the commands shown previously.



Figure 3-119 Backup tree

3. Optionally, the backups can be tested to ensure their integrity. Figure 3-120 shows the result of the **db2ckbkp** command issued against one of the backups taken in the previous steps.

🖼 DB2 CLP						
D:\DBBCK>db2ckbkp TPCDB	0\DB2\NODE0000\	CATNOOO	0\200904	30\04054	9.001	
[1] Buffers processed:	*****	*****	******	#		
Image Verification Comp	lete - successfu	1.				
D:\DBBCK>_						
						<b>T</b>
•						

Figure 3-120 Backup Verification

## 3.6.2 Migrating DB2

Now you are ready to migrate the DB2 server version from v8.1 to v9.5 Fix Pack 3:

1. Locate and double-click the **setup.exe** file in the DB2 v9.5 CD image. The Welcome panel is displayed (see Figure 3-121). Click **Install a Product** to proceed.

DB2 Setup Launchpad	
Information Management software	IBM
Welcome	Welcome to DB2 Version 9.5 Fix Pack 3
Installation Prerequisites Release Notes Migration Information Install a Product +	The DB2 Setup Launchpad gives you access to all of the information that you need to install your DB2 products and features for Linux, UNIX, and Windows operating systems. To access more information about the DB2 products available for installation or to perform an installation, select from the tabs provided. You can find more product information by searching the Information Center.
Exit	Search Information Center  Copyright International Business Machines Corporation, 1993, 2007. All rights reserved.

Figure 3-121 DB2 Welcome panel

2. Under the section, DB2 Enterprise Server Edition Version 9.5 Fix Pack 3, click **Work with Existing** as shown in Figure 3-122.



Figure 3-122 DB2 Select the product

3. A panel showing existing DB2 installation on the server is shown. See Figure 3-123. In the list of the possible actions that can be performed, the Migrate action is present. Click **Launch DB2 Setup wizard** to proceed.

The following DB2 copies have b	been detected on your computer. Selec	t the DB2 copy and the corresponding
action you would like to perform.		
DB2 copy name:	DB2 installation path:	Action
DB2V8 (default)	D:\IBM\SQLLIB	Migrate
•		
✓ Show all DB2 copies, included the second seco	uding those that do not have any applic	able action
Show all DB2 copies, include	uding those that do not have any applic	able action
✓ Show all DB2 copies, include the second secon	uding those that do not have any applic	able action
Show all DB2 copies, incl Show all DB2 copies, incl Details:	uding those that do not have any applic	vable action
Show all DB2 copies, incli Details: DB2 copy name: DB2 copy version:	uding those that do not have any applic DB2V8 8.1.15.0	able action
Show all DB2 copies, incle Details: DB2 copy name: DB2 copy version: Products in DB2 copy: Popt of the top of top of the top of t	uding those that do not have any applic DB2V8 8.1.15.0 DB2 Enterprise Server	able action
Show all DB2 copies, incli Show all DB2 copies, incli Details: DB2 copy name: DB2 copy version: Products in DB2 copy: DB2 installation path: Action description:	uding those that do not have any applic DB2V8 8.1.15.0 DB2 Enterprise Server D:\IBM\SQLLIB Micrate DB2 Enterprise	Edition
Show all DB2 copies, include the second	Uding those that do not have any applic DB2V8 8.1.15.0 DB2 Enterprise Server D:\IBM\SQLLB Migrate DB2 Enterprise 9.5.301.436. If there is	Edition
Show all DB2 copies, incli Details:     DB2 copy name: DB2 copy vame: DB2 copy version: Products in DB2 copy: DB2 installation path: Action description:	DB2V8 B22V8 8.1.15.0 DB2 Enterprise Server D:\UBM\SQLLB Migrate DB2 Enterprise 9.5.301.436. If there is DB2 conu. micrating DB	Edition

Figure 3-123 DB2 copy selection

4. The warning message shown in Figure 3-124 is presented, suggesting to run the db2ckmig tool. We executed this check in step 3 on page 133. Click **OK** to continue.

Warning
Migration will apply changes to your DB2 copy. Some of these changes may require the following pre-migration or post-migration tasks:
1. To use existing local databases with DB2 Enterprise Server Edition Version 9.5, the existing local databases must be migrated after DB2 Enterprise Server Edition Version 9.5 is installed. The db2ck checks for conditions that would prevent the successful migration of the local databases. The db2ckmig command must be run using your current installed DB2 version prior to DB2 Enterprise Server E 9.5 Installation. It cannot be used to check your databases after DB2 Enterprise Server Edition Version 9.5 is installed. The db2ckmig command is located in the db2\Windows\utilities directory on the media.
<ol> <li>All pre-existing DB2 products in the DB2 copy DB2VB being migrated will be removed. Migration will install a copy of DB2 Enterprise Server Edition Version 9.5. DB2 products other than DB2 Enterprise Edition Version 9.5 will need to be installed separately following the migration.</li> </ol>
Click OK to continue, or Cancel to exit the DB2 setup program and verify that your DB2 copy DB2V8 is ready for migration.
OK Cancel

Figure 3-124 Warning message

5. The installer is launched showing the message in Figure 3-125 until it starts.

Windows Installer	
Preparing to install	
	Cancel

Figure 3-125 Preparing for install

6. Even if the DB2 instance is not running, you might still have a few DB2 processes running. The message shown in Figure 3-126 warns you about this situation. By selecting **Yes**, these processes will be shut down and the migration will continue.

🔂 DB2 Setup - DB2 Enterprise Serv	ver Edition	
Information Management softw	are	IBM.
		92
→ → → → → → → → → → → → → → → → → → →	p - DB2 Enterprise Server Edition - DB2COPY1 DB2 is currently running and locked by the following process(es): db2dasrm.exe (PID=1244) db2ds.exe (PID=2412) db2scr.exe (PID=2422) db2scr.exe (PID=4520) db2by.texe (PID=4520) db2by.texe (PID=1628) Click No to exit. (Recommended)	gram setup
	Click Yes to shutdown these processes and continue. (Warning: Terminating a process can cause loss of data)	ion, 1993, 2007. All
	<u>Ne</u> 2	t > Cancel

Figure 3-126 DB2 running processes

7. The Welcome panel is shown. See Figure 3-127. Click Next to proceed.



Figure 3-127 DB2 Welcome panel

8. Read and accept the license agreement selecting the appropriate radio button. Then click **Next** (see Figure 3-128).

🔀 DB2 Setup - DB2 Enterprise Server Edition - DB2COPY1
Software License Agreement         Please read the following license agreement carefully.
Two license agreements are presented below.
1. IBM International License Agreement for Evaluation of Programs 2. IBM International Program License Agreement
If you are obtaining the Program for purposes of productive use (other than evaluation, testing, trial "try or buy," or demonstration): By clicking on the "Accept" button below, You accept the IBM International Program License Agreement, without modification.
If you are obtaining the Program for the purpose of evaluation, testing, trial "try or buy," or demonstration (collectively, an "Evaluation"): By clicking on the "Accept" button below, You accept both (i) the IBM International License Agreement for Evaluation of Programs (the "Evaluation License"), without
Read non-IBM terms.
C I go not second the terms in the license agreement
InstallShield
Print < Back Dext > Cancel

Figure 3-128 DB2 License Agreement panel

9. In the DB2 installation type panel, accept the default **Typical installation** and click **Next**. to continue (Figure 3-129).

👘 DB2 Setu	o - DB2 Enterprise Se	erver Edition - DB2COPY1	
Select t	he installation ty	pe	
0 <u>1</u> 0 <u>0</u> 0 0	ypical: ompact: <u>u</u> stom:	Approximately 590 - 800 MB Approximately 340 - 550 MB Approximately 340 - 990 MB	
Inf	ormation about the inst The typical setup inclu features and functiona To add features for ap Custom.	aliation type des basic database server function, database administration tools, and most produ lity. plication development and other optional functionality later in the setup process, cl	:t ck
InstallShield -		< Back Cancel	Help

Figure 3-129 DB2 installation type panel

10. In panel shown in Figure 3-130, accept the default option to create a response file also. Change the response file name and location if you want.

DB2 Setup - DB2 Enterprise Server Edition - DB2COPY1
Select the installation, response file creation, or both
The DB2 Setup Wizard can install DB2 Enterprise Server Edition on this computer, create a response file that you can use to install this product on a computer later, or both.
If you are setting up a DB2 Enterprise Server Edition (ESE) partitioned database environment, you can also create a response file to install DB2 on the other computers that will act as database partition servers.
C Install DB2 Enterprise Server Edition on this computer
C Save my installation settings in a response file
No software will be installed on this computer.
Install DB2 Enterprise Server Edition on this computer and save my settings in a response file
Response file name C:\Documents and Settings\Administrator\My Documents\PROD_ESE.r:
talishield
< <u>Back</u> Cancel Help

Figure 3-130 DB2 installation response file creation

11. The DB2 location panel is shown. The location cannot be changed because we are upgrading a previous version. Click **Next** as shown in Figure 3-131.

👘 DB2 Setup - DB2 E	nterprise Server Edit	ion - DB2COPY1			
Installation fol	der				
The DB2 Setup w	izard installs DB2 Enterpr	ise Server Edition in	the following folder.		
Directory	D:\IBM\SQLLIB\				
	Space required:	491 MB		Disk space	
InstallShield		< <u>B</u> ack	Next >	Cancel	Help

Figure 3-131 DB2 install location panel

12. In the panel shown in Figure 3-132, you can change the DB2 copy name. Accept the default and click **Next**.

Set the DB2 copy name	
The DB2 copy name is used to identify a location where DB2 products are installed on the computer. Enter the DB2 copy name for the location you have chosen.	
DB2 copy name	
DB2COPY1	k.
Set this as the default DB2 copy on this computer	
Applications that are not enabled or configured to use a specific DB2 copy will use this copy by default. It will also be the copy that will be accessible by default from the command line.	
InstallShield	
< <u>B</u> ack <u>N</u> ext > Cancel Help	

Figure 3-132 DB2 Copy name panel

13. In the panel shown in Figure 3-133, the User name field must be already filled in with the correct DB2 admin user ID. Fill in the Password and Confirm password fields and click **Next** to continue.

🔂 DB2 Setup - DB2 Ente	rprise Server Edition - DB2	2COPY1		_ 🗆 X
Set user informat	ion for the default DB2	? instance		
Specify the requi	red user information that the D	DB2 instance, DB2, v	vill use to log on to your syste	m.
	User information			
	Domain		None - use local user accou	int 💌
	User name		db2admin	
	Password		****	
	Confirm password		****	
InstallShield				
		< <u>B</u> ack	Next > Cance	l Help

Figure 3-133 DB2 user panel

14. Leave the operating system security options unchanged and click **Next**. See Figure 3-134.

🙀 DB2 Setup - I	DB2 Enterprise Server Edition - DB2COPY1		×
Enable ope	erating system security for DB2 obje	ects	
Specify objects the gro	if you would like to enable operating system see on your computer. If you enable this security, o ups specified below.	curity for DB2 files, folders, registry keys, and other operating system access to DB2 objects will be limited to	
Note: T	he DB2 Setup wizard has detected that the grou	up names shown below already exist on your computer.	
🔽 Ena	ble operating system security		
	Information on the DB2 administrators group	and DB2 users group is available by clicking Help.	
	DB2 administrators group		1
	Domain	None - use local group	
	Group name	DB2ADMN5	
	DB2 users group		
	Domain	None - use local group	
	Group name	DB2USER5	
InstallShield			
	<u> </u>	Cancel	Help

Figure 3-134 DB2 OS Security

15. It is likely that the DB2 groups defined in the previous step are already present in the system. In this case, the warning message shown in Figure 3-135 is shown. Click **OK** to proceed.

Warning							
The group name "DB2ADMNS, DB2USE Cancel to input another group name.	RS" already exists in th	ne system and will be gra	nted com <b>plete acc</b>	ess to DB2 fok	ders and objects through th	ne operating system.	Click OK to continue the installation
			OK	Cancel			
Figure 2 125 DDD		ming maaaa	~~				

Figure 3-135 DB2 Groups warning message

16.A panel summarizing the selected options is shown. Click **Finish** to begin the installation (see Figure 3-136).

🖥 DB2 Seti	ıp - DB2 Enterprise Server Edition	- DB2COPY1
Start o	copying files and create resp	onse file
Th If re	e DB2 Setup wizard has enough inform you want to review or change any set sponse file name and click Finish to bec	ation to create the response file and start copying the program files. sings, click Back. If you are satisfied with the settings, type the in copying files.
CL F	rrent settings: Product to install: nstallation type:	DB2 Enterprise Server Edition - DB2C0PY1
C S S	IB2 copy name: et as default DB2 copy: et as default IBM database c	DB2C0PY1 Yes client interface copy: Yes
s	elected features: XML Extender DB2 WMI Provider DB2 Text Search SQLJ Support Sample database source Replication tools	
tallShield		<back cancel="" finish="" help<="" td=""></back>

17. The installation process begins. Panels similar to the one shown in Figure 3-137 are

🙀 DB2 Setup - DB2	2 Enterprise Server Edition - DB2COPY1			
Installing DB2 Er	aterprise Server Edition - DB2COPY1			
P				
	Status: Validating install			
InstallShield				
		< <u>B</u> ack	Next >	Cancel

Figure 3-137 DB2 installation running

shown.

18. When the setup completes, the panel in Figure 3-138 is shown. Click Next.

🔂 DB2 Setup - DB2 Enterprise Server Ed	dition - DB2COPY1	×
TW DB2 Setup - DB2 Enterprise Server E	Bitton - DB2COPY1         Setup is complete         DB2 Setup wizard has finished copying files to your computer and has completed all the required system configuration tasks. Shut down all software programs running on the system now. The programs can then be restarted and DB2 will be ready for use. The install log is located in C1/Documents and Setting3/Administrator/My Document/SD82.OG/DB2-ESE-Thu Apr 30.21_S1_01 2009.log. Consult the log file to ensure that all tasks completed successfully.         If you have not already done so, it is recommended that you complete the post-install steps after installation.         Required steps:         You have enabled DB2 extended Windows security. You must add DB2 users that need to run DB2 local applications or tools to either the DB2ADMNS or DB2USERS group.         Optional steps:         Click Next to install additional products.	X
	Next >	

Figure 3-138 DB2 Setup complete panel

19. Click Finish on the panel shown in Figure 3-139 to exit the DB2 setup wizard.



Figure 3-139 DB2 setup wizard

20. Click **Exit** on the First steps panel shown in Figure 3-140.

DB2 First Steps		
	DB2 Database for Linux, UNIX, and Windows	IBM. 🖻
Welcome to First Steps	Welcome to First Steps for DB2 Database for Linux, UNIX, and	
Database Creation	windows	
Database Administration	First Steps introduces some of the key database functions that you can perform using DB2	
Application Development	automatically by taking advantage of autonomic capabilities, and protecting data using access automatically by taking advantage of autonomic capabilities, and protecting data using access	5
Technical Resources	database systems and its features.	
Product Updates	The Control Center is set of tools that you can use to manage and administer your data servers and	
Exit.	databases. The Command Line Processor (CLP) is a text-based interface that you can use to run DB2 commands, SQL statements, and database utilities. These interfaces are included with the IBM Data Server Client.	
	In addition to the CLP and the Control Center, you may want use the IBM Data Studio Administration Console, a Web-based application to manage your DB2 data servers. It helps you maintain required levels of performance by reducing the time to resolve problems and utimately avoid problems altogether. Data Studio Administration Console is a separate application that you can obtain from the IBM Data Studio Web site.	
	Details on all product features and licensing terms included with DB2 database products are available in the DB2 Version 9.5 product licensing information technote.	
	First Steps helps you perform the following tasks:	
	Create the SAMPLE database	
	Create your own database	
	View and administer your databases	
	<ul> <li>Create an application using various development environments, including the data server developer tool, IBM Rational development tools, and Microsoft<sup>®</sup> Visual Studio 2005</li> </ul>	
	Find DB2 information from a wide range of sources	
	Check for product updates to find out about available DB2 product updates and to install them	
	To make full use of the resources provided by First Steps, you must have access to the online DB2 Informatio Center.	n
		-
		<u> </u>

Figure 3-140 DB2 first steps

### 3.6.3 Migrating the databases

Now that we have migrated the DB2 instance, we need to migrate the databases:

- Open a DB2 Command window: Start → Programs → IBM DB2 → DB2COPY1 (Default) → Command Line Tools → Command Window.
- 2. Start the DB2 database manager by issuing the following command:

db2start

3. We need to issue the **migrate database** command against the TPC related databases. The syntax of the command is as follows:

db2 MIGRATE DATABASE <database\_alias> USER <userID> USING <password>

We executed the command on all three databases, as shown in Figure 3-141, with a positive result. The databases are now correctly migrated.

🖼 DB2 CLP - DB2COPY1	
D:\IBM\SQLLIB\BIN)db2 migrate database TPCDB user db2admin using db2adm DB20000I The MIGRATE DATABASE command completed successfully.	in 🔺
D:\IBM\SQLLIB\BIN>db2 migrate database IBMCDB user db2admin using db2ad DB20000I The MIGRATE DATABASE command completed successfully.	lmin
D:\IBM\SQLLIB\BIN>db2 migrate database TPCRM user db2admin using db2adm DB20000I The MIGRATE DATABASE command completed successfully.	in
D:\IBM\SQLLIB\BIN>_	-

Figure 3-141 DB2 database migration command

4. We must verify that the migration completed correctly. From the same command window, we can issue the commands to connect to the databases. If there are no issues, the result is the one presented in Figure 3-142.

CAN DB2 CLP - DB2COPY1	_ 🗆 ×
D:\IBM\SQLLIB\BIN>db2 connect to tpcdb	<u> </u>
Database Connection Information	
Database server = DB2/NT 9.5.3 SQL authorization ID = ADMINIST Local database alias = TPCDB	
D:\IBM\SQLLIB\BIN>db2 connect to ibmcdb	
Database Connection Information	
Database server = DB2/NT 9.5.3 SQL authorization ID = ADMINIST Local database alias = IBMCDB	
D:\IBM\SQLLIB\BIN>db2 connect to tpcrm	
Database Connection Information	
Database server = DB2/NT 9.5.3 SQL authorization ID = ADMINIST Local database alias = TPCRM	
D:\IBM\SQLLIB\BIN>	•

Figure 3-142 DB2 connect statements

- 5. Now the following parameters must be manually set for each database:
  - self\_tuning\_mem: Parameter that determines whether the memory tuner will dynamically distribute available memory resources as required between memory consumers that are enabled for self tuning. We set it to ON.
  - pckcachesz: Package cache size configuration parameter. We set it to AUTOMATIC.
  - database\_memory: Database shared memory size configuration parameter. We set it to AUTOMATIC.
  - avg\_appls: Average number of active applications configuration parameter. We set it to AUTOMATIC.

We need to execute the following commands from a DB2 command window for TPCDB:

db2 update db cfg for tpcdb using self\_tuning\_mem on db2 update db cfg for tpcdb using pckcachesz automatic db2 update db cfg for tpcdb using database\_memory automatic db2 update db cfg for tpcdb using avg\_appls automatic

Then we execute similar commands for IBMCDB and TPCRM:

```
db2 update db cfg for ibmcdb using self_tuning_mem on
db2 update db cfg for ibmcdb using pckcachesz automatic
db2 update db cfg for ibmcdb using database_memory automatic
db2 update db cfg for ibmcdb using avg_appls automatic
db2 update db cfg for tpcrm using self_tuning_mem on
db2 update db cfg for tpcrm using pckcachesz automatic
db2 update db cfg for tpcrm using database_memory automatic
db2 update db cfg for tpcrm using avg_appls automatic
db2 update db cfg for tpcrm using avg_appls automatic
```

Figure 3-143 shows the result of the previous commands.

📾 DB2 CLP - DB2COPY1	- 🗆 ×
DB200001 The UPDATE DATABASE CONFIGURATION command completed successfully.	
D: BM\SQLLIB\BIN>db2 update db cfg for tpcdb using database_memory automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for tpcdb using avg_appls automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for ibmcdb using self_tuning_mem on DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for tpcdb using pckcachesz automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for ibmcdb using pckcachesz automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for ibmcdb using database_memory automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for ibmcdb using avg_appls automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for tpcrm using self_tuning_mem on DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for tpcrm using pckcachesz automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for tpcrm using database_memory automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>db2 update db cfg for tpcrm using avg_appls automatic DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
D:\IBM\SQLLIB\BIN>_	-

Figure 3-143 DB2 configuration parameters update

## 3.7 Upgrading the Agent Manager

In this section, we show how to upgrade the Tivoli Agent Manager. The latest version currently available and shipped with TPC V4.1 is Agent Manager V1.3.2.30.

**Note:** If you are running an Agent Manager, V1.2.x is mandatory to upgrade to V1.3.2 because V1.2.3 runs inside a WebSphere version that is not supported anymore.

Follow these steps:

1. Start the Agent Manager upgrade procedure backing up the certificates. Move to <<u>Agent\_Manager\_install\_dir</u>/certs directory on the Agent Manager server and copy all the files in the directory in a safe place. On Figure 3-144, you see an example of the content of this directory. We installed the Agent Manager on D:\IBM\AgentManager.

	5\system:	32\cmd.e	хе			
D:\IBM\Agen	tManage	r\cert	s>dir	- 1.		<b></b>
Volume Ser	ial Nur	ber is	FC3B-I	)9B8		
Directory	of D:\I	BM\Age	ntManag	er\certs	3	
05/02/2009	02:58	AM ·	<dir></dir>			
05/02/2009	02:58	AM ·	<dir></dir>			
05/02/2009	02:58	AM		3,537	agentManagerKeys.jks	
05/02/2009	02:58	AM		806	agentManagerTrust.jks	
10/26/2006	11:34	AM		806	agentTrust.jks	
10/26/2006	11:34	AM		24	CARoot Key.pwd	
10/26/2006	11:34	AM		1,986	CARootKeyRing.jks	
05/02/2009	02:41	AM		72	REGKey.pwd	
01/30/2009	12:37	PM		806	testTrust.jks	
	7 F	File(s)		8,037	? bytes	
	2 I	)ir(s)	17,663	3,248,384	l bytes free	
D:\IBM\Agen	tManage	er\cert	s≻_			-
4			_			• //

Figure 3-144 Agent Manager certificates directory

2. From the EmbeddedInstaller directory, run the program specified in Figure 3-17. You must have a Java Virtual Machine installed. If you want to designate a JVM located in a specific path, use the command presented in the third column of this table.

Operating system	Command	Java alternate command
Microsoft Windows	setupwin32.exe	setupwin32.exe -is:javahome <jvm path=""></jvm>

Table 3-17 Embedded Installer directory commands

**Note:** Before launching the installation, ensure that the user ID with which you are logged into the system has administrative authority.

 The InstallShield wizard detects that a previous version of the Agent Manager is already installed and it gives the only option of performing an upgrade as shown in Figure 3-145. Click Next to proceed with the upgrade.



Figure 3-145 Agent Manager Upgrade panel

4. The Database User Information panel is shown in Figure 3-146. A default user ID is already present in the user field. Type the corresponding password to use it. You can also enter another database user name and type the corresponding password. This must be a DB2 administrator user ID that is in the DB2ADMNS group and Administrator group.

If you want to use another user ID for the installation of Agent Manager only, you can select **Use a different user ID during the installation**, and enter the user ID and password. Note that if you do not select the check box, the following Database Administrator User ID and Password will not be used.

In our case, we accepted the suggested db2admin user ID and we typed the corresponding password. Click **Next** after you are done with this panel.

🍟 InstallShield Wizard for Inst	alling the Agent Manager
	Database User Information
	Specify the user ID and password for accessing the database
	Database Runtime User ID
	db2admin
	Password
	******
	<ul> <li>Use a different user ID during the installation</li> <li>Specify a separate user ID for installing the agent manager. This user must have the authority to create a database and tables. This lets you limit the authority you give the runtime user ID because it does not need the authority to create objects.</li> <li>Database Administrator User ID</li> </ul>
	Password
InstallShield	
	< Back Next > Cancel

Figure 3-146 Agent Manager DB2 user ID and password

5. The installation program gathers information from the installed WebSphere application server. During this process, a panel similar to Figure 3-147 is shown.

🖄 InstallShield Wizard for Inst	talling the Agent Manager		
IBM.	Wait while the installation and configuration of the embedded v completes.	version of the IBM WebSphere	Application Server
		< <u>B</u> ack <u>N</u> ext >	<u>C</u> ancel

Figure 3-147 Agent Manager installation gathering WebSphere info

6. A panel summarizing the information for the upgrade is shown (see Figure 3-148). Click **Next** to start the upgrade.

	Please read the summary information below.	
	Tivoli Agent Manager will be installed in the following location: D:\UBMIAgentManager with the following features: Tivoli Agent Manager for a total size: 28.3 MB	
InstallShield	< Back Next > Cancel	

Figure 3-148 Agent Manager summary panel

 The upgrade process starts and multiple panels are shown describing the current upgrade step being performed. An example is given in Figure 3-149. Wait until these steps are completed.



Figure 3-149 Agent Manager upgrade running

8. The panel shown in Figure 3-150 asks if you want to stop and restart the Agent Manager in order for the changes to take effect. If the Agent Manager can be stopped now, keep the default option **Yes, stop and then start Agent Manager now** and click **Next**.



Figure 3-150 Agent Manager stop and start panel

9. The installation program stops and starts the Agent Manager and the panel shown in Figure 3-151 is shown. Wait until this process completes.



Figure 3-151 Agent Manager stopping

10.Upon completing the Agent Manager restart step, a summary panel is shown (Figure 3-152). Verify that all the steps concluded with a successful result and click Next to continue.



Figure 3-152 Agent Manager summary panel

11. The last panel of the wizard informs us that the upgrade process has been concluded successfully. Click **Finish** on the panel to close the upgrade program (Figure 3-153).



Figure 3-153 Agent Manager upgrade final summary panel

To verify that the upgrade process for the Agent Manager has been performed correctly, we can follow the same procedure described in "Verifying the installation" on page 92.

# 3.8 Upgrading the TPC components

In this section, we show how to upgrade the TPC components. Before proceeding with the upgrade, there are various steps that must be performed.

#### Preparing for upgrade of TPC components

Follow these steps:

- 1. Exit all instances of the Tivoli Storage Productivity Center GUI.
- 2. Make sure that you have exclusive access to the server you are installing TPC V4.1 on. If you are accessing the server remotely, make sure that there are no other remote connections to the server. Multiple remote connections, such as Windows Remote Desktop Connections, will cause the upgrade to fail and can render the server unrecoverable. To log off other remote users on Windows, follow these steps:
  - a. Go to Start  $\rightarrow$  Settings  $\rightarrow$  Control Panel  $\rightarrow$  Administrative Tools  $\rightarrow$  Terminal Services Manager.
  - b. On the Users tab, right-click the users that ought not to be logged on to the server and select Logoff from the pop-up menu (see Figure 3-154).



Figure 3-154 Terminal Services Manager

- c. Close the Terminal Services Manager window.
- Stop all the TPC services. Also make sure that you stop any long running scan jobs. To stop the services, go to Start → Setting → Control Panel → Administrative Tools → Services. Right-click the service and select Stop. The following services have to be stopped:
  - IBM WebSphere Application Server V6 Device Server
  - IBM TotalStorage Productivity Center Data Server
  - IBM Tivoli Common Agent <directory> where <directory> is where the Common Agent is installed. The default is <TPC\_install\_dir>/ca.
  - IBM WebSphere Application Server v6.1 CSM if you also have TPC for Replication
- Back up your current TPC V3.3 server and database. This is important in case of an upgrade failure:
  - a. Back up your TPC database using the same DB2 backup process described in the section "Backing up the databases" on page 134.
  - Back up your <TPC\_install\_dir> copying all its content in another directory. On Windows, the default TPC Install directory is:

C:\Program Files\IBM\TPC

- c. Back up your Common Agent installation directory (<common\_agent\_install\_dir>) if it is not a subdirectory under your TPC directory. If you used the default directory structure when you installed Version 3.3, your <common\_agent\_install\_dir> is C:\Program Files\IBM\TPC\ca and you do not need to back it up separately. It was already backed up in the previous step.
- d. Back up the registries:
  - · InstallShield registries: backup the following directory

C:\Program Files\Common Files\InstallShield\Universal

• Backup the Windows registry. For Windows 2003 Server platforms you can refer to the following document:

http://technet.microsoft.com/en-us/library/cc758453(WS.10).aspx

· CA registry: backup the following registry

C:\Program Files\tivoli\ep.reg

- Restart all TPC services. To start the services, go to Start → Setting → Control Panel → Administrative Tools → Services. Right-click the service and select Start. The following services need to be restarted are:
  - IBM WebSphere Application Server V6 Device Server
  - IBM TotalStorage Productivity Center Data Server
  - IBM Tivoli Common Agent <directory> where <directory> is where the Common Agent is installed. The default is <TPC\_install\_dir>/ca.
  - IBM WebSphere Application Server v6.1 CSM if you also have TPC for Replication

#### Upgrading the TPC components

The TPC upgrade is performed with the same installation program used for installing the product. Depending on the components already installed on the system, various panels are displayed.

**Note:** If TPC for Replication is installed in the system prior to the upgrade, it will be upgraded to V4.1 with the other components. If it is not present, it will be installed. The upgrade process will also install the Tivoli Integrated Portal on the same system.

To perform the upgrade, execute the following procedure:

- 1. Double-click the **setup.exe** file located in the root directory of the structure presented in 3.1.2, "Product code media layout and components" on page 55.
- 2. Choose the language that must be used for installation and click OK (see Figure 3-155).

w Installer	
Select a language to be used	for this wizard.
English	
	ancel

Figure 3-155 Language selection panel

3. The License Agreement panel is displayed. Read the terms and select **I accept the terms** of the license agreement. Then click Next to continue (see Figure 3-156).

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer 📃 🗌 🗙
	IBM Tivoli Storage Productivity Center V4.1.0.97
	International Program License Agreement Part 1 - General Terms By DOWNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS, - DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM, AND - PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE PROGRAM, CONTACT THE PARTY FROM WHOM YOU ACQUIRED IT. "IBM" Is International Business Machines Corporation or one of its subsidiaries.
	C I do not accort the terms of the licence agreement
	<u>N</u> ext > <u>C</u> ancel

Figure 3-156 License panel

- Figure 3-52 shows how to select typical or custom installation. You have the following options:
  - Typical installation:

This selection allows you to upgrade all of the components on the same computer. Certain options are grayed out by selecting **Servers**, **Agents**, and **Clients**.

- Custom installation:

This selection allows you to select the components that you can upgrade.

Installation licenses:

This selection installs the Tivoli Storage Productivity Center licenses. The Tivoli Storage Productivity Center license is on the CD. You only need to run this option when you add a license to a Tivoli Storage Productivity Center package that has already been installed on your system.

Note that the installation directory field is automatically filled with the TPC installation directory on the current machine and grayed out. In our case, a previous version of TPC is already installed in D:\IBM\TPC directory. Select **Custom Installation**. Click **Next** to continue.



Figure 3-157 TPC Custom install

5. The panel with the TPC components is shown. The components already installed on the system are discovered, selected for upgrade, and greyed out. The current version of each component is displayed next to it. In our case, we have a TPC V3.3.2.72 installed on our system without local Data agents or Fabric agents. Figure 3-158 shows the corresponding panel. Click **Next** to proceed with the installation.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer			
IBM.	Select one or more components to instal This program will install or upgrade vari example, if version number 3.1.0.39 is d that the version of the component is alre installation, all installed components wi software. You can choose to install addi	I on the local or remote computer. ous components displayed below. For isplayed next to the component, this means, ady installed on this computer. In this I be upgraded to the current version of tional components which are not installed.		
	Create database schema 3.3.2.72			
and part and a	☑ Tivoli Storage Productivity Center Servers 3.3.2.72			
	🔽 GUI 3.3.2.72	🔽 CLI 3.3.2.72		
	🗖 Data Agent	🗖 Fabric Agent		
11/19	🗖 Remote Data Agent	🗌 Remote Fabric Agent		
111-11-11-1	Register with the agent manager			
NIA	E Register Launch Information With Oth	ner Applications		
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> ancel		

Figure 3-158 TPC Components panel

6. If you are running the upgrade on a system with at least 4 GB but less than 8 GB of RAM, you will get the warning message shown in Figure 3-159. You can close the message panel by clicking **OK**.

**Note:** 8 GB of RAM is the minimum memory requirement to run both Tivoli Storage Productivity Center and Tivoli and Tivoli Storage Productivity Center for Replication.

If you have less than 8 GB of RAM, you have to run only Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication because of system load. To do that, you must disable Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication after installation.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer		
	Select one or more components to insta	all on the local or remote computer.	
IBM.	This program will install or upgrade va example, if version number 3.1.0.39 is that the version of the component is alr installation, all installed components w software. You can choose to install add	rious components displayed below. displayed next to the component, thi eady installed on this computer. In t vill be upgraded to the current versio ditional components which are not in	For s means, his n of istalled.
WARNING:	memory size is low	×	
	VARNING: 8 GB of RAM is required. If yo RAM, you cannot run Tivoli Storage Produ Productivity Center for Replication at the s guide for further details.	u have between 4 to 8 GB of ctivity Center and Tivoli Storage ame time. See the install	
DILW/AS	🗖 Data Agent	🗖 Fabric Agent	
1/1/2	🗖 Remote Data Agent	Remote Fabric Agent	
	Register with the agent manager		
AND H	Register Launch Information With C	ther Applications	
	< <u>B</u> ack	<u>N</u> ext >	<u>C</u> ancel

Figure 3-159 TPC Memory warning message

7. The DB2 user ID and password panel is shown as in Figure 3-160. The information in these fields is propagated. Click **Next** to proceed.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer			
	Database administrator information			
IBM.	Enter the database administrator user ID and password to connect to the database during installation and uninstallation.			
	Database administrator	db2admin		
	Password	****		
	< <u>B</u> ack	Next > (	<u>2</u> ancel	

Figure 3-160 TPC DB2 Administrator panel

8. The Database Schema panel is shown as in Figure 3-161. All the information in this panel is already propagated. Verify it and click **Next** to continue.

🕲 IBM Tivoli Storage Productivity Center - Installer 🗾 🖂 🗙						
·	Existing database s Enter the informati	chema informati ion to use an exi:	on sting database :	schema for th	e repository.	
IBK.	DB user ID	db2admin	Passw	rord	*****	
© Use local database						
	Port 50000	Database TPCDB	Schema TPC	Instance DB2	Version 9.5.301.436	
	C Use remote dat	abase				
	Host name	localhost	Port		50000	
1 4 Sec.	Database name	TPCDB	Schem	ia name	ТРС	
11 115	D:\IBM\SQLLIB\j	ava\db2jcc.jar			JDBC driver	
11 Ame						
	*	<u>B</u> ack	Next	>	<u>C</u> ancel	

Figure 3-161 TPC Database Schema panel

9. In the TPC servers panel shown in Figure 3-162, verify that the fields are filled with the correct information. Also, the password fields are filled with propagated information. Click **Next** when you are done.

🕲 IBM Tivoli Storage Productivity Center - Installer						
	Data server, Device server, Data agent, and Agent Information					
IBM.	Enter the server name a communicate with the s	and port that the Data agen server.	t and Fabric agent, and (	3UI will use to		
	Data server name	nc124040.romelab.	Data server port	9549		
	Device server name	nc124040.romelab.	Device server port	9550		
	Enter an OS user group administrators group.	whose members will be 1	PC administrators in the	)		
	TPC superuser	Administrators	Secu <u>r</u> ity roles.			
	Enter a password that the Fabric agents will use to communicate with the Device server.					
	Host authentication pas	ssword	***			
1 11 15	Enter a password that will be used to create the Data Server Account.					
1111	Data Server Account Pa	assword				
	WAS admin ID	Administrator Passv	/ord ******	***		
all ashing			NAS discovery			
			Data agent <u>o</u> ptions			
	< <u>B</u> a	ck <u>N</u> e	xt >	<u>C</u> ancel		

Figure 3-162 TPC Servers panel

10. The Tivoli Integrated Portal panel is shown as in Figure 3-163. Remember that this component is always installed when upgrading to TPC V4.1 unless you have an instance of TIP already installed on the system. In this case, the option, Reuse an existing TIP install section, is enabled and you can select that instance. If a TIP instance is not installed, you have to specify the installation directory for this new instance. We selected the D:\IBM\Tivoli\tip directory. The TPC/IP port 16310 is proposed as default in the Port field (called Base Port). TIP will use 10 port numbers starting from the one specified.

The ten ports will be:

- base port
- base port+1
- base port+2
- base port+3
- base port+5
- base port+6
- base port+8
- base port+10
- base port+12base port+13

The TIP administrator ID and password are pre-filled with the WebSphere admin ID and password specified for the Device Server. Click **Next** to proceed with the upgrade.

🕲 IBM Tivoli Storage Proc	ductivity Center - Installer	<
	Tivoli Integrated Portal (TIP)         TIP provides TPC with the ability for Single Sign-On authentication, launch other applications in context, and reports to be viewed from Tivoli Common Reporting. Select an existing TIP install to be used with TPC or specify the install directory where TPC is to install TIP.         Specify the location to install TIP         D:\UBM\Tivoli\u00edtip         Port         16310	
1.100	C Reuse an existing TIP install  Existing TIP Installs:	
	TIP Administrator ID Administrator Password *******	
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel	

Figure 3-163 TIP Installation panel.

11. In the Authentication type panel shown in Figure 3-164, you are prompted to select if the user authentication must be performed against the Operation System or against an LDAP/Active Directory server. If you select OS authentication, the panel shown after clicking **Next** is the one shown in Figure 3-167 on page 164, otherwise additional panels are displayed.



Figure 3-164 Authentication type panel

12. If you selected the LDAP/Active Directory option, the panel shown in Figure 3-165 is displayed. Insert the LDAP Server host name and change the LDAP Port Number if not corresponding to the proposed default value. You also need to fill in the Bind Distinguished Name and the Bind Password only if the anonymous binds are disabled on your LDAP server. Click **Next** to continue.

🕲 IBM Tivoli Storage Productivity Center - Installer 📃 🖂 🗙					
	Lightweight Directory Access Protocol (LDAP) Specify the LDAP server information required for TPC to use LDAP authentication. The Bind Distinguished Name and Bind Password options are optional if the LDAP server supports anonymous binds and user or group creation from TIP is not required.				
	LDAP Server Hostname nc124039.romelab.it.ibm.com LDAP Port Number 389 The following are optional if anonymous binds are allowed:				
	Bind Distinguished Name Bind Password				
	< Back Next > Cancel				

Figure 3-165 LDAP server details

13. In the panel shown in Figure 3-166, you are required to insert the LDAP RDN for users and groups and the attributes that must be used to search the directory. When clicking **Next**, the TPC install makes an attempt to connect to the LDAP server to validate the provided parameters. If the validation is successful, you are prompted with the next panel; otherwise an error message explaining the problem encountered is shown.

🕲 IBM Tivoli Storage Produ	uctivity Center - Installer	_ 🗆 🗵
	Lightweight Directory Access Protocol (LDAP) Specify the LDAP user and group information required for TPC to use LDAP authentication.	
	Relative Distinguished Name for usernames cn=TPC-realm,cn=itso,o=ibm Attribute to use for usernames uid	
	Relative Distinguished Name for groups cn=TPC-realm,cn=itso,o=ibm Attribute to use for groups cn	
	< <u>Back Next &gt; Cancel</u>	

Figure 3-166 LDAP RDN details

**Warning:** Due to the WebSphere Application Server APAR PK77578, the LDAP TPC Administrator user name value must not contain a space in it.

14. In the panel shown in Figure 3-167, you are requested to specify the LDAP user ID and password corresponding to the TPC Administrator and the LDAP group that will be mapped to the TPC Administrator group. Also in this panel, after filling in the fields and clicking **Next**, the installation program will connect to the LDAP server to verify the provided values. If the validation is successful, the next installation panel is shown.



Figure 3-167 LDAP user and group for TPC administration

15. If the validation is successful, the summary panel shown in Figure 3-168 is presented. Review its content and click **Install** to start the upgrade.

Figure 3-168 Summary panel



16. Multiple panels such as the ones in Figure 3-169 and Figure 3-170 are now shown.

Figure 3-169 Running upgrade

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer	
	Installing TIP. Please wait Installing Tivoli Integrated Portal 31%	
	L	<u>C</u> ancel

Figure 3-170 TIP install

**Note:** The installation of the Tivoli Integrated Portal can be a time consuming process, requiring more time than the other TPC components.

17. Upon completion of the TIP installation, the TPC for Replication upgrade program is launched. The TPC installation is temporarily suspended and remains in the background while the TPC for Replication installation starts and a Welcome panel is displayed. See Figure 3-171.

If TPC for Replication is already installed on your system, it will be upgraded, whereas if it is not present, it will be installed. In our system we have a previous version of TPC for Replication already installed, so the following panels will show a TPC for Replication upgrade. If it is the first time that TPC for Replication is installed on the system installation, the panels shown are those in section "TPC for Replication installation" on page 112.



Figure 3-171 TPC for Replication Welcome panel.

**Note:** If TPC for Replication is not installed in your system and you do not plan to use TPC for Replication, you can interrupt the installation by clicking the **Cancel** button. Every subsequent upgrade of TPC will attempt to install it again. We suggest that you complete the TPC for Replication installation and then disable it.
18. The installation wizard checks on the system prerequisites to verify that the operating system is supported and the appropriate fix packs are installed. See Figure 3-172.

IBM Tivoli Storage P	roductivity Center for Replication - InstallShield Wizard
	System prerequisites check The Installation wizard checks your system to determine whether a supported operating system is running and whether the operating system is at the appropriate fix pack or update level. Checking your system
InstallShield ———	< Back: Next > Cancel

Figure 3-172 System prerequisites check running

19.If the system passes the prerequisites check, the panel shown in Figure 3-173 is displayed. Click **Next** to continue.



Figure 3-173 System prerequisites check passed

20. The license agreement panel is shown. Accept it and click Next as shown in Figure 3-174.



Figure 3-174 License Agreement Panel

21.On the panel shown in Figure 3-175, you can select the directory where TPC for Replication will be installed. The directory where TPC for Replication is correctly installed is proposed as the default location. You can accept it or change it based on your requirements. Click **Next** to continue.

IBM Tiyoli Storage	Productivity Center for Deplication	n - InstallShield Wizard		
	Click Next to install "IBM Tivoli Stor install to a different directory.	age Productivity Center for F	Replication" to this directory,	or click Browse to
	Directory Name: d:NBMreplication			Browse
InstallShield —				
		< Back	Next >	Cancel

Figure 3-175 TPC-R Installation directory

22. In the panel shown Figure 3-176 you are prompted for the DB2 user ID and password. They are already propagated in the corresponding fields but they can be changed if necessary. Click **Next** to proceed.

**Note:** This panel is shown only if you are upgrading from an instance of TPC for Replication configured to use DB2 as database repository.

IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard	
	User ID	
	db2admin	
	Password	
	*****	
InstallShield		
	< Back Next > Cancel	

Figure 3-176 TPC for replication DB2 user

23. The upgrade program checks for currently running TPC for Replication instances. If it is found, the message shown in Figure 3-177 is presented. Clicking **Yes** will continue stopping the TPC for Replication instance.



Figure 3-177 Stop the running TPC for Replication instance

24. Review the settings shown in Figure 3-178 and click **Install** to start the upgrade.

IBM Tivoli Storage	Productivity Center for Replication -	InstallShield Wizard		
	Installer has enough information to a change any setting, click Back. If you	start installation. Please are satisfied with the se	review the settings below an ettings, click Install to begin in	d if you wish to stallation.
	IBM Tivoli Storage Productivity Cent d:\IBM\replication with the following features: IBM Tivoli Storage Productivit for a total size: 222.9 MB	er for Replication will be y Center for Replication	installed in the following loca	tion:
InstallShield ——		< Back	Install	Cancel

Figure 3-178 TPC for Replication summary panel

25. The installation of TPC for Replication starts. Several messages about the installation process are shown, such as the one in Figure 3-179.

🕼 IBM Tivoli Storage I	Productivity Center for Replication - InstallShield Wizard	
	Installing IBM Tivoli Storage Productivity Center for Replication. Please wait	
	Extracting WebSphere installation media	
	30%	_
InstallShield	Cance	1

Figure 3-179 TPC-R installation running

26. After the completion of the TPC for Replication upgrade, a summary panel is shown reporting also the URL where the Web browser can be pointed to access the TPC-R Web-UI (see Figure 3-180). By clicking the **Finish** button, this panel is closed and the installation flows goes back to the TPC installation panels.



Figure 3-180 TPC-R Summary panel.

27. The TPC installation continues its flow, creating the uninstaller for TPC as shown in Figure 3-181.

🕲 IBM Tivoli Storage Productivity Center - Installer	
Treating uninstaller         74%	
	<u>C</u> ancel

Figure 3-181 TPC Uninstaller creation

28. The TPC upgrade completes by clicking **Finish** on the panel shown in Figure 3-182.



Figure 3-182 TPC Upgrade summary panel

#### Migrating the TPC Database

After you upgrade TPC, you have to migrate the TPC database using the database migration tool (partitiontables.bat or partitiontables.sh).

TPC will function normally without the database migration, but with decreased performance as compared to the migrated database. The TPC V4.1 database has been changed to improve performance by taking advantage of the table partitioning and multidimensional clustering features of DB2. These changes are automatically included when you install TPC but the TotalStorage Productivity Center Version 3.x database is not migrated at this time.

**Hint:** Because the database migration tool can take a long time to run (depending on the size of the database to be migrated), you can run the migration tool at a time that is convenient for you.

You only have to run the database migration tool one time. You must run the database migration tool before you apply any fix packs or PTFs for TPC.

When you run the database migration tool, you can check the progress of the database migration in the migrateTable.log file in the <TPC\_install\_directory>\data\server\tools directory. You will see warning messages if the migration cannot be performed on the database or if the migration has been previously completed. The database migration tool prints out messages in this log indicating which table is currently being migrated and which subsystem ID or switch ID is currently being migrated. The database migration tool can be run more than once if an error occurred during execution. Tables that were successfully migrated during previous attempts will not be migrated in subsequent runs.

**Warning:** Do not use the database migration tool that is shipped on the IBM Tivoli Storage Productivity Center 4.1 DVD or electronic images. Use this interim fix for the tool available at the following address:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&dc=D400&uid=swg2
4022828&loc=en\_US&cs=UTF-8&lang=en

To run the database migration tool, follow these steps:

 Download and unzip or untar the database migration tool into the TPC install directory. On Windows, the default directory is:

c:\Program Files\IBM\TPC\

- 2. Stop the Data Server and Device Server.
- 3. Change to the following directory:

<TPC\_install\_directory>\data\server\tools

- Run the following command: partitiontables.bat
- 5. Restart the Data Server and the Device Server

### 3.9 Upgrading TPC agents

You have two options for upgrading an existing or older version of TPC Data agents or Fabric agents to the current release:

- Upgrading the agents through the GUI. This is also called a scheduled upgrade because you can specify to upgrade the agents at a time when network activity will not be impacted by the upgrades.
- Performing a local install of the agent, where the upgrade is actually done through the installation program.

**Note:** If you plan to use the Storage Resource agents and you have a TPC for Data agent or Fabric agent installed, we strongly recommend to uninstall them.

In this section we describe how to upgrade a TPC agent using this second approach.

- 1. Start the TPC Agent installation program launching the **setup.exe** file in the root directory of TPC Installation Disk2 (see 3.1.2, "Product code media layout and components" on page 55)
- 2. The language selection panel is presented. Select the preferred language and click **OK** (see Figure 3-183).

() Installer	
Select a language to be use	ed for this wizard.
English	-
<u>o</u> ĸ	Cancel

Figure 3-183 Language Selection Panel

3. On the License Agreement panel, accept the License condition and then select **Next** (see Figure 3-184).



Figure 3-184 License Agreement Panel

4. Select the **Custom Installation** option. The TPC install location is prefilled and greyed out. See Figure 3-185. Click **Next** to proceed.



Figure 3-185 TPC Custom install panel

5. In the components panel shown in Figure 3-186, the old agents are already selected and greyed out. The corresponding version is displayed next to them. Ensure that no other components are selected and click **Next** to continue.

🕲 IBM Tivoli Storage Pro	🕲 IBM Tivoli Storage Productivity Center - Installer 📃 🖂 🔀					
IBM.	Select one or more components This program will install or upg example, if version number 3.1	to install on the local or remote computer. rade various components displayed below. For 0.39 is displayed next to the component, this means,				
	that the version of the compone installation, all installed compo software. You can choose to in:	nt is aiready installed on this computer. In this nents will be upgraded to the current version of stall additional components which are not installed.				
	🗖 Create database schema					
	Tivoli Storage Productivity C	enter Servers				
	🗖 GUI					
	🔽 Data Agent 3.3.2.72	Fabric Agent 3.3.2.72				
1 11.110	🗖 Remote Data Agent	🗖 Remote Fabric Agent				
ING						
	🔽 Register with the agent man	ager				
AND AT	🗖 Register Launch Information	n With Other Applications				
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> ancel				

Figure 3-186 Agent selection panel

6. In the Servers information panel shown in Figure 3-187, all the fields are already filled with the propagated values. Check the corresponding values and click **Next** to continue.

🕲 IBM Tivoli Storage Pro	ductivity Center - Insta	ller		
	Data server, Device ser	ver, Data agent, and Agent	nformation	
IEM.	Enter the server name communicate with the	and port that the Data ager server.	t and Fabric agent, and	GUI will use to
	Data server name	nc124040.romelab.	Data server port	9549
	Device server name	nc124040.romelab.	Device server port	9550
	Enter an OS user grou administrators group.	p whose members will be <sup>-</sup>	FPC administrators in th	e
	TPC superuser	Administrators	Security roles	····
	Enter a password that	the Fabric agents will use t	o communicate with the	Device server.
	Host authentication pa	ssword	***	
1 Martin	Enter a password that	will be used to create the D	ata Server Account.	
ING	Data Server Account P	assword		
AFRI -	WAS admin ID	Passy	vord	
AN ISSN A			NAS discovery	
			Data agent <u>o</u> ptions	
	< <u>B</u> a	ack <u>N</u> e	xt >	<u>C</u> ancel

Figure 3-187 TPC Servers information panel

7. Now you are prompted with the Agent Manager information panel shown in Figure 3-188. All the fields are pre-filled. Review the values and click **Next** to proceed.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer		
	Agent manager information		
IBM.	Enter the information that the proo server, Data agent, or Fabric ager	duct will use to register its Data server, Device nt with the agent manager.	
	Hostname or IP address	nc124040.romelab.it.ibm.com	
A	Port (Secured)	9511	
	Port (Public)	9513	
	Enter the Data server and Device the agent manager.	server registration information as specified on	
	User ID	manager	
	Password	****	
1 Friday	Enter the common agent registrat manager.	tion password as specified on the agent	
11.300 -	Password	****	
AMA -			
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> ancel	

Figure 3-188 Agent Manager panel

8. A summary panel is shown. See Figure 3-189. Click Install to start the upgrade.

🕲 IBM Tivoli Storage Proc	ductivity Center - Installer	_ 🗆 🗙
(18) IBM Tivoli Storage Prod	ductivity Center - Installer Please read the summary information below. IBM Tivoli Storage Productivity Center will be installed in the following location: H:NBMTPC with the following features: Data agent Fabric agent	
	for a total size: 61.4 MB total space by filesystem: HA 61.38 MB	
	< <u>B</u> ack <u>Install</u> Cancel	

Figure 3-189 Summary information panel

9. The installation of the agents start. During this process you might see messages such as the one in Figure 3-190.

(1) IBM Tivoli Storage Product	ctivity Center - Installer	×
IBM.	<b>Installing Data Agent. Please wait</b> Installing Data agent	
	1%	
	Cancel	

Figure 3-190 Data agent installation process

10. The installation is then completed by clicking the **Finish** button on the summary panel shown in Figure 3-191.

🕲 IBM Tivoli Storage Prod	uctivity Center - Installer
	Please read the summary information below.
	Please read the summary information below. The InstallShield Wizard has successfully installed IBM Tivoli Storage Productivity Center. Choose Finish to exit the wizard.
	<u> </u>

Figure 3-191 Installation summary panel



# 4

# Tivoli Storage Productivity Center installation and upgrade on AIX

In this chapter, we show the step-by-step installation of the Tivoli Storage Productivity Center V4.1 on the AIX platform. We also show how you can upgrade previous TotalStorage Productivity Center 3.1.3 or later releases to Tivoli Storage Productivity Center V4.1.

# 4.1 Tivoli Storage Productivity Center installation on AIX

In this chapter, we describe how to install the Tivoli Storage Productivity Center Standard EditionV4.1 and Tivoli Storage Productivity Center for Replication V4.1. The prerequisite components are installed prior to invoking the installation program.

Furthermore, in this section we provide information about the preparation work required before installing the Tivoli Storage Productivity Center family.

#### 4.1.1 Installation overview

In order to get Tivoli Storage Productivity Center V4.1 to work, you need to follow certain steps as indicated in the following section references:

- Check that the system meets the prerequisites.
   See 4.2, "Preinstallation steps for AIX" on page 181.
- Install and configure all required prerequisite components. See 4.3, "Installing TPC prerequisites for AIX" on page 182.
- Install Tivoli Storage Productivity Center components.
   See 4.4, "Installing Tivoli Storage Productivity Center components" on page 203.

You can install Tivoli Storage Productivity Center using either Typical installation or Custom installation.

Custom installation allows you to see what components are being installed and where the components are being installed, as well as giving you the ability to customize your environment by allowing you to install separate components, versions, supply various passwords for user IDs, and change the default installation directories if required.

In our case, we install Tivoli Storage Productivity Center using the Custom installation option.

**Note:** Tivoli Storage Productivity Center for Replication is no longer a stand-alone application with TPC V4.1. Tivoli Storage Productivity Center V4.1 now installs Tivoli Integrated Portal and Tivoli Storage Productivity Center for Replication V4.1.

When you install Tivoli Storage Productivity Center, you have these installable components:

- Database schema
- Data Server and Device Server
- Graphical User Interface (GUI)
- Command Line Interface (CLI)
- Data agent
- Fabric agent

After Tivoli Storage Productivity Center is installed, the installation program will start the Tivoli Storage Productivity Center for Replication installation wizard.

#### 4.1.2 Product code media layout and components

In this section, we describe the contents of the product media at the time of writing. The media content will differ depending on whether you are using the Web images or the physical media shipped with the Tivoli Storage Productivity Center V4.1 package.

#### Passport Advantage and Web media content

The Web media consists of two disk images:

- Disk1 contains all Tivoli Storage Productivity Center components:
  - Database Schema
  - Data Server
  - Device Server
  - GUI
  - CLI
  - Data agent
  - Fabric agent
  - Tivoli Integrated Portal
  - Tivoli Storage Productivity Center for Replication
  - Storage Resource agent

Note: Dlsk 1 has two parts to it; both parts must be downloaded in the same directory.

- Disk2 contains local agent installation:
  - Data agent
  - Fabric agent
  - Storage Resource agent

#### **Physical media**

The physical media shipped with the TPC V4.1 product consists of a DVD and a CD. The DVD contains the Disk1 part 1 and Disk1 part 2 content described in "Passport Advantage and Web media content". The physical media CD is the same as the Web Disk2 media.

# 4.2 Preinstallation steps for AIX

Before deploying Tivoli Storage Productivity Center V4.1on AIX, you need to analyze your environment to ensure that the system requirements have been met and that you have all the prerequisite components installed and configured.

Certain prerequisite components need to be installed before proceeding with the Tivoli Storage Productivity Center V4.1 SE installation. See 4.2.3, "Prerequisite components for Tivoli Storage Productivity Center V4.1" on page 182.

#### 4.2.1 Verifying system hardware prerequisites

For the hardware prerequisites, see the Web site at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp?topic=/com.ibm.tp c V41.doc/fqz0 r hw requirements.html

The Tivoli Storage Productivity Center server requires 8 GB of RAM. If you have at least 4 GB but less than 8 GB of RAM, you can still install Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication. However, you will get a warning message during installation.

If you have less than 8 GB of RAM, you have to run only Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication because of system load. To do that, you must disable Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication after installation.

For installations on AIX or Linux, you need a total of 6 GB of free disk space as shown next. Refer to "Disk space requirements" on page 33 for more information.

- ► 2.25 GB for the /tmp directory
- ► 3 GB for the /opt directory
- ► 250 MB in the /home directory
- ▶ 10 KB of free space in /etc directory
- ► 200 MB in the /usr directory
- ► 50 MB in the /var directory

#### 4.2.2 Verifying system software prerequisites

For the software prerequisites, see the Web site at:

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp?topic=/com.ibm.tp c\_V41.doc/fqz0\_r\_sw\_requirements.html

#### 4.2.3 Prerequisite components for Tivoli Storage Productivity Center V4.1

These are the components that you will need to install and configure prior to installing Tivoli Storage Productivity Center V4.1:

- ► IBM DB2 UDB Enterprise Server Edition v9.5 FixPack 3 64-bits
- Agent Manager 1.3.2:

Keep in mind that from Tivoli Storage Productivity Center V4.1 release, installing the Agent Manager is optional. You are only required to install the Agent Manager if you are planning to install Data and Fabric agents.

#### Order of component installation

The components are installed in the following order:

- 1. DB2
- 2. Agent Manager

#### 4.2.4 User IDs and passwords to be used and defined

For considerations and information about the user IDs and passwords that you need to define or set up during TotalStorage Productivity Center installation, see "Security considerations" on page 38.

## 4.3 Installing TPC prerequisites for AIX

In this section, we describe how to install the TPC prerequisites on AIX. We perform a new installation of DB2 9 Fix Pack 3 64 bits for AIX as well as the Agent Manager 1.3.2 installation.

Ensure that you have verified that your system meets all the minimum system requirements for installing the prerequisites, including adequate free disk space.

Before beginning the installation, it is important that you log on to your system as a local system user with system rights authority.

**Attention:** In this section, we are dealing with a clean installation of TPC V4.1. Therefore it is important to understand that if you are required to migrate or upgrade your current TPC environment to TPC 4.1, that you follow the migration and upgrade sections found later on in this chapter.

#### 4.3.1 DB2 installation: Command line

This topic describes how to install DB2 v9.5 Fix Pack 3 64-bit on AIX using the command line. To install DB2, first log on as a user with root authority, then use the following procedures.

#### To access the installation media using the CD, follow these steps:

1. Create a mount point or choose an existing mount point. To create a mount point called /cdrom, we enter the following command:

mkdir /cdrom

Insert the DB2 CD into the CD-ROM. Mount the CD-ROM file system at the desired mount point.

On AIX, you can use the **crfs** command to add an entry to /etc/file systems for the mount point. Run the following commands to achieve this:

```
/usr/sbin/crfs -v cdrfs -p ro -d'cd0' -m'/cdrom' -A'no'
mount /cdrom
```

The **crfs** command only has to be run once for a given mount point, and after that you can use **mount** and **umount** for each CD or DVD you put in the drive.

3. Change to the directory where the CD-ROM is mounted:

cd /cdrom

#### To access the installation media using a downloaded image, follow these steps:

1. Create a temporary directory (for example, db2temp) to hold the DB2 installer tar file and untarred files. These files require 2 GB to 3 GB of hard drive space:

mkdir /db2temp

- 2. Copy or download the DB2 installer into db2temp.
- 3. Change to the directory where you have stored the image, for example:

cd /db2temp

4. Un-tar (extract) the DB2 installer file, following the instructions supplied at the repository from which you download the image, which might invole running the tar or gunzip commands, or a combination of both. For example:

```
tar -xvf v9.5fp3a_aix64_ese.tar
```

5. Change to the installation directory, which you extracted from the image. For example:

cd /db2temp/ese

#### Beginning the installation

1. At the command prompt on the host, execute the command line installer:

./db2\_install

2. The installer is started, requesting you either to select the default installation directory, or optionally, you can choose another directory, as shown in Figure 4-1. We choose **No**.



Figure 4-1 Select directory

3. Select the product to install, ESE (DB2 Enterprise Server Edition) as shown in Figure 4-2.

```
Specify one of the following keywords to install DB2 products.

ESE

CLIENT

RTCL

Enter "help" to redisplay product names.

Enter "quit" to exit.
```

Figure 4-2 Select product

4. Figure 4-3 shows the DB2 installation being initiated and informs you of the estimated time to perform all tasks.

₽ 9.12.5.35 - PuTTY	
DB2 installation is being initialized.	
Total number of tasks to be performed: 43	
Total estimated time for all tasks to be performed: 2116	
Task #1 start	
Description: Checking license agreement acceptance	
Estimated time 1 second(s)	
lask #1 end	
Tesk #2 start	
Description: Base Client Support for installation with root privileges	
Estimated time 3 second(s)	
Task #2 end	
Task #3 start	
Description: Product Messages - English	
Estimated time 11 second(s)	
Task #3 end	
Tools #4 stort	
Description: Base client support	
Estimated time 198 second(s)	
	-

Figure 4-3 DB2 ESE installation progress

5. The Installation Summary eventually is displayed and indicates a successful installation.

#### **Configuring the DB2 environment**

When configuring the users and groups required for the DB2 environment, refer to the information in the Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31.

1. Create users and groups for use with DB2; from the host command line, type:

```
mkgroup id=999 db2iadm1
mkgroup id=998 db2fadm1
mkgroup id=997 dasadm1
mkuser id=1004 pgrp=db2iadm1 groups=db2iadm1 home=/home/db2inst1 db2inst1
mkuser id=1003 pgrp=db2fadm1 groups=db2fadm1 home=/home/db2fenc1 db2fenc1
mkuser id=1002 pgrp=dasadm1 groups=dasadm1 home=/home/dasusr1 dasusr1
```

2. Verify the owner of the directories. Do this by typing 1s -1d against the directories as seen in Figure 4-4; the directory owners are displayed as defined in Step 1.

```
      9.12.5.35 - PuTTY

      drwxr-xr-x
      2 db2inst1 db2iadm1
      256 Apr 29 18:09 /home/db2inst1

      # 1s -1d /home/db2fenc1

      drwxr-xr-x
      2 db2fenc1 db2fadm1
      256 Apr 29 18:09 /home/db2fenc1

      # 1s -1d /home/dasusr1

      drwxr-xr-x
      2 dasusr1 dasadm1
      256 Apr 29 18:09 /home/dasusr1
```

Figure 4-4 Verify directory owners

3. Set the DB2 user passwords:

passwd db2inst1

You are required to enter the password twice for verification, this presents the password that you want to use for the *DB2 instance*.

passwd db2fenc1

You are required to enter the password twice for verification, this presents the password that you want to use for the *fenced user*.

```
passwd dasusr1
```

You are required to enter the password twice for verification, this presents the password that you want to use for the *DB2 administration server (DAS) user*.

4. Add authentication attributes to the users:

```
pwdadm -f NOCHECK db2inst1
pwdadm -f NOCHECK db2fenc1
pwdadm -f NOCHECK dasusr1
```

5. Change group db2iadm1 to include the root user:

chgroup users=db2inst1,root db2iadm1

6. Create a DB2 Administration Server (DAS):

/opt/IBM/db2/V9.5/instance/dascrt -u dasusr1

As shown in Figure 4-5, you ought to see a message indicating that the program completed successfully.



Figure 4-5 Create DAS server

7. Create a DB2 instance:

/opt/IBM/db2/V9.5/instance/db2icrt -a server -u db2fenc1 db2inst1

As shown in Figure 4-6, you ought to see a message indicating that the program completed successfully.



Figure 4-6 Create DB2 instance

Source the instance profile:

. /home/db2inst1/sqllib/db2profile

Note: There is a space between . and /home.

 Optional: Change the default location for database repositories. By default, this location is /home/db2inst1.

Note: /home is usually not large enough for database repositories. Choose a file system with enough free space to contain the IBM Tivoli Storage Productivity repository.

In our case, we use the default repository location.

To change the default location, complete the following steps:

- a. Type **db2 update dbm cfg using DFTDBPATH** *<new repository path>* **IMMEDIATE,** where *<new repository path>* represents the new location for the repository.
- b. Type **chown** -**R db2inst1:db2iadm1** <*new repository path*> to assign ownership to db2inst1 and permission to anyone in db2iadm1.
- 9. Configure DB2 communication:
  - a. Edit /etc/services and verify or add the following line at the end of the file:

db2c db2inst1 50000/tcp

- b. Type db2 update dbm cfg using svcename db2c\_db2inst1
- c. Type db2set DB2COMM=tcpip

10.Add the DB2 license:

- a. Type cd /opt/IBM/db2/V9.5/adm
- b. Type

./db2licm -a <*DB2* installer location>/db2/ese/disk1/db2/license/db2ese\_o.lic

Here, <DB2 installer location> represents the directory where the DB2 installer is located.

- 11. Restart DB2, as shown in Figure 4-7.
  - a. Type db2stop force
  - b. Type db2 terminate
  - c. Type db2start

🛃 9.12.5.35 - PuTTY			
# db2stop force			·
04/29/2009 22:19:27	0 0 SQL1032N	No start database manag	er command was
issued.			
SQL1032N No start data	base manager comma	nd was issued. SQLSTATE	=57019
# db2 terminate			
DB20000I The TERMINATE	command completed	successfully.	
# db2start			
04/29/2009 22:19:49	0 0 SQL1063N	DB2START processing was	successful.
SQL1063N DB2START proc	essing was success	ful.	
#			•
Figure 4.7 Postart DP2			

Figure 4-7 Restart DB2

#### Verifying that DB2 is installed correctly

The general steps to verify that DB2 has been installed properly are as follows:

- 1. Create the SAMPLE database.
- Connect to the SAMPLE database.
- 3. Run a query against the SAMPLE database.
- 4. Drop the SAMPLE database.

To verify that DB2 has been installed successfully, complete the following steps:

 Change to the instance owner user ID by using the su command. For example, if your instance owner user ID is db2inst1, type the following command at the host command prompt:

```
su - db2inst1
```

- 2. Start the database manager by entering the **db2start** command.
- 3. Enter the db2samp1 command to create the SAMPLE database.

**Note:** There is no completion message. When the command prompt returns, the process is complete.

4. Enter the following DB2 commands from a DB2 command window to connect to the SAMPLE database, retrieve a list of all the employees that work in Department 20, and reset the database connection. You can see the results of step 3 and step 4 in Figure 4-8:

```
db2 connect to sample
db2 "select * from staff where dept=20"
db2 connect reset
```

```
🛃 9.12.5.35 - PuTTY
                                                                                                          - 🗆 ×
  $ db2samp1
     Creating database "SAMPLE"...
     Connecting to database "SAMPLE"...
     Creating tables and data in schema "DB2INST1"...
     'db2sampl' processing complete.
  $ db2 connect to sample
      Database Connection Information
   Database server = DB2/AIX64 9.5.3
   SQL authorization ID = DB2INST1
   Local database alias = SAMPLE
  $ db2 "select * from staff where dept = 20"
                       DEPT JOB YEARS SALARY COMM
  ID
        NAME
   ----- ------

        10 Sanders
        20 Mgr
        7
        98357.50
        -

        20 Pernal
        20 Sales
        8
        78171.25
        612.45

        80 James
        20 Clerk
        -
        43504.60
        128.20

        190 Sneider
        20 Clerk
        8
        34252.75
        126.50

    4 record(s) selected.
  $ db2 connect reset
  DB200001 The SQL command completed successfully.
  $
Figure 4-8 Verify DB2
```

5. If all steps completed successfully, you can remove the SAMPLE database. Enter the command **db2 drop database sample** to drop the SAMPLE database.

#### 4.3.2 Agent Manager installation using 64-bit DB2 instance: Console install

The Agent Manager is required only if you are installing the Data agents and Fabric agents.

Agent Manager is optional. If you decide at a later stage to install Agent Manager, you can do so, however you will then be required to register the Device Server and Data Server with the Agent Manager before installing Data agents and Fabric agents.

When you install a new version of Agent Manager on your system, you will be installing version 1.3.2.

Agent Manager requires a DB2 database repository. You can install Agent Manager using a 32-bit DB2 instance or a 64-bit DB2 instance. To determine the level of DB2 you have, run the **db21eve1** command.

In this example, we will be installing Agent Manager using a 64-bit DB2 instance.

#### Preparing DB2 database for use with Agent Manager

Follow these steps to prepare the DB2 database:

- 1. Ensure that you are logged in as root on the Agent Manager host.
- 2. Set the environment variables for the database instance (source db2profile):
  - . /home/db2inst1/sqllib/db2profile

3. You must enable TCP/IP communications to be able to install Agent Manager with a 64-bit DB2 instance. Run the **db2set** command to check for the DB2COMM variable; the correct value returned is tcpip, as seen in Figure 4-9.



Figure 4-9 TCP/IP Communication

- 4. Configure the database on the DB2 instance:
  - a. Open a db2 prompt by typing **db2** in the shell command prompt, as shown in Figure 4-10.



Figure 4-10 DB2 prompt

 b. Create this database object without any schema. Use the following command: db2 =>CREATE DATABASE <DATABASE\_NAME> USING CODESET UTF-8 TERRITORY US Here, <DATABASE\_NAME> is the name of the database that is created, as shown in Figure 4-11.

**Note:** We use the default database name, which is IBMCDB. We recommend using the default name, however, you can make it whatever you prefer, keeping in mind that it must not exceed 8 characters.



Figure 4-11 Create database

c. For DB2 V9.1 or V9.5, you are required to run the following command, which updates certain parameters on the database to the recommend values:

```
db2 =>UPDATE DATABASE CONFIGURATION FOR <DATABASE NAME> USING
DBHEAP 8192
APPLHEAPSZ 4096
APP CTL HEAP SZ 512
STMTHEAP 32768
PCKCACHESZ 2000
CATALOGCACHE SZ 360
LOGBUFSZ 800
UTIL_HEAP_SZ 10000
STAT HEAP SZ 6000
MINCOMMIT 1
NUM_IOCLEANERS 1
NUM IOSERVERS 3
MAXAPPLS 120
AVG_APPLS 5
NUM_DB_BACKUPS 30
LOGPRIMARY 6
LOGSECOND 50
LOGFILSIZ 1024
```

Here, <DATABASE\_NAME> is the name of the database which is created, as shown in Figure 4-12.

💤 9.12.5.35 - PuTTY	_ 🗆 ×
db2 =>	
db2 => UPDATE DATABASE CONFIGURATION FOR IBMCDB USING DBHEAP 8192 APPLHEAPS:	Z 409
6 APP_CTL_HEAP_SZ 512 STMTHEAP 32768 PCKCACHESZ 2000 CATALOGCACHE_SZ 360 LOC	GBUFS
Z 800 UTIL_HEAP_SZ 10000 STAT_HEAP_SZ 6000 MINCOMMIT 1 NUM_IOCLEANERS 1 NUM	IOSE
RVERS 3 MAXAPPLS 120 AVG_APPLS 5 LOGPRIMARY 6 LOGSECOND 50 LOGFILSIZ 1024	
DB200001 The UPDATE DATABASE CONFIGURATION command completed successfully.	
db2 =>	•

Figure 4-12 Update DB2 database parameters

d. Check if the database was created by running the command shown in Figure 4-13:

db2 =>list db directory

🛃 9.12.5.35 - PuTTY		'×
db2 => list db directory		
System Database Directory		
Number of entries in the directory =	2	
Database 1 entry:		
Database alias	= IBMCDB	
Database name	= IBMCDB	
Local database directory	= /home/db2inst1	
Database release level	= c.00	
Comment	=	
Directory entry type	= Indirect	
Catalog database partition number	= 0	
Alternate server hostname	=	
Alternate server port number	=	-

Figure 4-13 Verify creation of database

e. Type **QUIT** at the command prompt to exit DB2 interactive mode.

#### To access the installation media using the CD:

1. Create a mount point or choose an existing mount point. To create a mount point called /cdrom, we enter the following command:

mkdir /cdrom

Insert the CD into the CD-ROM. Mount the CD-ROM file system at the desired mount point.

On AIX, you can use the **crfs** command to add an entry to /etc/filesystems for the mount point. Run the following command to achieve this:

```
/usr/sbin/crfs -v cdrfs -p ro -d'cd0' -m'/cdrom' -A'no'
mount /cdrom
```

The crfs command only has to be run once for a given mount point, and after that you can use mount and umount for each CD or DVD you put in the drive.

3. Change to the directory where the CD-ROM is mounted:

cd /cdrom

#### To access the installation media using a downloaded image:

1. Create a temporary directory (for example, temp) to hold the Agent Manager installer tar file and untarred files. These files require 2 GB of hard drive space.

mkdir /temp

- 2. Copy or download the Agent Manager installer into the temp directory.
- 3. Change to the directory where you have stored the image, for example:

cd /temp

4. Un-tar (extract) the Agent Manager installer file, following the instructions supplied at the repository from which you download the image, which might involve running the tar or gunzip commands, or a combination of both. For example:

tar -xvf AgentManagerEmbeddedWS\_AIX.tar

- 5. Change to the installation directory, which you extracted from the image. For example:
  - cd /temp/EmbeddedInstaller

#### Beginning the installation

Follow these steps:

1. To start the Agent Manager installation program, run the command shown in Figure 4-14:

```
setupAix.bin -console
```

🛃 9.12.5.35 - PuTTY	
amInstall.rsp	license_pl.txt
application.properties	license_pt_BR.txt
license.txt	license_tr.txt
license_cs.txt	license_zh.txt
license_de.txt	license_zh_TW.txt
license_en.txt	setup.jar
license_es.txt	setuplix.bin
license_fr.txt	stderr.log
license_it.txt	stdout.log
# ./setupAix.bin -console	
InstallShield Wizard	
Initializing InstallShield W	izard
Searching for Java(tm) Virtu	al Machine
<u>.</u>	

Figure 4-14 Start installation program

2. Choose the runtime container that you want to use for the Agent Manager. You are required to select to install the embedded version, as seen in Figure 4-15.

Attention: You have the option to choose an existing WebSphere Application Server, however, this option is not supported. *Do Not* select this option.

	_
■ 9.12.5.35 - PuTY	×
Choose the runtime container for the Agent Manager: [ ] 1 - The embedded version of the IBM WebSphere Application Server delivered	<b>_</b>
with the Agent Manager installer. [X] 2 - The Websphere Application Server. Make sure that the WebSphere Application Server is already installed.	
To select an item enter its number, or O when you are finished: [O] 1	
<ul> <li>[X] 1 - The embedded version of the IBM WebSphere Application Server delivered with the Agent Manager installer.</li> <li>[] 2 - The Websphere Application Server. Make sure that the WebSphere Application Server is already installed.</li> </ul>	
To select an item enter its number, or O when you are finished: [O]	•

Figure 4-15 Select runtime container

3. Type the directory name or accept the default directory where you want to install the Agent Manager software. Keeping in mind that this location requires sufficient space, we choose the default as shown in Figure 4-16.

Figure 4-16 Choose installation directory

4. Choose the type and location of the Database for the Registry; we choose a 64-bit DB2 local database as shown in Figure 4-17.

₽.12.5.35 - PuTTY	
[] 4 - Oracle database on this computer	
[] 5 - Oracle database on another computer (using Oracle Database Client)	
[] 6 - Derby database on this computer	
To select an item enter its number, or O when you are finished: [O] 2	
[] 1 - 32-bit DB2 local database	
[X] 2 - 64-bit DB2 local database or DB2 remote database (without DB2	
Administrator Client)	
[] 3 - Local alias to a DB2 database on another computer (using DB2	
Administration Client)	
[] 4 - Oracle database on this computer	
[] 5 - Oracle database on another computer (using Oracle Database Client)	
[] 6 - Derby database on this computer	
	_
To select an item enter its number, or O when you are finished: [O]	•
To select an item enter its number, or o when you are infished. [o]	

Figure 4-17 Choose type and location of the Database for the Registry

5. Enter the required DB2 database connection information as prompted by the installer and shown in Figure 4-18. Ensure that you enter the correct information here.

We choose the defaults for the Host Name, Database Port, and Database Name. You will need to make changes where applicable if necessary.

The location of DB2 Universal Database Type 4 Drivers for JDBC<sup>™</sup> is the location where DB2 is installed.



Figure 4-18 DB2 database connection information

6. A message is displayed as seen in Figure 4-19; this is for informational purposes. This message is only applicable if you have chosen to use a remote DB2 database. Click **Next** and continue.

🛃 9.12.5.35 - PuTTY	_ 🗆 🗡
Database Port [50000]	-
Database Name [IBMCDB]	
Location of DB2 Universal Database Type 4 Drivers for JDBC [/data/db2users/db2inst1/sqllib]/home/db2inst1/sqllib	
Because you are not using the DB2 Administration Client to connect to the remote database, the database must be preconfigured on the remote system be you continue. For instructions for preconfiguring the database, see the age manager documentation about configuring a remote registry.	fore
Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]	•

Figure 4-19 Informational message

7. Enter the required DB2 user information as seen in Figure 4-20. This is the user ID created when installing DB2 with the correct DB2ADMNS rights.

```
      Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]

      Database User Information

      Specify the user ID and password for accessing the database

      Database Runtime User ID [db2admin] db2inst1

      Password:

      [] 1 - Use a different user ID during the installation

      To select an item enter its number, or 0 when you are finished: [0]
```

Figure 4-20 DB2 user information

You have the option of using another user ID for installation of Agent Manager; in our example we choose this option as seen in Figure 4-21. We have chosen to use the same user ID and password entered in the previous step.

🚰 9.12.5.35 - PuTTY	_ 🗆 🗙
[] 1 - Use a different user ID during the installation	<b></b>
To select an item enter its number, or O when you are finished: [O] 1	
[X] 1 - Use a different user ID during the installation	
To select an item enter its number, or O when you are finished: [O]	
Specify a separate user ID for installing the agent manager. This user mu have the authority to create a database and tables. This lets you limit t authority you give the runtime user ID because it does not need the author to create objects.	lst :he prity
Database Administrator User ID [db2admin]	•

Figure 4-21 Specify separate user ID for installation

8. Enter the connection information for the WebSphere Application Server as seen in Figure 4-22.

**Note:** If you specify a host name, use the fully qualified host name. For example, specify **azov.itsosj.sanjose.ibm.com**. This value is used for URLs for all Agent Manager services. We recommend that you use the fully qualified host name rather than an IP address.

🛃 9.12.5.35 - PuTTY 📃 🗖 🗙
(Apr 30, 2009 2:30:20 PM), AM_Install, com.installshield.wizardx.conditions.Plat 🔺
formWizardBeanCondition, dbg.platform, condition platform: name="Windows .*" ver
sion="." arch="."
websphere approaction server connection information
Host Name or Alias of Agent Manager [virtc535.itso.ibm.com] azov.itsosj.sanjose.
ibm.com
<small>Tip: This is the network name that common agents and resource managers</small>
use to connect to the agent manager. Use a host name that can be resolved by
those systems. For example, use a network alias such as AgentManagerServer or a
tully qualified host name such as agman.mycompany.com.
Degrigeration Port [0511]

Figure 4-22 WebSphere Application Server connection information

Accept the default ports and continue to next step.

9. Next, in this step, we choose to accept the default, which is port 80 that will be used for the agent recovery service as seen in Figure 4-23, if you are not sure if port 80 is being used by another application, you can issue the command **netstat** -a -n, and look for port 80 in the listening state.



Figure 4-23 Choose port for the agent recovery service

10. Accept the defaults for the following prompts: Application Server Name, Context Root of Application Server, and Automatically start the agent manager each time the system restarts, as shown in Figure 4-24.



Figure 4-24 Application Server information

11. The Security Certificates step as seen in Figure 4-25 lets you choose whether you want to use the demonstration certificates or create your own certificates for this installation. *We highly recommend that you generate new certificates for a secure environment.* We choose to generate new certificates.

🛃 9.12.5.35 - PuTTY	
ASInput, dbg, Invoking AMVariables.setValidationSuccess(true)	
Security Certificates	
Do you want to create certificates that are specific to this installation of	
the agent manager, or use the demonstration certificates?	
<pre>[X] 1 - Create certificates for this installation [ ] 2 - Use the demonstration certificates</pre>	
To select an item enter its number, or O when you are finished: [O]	
Demonstration certificates are publicly available and do not provide the level	
of security required by a typical IT environment. They are provided for testing	•
or demonstration environments only.	
Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]	•

Figure 4-25 Security Certificates

12. Define the Certificate Authority, as seen in Figure 4-26.

**Note:** We recommend that you specify a password so that you can view the certificate files at a later stage if you experience problems. If you do not specify a password, you will not be able to view the certificate files.

```
Define the Certificate Authority
Certificate Authority Name [TivoliAgentManagerCA]
Security Domain [itso.ibm.com] ibm.com
Certificate Authority Password
<small>This password locks the certificate authority truststore. The CA
password is typically used only by the agent manager. If your security
policies do not require you to examine the contents of the CA truststore you
can leave this field blank to generate a randomized password.
```

Figure 4-26 Certificate Authority

13. Enter the passwords required:

a. Agent Manager Password:

This is the resource manager registration password. This password is used to register the Data Server or Device Server with the Agent Manager. Enter the password twice; see Figure 4-27.

Write this password down so that you can provide the proper password when you install the Tivoli Storage Productivity Center server.

Note: The default password is *password*.

At the time of writing this book, entering a password other than *password* will not work. The Agent Manager will revert back to using the default password, so ensure that you enter the default password when installing the Device and Data Server.

📲 9.12.5.35 - PuTTY	IX			
ertSettings, dbg, Invoking AMVariables.setCertificateAuthorityPassword(********) (Apr 30, 2009 2:46:38 PM), AM_Install, com.tivoli.cas.install.manager.AMValidate ertSettings, dbg, Invoking AMVariables.setSecurityDomain(ibm.com) (Apr 30, 2009 2:46:38 PM), AM_Install, com.tivoli.cas.install.manager.AMValidate ertSettings, dbg, Invoking AMVariables.setValidationSuccess(true)	£C 2: 2:			
Set Passwords				
Agent Manager Password				
<small>This password locks the agent manager truststore file (AgentManagerTrust.jks) and keystore file (agentManagerKeys.jks). This password is used internally by the agent manager. </small>				
Password:				
Confirm Deseword	Ţ			
Confirm Password:	•			

Figure 4-27 Agent Manager password

b. Agent Registration Password:

This is the password used to register the Common Agents (for Fabric agent and Data agent). You must supply this password when you install the agents. This password locks the agentTrust.jks file. Enter the password twice; see Figure 4-28.

Write this password down so that you can provide the proper password when you install the agents.

**Note:** The default password for this was *changeMe* in Agent Manager 1.2. In Agent Manager 1.3.2, a default password is no longer supplied.

🔮 9.12.5.35 - PuTTY	×
Password:	
Confirm Password:	
Agent Registration Password	
<pre><small>A common agent must provide this password to register with the agent manager. This password also locks the agentTrust.jks truststore file. A common agent or resource manager compares the certificate in its copy of the agentTrust.jks file with the certificate presented by the agent manager to make sure that it registers with the correct agent manager. This password is required to install a common agent or a resource manager.</small></pre>	
Passwuru:	
Confirm Password:	•

Figure 4-28 Agent Registration password

14. The User Input Summary is displayed as seen in Figure 4-29. Review the information that you have defined for the Agent Manager installation. If you are in agreement that all the information entered is correct, you can proceed; type 1 and press Enter to continue.

🖧 9.12.5.35 - PuTTY	
Installation location: /opt/IBM/AgentManager	<b></b>
Type and Location of the Database for the Registry: DB2 Universal Database	
Type of database connection: Remote database	
Database Name: IBMCDB	
Database Software Directory: /home/db2inst1/sqllib	
Database Runtime User ID: db2inst1	
Use a different user ID during the installation: true	
Database Administrator User ID: db2inst1	
Host Name of DB2 Universal Database Server: localhost	
Database Port: 50000	
WebSphere Application Server Cell Name: AgentManagerCell	
WebSphere Application Server Node Name: AgentManagerNode	
WebSphere Application Server Profile Directory:	
/opt/IBM/AgentManager/AppServer/agentmanager	
WebSphere Application Server Installation Directory:	
/opt/IBM/AgentManager/AppServer	
Registration Port: 9511	
Secure Port: 9512	
Public Port and Alternate Port for the Agent Recovery Service: 9513	
Press ENTER to read the text [Type q to quit]	•

Figure 4-29 User Input Summary

15. You will see several installing panels displayed for Embedded WebSphere; see Figure 4-30. Wait for the installation to complete, then press Enter.

🛃 9.12.5.35 - PuTTY 📃 🗖 🗙				
ddedWAS, dbg, Executing "tar -xf /st8d10/AgentManager/EmbeddedInstaller/EmbeddedE 🔺				
xpress_aix_ppc.tar" in directory /tmp/AppServer				
(Apr 30, 2009 2:53:53 PM), AM_Install, com.tivoli.cas.install.manager.InstallEmbe				
(Area 20, 2000 2.52, 52, 54, Ar Tratell, are tively restants)				
(Apr 30, 2009 2:53:53 PM), An Install, com. tivoll.cas.install.manager.installembe				
ddedwAS, dbg, installimbeddedwAS.unpackArchive run install script				
(Apr 30, 2009 2:53:53 PM), AM_Install, com.tivoli.cas.install.manager.InstallEmbe				
ddedWAS, dbg, Executing "/tmp/AppServer/install.sh -installRoot /opt/IBM/AgentMan				
ager/AppServer"				
(Apr 30, 2009 2:55:49 PM), AM Install, com.tivoli.cas.install.manager.InstallEmbe				
ddedWAS, dbg, ++				
+ WEAS Version 6.1 Install +				
++				
Validating target directory				
Conving files				
Copying remains				
Tetellig permissions				
Installation complete.				
(Apr 30, 2009 2:55:49 PM), AM_Install, com.tivoli.cas.install.manager.InstallEmbe				
ddedWAS, dbg, InstallEmbeddedWAS.unpackArchive run install script returned 0				

Figure 4-30 Progress panel for Embedded WebSphere

16.After the Embedded WebSphere has been installed and configured, you will see the summary information panel for Agent Manager (Figure 4-31). Press Enter to proceed.



Figure 4-31 Summary information for Agent Manager

Progress panels will be displayed as seen in Figure 4-32.

```
🛃 9.12.5.35 - PuTTY
                                                                           (Apr 30, 2009 2:58:45 PM), AM_Install, com.installshield.product.actions.Uninstal 📥
lerJVMResolution, dbg.jvm, resolved to the current jvm file: null with JVM HOME =
null
|-----|-----|-----|
                                75%
0%
         25%
                 50%
                                           100%
||||||||(Apr 30, 2009 2:58:45 PM), AM Install, com.ibm.wizard.platform.aix.AixPr
oductServiceImpl, dbg.install, JVM memory before installing Add Required Bytes (R
equiredBytesUnix): free=3605536 total=10109952
(Apr 30, 2009 2:58:45 PM), AM Install, com.ibm.wizard.platform.aix.AixProductServ
iceImpl, msg1, installing Add Required Bytes (RequiredBytesUnix)
(Apr 30, 2009 2:58:45 PM), AM_Install, com.ibm.wizard.platform.aix.AixProductServ
iceImpl, dbg.install, JVM memory after installing Add Required Bytes (RequiredByt
esUnix): free=3605256 total=10109952
(Apr 30, 2009 2:58:45 PM), AM Install, com.ibm.wizard.platform.aix.AixProductServ
iceImpl, dbg.install, JVM memory before installing Files (AM FilesUnix): free=360
5256 total=10109952
(Apr 30, 2009 2:58:45 PM), AM Install, com.ibm.wizard.platform.aix.AixProductServ
iceImpl, msg1, installing Files (AM_FilesUnix)
```

Figure 4-32 Agent Manager Progress Panel

17. The prompt, Start the Agent Manager Application Server? is displayed. Select **Yes** to start the Agent Manager and press Enter, as shown in Figure 4-33.



Figure 4-33 Start Agent Manager Application Server

 You ought to see the message shown in Figure 4-34 if the Agent Manager installed successfully.



- 19.Press Enter to finish installation.
- 20.At the end of the installation, the Agent Manager starts automatically. Run the **HealthCheck** command to verify that the Agent Manager is running. This command is located in <directory>/toolkit/bin where <directory> is the location where Agent Manager is installed. An example shown in Figure 4-35.

🛃 9.12.5.35 - PuTTY					
# pwd					
/opt/IBM/AgentManager/toolkit/bin					
# 1s					
EncryptDBPassword.sh	PurgeAgents.sh	backupTool.sh			
HealthCheck.sh	RelocationTool.sh	db_info.cfg			
LogCollector.sh	RetrieveAgents.sh	_			
LogicallyDeleteAgents.sh	WSRetrieveAgents.sh				
# ./HealthCheck.sh -registrationPw itso13sj					
Tool Launcher is trying to instantiate Command line tool com.tivoli.cas.manager.					
ools.HealthCheck					
Command Line Tool com.tivoli.cas.manager.tools.HealthCheck succesfully instantia					
ied.					
Apr 30, 2009 3:40:03 PM P	DT Arguments passed	to Command Line Tool: -HOST local			
ost -registrationPw itso13sj					
Apr 30, 2009 3:40:06 PM P	DT Initializing conf	iguration with file:/opt/IBM/Agent			
anager/toolkit/bin/config/endpoint.properties					
Apr 30, 2009 3:40:07 PM c	om.tivoli.agentmgr.cl	ient.proxy.WSDLClient\$AddressCache			
tem tryConnect					
INFO: NOTE ==>Connected to host=localhost on port=9513					
Apr 30, 2009 3:40:07 PM com.tivoli.agentmgr.client.proxy.WSDLClient\$AddressCache					
tem directConnect		<b>•</b>			

Figure 4-35 HealthCheck command
Verify that the HealthCheck passed, as shown in Figure 4-36.

🛃 9.12.5.35 - PuTTY	
Query.Agent.Max.Return	= -1
Query.Database.Type	= db2
ARS.version	= 1.3.2.30
Key.Algorithm.Name	= RSA
Config.Listener.Manager	<pre>= com.tivoli.agentmgr.spi.providers.</pre>
akeAgentRegistryUpdate, com.tivoli.agentmgr	.cert.AgentStatusChangeListener
Config.Listener.Agent	<pre>= com.tivoli.agentmgr.spi.providers.</pre>
akeAgentRegistryUpdate	
Registration.Listeners.Manager.Request	<pre>= com.tivoli.agentmgr.registration.A</pre>
thorizationValidator, com.tivoli.agentmgr.r	egistration.AuthorizationTestOnly, co
.tivoli.agentmgr.registration.AgentReregist	rationTest
Registration.Listeners.Manager.Issue	<pre>= com.tivoli.agentmgr.registration.S</pre>
oreCertificateListener	
Registration.Listeners.Agent.Request	= com.tivoli.agentmgr.registration.S
mplePWRequestValidator, com.tivoli.agentmgr	.registration.AuthorizationTestOnly,
om.tivoli.agentmgr.registration.AgentReregi:	strationTest
Registration.Listeners.Agent.Issue	= com.tivoli.agentmgr.registration.S
oreCertificateListener	
Apr 30, 2009 3:40:09 PM PDT Health Check pa	assed.
Apr 30, 2009 3:40:09 PM PDT Command Line To	ool execution successful.
#	<b>•</b>

Figure 4-36 Verify HealthCheck passed

We are now complete with the prerequisite software installations.

# 4.4 Installing Tivoli Storage Productivity Center components

Now that all the prerequisites have been installed, we can install the Tivoli Storage Productivity Center components.

Before you begin the installation, consider the following requirements:

- Confirm that the correct versions of DB2 and Agent Manager are installed on your system.
- ► User IDs that will be required during the installation have been documented for reference.
- If you are planning to use LDAP, ensure that you have all the correct information; see the LDAP section. Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31 for LDAP planning considerations.
- Make sure that DB2 is up and running.

We will split the installation into two parts. First, we install the Database Schema. Second, we install the remaining components, including Data Server, Device Server, local Data agents and Fabric agents, Tivoli Integrated Portal, and Tivoli Storage Productivity Center for Replication.

**Note:** It is optional to install the Data and Fabric agents. Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31 for agent considerations.

### Accessing the installation media using the CD

Follow these steps:

1. Create a mount point or choose an existing mount point. To create a mount point called /cdrom, we enter the following command:

mkdir /cdrom

Insert the CD into the CD-ROM. Mount the CD-ROM file system at the desired mount point.

On AIX, you can use the **crfs** command to add an entry to /etc/filesystems for the mount point. Run the following command to achieve this:

/usr/sbin/crfs -v cdrfs -p ro -d'cd0' -m'/cdrom' -A'no'
mount /cdrom

The **crfs** command only has to be run once for a given mount point, and after that you can use **mount** and **umount** for each CD or DVD that you put in the drive.

3. Change to the directory where the CD-ROM is mounted:

cd /cdrom

#### Accessing the installation media using a downloaded image

Follow these steps:

 Create a temporary directory (for example, temp) to hold the Tivoli Storage Productivity Center installer tar files and untarred files. These files require 3 GB to 4 GB of hard drive space.

mkdir /temp

- 2. Copy or download the Tivoli Storage Productivity Center installer into temp.
- 3. Change to the directory where you have stored the image, for example:

cd /temp

4. Un-tar (extract) the Tivoli Storage Productivity Center installer file, following the instructions supplied at the repository from which you download the image, which might involve running the **tar** or **gunzip** commands, or a combination of both. For example:

```
tar -xvf TPC_4.1.0.97_SE_aix_disk1_part1.tar
```

Be sure to untar both parts for disk1.

5. Change to the installation directory, which you extracted from the image. For example: cd /temp

#### Preparing the display

If you are installing from a remote terminal session, you must set up an X-Windows display or a Virtual Networking Computing (VNC) Viewer connection prior to beginning the installation process.

If you decide to use X-Windows server, you first need to start your local X-Windows server application. Examples are Hummingbird Exceed or Cygwin. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621 for more information.

If you decide to use VNC Viewer, you first need to start the VNC Server on the AIX server, set up a connection password, and then start the local VNC Viewer.

When launching the Tivoli Storage Productivity Center setup as shown in step 3 on page 206, you might find that the graphical interface fails to launch.

InstallShield will show launching as seen in Figure 4-37, and eventually return to the command prompt; in our case this was caused by missing font packages within Cygwin.



Figure 4-37 InstallShield

To check the logs, cd to the /tmp directory where you will find for example a folder named "istemp180486124151244", cd into this folder and view the "APP\_STDERR" file, you can see the output as shown in Figure 4-38. This indicates an error relating to the fonts.

🛃 9.12.5.35 - PuTTY
skipping
Warning: Cannot convert string "-*-lucida-medium-r-*-*-*-*-*-*-**-iso8859-1" to
type FontStruct
The installer is unable to run in graphical mode. Try running the installer with
the -console or -silent flag.
Exception in thread "main" java.lang.UnsatisfiedLinkError: nativeDeleteFilesAfte
rExit
at com.ibm.wizard.platform.aix.AixSystemUtilServiceImpl.deleteFilesAfter
Exit(AixSystemUtilServiceImpl.java:949)
at com.installshield.wizard.service.system.PureJavaSystemUtilServiceImpl
.deleteLockedFiles(Unknown Source)
at com.installshield.util.FileUtils.deleteTempFiles(Unknown Source)
at com.installshield.wizard.Wizard.startup(Wizard.java:238)
at com.installshield.boot.BootMain.boot(Unknown Source)
at run.main(Unknown Source)
APP_STDERR: END

Figure 4-38 Install error caused by fonts

To solve this problem, you need to install the correct font packages. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621 for more information.

## 4.4.1 Creating the database schema

This topic provides information about how to create the database schema for use with Tivoli Storage Productivity Center.

**Note:** If you are using a remote database for Tivoli Storage Productivity Center, you must install the database schema on that computer after you have installed DB2.

The DB2 database schema name for Tivoli Storage Productivity Center cannot be longer that eight characters.

- 1. Log on to the system with root authority.
- 2. Set up your shell environment to point to the instance where the database repository will be installed, to do this, source the **db2profile** script for the desired instance.

In our case the DB2 instance is db2inst1, so we issue the following command:

. /home/db2inst1/sqllib/db2profile

Note: There is a space between . and /home.

3. Change to the directory where you have extracted the Tivoli Storage Productivity Center software package, then launch the following command:

./setup.sh

4. Tivoli Storage Productivity Center installer is launched, prompting you to select an installation language (Figure 4-39); click **OK** to continue.

X			21	nstalle	2
ard.	for this wiza	be used	language 1	lect a la	Σe
			English		
	icel	<u>C</u> ar	<u>о</u> к		
	cel	<u>C</u> ar	<u>o</u> k		

Figure 4-39 Select language

5. The International Program Licence Agreement is displayed. Click I accept the terms of the licence agreement, and then click Next, as seen in Figure 4-40.

🐹 IBM Tivoli Storage Produ	uctivity Center - Installer	
×	IBM Tivoli Storage Productivity Center V4.1.0.97	
IBM.	International Program License Agreement	
	Part 1 - General Terms	
	BY DOWNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY, YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS,	
	- DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM; AND	
	- PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE PROGRAM, CONTACT THE PARTY FROM WHOM YOU ACQUIRED IT. "IBM" is International Business Machines Corporation or one of its subsidiaries.	
ANTE/AD	⑥ I accept the terms of the license agreement.	
AN ASSA	I do not accept the terms of the license agreement.	
	Next > Cancel	

Figure 4-40 Licence Agreement

The Installation Types panel is displayed (Figure 4-41). Click **Custom installation**. In addition, you can change the TPC Installation Location to suit your requirements; we choose the default location, which is /opt/IBM/TPC. After you have completed this panel, click **Next** to continue.

🐹 IBM Tivoli Storage Proc	luctivity Center - Installer			
	Select the type of installa	ition you want to run		
IBM.	Typical installation This will install the TPC CLI. A new database w database during install	servers, TPC agents, Tivoli Int vill be created, and the schema ation. The database and schei	egrated Portal (TIP), GUI, and a will be created on the a will be reused for upgrade.	
	Servers	Clients		
	Agents	Register with the ag	gent manager	
	Custom installation			
	I his will custom install agents are installed on client to be installed on database and schema	the individual FPC component: other computers. You can chi i this computer. You will have on this computer.	s on this computer. Remote oose any server, agent, or a choice to create the	
1 11 112	Oinstallation licenses			
	/opt/IBM/TPC		TPC Installation Location	
	< Bac	K Next >	Cancel	

Figure 4-41 Custom Installation selection

 The panel, Select one or more components to install on the local or remote computer, is displayed. Remove all check marks except for Create database schema as specified during the DB2 install. See Figure 4-42. Click Next to continue.

🐹 IBM Tivoli Storage Prod	uctivity Center - Installer		
IEM.	Select one or more components to inst This program will install or upgrade v example, if version number 3.1.0.39 means, that the version of the compo this installation, all installed compone software. You can choose to install ad	all on the local or remote computer. arious components displayed below. For is displayed next to the component, this nent is already installed on this computer. In nts will be upgraded to the current version of ditional components which are not installed.	
	Create database schema		
and and and a	Tivoli Storage Productivity Center Servers		
	GUI	□cu	
	Data Agent	Fabric Agent	
11/15	Remote Data Agent	Remote Fabric Agent	
1112	Register with the agent manager		
Stillet -	Register Launch Information With O	ther Applications	
	< Back	Nex*> Cancel	

Figure 4-42 Select "Create database schema" component

7. The Database administrator information panel is displayed. Enter the user ID and password for the DB2 instance owner as seen in Figure 4-43. Click **Next** to continue.

🐹 IBM Tivoli Storage Productivity Center - Installer			
	Database administrator informat	ion	
IBM.	Enter the database administrator user ID and password to connect to the database during installation and uninstallation.		
	Database administrator	db2inst1	
	Password	*******	
	< Back	Next Cance	1

Figure 4-43 Database credentials

- 8. The new database schema information panel is displayed:
  - a. Enter the DB user ID and password and select **Create local database** as seen in Figure 4-44.
  - b. If you click **Database creation details**, you will see the Database schema creation information panel (Figure 4-45). Do not change the default values unless you are a knowledgeable DB2 administrator. Click **Next** to continue.
  - c. Refer to Appendix B, "DB2 table space considerations" on page 637 for the differences between SMS and DMS table spaces.

🐹 IBM Tivoli Storage Prod	luctivity Center - Insta	aller			
	New database schen Enter the database with the instance an	na information information that the pr d creating the required	oduct will use when c I repository tables.	ommunicating	
	DB user ID	db2inst1	Password	******	
	OUse local databas	e			
	Port	Database	Path	Instance	
	50000 50000	SAMPLE IBMCDB	/home/db2inst1 /home/db2inst1	db2inst1 db2inst1	
	OUse remote datak	pase	Database name	PCDB	
	Host name	localhost	Port	50000	
	/home/db2inst1	L/sqllib/java/db2jcc.ja	r	JDBC driver	
. 14 J	🦲 Create local data	base	Database name	PCDB	
1.1.1.2					
1 Na At			Database creation d	letails	
1 N 16997					
	<	Back	Next >	Cancel	

Figure 4-44 Database schema information

🐹 IBM Tivoli Storage Prod	uctivity Center - Installer		
IBM.	Database schema creation in Enter the information to creater remote) computer. Schema name Database Drive Tablespace Normal Key	nformation ate the database schema on the s TPC /home/db2inst1 Container directory /home/db2inst1/db2inst1/TPCC /home/db2inst1/db2inst1/TPCC	Browse 200 MB V Size Browse 200 MB V Browse 200 MB V
	Big Temp Temporary user	/home/db2inst1/db2inst1/TPCE /home/db2inst1/db2inst1/TPCE /home/db2inst1/db2inst1/TPCE	Browse 350 MB ▼ Browse 200 MB ▼ Browse 200 MB ▼
	System managed (SMS)	Database managed Automatic Storage /TPCDB/TPC B <u>r</u> owse Size	1 (DMS)
		K	Cancel

Figure 4-45 Database schema creation

9. The summary information panel is displayed (Figure 4-46). Click **Install** to begin the database schema installation.



Figure 4-46 Summary information

10. The progress panel is displayed, as seen in Figure 4-47.



Figure 4-47 Progress panel

11. When the installation is complete, the installation results panel is displayed (Figure 4-48).



Figure 4-48 Installation results

12.Click Finish to exit the installer.

### Verifying the installation

To check the installation, verify that you have the database named TPCDB. Do this by following these steps:

- 1. Source the db2 profile:
  - . /home/db2inst1/sqllib/db2profile
- 2. Verify the creation of the TPCDB database:

db2 list db directory

3. The command lists the databases that exist, as seen in Figure 4-49.

```
🚰 9.12.5.35 - PuTTY
                                                                         I 🗆 X
# db2 list db directory
System Database Directory
Number of entries in the directory = 2
Database 1 entry:
                                  = IBMCDB
Database alias
Database name
                                  = IBMCDB
Local database directory
                                 = /home/db2inst1
= c.00
Database release level
Comment
                                   = Indirect
Directory entry type
Catalog database partition number = 0
Alternate server hostname
                                    =
Alternate server port number
Database 2 entry:
                                    = TPCDB
Database alias
                                    = TPCDB
Database name
Local database directory
                                   = /home/db2inst1
                                   = c.00
Database release level
Comment
                                   -
                                    = Indirect
Directory entry type
                                  = 0
Catalog database partition number
Alternate server hostname
Alternate server port number
#
```

Figure 4-49 Verify database creation

# 4.4.2 Installing TPC components

After you have completed creating the database schema, you are ready to install the following Tivoli Storage Productivity Center components:

- Data Server
- Device Server
- ► GUI
- ► CLI
- Data agent
- Fabric agent

**Note:** In addition to the components just mentioned, two additional components will be installed by default, namely *Tivoli Integrated Portal* as well as *Tivoli Storage Productivity Center for Replication*.

Follow these steps to complete the installation process:

- 1. Make sure that you are logged in with the root account.
- 2. Source the DB2 instance profile:
  - . /home/db2inst1/sqllib/db2profile
- 3. Change to the directory where you have extracted the Tivoli Storage Productivity Center software package, then launch the following command:

./setup.sh

4. Tivoli Storage Productivity Center installer is launched prompting you to select an installation language (Figure 4-50), click **OK** to continue.



Figure 4-50 Select language

5. The International Program Licence Agreement is displayed, click I accept the terms of the licence agreement, and then click Next, as seen in Figure 4-51.



Figure 4-51 Licence agreement

6. The installation types panel is displayed (Figure 4-52). Click **Custom installation** and then click **Next** to continue.

🐹 IBM Tivoli Storage Proc	ductivity Center - Installer	
	Select the type of installation you want to run	
IBM.	Typical installation This will install the TPC servers, TPC agents, Tivoli Integrated Portal (TIP), GUI, and CLI. A new database will be created, and the schema will be created on the database during installation. The database and schema will be reused for upgrade.	
	Servers Clients	
	Agents Register with the agent manager	
	Custom installation	
	This will custom install the individual TPC components on this computer. Remote agents are installed on other computers. You can choose any server, agent, or client to be installed on this computer. You will have a choice to create the database and schema on this computer.	
1 11 112	Oinstallation licenses	
White	/opt/IBM/TPC TPC Installation Location	
	< Back Next > Cancel	

Figure 4-52 Custom installation

- 7. The panel, Select one or more components to install, is displayed. Select these choices:
  - Tivoli Storage Productivity Center Servers
  - GUI
  - CLI
  - Data agent (optional)
  - Fabric agent (optional)

After you have made the required selections as shown in Figure 4-53, click Next.

💥 IBM Tivoli Storage Prod	luctivity Center - Installer				
¥/	Select one or more components to install	on the local or remote computer.			
IEM.	example, if version number 3.1.0.39 is displayed next to the component, this means, that the version of the component is already installed on this computer. In this installation, all installed components will be upgraded to the current version of software. You can choose to install additional components which are not installed.				
	Create database schema 4.1.0.97				
	✓ Tivoli Storage Productivity Center Servers				
	GUI	<b>√</b> cu			
ALL UNALS	🖌 Data Agent	<b>√</b> Fabric Agent			
11/195	Remote Data Agent	Remote Fabric Agent			
	Register with the agent manager				
A PAR	Register Launch Information With Other Applications				
	r Dostr	Next x			
	< Back				

Figure 4-53 Select components

8. If you are running the TPC installation on a system with at least 4 GB but less than the recommended 8 GB of RAM, a warning message will be displayed as seen in Figure 4-54. To ignore this message and continue with the installation, click **OK**.



Figure 4-54 Memory size warning

**Note:** When attempting to install TPC V4.1 on a system with less than 4 GB, this will result in an error message and the installation will fail.

9. The Database administrator information panel is displayed (Figure 4-55). The DB2 user ID and password are automatically filled in. This is due to the fact that we used it to create the database schema. Click **Next**.

💥 IBM Tivoli Storage Prod	luctivity Center - Installer		
	Database administrator inform	ation	
IBM.	Enter the database administrator user ID and password to connect to the database during installation and uninstallation.		
	Database administrator	db2inst1	
	Password	****	
1 Wash			
1 Nict			
NEL-			
	< Back	Next > Cancel	

Figure 4-55 Database administrator info

10. The database schema panel is displayed (Figure 4-56). You have the option to select a local database or alternatively a remote database to be used by the Data Server and Device Server. We select the **Use local database**, because this is the database schema installed in the previous steps. Click **Next**.

💥 IBM Tivoli Storage Prod	uctivity Center - Insta	iller			
TRM.	Existing database s Enter the informat	chema informatio ion to use an exis	n Iting database schem	na for the repository.	
	DB user ID	db2inst1	Password	*****	
	🕞 Use local databa	ise			
	Port 50000	Database TPCDB T	Schema Ins PC db2in:	tance Version st1 9.5.0.3	
	Use remote data	abase	Port	50000	
	Database name	TPCDB	Schema name	россос трс	
1/1/2	/home/db2inst1	/sqllib/java/db2	jcc.jar	JDBC driver	
KAR					
	<	Back	Next 📐	Cancel	

Figure 4-56 Use local database

- 11. The next panel, shown in Figure 4-57, requires the following inputs:
  - Data Server Name:

Enter the fully-qualified host name of the Data Server.

Data Server Port:

Enter the Data Server port. The default is 9549.

- Device Server Name:

Enter the fully-qualified host name of the Device Server.

- Device Server Port:

Enter the Device Server port. The default is 9550.

- TPC Superuser:

Enter an operating system group name to associate with the TPC superuser role. This group must exist in your operating system before you install Tivoli Storage Productivity Center. Membership in this group provides full access to the Tivoli Storage Productivity Center product. You can assign a user ID to this group on your operating system and start the Tivoli Storage Productivity Center GUI using this user ID.

**Note:** If you select LDAP authentication later in the Tivoli Storage Productivity Center installation, then the value you enter for the LDAP TPC Administrator group overrides the value you entered here for the TPC superuser.

- Host authenticate password:

This is the password used by the Fabric agent to communicate with the Device Server. This password must be specified when you install the Fabric agent.

Data Server Account Password:

This is not required for AIX installations; it is only required for Windows.

WebSphere Application Server Admin ID and Password:

This is the WebSphere administrator user ID and password required by the Device Server to communicate with embedded WebSphere.

In our case, we use the db2inst1 user; you can use the TPC Superuser here. This user will be used for the local Tivoli Integrated Portal administrator ID.

**Note:** If you select LDAP authentication later in the Tivoli Storage Productivity Center installation, then the value you enter for the LDAP TPC Administrator group overrides the value you entered here for the WebSphere Application Server admin ID and password.

**Important:** Ensure that you record all passwords that are used during the installation of TPC.

If you click the **Security roles...** button, the Advanced security roles mapping panel is displayed. You can assign a system group for each TPC role that you want to make an association with; this allows you the flexibility to set up separate authority IDs to perform various TPC operations. The operating group must exist before you can associate a TPC role with a group. You do not have to assign security roles at installation time; you can assign these roles after you have installed TPC.

If you click the NAS discovery... button, the NAS discovery information panel is displayed. You can enter the NAS filer login default user name and password and the SNMP communities to be used for NAS discovery. You do not have to assign the NAS discovery information at installation time, you can configure it after you have installed TPC.

🖞 IBM Tivoli Storage	Productivity Center - Installer	_
	Data server, Device server, Data agent, an	d Agent Information
IBM.	Enter the server name and port that the D to communicate with the server.	Data agent and Fabric agent, and GUI will use
6	Data server name azov.itsosj.sanjo	ose. Data server port 9549
	Device server name azov.itsosj.sanjo	ose. Device server port 9550
	Enter an OS user group whose members v administrators group.	will be TPC administrators in the
	TPC superuser system	Security roles
	Enter a password that the Fabric agents w	vill use to communicate with the Device server.
	Host authentication password	****
1 Walt	Enter a password that will be used to crea	ate the Data Server Account.
11/15/1	Data Server Account Password	
10H	WAS admin ID db2inst1	Password ******
		NAS discovery
		Data agant entians

Figure 4-57 TPC Server and Agent information

- 12. The Agent Manager information panel is displayed (Figure 4-58). Complete the following information:
  - Host name or IP address:

The fully qualified host name or IP address of the Agent Manager server.

- Port (Secured):

The port number of the Agent Manager server. The default is 9511.

Port (Public):

The public communication port. The default is 9513.

- ► Data and Device Server registration information as specified on the Agent Manager:
  - User ID:

This is the resource manager registration user ID. This user ID is used to register the Data Server or the Device Server with the Agent Manager. The default is *manager*.

Password:

This is the resource manager registration password. This password is used to register the Data Server or the Device Server with the Agent Manager. The default is *password*.

**Attention:** At the time of writing this book, if you entered a password other than *password* during the Agent Manager installation, this will not work. The Agent Manager will revert back to using the default password, so ensure that you enter the default password here, or the Device and Data Server installation will fail.

- Common Agent registration password as specified on the Agent Manager:
  - Password:

This is the Common Agent registration password used by the Common Agent to register with the Agent Manager. This was specified when you installed the Agent Manager. The default is *changeMe*.

Click **Next** to continue.

💥 IBM Tivoli Storage Prod	luctivity Center - Installer		
	Agent manager information		
IBM.	Enter the information that the Device server, Data agent, or	product will use to register its Data server, Fabric agent with the agent manager.	
	Hostname or IP address	azov.itsosj. sanjose. ibm. com	
A	Port (Secured)	9511	
	Port (Public)	9513	
	Enter the Data server and Dev on the agent manager.	ice server registration information as specified	
	User ID	manager	
	Password	****	
( Wat	Enter the common agent regis manager.	tration password as specified on the agent	
1 YEAR	Password	*******	
	< Back	Next 💦 Cancel	

Figure 4-58 Agent Manager information

13. Seeing that we have decided to install the Data agent and Fabric agent, we are required to install the Common Agent. We select the directory and port to be used with the new Common Agent, and accept the **defaults** as shown in Figure 4-59.

💥 IBM Tivoli Storage Prod	uctivity Center - Inst	aller			
IBM.	Common agent sele Select the installatio agent already insta	ction on of a new commo Illed on your compt	n agent or choose iter for the Data ag	an existing comm jent and Fabric ag	on ent.
	Install the new point of the new poin	common agent at tl ca 9510	ne location listed b	elow	Browse
	Select an existir	ng common agent fi	Windows service in rom the list below	nfo	
	Port	Version	Location	Data agent	Fabric agent
	*	: Back	Next >		ancel

Figure 4-59 Common Agent selection panel

14. The Tivoli Integrated Portal (TIP) panel is displayed (see Figure 4-60). You can select to install the TIP program or use an existing TIP install.

**Important:** TIP must be installed on the same server as the TPC server. It is important to note that you are limited to one TPC instance per TIP.

TIP will use 10 port numbers starting from the one specified in the Port field (referred to as the Base Port). The 10 ports will be:

- base port+1
- base port+2
- base port+3
- base port+5
- base port+6
- base port+8
- base port+10
- base port+12
- base port+13

The TIP administrator ID and password are pre-filled with the WebSphere Application Server admin ID and password specified during step 11 (Device Server installation).

We have chosen to install the TIP program and not use an existing TIP. You have to specify the installation directory as well as the port to be used; we accept the defaults. Click **Next** to continue.

💥 IBM Tivoli Storage Produ	ctivity Center - Installer		
IBM.	Tivoli Integrated Portal ( TIP provides TPC with th applications in context, an existing TIP install to install TIP.	(TIP) he ability for Single Sign-On authentication, launch other and reports to be viewed from Tivoli Common Reporting. be used with TPC or specify the install directory where Ti o install TIP	Select PC is to
	/opt/IBM/Tivoli/tip	Brow	se
	Port	16310	
	OReuse an existing TIF	P install	
1.1.1.2		Existing TIP Installs:	
1/Viet-			
KE/CH-	TIP Administrator IE	db2inst1	
AN ADDAN	Password	****	
	< Back	Next > Cancel	

Figure 4-60 TIP panel

15. The authentication selection panel is displayed (Figure 4-61). This panel refers to the authentication method that will be used by TPC to authenticate the users.



Figure 4-61 Authentication panel

If you have a valid Tivoli Integrated Portal instance on the system and it uses either OS-based or LDAP-based authentication, then TPC will use that existing authentication method.

Otherwise, select the authentication method to use:

- OS Authentication:

This uses the operating system for user authentication.

- LDAP/Active Directory:

If you select LDAP or Microsoft Active Directory for authentication, you must have an LDAP or Active Directory already installed and set up. For more information about LDAP, refer to Chapter 6, "LDAP authentication support and Single Sign-On" on page 335. Method 1:

Choose OS Authentication, then click Next to continue.

16. The summary information panel is displayed (Figure 4-62). Review the information; at this stage, it is a good idea to check that you have sufficient space in the required file systems as mentioned in the Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31. Click **Install** to continue.

**Note:** Remember that the Replication Server is included in the installation of Tivoli Storage Productivity Center V4.1 by default, as mentioned before.



Figure 4-62 Summary information

17. You will see the installing panel indicating various stages within the installation process, as shown in the following example.

The installation starts with the Data Server installation as seen in Figure 4-63. The installer will proceed through the separate components after the previous component has installed successfully.

**Note:** If the installer fails to install a specific component, the process will stop and the installer will uninstall all components.

💥 IBM Tivoli Storage Product	ivity Center - Installer	
IBM.	Installing Data Server. Please wait Installing Data server	
	6%	
		Cancel

Figure 4-63 Data Server install

The Installing Device Server panel is shown in Figure 4-64. You can see various messages during the Device Server installation process, and when complete, the installer will briefly display the installing panel for the GUI, CLI, and Agents (if selected). When done, the installing TIP panel is displayed as seen in Figure 4-65.

🐹 IBM Tivoli Storage Prod	uctivity Center - Installer	
IBM.	Installing Device Server. Please wait	
	11%	
	Cancel	

Figure 4-64 Device Server installer

🐹 IBM Tivo	oli Storage Productivity Center - I	nstaller	
	Installing	TIP. Please wait Tivoli Integrated Portal 100%	Cancel

Figure 4-65 Tivoli Integrated Portal installing

**Important:** During the installation of Tivoli Integrated Portal on AIX systems, the progress bar incorrectly indicates that the Tivoli Integrated Portal installation is 100% complete even though it is not yet complete. *Continue to wait until the installation is complete*. The installation of Tivoli Integrated Portal can be a time consuming exercise, so be patient.

## **TPC for Replication installation**

After the TIP installation has completed, the TPC for Replication installation is launched. The TPC installation is temporarily suspended in the background, and the TPC for Replication panel is displayed as seen in Figure 4-66.



Figure 4-66 TPC for Replication installation is launched

To install TPC for Replication, we follow steps a through j:

a. The Welcome panel is displayed as seen in Figure 4-66; choose **Next** to continue.

**IMPORTANT:** If you are not planning to use TPC for Replication and you attempt to cancel or bypass the installation, it will result in an interruption in the installation process, which will invoke a complete TPC installation rollback.

b. The System prerequisites check panel is displayed (Figure 4-67). At this stage the wizard will check that the operating system meets all prerequisite requirements as well as having the necessary fix packs installed.

💥 IBM Tivoli Storage Pr	oductivity Center for Replication - InstallShield Wizard
	System prerequisites check
	The Installation wizard checks your system to determine whether a supported operating system is running and whether the operating system is at the appropriate fix pack or update level.
- 11	Checking your system
InstallShield	
	< Back Next > Cancel

Figure 4-67 System check

c. If the system passes the check as seen in Figure 4-68, you can continue by clicking **Next** to continue.

💥 IBM Tivoli Storage I	Productivity Center for Replication - InstallShield Wizard
	System prerequisites check
	The Installation wizard checks your system to determine whether a supported operating system is running and whether the operating system is at the appropriate fix pack or update level.
	Your system has all of the necessary prerequisites for IBM Tivoli Storage Productivity Center for Replication. You may continue.
InstallShield	
	< Back Next > Cancel

Figure 4-68 System check complete

d. Accept the License Agreement as seen in Figure 4-69. Click **Next** to continue.



Figure 4-69 Licence agreement

e. Select the Directory Name where you want to install TPC for Replication. You can choose a directory either by changing the location or by accepting the default directory as we have done in Figure 4-70. Click **Next** to continue.

🐹 IBM Tivoli Storage I	Productivity Center for Replication - InstallShield Wizard	_ 🗆 X
	Click Next to install "IBM Tivoli Storage Productivity Center for Replication" to this directory, or click Browse install to a different directory.	e to
-2	Directory Name: popt/IBM/replication Brows	e
InstallShield	< Back Next > Cancel	

Figure 4-70 Directory Name

f. The TPC Administrator user panel is displayed (Figure 4-71). You are required to enter the user ID and password that will be used; this ID is usually the operating system administrator user ID. We choose the root user ID.

**Note:** If you prefer to use another user ID, you are required to create it beforehand and ensure that it has administrator/system rights.

🐹 IBM Tivoli Storage I	Productivity Center for Replication - InstallShield Wizard
	Enter the user name and password for IBM Tivoli Storage Productivity Center for Replication Administrator user. You must enter an existing user name and be sure the password is correct.
	TPC-R Administrator User Name
	root
	Password
	********
InstallShield	
	< Back Next > Cancel

Figure 4-71 TPC-R User ID and Password

g. The Default WebSphere Application Server ports panel is displayed (Figure 4-72). Accept the defaults. Click **Next** to continue.

🐹 IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard
	IBM Tivoli Storage Productivity Center for Replication uses WebSphere application server as its runtime environment. This will be automatically installed by this installation wizard. You are required to specify the port numbers needed by WebSphere application server. You can change any default port numbers that are already in use. Default Host Port 3080 Default Host Secure Port 3443
InstallShield ——	< Back Next > Cancel

Figure 4-72 Default ports

h. The settings panel is displayed (Figure 4-73). Review the settings and make the necessary changes if needed by clicking **Back**. Otherwise, click **Install** to continue.



Figure 4-73 Summary display

i. The TPC for Replication installation progress panel is displayed (see Figure 4-74).

🐹 IBM Tivoli Storage P	roductivity Center for Replication - InstallShield Wizard	
	Installing IBM Tivoli Storage Productivity Center for Replication. Please wait	
	Installing Server 71%	_
InstallShield		Cancel

Figure 4-74 TPC-R progress panel

j. The TPC-R installation result panel is displayed (see Figure 4-75). Notice that the URL to connect to TPC-R is displayed. Click **Finish** to continue.



Figure 4-75 Installation results

**Note:** Tivoli Storage Productivity Center for Replication is installed with no license. You must install the Two Site or Three Site Business Continuity (BC) license. For information about installing the license, refer to "Installing the Two Site or Three Site Business Continuity License" on page 461.

18.After the TPC-R installation has completed, the TPC Installer will continue creating the uninstaller as seen in Figure 4-76.



Figure 4-76 Creating the uninstaller

19. The Tivoli Storage Productivity Center installation results panel is displayed (see Figure 4-77). Click **Finish** to continue.



Figure 4-77 TPC Installation Results

## Verifying the installation

At the end of the installation, it is a good idea to make sure that all the components have been installed successfully and that Tivoli Storage Productivity Center is in good working order.

To test this on AIX, we have chosen to launch the Tivoli Integrated Portal  $\rightarrow$  launch the Tivoli Storage Productivity Center user interface. On TPC, we confirm that all servers are started and running, using the following steps:

1. We launch the TIP portal using the URL specific to our environment (https://azov.itsosj.sanjose.ibm.com:16316/ibm/console/logon.jsp) We login using the root account as shown in Figure 4-78.

Tivoli.	
Tivoli Integrated Portal	
User ID: root Password: •••••••• Log in	
LICENSED MATERIALS PROPERTY OF IBM 5724-i63, 5724-H88, 5655-N01 (C) Copyright International Business Machines Corp. 2005, 2008 All Rights Reserved US Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp. IBM is a registered trademark of the IBM Corp.	

Figure 4-78 TIP Login

2. Start the Tivoli Storage Productivity Center user interface (see Figure 4-79).



Figure 4-79 TPC user interface

3. Verify that all services are started (Figure 4-80), the nodes ought to reflect as green.



Figure 4-80 Data and Device services

# 4.5 Migrating TotalStorage Productivity Center V3.x to V4.1

The procedure to migrate from TotalStorage Productivity Center V3.x to Tivoli Storage Productivity Center V4.1 can be summarized as follows:

- 1. Upgrade DB2 to a supported version. This step can be optional depending on the current version of DB2 installed.
- 2. Migrate the database repository.
- 3. Upgrading the Agent Manager. This step can be optional.
- 4. Upgrading TPC Components.
- 5. Upgrading TPC Agents.

The steps presented in this chapter have been performed on an AIX 6.1 x64 system with the following components installed on it:

- DB2 V9.1
- TPC V3.3.2
- Tivoli Agent Manager 1.3.2.
- TPC for Replication V3.4.1

Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31.

# 4.6 Upgrading DB2 and migrating the TPC database

TPC V4.1 requires one of the following DB2 versions:

- IBM DB2 UDB Enterprise Server Edition v9.1 Fix Pack 2 or later
- IBM DB2 UDB Enterprise Server Edition v9.5 Fix Pack 3a or later

Depending on the version of DB2 currently available in your environment, you might need to upgrade it or install the required fix pack level. Table 4-1 reports the suggested action for each current DB2 version installed and an alternate action if available.

Table 4-1 DB2 Upgrade paths

Current DB2 version	Suggested action	Alternate action	
DB2 v8.1	Upgrade to DB2 v9.5		
DB2 v9.1 Fix Pack 2 or lower	Apply DB2 v9.1 Fix Pack 5	Upgrade DB2 v9.5	
DB2 v9.5	Apply DB2 v9.5 Fix Pack 3		

To check the current version of DB2 installed on your system, log onto the DB2 server as the DB2 instance owner and issue the **db21eve1** command as shown in Figure 4-81.

🛃 9.12.5.35 - PuTTY					
\$ db2level				<b>_</b>	
DB21085I Instance "db2inst1" uses '	"64" bits an	d DB2 code :	celease "SQL09015"		
with level identifier "01060107".					
Informational tokens are "DB2 v9.1.0" "5".	0.5", "s0805	12", "U8159:	22", and Fix Pack		
Product is installed at "/opt/IBM/dk	p2/V9.1".				
\$					

Figure 4-81 DB2 current level

## 4.6.1 Migrating the database repository

Before proceeding with the DB2 upgrade, there are certain steps that must be performed in order to ensure a successful upgrade procedure. In the following sections, we describe the necessary steps to ensure a smooth transition.

To migrate the DB2 database, these are the general steps to follow:

- 1. Stop the IBM Tivoli Storage Productivity Center services and Agent Manager (if you have Agent Manager installed).
- 2. Pre-check the database for migration.
- 3. Back up the DB2 9.1 database.
- 4. Migrate the DB2 instance.
- 5. Migrate the database.
- 6. Verify the migration.
- Start the IBM Tivoli Storage Productivity Center services and Agent Manager (if you have Agent Manager installed).

### Stopping the TPC services and Agent Manager

Log on to the AIX TPC server, and make sure that you are logged in with system rights.

To stop the TPC services on AIX, use the following commands:

- Data Server: stopsrc -s TSRMsrv1
- Device Server: /<usr or opt>/IBM/TPC/device/bin/aix/stopTPCF.sh
- Common Agent: /<usr or opt>/IBM/TPC/ca/endpoint.sh stop

To stop the Agent Manager on AIX, type the following command and press Enter:

Agent Manager Server: <directory>/embedded/bin/stopServer.sh <app\_server\_name>

Here, <app\_server\_name> is the case-sensitive name of the server where Agent Manager is installed. By default, this name is *AgentManager*.

#### Pre-checking the database for migration

Verify that your databases are ready for migration.

- 1. Log onto the DB2 server as the DB2 instance owner that you want to migrate.
- 2. Stop the instance by running the db2stop command:

db2stop force

3. From the DB2 command prompt, change to the following directory:

\$DB2DIR/bin directory

Here, DB2DIR is the location that contains the DB2 Version 9.5 installation media.

4. Run the **db2ckmig** command to verify that the databases that are owned by the current instance are ready to be migrated and to generate a log file.

Here is the syntax of the command:

db2ckmig <database> -1 db2ckmig.log -u <admin\_user> -p <password>

Here is an example of the command:

db2ckmig TPCDB -1 db2ckmig.log -u db2inst1 -p db2inst1

If the db2ckmig command is successful, the databases can be migrated.

5. The db2ckmig.log file is created in the current directory and includes information about errors and warnings.

Ensure that the log file for the db2ckmig command shows the following text:

Version of DB2CKMIG being run: VERSION 9.5.

This text confirms that you are running the correct level of the db2ckmig command.

**Note:** In the rest of this chapter, we assume that the names of the databases are the default names, being, *TPCDB* for the TPC database, *IBMCDB* for the Agent Manager database and *TPCRM* for the TPC for Replication database.

Run the **db2ckmig** command against all the existing databases to verify that they can be migrated.

If you are unsure about the database names in your environment, you can verify them by issuing the following command from the DB2 command line:

db2 list db directory

### Backing up the database before migration

This step is optional; however, we highly recommend that you have a backup if anything happens to go wrong during the migration or installation.

We perform an offline full backup for each local database:

- 1. Log onto the DB2 server as the DB2 instance owner.
- Disconnect all applications and users from the database. To disconnect all applications and users, use the force application command:

```
db2 force application all
```

To verify that the command completed correctly, run the list applications command:

db2 list applications

The message in Figure 4-82 shows that all applications have been correctly disconnected.



Figure 4-82 DB2 disconnect applications and users

3. Back up your local databases using the **backup database** command (Figure 4-83). This is the syntax for the command:

db2 BACKUP DATABASE <database> USER <user\_ID> USING <password> TO <backup\_directory>

In our case, the command looks like this:

db2 BACKUP DATABASE tpcdb USER db2inst1 using db2inst1 TO /home/DBBACKUP

Issue this backup command to back up all local databases.



Figure 4-83 DB2 backup commands

Figure 4-84 shows the completed backup saved in the directory specified, which is a result of the previous command.



Figure 4-84 Backup job

If you want to test the backup integrity, this can be done by running the **db2ckbkp** command against the backup as shown in Figure 4-85.



Figure 4-85 Backup verification

## 4.6.2 Migrating the DB2 instance

We are ready to migrate the DB2 server version from v9.1 to v9.5. We will be migrating the DB2 server using the command line.

**Note:** You do *not* need to create an instance while installing DB2 9.5. You must migrate the instance used in DB2 9.1 to DB2 9.5 after installation of DB2 9.5.

### Installing DB2 9.5

Follow these steps for the installation:

- 1. Log onto the DB2 server as the system user, in this case, the root user.
- Change to the DB2 code directory, and run the db2\_install command. We choose not to change the directory; we stick to the default path.

We choose **ESE** because we are upgrading the Enterprise Server Edition; this is shown in Figure 4-86.



Figure 4-86 DB2 Select the product

3. You can now see the installation starting, indicating the amount of tasks as well as the estimated duration as shown in Figure 4-87.
```
🛃 9.12.5.35 - PuTTY
                                                                                        _ 🗆 ×
Specify one of the following keywords to install DB2 products.
 ESE
  CLIENT
 RTCL
Enter "help" to redisplay product names.
Enter "quit" to exit.
         ESE
DB2 installation is being initialized.
Total number of tasks to be performed: 43
Total estimated time for all tasks to be performed: 2116
Task #1 start
Description: Checking license agreement acceptance
Estimated time 1 second(s)
Task #1 end
Task #2 start
Description: Base Client Support for installation with root privileges
```

Figure 4-87 DB2 upgrade

4. When the installation completes, it will display a successful message.

#### Migrating the DB2 instance

We are required to migrate the DB2 instance at this stage:

- Change the directory to the DB2 9.5 installation location and instance; in our case: cd /opt/IBM/db2/V9.5/instance
- 2. Next, issue the db2imigr command:

/db2imigr -d -u <db2\_fence\_id> <db2\_9.1\_instance\_name>

In our environment we issue the command as seen in Figure 4-88.



Figure 4-88 DB2 migrate instance

3. This command returns "exit 0" as shown in Figure 4-89.



Figure 4-89 DB2 migrate complete with exit 0

4. Verify that the instance has been migrated successfully by checking the DB2 level. We do this by issuing the following command, as shown in Figure 4-90.



Figure 4-90 DB2 level at 9.5

# 4.6.3 Migrating the TPC databases

Now that we have migrated the DB2 instance, we need to migrate the TPC databases:

- 1. As the DB2 instance owner, start the DB2 database manager by issuing the **db2start** command as shown in Figure 4-91.
- 2. We need to issue the migrate database command against the TPC related databases.

The syntax of the command is as follows:

db2 MIGRATE DATABASE <database\_alias> USER <user\_ID> USING <password>

We execute the command on the TPCDB database, as shown in Figure 4-91; issue the command against all the local TPC related databases.

📌 9.12.5.35 - PuTTY	- X
ŝ	
\$ db2start	
04/28/2009 12:28:26 0 0 SQL1063N DB2START processing was successful.	
SQL1063N DB2START processing was successful.	
\$ db2 migrate database TPCDB	
DB20000I The MIGRATE DATABASE command completed successfully.	_
\$	•

Figure 4-91 db2start command example

- 3. We need to set certain DB2 9.5 specific parameters manually for each TPC database, as shown in Figure 4-92. These parameters are as follows:
  - self\_tuning\_mem: Parameter that determines whether the memory tuner will dynamically distribute available memory resources as required between memory consumers that are enabled for self tuning. We set it to ON.
  - pckcachesz: Package cache size configuration parameter. We set it to AUTOMATIC.
  - database\_memory: Database shared memory size configuration parameter. We set it to AUTOMATIC.
  - avg\_app1s: Average number of active applications configuration parameter. We set it to AUTOMATIC.

We need to execute the following commands from a DB2 command window for TPCDB:

db2 update db cfg for tpcdb using self\_tuning\_mem on db2 update db cfg for tpcdb using pckcachesz automatic db2 update db cfg for tpcdb using database\_memory automatic

🧬 9.12.5.35 - PuTTY	
\$ db2 update db cfg for TPCDB using self_tuning_mem on	-
DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
\$ db2 update db cfg for TPCDB using pckcachesz automatic	
DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	
\$ db2 update db cfg for TPCDB using database_memory computed	
DB20000I The UPDATE DATABASE CONFIGURATION command completed successfully.	_
\$	•

Figure 4-92 DB2 configurations parameters

**Note:** Ensure that you follow step 2 and 3 for all TPC databases on your system, including TPCDB, IBMCDB, and TPCRM.

# 4.7 Upgrading the Agent Manager

In this section, we show how to upgrade the Tivoli Agent Manager. The latest version currently available and shipped with TPC V4.1 is Agent Manager 1.3.2.30.

**Note:** If you are running an Agent Manager 1.2.x or lower, then it is mandatory to upgrade to 1.3.2, this is because 1.2.x runs inside a WebSphere version that is not supported anymore.

Seeing that we have also upgraded DB2 9.1 to DB2 9.5, we must migrate the DB2 database after upgrading the Agent Manager

To upgrade the Agent Manager, complete the following steps:

1. Make a backup copy of your certificates before upgrading:

Move to the Agent Manager directory on the server and copy all the files in the directory to a safe place. Figure 4-93 is an example of the content within this directory.

9.12.5.35 - PuTTY		
# pwd		-
/opt/IBM/AgentManager/cert	.s	
# 1s		
CARootKey.pwd	agentManagerKeys.jks	
CARootKeyRing.jks	agentManagerTrust.jks	
CertificateRevocationList	agentTrust.jks	
REGKey.pwd	testTrust.jks	
#		
		-

Figure 4-93 Agent Manager certificates directory

- 2. Ensure that you are logged on as the system user (root), you must have root authority.
- 3. Source the db2profile for the instance used by the Agent Manager:
  - In our case the database instance is db2inst1, so we issue:
  - . /home/db2inst1/sqllib/db2profile
- 4. Go to the directory where the Agent Manager software resides.

**Note:** We are upgrading the Agent Manager by using the command line with the **-console** option.

5. Navigate to the Embedded Installer directory. Invoke the Agent Manager installation program as shown in Figure 4-94 by issuing the following command:

setupAix.bin -console

Figure 4-94 Agent Manager Installation program

6. The Agent Manager installation program discovers an existing instance of Agent Manager installed, as shown in Figure 4-95. Choose 1 and press Enter.

9.12.5.35	5 - PuTTY			_ 🗆 ×
(Apr 28,	2009 2:42:00	PM),	AM Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	portCount		_	=
(Apr 28, on, dbg,	2009 2:42:00 messageID	PM),	AM_Install,	<pre>com.tivoli.cas.install.manager.AMInstallati = CTGEM2175I</pre>
(Apr 28,	2009 2:42:00	ΡМ),	AM_Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	keyFileNa	me	-	= certs/agentManagerKeys.jks
(Apr 28,	2009 2:42:00	PM),	AM_Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	trustFile	Name	_	= certs/agentManagerTrust.jks
(Apr 28,	2009 2:42:00	PM),	AM_Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	jdbcDrive:	rType	_	= type4
(Apr 28,	2009 2:42:00	PM),	AM_Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	dbDriverJ:	ar		=
(Apr 28,	2009 2:42:00	PM),	AM_Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	dbDriverNa	ativeP	ath	-
(Apr 28,	2009 2:42:00	PM),	AM_Install,	com.tivoli.cas.install.manager.AMInstallati
on, dbg,	intuitive	Path		= false
Version :	1.3.2.26 of t	he age	nt manager	is currently installed on this computer.
Click Ne:	kt to upgrade	this	configurati	on to version 1.3.2.30 build
200901300	0502. If you	do not	want to up	grade, click Cancel to stop the
installa	tion.			
Press 1 :	for Next, 3 t	o Canc	el or 4 to 3	Redisplay [1] 1

Figure 4-95 Agent Manager discovers current version

7. The Database User Information is displayed as shown in Figure 4-96. Type the corresponding password to use it. You can also enter another database user name and type the corresponding password.

If you want to use another user ID for the installation of Agent Manager only, you can enter the user ID and password. Note that if you do not select this option, the following Database Administrator User ID and Password will not be used.

In our case we accepted the suggested db2inst1 user ID and we typed the corresponding password. Press Enter.

(Apr 28, 2009 3:12:25 PM), AM_Install, com.tivoli.cas.install.manager.SetWizardB
eanPropertyAction, dbg, Invoking DBInfoRemote->DBName.setValue(IBMCDB)
(Apr 28, 2009 3:12:25 PM), AM_Install, com.tivoli.cas.install.manager.SetWizardB
eanFropertyAction, dbg, Invoking DBInfoRemote->DBHostname.setValue(localhost)
(Apr 28, 2009 3:12:25 PM), AM_Install, com.tivoli.cas.install.manager.SetWizardB
eanPropertyAction, dbg, Invoking DBInfoRemote->DBPort.setValue(50000)
(Apr 28, 2009 3:12:25 PM), AM_Install, com.tivoli.cas.install.manager.SetWizardB
eanPropertyAction, dbg, Invoking DBInfoRemote->DBLocation.setValue(/home/db2inst
1/sqllib)
Database Her Information
Specify the user ID and password for accessing the database
Database Runtime User ID [db2inst1]
Password:

Figure 4-96 Database User Information

8. The summary information is displayed indicating where Agent Manager will be installed with the size information (see Figure 4-97). Review the information, choose **1** and press Enter.



Figure 4-97 Agent Manager summary information

9. The Start AgentManager Application Server panel is displayed. Choose option **1** to start the Agent Manager now as seen in Figure 4-98. Press Enter twice.

```
🚰 9.12.5.35 - PuTTY
(Apr 28, 2009 5:33:00 PM), AM_Install, com.tivoli.cas.install.common.ExecAction, dbg,
                                                                                      Comma 4
nd "/opt/IBM/AgentManager/AppServer/agentmanager/bin/serverStatus.sh" returned O
(Apr 28, 2009 5:33:00 PM), AM_Install, com.tivoli.cas.install.manager.AMServerStatus, dbg,
Invoking AMVariables.setServerStatus(stopped)
(Apr 28, 2009 5:33:00 PM), AM Install, com.tivoli.cas.install.manager.AMServerStatus, dbg,
Server status is: stopped
(Apr 28, 2009 5:33:00 PM), AM_Install, com.tivoli.cas.install.common.FileOps, dbg, Deleting
 [/tmp/status.log] [false]
(Apr 28, 2009 5:33:00 PM), AM_Install, com.tivoli.cas.install.common.FileOps, dbg, FileOps.
delete returning true
Start the AgentManager Application Server?
Do you want to start the AgentManager application server now?
[X] 1 - Yes, start AgentManager now
[ ] 2 - No, I will start AgentManager later
To select an item enter its number, or O when you are finished: [O]
```

Figure 4-98 Start Agent Manager

10. The Summary Information panel is displayed (see Figure 4-99). For a successful upgrade, you will see the following text displayed:

The agent manager upgrade completed successfully.Click Finish to exit the installation. The installation is complete and the agent manager application server has been started.

Press Enter to continue.

	😼 9.12.5.35 - PuTTY
	(Apr 28, 2009 10:44:47 PM), AM_Install, com.tivoli.cas.install.manager.AMInstallReturnVa 🔺
	lues, dbg, Start Server returns O
	(Apr 28, 2009 10:44:47 PM), AM_Install, com.tivoli.cas.install.manager.AMInstallReturnVa
	lues, dbg, The Agent Manager installer is exiting with code O
	Summary of Installation and Configuration Results
,	Validating the WebSphere Cell Name: Successful.
1	Validating the WebSphere Node Name: Successful.
	Installation of agent manager applications in WebSphere: Successful
	Start Agent Manager Server: Successful
	Press 1 for Next or 4 to Redisplay [1]
	Please read the summary information below
	The event menager ungrade completed successfully. Click Finish to evit the
	installation The installation is complete and the each monoger explication
	installation. The installation is complete and the agent manager application
	server has been started. Click Finish to exit the installation.
	and a Rivich and the Redicular [2]
	rress 3 to rinish or 4 to kedisplay [3]

Figure 4-99 Agent Manager upgrade complete

11. You can use the **GetAMInfo** command to verify the Agent Manager version. To run the **GetAMInfo** command, go to the <agent\_manager\_dir>/bin directory:

./GetAMInfo.sh



Figure 4-100 Agent Manager Version using GetAMInfo command

# 4.8 Upgrading the TPC components

In this section, we describe how to go about upgrading the TPC components.

#### Preparing for upgrade of the TPC components

Before proceeding with the upgrade, there are certain steps that must be performed:

- 1. Exit all instances of the Tivoli Storage Productivity Center GUI.
- Make sure that you have exclusive access to the server where you are installing TPC V4.1.
- 3. Stop the TPC services on AIX:
  - Data Server: stopsrc -s TSRMsrv1
  - Device Server: /<usr or opt>/IBM/TPC/device/bin/aix/stopTPCF.sh
  - Common Agent: /<usr or opt>/IBM/TPC/ca/endpoint.sh stop
  - IBM WebSphere Application Server V6.1 CSM (TPCR):

/<usr or opt>/IBM/replication/eWAS/profiles/CSM/bin/stopServer.sh server1
-username <username> -password <passsword>

Here, <username> represents the ID of the TPC superuser and <password> represents the password for that user.

4. Back up all the local TPC databases following the same procedure as depicted in "Backing up the database before migration" on page 237, with the addition of the following file systems:

Back up your <TPC\_install\_dir>:

<usr or opt>/IBM/TPC

Back up the InstallShield registry:

/usr/lib/objrepos/InstallShield/Universal/IBM-TPC

- 5. Restart the TPC services on AIX:
  - Data Server: startsrc -s TSRMsrv1
  - Device Server: /<usr or opt>/IBM/TPC/device/bin/aix/startTPCF.sh
  - Common Agent: /<usr or opt>/IBM/TPC/ca/endpoint.sh start
  - IBM WebSphere Application Server V6.1 CSM (TPCR):

/<usr or opt>/IBM/replication/eWAS/profiles/CSM/bin/startServer.sh server1
-username <username> -password <passsword>

#### Upgrading the TPC components

To upgrade Tivoli Storage Productivity Center, we use the same installation program when installing the product as presented in 4.4.2, "Installing TPC components" on page 213.

If TPC for Replication is installed on the system, it will be upgraded to V4.1 together with the other components. If it is not present, it will be installed. The upgrade will also install the Tivoli Integrated Portal.

Follow these steps to complete the upgrade process:

- 1. Make sure that you are logged in with the root account.
- 2. Source the DB2 instance profile:
  - . /home/db2inst1/sqllib/db2profile
- 3. Change to the directory where you have extracted the Tivoli Storage Productivity Center software package, then launch the following command:

./setup.sh

4. Choose the language that must be used for installation and click OK.See Figure 4-101.

💑 Installer 📃 🗆 🗙
Select a language to be used for this wizard.
English
English
<u>O</u> K <u>C</u> ancel
<u> </u>

Figure 4-101 Select Language

5. The License Agreement panel is displayed. Read the terms and select **I accept the terms of the license agreement**. Then click **Next** to continue as presented in Figure 4-102.



Figure 4-102 Accept License terms

- 6. Figure 4-103 shows how to select typical or custom installation. You have the following options:
  - Typical installation:

This selection allows you to upgrade all of the components on the same computer. Certain options are grayed out by selecting **Servers**, **Agents**, and **Clients**.

– Custom installation:

This selection allows you to select the components that you can upgrade.

- Installation licenses:

This selection installs the Tivoli Storage Productivity Center licenses. The Tivoli Storage Productivity Center license is on the DVD. You only need to run this option when you add a license to a Tivoli Storage Productivity Center package that has already been installed on your system.

Note that the installation directory field is automatically filled with the TPC installation directory on the current machine and grayed out. In our case, a previous version of TPC is already installed in the /opt/IBM/TPC directory. Select **Custom Installation**. Click **Next** to continue.

💥 IBM Tivoli Storage Proc	ductivity Center - Installer	
	Select the type of installation you want to run	
IBM.	○Typical installation This will install the TPC servers, TPC agents, Tivoli Integrated Portal (TIP), GUI, and CLI. A new database will be created, and the schema will be created on the database during installation. The database and schema will be reused for upgrade.	
6	Servers     Clients       Agents     Register with the agent manager	
	© Custom installation	
	This will custom install the individual TPC components on this computer. Remote agents are installed on other computers. You can choose any server, agent, or client to be installed on this computer. You will have a choice to create the database and schema on this computer.	
	)Installation licenses	
	/opt/IBM/TPC TPC Installation Location	
	< Back Next > Cancel	

Figure 4-103 TPC Custom installation

7. The panel, Select one or more components to install, is shown. The components already installed on the system are discovered, selected for upgrade and greyed out. The current version of each component is displayed next to it. In our case we have a TPC V3.3.0.137 installed on our system including the local Data or Fabric agents. Figure 4-104 shows the corresponding panel. Click **Next** to proceed with the installation.



Figure 4-104 TPC Components

8. f you are upgrading the TPC on a system with at least 4 GB but less than the recommended 8 GB of RAM, a warning message will be displayed as seen in Figure 4-105. To ignore this message and continue with the installation, click **OK**.



Figure 4-105 TPC Memory warning message

**Note:** When attempting to upgrade TPC on a system with less than 4 GB, this will result in an error message and the installation will fail.

9. The DB2 user ID and password panel is displayed as seen in Figure 4-106. These fields are already propagated with the information required. Click **Next** to proceed.

🐹 IBM Tivoli Storage Proc	luctivity Center - Installer		
	Database administrator inform	ation	
IBM.	Enter the database administr database during installation a	ator user ID and password to connect to the ind uninstallation.	
	Database administrator	þib2inst1	
	Password	*****	
	< Back	Next > Cancel	

Figure 4-106 DB2 Administrator panel

10. The Database schema panel is displayed, as seen in Figure 4-107. All the information in this panel is already propagated. Verify it and click **Next** to continue.

🐹 IBM Tivoli Storage Prod	uctivity Center - Inst	aller				
	Existing database s Enter the informa	chema informat tion to use an e>	ion (isting database	e schema for	the repository.	
IBM.	DB user ID	db2inst1	Passw	ord	*****	
	🖲 Use local datab	ase				
	Port	Database	Schema	Instance	Version	
	50000	TPCDB	TPC	db2inst1	9.5.0.3	
	Use remote dat	abase				
	Host name	localhost	Port		50000	
9 11/1/2	Database name	TPCDB	Schem	ia name	ТРС	
11 11	/home/db2inst	1/sqllib/java/db	o2jcc.jar		JDBC driver	
UM .						
		: Back	Next	>	Cancel	

Figure 4-107 TPC Database schema panel

11. The TPC Servers panel is displayed, as seen in Figure 4-108. Verify that all the fields are filled in correctly. The password fields are filled with the propagated information. Click **Next** when complete to continue.

🗙 IBM Tivoli Storage Prod	uctivity Center - Installer
	Data server, Device server, Data agent, and Agent Information
IBK.	Enter the server name and port that the Data agent and Fabric agent, and GUI will use to communicate with the server.
	Data server name azov.itsosj.sanjose. Data server port 9549
A	Device server name azov.itsosj.sanjose. Device server port 9550
	Enter an OS user group whose members will be TPC administrators in the administrators group.
	TPC superuser system Security roles
	Enter a password that the Fabric agents will use to communicate with the Device server.
	Host authentication password
1 1111	Enter a password that will be used to create the Data Server Account.
1118	Data Server Account Password
UP :	WAS admin ID db2inst1 Password *******
VIN 10097 N	NAS discovery
	Data agent options
	< Back Next > Cancel

Figure 4-108 TPC server panel

12. The Tivoli Integrated Portal panel is shown as in Figure 4-109. Remember that this component is always installed when upgrading to TPC V4.1 unless you have an instance of TIP already installed on the system. In this case the Reuse an existing TIP install section is enabled and you can select that instance.

If a TIP instance is not installed, you have to specify the installation directory for this new instance. We selected the /opt/IBM/Tivoli/tip directory. The TPC/IP port 16310 is proposed as default in the Port field (called Base Port). TIP will use 10 port numbers starting from the one specified. The 10 ports will be:

- base port
- base port+1
- base port+2
- base port+3
- base port+5
- base port+6
- base port+8
- base port+10
- base port+12
- base port+13

The TIP administrator ID and password are pre-filled with the WebSphere admin ID and password specified for the Device Server. Click **Next** to proceed with the upgrade.

💥 IBM Tivoli Storage Prod	uctivity Center - Installer
Reference in the storage Processing in the s	Tivoli Integrated Portal (TIP) TIP provides TPC with the ability for Single Sign-On authentication, launch other applications in context, and reports to be viewed from Tivoli Common Reporting. Select an existing TIP install to be used with TPC or specify the install directory where TPC is to install TIP.
	Vopt/IBM/Tivoli/tip     Browse       Port     16310       OReuse an existing TIP install
	Existing TIP Installs:       TIP Administrator ID       db2inst1       Password
	< Back Next > Cancel

Figure 4-109 TIP Installation panel

13. In the Authentication type panel shown in Figure 4-110, we are prompted to select if the user authentication must be performed against the Operation System or against an LDAP/Active Directory server. We select OS authentication. Click **Next** to continue. If you want to use the LDAP authentication option, refer to Chapter 6, "LDAP authentication support and Single Sign-On" on page 335 for additional information.



Figure 4-110 OS Authentication

14. The Summary Information panel is displayed as shown in Figure 4-111. Verify the information, then click **Install**.

💥 IBM Tivoli Storage Produ	uctivity Center - Installer	
	Please read the summary information below.           IBM Tivoli Storage Productivity Center will be installed in the following location:           /opt/IBM/TPC           with the following features:	
	Database schema Data server Device Server Data agent Fabric agent GUI CLI Tivoli Integrated Portal Replication Server for a total size: 2798.8 MB total space by filesystem: /tmp 1,019.89 MB /usr 166.89 MB /var 0.33 MB /st8d10 200 MB /opt 1,411.64 MB	
	< Back Cancel	

Figure 4-111 Summary Information

15. Multiple panels are shown displaying the progress made during each step; we show a few next. Installing the Data Server progress is shown in Figure 4-112.

🐹 IBM Tivoli Storage Prod	uctivity Center - Installer	
IBM.	Installing Data Server. Please wait Installing Data server	
	6%	
	Cano	el

Figure 4-112 Upgrading Data Server

Installing the Data agents progress panel is displayed as seen in Figure 4-113.



Figure 4-113 Agent upgrade

Installing the Tivoli Integrated Portal component progress panel is displayed as presented in Figure 4-114.

Installing TIP. Please wait Installing Tivoli Integrated Portal 100%

Figure 4-114 Installing TIP

**Note:** During the installation of Tivoli Integrated Portal on AIX systems, the progress bar incorrectly indicates that the Tivoli Integrated Portal installation is 100% complete even though it is not yet complete. Continue to wait until the installation is complete. The installation of Tivoli Integrated Portal can be a time consuming exercise; be patient.

16.Upon completion of the TIP installation, the TPC for Replication upgrade program is launched. If TPC for Replication is already installed, it will be upgraded, whereas if it is not present, it will be installed. The TPC installation is temporarily suspended in the background and the TPC for Replication panel is displayed, as seen in Figure 4-115.



Figure 4-115 TPC for Replication Welcome panel

**Note:** If TPC for Replication is not installed in your system and you do not plan to use TPC for Replication, you can interrupt the installation by clicking the **Cancel** button. However, take note that every subsequent upgrade of TPC will attempt to install it again. We suggest to complete the TPC for Replication installation and then disable it.

17. The System prerequisites check panel is displayed, see Figure 4-116. The installation wizard checks whether the prerequisites are installed, then confirms whether your operating system is supported and is at the appropriate fix pack or update level. Click **Next** to continue.



Figure 4-116 System prerequisite check running

18.If the system passes the prerequisites checks, the panel shown in Figure 4-117 is displayed. Click **Next** to continue.



Figure 4-117 System prerequisites check passed

19. The license agreement panel is shown. Accept it and click **Next** as shown in Figure 4-118.



Figure 4-118 Accept license agreement

20. The Directory Name panel is displayed (Figure 21). Accept the default installation directory by clicking **Next**, or specify another installation directory and click **Next** to continue.

🐹 IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard
	Click Next to install "IBM Tivoli Storage Productivity Center for Replication" to this directory, or click Browse to install to a different directory.
	Directory Name: popt/IBM/replication Browse
InstallShield	
	< Back Next > Cancel

Figure 4-119 TPC-R Installation directory

21. The panel, IBM Tivoli Storage Productivity Center for Replication, requesting an administrator ID and password, is displayed (Figure 4-120). Enter the administrator user ID and password. This user ID is usually the operating system administrator user ID. If you use another user ID, create it beforehand and ensure that it has administrator rights. Click **Next** to continue.

🐹 IBM Tivoli Storage I	Productivity Center for Replication - InstallShield Wizard	_ 🗆 🗡
	Enter the user name and password for IBM Tivoli Storage Productivity Center for Replication Administrator user. You must enter an existing user name and be sure the password is correct.	
	TPC-R Administrator User Name	
	root	
	Password	
	[********	
		, , , , , , , , , , , , , , , , , , ,
InstallShield ———	< Back Next > Cancel	

Figure 4-120 TPC-R User

22. Review the settings shown in Figure 4-121 and click Install to start the upgrade.



Figure 4-121 Summary panel

23. The panel, Installing TPC for Replication. Please wait..., is displayed. Several progress messages about the installation are displayed as shown in Figure 4-122.

🐹 IBM Tivoli Storage P	roductivity Center for Replication - InstallShield Wizard	
	Installing IBM Tivoli Storage Productivity Center for Replication. Please wait	
	Installing Server	
	71%	
InstallShield	Cance	

Figure 4-122 TPC-R Installation progress

24. You will see the summary information panel (Figure 4-123). Review the information. Click **Finish** to complete the install. Note the URL displayed indicating where the Web browser can be pointed to access the TPC-R Web user interface.



Figure 4-123 TPC-R Summary panel

25. The TPC installation process continues; the uninstaller for TPC progress is displayed as shown in Figure 4-124.



Figure 4-124 TPC Uninstaller creation

26. The TPC upgrade completes; click Finish as shown in Figure 4-125.



Figure 4-125 TPC Upgrade summary panel

27. Migrate the Tivoli Storage Productivity Center database. This step can be performed right after upgrading or at a later time. The database migration tool can run a long time, depending on the size of your database. You must, however, run the database migration tool before you install any Tivoli Storage Productivity Center patches or PTFs. To run the database migration tool, go to the following directory:

<disk1\_image\_directory>\data\scripts

Run this command:

partitiontables.sh

The database connection information is automatically obtained and the migrateTable.log file is created under the following directory:

<TPC\_install\_directory>\data\server\tools

If the database migration tool is interrupted for any reason, it is safe to run the migration tool again. The tool will pick up where it left off the last time. If the database migration has been completed and the command is run again, this tool returns immediately.



# Tivoli Storage Productivity Center installation on Linux

In this chapter, we show the step-by-step installation of Tivoli Storage Productivity Center V4.1 on the Red Hat Linux platform. Of the available installation paths, Typical and Custom, we describe the Custom installation in our environment.

# 5.1 Tivoli Storage Productivity Center installation on Linux

This chapter describes how to install IBM Tivoli Storage Productivity Center Standard Edition V4.1 and IBM Tivoli Storage Productivity Center for Replication V4.1 on 64-bit Red Hat Enterprise Linux 4 using the graphical interface. The prerequisite components (DB2 and Agent Manager) are installed prior to invoking the installation program.

This section also provides information about the preparation work required before installing the Tivoli Storage Productivity Center family.

# 5.1.1 Installation overview

In order to successfully install Tivoli Storage Productivity Center V4.1 you need to follow certain steps as indicated here:

- Check that the system meets the prerequisites. Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31.
- Install and configure all required prerequisite components. Refer to "Installing TPC prerequisites for Linux" on page 266.
- Install Tivoli Storage Productivity Center database schema. Refer to "Creating the database schema" on page 306.
- Install Tivoli Storage Productivity Center server components. Refer to "Installing TPC Servers, GUI and CLI" on page 311.
- ► Install Tivoli Storage Productivity Center agents. Refer to "Agent installation" on page 328.

You can install Tivoli Storage Productivity Center family components using either Typical installation or Custom installation.

# **Typical installation**

The Typical installation allows you to install all the components of the Tivoli Storage Productivity Center on the local server in one step. Our recommendation is not to use the Typical installation, because the control of the installation process is much better when you use the Custom installation method.

## **Custom installation**

The Custom installation allows you to install each component of the Tivoli Storage Productivity Center separately and deploy remote Fabric and or Data agents on various computers. Additional panels are presented allowing you to control the installation sequence of the components and specify additional TPC parameters. This is the installation method that we recommend.

**Note:** Tivoli Storage Productivity Center for Replication is no longer a stand-alone application. Tivoli Storage Productivity Center Version 4.1 now installs Tivoli Integrated Portal and Tivoli Storage Productivity Center for Replication Version 4.1 during the server components installation process.

When you install Tivoli Storage Productivity Center using custom installation, you have the following installable components:

- Database schema
- Tivoli Storage Productivity Center Servers
- Graphical User Interface (GUI)

- Command Line Interface (CLI)
- Data agent
- Fabric agent

After Tivoli Storage Productivity Center Standard Edition is installed, the installation program will start the Tivoli Storage Productivity Center for Replication installation wizard.

The approximate time to install Tivoli Storage Productivity Center, including Tivoli Integrated Portal, is about 60 minutes. The approximate time to install Tivoli Storage Productivity Center for Replication is about 20 minutes.

# 5.1.2 Product code media layout and components

This section outlines the contents of the product media at the time of writing. The media content will differ depending on whether you are using the Web images or the physical media shipped with the TPC V4.1 package.

#### Passport Advantage and Web media content

The Web media consists of two disk images:

- Disk 1 contains all Tivoli Productivity Center components:
  - Database Schema
  - Data Server
  - Device Server
  - GUI
  - CLI
  - Local Data agent
  - Local Fabric agent
  - Storage Resource agent
  - Remote Data agent
  - Remote Fabric agent
  - Tivoli Integrated Portal
  - Tivoli Storage Productivity Center for Replication

**Note:** Disk 1 has two parts to it. Both parts must be downloaded and extracted into the same directory.

- Disk 2 contains local and remote agent installation images:
  - Local Data agent
  - Local Fabric agent
  - Storage Resource agents
  - Remote Data agent
  - Remote Fabric agent
  - Installation scripts for the Virtual I/O server

## **Physical media**

The physical media shipped with the TPC V4.1 product consists of a DVD and a CD. The DVD contains the Disk1 part 1 and Disk1 part 2 content described in "Passport Advantage and Web media content" on page 265. The physical media CD is the same as the Web Disk 2 media.

# 5.2 Preinstallation steps for Linux

Before deploying Tivoli Storage Productivity Center on Linux, you need to analyze your environment to ensure that the system requirements have been met and that you have all the prerequisite components installed and configured.

## 5.2.1 Verifying system hardware and software prerequisites

Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31 for detailed description of the system hardware and software prerequisites. For the latest platform support information, see the Web site at:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&uid=swg21384678&loc =en\_US&cs=UTF-8&lang=en

# 5.2.2 Prerequisite components for Tivoli Storage Productivity Center V4.1

These are the components you will need to install and configure prior to installing Tivoli Storage Productivity Center V4.1.

- IBM DB2 UDB Enterprise Server Edition v9.5 Fix Pack 3 or later
- Agent Manager 1.3.2 (optional)

Note that with Tivoli Storage Productivity Center V4.1 release, installing the Agent Manager is optional. You are only required to install the Agent Manager if you are planning to install Data and Fabric agents.

#### Order of component installation

The components are installed in the following order:

- 1. DB2
- 2. Agent Manager (optional)

# 5.3 Installing TPC prerequisites for Linux

This section describes how to install the TPC prerequisites on Linux. We perform a typical installation of DB2 v9.5 Fix Pack 3a 64-bit on Red Hat Enterprise Linux 4, as well as the Agent Manager V1.3.2.

Ensure that you have verified that your system meets all the minimum system requirements for installing the prerequisites, including adequate free disk space. Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31.

Before beginning the installation, it is important that you log on to your system as a local system user with root authority.

**Attention:** In this section, we are dealing with a clean installation of TPC, therefore it is important to understand that if you are required to migrate your current TPC environment to Version 4.1, that you refer to the *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337, Chapter 4. "Upgrading and migrating the IBM Tivoli Storage Productivity Center family."

# 5.3.1 DB2 installation: GUI install

This topic describes how to install DB2 v9.5 Fix Pack 3a 64-bit on Linux using the GUI installation program.

**Note:** You must have the X11 graphical capability installed before installing DB2 using the GUI. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

To install DB2, log on as a user with root authority, and then use the following procedures.

#### Accessing the installation media using the CD

Follow these steps:

1. Create a mount point or choose an existing mount point. To create a mount point called /cdrom, we enter the following command:

mkdir /cdrom

2. Insert the DB2 CD into the CD-ROM drive. Mount the CD-ROM file system at the desired mount point. Run the following command to achieve this:

mount -o ro /dev/cdrom /cdrom

3. Change to the directory where the CD-ROM is mounted:

cd /cdrom

#### Accessing the installation media using a downloaded image

Follow these steps:

1. Create a temporary directory (for example, db2temp) to hold the DB2 installer tar file and untarred files. These files require from 2 GB to 3 GB of hard drive space.

mkdir /db2temp

- 2. Copy or download the DB2 installer into db2temp.
- 3. Change to the directory where you have stored the image, for example:

cd /db2temp

4. Un-tar (extract) the DB2 installer file, following the instructions supplied at the repository from which you downloaded the image, which might involve running the **tar** or **gunzip** commands, or a combination of both. For example:

```
tar -xvzf v9.5fp3a_linuxx64_ese.tar.gz
```

5. Change to the installation directory, which you extracted from the image. For example:

cd /db2temp/ese

#### Beginning the installation

Follow these steps:

 Run the following command in order to verify that all necessary prerequisite packages are installed on the system:

./db2prereqcheck

If during the prerequisite check you receive an error message such as the one shown in Figure 5-1, you might need to install additional packages to satisfy DB2 dependencies before proceeding with the installation.



Figure 5-1 Error message indicating missing DB2 prerequisite packages

Refer to the following URL for additional information about DB2 installation requirements for your specific platform:

http://www.ibm.com/software/data/db2/udb/sysreqs.html

2. Run the following command to execute the graphical installer:

./db2setup

This will open the DB2 Setup Launchpad, as shown in Figure 5-2.

IBM DB2 Setup Launchpad		
Welcome         Installation Prerequisites         Release Notes         Migration Information         Install a Product →         Exit	<ul> <li>Welcome root to DB2 Version 9.5 Fix Pack 3</li> <li>The DB2 Setup Launchpad gives you access to all of the information that you need to install your DB2 products and features for Linux, UNIX, and Windows operating systems.</li> <li>To access more information about the DB2 products available for installation or perform an installation, select from the tabs provided. You can find more product information by searching the Information Center.</li> <li>Search Information Center</li> </ul>	
✓		~

Figure 5-2 DB2 Setup Launchpad

3. Select **Install a Product** from the left-hand panel, then select DB2 Enterprise Server Edition Version 9.5 Fix Pack 3 and click the **Install New** button in order to proceed with the installation, as shown in Figure 5-3.

💥 IBM DB2 Setup Launchpad	
Information Management software	
Information Management     software       Welcome     Installation Prerequisites       Release Notes     Migration Information       Install a Product →     Exit	Install a Product as root         Image: Sever Edition Version 9.5 Fix Pack 3         DB2 Enterprise Server Edition version 9.5 Fix Pack 3         DB2 Enterprise Server Edition is designed to meet the data server needs of mid- to large-size businesses. It can be deployed on Linux, UNDX, or Windows servers of any size, from one CPU to any number of CPUs.
	DB2 Enterprise Server Edition is an ideal foundation for building on demand enterprise-wide solutions, such as large data warehouses of multiple terabyte size or high performing 24x7 available high volume transaction processing business solutions, or Web-based solutions. DB2 Enterprise Server Edition incorporates a native XML data store and delivers flexible access to XML data using XQuery, XPath, SQL, and standard reporting tools. Optional features for DB2 Enterprise Server Edition are available that provide additional advanced product capabilities in areas such as database partitioning, performance, security, data federation, and database administration. Please see http://www.ibm.com/db2 for more information.
	Install New IBM Data Server Client Version 9.5 Fix Pack 3 IBM Data Server Client is a collection of graphical and nongraphical tools and components for administring DB2 products and developing applications with DB2 products. Add-ins for Eclipse, Microsoft Visual Studio 2005 and Visual Studio 2008 development environments are also included. IBM Data Server Client is a component of DB2 Server, DB2 Express, DB2 Connect Server, and DB2 Connect Personal Edition products. Please see http://www.ibm.com/db2 for more Information
$\checkmark$	

Figure 5-3 Click Install New to start the installation

4. The DB2 Setup wizard panel is displayed, as shown in Figure 5-4. Click Next to proceed.



Figure 5-4 DB2 Setup welcome message

 The next panel displays the software license agreement. Click Read non-IBM terms to display additional license information and, if you agree with all terms, click Accept and Next to continue (see Figure 5-5).



Figure 5-5 Software License Agreement

6. You will be prompted to select the installation type. Accept the default of **Typical** and click **Next** to continue (see Figure 5-6).



Figure 5-6 Select Typical installation type

7. On the next panel, accept the default: **Install DB2 Enterprise Server Edition on this computer and save my settings in a response file**. Even though not required, we recommend that you generate such a response file because it will greatly ease tasks such as documenting your work. Specify a valid path and the file name for the response file in the *Response file name* field. Click **Next** when you are ready, as shown in Figure 5-7.



Figure 5-7 Select both installation and response file creation

8. The panel shown in Figure 5-8 shows the default directory to be used as the installation folder. You can change the directory or accept the defaults. Make sure the installation folder has sufficient free space available (refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31), then click **Next** to continue.

XDB2 Setup - DB2 En	terprise Server Edition Version 9.5 Fix Pack 3
Introduction     Software License Agreement     Installation type     Installation action     Sinstallation action     Software License     Component     DAS user     Instance setup     Partitioning     options     I. Fenced user     I. Fenced user     I. Fortact     Software     Software	Select the installation directory.         The DB2 Setup wizard installs DB2 Enterprise Server Edition Version 9.5 Fix Pack 3 in the following directory.         to select a different directory, type the path or click the ellipsis button and select another directory.         Directory       Iopt/ibm/db2/V9.5         Space required:       1021 MB         Space available:       246865 MB
	▲Back         Next ▶         Enrich         Cancel         Help

Figure 5-8 Select installation directory

 After you click Next, if your system is an IBM System x or System p, you might see a panel titled, Install the IBM Tivoli System Automation for Multiplatforms Base Component (SA MP Base Component). This component is not required by Tivoli Storage Productivity Center, so choose Do not install SA MP Base Component and click Next.
10. The next panel will prompt you for user information for the DB2 Administration Server (DAS) user. This user must have a minimal set of system privileges. We recommend that you create a **New user** (which is the default). Specify a password for the new user as shown in Figure 5-9 and click **Next** when you are ready.

XDB2 Setup - DB2 Ente	erprise Server Edition Versi	on 9.5 Fix Pack 3			
1. Introduction       2. Software License       Agreement       3. Installation type       4. Installation action       5. Installation action	Set user inform The DB2 Administration user with a minimal set DAS.	nation for the l Server (DAS) runs on y of privileges is required	DB2 Admir our computer to d to run the DAS.	iistration Serve provide support require Specify the required u	ed by the DB2 tools. A ser information for the
directory	User name				
6. SA MP Base	User name	dasusr1	_		
7. DAS user	UID			✓ <u>U</u> se default UID	
<u>8</u> . Instance setup <u>9</u> . Partitioning	Group name	dasadm1			
options 1 <u>0</u> . Instance-owning	GID			<b>√</b> Use default <u>G</u> ID	
USEF 11 Feaced user	Password	*****			
12. Tools catalog	Confirm password	*****	_		
13. Notification setup 14. Contact	Home directory	/home/dasusr1			
15. Summary	○ <u>E</u> xisting user				
	User name				
			Back Next	Finish Cance	l Help

Figure 5-9 Create new user for DB2 Administration Server (DAS)

11. You will be prompted whether you want to set up a DB2 instance. Accept the default to **Create a DB2 instance** and click **Next** to continue (see Figure 5-10).



Figure 5-10 Set up a DB2 instance

12. In the panel shown in Figure 5-11, accept the default to create a **Single partition instance** and click **Next** to continue.



Figure 5-11 Choose to create a single partition instance

13. The next panel, shown in Figure 5-12, will prompt you for user information for the DB2 instance owner. This user must have a minimal set of system privileges. Accept the default to create a **New user** and specify a password. Click **Next** when you are ready.

**Note:** The TPC database repository will be stored in the home directory of the DB2 instance owner specified here. Make sure to place the user's home directory on a file system that has sufficient free space available; /home is usually not large enough for database repositories!

In general, choose the file system with the most available free space on your system to hold database repositories. If you are uncertain about the available file systems and their size, use the **df** -**h** command to get an overview. For additional information about space requirements, refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31.

XDB2 Setup - DB2 Ente	erprise Server Edition Versi	on 9.5 Fix Pack 3		
DB2 Setup - DB2 Enter <u>1</u> . Introduction <u>2</u> . Software License     Agreement <u>3</u> . Installation type <u>4</u> . Installation action <u>5</u> . Installation action <u>5</u> . Installation <u>6</u> . SA MP Base     Component <u>7</u> . DAS user <u>8</u> . Instance setup <u>9</u> . Partitioning     options <u>10</u> . Instance ownint <u>user     11. Fenced user     12. Tools catalog     13. Notification     Setup     14. Contact     15. Summary </u>	erprise Server Edition Versi Set user inform Specify the instance-ow functions, and will store the same as the user no New user User name UID Group name GID Password Confirm password Home directory Existing user User name	on 9.5 Fix Pack 3  nation for the DB2 ming user information for the instance information in the u me.  db2inst1  db2iadm1  r******* /home/db2inst1	Cinstance owner DB2 instance. DB2 will use this user's home directory. The name ✓Use default UID ✓Use default GID 	user to perform instance of the instance will be
		<u>▲ Back</u>	L Next Finish Canc	el Help

Figure 5-12 Create new user for DB2 instance owner

14. The last user you have to specify is the DB2 fenced user, which is used to execute User Defined Functions (UDFs) and stored procedures. This user must have minimal system privileges as well. We recommend that that you create a **New user** as shown in Figure 5-13. Specify a new password and click **Next** to continue.

💥 DB2 Setup - DB2 Ente	rprise Server Edition Versi	on 9.5 Fix Pack 3		
1. Introduction       2. Software License       3. Installation type       4. Installation action	Set user inform Specify the required info procedures will execute	nation for the fenced u ormation for the fenced user. Fenced under this user and group.	Ser I user defined functions (UDFs	;) and stored
5. Installation direct	💿 Ne <u>w</u> user			
<u>6</u> . SA MP Base Comj <u>7</u> . DAS user	User name	db2fenc1		
<u>8</u> . Instance setup <u>9</u> . Partitioning optio	UID		<b>√</b> <u>U</u> se default UID	
10. Instance-owning	Group name	db2fadm1		
12. Tools catalog	GID		✓Use default <u>G</u> ID	
14. Contact	Password	*****		
15. Summary	Confirm password	******** <u> </u>		
	Home directory	/home/db2fenc1 ···	]	
	) <u>E</u> xisting user			
	User name	<u>.</u>		
		Back Ne	xt D Einish Cancel	Help
		- Eacy Tie		-rep

Figure 5-13 Create new user for DB2 instance owner

15. The next panel prompts you to prepare the DB2 tools catalog. Because this component is not required by Tivoli Storage Productivity Center, click **Do not prepare the DB2 tools catalog** as shown in Figure 5-14. Click **Next** when you are ready.

Introduction	Prepare the DB	2 tools catalog		
Installation type	The DB2 tools catalog n to schedule common tas	nust be created in order to use the Task sks such as backups. The DB2 tools cata	Center and scheduler. log must be stored in a	These tools allow you a DB2 database.
Installation action	⊖ <u>P</u> repare the DB2	tools catalog		
DAS user	Instance	db2inst1		
Partitioning optio	Database			
. Instance-owning Fenced user	©N <u>e</u> ₩	TOOLSDB		
. Tools catalog	Existing	<select></select>		
. Notification setu	Schema			
. Summary	New	รรราดอเร		
	 ⊖Evicting	<select></select>		
	Oevisving			
	Do not prepare t	he DB2 tools catalon		
	<u>O Bo not prepare (</u>	ne bbz (oon) catalog		

Figure 5-14 Choose not to prepare the DB2 tools catalog

16. The panel shown in Figure 5-15 allows you to specify a Notification SMTP (e-mail) server. You can optionally specify an existing server or click **Do not set up your DB2 server to send notifications at this time**—a notification server can always be specified after the installation is finished. Make a choice and click **Next** to continue.

**Tip:** Configuring DB2 to send e-mail notifications on errors and warning conditions can help resolve those conditions more quickly, thus improving overall stability and resiliency of the solution. This is an important factor in preventing unplanned outages!

DB2 Setup - DB2 Enter	prise Server Edition Version 9.5 Fix Pack 3
1. Introduction         2. Software License         3. Installation type         4. Installation action         5. Installation direct	Set up notifications You can set up your DB2 server to automatically send e-mail or pager notifications to alert administrators when a database needs attention. The contact information is stored in the administration contact list. You need an unauthenticated SMTP server to send these notifications.
<u>6</u> . SA MP Base Comj <u>7</u> . DAS user	Set up your DB2 server to send notifications
<u>8</u> . Instance setup 9. Partitioning optio	Notification SMTP server baltic
10. Instance-owning 11. Fenced user	Administration contact list location
12. Tools catalog 13. Notification setu	Local - Create a contact list on this computer
14. Summary	<u>Remote</u> - Use an existing contact list that resides on another D82 server
	Remote DB2 server
	© Do not set up your DB2 server to send notifications at this time
	If you do not set up your DB2 server to send notifications, the health alerts are still recorded in the administration notification log.

Figure 5-15 Optionally specify a notification server

17. Figure 5-16 shows the summary panel about what is going to be installed. Review all settings and, if you agree with them, click **Finish** to begin copying files.

on License n type	Start copying files and create response file The DB2 Setup wizard has enough information to start copying the program files and create file. If you want to review or change any settings, click Back. If you are satisfied with the set to begin cooving files and create the response file.	the response tings, click Finish
n direct		
se Comi		
	FCM port range: 60000-60003	
setup	Service name: db2c db2inct1	
ng optio	Port number: 50001	
-ownin(	Instance user information:	
user	User name: db2inst1	
italog	Group name: db2iadm1	
ion setu	Home directory: /home/db2inst1	
y 👘	Fenced user information:	
	User name: db2fenc1	
	Group name: db2fadm1	
	Home directory: /home/db2fenc1	
	UB2 lext Search:	
	HITP service name: up2j_up2insti	
	HITP Service port number: 55001	
	DB2 Administration server	
	Instance user information:	
	User name: dasusr1	
	Group name: dasadm1	
	Home directory: /home/dasusr1	
	Kesponse file name: /root/db2ese.rsp	
		nish Cancel

Figure 5-16 Installation summary

- 18. You will see a progress panel as the installer copies the required files. Wait for the installation to complete.
- 19. When the installation was successful, you will see a panel such as Figure 5-17. Click **Finish** to close the panel.



Figure 5-17 Setup Complete

20. After you have completed installing DB2, you need to edit the file /etc/group and add the root account to the db2iadm1 group. The db2iadm1 group line in /etc/group looks like this:

db2iadm1:x:102:root

## Verifying that DB2 is installed correctly

The general steps to verify that DB2 has been installed properly are as follows:

- Create the SAMPLE database.
- Connect to the SAMPLE database.
- Run a query against the SAMPLE database.
- Drop the SAMPLE database.

You can verify that DB2 has been installed properly using the following procedure:

1. Log on as a user with root authority.

**Note:** After adding the root account to the **db2iadm1** group as outlined in the previous section, you need to log out and log back in to allow the system to pick up this change.

Before proceeding, check that root is a member of this group by issuing the id command. Make sure that the output line contains the db2iadm1 group—it looks similar to Figure 5-18.



Figure 5-18 Verify that root is member of db2iadm1 group

- 2. In order to set the environment variables for the database instance, you need to source the instance profile (db2profile) found in the instance user's home directory:
  - . /home/db2inst1/sqllib/db2profile

Note: There is a space between . and /home.

 After setting the DB2 environment variables, you can verify the installed version of DB2 by issuing the db21eve1 command.

The output will indicate which DB2 instance is currently being used, which code release is installed, and whether the selected DB2 instance is 32-bit or 64-bit, as shown in Figure 5-19.



Figure 5-19 Verify DB2 version and level

**Important:** Especially note whether the selected DB2 instance is 32-bit or 64-bit because this will greatly affect future installation steps!

4. Make sure that DB2 was started and is currently running by issuing the **db2start** command. If this gives you an error as shown in Figure 5-20, that means DB2 was already running when you issued the command. Otherwise it will be started now.



Figure 5-20 Verify that DB2 is running

5. Enter the **db2samp1** command to create the SAMPLE database. The results look similar to Figure 5-21.



Figure 5-21 Create sample database

Note: This process can take several minutes to complete.

6. Enter the following commands to connect to the SAMPLE database, retrieve a list of all the employees that work in Department 20, and reset the database connection:

```
db2 connect to sample
db2 "select * from staff where dept = 20"
db2 connect reset
```

7. If all steps completed successfully, you can remove the SAMPLE database. Enter the following command to do so:

db2 drop database sample

The results look similar to Figure 5-22.

🚽 root@baltic:~	
[root@baltic ~]# db2 connect to sample	<b></b>
Database Connection Information	
Database server = DB2/LINUXX8664 9.5.3 SQL authorization ID = ROOT Local database alias = SAMPLE	
[root@baltic ~]# db2 "select * from staff where dept = 20"	
ID NAME DEPT JOB YEARS SALARY COMM	
10 Sanders 20 Mgr 7 98357.50 -	
20 Pernal 20 Sales 8 78171.25 612.45	
80 James 20 Clerk - 43504.60 128.20	
190 Sneider 20 Clerk 8 34252.75 126.50	
4 record(s) selected.	
[root@baltic ~]# db2 connect reset	
DB20000I The SQL command completed successfully.	
[root@baltic ~]# db2 drop database sample	
DB200001 The DROP DATABASE command completed successfully.	
[root@baltic ~]#	

Figure 5-22 Verify DB2 installation

You have now successfully completed the DB2 installation.

# 5.3.2 Agent Manager installation using 64-bit DB2 instance: GUI install

The Agent Manager is required only if you plan to install Data agents and Fabric agents.

Agent Manager is optional. If you decide at a later stage to install Agent Manager, you can do so. However, you will then be required to register the Agent Manager with TPC manually before installing Data agents and Fabric agents. For additional information about manually registering the Agent Manager with TPC, refer to *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337, Chapter 3. "Configuring IBM Tivoli Storage Productivity Center"  $\rightarrow$  "Agent Manager Registration."

When you install a new version of Agent Manager on your system, you will be installing version 1.3.2. You can also upgrade from previous versions to 1.3.2. For additional information, refer to *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337, Chapter 4. "Upgrading and migrating the IBM Tivoli Storage Productivity Center family"  $\rightarrow$  "Upgrading Agent Manager."

Agent Manager requires a DB2 database repository. You can install Agent Manager using a 32-bit DB2 instance or a 64-bit DB2 instance. To determine the level of DB2 that you have, run the db21evel command.

In this example, we will be installing Agent Manager using a 64-bit DB2 instance. For information about how to install Agent Manager on 32-bit DB2 instances, refer to *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2337, Chapter 2. "Installing the IBM Tivoli Storage Productivity Center family"  $\rightarrow$  "Installing the Agent Manager using a 32-bit DB2 instance - GUI install."

# Preparing the DB2 database for use with Agent Manager

Follow these steps:

1. Log on as a user with root authority.

**Note:** After adding the root account to the **db2iadm1** group as outlined in 5.3.1, "DB2 installation: GUI install" on page 267, you need to log out and log back in to allow the system to pick up this change.

Before proceeding, check that root is a member of this group by issuing the **id** command. Make sure that the output line contains the **db2iadm1** group.

2. In order to set the environment variables for the database instance, you need to source the instance profile (db2profile) found in the instance user's home directory:

```
. /home/db2inst1/sqllib/db2profile
```

Note: There is a space between . and /home.

- Make sure that DB2 was started and is currently running by issuing the db2start command. If this gives you an error as shown in Figure 5-20 on page 284, that means DB2 was already running when you issued the command. Otherwise it will be started now.
- 4. If you have not done so already, verify which version of DB2 is installed by issuing the db21eve1 command. The output will indicate which DB2 instance is currently being used, which code release is installed, and whether the selected DB2 instance is 32-bit or 64-bit, as shown in Figure 5-19 on page 283.

**Important**: There are separate Agent Manager installation procedures for 32-bit and 64-bit DB2 instances. We discuss the procedure for 64-bit instances, only.

- 5. Installing Agent Manager on a 64-bit DB2 instance will require you to manually prepare the database prior to running the Agent Manager installer. Before creating the database, make sure DB2 communication method is set to TCP/IP by running the following command:
  - db2set DB2COMM=tcpip

The correct value returned is **tcpip**. If the communication method is not set to TCP/IP, refer to the following URL for instructions on how to set it:

http://publib.boulder.ibm.com/infocenter/db2luw/v9/index.jsp?topic=/com.ibm.db2 .udb.uprun.doc/doc/t0004727.htm 6. In order to prepare the database *IBMCDB*, which is to be used by Agent Manager, open a DB2 command prompt by issuing the **db2** command as shown in Figure 5-23.

```
🛃 root@baltic:~
                                                                             _ 🗆 🗙
[rootRbaltic ~]# db2
                                                                                 ٠
(c) Copyright IBM Corporation 1993,2007
Command Line Processor for DB2 Client 9.5.3
You can issue database manager commands and SQL statements from the command
prompt. For example:
   db2 => connect to sample
   db2 => bind sample.bnd
For general help, type: ?.
For command help, type: ? command, where command can be
the first few keywords of a database manager command. For example:
? CATALOG DATABASE for help on the CATALOG DATABASE command
? CATALOG
                   for help on all of the CATALOG commands.
To exit db2 interactive mode, type QUIT at the command prompt. Outside
interactive mode, all commands must be prefixed with 'db2'
To list the current command option settings, type LIST COMMAND OPTIONS.
For more detailed help, refer to the Online Reference Manual.
db2 =>
```

Figure 5-23 DB2 command prompt

a. To manually create the database object, issue the following command (Figure 5-24): db2 =>CREATE DATABASE IBMCDB USING CODESET UTF-8 TERRITORY US





**Note:** We use the default database name, which is *IBMCDB*. We recommend staying with the default name, however, you can make it whatever you prefer, keeping in mind that it must not exceed 8 characters.

b. To set the required parameters of the database object, run the following command:

db2 =>UPDATE DATABASE CONFIGURATION FOR IBMCDB USING DBHEAP 8192 APPLHEAPSZ 4096 APP CTL HEAP SZ 512 STMTHEAP 32768 PCKCACHESZ 2000 CATALOGCACHE SZ 360 LOGBUFSZ 800 UTIL HEAP SZ 10000 STAT HEAP SZ 6000 MINCOMMIT 1 NUM IOCLEANERS 1 NUM IOSERVERS 3 MAXAPPLS 120 AVG APPLS 5 NUM DB BACKUPS 30 LOGPRIMARY 6 LOGSECOND 50 LOGFILSIZ 1024

The result looks like Figure 5-25.



Figure 5-25 Update database parameters

c. To verify that the database has been created, run the following command:

db2 =>list db directory

The result looks like Figure 5-26.

🛃 root@baltic:~		
db2 => list db directory		
System Database Directory		
Number of entries in the directory =	1	
Database 1 entry:		
Database alias	=	IBMCDB
Database name	=	IBMCDB
Local database directory	=	/home/db2inst1
Database release level	=	c.00
Comment	=	
Directory entry type	=	Indirect
Catalog database partition number	=	0
Alternate server hostname	=	
Alternate server port number	=	
db2 =>		<b>•</b>

Figure 5-26 Verify creation of database

d. Type **quit** at the command prompt to exit DB2 interactive mode.

# Accessing the installation media using the CD

Follow these steps:

1. Create a mount point or choose an existing mount point. To create a mount point called /cdrom, we enter the following command:

mkdir /cdrom

2. Insert the Agent Manager CD into the CD-ROM drive. Mount the CD-ROM file system at the desired mount point. Run the following command to achieve this:

mount -o ro /dev/cdrom /cdrom

3. Change to the installation directory where the CD-ROM is mounted, for example:

cd /cdrom/Linux/EmbeddedInstaller

### Accessing the installation media using a downloaded image

Follow these steps:

1. Create a temporary directory (for example, amtemp) to hold the Agent Manager installer tar file and untarred files. These files require 2 GB of hard drive space.

mkdir /amtemp

- 2. Copy or download the Agent Manager installer into the amtemp directory.
- 3. Change to the directory where you have stored the image, for example:

cd /amtemp

4. Un-tar (extract) the Agent Manager installer file, following the instructions supplied at the repository from which you downloaded the image, which might involve running the **tar** or **gunzip** commands, or a combination of both. For example:

tar -xvzf AgentManagerEmbeddedWS\_Linux.tar.gz

- 5. Change to the installation directory, which you extracted from the image. For example:
  - cd /amtemp/EmbeddedInstaller

# Beginning the installation

**Note:** You must have the X11 graphical capability installed before installing Agent Manager using the GUI. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

Follow these steps:

1. Run the following command to execute the graphical installer:

./setupLinux.bin

This will open the Agent Manager InstallShield Wizard.

2. The installation wizard prompts you as to whether you want to use an already existing WebSphere instance (the runtime container for Agent Manager) or install a new one. It is not supported to install Agent Manager on an existing WebSphere Application Server instance, so choose The embedded version of the IBM WebSphere Application Server as shown in Figure 5-27. Click Next when you are ready to continue with the installation.

**Note:** You have the option to choose an existing WebSphere Application Server. This option, however, is not supported—so do not select this option.

🕍 InstallShield Wizard for Insta	alling the Agent Manager	
	Choose the runtime container for the Agent Man The embedded version of the IBM WebSpher The Websphere Application Server. Make sur	ager: e Application Server delivered with the Agent Manage re that the WebSphere Application Server is already ir
InstallShield		< <u>Back</u> <u>Next &gt; Cancel</u>

Figure 5-27 Select runtime container

3. The installation wizard will prompt you for the directory to install Agent Manager, as shown in Figure 5-28. You can change the directory or accept the defaults. Make sure the installation folder has sufficient free space available, then click **Next** to continue.

🐮 InstallShield Wizard for Ins	talling the Agent Manager
IBM.	Click Next to install "Tivoli Agent Manager" to this directory, or click Browse to install to a different directory. Directory Name: /opt/IBM/AgentManager Browse
InstallShield	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel

Figure 5-28 Choose installation directory

4. The panel shown in Figure 5-29 prompts you for the location of the registry database. When installing on a 64-bit DB2 instance, you must choose DB2 database on another computer (without DB2 Administrator Client), even though DB2 is installed locally. Click Next to continue with the installation.



Figure 5-29 Choose type and location of the database for the registry

5. Enter the required DB2 database connection information as prompted by the installer. See Figure 5-30 for an example.

🖄 InstallShield Wizard for Insta	alling the Agent Manager	
	DB2 Universal Database Connection Information	
IBM.	Host Name of DB2 Universal Database Server	
	localhost	
	Database Port	
	50000	
	Database Name	
	IBMCDB	
	Location of DB2 Universal Database Type 4 Drivers for JDBC	
	/home/db2inst1/sqllib/java	
		Browse
	Because you are not using the DB2 Administration Client to connect to the remote data database must be precentiqueed on the remote system before you continue. For jectru	base, the
	preconfiguring the database, see the agent manager documentation about configuring	a remote
	registry.	
InstallShield		
marginalmenti -		
	< <u>B</u> ack <u>N</u> ext >	<u>C</u> ancel

Figure 5-30 DB2 database connection information

When installing Agent Manager with 64-bit DB2 instances, you need to change the **Location of DB2 Universal Database Type 4 Drivers for JDBC** to the proper directory containing the db2jcc.jar file. In this example, it is /home/db2inst1/sqllib/java.

See the TPC 4.1 Flash for additional details, which can be found at the following URL:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&dc=D600&uid=swg2
1383263&loc=en\_US&cs=UTF-8&lang=en

**Tip**: If you are uncertain about the TCP/IP port that DB2 is using, run the following commands (make sure you have sourced db2profile prior to running the commands):

db2 get dbm cfg | grep SVCENAME TCP/IP Service name

(SVCENAME) = db2c db2inst1

This will output the service name the DB2 instance is using—in this example, it is **db2c\_db2inst1**. The service name is mapped to a port number in the file /etc/services —the following command will resolve it:

```
grep db2c_db2inst1 /etc/services
db2c_db2inst1 50000/tcp
```

The Agent Manager installer will require you to input port **50000** in this example; see Figure 5-31.

<pre>[root@baltic ~]# db2 get dbm cfg   grep SVCENAME TCP/IP Service name (SVCENAME) = db2c_db2inst1 [root@baltic ~]# grep db2c_db2inst1 /etc/services db2c_db2inst1 50000/tcp</pre>	⊮ root@baltic:~	_ 🗆 🗵
[root@baltic ~]#	<pre>[root@baltic ~]# db2 get dbm cfg   grep SVCENAME TCP/IP Service name (SVCENAME) = db2c_db2inst1 [root@baltic ~]# grep db2c_db2inst1 /etc/services db2c_db2inst1 50000/tcp [root@baltic ~]#</pre>	

Figure 5-31 Verify TCP/IP port DB2 is using

6. The next panel will prompt you for database user information. Specify a user ID with administrative database authority as **Database Runtime User ID**, such as **db2inst1** - see Figure 5-32 for details. Leave **Use a different User ID during the installation** unchecked and click **Next** to continue.

🕍 InstallShield Wizard for Ins	talling the Agent Manager
	Database User Information
IBM.	Specify the user ID and password for accessing the database
	Database Runtime User ID
	db2inst1
	Password
	*****
	Use a different user ID during the installation
	Specify a separate user ID for installing the agent manager. This user must have the authority to create a database and tables. This lets you limit the authority you give the runtime user ID because it does not need the authority to create objects.
	Database Administrator User ID
	Password
InstallShield	
instalishield -	
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel

Figure 5-32 DB2 user information

7. The panel shown in Figure 5-33 allows you to input the network information used by the Agent Manager. This information is used by agents to connect to the Agent Manager. Make sure the specified host name properly resolves to the Agent Manager's IP address.

📓 InstallShield Wizard for Installing the Agent Manager		
	WebSphere Application Server Connection Information	
	Host Name or Alias of Agent Manager	
IBM.	baltic.itso.ibm.com	
	Tip: This is the network name that common agents and resource managers use to connect to the agent manager. Use a host name that can be resolved by those systems. For example, use a network alias such as AgentManagerServer or a fully qualified host name such as agman.mycompany.com.	
	Registration Port	
	Secure Port	
	Public Part and Alternate Part (anthe Asses Press on Carlies	
	Public Port and Alternate Port for the Agent Recovery Service	
	Do not use port 80 for the agent recovery service	
	Tip: If you want to run the agent manager as a user other than root, you must check this box.	
InstallShield		
	A Park Novt > Consol	

Figure 5-33 WebSphere Application Server connection information

We recommend that you accept the default to use port 80 for the agent recovery service. Leave **Do not use port 80 for agent recovery service** unchecked. If you are not sure if port 80 is being used by another application, you can issue **netstat** -a -n, and look for port 80 in the listening state.

**Note:** We recommend that you use fully qualified host names. This value is used for URLs for all Agent Manager services. It is preferable to use the fully qualified host name rather than an IP address.

Accept the default ports and continue to the next panel by clicking Next.

8. Accept the defaults when prompted for **Application Server Name** and **Context Root**, as shown in Figure 5-34.

📓 InstallShield Wizard for Installing the Agent Manager			
WebSphere Application Server Connection Information			
	Application Server Name		
IEM.	AgentManager		
	Use this name to start and stop the application server and to locate the agent manager files in the WebSphere directory.		
	Context Root of Application Server		
	/AgentMgr		
	The context root is part of the URL that common agents and resource managers use to contact the agent manager. The underlined string in the following URL, including the forward slash, is the context root: http://baltic.itso.ibm.com:9513 <u>/AgentMgr</u>		
	☑ Automatically start the agent manager each time the system restarts		
InstallShield	< <u>B</u> ack <u>Next</u> <u>C</u> ancel		

Figure 5-34 Application Server information

We recommend that you choose **Automatically start the agent manager each time the system starts**, so accept the default setting and click **Next** to continue.

9. The Security Certificates panel shown in Figure 5-35 lets you choose whether you want to use demonstration certificates or create your own certificates for this installation. *We highly recommend that you generate new certificates for a secure environment!* 

🛐 InstallShield Wizard for Installing the Agent Manager			
Security Certificates			
IBM.	Do you want to create certificates that are specific to this installation of the agent manager, or use the demonstration certificates?		
	Create certificates for this installation		
	O Use the demonstration certificates		
	Demonstration certificates are publicly available and do not provide the level of security required by a typical IT environment. They are provided for testing or demonstration environments only.		
InstallShield			
	< <u>B</u> ack <u>Next</u> <u>Cancel</u>		

Figure 5-35 Security Certificates

Choose to generate new certificates and click Next to continue.

10. Accept the default **Certificate Authority Name** and **Security Domain** as seen in Figure 5-36.

📓 InstallShield Wizard for Installing the Agent Manager 📃 🗖 🗙			
Define the Certificate Authority			
	Certificate Authority Name		
IBM.	TivoliAgentManagerCA		
	Security Domain		
	itso.ibm.com		
	Certificate Authority Password		
	This password locks the certificate authority truststore. The CA password is typically used only by the agent manag	ier.	
	If your security policies do not require you to examine the contents of the CA truststore you can leave this field bla to generate a randomized password.	.nk	
	Password *******		
	Confirm Password		
InstallShield			
	< <u>Back</u> <u>Next</u> > <u>Cancel</u>		

Figure 5-36 Certificate Authority

**Note:** Even though not required, we recommend that you specify a password to lock the certificates. If you do not specify a password, you will not be able to unlock the certificate files in case of problems.

Click Next to proceed with the installation.

11.On the panel shown in Figure 5-37, enter the required passwords:

📓 InstallShield Wizard for Installing the Agent Manager 📃 🛛 🗙			
	Set Passwords		
	Set Passwords Agent Manager Pas This password locks the (agentManagerKeys.jks) This password is used i Password Confirm Password Agent Registration F A common agent must This password also lock certificate in its copy of it registers with the coi This password is requir Password Confirm Password	sword e agent manager truststore file (AgentManagerTrust.jks) and keystore file s). internally by the agent manager.  ******* Password provide this password to register with the agent manager. ks the agentTrust.jks truststore file. A common agent or resource manager compares the f the agentTrust.jks file with the certificate presented by the agent manager to make sure rrect agent manager.  ********  *******  *******  *******	that
InstallShield			
		< <u>B</u> ack <u>N</u> ext > <u>C</u> ance	el

Figure 5-37 Set passwords

#### Agent Manager Password:

This is the resource manager registration password. This password is used to register the Data Server and Device Server with the Agent Manager. Enter the password twice.

We recommend that you record it in the worksheets provided in Appendix C, "Worksheets" on page 641.

#### **Agent Registration Password:**

This is the password used to register the Common Agents (for Fabric agent and Data agent). You must supply this password when you install the agents. Enter the password twice.

You specify a unique password and record it in the worksheets provided in Appendix C, "Worksheets" on page 641. You must provide a password here, otherwise you cannot continue the installation.

12. The User Input Summary panel is displayed as seen in Figure 5-38.

🕍 InstallShield Wizard for Ins	talling the Agent Manager
	User Input Summary Installation location: /opt/IBM/AgentManager Type and Location of the Database for the Registry: DB2 Universal Database Type of database connection: Local database Database Name: IBMCDB Database Name: IBMCDB Database Runtime User ID: db2admin WebSphere Application Server Cell Name: AgentManagerCell WebSphere Application Server Profile Directory: /opt/IBM/AgentManager/AppServer/agentmanager WebSphere Application Server Installation is complete: true Automatically start the agent manager each time the system restarts: true Application Server Name: AgentManager: baltic.tso.ibm.com Certificate Authority Name: TivollAgentManagerCA Security Domain: localdomain
InstallShield	< Back Next > Cancel

Figure 5-38 User Input Summary

Review the information that you have provided for the Agent Manager installation. If you agree with the settings, click **Next** to continue with the installation.

- 13. You will see a progress panel as the installer copies the required files. Wait for the installation to complete.
- 14. After the embedded version of WebSphere has been installed and configured, you will see the summary information panel for Tivoli Agent Manager, as illustrated in Figure 5-39.

🕍 InstallShield Wizard for Inst	alling the Agent Manager
	Please read the summary information below.
	Tivoli Agent Manager will be installed in the following location:
IBM.	/opt/IBM/AgentManager with the following features:
	Tivoli Agent Manager
	for a total size:
	202 MB
InstallShield	
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel

Figure 5-39 Summary information for Agent Manager

Click **Next** to proceed with the installation.

- 15. You will see a progress window as Agent Manager is installed. Wait for the installation to complete.
- 16. You will be prompted whether you want to Start the Agent Manager Application Server now, as illustrated in Figure 5-40. Select **Yes** and click **Next** to finish the installation.

🐮 InstallShield Wizard for Inst	alling the Agent Manager	- 🗆 🗙
	Start the AgentManager Application Server?	
	Do you want to start the AgentManager application server now?	
IBM.	● Yes, start AgentManager now	
	O No, I will start AgentManager later	
InstallShield		
marcanamena	< Back Next > Cance	el

Figure 5-40 Start Agent Manager Application Server

17. When the installation was successful, you will see a summary panel such as Figure 5-41.



Figure 5-41 Installation summary

Click Next to continue.

18.A final summary panel will be displayed, such as the one shown in Figure 5-42. Click **Finish** to close the graphical installer.

🕍 InstallShield Wizard for Inst	alling the Agent Manager
	Please read the summary information below.
IBM.	The installation is complete and the agent manager application server has been started. Click Finish to exit the installation.
InstallShield	< Back Next > Finish

Figure 5-42 Installation complete

## Verifying that Agent Manager is installed correctly

You can verify the installation by running the HealthCheck utility:

1. Change to the directory where Agent Manager is installed, and descend to the toolkit/bin subdirectory, for example:

```
cd /opt/IBM/AgentManager/toolkit/bin
```

2. Run the HealthCheck.sh command to verify that Agent Manager is installed correctly. You have to specify the agent registration password as part of the -registrationPW parameter:

./HealthCheck.sh -registrationPW password

See Figure 5-43 for an example:

🚰 9.12.5.35 - PuTTY			
# pwd		▲	
/opt/IBM/AgentManager/too	lkit/bin		
# 1s			
EncryptDBPassword.sh	PurgeAgents.sh	backupTool.sh	
HealthCheck.sh	RelocationTool.sh	db_info.cfg	
LogCollector.sh	RetrieveAgents.sh		
LogicallyDeletelgents.sh	WSRetrieveAgents.sh		
# ./HealthCheck.sh -regis	trationPw password		
Tool Launcher is trying t	o instantiate Command lin	e tool com.tivoli.cas.manager.	
ools.HealthCheck			
Command Line Tool com.tiv	oli.cas.manager.tools.Hea	lthCheck succesfully instantia	
1ed.	<b>Nm</b>		
Apr 30, 2009 3:40:03 PM P	Di Arguments passed to C	ommand Line 1001: -HUSI 100al	
ost -registrationPW password			
Apr 50, 2009 Site in PDI Initializing Configuration with file:/opt/ibm/Agent			
anager coorrespondences and second studies and an and a second second state and the second se			
tem true non-set			
INFO: NOTE ==>Connected to host=localhost on nort=9513			
Apr 30, 2009 3:40:07 PM c	om.tivoli.agentmgr.client	.proxv.WSDLClient\$AddressCache	
tem directConnect			

Figure 5-43 HealthCheck command

Refer to the HealthCheck.readme file located in the toolkit directory for additional information about usage of **HealthCheck**.

3. The output looks similar to Figure 5-44. Especially, look for the output:

Health Check passed.

🛃 9.12.5.35 - PuTTY	
Query.Agent.Max.Return	= -1
Query.Database.Type	= db2
ARS.version	= 1.3.2.30
Key.Algorithm.Name	= RSA
Config.Listener.Manager	= com.tivoli.agentmgr.spi.providers.
akeAgentRegistryUpdate, com.tivoli.agentm	ngr.cert.AgentStatusChangeListener
Config.Listener.Agent	= com.tivoli.agentmgr.spi.providers.
akeAgentRegistryUpdate	
Registration.Listeners.Manager.Request	= com.tivoli.agentmgr.registration.A
thorizationValidator, com.tivoli.agentmgr	.registration.AuthorizationTestOnly, co
.tivoli.agentmgr.registration.AgentReregi	IstrationTest
Registration.Listeners.Manager.Issue	= com.tivoli.agentmgr.registration.S
oreCertificateListener	
Registration.Listeners.Agent.Request	= com.tivoli.agentmgr.registration.S
mplePWRequestValidator, com.tivoli.agentm	<pre>ngr.registration.AuthorizationTestOnly,</pre>
om.tivoli.agentmgr.registration.AgentRere	gistrationTest
Registration.Listeners.Agent.Issue	= com.tivoli.agentmgr.registration.S
oreCertificateListener	
Apr 30, 2009 3:40:09 PM PDT Health Check	t passed.
Apr 30, 2009 3:40:09 PM PDT Command Line	e Tool execution successful.
#	

Figure 5-44 Health Check passed

You have now successfully completed Agent Manager installation.

# 5.4 Installing Tivoli Storage Productivity Center components

Now that the prerequisites have been installed, we can install the Tivoli Storage Productivity Center components.

Before you begin the installation, consider the following requirements:

- Confirm that the correct versions of DB2 and Agent Manager (optional) are installed on your system.
- User IDs that will be required during the installation have been documented for reference. Refer to Appendix C, "Worksheets" on page 641.

- If you are considering the use of LDAP, ensure that you have all the correct information. Refer to Chapter 6, "LDAP authentication support and Single Sign-On" on page 335.

**Tip:** We recommend that you install the Database Schema first. After that, install Data Server, Device Server, Tivoli Storage Productivity Center for Replication, and Tivoli Integrated Portal in a separate step.

If you install all the components in one step, if any part of the installation fails for any reason (for example, space or passwords), the installation suspends and rolls back, uninstalling all the previously installed components.

## Accessing the installation media using the CD

Follow these steps:

1. Create a mount point or choose an existing mount point. To create a mount point called /cdrom, we enter the following command:

mkdir /cdrom

 Insert the Tivoli Storage Productivity Center Disk 1 CD into the CD-ROM drive. Mount the CD-ROM file system at the desired mount point. Run the following command to achieve this:

mount -o ro /dev/cdrom /cdrom

3. Change to the installation directory where the CD-ROM is mounted, for example:

cd /cdrom

# Accessing the installation media using a downloaded image

Follow these steps:

1. Create a temporary directory (for example, tpctemp) to hold the Tivoli Storage Productivity Center installer tar files and untarred files. These files require 3-4 gigabytes of hard drive space.

mkdir /tpctemp

- 2. Copy or download the Tivoli Storage Productivity Center installer into tpctemp.
- 3. Change to the directory where you have stored the image, for example:

cd /tpctemp

4. Un-tar (extract) the Tivoli Storage Productivity Center installer files, following the instructions supplied at the repository from which you downloaded the image, which might involve running the **tar** or **gunzip** commands, or a combination of both. For example:

```
tar -xvzf TPC_4.1.0.97_SE_linux_ix86_disk1_part1.tar.gz
tar -xzvf TPC_4.1.0.97_linux_ix86_disk1_part2.tar.gz
```

Note: Be sure to extract both parts of Disk 1 to the same directory!

# 5.4.1 Creating the database schema

This topic provides information about how to create the database schema for use with Tivoli Storage Productivity Center .

**Note:** If you are using a remote database for TPC, you must install the database schema on that computer first, after you have installed DB2. Afterwards you need to install the TPC server components on the other machine, and choose to use a remote database connection. We outline these activities in the following chapter.

Next we explain how to install the TPC database schema.

**Note:** You must have the X11 graphical capability installed before installing Tivoli Storage Productivity Center using the GUI. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

To install the TPC database schema, follow these procedures:

1. Log on as a user with root authority.

**Note:** After adding the root account to the **db2iadm1** group as outlined in 5.3.1, "DB2 installation: GUI install" on page 267, you need to log out and log back in to allow the system to pick up this change.

Before proceeding, check that root is a member of this group by issuing the **id** command. Make sure that the output line contains the **db2iadm1** group.

- 2. In order to set the environment variables for the database instance, you need to source the instance profile (db2profile) found in the instance user's home directory:
  - . /home/db2inst1/sqllib/db2profile

Note: There is a space between . and /home.

- 3. Make sure that DB2 was started and is currently running by issuing the **db2start** command. If this gives you an error as shown in Figure 5-20 on page 284, that means DB2 was already running when you issued the command. Otherwise it will be started now.
- 4. Change to the directory where you have extracted the Tivoli Storage Productivity Center Disk 1 software package, then launch the graphical installer by issuing the command:

./setup.sh

5. Tivoli Storage Productivity Center installer is launched, prompting you to select an installation language (see Figure 5-45). Choose a language and click **OK** to continue.

staller	
ect a language to	be used for this wizard.
English	-
ок	Cancel
	staller ect a language to English OK

Figure 5-45 Select language

6. The International Program License Agreement is displayed. Read the license text and, if you agree with it, click I accept the terms of the license agreement as shown in Figure 5-46. Click Next when you are ready to proceed with the installation.



Figure 5-46 License Agreement

7. The Installation Types panel is displayed, as seen in Figure 5-47. Click **Custom Installation**. In addition, you can change the TPC Installation Location to suite your requirements or accept the defaults. Make sure that the installation folder has sufficient free space available (Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31), then click **Next** to continue.



Figure 5-47 Choose Custom Installation

8. The panel shown in Figure 5-48 prompts you to select one or more components to install. Remove all check marks except for **Create database schema** for now. Click **Next** to continue with the installation.

IBM Tivoli Storage Productivity Center - Installer				
~	Select one or more components to inst	all on the local or remote com	iputer.	
IEM.	I his program will install of upgrade v example, if version number 3.1.0.39 means, that the version of the compo this installation, all installed compone software. You can choose to install ac	arious components displayed is displayed next to the comj nent is already installed on th nts will be upgraded to the cu ditional components which ar	below. For oonent, this is computer. In irrent version of e not installed.	
	✓ Create database schema			
	Tivoli Storage Productivity Center Servers			
	🗆 GUI	🗆 cu		
ALL VICE	🗌 Data Agent	🗌 Fabric Agent		
1.11.118	🗌 Remote Data Agent	Remote Fabric Agent		
ING				
-	Register with the agent manager      Register Launch Information With Other Applications			
IN//JB				
	< <u>B</u> ack	<u>N</u> ext >	<u>C</u> ancel	

Figure 5-48 Select Create database schema component

9. The Database administrator information panel is displayed. Specify a user ID with administrative database authority as **Database administrator**, such as **db2inst1**, as seen in Figure 5-49. Specify the according password and click **Next** to continue.

💯 IBM Tivoli Storage Prod	luctivity Center - Installer		
	Database administrator informa		
IBN.	Enter the database administra database during installation ar	tor user ID and password to connect to the nd uninstallation.	
	Database administrator	db2inst1	
	Password	****	
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> a	ncel

Figure 5-49 Database credentials

10. The panel shown in Figure 5-50 is displayed. Enter the administrative user ID (in our case, db2inst1) and according password again as *DB user ID*. Make sure that you select **Create local database**.

	vew database schema information Enter the database information that the product will use when communicating with the instance and creating the required repository tables.			
	DB user ID	db2inst1	Password	****
	🔿 Use local databa	se		
V	Port	Database	Path	Instance
			promey disense	did ti fior t
	O Use remote data	base	Database nam	e TPCDB
	Host name	localhost	Port	50000
5	/home/db2inst	1/sqllib/java/db2jcc.j	ar	JDBC driver
	Create local data	ibase	Database nam	PE TPCDB
			Database creation	details

Figure 5-50 Choose Create local database

You can click **Database creation details** in order to verify additional details, as shown in Figure 5-51. Do not change the default values unless you are a knowledgeable DB2 administrator. Click **Next** to proceed with the installation.

💯 IBM Tivoli Storage Prod	uctivity Center - Installer				
IBM.	Database schema creation i Enter the information to cre remote) computer.	nformation eate the database schema on	the specifie	ed (local or	
	Schema name	ТРС			
	Database Drive	/home/db2inst1	B <u>r</u> owse	200 MB 🔻	]
	Tablespace	Container directory		Size	
	Normal	/home/db2inst1/db2inst1/	Browse	200 MB 🔻	]
and produced and	Key	/home/db2inst1/db2inst1/	Browse	200 MB 🔻	]
	Big	/home/db2inst1/db2inst1/	B <u>r</u> owse	350 MB 🔻	]
	Temp	/home/db2inst1/db2inst1/	B <u>r</u> owse	200 MB 🔻	]
1 11/1000	Temporary user	/home/db2inst1/db2inst1/	Browse	200 MB 🔻	]
INA	System managed (SMS)	🔿 Database mar	iaged (DMS)	)	
AF/L -	C Log location	) Automatic Storage			
	/home/db2inst1/db2inst1	/TPCDB/TPC Browse	Size	20 MB 🔻	
Ť		<u>o</u> ĸ		<u>C</u> ancel	

Figure 5-51 Database schema creation

**Note:** The TPC schema name cannot be longer than eight characters.

11. Figure 5-52 shows the summary information panel. Review the information that you have provided for the database schema installation. If you are in agreement that all data entered is correct, you can proceed by clicking **Install**.

🕎 IBM Tivoli Storage Prod	uctivity Center - Installer	
	Please read the summary information below.	
	Please read the summary information below. IBM Tivoli Storage Productivity Center will be installed in the following location: /opt/IBM/TPC with the following features: Database schema for a total size: 305.7 MB total space by filesystem: / 305.63 MB	
WAU COLUMN		
	< Back Install Cancel	

Figure 5-52 Summary information

12. The progress panel is displayed. Wait for the installation to finish; the results panel looks like Figure 5-53.



Figure 5-53 Installation results

13. Click **Finish** to exit the graphical installer.
#### Verifying the database schema installation

To verify the installation, check that you have the database named **TPCDB**. Do this by following these steps:

- 1. Source the DB2 profile:
  - . /home/db2inst1/sqllib/db2profile
- 2. Verify creation of the TPCDB database by issuing the following command:

db2 list db directory

The command lists all databases that exist, as seen in Figure 5-54.

🛃 root@baltic:~		
[root@baltic ~]# db2 list db director	Υ	
System Database Directory		
Syboom bacababe bilecoory		
Number of entries in the directory =	• 2	
Detabase 1 entru:		
Pacabase I chery.		
Database alias	= IBMCDB	
Database name	= IBMCDB	
Local database directory	= /home/db2inst1	
Database release level	= c.00	
Comment	=	
Directory entry type	= Indirect	
Catalog database partition number	= 0	
Alternate server hostname	=	
Alternate server port number	=	
Database 2 entry:		
Database alias	= TPCDB	
Database name	= <b>IFGDE</b>	
Local database directory	= /home/db2inst1	
Database release level	= c.UU	
Comment	=	
Directory entry type	= Indirect	
Catalog database partition number	= U	
Alternate server hostname		
Alternate server port number	=	
[root@baltic ~]#		<b>•</b>

Figure 5-54 Verify database creation

# 5.4.2 Installing TPC Servers, GUI and CLI

After you have completed creating the database schema, you are ready to install the following Tivoli Storage Productivity Center components:

- Data Server
- Device Server
- GUI
- CLI

**Note:** In addition to the components just mentioned, two additional components will be installed by default, namely *Tivoli Integrated Portal* as well as *Tivoli Storage Productivity Center for Replication*.

You can additionally install the Data agent and Fabric agent as part of the TPC server installation, but we recommend to install them subsequently in a separate step. If you install all the components at the same time, if one fails for any reason (for example, space or passwords), the installation suspends and a rollback occurs, uninstalling all the previously installed components.

Next we describe how to complete the installation process.

**Note:** You must have the X11 graphical capability installed before installing Tivoli Storage Productivity Center using the GUI. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

Follow these steps to complete the installation process:

- 1. Log on as a user with root authority.
- 2. In order to set the environment variables for the database instance, you need to source the instance profile (db2profile) found in the instance user's home directory:
  - . /home/db2inst1/sqllib/db2profile

Note: There is a space between . and /home.

- 3. Make sure that DB2 was started and is currently running by issuing the **db2start** command. If this gives you an error as shown in Figure 5-20 on page 284, that means DB2 was already running when you issued the command. Otherwise it will be started now.
- 4. Change to the directory where you have extracted the Tivoli Storage Productivity Center Disk 1 software package, then launch the graphical installer by issuing the following command:

./setup.sh

5. Tivoli Storage Productivity Center installer is launched, prompting you to select an installation language (see Figure 5-55). Choose a language and click **OK** to continue.

🕲 Installer	
Select a language to l	be used for this wizard.
English	
<u>0</u> K	<u>C</u> ancel

Figure 5-55 Select language

6. The International Program License Agreement is displayed. Read the license text and, if you agree with it, click I accept the terms of the license agreement as shown in Figure 5-56. Click Next when you are ready to proceed with the installation.



Figure 5-56 License Agreement

7. The Installation Types panel is displayed, as seen in Figure 5-57. Click **Custom Installation**, then click **Next** to continue.



Figure 5-57 Choose Custom Installation

 The next panel prompts you to select one or more components to install. Remove all check marks except for Tivoli Storage Productivity Center Servers, GUI and CLI. Note that the database schema is greyed out, because it was already installed previously; see Figure 5-58. Click Next to continue with the installation.

💯 IBM Tivoli Storage Proc	🗓 IBM Tivoli Storage Productivity Center - Installer 📃 🗌 🗙				
IBM.	Select one or more components to in This program will install or upgrad example, if version number 3.1.0. means, that the version of the com this installation, all installed compo software. You can choose to install	nstall on the local or remote computer. e various components displayed below 39 is displayed next to the component ponent is already installed on this com nents will be upgraded to the current additional components which are not i	/. For , this puter. In version of nstalled.		
	<ul> <li>Create database schema 4.1.0.</li> <li>Tivoli Storage Productivity Center</li> <li>GUI</li> <li>Data Agent</li> <li>Remote Data Agent</li> <li>Register with the agent manager</li> <li>Register Launch Information With</li> </ul>	97 r Servers CL Fabric Agent Remote Fabric Agent r h Other Applications			
	< <u>B</u> ack	<u>N</u> ext >	<u>C</u> ancel		

Figure 5-58 Select Servers, GUI, and CLI

Tip: We recommend installing the Data agent and Fabric agent in a separate step.

If you install all the components at the same time, if one fails for any reason (for example, space or passwords), the installation suspends and a rollback occurs, uninstalling all the previously installed components.

Because we do not plan to install the Data agent or Fabric agent at this time, there is no need to **Register with the agent manager**; we perform this step subsequently.

9. If you are running the TPC installation on a system with at least 4 GB but less than the recommended 8 GB of RAM, a warning message will be displayed as seen in Figure 5-59. To ignore this message and continue with the installation, click **OK**.



Figure 5-59 Memory size warning

**Note:** 8 GB of RAM is the minimum memory requirement to run both Tivoli Storage Productivity Center and Tivoli and Tivoli Storage Productivity Center for Replication.

If you have less than 8 GB of RAM, you have to run only Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication because of system load. To do that, you must disable Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication after installation. Refer to "Disabling Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication" on page 467.

10. The Database administrator information panel is displayed, as seen in Figure 5-60. The database administrator user and password are automatically filled in. This is due to the fact that we previously used it to create the database schema. Click **Next** to continue.

💯 IBM Tivoli Storage Proc	luctivity Center - Installer		
	Database administrator infor	mation	
IBM.	Enter the database adminis database during installation	trator user ID and password to connect to the and uninstallation.	
	Database administrator	db2inst1	
	Password	******	]
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> ancel	

Figure 5-60 Database credentials

11. The database schema information panel is displayed, as shown in Figure 5-61. Because we already installed the database schema previously, nothing can be changed here. Click **Next** to continue with the installation.

Note that if you want to use a remote database on another machine, then you need to install the TPC schema component on this machine first, following the procedure documented in the previous section. Afterwards, install the TPC server components, select the **Use remote database** option, and specify the host name of the server running the DB2 Manager.

rivoli Storage Prod	Existing database s	aller chomo informat	ion			
2	Existing database schema information					
M. 🥖		ion to use an ex		e schenna for (		-
	DB user ID	db2inst1	Fassw	oru	******	
	Use local datab	ase				
	Port	Database	Schema	Instance	Version	
	50000	TPCDB	ТРС	db2inst1	9.5.0.3	
	O Use remote dat	abase				
	Host name	localhost	Port		50000	
Blat -	Database name	TPCDB	Schem	a name	ТРС	
12	/home/db2inst:	L/sqllib/java/dt	o2jcc.jar		JDBC driver	
14						
1/10-						
l						

Figure 5-61 Local database preselected

12. If you selected to use a remote database, a warning message is presented to ensure that the remote DB2 instance is running before proceeding; see Figure 5-62.

Remote	database manager 🛛 🗶
⚠	The remote DB2 database manager must be active in order to successfully run Database schema installation.
	Please ensure that remote DB2 instance is running before continue the installation process.

Figure 5-62 Ensure that DB2 is running on the remote system

- 13. The panel shown in Figure 5-63 on page 318 requires the following inputs:
  - Data Server Name:

Enter the fully qualified host name of the Data Server.

Data Server Port:

Enter the Data Server port. The default is 9549.

Device Server Name:

Enter the fully qualified host name of the Device Server.

Device Server Port:

Enter the Device Server port. The default is 9550.

– TPC Superuser:

Enter an operating system group name to associate with the TPC superuser role. This group must exist in your operating system before you install Tivoli Storage Productivity Center . Membership in this group provides full access to the Tivoli Storage Productivity Center product. You can assign a user ID to this group on your operating system and log on to the TPC GUI using this user ID.

If you click the **Security roles...** button, the Advanced security roles mapping panel is displayed. You can assign an operating system group for each TPC role you want to make an association with, so you can have separate authority IDs to do various TPC operations. The operating system group must exist before you can associate a TPC role with it. Except for the superuser role, you do not have to assign security roles at installation time; you can assign these roles after you have installed TPC.

**Note:** If you select LDAP authentication later in the Tivoli Storage Productivity Center installation, then the values you enter for LDAP TPC Administrator groups override the values you entered here for the TPC superuser.

You can record information used in the component installation, such as user IDs, passwords, and storage subsystems in the worksheets in Appendix C, "Worksheets" on page 641.

- Host Authentication Password:

This is the password used for the Fabric agents to communicate with the Device Server. This password must be specified when you install the Fabric agent.

- Data Server Account Password:

This is not required for Linux installations, this is only required for Windows.

 WebSphere Application Server (WebSphere Application Server) Admin ID and Password:

This is the user ID and password required by the Device Server to communicate with the embedded WebSphere.

You can use any existing user ID here, such as the **dasusr1** ID created upon DB2 installation. The WebSphere Application Server admin ID does not need to have any operating system privileges. The user will be used for the local Tivoli Integrated Portal (TIP) administrator ID.

If you click the **NAS discovery...** button, the NAS discovery information panel is displayed. You can enter the NAS filer login default user name and password and the SNMP communities to be used for NAS discovery. You do not have to assign the NAS discovery information at installation time, you can configure it after you have installed TPC.

**Important:** Ensure that you record all passwords that are used during the installation of Tivoli Storage Productivity Center .

🖽 IBM Tivoli Storage Proc	luctivity Center - Installer			
	Data server, Device serve	er, Data agent, and A	gent Information	
IBM.	Enter the server name a to communicate with the	nd port that the Data server.	agent and Fabric agent, a	and GUI will use
	Data server name	baltic.itso.ibm.com	Data server port	9549
	Device server name	baltic.itso.ibm.com	Device server port	9550
	Enter an OS user group administrators group.	whose members will	be TPC administrators in 1	the
	TPC superuser	root	Secu <u>r</u> ity role	s
Enter a password that the Fabric agents will use to communicate with			use to communicate with t	he Device server.
	Host authentication pass	word	*****	
Enter a password that will be used to create the Data Server Account. Data Server Account Password				
UN -	WAS admin ID	asusr1 Pa	ssword ***	*****
AN ADR			NAS discovery	
			Data agent <u>o</u> ptions	
	< <u>B</u> aci	k 📃	Next >	<u>C</u> ancel

Figure 5-63 TPC Server and Agent information

When you are ready, click Next to continue.

14. The Tivoli Integrated Portal panel is displayed, as seen in Figure 5-64. You can select to install a new version of TIP or use an already existing install on the local machine.

TIP will use 10 port numbers starting from the one specified in the Port field (referred to as the Base Port). The 10 ports will be:

- base port
- base port+1
- base port+2
- base port+3
- base port+5
- base port+6
- base port+8
- base port+10
- base port+12
- base port+13

The TIP administrator ID and password are pre-filled with the WebSphere Application Server admin ID and password specified in the previous step (Device Server installation).

Click Next to continue.

💯 IBM Tivoli Storage Produ	uctivity Center - Installer	×
IBM.	Tivoli Integrated Portal (TIP) TIP provides TPC with the ability for Single Sign-On authentication, launch other applications in context, and reports to be viewed from Tivoli Common Reporting. Select an existing TIP install to be used with TPC or specify the install directory where TPC is to install TIP.	
	Spectry the location to install fill       /opt/IBM/Tivoli/tip       Port       16310       O Reuse an existing TIP install	
Ulfe	Existing TIP Installs: TIP Administrator ID dasusr1	
	Password         *******           < Back	

Figure 5-64 Tivoli Integrated Portal

**Important:** TPC Version 4.1 only supports a TIP instance that is exclusively used by TPC and TPC-R, but no other application exploiting TIP. Expect support for multiple applications using a shared TIP instance in a future release.

15. The authentication selection panel is displayed (Figure 5-65). This panel refers to the authentication method that will be used by TPC to authenticate the users.



Figure 5-65 Authentication selection

16. If you already have a valid Tivoli Integrated Portal instance on the system and it uses either OS-based or LDAP-based authentication, then TPC will use that existing authentication method.

Otherwise, select the authentication method to use:

- OS Authentication:

This uses the operating system of the TPC server for user authentication.

- LDAP/Active Directory:

If you select LDAP or Microsoft Active Directory for authentication, you must have LDAP or Active Directory installed already. Refer to Chapter 6, "LDAP authentication support and Single Sign-On" on page 335 for additional information.

Choose either of the two options and click **Next** to proceed.

- 17. If you decide to use LDAP/Active Directory authentication, additional panels are displayed to configure this authentication method. Refer to "Installing TPC Servers, GUI and CLI" on page 311 for additional details.
- 18. The summary information panel is displayed. Review the information, then click **Install** to continue as illustrated in Figure 5-66.

🕎 IBM Tivoli Storage Prod	luctivity Center - Installer	_ 🗆 🗵
IBM Tivoli Storage Prod	Iuctivity Center - Installer Please read the summary information below. IBM Tivoli Storage Productivity Center will be installed in the following location: /opt/IBM/TPC with the following features: Data server Device Server	
	GUI CLI Tivoli Integrated Portal Replication Server for a total size: 3643.9 MB total space by filesystem: / 3,643.92 MB	
	< Back Install Cancel	

Figure 5-66 Summary information

- 19. You will see a progress window as Tivoli Storage Productivity Center is installed. Wait for the installation to complete.
- 20. If you install from the electronic image, the installer might prompt you to change to the directory of the second disk. Click **Browse**, choose the directory of Disk 2, and click **OK** to continue.

**Tip:** Extract the files from Disk 1 and Disk 2 into a directory of the names: disk1 and disk2. The Tivoli Storage Productivity Center installation program will then be able to find the Disk 2 files automatically; it will not prompt with the **Insert Next Disk** panel. Put disk1 and disk2 in the same directory, for example:

/tpctemp/disk1
/tpctemp/disk2

After the TPC Data Server, Device Server, GUI, and CLI installation are complete, the installing TIP panel is displayed (see Figure 5-67). Wait for the TIP installation to finish as well.

**Note:** If the installer fails to install a specific component, the process will stop and the installer will uninstall all components.



Figure 5-67 Tivoli Integrated Portal installation

After the TIP installation has completed, the TPC for Replication installation is launched in a separate window. The TPC installation is temporarily suspended in the background and the TPC for Replication panel is displayed as seen in Figure 5-68.

IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard	
	Welcome to the InstallShield Wizard for IBM Tivoli Storage Productivity Center for Replication	
	The InstallShield Wizard will install IBM Tivoli Storage Productivity Center for Replication on your computer. To continue, choose Next. IBM Tivoli Storage Productivity Center for Replication IBM http://www.ibm.com	
InstallShield	Next > Cancel	

Figure 5-68 TPC for Replication installation

# Installing TPC for Replication

Follow these steps:

1. The Welcome panel is displayed as seen in Figure 5-68. Click Next.

**Important:** If you are not planning to use TPC for Replication and you attempt to cancel or bypass the installation, it will result in an interruption of the installation process, which will invoke a complete TPC installation rollback.

2. The system prerequisites check panel is displayed, as seen in Figure 5-69. At this stage the wizard will check that the operating system meets all prerequisite requirements as well as fix packs installed.

B ID THIN SCOUGE IT	oductivity Center for Replication -	InstallShield Wizard		
	System prerequisites check The Installation wizard checks y and whether the operating syst	your system to determine w em is at the appropriate fix	/hether a supported operati < pack or update level.	ing system is running
InstallShield		< Back	Next >	Cancel

Figure 5-69 System check

3. If the system passes the check as seen in Figure 5-70, you can continue by clicking Next.



Figure 5-70 System check complete

4. Read the license agreement text displayed on the next panel (Figure 5-71) and, if you agree with it, select I accept the terms of the license agreement prior to clicking Next.



Figure 5-71 License Agreement

5. Specify the Directory Name where you want to install TPC for Replication. You can either choose a directory by changing the location or by accepting the default directory. See Figure 5-72 for an example. Make sure that the installation folder has sufficient free space available (refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31), then click **Next** to continue with the installation.

IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard
	Click Next to install "IBM Tivoli Storage Productivity Center for Replication" to this directory, or click Browse to install to a different directory.
- 11	Directory Name: //opt/IBM/replication Browse
InstallShield	< Back Next > Cancel

Figure 5-72 Directory Name

6. The TPC-R Administrator user panel is displayed, as illustrated in Figure 5-73. Enter the user ID and password that will be used as TPC-R administrator. This user must already exist in the operating system and have administrator rights, such as the **root** account. When you are done, click **Next** to continue.

BM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard	IX
	Enter the user name and password for IBM Tivoli Storage Productivity Center for Replication Administrator user. You must enter an existing user name and be sure the password is correct.	
	< Back Next > Cancel	

Figure 5-73 TPC-R User ID and Password

**Note:** If you prefer to use another user, you are required to create it beforehand and ensure that it has administrator rights.

7. The default WebSphere Application Server ports panel is displayed, as shown in Figure 5-74. Accept the defaults and click **Next** to continue.

IBM Tivoli Storage	Productivity Center for Replication - InstallShield Wizard	<u>_                                    </u>
	IBM Tivoli Storage Productivity Center for Replication uses WebSphere application server as its runtime environment. This will be automatically installed by this installation wizard. You are required to specify the port numbers needed by WebSphere application server. You can change any default port numbers that ar already in use. Default Host Port 3080 Default Host Secure Port 3443	e
InstallShield —	< Back Next > Cancel	

Figure 5-74 Default ports

8. The Installation Summary panel is displayed (Figure 5-75). Review the settings and make necessary changes if needed by clicking **Back**. Otherwise, click **Install**.

🐻 IBM Tivoli Storage I	Productivity Center for Replication - InstallShield Wizard	_ 🗆 ×
	Installer has enough information to start installation. Please review the settings below and if you wish to change any setting, click Back. If you are satisfied with the settings, click Install to begin installation.	
	IBM Tivoli Storage Productivity Center for Replication will be installed in the following location: /opt/IBM/replication with the following features: IBM Tivoli Storage Productivity Center for Replication for a total size: 247.6 MB	
	< Back Install Cancel	

Figure 5-75 TPC-R Installation Summary

9. The TPC for Replication installation progress panel is displayed, as seen in Figure 5-76. Wait for the installation to finish.

B IBM Tivoli Storage P	roductivity Center for Replication - InstallShield Wizard				
	Installing IBM Tivoli Storage Productivity Center for Replication. Please wait				
	Extracting WebSphere installation media				
	30%				
locate II Sticular					
และสารก่อยุ	Cance				

Figure 5-76 TPC-R progress panel

10. The TPC-R Installation Result panel is displayed, as shown in Figure 5-77. Notice the URL to connect to TPC-R. Click **Finish**.

**Note:** Tivoli Storage Productivity Center for Replication is installed with no license. You must install the Two Site or Three Site Business Continuity (BC) license in order to use it. For information about installing the license, see "Installing the Two Site or Three Site Business Continuity License" on page 461.



Figure 5-77 TPC-R Installation result

11. After the TPC-R installation has completed, the TPC installer will continue creating the uninstaller as seen in Figure 5-78. Wait for the installation to complete.

💯 IBM Tivoli Storage Product	ivity Center - Installer		
IBM.	Creating uninstaller	92%	
			Cancel

Figure 5-78 Creating uninstaller

12. After the installation has finished, you see the Summary Information panel (Figure 5-79). Read and verify the information and click **Finish** to complete the installation.

💯 IBM Tivoli Storage Produ	uctivity Center - Installer	- 🗆 ×
	Please read the summary information below. The InstallShield Wizard has successfully installed IBM Tivoli Storage Productivity Cente Choose Finish to exit the wizard.	- 10 1×
	<u> </u>	

Figure 5-79 Summary Information

### Verifying the TPC Server installation

At the end of the installation, it is a good idea to make sure that all the components have been installed successfully and that Tivoli Storage Productivity Center is in good working order.

To test this situation on Linux, we have chosen to launch the Tivoli Storage Productivity Center GUI. In TPC we then confirm that all services are started and running.

Follow these steps:

1. If you installed TPC to the default location, the following command will launch the TPC GUI on Linux:

/opt/IBM/TPC/gui/TPCD.sh

- 2. Log on to TPC using a user ID that is mapped to the TPC superuser role. If you used the defaults during installation, the **root** user is mapped to this role.
- From the Navigation Tree, expand Administrative Services → Service → Data Server and Device Server. All nodes within these branches are marked green, as illustrated in Figure 5-80.



Figure 5-80 Data and Device Server services

You have now successfully completed Tivoli Storage Productivity Center server installation.

## 5.4.3 Agent installation

In this section, we present how to locally install TPC Data and Fabric agents. When installing Data agents or Fabric agents, you need to register the TPC server with an Agent Manager; we also demonstrate how to do so.

For instructions and guidelines on installing the newly introduced Storage Resource agents, refer to "Deploying Storage Resource agents using the TPC GUI" on page 440.

**Note:** You must have the X11 graphical capability installed before installing Tivoli Storage Productivity Center using the GUI. Refer to Appendix A, "Report and Data Source Import Configuring X11 forwarding" on page 621.

To register the TPC server with an Agent Manager and install a Data agent and a Fabric agent on the server, follow these steps:

- 1. Log on as a user with root authority.
- Change to the directory where you have extracted the Tivoli Storage Productivity Center Disk 1 or Disk 2 software package, then launch the graphical installer by issuing the following command:

./setup.sh

3. Tivoli Storage Productivity Center installer is launched prompting you to select an installation language (see Figure 5-81). Choose a language and click **OK** to continue.

💯 Installer	_ 🗆 🗙
Select a language to be used for this	wizard.
English 💌	
	$\geq$
OK Cancel	

Figure 5-81 Select language

4. The International Program License Agreement is displayed. Read the license text and, if you agree with it, click I accept the terms of the license agreement as shown in Figure 5-82. Click Next when you are ready to proceed with the installation.



Figure 5-82 License Agreement

5. The Installation Types panel is displayed, as seen in Figure 5-83. Click **Custom Installation**, then click **Next** to continue.

🕎 IBM Tivoli Storage Pro	ductivity Center - Installer	
	Select the type of installation you want to run	
IBM.	Typical installation This will install the TPC servers, TPC agents, Tivoli Integrated Portal (TIF CLI. A new database will be created, and the schema will be created or database during installation. The database and schema will be reused to database during installation.	'), GUI, and n the for upgrade.
	Servers  Clients	
$\mathbf{C}$	Agents Register with the agent manager	
	client to be installed on this computer. You will have a choice to create database and schema on this computer.	the
	/opt/IBM/TPC TPC Installation Loc	ation
	< <u>B</u> ack Next >	<u>C</u> ancel

Figure 5-83 Choose Custom Installation

6. The next panel prompts you to select one or more components to install. Note that database schema, servers, GUI, and CLI are greyed out, because they were already installed previously. Check **Data Agent** and **Fabric Agent** as illustrated in Figure 5-84.

🕲 IBM Tivoli Storage Prod	ductivity Center - Installer			
IBM.	Select one or more componen This program will install or u example, if version number ; means, that the version of th this installation, all installed o software. You can choose to	ts to install on the loca pgrade various compo 3.1.0.39 is displayed e component is alread components will be up install additional comp	I or remote compute inents displayed beli next to the compone ly installed on this co graded to the currer ionents which are no	er. ow. For ent, this omputer. In nt version of it installed.
	Create database schema Tivoli Storage Productivity GUI 4.1.0.97		97 1.0.97 <b>Agent</b>	
	<ul> <li>Remote Data Agent</li> <li>Register with the agent magent</li> <li>Register Launch Information</li> </ul>	☐ Remot anager on With Other Applicat	e Fabric Agent ions	
	< <u>B</u> ack	<u>N</u> ext	>	<u>C</u> ancel

Figure 5-84 Select Data Agent and Fabric Agent

**Note:** The Fabric agent needs to be installed if the server is equipped with a Fibre Channel HBA, only. Unless the server is Fibre attached, the Fabric agent will not provide any meaningful information.

Note that when installing Data agents or Fabric agents, the TPC server needs to be registered with an Agent Manager; the **Register with the agent manager** options gets selected automatically. Click **Next** to proceed with the installation.

7. The Server Information panel is displayed, as illustrated in Figure 5-85. When installing agents on the TPC server itself, all fields are automatically filled in. Click **Next** to continue.

🕎 IBM Tivoli Storage Proc	ductivity Center - Installer					
	Data server, Device serv	er, Data agent, and Agen	t Information			
IBM.	Enter the server name a to communicate with the	and port that the Data ag e server.	ent and Fabric agent, and Gl	JI will use		
	Data server name	baltic.itso.ibm.com	Data server port 95.	49		
A	Device server name	baltic.itso.ibm.com	Device server port 955	50		
	Enter an OS user group administrators group.	whose members will be	TPC administrators in the			
	TPC superuser	root	Secu <u>r</u> ity roles			
	Enter a password that t	he Fabric agents will use	to communicate with the Dev	ice serv <b>er</b> .		
	Host authentication pas	sword *****	****			
1 Walter	Enter a password that v	vill be used to create the	Data Server Account.			
INCE	Data Server Account Pa	ssword				
Charles -	WAS admin ID d	asusr1 Passw	ord ******			
NAS discovery						
			Data agent <u>o</u> ptions			
	< <u>B</u> ac	:k <u>N</u> e:	kt > <u>C</u> an	cel		

Figure 5-85 TPC Server and Agent information

8. Now you are prompted for the Agent Manager information, as seen in Figure 5-86. Host name and ports must be pre-filled. Verify that the correct fully qualified host name is specified.

🕎 IBM Tivoli Storage Prod	luctivity Center - Installer		
	Agent manager information		
IBK.	Enter the information that the p Device server, Data agent, or F	roduct will use to register its Data server, abric agent with the agent manager.	
	Hostname or IP address	baltic.itso.ibm.com	
A	Port (Secured)	9511	
	Port (Public)	9513	
	Enter the Data server and Devi on the agent manager.	ce server registration information as specified	
	User ID	manager	
X	Password	****	
1 Val	Enter the common agent regist manager.	ration password as specified on the agent	
11.300	Password	*****	
APR -			
	< <u>B</u> ack	<u>N</u> ext > <u>C</u> ancel	

Figure 5-86 Agent Manager information

When prompted for the Data Server and Device Server registration information, enter **manager** as the user ID and **password** as the corresponding password.

In addition, enter the Common Agent Registration password specified during the Agent Manager installation. When you are ready, click **Next** to proceed.

9. Accept the default to **Install the new common agent** on the next panel. as shown in Figure 5-87. You can optionally change the installation location and the port. We recommend that you accept the defaults. Click **Next**.

💯 IBM Tivoli Storage Pro	ductivity Center - Insl	aller			
	Common agent sele	ction			
IBM.	Select the installati agent already insta	on of a new commo alled on your compu common agent at ti	n agent or choose uter for the Data ag	an existing comm gent and Fabric ag elow	on gent.
	/opt/IBM/TPC/	ca		E	rowse
	Agent port	9510			
			Windows service i	info	
	O Select an existi	ng common agent f	rom the list below		
	Port	Version	Location	Data agent	Fabric agent
		< <u>B</u> ack	<u>N</u> ext >		ancel

Figure 5-87 Common Agent selection

10. The summary information panel is displayed. Review the information, then click **Install** to continue as illustrated in Figure 5-88.



Figure 5-88 Summary information

- 11. You will see a progress window as files are being copied. Wait for the installation to complete.
- 12. After the installation has finished, you see the installation results panel (Figure 5-89). Read and verify the information and click **Finish** to complete the installation.

💯 IBM Tivoli Storage Prod	uctivity Center - Installer
	Please read the summary information below.
	The InstallShield Wizard has successfully installed IBM Tivoli Storage Productivity Center. Choose Finish to exit the wizard.
	Einish

Figure 5-89 Installation results

#### Verifying the agent installation

At the end of the installation, it is a good idea to make sure that all the components have been installed successfully and that the agents are in good working order.

To test this situation on Linux, we have chosen to launch the Tivoli Storage Productivity Center GUI and confirm that all Data agents and Fabric agents are displayed as Data Sources. Follow these steps to do so:

1. If you installed TPC to the default location, the following command will launch the TPC GUI on Linux:

/opt/IBM/TPC/gui/TPCD.sh

- 2. Log on to TPC using a user ID that is mapped to the TPC superuser role. If you used the defaults during installation, the **root** user is mapped to this role.
- 3. From the Navigation Tree, expand Administrative Services → Data Sources → Data/Storage Resource Agents. Be sure that the newly installed agent is included in the list and its state is marked green ("Up"), as presented in Figure 5-90.

📄 IBM Tivoli Storage Productivity Center: colo	rado.its	o.ibm.com Data/	Storage Resou	irce Agents	;		
<u>File View Connection Preferences Window Help</u>							
Element Management	×						
Navigation Tree	Defee		hilling Last	D-6	0.00.14		
Administrative Services	nerres	sn hate	Mins Las	nerresn: i	0:32:14		
	¥/6=			2	I David I	E	. 1
⊟-Data Sources	VIBV	v Log Lonngure	: Hacing	nead Config	Disable	Chable	<u> </u>
CIMOM Agents	Cha	nao Authoritiontion	Add Character	D			1
Data/Storage Hesource Agents	Una	nge Aumentication	Add Storage	Resource Ag	jents Upgra	de Agents	
Inband Fabric Agents	-Data/9	Storage Resource Ager	nts				
Uut of Band Fabric Agents						<b>.</b>	0.0
TPC Servers		Agent	IP Address	Version 🔺	Agent Type	State	USI
WMware VI Data Source	Q	9.12.5.20	9.12.5.20	4.1.0.97	Storage Resource	💷 Up	Linux
	Q	gallium	9.12.6.76	4.1.0.97	Data	💷 Up	Winde
	Q	maryl.itso.ibm.com	9.12.4.139	4.1.0.97	Storage Resource	💷 Up	Winde
I ⊞ IBM Tivoli Storage Productivity Center	Q	9.12.5.11	9.12.5.11	4.1.0.97	Storage Resource	🖬 Up	AIX
E → Data Manager	ā	colorado.itso.ibm.com	9.12.6.75	4.1.0.97	Storage Resource	🖬 Up	Winde
Uata Manager for Databases	ā	9.12.5.12	9.12.5.12	4.1.0.97	Storage Resource	a Un	AIX
E Data Manager for Unargeback			4				1.00.0
terret in terret terret in terret i							
I ape Manager							
II 🗆 Liement Manager						-	

Figure 5-90 Newly installed Data agents

 If you have installed a Fabric agent as well, navigate to Administrative Services → Data Sources → Inband Fabric Agents. Be sure that the newly installed agent is included in the list and its state is marked green ("active"), as seen in Figure 5-91.

IBM Tivoli Storage Productivity Center: colorado.itso.ibm.com Inband Fabric Agents         File       View       Connection       Preferences       Window       Help         Element       Management       Connection       Preferences       Window       Help
File     View     Connection     Preferences     Window     Help       Element     Image: Management     Image: Management     Image: Management     Image: Management
Flement Management
Navigation Tree
-Administrative Services
• Services
-Data Sources View Log Check Delete
CIMOM Agents
Data/Storage Resource Agents
Inband Fabric Agents Agent IP Address State 🔺 OS and Version
Out of Band Fabric Agents Q colorado.itso.ibm.com 9.12.6.75 a active Windows 5.2:Service Pack 2
TPC Servers Q gallium 9.12.6.76 a active Windows 5.2:Service Pack 2
Whware VI Data Source
Discovery
E - Configuration
E-IBM Tivoli Storage Productivity Center
🔁-Data Manager
B - Data Manager for Databases
🗄 Data Manager for Chargeback
🔁-Disk Manager
B-Fabric Manager
E-Tape Manager

Figure 5-91 Newly installed Inband Fabric agents

You have now successfully completed Tivoli Storage Productivity Center agent installation.

6

# LDAP authentication support and Single Sign-On

In this chapter, we take you through the usage and setup steps to use a Lightweight Directory Access Protocol (LDAP) server for authentication in TPC. We also show how it can enable the Single Sign-On functionality.

Authentication is the act of establishing or confirming that a user is authentic. In software applications, users are primarily authenticated against a set of credentials that the user supplies. These credentials are typically a user name and password, which are then validated against a previously set up repository. If the user name and password are exactly the same, the user is considered authenticated.

In TPC V4.1, Lightweight Directory Access Protocol (LDAP) has been added as a supported authentication mechanism. LDAP provides a centralized repository for use in a system wide authentication. The benefit that this provides is a single place to manage all user accounts, meaning that all authentication requests within an environment can be sent to a remote LDAP server as opposed to the local OS repository.

Single Sign-On (SSO) is the method of access control that enables a user to authenticate once and gain access to the resources of multiple, trusted applications. In order to have an SSO environment, there must be a centralized authentication repository such as LDAP or Active Directory that is accessed by all applications within an SSO environment. The user's user name and password are passed between applications in an encrypted manner, which allows the user to navigate among various products and user interfaces without being required to enter authentication credentials, such as user name and password, more than once.

# 6.1 LDAP authentication

Starting from Tivoli Storage Productivity Center V4.1, TPC allows not only the use of the OS user registry for authentication, but also the Microsoft Active Directory or an LDAP user registry. In order to keep all the TPC components (TIP, TPC servers, and TPC for Replication server) in sync and allow a seamless Single Sign-On between them, TPC V4.1 uses the TIP infrastructure and its underlying WebSphere Application Server capabilities to use an LDAP registry and enable SSO. In the next section we describe how to configure TPC to use an LDAP server for authentication and explain how to change this setting from OS authentication to LDAP or from LDAP to OS authentication.

Because TPC is not directly interfacing with the LDAP server, but it does it through WebSphere, TPC's support of LDAP server types matches whatever WebSphere supports. The following Web site lists the various types of LDAP that WebSphere Application Server supports:

http://www-1.ibm.com/support/docview.wss?rs=180&uid=swg27007642

In TPC V4.1, the TPC CLI supports OS, LDAP, or Active Directory authentication. TPC CLI makes use of the security of the Device Server. Because of this, it will automatically pick up the authentication mechanism that the Device Server is configured for. No external changes to the TPC CLI have been made, ensuring full backward compatibility with previous versions. Although LDAP or Active Directory will be added as an authentication mechanism, the use of LTPA tokens will not be supported within the TPC CLI. This means that Single Sign-On capability is not supported with the TPC CLI, and the user credentials must be provided every time the TPC CLI is invoked.

# 6.1.1 Setting the authentication method during TPC installation

The TPC setup program enables you to select, at installation time, the user authentication method that will be used by TPC, TPC for Replication, and TIP. You can choose to authenticate users against the users defined on the local operating system, or to authenticate users against the users defined in a Lightweight Directory Access Protocol (LDAP) or Microsoft Active Directory repository. You can change the user authentication method afterward using Tivoli Integrated Portal and the procedures documented in the next sections. Nevertheless, we strongly suggest to plan and decide for the authentication method that you are going to use before the installation takes place.

If, during the installation, you select to use an LDAP server for authentication, you are prompted by the installation program for the information required to set up the TPC components accordingly. You can refer to the installation chapter for your specific platform for detailed information.

If you decide to change the authentication method after installation, you can follow the procedures outlined in the next sections. Alternatively, if your environment permits, you can decide to uninstall the TPC servers (without dropping the corresponding database) and reinstall them again. In this case, the installation program will take care of configuring the required authentication parameters using the information that you have provided.

# 6.1.2 Changing authentication method from local OS to LDAP

If you have configured TPC to use the local operating system for authentication, you can change this setting to configure TPC to use a LDAP repository for authentication. You have to make this change through TIP to ensure that all the involved TPC components are kept in sync because the modification made through TIP are propagated to the other involved components (TPC Device Server and TPC for Replication server).

**Warning:** Be advised that if you change the authentication method, all the Role-to-Group Mappings defined in TPC will be lost.

Before proceeding with the authentication method change, there is a set of minimal information that must be gathered from the LDAP administrator, as reported in Table 6-1. Certain additional information might be required, depending on the configuration of the LDAP server.

Information required	Description
Directory type	The type of LDAP server to which you want to connect
Primary host name	The host name of the primary LDAP server
LDAP Server Port	The LDAP server port
Bind Distinguished name and password	The distinguished name (DN) and password to use when binding to the LDAP repository if anonymous binding is not allowed
Search bases for Group, OrgContainer and PersonalAccount object types	The search bases that are used to search these entity types. The search bases specified must be subtrees of the base entry in the repository
Relative DN for Group, OrgContainer and PersonalAccount object types	The LDAP attribute name to use when searching for these entity types.
Administrative User ID and password	User in the repository that will be granted administrative privileges in the TIP

Table 6-1 Minimal LDAP information set

To change the user authentication method from the local operating system to LDAP, complete the following steps:

1. Start a Web browser and point to the TIP URL. The address typically is:

http://hostname:port

Here, hostname defines the server that is running TIP and port defines the port number for TIP. If the default port was accepted during the installation, the port number is 16310.

2. On the TIP logon page, log on using the appropriate user ID and password defined on your operating system. You can use any user ID provided that this user ID has administrative privileges in TIP. In our case we used the *tpcadmin* user. See Figure 6-1.

C C	× 🏠 🔝	https://nc124040.romelab.it.ibm.com:16316/ibm/console/logc 🏠 🍞 🔹	Google
	Tivoli.	Tivoli Integrated Portal	
	8	User ID: tpcadmin Password: ••••••• Log in	
	IBM.	LICENSED MATERIALS PROPERTY OF IBM 5724-i63, 5724-H88, 5655-N01 (C) International Business Machines Corp. 2005, 2008 All Rights Reserved US G Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADI Contract with IBM Corp. IBM is a registered trademark of the IBM Corp.	, Copyright overnment > Schedule

Figure 6-1 TIP Login page

3. In the Tivoli Integrated Portal Navigation Tree, click Security  $\rightarrow$  Secure administration, applications, and infrastructure. See Figure 6-2.



Figure 6-2 TIP security option

4. On the Secure administration, applications, and infrastructure page, select **Federated Repositories** from the **Available Realm Definitions** list and click **Configure**. See Figure 6-3.

Secure administration, applications, and infrastructure	Close pag
Secure administration, applications, and infrastructure	? -
Secure administration, applications, and infrastructure The application serving environment is completely secured when administration i supports the administration and applications also are secured. Configuration	s restricted. The applications and the infrastructure that
Security Configuration Wizard       Security Configuration Report         Administrative security       Administrative User Roles         Enable administrative security       Administrative Group Roles         Application security       Enable application security	Authentication Use domain-qualified user names Web security RMI/IIOP security Java Authentication and Authorization Service
Java 2 security  Use Java 2 security to restrict application access to local resources  Warn if applications are granted custom permissions Restrict access to resource authentication data User account repository	Authentication mechanisms and expiration     External authorization providers     Custom properties
Current realm definition Local operating system Available realm definitions Local operating system Federated repositories Docal operating system Standalome tDAD registry A Standalone custom registry Specifies the available repositories.	

Figure 6-3 Secure administration panel

5. The Federated repositories page is displayed. Under Related Items, click **Manage repositories** as shown in Figure 6-4.

rre administ ecure admin y federating he realm car xternal repo: Configuratior	ration, applications, and intrastri istration, applications, and infra- repositories, identities stored in a consist of identities in the file-b sitories, or in both the built-in rep	structure > Federated rep multiple repositories can b ased repository that is bu pository and one or more o	ositories e managed in a single, virtua It into the system, in one or r external repositories.	il realm. more Page help More information this page
General P * Realm ( LDAPRe * Primary vaccaro Server U ③ Au ⑤ Se v	roperties name alm administrative user name user identity tomatically generated server iden rver identity that is stored in the erver user ID or administrative us accaro	ntity repository ier on a Version 6.0.x nod	2	
✓ Ign Reposito Add Select	ore case for authorization pries in the realm: Base entry to Realm Use to Base entry o=defaultWIMFileBasedRealm	Repository Rem Repository identifier InternalFileRepository	Repository type File	
Additio	nal Properties	Related Ite	e repositories	

Figure 6-4 Federated repositories panel

6. On the Manage repositories page, we have to add the LDAP repository that we want to use for authentication. Click **Add** to add the new repository as in Figure 6-5.



Figure 6-5 Manage repositories panel

- 7. On the panel shown in Figure 6-6, enter the values for the following fields:
  - a. Repository identifier. A unique identifier for the LDAP repository. In our environment, we set it to *LDAP1*.
  - b. Directory type. The type of LDAP server to which you want to connect. In our case, we are using an instance of Tivoli Directory Server v6.2.

**Note:** If you are using an open LDAP server, you have to select **Custom** for this field.

- c. Primary host name. The host name of the primary LDAP server. This host name is either an IP address or a fully qualified domain name. In our case, we set it to *nc124039.romelab.it.ibm.com*.
- d. Port. The LDAP server port. The default value is *389*, which is not a Secure Sockets Layer (SSL) connection. The default SSL connection port is *636*.
- e. Bind distinguished name. The distinguished name (DN) for the application server to use when binding to the LDAP repository. If no name is specified, the application server binds anonymously. In most cases, bind DN and bind password are needed. In our case, the anonymous bind is enabled on the server, and the bind DN and bind password are not needed.
- f. Bind password. The password for the application server to use when binding to the LDAP repository.

Click OK to continue.

Repository identifier nc124039	
LDAP server	Security
* Directory type	Bind distinguished name
IBM Tivoli Directory Server Version 6	
* Primary bost name Port	Bind password
nc124039.romelab.it.ibm.cor 389	
	Login properties
Failover server used when primary is not available:	uid
Delete	Certificate mapping
Select Failover host name Port	EXACT_DN
None	Certificate filter
Incirc	
Add	
	Require SSL communications
Support referrals to other LDAP servers	,
ignore 💌	Centrally managed
	Manage endpoint security configurations
	O Use specific SSL alias
	NodeDefaultSSLSettings V SSL configurations
we have a second of the state	
general properties for this item are applied or saved.	
Additional Properties	
= Performance	
LDAP entity types	
<ul> <li>Group attribute definition</li> </ul>	

Figure 6-6 New repository reference panel

8. In the Messages box on the Manage repositories page, click the **Save** link to save the configuration. See Figure 6-7.

ure adm	inistration, applications, and infrastructure					? =
	<ul> <li>Messages</li> <li>Changes have been made to your</li> <li>Save directly to the master configur</li> <li>Save directly to</li></ul>	local configuration. You ation. scarding. ad for these changes to	can: take effect.			
Secure a Repositor epositori Prefer	dministration, applications, and infrastructure > ries that are configured in the system are listed ies. rences	Federated repositories in the following table. You repose the following table.	s > Manage ou can add o	<b>repositori</b> e or delete e	es xternal	
Secure and Repositori repositori E Prefer Add	dministration, applications, and infrastructure > ries that are configured in the system are listed ies. rences Delete	Federated repositories in the following table. You following table.	s > Manage ou can add (	<b>repositori</b> e or delete e	xternal	
Repositor repositori Prefer Add	dministration, applications, and infrastructure >         rise that are configured in the system are listed lies.         rences         Delete         Image: Im	Federated repositories in the following table. You following table.	s > Manage ou can add (	repositorie or delete e	es xternal	
Repositor repositori Prefer Add Select	dministration, applications, and infrastructure >         ries that are configured in the system are listed ies.         rences         Delete         Image: Second system in the system are listed in the system are listem are listed in the system are listed in	P Federated repositories in the following table. Yo Repository type	s > Manage ou can add (	repositorie or delete e	xternal	
Secure al Repositori Prefer Add ©©© Select I	dministration, applications, and infrastructure >         ries that are configured in the system are listed ies.         rences         Delete         Image: the system is the system are listed ies.         Repository identifier \$         InternalFileRepository	Federated repositories in the following table. Yo Repository type File	s > Manage ou can add (	repositoria or delete e	xternal	
Secure al Repositor Prefer Add Select I Select I	dministration, applications, and infrastructure >         ries that are configured in the system are listed ies.         rences         Delete         Image: the system is the system are listed ies.         Repository identifier \$         InternalFileRepository         nc124039	Federated repositories in the following table. Yo Repository type File LDAP:IDS6	S > Manage ou can add o	repositoria or delete e	xternal	

Figure 6-7 Manage repository panel

9. On the same panel, click the identifier for the repository that you created in the Repository identifier column, in our case, *nc124039*. It will open the Configuration panel for this repository.

10.On the configuration page for the repository, click **LDAP entity types** under Additional Properties. See Figure 6-8.

Repository identifier nc124039	
LDAP server	Security Bind distinguished name
Primary host name Port nc124039.romelab.it.ibm.cor 389 Failover server used when primary is not available:   Delete   Select   Failover host name   None     Add   Support referrals to other LDAP servers ignore	Bind password Login properties uid Certificate mapping EXACT_DN Certificate filter Require SSL communications Centrally managed
Additional Properties	<pre>Manage endpoint security configurations Use specific SSL alias NodeDefaultSSLSettings</pre>

Figure 6-8 Repository configuration panel

11. The LDAP entities page is displayed. In the Entity type column, click the link for **Group**. See Figure 6-9.

cure administration, application	ns, and infrastructure
Secure administration, applicat	tions, and infrastructure > <u>Federated repositories</u> > <u>Manage repositories</u> > <u>nc124039</u> >
Use this page to list entity type change its configuration proper	as that are supported by the member repositories or to select an entity type to view or tries.
Entity type 🗘	Object classes 🗘
	groupOfNames
Group	
<u>OrqContainer</u>	organization;organizationalUnit;domain;container
<u>DrqContainer</u> PersonAccount	organization;organizationalUnit;domain;container inetOrgPerson

Figure 6-9 LDAP entity types panel

12.On the Group properties panel, complete the Search bases field. This field specifies the search bases that are used to search this entity type. The search bases specified must be subtrees of the base entry in the repository. In our case we set it to cn=TPC-realm,cn=itso,o=ibm. You can set multiple search bases delimiting them with a semicolon (;). Then click **OK** as shown in Figure 6-10.

ure administration, applications, and infrastructure	C
cure administration, applications, and infrastructure	? = Help
Secure administration, applications, and infrastructure > Federated repositories > Manage repositories > nc124039 LDAP entity types > Group Use this page to list entity types that are supported by the member repositories or to select an entity type to view or change its configuration properties.	Field help Specifies the sear that are used to s this entity type.
Configuration	Page help
	this page
	Command Assist
General Properties	View administrativ
* Entity type	scripting comman action
Group	
* Object classes groupOfNames	
Search bases :n=TPC-realm,cn=itso,o=ibm Search-filter	
Apply OK Reset Cancel	

Figure 6-10 Set search bases for LDAP entity

13.On the LDAP entity types, click the **Save** link in Save to the master configuration message. See Figure 6-11.

ecure administration, ap	plications, and infrastruct	ture				
E Mess	E Messages					
4	Changes have been made to your local configuration. You can:					
<u>( s</u>	<ul> <li><u>Save</u> directly to the master configuration.</li> </ul>					
	Review changes before saving or discarding.					
The server may need to be restarted for these changes to take effect.						
Secure administration, applications, and infrastructure > Federated repositories > Manage repositories > nc124039 > LDAP entity types UDAP entity types Use this page to list entity types that are supported by the member repositories or to select an entity type to view or change its configuration properties.						
Preferences						
Entity type 💠		Object classes 🗘				
Group		groupOfNames				
OrgContainer		organization; organizationalUnit; domain; container				
PersonAccount		inetOrgPerson				
PersonAccount	Total 3					
PersonAccount Total 3						

Figure 6-11 Save to master configuration

14. Repeat the steps from 11 to 13 also for OrgContainer and PersonAccount types.

15. Return to the Federated repositories page by clicking the link shown in Figure 6-12.

cure administration, applications	and infrastructure	.2 -
Secure administration, application LDAP entity types	ns, and infrastructure > Federated repos	sitories Manage repositories > nc124039 >
Use this page to list entity types change its configuration propertie	that are supported by the member reposites.	tories or to select an entity type to view or
Preferences		
****		
Entity type 🛟	Object classes 🗇	
Group	groupOfNames	
OrgContainer	organization;organizatio	nalUnit;domain;container
PersonAccount	inetOrgPerson	
Total 3		

Figure 6-12 Return to Federated repositories

16.In the Federated repositories panel, click **Supported Entity Types** under Additional Properties as shown in Figure 6-13.

Configuratio	n							
General	Properties			-				
+ Realm	ealm							
* Prima	y administrative user name							
vaccar	<b>.</b>							
Server	user identity							
م 💿	• Automatically generated server identity							
0 s	erver identity that is stored in the	e repository						
	Server user ID or administrative user on a Version 6.0.x node							
	Password							
l								
Le Ig	nore case for authorization							
Reposi	tories in the realm:							
Add	Base entry to Realm Use	built-in repository Remove						
Select	Base entry	Repository identifier	Repository type					
	o=defaultWIMFileBasedRealm	InternalFileRepository	File					
Additi	Additional Properties Related Items							
	Property extension repository Manage repositories							
	Supported entity types							
Apply	Apply OK Reset Cancel							

Figure 6-13 Federated repositories panel
17.On the Supported entity types page, in the Entity type column, click the link for **Group** shown in Figure 6-14.

Secure administration, ap	plications, and infrastructure	?
Secure administration	, applications, and infrastructure > Feder	rated repositories > Supported entity types
Use this page to config	gure entity types that are supported by the	e member repositories.
Preferences		
Entity type 💠	Base entry for the default parent $\diamondsuit$	Relative Distinguished Name properties 🗘
Group	cn=TPC-realm,cn=itso,o=ibm	cn
OrgContainer	cn=tpc-realm,cn=itso,o=ibm	o;ou;dc;cn
PersonAccount	cn=TPC-realm,cn=itso,o=ibm	sn
Total 3		

Figure 6-14 Supported entity types

- 18.Complete the Base entry for the default parent and Relative Distinguished Name properties fields with the following values:
  - a. In the Base entry for the default parent field, enter the same value that you entered in the Search bases field in step 12, in our case, *cn=TPC-realm,cn=itso,o=ibm*.
  - b. In the Relative Distinguished Name properties field, enter the appropriate LDAP attribute name. In most cases, the values for this field will be *cn* for Group, *o;ou;dc;cn* for OrgContainer, and *uid* for PersonAccount.

Then click OK. See Figure 6-15.



Figure 6-15 Group panel

19. Click the **Save** link in Save to the master configuration message as shown in Figure 6-16.

	cracion, applic		
	Messages     Save o     Review	es have been made to your local con inectly to the master configuration. changes before saving or discarding.	figuration. You can:
	<b>∆</b> •The se	erver may need to be restarted for the	ese changes to take effect.
Secure admi	inistration, ap e to configure	plications, and infrastructure > Feder entity types that are supported by the	rated repositories > Supported entity types e member repositories.
Secure admi Use this pag	inistration, ap le to configure es	plications, and infrastructure > Feder entity types that are supported by the	rated repositories > Supported entity types e member repositories.
Secure admi Use this pag Preference 	inistration, ap le to configure les	Dications, and infrastructure > Feder entity types that are supported by the Base entry for the default parent \$	rated repositories > Supported entity types e member repositories. Relative Distinguished Name properties ◊
Secure admi Use this pag	inistration, ap le to configure les	entity types that are supported by the Base entry for the default parent cn=TPC-realm,cn=itso,o=ibm	rated repositories > Supported entity types e member repositories. Relative Distinguished Name properties cn
Secure admi Use this pag Preference Use this pag Preference Secure Croup OrgContaine	inistration, ap le to configure les	entity types that are supported by the Base entry for the default parent cn=TPC-realm,cn=itso,o=ibm cn=tpc-realm,cn=itso,o=ibm	Relative Distinguished Name properties 🗘
Secure admi Use this pag Preference *** Entity type Group OrgContaine PersonAccou	inistration, ap le to configure les 	Base entry for the default parent cn=TPC-realm,cn=itso,o=ibm cn=TPC-realm,cn=itso,o=ibm	Relative Distinguished Name properties 🗘

Figure 6-16 Save to master configuration

- 20. Repeat the steps from 17 to 19 also for OrgContainer and PersonAccount entity types.
- 21.Return to the Federated repositories page as in step 15 and click **Apply**. Then click the **Save** link in Save to the master configuration message.
- 22. Under Repositories in the realm, click Add base entry to Realm. See Figure 6-17.

federating	repositories, identities stored in mu	ultiple repositories can be man	aged in a single, virtual realm. The
alm can co	nsist of identities in the file-based re	epository that is built into the s	system, in one or more external
oofiquatio	of in both the ballt in repository and	one of more external reposit	Shes.
onnguratio			
Conoral I	Properties		
* Roolm	name		
LDAPR	ealm		
* Primar	v administrative user name		
vaccard			
Server	user identity		
	utomatically generated server identi	ty	
Us	erver identity that is stored in the re erver user ID or administrative user	pository	
	accaro		
F	assword		
	fore case for authorization		
🗹 Igr	ories in the realm:		
Igr Rep <del>osit</del>		Itain monositony Romovo	
Reposit Add	Base entry to Realm	itemove Remove	
Reposit Add Select	Base entry to Realm Se bui	Repository identifier	Repository type
Reposit Add Select	Base entry to Realm Base entry o=defaultWIMFileBasedRealm	Repository identifier InternalFileRepository	Repository type File

Figure 6-17 Federated Repository panel

- 23.On the Repository reference page, set the following fields:
  - a. In the Repository list, select the repository that you created in step 7, in our case, nc124039.
  - b. In the Distinguished name of a base entry that uniquely identifies this set of entries in the realm field, enter the distinguished name of a base entry that uniquely identifies the repository in the realm. In most instances, this value will be the same value that you entered in the Search bases field in step 12. In our case, the value is cn=TPC-realm,cn=itso,o=ibm.
  - c. In the Distinguished name of a base entry in this repository field, enter the distinguished name of the base entry within the repository. In most instances, this value will be the same value that you entered in the Distinguished name of a base entry that uniquely identifies this set of entries in the realm field.

When done, click **OK**. See Figure 6-18.

	And the second sec	ated repositories > Repository reference
multiple repo multiple repo me that uniq	sitories are included in the same realm, it might sitories are included in the same realm, it might uely identifies this set of entries within the realm	be necessary to define an additional distinguished
onfiguration		
General Pro	perties	
* Reposito		
nc12403	Add Repository	
* Distingui	hed name of a base entry that uniquely identifie	es this set of entries in the realm
in=TPC-re	alm,cn=itso,o=ibm	
Distinguis	ned name of a base entry in this repository	
Apply	OK Reset Cancel	

Figure 6-18 Repository reference panel

24. Click the **Save** link in Save to the master configuration, as shown in Figure 6-19.

	Save directly to the master configuration.
	<u>Review</u> changes before saving or discarding.
	$\Delta$ The server may need to be restarted for these changes to take effect.
<u>ure adn</u>	inistration, applications, and infrastructure > Federated repositories
federatir	ig repositories, identities stored in multiple repositories can be managed in a single, virtual realm. The
ositories	onsist of identifies in the file-based repository that is built into the system, in one or more external , or in both the built-in repository and one or more external repositories.
nfigurati	on
onfigurati	on
onfigurati	on
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General * Realr LDAPI * Prima vacca	Properties n name %ealm iry administrative user name ro
General * Realr LDAPI * Prima vacca	Properties n name Realm iry administrative user name to
General * Realr LDAPI * Prima vacca Serve	Properties n name Realm sry administrative user name to ruser identity
General * Realr LDAPI * Prima Vacca	Properties n name Realm Iny administrative user name ro Iry administrative user name Realm Iry administrative user name Realm Iry Advisor administrative user name Iry Automatically generated server identity
General * Realr LDAPI * Prima Vacca	Properties n name Realm ary administrative user name ro r user identity Automatically generated server identity Server identity that is stored in the repository
General * Real LDAPI * Prima Vacca Serve ③	Properties n name Realm ry administrative user name ro r user identity Automatically generated server identity Server user ID or administrative user on a Version 6.0ex node
General * Real * Real * Prima Vacca Serve	Properties n name Realm ary administrative user name ro ruser identity Automatically generated server identity Server identity that is stored in the repository Server user ID or administrative user on a Version 6.0xx node Vaccaro
General * Realr LDAPI * Prima Vacca Serve ©	Properties n name Realm Iny administrative user name ro rs user identity Automatically generated server identity Server identity that is stored in the repository Server user ID or administrative user on a Version 6.0x node Vaccaro Password
General * Real LDAPI * Prima Vacca Serve	Properties n name Realm ary administrative user name ro ru user identity Automatically generated server identity Server identity that is stored in the repository Server identity that is stored in the repository Password Password
General * Realr LDAPI * Prima Vacca Serve	Properties n name Realm ry administrative user name ro ru user identity Automatically generated server identity Server identity that is stored in the repository Server user ID or administrative user on a Version 6.0xx node Vaccaro Password

Figure 6-19 Save changes to master configuration

25.On the Federated repositories page, there are now two repositories that are displayed under Repositories in the realm; the repository that you have added and a default repository that shows **File** in the Repository type column.

On this page, you have to configure the following values:

- Leave the value in the Realm name field as is or change the name of the realm name.
- In the Primary administrative user name field, enter the name of a user in the repository that you added. This user will be granted administrative privileges in the TIP, the TPC Device Server, and the TPC for Replication server. In our case, the user is *vaccaro*.

**Warning:** Due to the WebSphere Application Server APAR PK77578, the LDAP TPC Administrator user name value must not contain a space in it.

- Click the Server identity that is stored in the repository.
- In the Server user ID or administrative user on a Version 6.0.x node field, enter the same ID that you entered in the Primary administrative user name field, and enter the password for the user ID in the Password field.
- Select the default file repository that shows File in the Repository type column and click Remove.





Figure 6-20 Federated Repository properties

26.Click the **Save** link in Save to the master configuration message as shown in Figure 6-21.

aumin	stration, applications, and infrastructure
	Messages
	When you remove the built-in repository from the administrative realm, verify that atleast one user in another member repository is a console user with administrative rights. Otherwise, you must disable security to regain access to the administrative console.
	Changes have been made to your local configuration. You can:
	<u>Review</u> changes before saving or discarding.
	The server may need to be restarted for these changes to take effect.
re adn	inistration, applications, and infrastructure > Federated repositories
smories	
figurat	, or in both the built-in repository and one or more external repositories.
figurat	Properties
figurat ienera k Real LDAP	, or in both the built-in repository and one or more external repositories. on Properties n name Realm
figurat enera Real LDAP Prim. vacca	, or in both the builden repository and one or more external repositories.  on  Properties  n name Realm ary administrative user name ro
figurat enera Real DAP Prim vacca	, or in both the builden repository and one or more external repositories. on Properties m name Realm any administrative user name ro er user identity
figurat	, or in both the builden repository and one or more external repositories.  on  Properties  n name Realm ary administrative user name ro  sr user identity Automatically generated server identity
figurat	, or in both the builden repository and one or more external repositories. on Properties n name Realm ary administrative user name ro er user identity Automatically generated server identity Server identity that is stored in the repository
Figurat	, or in both the builden repository and one or more external repositories. on Properties n name Realm ary administrative user name ro er user identity Automatically generated server identity Server identity that is stored in the repository Server user ID or administrative user on a Version 6.0.x node
Figurat Real LDAP * Prim Vacca Serv O ()	, or in both the builden repository and one or more external repositories. on Properties n name Realm ary administrative user name ro er user identity Automatically generated server identity Server identity that is stored in the repository Server user ID or administrative user on a Version 6.0.x node Vaccaro Pacement
ienera Real LDAP Prim Vacca Serv O ()	Properties  In name Realm any administrative user name re re re user identity Automatically generated server identity Server identity that is stored in the repository Server user ID or administrative user on a Version 6.0.x node [vaccaro Password

Figure 6-21 Save to master configuration panel

27. Return to the Secure administration, applications, and infrastructure page. In the Available realm definitions list, select Federated repositories and then click **Set** as current. Then click **Apply**. See Figure 6-22.

Secure administration, applications, and infrastructure  Secure administration, applications, and infrastructure  Secure administration, applications, and infrastructure  The application serving environment is completely secured when administration is supports the administration and applications also are secured.  Configuration	s restricted. The applications and the infrastructure that
Security Configuration Wizard       Security Configuration Report         Administrative security       Image: Administrative User Roles         Image: Comparison of the security       Image: Administrative User Roles         Image: Administrative Group Roles       Image: Administrative Group Roles	Authentication Use domain-qualified user names Web security
Application security ✓ Enable application security	<ul> <li>RMI/IIOP security</li> <li>Java Authentication and Authorization Service</li> <li><u>Authentication mechanisms and expiration</u></li> </ul>
Java 2 security Use Java 2 security to restrict application access to local resources Warn if applications are granted custom permissions Restrict access to resource authentication data	<ul> <li>External authorization providers</li> <li>Custom properties</li> </ul>
User account repository Current realm definition Local opaceting system Available realm definitions Federated repositories V Configure Set as current Apply Reset	

Figure 6-22 Secure administration, applications, and infrastructure panel

28.Click the **Save** link in Save to the master configuration message as in Figure 6-23.

	tion, applications, and infrastructure
	<ul> <li>Messages</li> <li>The domain name for single signon is not defined. The Web browser defaults the domain name to the host name that runs the Web application. Single signon is restricted to the application server host name and does not work with other application server host names in the domain.</li> <li>If the Restrict access to local resources option is not enabled, the Java virtual machine (JVM) system resources are not protected. For example, applications can read and write to files on file systems, listen</li> </ul>
	<ul> <li>to sockets, exit the Application Server process, and so on. However, by enabling the Restrict access to local resources option, applications might fail to run if the required permissions are not granted to the applications.</li> <li>If any of the fields are changed, save the configuration and then stop and restart the server.</li> <li>Changes have been made to your local configuration. You can:</li> <li>Save directly to the master configuration.</li> <li><u>Review</u> changes before saving or discarding.</li> </ul>
	Ine server may need to be restarted for these changes to take effect.
cure adminis e application ports the ad	tration, applications, and infrastructure serving environment is completely secured when administration is restricted. The applications and the infrastructure that ministration and applications also are secured.
cure adminis e application ports the ad onfiguration Securit Administr	tration, applications, and infrastructure serving environment is completely secured when administration is restricted. The applications and the infrastructure that ministration and applications also are secured. y Configuration Wizard Security Configuration Report ative security
cure adminis e application oports the ad onfiguration Securit Administr En: Applicatio	tration, applications, and infrastructure         serving environment is completely secured when administration is restricted. The applications and the infrastructure that ministration and applications also are secured.         y Configuration Wizard       Security Configuration Report         ative security       Administrative User Roles         able administrative security       Administrative User Roles         able administrative security       Administrative Group Roles         m security       multiple administrative Group Roles

Figure 6-23 Save to master configuration

29. The last step to perform is to log out from TIP and stop and restart the TIP, TPC, and TPC for Replication.

Now you can log on using a user ID and password combination defined in your LDAP repository.

#### 6.1.3 Changing authentication method from LDAP to local OS

If you have configured TPC to use LDAP for authentication, you can change this setting to set TPC to use the local operating system for authentication. You have to use the TIP to make this change.

**Note:** If you use operating system authentication, the use of the Single Sign-On feature is limited. In this case, Single Sign-On for element managers is not supported even when they are installed on the same computer.

**Warning:** Be advised that if you change the authentication method, all the Role-to-Group Mappings defined in TPC will be lost.

To change the user authentication method from LDAP to local operating system, complete the following steps:

1. Start a Web browser and point to the TIP URL. The address typically is:

http://hostname:port

Here, hostname defines the server that is running TIP and port defines the port number for TIP. If the default port was accepted during the installation, the port number is 16310.

2. On the TIP logon page, log on using the appropriate user ID and password defined in your LDAP server. Your user ID must have administrator permissions. In our case, we used the *vaccaro* user. See Figure 6-24.

<u>Eile Edit View History Bookmarks Tools H</u> elp	*** ***
🕢 🗸 - 😋 🗙 🏠 🗋 https://nc124040.romelab.it.ibm.com:16316, 🏠 🚹 - 💽 - Google	P 🕘
Tivoli.	
Tivoli Integrated Portal	
User ID: Vaccaro	
Password:	
LICENSED MATERIALS PROPERTY OF IBM 5724-i63, 5724-H88, 5655-N01 (C) Copyright International Business Machines Corp. 2005, 2008 All Rights Reserved US Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp. IBM is a registered trademark of the IBM Corp.	t t

Figure 6-24 TIP Logon page

3. In the Tivoli Integrated Portal navigation tree, click Security  $\rightarrow$  Secure administration, applications, and infrastructure. See Figure 6-25.



Figure 6-25 TIP security option

4. On the Secure administration, applications, and infrastructure page shown in Figure 6-26, select **Local operating system** from the Available Realm Definitions list and click **Configure**.

Secure administration, applications, and infrastructure	
Secure administration, applications, and infrastructure	
Secure administration, applications, and infrastructure The application serving environment is completely secured when administration is supports the administration and applications also are secured. Configuration	s restricted. The applications and the infrastructure that
Security Configuration Wizard       Security Configuration Report         Administrative security       Administrative User Roles         Enable administrative security       Administrative Group Roles         Application security       Administrative Group Roles         Application security       Enable application security         Java 2 security       Enable application security         Java 2 security       Warn if applications are granted custom permissions         Restrict access to resource authentication data         User account repository         Current realm definition         Federated repositories         Available realm definitions         Local operating system         Apply         Reset	Authentication         Use domain-qualified user names         Web security         RMI/IIOP security         Java Authentication and Authorization Service         Authentication mechanisms and expiration         External authorization providers         Custom properties

Figure 6-26 Secure administration panel

- 5. On the Local operating system page shown in Figure 6-27, configure the following items:
  - a. In the Primary administrative user name field, enter the name of a user that is defined in your local operating system. This user will be granted administrative privileges in the TIP server, the TPC Device Server, and the TPC for Replication server. In our case, we are using the *tpcadmin* user.

**Note:** Ensure that this user is already defined on your local operating system before proceeding.

- b. Click the Server identity that is stored in the repository.
- c. In the Server user ID or administrative user on a Version 6.0.x node field, enter the same ID that you entered in the Primary administrative user name field and enter the password for the user ID in the Password field.
- d. Click OK.

nese properties, go to the Security > Secure administration, applications, and infra	astructure. Click Apply or OK to validate the
anges. Configuration	
General Properties	Additional Properties
tpcadmin Server user identity	
<ul> <li>Automatically generated server identity</li> <li>Server identity that is stored in the repository</li> <li>Server user ID or administrative user on a Version 6.0.x node</li> </ul>	
Password ••••••••	
Apply OK Reset Cancel	

Figure 6-27 Local Operating system page

6. In the Messages box on the Secure administration, applications, and infrastructure page, shown in Figure 6-28, click the **Save** link in Save to the master configuration.

	Messages     Messages     Messages	n. You can:
	Save directly to the master configuration.     Review changes before saving or discarding.     The server may need to be restarted for these changes the server may need to be restarted for these changes.	ges to take effect.
Sec The sup Co	ure administration, applications, and infrastructure application serving environment is completely secured when administration ports the administration and applications also are secured. nfiguration	on is restricted. The applications and the infrastructure that
	Security Configuration Wizard Security Configuration Repo	rtAuthentication
	Security Configuration Wizard       Security Configuration Report         Administrative security       Administrative User Roles         Main Strative Group Roles       Administrative Group Roles	t Authentication Use domain-qualified user names Web security RMI/IIOP security Dava Authentication and Authorization Service
	Security Configuration Wizard       Security Configuration Report         Administrative security       Administrative User Roles         Main Strative Group Roles       Administrative Group Roles         Application security       Enable application security         Java 2 security       Use Java 2 security to restrict application access to local	Authentication         Use domain-qualified user names         Web security         RMI/IIOP security         Java Authentication and Authorization Service         Authentication mechanisms and expiration

Figure 6-28 Save the configuration

7. On the Secure administration, applications, and infrastructure page, select **Local operating system** in the Available realm definitions list and click **Set as current**. See Figure 6-29.

Secure administration, applications, and infrastructure	
Secure administration, applications, and infrastructure	
Secure administration, applications, and infrastructure The application serving environment is completely secured when administration is supports the administration and applications also are secured.	s restricted. The applications and the infrastructure that
Security Configuration Wizard Security Configuration Report	
Administrative security         Image:	Authentication Use domain-qualified user names Web security
Application security  Enable application security	KMU/HOP security     Java Authentication and Authorization Service     Authentication mechanisms and expiration
Java 2 security Use Java 2 security to restrict application access to local resources Warn if applications are granted custom permissions Restrict access to resource authentication data	<ul> <li>External authorization providers</li> <li>Custom properties</li> </ul>
User account repository Current realm definition Federated repositories Local operating system Federated repositories Local operating system Standalone LDAP registry A Standalone custom registry Specifies the available repositories.	

Figure 6-29 Set Local operating system as current

8. Click **Apply** and then click the **Save** link in Save to the master configuration shown in Figure 6-30.

<ul> <li>Messages</li> <li>The domain name the host name that in name and does not in the set of the s</li></ul>	e for single signon is not defined. The Web browser defaults runs the Web application. Single signon is restricted to the a work with other application server host names in the domain ess to local resources option is not enabled, the Java virtual otected. For example, applications can read and write to file Application Server process, and so on. However, by enabling n, applications might fail to run if the required permissions is s are changed, save the configuration and then stop and re- en made to your local configuration. You can: e master configuration. efore saving or discarding. eed to be restarted for these changes to take effect. <b>infrastructure</b>	the domain name to pplication server host , machine (JVM) system s on file systems, listen the Restrict access to are not granted to the start the server.
e application serving environment is con oports the administration and application	npletely secured when administration is restricted. The appli ns also are secured.	cations and the infrastructure

Figure 6-30 Save the master configuration

In order for the changes to take effect, you need to stop and restart TIP, TPC, and TPC for Replication.

## 6.2 Single Sign-On and Launch in Context

In this section, we describe how the Single Sign-On (SSO) domain is implemented in TPC V4.1 and how it enables seamless Launch in Context (LIC) between the various components and interfaces.

#### 6.2.1 SSO architecture

Single Sign-On (SSO) is the method of access control that enables a user to authenticate once and gain access to the resources of multiple, trusted applications. A group of applications or systems being able to provide seamless user context forwarding when switching from one application to the other, eliminating the need to have the user log on to every application in the domain separately, is called a Single Sign-On domain.

In order to have an SSO domain, there must be a centralized authentication repository such as LDAP or Active Directory that is accessed by all applications within an SSO environment. The user's credentials are then passed between applications in an encrypted manner.

The SSO strategy implemented in TPC is based on the exchange of Lightweight Third-Party Authentication (LTPA) token between the various applications, based on the underlying WebSphere Application Server capabilities.

The token is an encrypted string (typically passed to the applications in the Single Sign-On domain by a Cookie) which contains the following pieces of information:

- User data: Typically set to the user ID, but can be any user information used to uniquely identify the user.
- Expiration time: Unlike the Cookie expiration, this field is used to enforce a time limit that starts from the moment of login and is unaffected by browser activity or inactivity. The time limit is a configurable LTPA setting that defaults to 30 minutes.
- Digital signature: Used to validate the token.

Because the LTPA token is encrypted to prevent illegal access or modification of the information in the token, the applications participating in the token exchange must use the same type of user data, and they need to have the required keys available to access and validate the token. As a result, all applications must have the same key set to be part of the key store they use, and any change to the keys has to be synchronized among them.

Because TIP, TPC Device Server, and TPC for Replication are all based on an underlying WebSphere Application Server, the process of LTPA token exchange is straightforward as shown in Figure 6-31.



Figure 6-31 LTPA Token exchange between WebSphere based applications

In order to allow other applications, which are not based on WebSphere, to participate in an LTPA token exchange, an authentication server and a corresponding client library are provided by IBM. The Tivoli Embedded Security Service (ESS) is composed of those components to simplify the handling of LTPA tokens, with the ESS server being deployed in the TPC/TIP eWAS instance and the ESS client as the part that is included in the applications to be launched.

In this case, the user interaction can be initiated in any one of the applications (WebSphere based or ESS based) involved in the integration, and then the user credentials are propagated to the other applications as shown in Figure 6-32. An example of an application using the ESS client to participate to an SSO domain is the DS8000 Element Manager.



Figure 6-32 LTPA Token exchange between WebSphere and non-WebSphere based applications

#### 6.2.2 SSO from TIP to TPC and TPC for Replication

An SSO domain is set up between TIP, TPC, and TPC for Replication by default when you install TPC V4.1, provided that you have selected to use LDAP as authentication method. Or, if you are using OS authentication, all three components are installed and running on the same machine and the user ID that is being used is defined in all the three servers as an authorized user.

After being logged into TIP with a user with the correct authorization level, the same user can launch the TPC GUI (by Java WebStart) or the TPC for Replication Web UI through the link shown in Figure 6-33 with no need to additionally sign on.

Tivoli. View: All tasks	Welcome TPCSuperuser	Help Logout IBM.
+ •	Tivoli Stor X	Select Action 💌
<ul> <li>Welcome</li> <li>My Startup Pages</li> <li>Security</li> <li>Users and Groups</li> <li>Troubleshooting</li> <li>Trivoli Storage Productivity Center</li> <li>Settings</li> </ul>	Tivoli Storage Productivity Center Tivoli Storage Productivity Center Start Tivoli Storage Productivity Center Start Tivoli Storage Productivity Center Java 5 JRE to deploy and execute the C not have the JRE installed, see the Tivo Productivity Center information center f configuration instructions for the JRE Ja component.	r for Replication
<]	Use the following links to access Tivoli Productivity Center documentation and Tivoli Storage Productivity Center Infor Tivoli Storage Productivity Center for F	Storage demonstrations: rmation Center Replication

Figure 6-33 TPC and TPC for Replication launching points in TIP

To ensure that any change in the authentication method (from LDAP to local OS or conversely) is propagated to all the components (TIP, TPC, and TPC for Replication), this procedure must be started from TIP as documented in the previous sections of this chapter. This will ensure that all parts of the SSO domain are kept in sync.

There are other SSO configuration changes other than the authentication method that are typically initiated using the TIP admin console and that are synchronized:

- Changes to the existing authentication configuration, for example, the addition of another LDAP server configuration to the Federated repositories.
- ► TIP eWAS's "administrator" role mappings.
- ► LTPA configuration changes, for example LTPA Token expiration time change.
- TPC role to group mappings are propagated to TIP (reverse synchronization): If you add a group in TPC role to group mappings, it is added in TIP with *Operator* and *iscadmins* roles.

During the period between logging on to Tivoli Integrated Portal and when you start another application such as TPC from TIP, the following conditions might occur:

- The user password that was used to log on to TIP is changed in the user repository.
- The user ID that was used to access TIP is changed in the repository or removed from the user repository.
- The user repository is not accessible.

Under the first condition, the original user credentials that were used to access TIP are used to access other applications until the time-out period for the LTPA token that is used for Single Sign-On expires.

When the LTPA token expires, you are prompted to re-enter your user ID and password when you attempt to start another application using Single Sign-On.

Under the second and third conditions, the Single Sign-On feature does not work. You are always prompted to re-enter your user ID and password when you attempt to start another application.

#### 6.2.3 SSO and LIC from TPC to TPC for Replication

Starting from TPC V4.1, Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication are tightly integrated. They share the same installation flow, and after being installed, they also share the same authentication method. If changes to the authentication method are made through TIP following the procedures shown in the previous sections, the changes will be propagated to both TPC server and TPC for Replication server.

If the authentication method selected is LDAP, an SSO domain is defined by default between those two products, and every time the TPC for Replication Web UI is launched from the TPC GUI, there will be no need to provide the credentials to log on. The SSO domain will be defined also if the authentication method is set to OS, provided that TPC and TPC for Replication are installed on the same machine and the user ID that is being used is defined in both the servers as an authorized user.

Many additional entry points have been added in the TPC GUI to monitor and control the TPC for Replication status and activity. A Replication Manager node has been added as a top-level node in the TPC Navigation Tree. From this node, by opening the Replication Management branch, you access a panel from which you can launch directly specific TPC for Replication Web UI subsections as shown in Figure 6-34. The same panel can be reached from the **Configuration Utility**  $\rightarrow$  **Replication Manager** tab.



Figure 6-34 TPC for Replication launch points

In both cases, you are presented with the buttons described in the following sections.

#### **Replication Health Overview**

The Replication Health Overview button displays the Health Overview panel for IBM Tivoli Storage Productivity Center for Replication.

#### **Replication Sessions Overview**

The Replication Sessions Overview button lists all sessions defined within the IBM Tivoli Storage Productivity Center for Replication environment, including their state and status.

#### **Replication Storage Systems Overview**

The Replication Storage Systems Overview button displays the Storage Systems panel. The Storage Systems panel lists all the known storage systems, and indicates whether the storage systems are communicating normally with the active and remote servers, if enabled.

#### **Replication Paths Overview**

The Replication Paths Overview button displays the ESS/DS Paths panel. The ESS/DS Paths panel summarizes all the known ESS/DS series paths, listing them by storage system.

#### **Replication Management Servers Overview**

The Replication Management Servers Overview button displays the Management Servers panel. The Management Servers main panel displays the status of the management servers configuration, lists the management servers in operation (up to two), and enables you to define a standby server, or to define the local server as a standby server to an alternate server.

#### **Replication Administration**

The Replication Administration button displays the Administration panel. The Administration panel displays a list of IBM Tivoli Storage Productivity Center for Replication users and groups and their access privileges, and allows administrators to take actions on users and groups.

#### **Replication Advanced Tools**

The Replication Advanced Tools button displays the Advanced Tools panel. The Advanced Tools panel enables you to create a diagnostic package and change the automatic refresh rate of the GUI.

When you click a button, a new browser window is opened to the TPC for Replication page.

When launching the TPC for Replication GUI, you might be required to download the certificate and add an exception to allow a connection to the server as shown in Figure 6-35. If so, click **Add Exception**.

Secure Connection Failed
loopback:3443 uses an invalid security certificate.
The certificate is not trusted because it is self signed. The certificate is only valid for colorado.itso.ibm.com
(Error code: sec_error_ca_cert_invalid)
<ul> <li>This could be a problem with the server's configuration, or it could be someone trying to impersonate the server.</li> </ul>
<ul> <li>If you have connected to this server successfully in the past, the error may be temporary, and you can try again later.</li> </ul>
You should not add an exception if you are using an internet connection that you do not trust
completely or if you are not used to seeing a warning for this server.

Figure 6-35 Certificate Exception

There are certain additional launch points that provide a Launch in Context of the TPC for Replication Web UI from the TPC GUI. Under the Alerting Log node in the TPC GUI, a Replication section has been added to collect all the alerts coming from TPC for Replication. When you right-click an alert, depending on its type (visible in the Obj. Type column), another launch point is presented. In the example in Figure 6-36, we right-click an alert related to an object type RM Server. In this case, the menu shows an entry pointing to the server overview: Replication Management Servers Overview.



Figure 6-36 TPC for Replication alerts launch-in-context

**Warning:** At the time of writing of this book, a known problem in the TPC and TPC for Replication exists. In certain cases, TPC for Replication launch points do not show up under the Replication Manager tab of the Configuration Utility node in the TPC GUI also if the TPC for Replication server is correctly configured and running. Moreover, the Launch in Context feature of the TPC for Replication GUI from the Replication Alerts is not available. The cause of this problem consists in a problem with the TPC for Replication WAR file (CSM-TIP.war) not installed or corrupted in TIP.

#### Procedure to remove and then re-deploy the CSM-TIP.war file

To solve the problem, it is necessary to remove from TIP the CSM-TIP.war if it is already deployed and then deploy it again by following this procedure:

- 1. Set default directory to <TIP install dir>\bin.
- 2. Open wsadmin console. On a Windows system DOS prompt, issue the following command replacing *tipadmin* and *tipadmin password* with the appropriate values:

wsadmin.bat -username <tipadmin> -password <tipadmin password>

3. At the WSAdmin prompt, write:

\$AdminApp update isclite modulefile {-operation delete -contenturi
CSM-TIP.war}

Then press Enter. At the WSAdmin prompt, type this:

\$AdminConfig save

Press Enter again.

- Move into <TIP Install>\systemApps\isclite.ear\ folder and delete CSM-TIP.war or rename it to something such as CSM-TIP.war.bak.
- From the installation image Disk1, copy <Install folder>\disk1\tpcr\TPCRM\CSM-TIP\CSM-TIP.war to <TIP Install>\systemApps\isclite.ear\ folder.
- 6. Now deploy the WAR file using the following commands from the WSAdmin prompt: (the following example is related to a Windows machine. If you are on UNIX, change the path to the WAR file location, accordingly keeping the double slashes //)

\$AdminApp update isclite modulefile {-operation add -contents "C://Program Files//IBM//Tivoli//tip//systemApps//isclite.ear//CSM-TIP.war" -contenturi CSM-TIP.war -custom paavalidation=true -usedefaultbindings -contextroot /CSM-TIP -MapWebModToVH {{.\* .\* admin\_host}}}

Then press Enter. At WSAdmin prompt, type this:

\$AdminConfig save

Press Enter. Type:

exit

Press Enter.

- 7. Restart the TIP.
- 8. Restart TPC.

The complete list of the launch points or landing points available from this view are presented in Table 6-2.

TPC GUI Launch Point	Parameter (Obj. Type)	TPC-R Landing Point
Alert Log Entry	TPC-R Session	TPC-R Session Details
Alert Log Entry	TPC-R Server	TPC-R Management Servers
Alert Log Entry	Storage Subsystem	TPC-R Storage Subsystem Details
Alert Log Entry	Path Pair (SS:LSS)	TPC-R Path Manager

Table 6-2 TPC to TPC for Replication launch points

You can refer to 9.2, "TPC for Replication monitoring and alerting" on page 493 for additional information about TPC for replication alerts.

#### 6.2.4 SSO and LIC from TPC to DS8000

Starting from DS8000 R4.2, it is possible to use an LDAP server to handle the users and groups definitions for a DS8000 systems. The big difference with the basic authentication is that the DS8000 user IDs (as used by the DSCLI or the DS GUI) are no longer locally managed and stored at the HMC. Instead they are managed and stored in a LDAP directory server.

However, the HMC cannot directly communicate with the LDAP server. As described in section 6.2.1, "SSO architecture" on page 360, the HMC of the DS8000 is one of the applications that embeds an Authentication Client (ESS client). When optimally configured, it can authenticate user IDs and passwords against a new service provided by TPC V4.1, called Authentication Server (or ESS Server). This Authentication Server in TPC, both receives authentication requests from an Authentication Client located at the HMC, and also acts as an LDAP client to communicate those request to the LDAP servers.

For example, when using the DSCLI, the connection from a user standpoint is still established as it was without LDAP. The user establishes the connection by specifying the HMC's IP address and is prompted for a user ID and password. Now, because the DS8000 has been configured to use LDAP for authentication, the Authentication Client sends the user request to the Authentication Server. The Authentication Server validates the user's credentials with LDAP, and if valid, a valid authentication token is returned to the ESS client, which executes the command against the DS8000.

In order to use the SSO, both TPC V4.1 and the DS8000 system must be configured to use the LDAP for authentication and must point to same LDAP server. The detailed procedure about how to configure the DS8000 for LDAP authentication can be found in the Redpapers publication, *IBM System Storage DS8000: LDAP Authentication*, REDP-4505.

Having the SSO enabled between TPC and the DS8000 system allows you to launch the DS8000 element manager wherever you have the option in the TPC GUI without having to provide the user credentials again.

If you are not in the situation just described, where you can use the Single Sign-On, you can still configure TPC to launch the DS8000 element manager without asking for credentials. The Element Manager tab shown in Figure 6-37 lists all element managers known to TPC, regardless of the presence of valid user credentials. The UID/PWD column specifies if the credentials to log on to the DS8000 element manager have been provided or not.

r							_
🗉 IBM Tivoli Storage Produ	ctivi	ty Center: colorado.	itso.ibm.com	Configuration U	tility		-
File View Connection Preferences V	Vindow	Help					
Element Management	9	×    •					
Navigation Tree	Servi	ces Data Manager Disk Mana	ner Eabric Manager	Tane Manager Element Mar	nager Replica	ation Man	aner
Administrative Services	50.0	bisk handger bisk hand	ger rubrie rundger	ruper landger			age.
Services	Re	fresh					
Data Sources							
Discovery	-	DS8000 Element Manager					
E-Configuration		Select Action	~				
IBM Tivoli Storage Productivity Center		-1		-			
Configuration Utility		Element Manager	Connection Status	Device	UID/PWD A		LIC Enabled
+ Reporting		nttps://9.12.6.17:8452/D5800	U Online	D58000-2107-75BALB1-IBM	INO	res	res
H Menikering		• The DS8000 Element Managers	section allows you to conf	figure multiple DS8000 element ma	anagers and laug	ch them fro	m within one sec
Storage Resource Group Manageme		the booter Lieneric Hanager	, , , , , , , , , , , , , , , , , , , ,				
- Alerting	+	Other Device Element Manage	r				
+ Authentication Configuration Ale	÷	External Tools					
+ @ Alert Log	Ŧ	Advanced Settings					
🕀 Data Manager		narance seeings					
🗄 Data Manager for Databases							
Data Manager for Chargeback							
🗄 Disk Manager							
🗄 Fabric Manager							
🗄 🖓 Tape Manager							
🗄 Element Manager							
Replication Manager							
	L						
<	<						

Figure 6-37 Element Manager Tab

You can add the credential to log on to the element manager by selecting the menu **Select** Action  $\rightarrow$  Modify Element Manager and inserting the user name and the password in the panel shown in Figure 6-38. These credentials will be stored in the TPC GUI and used to log on every time a request of launching the DS8000 Element Manager is issued.

File View Connection Preferences Win         Element Management         Image: Services         Image: Services	dow Help  Services Data Manager Disk Manager Fabric Manager Tape Manager Element Manager Replication Manager  Refresh  D58000 Element Manager  Modify Element Manager
BM Troll Storage Productivity Center     Configuration Utility     Reporting     Topology     Monitoring     Storage Resource Group Manageme     Analytics     Alerting     Alerting     Alerting     Alerting     Alerting     Alerting     Data Manager     Data Manager for Databases     Data Manager     Fabric Manager     Fabric Manager     Fabric Manager     Replication Manager	Select Action       Add Element Manager       UID/PWD (IIC)       CIM0M LIC         Add Element Manager       DS8000-2107-75BALB1-IBM       No       Yes       Yes         Remove Element Manager       Image: Proceedings       Proceedings       Wes vou to configure multiple DS8000 element managers and launch them from         Host       9.12.6.17       Port       Select       Username       Port         Password       Password       Password Confirm       Protocol       Protocol

Figure 6-38 Element Manager properties

**Note:** The element manager credentials provided in this panel are associated to the user currently logged on to TPC. If you log on to TPC with another user name, the element manager credentials are not available and must be inserted again.

In TPC V4.1, the support for the Launch in Context (LIC) with DS8000 systems is minimal. Wherever the link to DS8000 Element manager is shown in TPC, it launches to DS8000 Element Manager home page only, not pointing to any specific and context related page.

#### 6.2.5 Changing the LTPA token expiration time

Every time an LTPA token is generated, an expiration time is associated to it. When this expiration time is reached the LTPA token is not valid anymore and a new token must be generated providing the credentials again.

**Important:** One thing to ensure when setting up a Single Sign-On domain is the synchronization of all computers participating in the domain. This is because tokens have time-specific expiration, so the synchronization of the system clocks is crucial to the proper operation of token-based validation.

If the clocks are off by too much (approximately 10-15 minutes), you can encounter unrecoverable validation failures that can be avoided by having them in sync. You must ensure that the clock time, date, and time zones are all the same between systems. It is acceptable for nodes to be across time zones, provided that the times are correct within the time zones (for example, 5 PM CST = 6 PM EST, and so on).

You can also change the expiration time of the LTPA token if the default value (24 hours) does not fit your requirements. To change it, complete the following steps:

1. Start a Web browser and point to the TIP URL. The address typically is:

http://hostname:port

Here, host name defines the server that is running TIP and port defines the port number for TIP. If the default port was accepted during the installation, the port number is *16310*.

2. On the TIP logon page, log on using the appropriate user ID and password defined on your operating system. Your user ID must have administrator permissions. In our case, we used the *tpcadmin* user. See Figure 6-39.

G . C ×	https://colorado.itso.ibm.com:16316/ibm/console/logon.jsp	
	Tivoli. Tivoli Integrated Portal	
	User ID: tpcsuperuser Password: ••••••• Log in	
	LICENSED MATERIALS PROPERTY OF IBM 5724-i63, 5724-H88, 5655-N01 (C) Copyright International Business Machines Corp. 2005, 2008 All Rights Reserved US Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp. IBM is a registered trademark of the IBM Corp.	

Figure 6-39 TIP logon page

3. In the Tivoli Integrated Portal navigation tree, click Security  $\rightarrow$  Secure administration, applications, and infrastructure. See Figure 6-25.



Figure 6-40 TIP security option

4. Under Authentication, click Authentication mechanisms and expiration. See Figure 6-41.

Secure administration, applications, and infrastructure	Close page
Secure administration, applications, and infrastructure	
Secure administration, applications, and infrastructure The application serving environment is completely secured when administration supports the administration and applications also are secured. Configuration	n is restricted. The applications and the infrastructure that
Security Configuration Wizard       Security Configuration Report         Administrative security       Image: Administrative User Roles         Image: Comparison of the security       Administrative User Roles         Administrative Group Roles       Image: Comparison of the security	Authentication Use domain-qualified user names Web security
Application security Enable application security	RMI/IIOP security     Java Authentication and Authorization Service     Authentication mechanisms and expiration
Java 2 security           Java 2 security           Use Java 2 security to restrict application access to local resources           Warn if applications are granted custom permissions           Restrict access to resource authentication data	<ul> <li>External authorization providers</li> <li><u>Custom properties</u></li> </ul>
User account repository Current realm definition Federated repositories Available realm definitions Federated repositories Configure Set as current Apply Reset	

Figure 6-41 Secure administration, application and infrastructure panel

5. On the Configuration tab under Authentication expiration, type the expiration time in minutes in the field, Timeout value for forwarded credentials between servers. The expiration time must be greater than the authentication cache timeout value that is shown above the field, Timeout value for forwarded credentials between servers. The default expiration time is 1440 minutes (24 hours). We set it to 2160 (36 hours). Click **Apply** (see Figure 6-42).

Key generation	
Authentication data is encrypted and decrypted by using keys that are kept in one or more key stores.	
Key set group	
NodeLTPAKeySetGroup 🖌 Generate keys	
Key set groups	
Authentication expiration	
Authentication information persists in the system for a limited amount of time before it expires and must be refreshed.	
Authentication cache timeout	
10 minutes 0 seconds	
Timeout value for forwarded credentials between servers	
2160 minutes	
Cross-sell single sign-on	
Single signed arrest calls say he provided by sharing lows and passwords. To share the	
keys and password, log on to one cell, specify a key file, and click Export keys. Then, log	
on to the other cell, specify the key file, and click Import keys.	
* Password	
* Confirm password	
Fully qualified key file name	
Import keys Export keys	
Use SWAM-no authenticated communication between servers	
$\sim$	
Apply OK Reset Cancel	

Figure 6-42 Authentication mechanism and expiration panel

6. In the Messages box, click **Save** directly to the master configuration. See Figure 6-43.

	ation, applications, and infrastructure	Close page
ure administr	ation, applications, and infrastructure ? –	Help
_		Field help
ſ	- Messages	select a field label
	Changes have been made to your local configuration. You can:	marker when the h
	<ul> <li><u>Save</u> directly to the master configuration.</li> </ul>	cursor appears.
	<ul> <li><u>Review</u> changes before saving or discarding.</li> </ul>	Page help
		More information a
	$\Delta$ The server may need to be restarted for these changes to take effect.	this page
-		
ecure admini	stration, applications, and infrastructure > Authentication mechanisms and expiration	
ncrypts authe nother in a s	ntication information so that the application server can send the data from one server to scure manner. The encryption of authentication information that is exchanged between servers	
nvolves the L		
Configuration		
- Key gen	eration	
Authon	tication data is consulted and descripted by using leave that are least in one or more	
key sto	incation data is encrypted and decrypted by dsing keys that are kept in one of more	
Kana		
Key se		
Key se Node	It group LTPAKeySetGroup 💌 Generate keys	
Key se Node	et group LTPAKeySetGroup V Generate keys	
Key se Node	tt group LTPAKeySetGroup 💌 Generate keys av set groups	
Key se Node	at group LTPAKeySetGroup 💌 Generate keys ev set groups	
Key se Node	et group ITPAKeySetGroup C Generate keys ev set groups ication expiration	
Key se Node	at group         LTPAKeySetGroup         Generate keys         av set groups         ication expiration         tication information persists in the system for a limited amount of time before it	
Key se Node	at group         LTPAKeySetGroup         gev set groups         ication expiration         tication information persists in the system for a limited amount of time before it and must be refreshed.	
Key se Node E K Authent Authen expires Authe	at group         LTPAKeySetGroup         ex set groups    ication expiration tication information persists in the system for a limited amount of time before it and must be refreshed. tication cache timeout	
Key se Node E K Authent Authen Authen	tgroup LTPAKeySetGroup ♥ Generate keys ev set groups ication expiration tication information persists in the system for a limited amount of time before it and must be refreshed. tication cache timeout minutes 0 seconds	
Key se Node E K Authent Authen expires Authe	transmission         ex set groups         ex set groups         ication expiration         tication information persists in the system for a limited amount of time before it and must be refreshed.         utication cache timeout         minutes	
Key s< Node = K Authent Authen 10 Timec	et group         LTPAKeySetGroup         ex set groups    ication expiration tication information persists in the system for a limited amount of time before it and must be refreshed.          ntication cache timeout          minutes       0         seconds         ut value for forwarded credentials between servers	
Key so Node Kuthent Authent Suthent In Timec [2160]	at group         LTPAKeySetGroup         Exy set groups         ication expiration         tication information persists in the system for a limited amount of time before it         and must be refreshed.         ntication cache timeout         minutes       0         seconds         ut value for forwarded credentials between servers         minutes	

Figure 6-43 Save to master configuration message

A new value for the LTPA expiration time is now set. This procedure will generate an alert in the TPC GUI, as shown in Figure 6-44. The text of the message alerts you about the need to restart the Data Server and the Device Server in order for the changes to become active.

Navigation Tiree         □         25. May 12, 2009 2:58:1           □         26. May 13, 2009 2:59:1         □         27. May 14, 2009 3:59:1           □         27. May 14, 2009 3:69:1         □         27. May 14, 2009 3:69:1           □         27. May 14, 2009 3:69:1         □         27. May 14, 2009 3:69:1           □         77. May 14, 2009 3:69:1         □         -           □         72. Server Probes         Stores         Persupercent Frome Management	59 AM 00 AM 00 AM 58 PM	Detail for Alert Computer Alert Tupe	ederado ito ito con
Analytics     Analytics     Analytics     Configuration History     Storage Optimizer     Authentication Configuration /     Authentication Configuration /     Authentication Configuration     Authentication Configuration     Authentication Configuration     Authentication Configuration     Authentication Configuration     Onputer     Disk     Filesystem     Disk     Filesystem     Disk     Filesystem     Organizer     Storage Subsystem     Disk     Filesystem     Disk     Filesystem     Other Computer     Storage Subsystem     Other Computer     Disk     Storage Subsystem     Other Computer     Storage Subsystem     Other Computer     Storage Subsystem     Other Computer     Storage Subsystem     Other Computer     Storage Subsystem     Storage Subsystem	Alerts	State Timestamp Alert Creator Alert Name Alert Text	Configuration Changed Acknowledged May 8, 2003 334.45 PM TPCUser Authentication Configuration Change ALR4343W: The Single Sign-On token expiration time has changed. The Data

Figure 6-44 Alert for changing the LTPA token expiration time



# 7

# Optimizing storage configurations through Tivoli Storage Productivity Center

In this chapter, we describe how to use the Storage Optimizer through Tivoli Storage Productivity Center to analyze storage subsystems. We do this to identify performance bottlenecks and create a recommendations report describing improvements that you can make to subsystem performance, as well as providing recommendations for migration and consolidation.

## 7.1 Storage Optimizer overview

Analyzing large amounts of performance data and interpreting the results is a time consuming exercise and requires a certain set of skills. The Storage Optimizer changes all of this by automating the task of interpreting the vast amounts of configuration and performance data, which allows even the most junior storage administrator the ability to identify areas for improvement within their storage networks.

The Storage Optimizer uses data in the IBM Tivoli Storage Productivity Center database to analyze your storage subsystems to identify performance bottlenecks, and recommend changes to improve performance. This topic lists the supported subsystems and describes the general steps for using Storage Optimizer, as well as taking a look into how the Storage Optimizer functions.

The Storage Optimizer uses a unique "Heat Map" style of display that makes narrowing in on "Hot Spots" (bottlenecks) much easier than having to analyze huge amounts of raw performance data to identify problem areas.

#### 7.1.1 Main aspects

The Storage Optimizer also helps you develop storage migration or storage consolidation plans, and helps you plan for the growth of your storage infrastructure, based on the various performance behaviors.

There are two main aspects to the Storage Optimizer that are discussed in more detail later in this chapter. The first portion of work is called the *Analysis*, and the second portion is the actual *Optimization* itself. At a high level, the Analysis is responsible for collecting, aggregating, and predicting the utilizations of the storage subsystem infrastructure. The Optimization is responsible for utilizing the results of the Analysis to help put together a plan for potential migrations and consolidations, to improve overall utilization of the infrastructure.

**Note:** The Storage Optimizer does not actually perform any migrations or make any modifications to subsystem configurations.

It is the Storage Optimizer's primary purpose to provide you with a performance analysis and optimization recommendations report, which you can choose to implement at your own discretion.

#### 7.1.2 Users of Storage Optimizer

The main users of the Storage Optimizer include the following roles:

- Junior storage administrators that do not have much experience with interpreting existing performance reports
- Senior storage administrators looking to validate a hunch or learn what other reports indicate to be the case
- ► All storage administrators looking for a plan to consolidate or retire storage hardware:

This is useful when looking at retiring obsolete subsystems or alternatively when looking at consolidating onto a subset of subsystems to improve their density, thus leaving a few of them shut down (saving money on maintenance, depreciation, and energy costs) until such a time that their data growth actually catches up to their hardware capacities.

► Anyone with a *Standard Edition* licence:

To use the Storage Optimizer, you must have a Tivoli Storage Productivity Center Standard Edition License.

The two primary use-cases are:

- Migration Scenario: Provides recommendations to neutralize the "hot spots".
- Retirement Scenario: Provides recommendations to retire selected pools (move all volumes away from the selected pools)

#### 7.1.3 Supported subsystems and applications

The following IBM storage subsystems or applications are supported; see Table 7-1.

- ► DS8000
- ► DS6000<sup>™</sup>
- ► DS4000®
- SAN Volume Controller
- ESS

Table 7-1 Support Matrix

Supported Matrix	FC Drives	SATA Drives	SAS Drives	Solid® State Drives
DS3000	No	No	No	No
DS4000	Yes	No	No	No
DS5000	No	No	No	No
DS6000	Yes	No	No	No
DS8000	Yes	No	No	No
ESS	Yes	No	No	No
SVC	Yes	No	No	No
XIV®	No	No	No	No

No special firmware or CIMOM level requirements introduced by this feature. The supported TPC levels will be sufficient.

Note: Non-IBM subsystems are not supported by the Storage Optimizer.

You can analyze the front-end of an SVC that has non-IBM back-end storage, however, no recommendations will be made for these non-IBM back-end subsystems because there are no Disk Magic<sup>™a</sup> models for those devices. The Analysis can be useful when looking at the "Hot Spots" and determining where the bottlenecks lie on the SVC.

a. Refer to "A word on Disk Magic" on page 382

# 7.2 How the Storage Optimizer works

We mentioned that the first aspect to the Storage Optimizer is the Analysis.

The Analysis is responsible for using the <sup>1</sup>Disk Magic tool to produce *predicted* utilizations based on actual measured performance metrics collected for that device by TPC. These predicated utilizations are provided on a *per storage pool* basis.

The Storage Optimizer produces the following output:

- An analysis report that displays performance Heat Maps and tables that graphically illustrate the performance utilization of the storage subsystems that you specified as input.
- An optimization report that provides migration and consolidation recommendations for improving performance.

**Note:** If you are analyzing large numbers of subsystems, we recommend that you schedule a time to run the Storage Optimizer when processor demand is at a minimum.

Refer to 7.3, "Using the Storage Optimizer" on page 381 for more details on how the Storage Optimizer works through the various phases.

#### What to do before using the Storage Optimizer

Before running Storage Optimizer, you must set up performance monitors and collect performance monitoring data for all the storage subsystems that you want Storage Optimizer to analyze.

You must also collect performance monitoring data for a SAN Volume Controller's back-end subsystems in order to produce the most accurate Storage Optimizer analysis.

Note: You must have daily summation level performance monitor data.

We strongly recommend that you create a performance baseline prior to using the Optimizer, to understand where the peaks reside within your environment and to validate any recommendations.

Notice that when the Optimizer runs the Analysis, it looks at the period specified and during this time takes an average workload over this period. So in the case where you might have a storage pool running at 40% utilization and once a week it spikes to 90%, the Optimizer will average this out over the period chosen and not take the peaks or spikes into consideration.

Refer to SAN Storage Performance Management using TotalStorage Productivity Manager, SG24-7364, when setting up the performance monitoring and creating your baselines, as well as for guidance when validating the recommendations provided by the Optimizer following the previously used methods.

**Note:** Keep in mind that the Analysis will be less accurate if there are any gaps in the data collection for the time interval being analyzed. We recommend that you collect at least one week of performance data before using the Storage Optimizer.

Providing a longer time interval for data collection will increase the accuracy of the Storage Optimizer analysis and recommendations.

<sup>&</sup>lt;sup>1</sup> Refer to "A word on Disk Magic" on page 382

#### General steps for using the Storage Optimizer

Here is an overview of the tasks to be done:

- 1. Create the analysis report. See 7.3.1, "Creating an analysis report" on page 381.
- 2. Review the Storage Optimizer analysis report. See 7.3.2, "Viewing an analysis report" on page 389.
- 3. Create the optimization report based on this analysis. See 7.3.3, "Creating an optimization report" on page 392
- 4. Review the optimization report. See 7.3.4, "Viewing an optimization report" on page 397.
- 5. At your discretion, implement the recommendations suggested in the optimization report, or re-run the Analysis using various inputs.

# 7.3 Using the Storage Optimizer

In this topic, we describe how to use the Storage Optimizer. Furthermore, we briefly discuss the inner workings of the Storage Optimizer.

#### 7.3.1 Creating an analysis report

As we mentioned, the first aspect of the Storage Optimizer is the Analysis.

#### How the Storage Optimizer Analysis works

Before getting into the actual creation of the analysis report, let us consider how the Storage Optimizer analysis works when creating the report.

The Analysis is responsible for using the <sup>2</sup>Disk Magic tool to produce *predicted* utilizations based on actual measured performance metrics collected for that device by TPC. These predicated utilizations are provided on a *per storage pool* basis.

What do we mean by "utilizations"?

The Analysis reports on four unique aspects of the internals of a storage subsystem and how these are specific to a particular pool. It then produces a percentage number that represents how much of that component's total capacity is being used by the measured workload and configuration.

These are the four utilizations predicated by the Analysis:

HDD (Hard Disk)

The estimated overall "saturation" of the physical disks in a given subsystem. This number is very much impacted by the RPM speed, capacity, and workload being measured.

**Attention:** *Obviously, this does not apply to situations where the subsystem is a virtualizer with no internal disk (such as the SVC).* 

#### HA (Host Adapter)

Also known as a Fibre Adapter (FA) or Fibre Card. This is the estimated "saturation" of the ports on the subsystem. This number is very much impacted by the number of ports, maximum hardware bandwidth, and workload being measured.

<sup>&</sup>lt;sup>2</sup> Refer to "A word on Disk Magic" on page 382

#### DA (Device Adapter)

Also known as a RAID controller. This is the estimated "saturation" of the RAID controllers of the subsystem. This number is very much impacted by the model of the subsystem and workload being measured.

#### SMP (Controller)

This is the estimated "saturation" of the CPU complex of the subsystem. This number is very much impacted by the model of the subsystem and workload being measured.

Additionally, there are two utilization numbers provided by the Storage Optimizer that are somewhat unique in their computation:

#### Utilization

This overall "utilization" number is simply computed as MAX(HDD, HA, DA, SMP), Meaning that it just represents the biggest of the four other components, it does not represent a separate component.

#### Space

This utilization number is unique in that it is not *predicted*, it is measured. This is provided as a convenience to give an indication of how full a particular pool has become, in terms of allocated capacity versus total capacity.

#### A word on Disk Magic

Disk Magic is an IBM licensed component from a company called IntelliMagic™.

Disk Magic shows:

- Current and expected response times
- Component utilization levels
- Throughput limits for specific I/O loads

The Storage Optimizer uses the IBM specific Disk Magic models for prediction and computation of the utilization percentages.

 The Storage Optimizer pulls raw metrics from Performance Manager, aggregates them, and then plugs them into the Disk Magic models.

#### **Important Performance Metrics**

The Storage Optimizer looks at eleven raw metrics to feed into the Disk Magic models:

- Read I/O Rate (normal)
- Read I/O Rate (sequential)
- Read I/O Rate (overall)
- Write I/O Rate (normal)
- Write I/O Rate (sequential)
- Write I/O Rate (overall)
- Read Cache Hits Percentage (overall)
- Write Cache Hits Percentage (overall)
- Cache to Disk Transfer Rate
- Read Transfer Size
- Write Transfer Size

This is made available to the Storage Optimizer through the performance metrics that are gathered per volume. As seen in Figure 7-1, we are able to view the performance reports with these metrics to see part of the information being presented to Disk Magic. To do this, you can run a report by logging onto the TPC GUI and navigating to **Disk Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Storage Subsystem Performance**  $\rightarrow$  **By Volume**.
Available Columns Total I/O Rate (normal) Total I/O Rate (sequential) Total I/O Rate (sequential) Tabel VO Rate (sequential) Tabel VO Rate (sequential) Tabel VO Rate (sequential)	Summation Level Daily	
Total I/O Rate (normal) Total I/O Rate (sequential) Total I/O Rate (sequential) Tabel 40 Rate (sequential) Tabel 40 Rate (sequential)	Available Columns	Included Columns
Total I/O Rate (sequential) Time Eleven RAVV Metrics Interval	Total I/O Rate (normal)	Subsystem
Tatal VO Bata (averall)	Total I/O Rate (sequential)	Time Eleven RAW Wethos
Interval	Total I/O Rate (overall)	Interval
Read Cache Hit Percentage (normal) Read I/O Rate (normal)	Read Cache Hit Percentage (normal)	Read I/O Rate (normal)
Read Cache Hits Percentage (sequential) Read I/O Rate (sequential)	Read Cache Hits Percentage (sequential)	Read I/O Rate (sequential)
Write Cache Hits Percentage (normal) Read I/O Rate (overall)	Write Cache Hits Percentage (normal)	Read I/O Rate (overall)
Write Cache Hits Percentage (sequential) Write I/O Rate (normal)	Write Cache Hits Percentage (sequential)	Write I/O Rate (normal)
Total Cache Hits Percentage (normal) Write I/O Rate (sequential)	Total Cache Hits Percentage (normal)	Write I/O Rate (sequential)
Total Cache Hits Percentage (sequential) Write I/O Rate (overall)	Total Cache Hits Percentage (sequential)	Write I/O Rate (overall)
Total Cache Hits Percentage (overall)	Total Cache Hits Percentage (overall)	Read Cache Hits Percentage (overall)
Read Data Rate >> Write Cache Hits Percentage (overall)	Read Data Rate	>> Write Cache Hits Percentage (overall)
Write Data Rate Cache to Disk Transfer Rate	Write Data Rate	Cache to Disk Transfer Rate
Total Data Rate Keed Transfer Size	Total Data Rate	Read Transfer Size
Read Response Time Write Transfer Size	Read Response Time	Write Transfer Size
Write Response Time	Write Response Time	

Figure 7-1 Performance Metrics

## How to create the Analysis Report

We now illustrate how to go about creating the analysis report. Subsequently, we discuss the inner workings when creating the report, to give you a better understanding of how the Storage Optimizer functions.

This step in the process requires that you have a good understanding of the storage environment that you want to analyze.

To create the analysis, complete the following steps:

- 1. Navigate to one of the following menus:
  - a. Tivoli Storage Productivity Center  $\rightarrow$  Analytics
  - b. Tivoli Storage Productivity Center  $\rightarrow$  Disk Manager
  - In our example we navigate to option **b** as seen in Figure 7-2.

Navigation Tree
Administrative Services
IBM Tivoli Storage Productivity Center
🗄 Data Manager
🗄 Data Manager for Databases
Data Manager for Chargeback
🖻 Disk Manager
Storage Subsystems
🖻 Storage Optimizer
i →admirkstrator.Optim_Test1
⊡-db2admin.Optim_Test2
🗄 SAN Planner
<b>⊞</b> -Monitoring
Alerting
🕀 Profile Management
Reporting
🗄 Fabric Manager
⊞Tape Manager
Element Manager
⊞ Replication Manager

Figure 7-2 Storage Optimizer

2. Right-click **Storage Optimizer** and select **Create Analysis** to invoke the Create Analysis panel as seen in Figure 7-3.

Navigation Tree				
Administrative Services				
🗄 IBM Tivoli Stor	age Productivity Ce	enter		
🗄 Data Manager				
🗄 Data Manager	for Databases			
🗄 Data Manager	for Chargeback			
🖻 Disk Manager				
Storage Su	bsystems			
Storage Op	timizer Graate Analysia	1		
⊕⊸administ	Create Analysis			
	Refresh 📉			
+ SAN Plann	Collanse Branch			
+ Monitorin <u>c</u>	Collapse branch			
Alerting	Expand Branch			
	Print Branch			
H-Reporting	-	-		
Herabric Manager				
Hereitanager				
Element Manager				
	inager			

Figure 7-3 Create Analysis

3. In Figure 7-4, we illustrate a few of the fields, options, and panes that you will be working with when creating the analysis report. Familiarize yourself with the various functions.

Guasta Analysis			
Cieace Analysis			
Use this panel to alkalyze the subsystems and	I create a storage optimization re	port based on that analysis.	
Creator: tpcsuperuser Name:	unnamed		
Description:			
-Steps for using Storage Optimizer 1. Before Yos-begin: create and run a subsystem 2. Use this panel forschedule or run a Storage Op 3. After the analysis job Comgletes, review the a 4. Create and print an optimization-report.	performance monitor job for the timizer analysis job. Select stor nalysis and select any subsystem	subsystems you want Storage Optimizer to analy, age subsystems and the performance time interva is that you want to migrate or consolidate.	ze. I for the analysis.
Select Storage			
Select one or more storage subsystems for analy	This is a multi-step process, read the		
	step.		
The "Select Storage ->Add" invokes the Optimizer Selection panel, which is used to define the storage to be analyzed.	Providing a longer time interval for data collecti will increase the accura the Storage Optimizer	on sy of	
Performance Time Interval		en to run	
Specify the time interval Storage Optimizer uses to performance monitoring data for analysis. Start Date: 2009 ¥ / May ¥ / 7 ¥ End Date: 2009 ¥ / May ¥ / 7 ¥	collect C Ru C Ru 20	n Now n Once at: 39	44 You have the option to either run the job immediately or schedule at a time you specify.
How to handle time zones			
Specify which time zone to use:			
<ul> <li>Use the time zone that the server</li> </ul>	runs in		
C Use this time zone:			
(GMT+2:00) Africa/Harare			
(and the by writely large			

Figure 7-4 Create Analysis Panel

- 4. The *Select Storage* pane lists the storage subsystems that you want to include in the analysis. Use the **Add** button to add elements to the plan:
  - a. Click **Add** as seen in Figure 7-5. The *Optimizer Selection* panel opens (Figure 7-6). This provides a topology view of the current system configuration. Select the storage subsystems that you want to include in the analysis.

**Tip:** The Topology Viewer pane displays the configuration from which selections are made. The Select Elements pane displays the selections that will be used in the analysis.

Se	elect Storage-			
	Select one or mo	re storage subsyst	ems for analysis	
	Add.	Remove		

Figure 7-5 Add Subsystems

- b. *Double-click* the Storage box title to expand the storage view into the L0 level view of available subsystems(Figure 7-6).
- c. Click an element to select it. To select more than one element at once, press and hold the CTRL key and click each element icon (Figure 7-6).
- d. Click >> to move the selected elements into the Select Elements pane (see Figure 7-6). To remove elements, click <<.</p>

Optimizer Selection	X
Select the elements from topology	
Available elements:	Select Elements:
Topology Viewer	B-D Subsystems
△ Overview △ L0:Storage ⊗	DS8000-2107-75KA301-IBM
2882-TP 3992-TP 38 🐴 LO:Stor 🖃	
LÔ level view of available subsystems.	
Shortcuts Data Path Explorer DS8000 SVC-214	
Click to move selected elements into the Select Elements pane.	->>
13AAW2A         200200A         DS8000         Click element to select it.           DS8000         DS8000         SVC-214	
Action: Open Detail View V Locate: View Find	
Subsystem Tape Library Alert	
Group 🗸 Label Operational Vendor	
Normal 200200A0B80F033C	
Ostanovica DS8000-2107-75FX101-I ok IBM	
■ Normal     DS8000-2107-75FX102-I 0K     BM     BM	
	OK Cancel

Figure 7-6 Select Elements

**Note:** The **Select Elements** pane lists the subsystems to be included in the analysis.

e. When you are satisfied with all your selections, click **OK**. You return to the Storage Optimizer Create Analysis panel with the selections displayed in the *Select Storage* pane (Figure 7-7).

- Select Storage
o one of o tongo
Select one or more storage subsustems for analysis
Select one of more storage subsystems for analysis
🗖 🕅 Subaustana
DS8000-2107-75KA301-IBM
DS8000-2107-1302541-IBM
· ·
Add Bemove
Add

Figure 7-7 Selected Storage

- 5. Optional: You can select an element to remove it by selecting the element and clicking **Remove**.
- 6. In the **Performance Time Interval** section (Figure 7-8), select the **Start Date** and **End Date** to define the time interval that the Storage Optimizer uses to extract performance monitoring data from the IBM Tivoli Storage Productivity Center database. The performance monitoring data must exist in the database for the time interval that you specify. The default time interval is the start and end date of the current date.

The Optimizer looks at the first and last day, as well as the days in between. So as long as there is at least one daily summation value between the dates you selected, it will work. For example, if you select between 5/1/09 - 5/26/09, and you only have data from 5/5/09 - 5/7/09, it will work.

Providing a longer time interval for data collection will increase the accuracy of the Storage Optimizer analysis and recommendations, provided that there is performance data collected for the time specified.

-Performance Time Interval	7
Specify the time interval Storage Optimizer uses to collect performance monitoring data for analysis.	
Start Date: March 💌 20 💌 , 2009 💌	
End Date:	

Figure 7-8 Performance Time Interval

 You have the option of either selecting Run Now to begin the analysis as soon as you save the analysis job using File → Save, or selecting Run Once at to begin the analysis at a time you specify, as seen in Figure 7-9.

How often to run	
Run Now	
C Run Once at:	
May 🔽 11 🔽 , 2009 🔽	11 : 57 AM 💌

Figure 7-9 How often to run

8. For How to handle time zones, specify which time zone to use, as seen in Figure 7-10.



Figure 7-10 How to handle time zones

9. Click File  $\rightarrow$  Save to save and submit the analysis report job as shown in Figure 7-11.



Figure 7-11 Save Job

If you see the error shown in Figure 7-12 when saving the job, this means that there is currently no performance data available for the time interval you have selected.

Make sure that you have collected the required performance data for the subsystems selected over the time interval chosen.



Figure 7-12 Error no performance data

10. When started, you can view the analysis job status under the *Storage Optimizer* node in the Navigation Tree as shown in Figure 7-13. Ensure that the job status is green when complete, because this indicates a successful run.



Figure 7-13 Job Status

11. When the analysis report job is complete, select it to view the analysis report.

### 7.3.2 Viewing an analysis report

The analysis report displays a performance analysis for storage systems, and lets you generate an optimization report that lists storage migration and consolidation recommendations. You can experiment with various migration and consolidation scenarios to help you achieve the desired performance improvements for your storage infrastructure.

To view the analysis report:

- 1. Navigate to one of the following nodes:
  - a. Tivoli Storage Productivity Center → Analytics
  - b. Tivoli Storage Productivity Center -> Disk Manager
- 2. Expand the *Storage Optimizer* node and select a completed (green) analysis job to display the analysis report (Figure 7-13).
- 3. The analysis report (Figure 7-14) starts by detailing the *performance time interval* that was analyzed. See callout **A** in Figure 7-14.
- 4. By default, the Heat Maps display the *overall performance utilization* of all components. See callout **B** in Figure 7-14.

This is shown under the *Performance Heat Maps*. There are two views to choose from, *Performance Heat Maps* and *Performance Tables*. See callout **E** in Figure 7-14. Both show the same information in another manner, as we discuss later in this chapter.

- 5. To display the performance utilization for a specific component, select the component from the *Heat Map based on* list. See callout **C** in Figure 7-14.
- You can change the *Performance Threshold* slider (see callout **D** in Figure 7-14) to change the performance threshold for all the selected subsystems (from Figure 7-7 on page 386). The Heat Maps are automatically updated to reflect changes in the performance threshold.

This allows you to see the performance threshold at which various subsystems or components become bottlenecked.

Create Optimization Report	
View the analysis report and create an optimization report.	
Creator: administrator Analysis name: march20_april20_DS8Ks Description: No Description Provided	
teps for using Storage Optimizer	
In the heat map or table, select storage pools or subsystems and add them as source entities.     Z To consolidate an entity, select & and select "Make retirement recommendations for the selected entity".     Select storage pools or subsystems and add them as straget entities if you want to keep them.     Choose when to run the optimization report.     Schoose rike > Save to start or schedule the optimization report.	
ata Analysis Interval	
Start Date: Mar 20, 2009 12:00:01 AM A: Detailing the performance time interval that y	was analyzed
End Date: Apr 20, 2009 7:44:17 AM	forman will a formation of all
B: By default the heat maps display the overall per components	formance utilization of all
Performance Heat Maps   Performance Tables	Course Entition
HeatMap based on: Utilization C: Performance utilization Specific component	Add the storage pools and subsystems that you want to migrate or consolidate.
E: The same information is displayed on both of these tabs – just in a different manner.	>>>
Jeser al fone rei andi 2006. La concentrativa	Make retirement recommendations for the selected entity
Select all pools for storage subsystem: DS8000-2107-1302541-IBM	Target Entities:         Add the storage pools and storage subsystems that you want to keep.         >>         <
Legend N/A 0% 1.20% 21.40% 41.60% 61.60.0% 50.0%	D: Change the performance threshold slider here will dynamically change the heat maps as you move it.
How often to run	Performance Threshold
© Run Now	
	Threshold: 80%
hard the short hard hard	
View Previously Run Optimization Reports	
Refresh Job Status	
Job Status Job Name Date Log File	

Figure 7-14 Viewing Analysis Report

Let us now discuss the *Performance Heat Maps* and *Performance Tables* views mentioned in step 3 in a bit more detail. Notice that the same information is displayed on both of these tabs, just in another manner.

#### **Performance Heat Maps**

There is one Heat Map for each storage subsystem included in the analysis. The Heat Map (Figure 7-15) uses various colors to represent the actual performance of a storage subsystem, as measured against the default performance threshold of 80%. If you change the performance threshold, the Heat Maps are automatically updated to display the changes.

Each cell represents a storage pool. If there are not enough storage pools to fill an entire row, the remaining cells in that row will be gray. Select a cell to display more information about that storage pool (see Figure 7-15).

Green, blue, yellow, orange, red, and white cells indicate storage pool performance:

- Green: Storage pools performing at less than or equal to 25% of performance threshold.
- **Blue:** Storage pools performing at less than or equal to 50% of performance threshold.
- ▶ Yellow: Storage pools performing at less than or equal to 75% of performance threshold.
- Orange: Storage pools performing at less than or equal to 100% of performance threshold.
- ► **Red:** Storage pools exceeding performance threshold.
- White: Storage pools showing no performance utilizations.

For more information about the white cells displayed, refer to the FAQ section 1 on page 404.

Performance Heat Maps   Performance Tables
HeatMap based on : Utilization
Select all pools for storage subsystem: DS8000-2107-75KA301-IBM
Select all pools for storage subsystem: DS8000-2107-1302541-IBM
Subsystem name: DS8000-2107-1302541-IBM Pool name: P4
Utilization: 6.717%

Figure 7-15 Storage pool cell display

**Note:** Hovering over a storage pool (cell) will display specific information regarding that storage pool as seen in Figure 7-15.

#### **Performance tables**

The Performance tables (Figure 7-16) represent the same information that is displayed in each Heat Map, but in more detail. There is one table for each storage subsystem. Each row represents a storage pool. You can sort the table by clicking a column.

Performance Heat Maps Performance Tables

Table for Subsystem: DS8000-2107-75KA301-IBM

Pool Name	Utilization	Host Adaptor	Hard Disk	Controller	Device Adapter	Space	
EP_1_FB	100.0%	24.0%	100.0%	14.113%	52.373%	26.114%	
EP_3_FB	100.0%	27.553%	100.0%	23.472%	90.831%	63.291%	
EP_5_FB	73.349%	11.185%	73.349%	4.191%	8.874%	60.087%	
EP_4_FB	49.692%	3.418%	49.692%	1.336%	5.562%	69.93%	
EP_2_CKD	0.0%	0.0%	0.0%	0.0%	0.0%	50.825%	-

Table for Subsusters:	DS8000.2107.1302541.JBM
	D30000-2101-1302341-1DH

Pool Name	Utilization	Host Adaptor	Hard Disk	Controller	Device Adapter	Space	
P0	0.0020%	0.0%	0.0020%	0.0%	0.0%	64.893%	
P1	0.0%	0.0%	0.0%	0.0%	0.0%	96.919%	
P10	0.0%	0.0%	0.0%	0.0%	0.0%	2.572%	
P11	0.037%	0.0030%	0.037%	0.0020%	0.0040%	88.339%	
P12	0.0080%	0.0%	0.0080%	0.0%	0.0010%	94.609%	

Figure 7-16 Performance Tables

Column descriptions are as follows:

- Pool Name: The name of the storage pool
- Utilization: The aggregated performance utilization of all components, as measured against the performance threshold
- Host Adaptor: The performance utilization of the host adapter ports on the storage subsystem
- Hard Disk: The performance utilization of the disk arrays
- Controller: The processor and memory performance utilization
- Device Adapter: The performance utilization of the device adapter that connects the controller to the disk arrays
- Space: The physical disk space utilization

**Note:** At this stage of the process, we have created the analysis based on our selections (such as subsystems included, time interval, and so on) and viewed the output analysis report. We have a good understanding of how the separate customizable options (performance slider) effect the thresholds shown in the separate tabs (performance Heat Maps and performance tables).

# 7.3.3 Creating an optimization report

This is the generally the second step after running the analysis report and viewing it.

#### How the Storage Optimizer optimization works

After the Analysis is completed, the Optimization capabilities can be used to migrate or consolidate the storage infrastructure:

- Migration is the ability to alleviate hot spots by relocating "hot" volumes in the "hot" pools to "colder" pools and subsystems.
- Consolidation is the ability to identify possibilities for reclaiming space.

#### **Migration overview**

When selecting particular pool(s) as the *source* of the migration, you are effectively telling the Optimizer to consider migrating any volumes in the pool that cause the pool to exceed the set threshold level (those that cause the pool to be shown as red in the Heat Map).

The pools and subsystems listed as the *target* of the migration are the potential destinations for the volumes being considered.

Before the Optimizer can suggest moving a volume, several criteria must be met. The target pool:

- Must have the same format as the source pool (CKD versus FB format)
- Must have the same RAID level as the source pool (Not the case for an SVC)
- Must have adequate capacity for the potential new volume
- Must not exceed the utilization threshold when the Optimizer simulates the source volumes workload characteristics being added to the target pool

#### **Consolidation overview**

Retiring individual pools or entire subsystems can be a useful endeavor to essentially "defrag" your storage environment. This will help to increase the density of your storage utilization to help you get the most out of your hardware investment.

Instructing the Storage Optimizer to make retirement recommendations for the source entities is the same as telling the Optimizer to continue producing recommendations when the source pools are below the established threshold, but rather to continue until the source pools no longer contain any volumes.

Otherwise, all the same rules and restrictions from the Migration scenario still apply. The target pools provided must adhere to the same restrictions, and most importantly, the threshold setting still applies even in the Consolidation scenario. Space is often the most restricting requirement when trying to consolidate a given set of pools.

#### How to create the optimization report

You can create an optimization report that lists storage migration and consolidation recommendations. You can experiment with various migration and consolidation scenarios to help you achieve the desired performance improvements for your storage infrastructure.

**Keep in mind:** The Storage Optimizer does not actually perform any migrations or make any modifications to subsystem configurations.

To create the optimization report:

- 1. Navigate to one of the following nodes:
  - a. Tivoli Storage Productivity Center  $\rightarrow$  Analytics
  - b. Tivoli Storage Productivity Center  $\rightarrow$  Disk Manager
- 2. Expand the *Storage Optimizer* node and select a completed (green) analysis job to display the analysis report (see Figure 7-13 on page 389).

- 3. To include a storage pool or storage subsystem as a *Source Entity* that you want to migrate or consolidate to improve performance, follow these steps:
  - a. In the Heat Map or table, select a storage pool or storage subsystem, so that you can include them as source entities:
    - Choose **Select all pools for storage subsystem** to select all storage pools in a storage subsystem (Figure 7-17).
    - Choose a specific pool or a number of pools by holding down CTRL while selecting (Figure 7-18).

**Note:** When you are adding subsystems or storage pools as the *source* for a non-consolidation or retirement scenario, there is no point in selecting the entire subsystem, as shown below in Figure 7-17 as the source; the only pools that will be considered for migration are those cells shown as red.



Figure 7-17 Select all pools for storage subsystem

🔲 Select a	Select all pools for storage subsystem: DS8000-2107-75KA301-IBM								

Figure 7-18 Select specific pools

b. To add the selected pools or subsystems to the *Source Entities* pane, click >> as shown in Figure 7-19.

Note: The same storage pool cannot be added as both a source and a target entity.

Performance Heat Maps Performance Tables HeatMap based on : Utilization	Source Entities: Add the storage pools and subsystems that you want to migrate or consolidate. Importanties Im
Select all pools for storage subsystem: DS8000-2107-1302541-IBM	Target Entities:         Add the storage pools and storage subsystems that you want to keep         >>         <

Figure 7-19 Select Source Entities

c. For the Source Entities selected in the previous step, you have the option to select **Make retirement recommendations for the selected entity**, but keep in mind that the optimizer report will make retirement recommendations for *all source entities*.

**Note:** If you select **Make retirement recommendations for the selected entity**, all the workload will be moved off the of the source regardless of the utilizations.

- d. To remove an item from the list of source entities, select it and click << to the left of the *Source Entities* pane.
- 4. To include a storage pool or storage subsystem as a *Target Entity* (potential destinations for the volumes being considered) that you want to keep after storage migration and consolidation:
  - a. In the Heat Map or table, select a storage pool or storage subsystem:
    - Choose **Select all pools for storage subsystem** to select all storage pools in a storage subsystem (Figure 7-17).
    - Choose a **specific pool** or a number of pools by holding down Ctrl while selecting them (Figure 7-18) so that you can include them as target entities.
  - b. To add the selected pools or subsystems to the *Target Entities* pane, click >>.

Performance Heat Maps Performance Tables HeatMap based on: Utilization	Source Entities: Add the storage pools and subsystems that you want to migrate or consolidate.
	Entities     Berline Subsystem:DS8000-2107-75KA301-IBM
Select all pools for storage subsystem: DS8000-2107-75KA301-IBM	Make retirement recommendations for the selected entity
Select all pools for storage subsystem: DS8000-2107-1302541-IBM	Target Entities: Add the storage pools and storage subsystems that you want to keep.
	Control Contro Control Control Control Control Control Control Control Control Co

Figure 7-20 Select Target Entities

c. To remove an item from the list of source entities, select it and click << to the left of the *Target Entities* pane.

When the Storage Optimizer considers potential pools as targets of a migration, it takes into consideration whether the source and target pools have the same RAID level and format (CKD or FB). It considers the predicted utilization of the target pool after receiving the new volume's workload and whether or not the potential target has enough available capacity.

- 5. Choose when to run the optimization report (see Figure 7-9 on page 387) using one of the following options:
  - a. Run now: Creates the optimization report as soon as you save your report settings by clicking File → Save. After the report job begins, you can view the report and job status under the *View Previously Run Optimization Reports* pane located at the bottom of the Create Optimization report pane as shown in Figure 7-21.

-View Previ	ously Ru	n Optimization	n Reports	
Refresh	i Job Statu	s		
Job 9	Status	Job Name	Date	Log File
🔍 🗖 Suc	ccess	one_pools	Apr 20, 2009 8:29:26 AM	C:\Program Files\IBM\TPC\device\log\msg.control.6110215.0ptimizerJobList.log
🔍 💷 Suc	ccess	two pools	Apr 20, 2009 8:31:19 AM	C:\Program Files\IBM\TPC\device\log\msg.control.2567223.0ptimizerJobList.log
🔍 💷 Suc	ccess	end_of-Life	Apr 20, 2009 8:31:43 AM	C:\Program Files\IBM\TPC\device\log\msg.control.9116531.0ptimizerJobList.log
🔍 🖬 Suc	ccess	test	Apr 21, 2009 3:41:49 PM	C:\Program Files\IBM\TPC\device\log\msg.control.7379695.0ptimizerJobList.log

Figure 7-21 View Previously Run Optimization Reports

- b. Run Once at: Begins the report job at a specified date and time. When you save the report job by clicking File → Save, the report job is displayed under the View Previously Run Optimization Reports pane, but the job status will not be displayed until the job has started running.
- 6. Drag the *Performance Threshold* slider (Figure 7-22) to change the performance threshold for the selected subsystems and pools. Notice the legend changing automatically, reflecting the changes as shown in Figure 7-23.

The Heat Maps are automatically updated to reflect changes in the performance threshold. This allows you to see the performance threshold at which various subsystems and pools become bottlenecked.

Keep in mind that if you select the **Make retirement recommendations for the selected entity** option, the threshold that you choose using the *Performance Threshold* slider determines if the move to the target subsystem will keep the target subsystem below the chosen threshold.

Note the following considerations when setting the performance threshold:

#### Setting the threshold too aggressively (setting it too low)

- Setting the threshold too low means that:
  - More has to be migrated away from the source.
  - More options have to be available as targets.
  - It is tougher to place new volumes in target pools.

#### Setting the threshold too generously (setting it too high)

- Setting the threshold too high means that:
  - Possibly nothing violates the threshold.
  - There might be nothing to migrate.

**Note**: It is important to realize that migrations will never be made on space utilization alone. The Storage Optimizer is not a space planner.

Perfor	mance	Thres	hold		
	-	Thresho	ld : 63%		
	ا 20	ا 40	60 80	1 100	

Figure 7-22 Performance Threshold slider

Legend:	N/A	0%	1 - 15%	16 - 30%	31 - 45%	46 - 63%	> 63%
Eiguro 7	22 1	ogond					

Figure 7-23 Legend

7. Click **File**  $\rightarrow$  **Save** to save and submit the optimization report job as shown in Figure 7-24.



Figure 7-24 Save Analysis

 To update the job status for all optimization reports, click Refresh Job Status (Figure 7-25).

-View	View Previously Run Optimization Reports							
	Refresh 🔀 Statu	IS						
	Job Status	Job Name	Date	Log File				
Q	Success	one_pools	Apr 20, 2009 8:29:26 AM	C:\Program Files\IBM\TPC\device\log\msg.control.6110215.0ptimizerJobList.log				
Q	Success	two pools	Apr 20, 2009 8:31:19 AM	C:\Program Files\IBM\TPC\device\log\msg.control.2567223.0ptimizerJobList.log				
Q	Success	end_of-Life	Apr 20, 2009 8:31:43 AM	C:\Program Files\IBM\TPC\device\log\msg.control.9116531.0ptimizerJobList.log				
Q	Success	test	Apr 21, 2009 3:41:49 PM	C:\Program Files\IBM\TPC\device\log\msg.control.7379695.0ptimizerJobList.log				

Figure 7-25 Refresh

9. To view a completed optimization report, click the magnifying glass icon as shown in Figure 7-26. You have the option to double-click the row to see the job log.



Figure 7-26 Magnifying glass icon

#### Achieving your expectations

To see how the optimization recommendations change if you use other performance thresholds, select another performance threshold and run another optimization report. You can continue creating optimization reports using various performance thresholds until you achieve the expected performance improvements.

Notice that the job logs contain information about whether or not (and why) a particular set of volumes cannot be migrated or consolidated.

# 7.3.4 Viewing an optimization report

The optimization report displays a storage migration and consolidation report that lists recommendations for improving storage subsystem performance.

As mentioned before, the Storage Optimizer does not actually perform any migrations or make any modifications to subsystem configurations. Its primary purpose is to provide you with recommendations that you can choose to implement at your discretion.

**Important:** Storage Optimizer does not take into account any established *replication* relationships or sessions. Migration recommendations must be followed with care to ensure continuity of all replication relationships.

To view the optimization report:

- 1. Navigate to one of the following nodes:
  - a. Tivoli Storage Productivity Center  $\rightarrow$  Analytics
  - b. Tivoli Storage Productivity Center  $\rightarrow$  Disk Manager
- 2. Select a completed analysis job.
- 3. Optional: If you want to view all optimization reports run for the specific analysis job selected, you can click **Refresh Job Status** under the *View Previously Run Optimization Reports* pane.
- 4. Click the button as shown in Figure 7-27 to open the optimization report.

즈니
<u> </u>

Figure 7-27 Magnification button to expand report selection

We choose the report created in the previous steps (Figure 7-28).

View	/iew Previously Run Optimization Reports								
F	Refresh Job Statu	s							
	Job Status	Job Name	Date	Log File					
<u> </u>	🛎 Success	one_pools	Apr 20, 2009 8:29:26 AM	C:\Program Files\IBM\TPC\device\log\msg.control.6110215.0ptimizerJobList.log					

Figure 7-28 Optimization Report

5. The Storage Optimizer will show a "before and after" Heat Map (Figure 7-29). The "after" Heat Map shows the predicted utilizations after the recommendations have been implemented.

Optimization Report : one_pools				×
Steps for using Storage Optimizer				
<ol> <li>Select one or more recommendations to display the resulting per 2. The recommendations are based on the space and performance</li> <li>Space and performance utilization combinity are received accepted.</li> </ol>	rformance improvements after e utilization of the pools. Rep	er optimization. Click the plication relationships a	ne Print icon to print th are not accounted for	ne optimization report. Tin the analysis.
5. Space and performance duization constraints can create scena	anos where there might be 28	no or not enough rect	mmenuacions to mility	ate a not spot of consolidate.
Recommendations-				
Select all recommendations				
Select one or more recommendations to display the resulting perfo	rmance improvements after o	optimization		
Number Source Sub Target Subsystem Source V	olume Target Volume	Source Pool	Target Pool	Reason
1 DS8000-210 DS8000-2107-130 OS_DSsize	0001 (l	EP_1_FB_R5_0	P13	Hard disk utilization is 100%
2 DS8000-210 DS8000-2107-130 OS_DSsize	0002 (I IBM.2107-130254.	EP_1_FB_R5_0	P5	Hard disk utilization is 100%
3DS8000-210 DS8000-2107-130 OS_DSsize	JOO4 (I	EP_1_FB_R5_0	P14	Hard disk utilization is 100%
4 DS8000-210 DS8000-2107-130 US_DSsize	JUU5 (I	EP_1_FB_R5_0	P7	Hard disk utilization is 100%
DD58000-210 D58000-2107-130 US_D58i2ei	JUU3 (I		P6	Hard disk utilization is 100%
7 D 20000 210 D 20000 2107-130 US_D 58/200	JUU6 (I			Hard disk utilization is 100%
9 DS9000-210 DS9000-2107-130 US_DS82e	1007 (I			Hard disk utilization is 100%
9 DS8000-210 DS8000-2107-130 OS DSsize	1000 (I	EP 1 FB 85 0	P3	Hard disk utilization is 100%
rHeat Maps—				
Performance Threshold 00.0 %			/En Additional	data di sua data in antata dana sa 🗍
Performance Threshold: 90.0 %			Additional of	details available in printed report.
HeatMap based on : Utilization				
Performance Heat Maps Performance Tables	Performa	nce Heat Maps   Per	formance Tables	
· · · · · · · · · · · · · · · · · · ·				
Before optimization for subsystem:	A	fter optimization for su	bsystem:	
DS8000-2107-75KA301-IBM	D	\$8000-2107-75KA30*	I-IBM	
Before optimization for subsystem:	A	fter optimization for su	bsystem:	
D\$8000.2107.1302541.JBM		\$8000-2107-1302541	JBM	
			1211	
Legend: N/A 0%	1 - 22% 23 - 44%	45 - 66% 67 - 90	.0% > 90.0%	

Figure 7-29 Heat Maps before and after

The user interface will even allow you to select a *subset* of the recommendations to see the effect of just that subset on the Heat Map. To select a subset, remove the check mark next to **Select all recommendations** and select the subset or subsets that you want to view. Notice the difference between Figure 7-29 and Figure 7-30.

Optimization Report : one_pools					×
Steps for using Storage Optimizer					
<ol> <li>Select one or more recommendations to display the resulting performance 2. The recommendations are based on the space and performance utilization 2. Space and performance utilization constraints on prevalue accession when the space of the space of t</li></ol>	e improvements after optimization on of the pools. Replication related the there might be zero or not en	on. Click the Print i ationships are not a court recommend	con to print the accounted for in	optimization report. In the analysis.	olidate
5. space and performance duization constraints can create scenarios whe	re there might be zero of hot en	lougniecommenta	adons to midya	te a not spot of cons	uluate.
- Hecommendations-					
Select all recommendations					
Select one or more recommendations to display the resulting performance in	mprovements after optimization			5	
Number Source Sub Target Subsystem Source Volume	Target Volume Souri		arget Pool	Reason	100%
DS8000-210 DS8000-2107-130 US_DS81260001 (I 2 DS9000.210 DS9000.2107-130 OS DS size0002 (I	IPM 2107.120254 EP 1 EP	_H5_U PI3		Hard disk utilization	is 100%
3 DS8000-210 DS8000-2107-130 DS DSsize0004 (I	EP 1 FB	R5 0 P14		Hard disk utilization	is 100%
4 DS8000-210 DS8000-2107-130 OS_DSsize0005 (I	EP_1_FB	_R5_0 P7		Hard disk utilization	is 100%
5 DS8000-210 DS8000-2107-130 OS_DSsize0003 (I	EP_1_FB	_R5_0 P6		Hard disk utilization	is 100%
6 DS8000-210 DS8000-2107-130 OS_DSsize0006 (I	EP_1_FB	_R5_0 P10		Hard disk utilization	is 100%
Y DS8000-210 DS8000-2107-130 US_DSsize0007 (I PD59099 210 D59099 2107-130 US_DSsize0009 (I	EP_1_FB	_R5_0 P8		Hard disk utilization	is 100%
9DS8000-210DS8000-2107-130DS_DS8260006 (I	FP 1 FB	F1		Hard disk utilization	is 100%
					IS 100/8
Performance Threshold: 90.0 % HeatMap based on : Utilization ▼ Performance Heat Maps Performance Tables Before optimization for subsystem: DS8000-2107-75KA301-IBM Before optimization for subsystem: DS8000-2107-1302541-IBM	Performance Heat M After optimiza DS8000-2101 After optimiza DS8000-2101	tion for subsystem 7-75KA301-IBM	Additional de	tails available in prin	ted report.
Legend: N/A 0% <mark>1</mark> -	22% 23 · 44% 45 · 66%	67 - 90.0%	90.0%		

Figure 7-30 Specific subsets

6. To display the performance utilization for a specific component, select the component next to *Heat map based on* in Figure 7-31. Observe the changes displayed on the Heat Maps.

C Ontimization Report : one pools				X
Steps for using Storage Optimizer				
Select one or more recommendations to display the resulting performance improvements after optimization. Click the Print icon to print the optimization report.     The recommendations are based on the space and performance utilization of the pools. Replication relationships are not accounted for in the analysis.     Space and performance utilization constraints can create scenarios where there might be zero or not enough recommendations to mitigate a hot spot or consolidate.				
Recommendations				
Select all recommendations				
Select one or more recommendations to display the resulting performance in	mprovements after o	ptimization		
Number Source Sub Target Subsystem Source Volume	Target Volume	Source Pool	Target Pool	Reason
1 DS8000-210 DS8000-2107-130 OS_DSsize0001 (I		EP_1_FB_R5_0	P13	Hard disk utilization is 100%
2DS8000-210 DS8000-2107-130 OS_DSsize0002 (I	IBM.2107-130254	EP_1_FB_R5_0	P5	Hard disk utilization is 100%
3DS8000-210 DS8000-2107-130 US_DSsize0004 (I		EP_1_FB_R5_0	P14	Hard disk utilization is 100%
4 D58000-210 D58000-2107-130 U5_D5size0005[[]		EP_1_FB_R5_0	P7	Hard disk utilization is 100%
EDS0000-210DS0000-2107-130OS_DS020003 (I			P10	Hard disk utilization is 100%
7DS8000-210 DS8000-2107-130 DS bSsize0007 (		EP 1 FB B5 0	P8	Hard disk utilization is 100%
8DS8000-210 DS8000-2107-130 OS DSsize0008 (		EP 1 FB R5 0	P1	Hard disk utilization is 100%
9 DS8000-210 DS8000-2107-130 OS_DSsize000A (I		EP_1_FB_R5_0	P3	Hard disk utilization is 100%
	'			F
-Heat Maps				
Performance Threshold: 90.0 %			🚑 Additional	details available in printed report.
HeatMap based on : Host Adaptor				
Defenses Use Host Adapter	Destaura		· • • • •	
Hard Disk	1 Felloilliai	ice near maps   Per	formance l'ables	
Controller				
Device Adapter				
Space				
Before optimization for subsystem:	Af	ter optimization for su	bsystem:	
DS8000-2107-75KA301-IBM	DS	8000-2107-75KA30	1-IBM	
Before optimization for subsystem:	Af	ter optimization for su	bsystem:	
DS8000-2107-1302541-IBM	DS	68000-2107-130254	I-IBM	
	-			
Legend: N/A 0% 1	22% 23 - 44%	45 - 66% 67 - 90	1.0% > 90.0%	

Figure 7-31 Specific components

7. Printing the report will provide additional guidance related to datapath and zoning requirements, with a detailed explanation of each recommendation.

The printed report will include sample migration scripts (pseudo-scripts) for the SAN Volume Controller, provided that the migration recommendations are for an SVC.

To print the report, click the **Print** button (Figure 7-32) in the optimization report.

🛛 🚽 Additjonal details available in printed report.	

Figure 7-32 Print Report

**Note:** You can print either to a printer or to a PDF file, provided that you have a PDF printer driver installed.

The Optimization recommendations include the following information:

Recommendation number	The sequential number associated with the recommendation.
Source subsystem	The name of the source subsystem.
Target subsystem	The name of the target subsystem.
Source volume	The name of the source volume.
Target volume	The name of the target volume.
Source pool	The name of the source pool.
Target pool	The name of the target pool.
Reason	The reason why the storage pool utilization has exceeded the performance threshold.
Port information	The recommendation on which ports need to be configured on the target subsystem for the target volume. This information is shown only in the <i>printed report</i> .
Zone information	The recommended zoning changes necessary so that the target volume is visible to the host. This information is shown only in the <i>printed report</i> .
SVC pseudoscript	The sample migration script that serves as a guide to the commands that you must enter using the SAN Volume Controller command-line interface. This information is shown only in the <i>printed report</i> .

#### Verifying the expected performance recommendations

After you have implement the recommendations, if you want to verify that you have achieved the expected performance improvements, you must first collect more performance monitoring data before running the Storage Optimizer again.

# 7.3.5 Deleting analysis jobs

You can delete analysis job definitions or individual analysis jobs if you no longer need them.

To delete an analysis job definition or job run:

- 1. Navigate to one of the following nodes:
  - a. Tivoli Storage Productivity Center → Analytics
  - b. Tivoli Storage Productivity Center  $\rightarrow$  Disk Manager
- 2. Expand the Storage Optimizer node.
- 3. Right-click an analysis job definition or an analysis job.
- 4. Click Delete.

**Note:** Keep in mind that deleting an analysis job definition also deletes all analysis jobs and optimization reports that are associated with that job definition. If you delete an analysis job, all optimization reports associated with that job are also deleted.

# 7.3.6 Deleting an optimization report

You can delete optimization reports if you no longer need them.

To delete an optimization report job:

- 1. Navigate to one of the following nodes:
  - a. Tivoli Storage Productivity Center  $\rightarrow$  Analytics
  - b. Tivoli Storage Productivity Center  $\rightarrow$  Disk Manager
- 2. Expand the *Storage Optimizer* node.
- 3. Select a completed analysis job to display the list of optimization reports that are associated with that analysis job.
- 4. Under *View Previously Run Optimization Reports*, right-click a completed report, and choose **Delete**.

# 7.3.7 Retrieving an optimization report job definition

You can retrieve the report job definition that was used to generate an optimization report.

To retrieve the optimization report job definition associated with an optimization report:

- 1. Navigate to one of the following nodes:
  - a. Tivoli Storage Productivity Center → Analytics
  - b. Tivoli Storage Productivity Center → Disk Manager
- 2. Expand the Storage Optimizer node.
- 3. Select a completed analysis job to display the list of optimization reports that are associated with that analysis job under *View Previously Run Optimization Reports*.
- 4. Right-click an optimization report and choose Retrieve.

The **Generate Optimization Report** pane displays the inputs that were used to create the selected optimization report as shown in Figure 7-33.



Figure 7-33 Retrieve Optimization report job definition

#### 7.3.8 FAQs

This section touches on various questions that you might have:

- 1. Why is my Analysis Heat Map all white?
  - An all-white Heat Map means that PM is returning zeroes for the raw metrics.
  - Our advice is to run a PM report for the metrics listed earlier (daily summation):
    - By volume
    - By array
    - By subsystem
  - Determine if there are valid PM reports run for the time interval chosen.
- 2. How do I validate the hot spots?

You can look at the TPC performance reports and see the individual utilization numbers (you ought to see high numbers for the storage pools that are "hot."

- 3. I did not get any recommendations!
  - There are several common reasons for this, namely:
    - Threshold too low (too aggressive)
    - Threshold too high (nothing considered "hot")
    - Not enough space in target pools (physically unable to migrate anything)
    - Sources and targets are not compatible with each other:
      - RAID level
      - FB versus CKD format

Important: Storage Optimizer does not create recommendations in all cases!

The Storage Optimizer takes a conservative approach "migrations = risk". Generating the optimization report is an iterative process.

- Try multiple thresholds.
- Try multiple source/target combinations.
- 4. Analyzing SVC: I see "extra" results!

When you analyze an SVC, you might see extra subsystems in the analysis report.

- These "extra" subsystems are the back-end storage to the SVC.
- If no performance data has been collected on these back-end subsystems, or if they are non-IBM devices, they will have "N/A" utilization percentages.
- 5. The recommendation shows empty "Target Volumes":
  - When the *Target Volume* column is *empty*, it means that you will need to *create a new volume* in the *Target Pool*.
  - When the *Target Volume* column is *not empty*, it means that *one of the listed volumes is unassigned* and has the *same characteristics* as the *Source Volume*,
- 6. Diagnostics: Logging:
  - Job Logs:

```
<TPCHome>\device\log\msg.control.###.AnalyzerJobList.log
<TPCHome>\device\log\msg.control.###.OptimizerJobList.log
```

(This log will give you clues as to why no recommendations were made.)

- Device server trace logs - new tracers!

```
<TPCHome>\device\conf\DataStore.properties (default settings listed here)
san.OptimizerMsgLogger.listenerNames=file.message
san.OptimizerMsgLogger.logging=true
san.OptimizerMsgLogger.LoggerType=MessageLogger
san.OptimizerTraceLogger.level=WARN
san.OptimizerTraceLogger.listenerNames=file.trace
san.OptimizerTraceLogger.logging=true
san.OptimizerTraceLogger.LoggerType=TraceLogger
```

# 7.3.9 Understanding zoning recommendations

This topic describes the zoning recommendations provided by Storage Optimizer in the printed optimization report.

**Note:** The Storage Optimizer only provides zoning recommendations in the printed optimization report. The report lists the zoning recommendations for all volumes under each volume.

Where possible, the Storage Optimizer provides zoning recommendations for each migration recommendation.

The zoning recommendations will be to put the target subsystem's ports into the same zones as those of the source subsystem's ports, regardless of which zones the host is also a member.

For example, suppose you want the Storage Optimizer to provide zoning recommendations using the following source and target subsystems.

Source subsystem A includes the following ports:

- Port 1 (member of zones: host1\_zone, host2\_zone, host3\_zone)
- Port 2 (member of zones: host4\_zone, host5\_zone, host6\_zone)
- Volume X (mapped to host1 using Port 1)
- Volume Y (mapped to host4 using Port 2)

*Target* subsystem **B** includes the following ports:

- Port 1
- Port 2

Suppose that Storage Optimizer recommends *migrating Volume X from Source subsystem A* to Target subsystem B.

The zoning recommendations that accompany this migration recommendation will be to *add Target subsystem B's Port 1 to zones host1\_zone, host2\_zone, and host3\_zone.* 

# Tivoli Storage Productivity Center basic configuration and use

In this chapter, we focus on the basic configuration and use when working with Tivoli Storage Productivity Center V4.1.

At this stage we assume that all the Tivoli Storage Productivity Center V4.1 components have been installed successfully.

# 8.1 Basic use and configuration steps

We will be covering certain basic use and configuration steps when working with Tivoli Storage Productivity Center V4.1 mainly focusing on a few of the new features, including:

- Launching the Tivoli Storage Productivity Center GUI:
  - Through Tivoli Integrated Portal
  - Without Tivoli Integrated Portal
- Users, Roles, and Groups
- Deploying Agents:
  - Remote Data agent and Fabric agent
  - Storage Resource agent
- Creating a Storage Resource Group
- ► Disabling Tivoli Storage Productivity Center or Tivoli Productivity Center for Replication
- Tivoli Storage Productivity Center for Replication:
  - Accessing TPC-R
  - What to expect to see prior to installing the license
  - Launching TPC-R
  - Adding a subsystem
- Adding a CIMOM

# 8.2 Launching the Tivoli Storage Productivity Center GUI

The TPC GUI can be launched in several ways. We discuss all possibilities and describe what you can expect to see when launching the GUI using the various methods illustrated.

Notice that IBM Java Runtime Environment (JRE<sup>™</sup>) 1.5 is required as a prerequisite when launching the TPC GUI using a Web browser. Included in Java 1.5 is Java Web Start.

Java Web Start enables you to run the Java based TPC GUI on a system even if you do not have the TPC GUI installed locally. It enables a system to communicate with the Tivoli Storage Productivity Center Server that is running on AIX, Linux, UNIX, and Windows systems.

Java Web Start on the server automatically checks the remote system and provides links to the appropriate levels of the JRE and Java Web Start if it does not detect them.

# 8.2.1 Starting the GUI through Tivoli Integrated Portal

This section describes how to start the Tivoli Storage Productivity Center graphical user interface (GUI) through Tivoli Integrated Portal (TIP) local to the TPC server or from a remote computer.

The only difference that you need to be aware of when launching the TPC GUI remotely is the fact that you are required to have Java 1.5 installed, as mentioned before.

When launching the TPC GUI through TIP, Single Sign-On is enabled by default, allowing you to log on to the Tivoli Storage Productivity Center GUI without having to explicitly enter your user name and password.

Before logging into Tivoli Integrated Portal, ensure that you are using one of the following Web browsers:

- AIX: Firefox 2.0
- Linux and UNIX: Firefox 2.0
- Internet Explorer® 7, Firefox 2.0, Firefox 3.0

# 8.2.2 Starting Tivoli Storage Productivity Center from Tivoli Integrated Portal

To start Tivoli Storage Productivity Center from Tivoli Integrated Portal, complete the following steps.

1. Start a Web browser, and type the following information in the address bar as shown in Figure 8-1:

http://hostname:port

Here, *hostname* defines the server that is running Tivoli Integrated Portal, such as the server name or IP address, and *port* defines the port number for Tivoli Integrated Portal.

If the default port was accepted during the installation of Tivoli Integrated Portal, the port number is *16310*.



Figure 8-1 Tivoli Integrated Portal

Note: As seen in Figure 8-1, the port has changed from 16310.

- 2. Log on to TIP using the appropriate user ID and password. This depends on the type of authentication that has been setup, OS authentication or LDAP.
  - When using OS Authentication, you are required to enter the user ID and password as defined during the installation.
  - When using LDAP, you are required to enter the user ID and password defined in the LDAP server and provided during the installation. Refer to the
- 3. In the TIP Navigation Tree, click **Tivoli Storage Productivity Center**, as shown in Figure 8-2.



Figure 8-2 Launch TPC Portlet

4. If the TPC Data Server or Device Server is not accessible, an error message is displayed within the TPC porlet as shown in Figure 8-3. You will not be able to launch TPC until this issue has been resolved.

Notice that both the TPC Data Server and Device Server status is shown.

🖉 Tivoli Integrated Portal - Microsoft	Internet Explorer	X
<u>File E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> ools <u>F</u>	Help	1
🔇 Back 🔻 🕘 👻 📓 🏠 🔎 Sea	arch 👷 Favorites 🛛 😥 - 💺 🚍	
Address 🛃 https://9.12.6.75:16316/ibm/c	console/secure/securelogon.do 🔄 💽 Go 🛛 Links 🍟 🥌 SnagIt 🗮 🖻	r'
Tivoli. View: All tasks	Welcome TPCSuperuser Help Logout	
+ =	Tivoli Stor X	•
<ul> <li>Welcome</li> <li>My Startup Pages</li> </ul>	Tivoli Storage Productivity Center	1
Security     Users and Groups     Troubleshooting	Cannot start Tivoli Storage Productivity Center because server connectivity is missing.	
Reporting     Tivoli Storage Productivity	Data Server status: accessible Device Server status: inaccessible	
🖰 Settings	Start Tivoli Storage Productivity Center for Replication	
	The Tixon Storage Productivity Center requires the IBM Java 5 NE to deploy and execute the GUI. If you do not have the JRE installed, see the Tivoli Storage Productivity Center information center for download and configuration instructions for the JRE Java Web Start component.	
· · · · · · · · · · · · · · · · · · ·	Information _ 🗆	
	Use the following links to access Tivoli Storage Productivity Center documentation and demonstrations:	-
Error on page.	🔒 🖉 Trusted sites	11.

Figure 8-3 TPC Not Accessible

5. If no errors are shown, as seen in Figure 8-4, we can launch TPC by clicking **Start Tivoli Storage Productivity Center**.



Figure 8-4 TPC Accessible

- 6. On the TPC portlet page, click **Start Storage Productivity Center**. One of the following actions occurs:
  - If Single Sign-On is successful, TPC starts without displaying a logon window.
  - If Single Sign-On is not successful, an error message is displayed as seen in Figure 8-5. A TPC logon window will be displayed (see Figure 8-6); you are required to enter a user ID and password.



Figure 8-5 Login failed using Single Sign-On

📄 IBM Tiv	oli Storage Productivity Cente 🗙
User ID:	
Password:	
Server:	azov.itsosj.sanjose.ibm.com:9549 💌
	OK Cancel

Figure 8-6 TPC Login

 If you are using a Lightweight Directory Access Protocol (LDAP) server for TPC user authentication and the directory is not available, an error message is displayed.

#### Lightweight Third-Party Authentication

After you have logged on to Tivoli Integrated Portal, a Lightweight Third-Party Authentication (LTPA) token is created. This token is passed to other applications that you start from Tivoli Integrated Portal for Single Sign-On authentication purpose.

We show an example of this in Figure 8-7 when launching TPC from TIP.

Launch in Context
Starting the Tivoli Storage Productivity Center 4.1.0. Clicking on the cancel request button will stop transfer of the signon information, including user credentials, to the Tivoli Storage Productivity Center 4.1.0.
Status
Cancel Request

Figure 8-7 LTPA

During the period between logging on to Tivoli Integrated Portal and when you start another application such as Tivoli Storage Productivity Center from Tivoli Integrated Portal, the following conditions might occur:

- The user password that was used to log on to Tivoli Integrated Portal is changed in the user repository.
- The user ID that was used to access Tivoli Integrated Portal is changed in the repository or removed from the user repository.
- ► The user repository is not accessible.

Under the first condition, the original user credentials that were used to access Tivoli Integrated Portal are used to access other applications until the time-out period for the LTPA token that is used for Single Sign-On expires.

When the LTPA token expires, you are prompted to re-enter your user ID and password when you attempt to start another application using Single Sign-On.

Under the second and third conditions, the Single Sign-On feature does not work. You are always prompted to re-enter your user ID and password when you attempt to start another application.

**Note:** For additional information regarding LDAP, SSO, or Launch in Context refer to Chapter 6, "LDAP authentication support and Single Sign-On" on page 335.

# 8.2.3 Starting the GUI without Tivoli Integrated Portal

This section explains how to start the Tivoli Storage Productivity Center graphical user interface (GUI) without using Tivoli Integrated Portal.

We describe how to start the TPC GUI locally from the Microsoft Windows Start menu, Productivity Center icon on your desktop or from command line (AIX, Linux, or UNIX) as well as using a Web browser for local or remote access.

#### Starting the TPC GUI locally on Windows:

Proceed as follows:

- ► Click Start → All Programs → IBM Tivoli Storage Productivity Center → Productivity Center
- You can also double-click the IBM Tivoli Storage Productivity Center icon if it is installed on your desktop.

# Starting the TPC GUI locally on UNIX, Linux or AIX:

Proceed as follows:

Type the following path and command on the command line:

/opt/IBM/TPC/gui/TPCD.sh

In all of these cases, you will see the TPC GUI launched and requesting a user ID and password as seen in Figure 8-8.



Figure 8-8 TPC GUI Interface Login panel

#### Starting TPC GUI using a Web browser, locally or remotely

You can start the TPC GUI locally or from a remote location (for example, when using a mobile computer) or on a desktop computer, by using a Web browser interface.

Make sure that you have Java 1.5 or later installed on the remote system prior to attempting to launch the GUI by a Web browser.

Ensure that you are using one of the following Web browsers:

- AIX: Firefox 2.0
- Linux and UNIX: Firefox 2.0
- Internet Explorer 7, Firefox 2.0, Firefox 3.0

To launch the TPC GUI from a Web browser, follow these steps:

- 1. Open a Web browser window and enter the Web address of the target server (TPC server) this can be done locally or from a remote computer, see Figure 8-9.
- The URL is in the format:

http://<device\_server\_location>:<device\_server\_port>/ITSRM/app/welcome.html

**Note:** The default Device Server port is 9550; however, this number might have been changed during installation. Check with your system administrator to see if this port has changed.

3. As mentioned before, TPC requires that IBM JRE 1.5 (Java) be installed on your system. You will see a message displaying a link to download the required JRE if needed, as shown in Figure 8-9. If required, click the appropriate package to download and install the JRE.

🚰 IBM Tivoli Storage Productivity Center - Microsoft Internet Explorer		_ 🗆 🗙
Ele Edit View Favorites Iools Help		1
😮 Back 🔹 🔊 🛪 😰 🏠 🔎 Search 👷 Favorites  🧔 🔹 😓		
Address 🕘 http://azov.itsosj.sanjose.ibm.com:9550/ITSRM/app/en_US/index.ihtml	💌 🄁 Go	Links »
The TPC GUI requires an IBM 1.5.0 JRE. Should you not already have it available, click on one of the following links to download IBM 1.5.0 Java package for your supported platform:	l and install the	;
IBM 1.5.0 JRE for Windows IA32 (InstallShield)     IBM 1.5.0 JRE for Linux IA32 (RPM)     IBM 1.5.0 SDK for AIX PPC32 (installp)		
With the IBM 1.5.0 JRE installed on your system, setup your web browser to open JNLP files using the Java Web Start executable <i>javaws</i> ) packaged with the IBM 1.5.0 JRE. (If you're unfamiliar with how to do so, refer to the documentation provided with TPC	e ( <i>javaws.exe</i> for guidance.)	
Click on the following link to launch the TPC GUI using Java Web Start:		
TPC GUI (Jave Web Start)		
🙆 http://azov.itsosi,saniose.ibm.com:9550/ITSRM/app/tpcqui.inlp	Trusted sites	<u> </u>

Figure 8-9 TPC GUI Pre-requisites

If you have already installed the required JRE on your system, click the TPC GUI (Java Web Start) link as shown in Figure 8-9.

This will start the TPC GUI, where you will be required to log on. You can see the Java Web Start icon as shown in Figure 8-10. Subsequent to this, you will be presented with the TPC GUI login window, as shown in Figure 8-11.

IAVA	™ WEB S	TART
J2111		V 5.0

Figure 8-10 Java Web Start



Figure 8-11 TPC GUI Login

**Note:** For additional information regarding specific Web browser settings or limitations pertaining to JRE and Java Web Start, refer to the TPC V4.1 specific online documentation, which can be found at:

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

# 8.2.4 Logging on to TPC

Use the logon window to specify the following information when logging into the TPC server as shown in Figure 8-11.

User ID:

Enter the user ID. The roles that are assigned to that user ID determine what nodes in the navigation tree you can see and act upon, in other words, this will determine your level of authorization.

Password:

Enter the password that is associated with the user ID.

Server:

Enter the IP address or Domain Name System (DNS) name of the computer on which the TPC server is installed.

**Note:** Entering the foregoing information is dependent on which type of authentication was specified during the install, OS or LDAP.

The first panel that you will see when logging into the TPC GUI will be a "Welcome to the IBM Tivoli Storage Productivity Center" window, as shown in Figure 8-12.

Click one of the displayed buttons to select an option from the list:

Configuration:

Opens the Services Tab of the Configuration Utility.

► Element Management:

Opens the Element Manager of the Configuration Utility.

Dashboard:

Opens the main dashboard. Select this option if you do not want to work with the Configuration Utility immediately.

**Note:** You can check the "Do not display this dialog again" box within the window; this will ensure that when you launch the TPC GUI in future, the Welcome window is not displayed.

📑 Welcome to the IBM Tivoli Storage Productivity Center 🛛 🔀
The IBM Tivoli Storage Productivity Center provides the ability to administer complex and heterogeneous storage environments. To proceed select one of the options below.  Configuration Opens the Services Tab of the Configuration Utility. Select this option when configuring the Productivity Center to manage storage subsystems, fabric components or computers.
Element Management
Opens the Element Manager Tab of the Configuration Utility. Select this option when configuring the Productivity Center for the IBM DS8000 Storage Manager or other device element managers.
Dashboard
Opens the main dashboard. Select this option if you do not wish to work with the Configuration Utility immediately.
🔲 Do not display this dialog again.

Figure 8-12 Welcome to the IBM Tivoli Storage Productivity Center window

Next we show how to create additional users, roles, and groups.

# 8.3 Users, roles, and groups

During the installation process you are required to provide the user ID of the user that is going to have administrative privileges inside TIP. You have provided those credentials during the installation as described in "Custom installation" on page 100 or, if you have decided to use an LDAP server for authentication, the user with administrative privileges will be the one specified as described in that same section. Furthermore, you are requested to provide the name of the TPC Superuser group, if you have decided to use LDAP.

When you log on to TIP with the user indicated before, you have access to the **Users and Groups** section of the portal from where you can administer the users and the groups available inside TIP and their respective roles. See Figure 8-13 on page 419.


Figure 8-13 Users and Groups based on TIP

The following menu entries are available:

Administrative User Roles:

Use the Administrative User Roles page to give users specific authority to administer application servers through tools such as the administrative console or wsadmin scripting. In our case, it can be used to give users specific authority to administer TIP or TCP.

Administrative Group Roles:

Use the Administrative Group Roles page to give groups specific authority to administer application servers through tools such as the administrative console or wsadmin scripting. In our case, it can be used to give groups specific authority to administer TIP or TCP.

► Manage Users:

Use the Manage Users page to search for a list of users that match your search criteria. You can perform additional tasks, such as viewing more information about a user, changing information about a user, adding a new user, deleting users, or duplicating the group assignments of a user for other users.

Manage Groups:

Use the Manage Groups page to search for a list of groups that match your search criteria. You can perform additional tasks, such as viewing more information about a group, changing information about a group, adding a new group, deleting groups, or duplicating the group assignments of a group for other groups.

**Note:** To manage users and groups, either the federated repositories must be the current realm definition, or the current realm definition configuration must match the federated repositories configuration. If you use Lightweight Directory Access Protocol (LDAP), configure both the federated repositories and standalone LDAP registry configurations to use the same LDAP server. If you are using the local OS user registry for authentication, these two options are not available.

**Warning:** Currently you cannot create LDAP users and groups in Tivoli Integrated Portal. To resolve this issue, use your LDAP tools to create users or groups in LDAP.

If you log on to TIP right after the installation and move to **Users and Groups**  $\rightarrow$ **Administrative User Roles**, a panel such as the one shown in Figure 8-14 is presented. The user that you defined as the TIP administrative account during the installation is present in the list with the associated roles of *iscadmin* and *tcrSuperAdmin*. The Login status result is Active because you are currently logged in with this account.

dministra Administr	ative User Roles rative User Roles		2-	Close page Help
Admin Use th users o	<b>istrative User Roles</b> is page to add, update o enables them to adminis in scripting.	r to remove administrative roles to us ter application servers through the ad	ers. Assigning administrative roles to ministrative console or through	Field help For field help information, select a field label or list marker when the help cursor appears.
Log	jout Add Remove	2		Page help
	6 <del>4</del> 4	More information about this page		
Select	User 🛟	Role(s) 🗘	Login Status 🗘	
	Administrator	iscadmins, tcrSuperAdmin	Active	
Total	1			

Figure 8-14 Administrative User Roles

If you now move to **Users and Groups**  $\rightarrow$  **Administrative Group Roles** a panel such as the one shown in Figure 8-15 is presented. In our case, during the installation process, we selected to use the OS based authentication method and at step 9 on page 104 we have selected the *Administrators* group as the TPC Superuser group.

		Field help
Administrative Group Rol Use this page to add, up enables them to administ	es date or to remove administrative roles to groups. Assigning administrative roles to groups ere application servers through the administrative console or through waadmin scripting.	For field help info select a field labe marker when the
Add Remove		cursor appears.
0 1 # \$		<ul> <li>Page help</li> <li>More information</li> <li>this page</li> </ul>
Select Group 🛟	Role(s) 🗘	
Administrators	Administrator, adminsecuritymanager, iscadmins, tcrSuperAdmin	
Tabala		

Figure 8-15 Administrative Group Roles

On the other side, if you log on to the TPC GUI (both launching it from TIP or from a standalone GUI installation) and you move to **Administrative Services**  $\rightarrow$  **Configuration**  $\rightarrow$  **Role-to-Group mappings**, you will correctly see only the group designated as TPC Superuser group during the installation available here, as shown in Figure 8-16.

File View Connection Preferences Window Help					
Element Management					
Navigation Tree					
Administrative Services	Role-to-Group Mappings				
-Services	Superuser	A desiristantes	<b>E-40</b>	Dalata	
🖃 Data Server		Administrators		Delete	
Server	Productivity Center Administrator	<no mapping=""></no>	Edit	Delete	
Agent					
Cheduler     Device	l ape Uperator	<no mapping=""></no>	Edit	Delete	
	Tana Administrator				
E Device Server	rape Auninistrator	<no mapping=""></no>	Edit	Delete	
Benlication Server	Eabric Operator		<b>F-I</b>	Delete	
		<no mapping=""></no>	Edit	Delete	
	Fabric Administrator	<no mapping=""></no>	Edit	Delete	
Configuration					
Role-to-Group Mappings	Disk Operator	<no mapping=""></no>	Edit	Delete	
License Keys	BULAL COLOR				
Alert Disposition	Disk Administrator	<no mapping=""></no>	Edit	Delete	
Log-File Retention	Data Operator				
Quota and Constraint e-mail Address Rules		<no mapping=""></no>	Edit	Delete	
Scan/Probe Agent Administration	Data Administrator		<b>F</b> -43	Delete	
Manual NAS/Netware Server Entry		<no mapping=""></no>	Eak	Delete	
Agent Manager Registration					
Group Aggregator     Storage Resource Agent Deployments					
Data/Storage Resource Agent Upgrades					
Matulara Tran Logina					
<					

Figure 8-16 Role-to-Group Mapping

If you want to create a new role-to-group mapping, on this panel, select the role that you want to assign and click the **Edit** button on the corresponding row. A panel is shown asking for the group name to assign the corresponding rights. As an example, Figure 8-17 shows that we decided to map the group *tpcgroup1* with the Productivity Center Administrators group.

**Note:** The group you are trying to map to a TPC role must exist on your authentication repository (OS or LDAP server) before you can map it to a role.

Edit	Group
2	Edit group for role Productivity Center Administrator?  pcgroup1 OK Cancel

Figure 8-17 Specifying group to map to a role

After clicking the **OK** button and then the **Save** button on the TPC GUI, the corresponding change on the TPC configuration is saved. As an additional result, this change is also synchronized with the TIP Administrative Group Roles. The group selected in the previous step in the TPC GUI is now automatically granted into TIP with *Operator* and *iscadmins* roles. The result is visible into TIP as shown in Figure 8-18.

Messages Your workspace has been auto-refreshed from the master configuration. You can disable auto-refresh in your user preferences.					
Administrative Group Roles Use this page to add, update or to remove administrative roles to groups. Assigning administrative roles to groups enables them to administer application servers through the administrative console or through wsadmin scripting.					
Use th enable	s page to add, upd s them to administ	er application servers through the administrative console or through wsadmin scripting.			
Use th enable Add	Remove	er application servers through the administrative console or through visadmin scripting.			
Add	Remove Group $\diamondsuit$	r application servers through the administrative console or through vsadmin scripting.			
Add	Is page to add, upo s them to administ Remove Group Administrators	Role(s) ≎ Administrator, Operator, administrativmanager, iscadmins, tcrSuperAdmin			

Figure 8-18 Administrative Group Roles updated

If you are already logged on to TIP and you refresh the Administrative Group Roles view, you will also receive a message that warns you about the fact that a change in the configuration occurred.

Notice that the group is added with no TCR related roles. This means that if you do not change it and a member of that group logs into TIP, that member will be able to see the TPC portlet to launch TPC and TPC for Replication, but the Reporting section on the left of the portal will not be available for that member.

**Note:** The synchronization of the groups works only when adding a group on TPC. When a group is removed from the Role-to-Group mappings in the TPC GUI, the same group is not automatically removed from the Administrative Group Roles in TIP. If you want to remove it, you need to do it manually.

Furthermore, you might be willing to allow specific users or all the members of a group to log on to TIP and give them specific roles. In our case, we want to allow the members of the group *ReportingGroup* to log on and generate a TCR based report. To achieve this result, follow this procedure:

- 1. Log on to TIP as a user with administrative privileges and open the Administrative Group Roles panel, selecting **Users and Groups** → **Administrative Group Roles**.
- 2. Click the **Add** button highlighted in Figure 8-19.

ministrative Group	Roles ?	- Help
Administrative Gro Use this page to ac to groups enables wsadmin scripting.	up Roles d, update or to remove administrative roles to groups. Assigning administrative roles hem to administer application servers through the administrative console or through	Field help For field help inforr select a field label marker when the h- cursor appears.
Add Remov		Page help More information a this page
Select Group 🔷	Role(s) 🛟	
Administrat	rs Administrator, Operator, adminsecuritymanager, iscadmins, tcrSuperAdmin	
tpcqroup1	Operator, iscadmins	
Total 2		

Figure 8-19 Administrative Group Roles panel

3. In the panel shown in Figure 8-20, insert the name of the group that you want to add in the Group Name field and select the Roles that you want to give to the members of this group. You can select multiple roles by holding the Ctrl button and clicking the specific roles. For additional details about the TIP specific roles, you can click **More information about this page** in the Help section of the panel in Figure 8-20, whereas for TCR related roles, you can refer to 11.3.3, "Initial configuration and user management" on page 556. In our case, we want to grant the members of the *ReportingGroup* with *Operator* and *tcrAdministrator* roles.

inistrative Group Roles 2	Heln
dministrative Group Roles > Group se this page to add, update or to remove administrative roles to groups. Assigning administrative les to groups enables them to administer application servers through the administrative console	Field help For field help information, select a field label or list marker when the help
Group	cursor appears. Page help <u>More information about</u> <u>this page</u>
Group name ReportingGroup	
Select from special subjects Special subjects EVERYONE	
Role(s) Administrator Operator Configurator	
adminsecuritymanager iscadmins suppressmonitor tr:SuperAdmin	
troperator tr/Administrator trReportViewer trReportViewer	
terkeportAuthor terReportAdministrator	
Apply OK Reset Cancel	

Figure 8-20 Assign Roles to groups panel

**Note:** The group you are trying to associate with a role must exist on your authentication repository (OS or LDAP server) before you can assign it a role. In case it does not exist, you will get an error message.

4. By clicking the **OK** button, you go back to the Administrative Group Role panel. In Figure 8-21, you can see that the group and the associated roles have been added. Click the **Save** link on the message shown on the upper part of the panel to save the configuration.

ministrativ	Group Roles	2.	Help
	Message Char Save Revie	es te changes will be effective immediately. nges have been made to your local configuration. You can: directly to the master configuration. aw changes before saving or discarding.	Field help For field help informatio select a field label or list marker when the help cursor appears. Page help More information about this page
Administra Use this pa to groups e wsadmin sc Add	tive Group Ro ge to add, up nables them ipting. Remove	oles Idate or to remove administrative roles to groups. Assigning administrative roles to administer application servers through the administrative console or through	
Administra Use this pa to groups e wsadmin sc Add	tive Group Ro ge to add, up nables them ripting. Remove	Nes Idate or to remove administrative roles to groups. Assigning administrative roles to administer application servers through the administrative console or through	
Administra Use this pa to groups e wsadmin sc Add Add Select Grou	tive Group Ro ge to add, up nables them ipting. Remove	Nes date or to remove administrative roles to groups. Assigning administrative roles to administer application servers through the administrative console or through Role(s) Administrator. Operator, administrative procession trisuperadmin	
Administra Use this pa to groups e wsadmin sc Add Select Gro Adn	tive Group Ro ge to add, up nables them ipting. Remove # ++++++++++++++++++++++++++++++++++++	Mes date or to remove administrative roles to groups. Assigning administrative roles to administer application servers through the administrative console or through Role(s) ≎ Administrator, Operator, adminisecuritymanager, iscadmins, tcrSuperAdmin Operator, tcrAdministrator	
Administra Use this pa to groups e wsadmin sc Add Select Gro Adn C Adn C Adn C Adn	tive Group Ro ge to add, up nables them tipting. Remove # *** up timistrators ortingGroup roup1	Adde or to remove administrative roles to groups, Assigning administrative roles to administer application servers through the administrative console or through Role(s) Role(s) Administrator, Operator, administer administrator Operator, tcrAdministrator Operator, iscadmins	

Figure 8-21 Administrative Group Roles panel

The members of the ReportingGroup group now can log on to TIP. They will be able to operate with TCR. Additionally they will also be able to launch the TPC and the TPC for Replication GUIs, but because the same group is not present in the TPC Role-to-Group mapping table or the TPC for Replication users/groups map, no Single Sign-On is available and they will be prompted to provide the appropriate credentials.

Very similar steps can also be followed to associate roles to a specific user.

# 8.4 Deploying agents

This section describes how to deploy the Data agents and Fabric agents remotely from the system running the Tivoli Storage Productivity Center V4.1 server.

We also describe how to deploy the Storage Resource agents using the TPC GUI interface or additionally using the command line locally.

**Note:** You cannot have a Data agent and Storage Resource agent on the same system that point to the same Data Server. You can have a Data agent and Storage Resource agent on the same server if they are pointing to other Data Servers.

**Important:** Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31 for specific agent considerations prior to installing the agents to consider which agent will best suit your needs.

# 8.4.1 Deploying Data and Fabric agents remotely from the TPC V4.1 server

If you are installing the Data agent, Fabric agent, or both, you must have previously installed the Agent Manager and have registered the Device Server and Data Server with the Agent Manager.

For information about how to install Data and Fabric agents locally, refer to the chapter that covers the installation of Tivoli Storage Productivity Center V4.1 specific to your platform.

# Prior to installing the agents remotely

Keep in mind the following requirements:

- You must run the installation from the server where the Data and Device Server resides.
- You will need to have access to the media required to install the agents; this software is found on both installation disks or images.
- You must know the name or IP address of the computers on which you will be installing the agents.
- Ensure that you have at least one of the following protocols setup between the server and computers (agents):
  - Secure shell protocol (SSH)
  - Windows server message block protocol (SMB)
  - Remote execution protocol (REXEC)
  - Remote shell protocol (RSH)
- Seeing that the Common Agent is installed with the Data agent, you will need to install the Data agent prior to the Fabric agent, because the Fabric agent requires that the Common Agent be installed and running on the target server.
- You must supply a user ID and password that has *administrative* privileges on the target computer. The user ID must be a local administrative account on the target computer (not a domain administrative account).
- If you are installing the Data agent remotely on a *Linux* system, you must set the /etc/ssh/sshd\_config file parameter *PasswordAuthentication* to yes. Then stop and start the ssh daemon for the change to take effect.
- ► If you are installing the Data agent remotely on a Solaris<sup>TM</sup> 10 system, you must set the following parameters in file /etc/ssh/sshd\_config:

PasswordAuthentication yes PermitRootLogin yes

Stop and start the ssh daemon.

# Installing the Data and Fabric agents remotely

To install these agents, complete the following steps:

- 1. Change to the directory or CDROM where the TPC V4.1 software resides.
- 2. Launch the **setup.exe** (Windows) or **setup.sh** (UNIX) to start the installation process. In our example, we launch the **setup.exe** on Windows.
- 3. The panel, *Select a language to be used for this wizard*, is displayed (see Figure 8-22). After selecting the language, click **OK**.

🕲 Installer	
Select a language to be	e used for this wizard.
English	
<u>o</u> ĸ	Cancel

Figure 8-22 Select language

4. The *Software License Agreement* is displayed (Figure 8-23). Select I accept the terms of the license agreement. Click Next.

🕲 IBM Tivoli Storage Prod	ductivity Center - Installer	. 🗆 🗙
	IBM Tivoli Storage Productivity Center V4.1.0.97	
IEK.	International Program License Agreement	
	Part 1 - General Terms	
	BY DOWNLOADING, INSTALLING, COPYING, ACCESSING, OR USING THE PROGRAM YOU AGREE TO THE TERMS OF THIS AGREEMENT. IF YOU ARE ACCEPTING THESE TERMS ON BEHALF OF ANOTHER PERSON OR A COMPANY OR OTHER LEGAL ENTITY YOU REPRESENT AND WARRANT THAT YOU HAVE FULL AUTHORITY TO BIND THAT PERSON, COMPANY, OR LEGAL ENTITY TO THESE TERMS. IF YOU DO NOT AGREE TO THESE TERMS,	4
	- DO NOT DOWNLOAD, INSTALL, COPY, ACCESS, OR USE THE PROGRAM; AND	
	- PROMPTLY RETURN THE PROGRAM AND PROOF OF ENTITLEMENT TO THE PARTY FROM WHOM YOU ACQUIRED IT TO OBTAIN A REFUND OF THE AMOUNT YOU PAID. IF YOU DOWNLOADED THE PROGRAM, CONTACT THE PARTY FROM WHOM YOU ACQUIRED IT.	
1 Milt	"IBM" is International Business Machines Corporation or one of its subsidiaries.	<b>_</b>
ANTER T	A accept the terms of the license agreement.	
	$\tilde{O}$ I <u>do</u> not accept the terms of the license agreement.	
l		
	<u>N</u> ext > <u>C</u> ancel	

Figure 8-23 License Agreement

The panel, Select the type of installation you want to run, is displayed (Figure 8-24).
 Custom Installation is already selected by default. You cannot choose any other options to deploy remote agents. Click Next.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installe	t			
	Select the type of installati	on you want to run			
IBM.	C Typical installation This will install the TPC s CLI. A new database will database during installa	servers, TPC agents, I be created, and the tion. The database a	, Tivoli Integrated P schema will be cr nd schema will be	ortal (TIP), GUI, and eated on the reused for upgrade.	
	Servers	🗖 Clients			
	🗖 Agents	🗖 Register w	/ith the agent man	ager	
	<ul> <li>Custom installation This will custom install th agents are installed on of to be installed on this co schema on this compute</li> </ul>	ne individual TPC co ther computers. You mputer. You will hav r.	mponents on this o u can choose any s e a choice to creat	computer. Remote server, agent, or client e the database and	
Ulfe -	O Installation licenses				
WIN OF TAX	E:\Program Files\IBM\TF	0	TPC Instal	lation Location	
	< <u>B</u> ack		Next >	<u>C</u> ancel	

Figure 8-24 Custom installation

6. The panel, *Select one or more components to install*, is displayed (Figure 8-25). You can select both the Remote Data agent and Remote Fabric agent or only the Remote Data agent, depending on your requirements. We select both. Click **Next**.

🕲 IBM Tivoli Storage Pro	ductivity Center - Installer	·	
IEM.	Select one or more components to install on the local or remote computer. This program will install or upgrade various components displayed below. For example, if version number 3.1.0.39 is displayed next to the component, this means, that the version of the component is already installed on this computer. In this installation, all installed components will be upgraded to the current version of software. You can choose to install additional components which are not installed.		
	Tivoli Storage Productivity Center Serv	rers 4.1.0.97	
	🗖 GUI 4.1.0.97	CLI 4.1.0.97	
ALL PAGE	🗖 Data Agent	🗖 Fabric Agent 4.1.0.97	
1/1/2 E	Remote Data Agent	🗹 Remote Fabric Agent	
	Register with the agent manager		
	Register Launch Information With Oth	er Applications	
L	< Back	Next > Cancel	

Figure 8-25 Select agents to deploy

- 7. The panel, *Data Server, Device Server, Data agent, and Agent Information*, is displayed (Figure 8-26):
  - Enter the *password* that the Fabric agents will use to communicate with the Device Server.

This must be the password of the local administrator user running the installation.

 If the Data Server was installed on the local computer, the defaults will be populated in the fields. Otherwise, enter the Data Server name and Data Server port fields.

What this means is that, if you have changed the Data Server name and port on the localhost, you will need to enter the information. If not, the installation program will accept the defaults.

Click **Next** to continue.

🕲 IBM Tivoli Storage Pro	oductivity Center - Installer
	Data server, Device server, Data agent, and Agent Information
IBK.	Enter the server name and port that the Data agent and Fabric agent, and GUI will use to communicate with the server.
	Data server name colorado.itso.ibm.cc Data server port 9549
A	Device server name colorado.itso.ibm.cc Device server port 9550
	Enter an OS user group whose members will be TPC administrators in the administrators group.
	TPC superuser Administrators Security roles
	Enter a password that the Fabric agents will use to communicate with the Device server.
	Host authentication password
1 1 150-	Enter a password that will be used to create the Data Server Account.
11	Data Server Account Password
	WAS admin ID TPCSuperuser Password
CAN BERT	NAS discovery
	Data agent <u>options</u>
	< <u>B</u> ack <u>N</u> ext > <u>C</u> ancel

Figure 8-26 Data Server, Device Server, and agent information window

- 8. The panel, *Select the Remote Agents to Install*, is displayed (Figure 8-27). You can use this panel to:
  - Specify Windows computers on which to install agents (when installing from a Windows computer only). These Windows computers can be in the current domain or in another domain within your environment.
  - Specify computers on which to install agents. You can add multiple computers at the same time.
  - View a list of computers on which you want to install agents.
  - Remove a computer from the list of target computers. There are two options to choose from in this panel, Add Agents from MS® Directory and Manually Enter Agents.

🖟 IBM Tivoli Storage Productivity Center for Data Installation	_ <b>_ _ _</b>					
Select the remote agents to install.						
Add Agents from MS Directory Click this button to remotely install an a domain. You must be running this inst	agent on one or more Windows computers that are members of a Windows allation from a computer that is a member of a domain.					
Manually Enter Agents Click this button to manually enter the names and login credentials of the computers to which you want to remotely install an agent.						
Computers Targeted for a Remote Agent Install						
Host Name 🛆	IP Address					
No data is currently available. Prev Next	Remove					
rogress Log						
11 4/09 4:14:37 PM INS0000I: IBM Tivoli Storage Productivity Center for Data Install 11 4/09 4:14:39 PM INS1169I: Finding domains	ation					

Figure 8-27 Select remote agents to install

**Note:** In Figure 8-27, you can see that the **Add Agents from MS Directory** button is greyed out. This indicates that the server that you are installing from is not on a domain. Make sure that you are logged into the domain, if you want to select this option.

We list the information displayed and required when choosing to **Add Agents from MS Directory**. However, because our server is not part of a domain, we do not show the steps in detail.

We choose to use the method, "Manually Enter Agents, when deploying agents.

The following information is provided when selecting:

# Add Agents from MS Directory (button)

This applies to Windows domains, the server installing from needs to be part of a domain.

- When you click this button, the Add Agents from MS Directory panel is displayed.
- When you first access this window, the installation program will find and list all the computers in your domain.Complete the following fields on this panel:

# Remote Agent Machines (list box)

This list box provides a complete listing of the computers detected for the current domain that do not already have a Data agent installed.

Use the columns to sort and filter the computers if required.

#### Select:

Click the check box next to the computer on which you want to install an agent.

#### Host Name:

Displays the names of the computers detected in the current domain.

# Domain:

Displays the domain of the computers listed on the window.

#### Virtual Node:

Indicates whether the computer is a virtual node.

# OK (button):

Finally, click the **OK** button to add the computers you entered to the *Computers Targeted for a Remote Install* list on the *Remote Agents to Install* window.

**Note:** If you see the error, All servers selected not added to the list! this might be due to one of the following exceptions:

- Not able to establish communication with the target computer
- Insufficient authority to install on the remote computer
- Target computer already targeted for an installation

#### Manually Enter Agents (button)

Click this button as seen in Figure 8-28, to manually specify Windows and non-Windows (UNIX or Linux) computers on which you want to install agents.

	_	
Add Agents from MS Directory	Click this button to remotely install an domain. You must be running this inst	agent on one or more Windows computers that are members of a Window allation from a computer that is a member of a domain.
Manually Enter Agents	Click this button to manually enter the install an agent.	names and login credentials of the computers to which you want to remote
omputers Targeted for a Remote A	gent Install	
Host Name	<b>A</b>	IP Address
o data is currently available.		
o data is currently available.		Remo
o data is currently available. Prev Next		Remo
o data is currently available. Prev Next ess Log		Remo
o data is currently available. Prev Next ess Log 19 4:14:37 PM INS0000I: IBM Tivoli S 19 4:14:39 PM INS1169I: Finding do	Storage Productivity Center for Data Install mains	Remo Cancel

Figure 8-28 Select "Manually Enter Agents"

You can specify multiple computers on which to install agents at the same time, keeping the following considerations in mind:

- The server must be able to resolve the IP address of the remote computer as well as communicate with that computer.
- The user ID and password must have administrator rights (Windows) or system rights (UNIX) on the remote computer.
- When adding multiple computers in a single installation, they will need to share the same user ID and password, if not, you must add them individually.

9. The panel, *Manually Enter Agents*, is displayed as shown in Figure 8-29. The following information is required:

# **Remote Agent Machines:**

Enter the network names or IP addresses of the computers you want to install. We choose to install an agent on computer "9.12.6.76" as seen in Figure 8-29.

When adding multiple computers remember to add each computer on a separate line.

## **Remove Selected Entities (Optional):**

Click this button to remove the highlighted computers from the list.

## User and Password:

Specify the user ID and password for the computers (hosts) that you want to add manually, as shown in Figure 8-29.

# OK (button):

Finally, click the **OK** button to add the computers entered to the *Computers Targeted for a Remote Install* list on the *Select the remote agents to install* window illustrated in Figure 8-30.

🚽 Manually	Enter Agents	
<b>Vanually</b> Type or past Enter one co each entry n must have a	r Enter Agents te one or more computer names or IP addresses into the table below. omputer name per line. You can paste in a list with multiple entries, but nust be separated by a space, comma, or new line. All of the computers i common user ID and password.	
Remote Age	ent Machines	
	Computer Name or IP Address	
9.12.6.76		-
4		
_		
		-
		-
	Remove Selected Entries.	
Jser	administrator	
Password	*****	_
Re-type	****	
	OK Cancel	

Figure 8-29 Manually Enter Agents

Notice the fact that we have added our computer successfully and that you are able to monitor the process of adding the agents in the **Progress Log** as seen in Figure 8-30. If you have any problems adding computers, the errors will be displayed here.

🖥 IBM Tivoli Storage Productivity Center	for Data Installation							
Select the remote agents to	install.							
Add Agents from MS Directory	d Agents from MS Directory Click this button to remotely install an agent on one or more Windows computers that are members of a Windows domain. You must be running this installation from a computer that is a member of a domain.							
Manually Enter Agents	Click this button to manually enter the install an agent.	Click this button to manually enter the names and login credentials of the computers to which you want to remotely install an agent.						
Computers Targeted for a Remote Age	ent Install							
Host Name	۵	IP Address						
9.12.6.76		9.12.6.76						
Total: 1 Displayed: 1 Selected: 0								
		Remove						
Prev Next		Cancel						
rogress Log								

Figure 8-30 Add computers for remote agent install

**Note:** The error, All servers selected not added to the list! might be due to one of the following exceptions:

- Not able to establish communication with the target computer
- Insufficient authority to install on the remote computer
- Target computer already targeted for an installation

You have the option within the panel, *Select the remote agents to install*, to remove computers that have been targeted for a remote install, by selecting them and clicking the **Remove** button.

- 10.Click Next to continue.
- 11. The Windows Service Account panel is displayed for Windows only. This is not required for UNIX or Linux. You have two options:
  - a. Create a local account for the agent service (create a new service account under which the server will run).
  - b. Use this account for the agent service (provide a user name and password to use an existing account).

We chose option **b** as shown in Figure 8-31. There is no default or recommendation on what to select here, is up to the server administrator, based on your system.

Click **Next** to continue.

IBM Tivoli Storage Productivity Center for Data Installation	
Windows Service Account  Create a local account for the agent service  Use this account for the agent service: Username: administrator Password:   Free Service Service:	
Prev Next 2	Cancel
Progress Log	
5/14/09 4:14:37 PM INS00001: IBM Tivoli Storage Productivity Center for Data Installation 5/14/09 4:14:39 PM INS11691: Finding domains 5/14/09 4:17:24 PM INS0581: Adding 9.12.6.76 to selected list. 5/14/09 4:17:34 PM INS0501: Connecting to 9.12.6.76 using Windows protocol. 5/14/09 4:17:31 PM INS80521: Connected to 9.12.6.76 using Windows protocol. 5/14/09 4:17:32 PM INS30521: 9.12.6.76 was added to selected list.	

Figure 8-31 Windows Service Account

12. The Agent Status panel is displayed (Figure 8-32). The Data Manager will run a mini-probe on all the computers you selected to determine what necessary applications are installed and if an agent is already installed on any computer.

Make sure that the server can ping the agent and the agent can ping the server.

These are the column headings:

# OS Type:

Displays the operating system of the target computer.

**Computer:** 

Displays a list of computers where the agent will be installed.

# Status:

Displays the current status of the agent install on the remote computer.

# **Directory:**

Displays the directory where the agent will be installed. If an agent is already installed on a computer, you will not be able to edit this field.

- If you can edit the field, this means that an agent has not yet been installed, and you
  can edit the directory where the agent will be installed.
- If a Common Agent exists, the path cannot be changed.

#### Port:

Displays the port number on which the agent is listening. You can change the listener port for a remote probe on this panel. If you have a firewall, you can select the port that the program uses to communicate back to the installation program.

# **Space Required:**

Displays the space required to install the agent.

# Space Available:

Displays the available space on the computer.

There are two additional options to choose from in the "Agent status panel" prior to selecting install:

- Agent should perform a SCAN when first brought up (gathers default statistics)
- Agent may run scripts sent by the server (in addition to local scripts)

We select both options. However, it is your choice to run the scan now or later, as well as allowing the server to run scripts on the computer.

5	IBM Tivoli Storage Productivity Center for D	ata Installati	ion				
	OS Type	Computer	Status	Directory	Port	Space Regd	Space Avail
	Windows(R) Server 2003, Enterprise Edition	9.12.6.76	Reported back	C:\Program Files\IBM\TPC\ca	9510	153600 kB	6040396 kB
	Aront should perform a SCAN when first h	raught un (ac	there default etc	tistics			
	Agent should perform a SCAN when his to	Indition to loc	al ecrinte)	usucs)			
			ai scripts).				
	Prev Install						Cancel
Pr	rogress Log				 	****	
5/	14/09 4:17:24 PM INS30581 Adding 9:12:6.760 14/09 4:17:24 PM INS80501: Connecting to 9.12	) Selected IIS 7.6.76 Using (	t. Mindows protocol				<b></b>
5/	14/09 4:17:31 PM INS8052I: Connected to 9.12	.6.76 usina V	Vindows protocol.				
5/	14/09 4:17:32 PM INS3052I: 9.12.6.76 was add	led to selecte	d list.				1000
5/	14/09 4:19:41 PM INS1138I: Status of compute	r 9.12.6.76 ch	nanged to Copying	) getguid.			000
5/	14/09 4:19:41 PM INS1138I: Status of compute	r 9.12.6.76 ch	nanged to Getting	GUID on remote computer			
5/	14/09 4:19:49 PM INS1138I: Status of compute	r 9.12.6.76 ch	nanged to Getting	a list of common agents.			
5/	1 4/09 4:19:52 PM INS1138I: Status of compute	7 9.1 2.6.76 ch	nanged to Copying	i mini-prope. etina			
15/	14/09 4:19:53 PM INS 1381: Status of compute 14/09 4:20:00 PM INP11291: Status of compute	79.12.0.76 CF 70.12.6.76 cF	iarigeu iu investigi anged to Reporte	aung. diback			1000
101	14705 4.20.00 FWINGTTSOL Status Of Compute	1 3.12.0.70 U	rangeu to rteporte	u pach.			

Figure 8-32 Agent status panel

#### 13.Click Install.

The agents will be installed on the specified computers.

This window will be updated automatically as the agent is installed on the target computer.

The Status column will display the installation status. In Figure 8-33, the Status column shows *Copying software*.

IBM Tivoli Storage Productivity Center for D	ata Installati	ion				
OS Type	Computer	Status	Directory	Port	Space Reqd	Space Avai
Nindows(R) Server 2003, Enterprise Edition	9.12.6.76	Copying software	C:\Program Files\IBM\TPC\ca	9510	153600 kB	6040396 kE
Agent should perform a SCAN when first b	rought up (ga	athers default statis	tics)			
Agent should perform a SCAN when first b Agent may run scripts sent by server (in a	rought up (ga	athers default statis al scripts).	tics)			
Agent should perform a SCAN when first b Agent may run scripts sent by server (in a Prev Install	rought up (ga ddition to loca	athers default statis al scripts).	tics)			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in ar Prev Install	rought up (ga ddition to loca	athers default statis al scripts).	tics)			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in a Prev Install ress Log UP 4.Tr. 32 PM INS 30521: 9.T2:0.70 was aut	rought up (ga ddition to loca	athers default statis al scripts). o nst.	tics)			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in ar Prev Install ress Log 109 4:119:21 PM INS 30921: 9:12:0:76 was auto 109 4:119:41 PM INS 111381: Status of compute	rought up (ga ddition to loca nea to selecte r 9.12.6.76 ch	athers default statis al scripts). romsc. nanged to Copying g	ti <b>cs)</b> etguid.			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in ar Prev install 1994 - 17 - 32 PMI INS 30521. 9 - 12.6 - 76 was act 0994 - 17 - 32 PMI INS 311381: Status of compute 0994 - 19 - 41 PM INS 11381: Status of compute 0994 - 19 - 41 PMI INS 11381: Status of compute 0994 - 19 - 41 PMI INS 11381: Status of compute	rought up (ga ddition to loca rea to selecte r 9.12.6.76 ch r 9.12.6.76 ch r 9.12.6.76 ch	athers default statis al scripts). To inst. nanged to Copying gr nanged to Getting GL paned to Getting AL	tics) etguid. I/D on remote computer			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in a Prev Install 109 41 7.32 PWINS 30521 91 2.6.76 Was auto 109 419.41 PMINS11381: Status of compute 109 419.41 PMINS11381: Status of compute 109 419.49 PMINS11381: Status of compute 109 419.49 PMINS11381: Status of compute	rought up (ga ddition to loca r 9.12.6.76 ch r 9.12.6.76 ch r 9.12.6.76 ch r 9.12.6.76 ch	athers default statis al scripts). In IISL nanged to Copying gu nanged to Getting GL nanged to Getting SL nanged to Getting SL	ti <b>cs)</b> etguid. I/D on remote computer st of common agents. uin-bronbe			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in ar Prev Install gress Log 109 4:17:32 PM INS130521: 9.12.0.76 was aut 109 4:19:41 PM INS11381: Status of compute 109 4:19:49 PM INS11381: Status of compute 109 4:19:52 PM INS11381: Status of compute 109 4:19:52 PM INS11381: Status of compute 109 4:19:52 PM INS11381: Status of compute	rought up (ga ddition to loca rea to selecte r 9.12.6.76 ch r 9.12.6.76 ch r 9.12.6.76 ch r 9.12.6.76 ch	athers default statis al scripts). anged to Copying g nanged to Getting GL nanged to Getting a li nanged to Copying m	tics) etguid. 10 on remote computer st of common agents. ini-probe. ng.			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in ar Prev Install 09 9.17.32 PMINS30527.9.12.6.76 was add 09 9.13.41 PMINS11381: Status of compute V09 4.19.42 PMINS11381: Status of compute V09 4.19.52 PMINS11381: Status of compute V09 4.19.53 PMINS11381: Status of compute	rought up (ga ddition to loc: r9.12.6.76 cf r9.12.6.76 cf r9.12.6.76 cf r9.12.6.76 cf r9.12.6.76 cf r9.12.6.76 cf	athers default statis al scripts). To TISL Tanged to Copying gr Tanged to Getting a li Tanged to Getting a li Tanged to Copying m Tanged to Investigati	tics) etguid. I/D on remote computer st of common agents. init-probe. 19. Jack.			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in a Prev Install 09 419 41 PM INST30521 9.12.6.76 was auto 09 419 41 PM INST1381: Status of compute 09 419 441 PM INST1381: Status of compute 09 419 49 PM INST1381: Status of compute 09 419 53 PM INST1381: Status of compute 09 419 53 PM INST1381: Status of compute 09 419 53 PM INST1381: Status of compute 09 420 50 PM INST1381: Status of compute 09 420 50 PM INST1381: Status of compute 09 420 50 PM INST1381: Status of compute	rought up (ga ddition to loca rea to selecte r 9.12.6.76 cf r 9.12.6.76 cf	athers default statis al scripts). To TISL nanged to Copying gr nanged to Getting GL nanged to Getting al nanged to Copying m nanged to Investigatin nanged to Reported to Nen first brought up	tics) etguid. I/D on remote computer st of common agents. ini-probe. 1g. 1g. 1g. 1g. 1g. 1g. 1g. 1g. 1g.			Cancel
Agent should perform a SCAN when first b Agent may run scripts sent by server (in an Prev Install agress Log 409 4:11:42 PM INS130521:9.12.5.76 W3S aut 409 4:19:41 PM INS11381: Status of compute 409 4:19:42 PM INS11381: Status of compute 409 4:19:52 PM INS11381: Status of compute 409 4:19:52 PM INS11381: Status of compute 409 4:20:00 PM INS11381: Status of compute 409 4:20:00 PM INS11381: Status of compute 409 4:20:55 PM INS1051: Transmitting agen	rought up (ga idition to loc: 19.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 9.12.8.76 cf 00m a SCAN 11 licensing da	athers default statis al scripts). anged to Copying g nanged to Getting GL nanged to Getting a li nanged to Getting a li nanged to Reported to when first brought u when first brought u	tics) etguid. 10 on remote computer st of common agents. ini-probe. ng. g. jack. o (gathers default statistics)			Cancel

Figure 8-33 Copying software

14. The next step is to install the Common Agent as shown in the Status field, Installing Common Agent, in Figure 8-34.

E	BM Tivoli Storage Productivity Center for Da	ata Installati	on				
	OS Type	Computer	Status	Directory	Port	Space Reqd	Space Avail
	Windows(R) Server 2003, Enterprise Edition	9.12.6.76	Installing CA	C:\Program Files\IBM\TPC\ca	9510	153600 kB	6040396 kB
	Agent should perform a SCAN when first be	rought up (ga	thers default st	atistics)			
	Agent may run scripts sent by server (in ac	ldition to loca	al scripts).				
	Prev install						Cancel
Ē							
5	5/14/09 4:19:52 PM INS1138I: Status of computer	r 9.12.6.76 ch	anged to Copyi	ng mini-probe.			Ê
5	014/09 4:19:53 PM INS1138I: Status of compute 0/14/09 4:20:00 PM INS1138I: Status of compute	r 9.12.6.76 cr r 9.12.6.76 cr	langed to invest langed to Repor	gating. ted back.			
6	0/14/09 4:20:35 PM INS0077T: Agent should perf	orm a SCAN	when first broug	ht up (gathers default statistics)			
5	5/14/09 4:20:35 PM INS01051: Transmitting agen 5/14/09 4:20:35 PM INS11381: Status of computer	t licensing da r 9.12.6.76 ch	ita to server Janded to Copvir	na software.			100
5	5/14/09 4:21:33 PM INS1138I: Status of computer	r 9.12.6.76 ch	anged to Initiali:	zing Install.			
5	5/14/09 4:21:44 PM INS1138I: Status of computer 5/14/09 4:21:49 PM INS1138I: Status of computer	r 9.12.6.76 ch r 9 12 6 76 ch	anged to Initiali: anged to Install	zing Install. ing CA			
1	states against an an and the states of computer	. 5.12.5.10 0	angea to motali	ing one			

Figure 8-34 Installing CA

After the Common Agent is installed, the Status field shows Starting Data agent as shown in Figure 8-35.

5	IBM Tivoli Storage Productivity Center for D	ata Installati	ion				
	OS Type	Computer	Status	Directory	Port	Space Regd	Space Avail
	Windows(R) Server 2003, Enterprise Edition	9.12.6.76	Starting Data Agent	C:\Program Files\IBM\TPC\ca	9510	153600 kB	6040396 kB
		<u></u>		unannannannannann color an agus annannannann an air color	::::::::::::::::::::::::::::::::::::::		20000000000000
	Agent should perform a SCAN when first b	rought up (ga	athers default statistic	:s)			
	Agent may run scripts sent by server (in ad Agent may run scripts sent by server (in ad	ddition to loc	al scripts).				
	Prev Install						Cancel
P	rogress Log						
5/ 5/	/14/09 4:20:35 PM INS00771: Agent should pen /14/09 4:20:35 PM INS01051: Transmitting agen	t licensing da	ata to server	gainers deradit statistics)			<b></b>
5/ 5/	/14/09 4:20:35 PM INS1138I: Status of compute /14/09 4:21:33 PM INS1138I: Status of compute	r 9.12.6.76 ch r 9.12.6.76 ch	nanged to Copying soft nanged to Initializing In:	ware. stall.			
5/	/14/09 4:21:44 PM INS1138I: Status of compute	r 9.12.6.76 ch	nanged to Initializing In	stall.			
5/ 5/	/14/09 4:21:49 PM INST138: Status of computer /14/09 4:22:44 PM INS1138I: Status of computer	r 9.12.6.76 ch r 9.12.6.76 ch	hanged to Verifying CA				100
5/ 5/	/14/09 4:23:05 PM INS1138I: Status of compute /14/09 4:23:15 PM INS1138I: Status of compute	r 9.12.6.76 ch r 9.12.6.76 ch	hanged to Installing Da hanged to Install Succe	ta Agent. eded.			
5/	/14/09 4:23:20 PM INS1138I: Status of compute	r 9.12.6.76 ch	nanged to Starting Data	Agent.			

Figure 8-35 Starting Data agent

After the Data agent is successfully installed, the Status column displays Registered (see Figure 8-36).

OS Type	Computer	Status	Directory	Port	Space Reqd	Space /
Windows(R) Server 2003, Enterprise Edition	9.12.6.76	Registered	C:\Program Files\IBM\TPC\ca	9510	153600 kB	604039
Agent should perform a SCAN when first br	ought up (ga	thers default	statistics)			
Agent may run scripts sent by server (in ad	dition to loca	al scripts).				
Prev Install						Cano
Progress Log						
5/14/09 4:21:44 PM INS1138I: Status of computer	9.12.6.76 ch	langed to Initia	lizing Install.			
5/14/09 4:21:49 PM INS1138I: Status of computer	9.12.6.76 ch	anged to Insta	illing CA.			
	9.12.6.76 CD	langed to verif	/ing CA. Jling Data Agent			
5/14/09 4:22:44 PM INS1138I: Status of computer 5/14/09 4:23:05 PM INS1138I: Status of computer	912676ch	anged to Insta				
5/14/09 4:22:44 PM INS1138I: Status of computer 5/14/09 4:23:05 PM INS1138I: Status of computer 5/14/09 4:23:15 PM INS1138I: Status of computer	9.12.6.76 ch 9.12.6.76 ch	anged to Insta anged to Insta	II Succeeded.			
5/14/09 4:22:44 PM INS1138: Status of computer 5/14/09 4:23:05 PM INS1138: Status of computer 5/14/09 4:23:15 PM INS1138: Status of computer 5/14/09 4:23:20 PM INS1138: Status of computer 5/14/09 4:23:20 PM INS1138: Status of computer	9.12.6.76 ch 9.12.6.76 ch 9.12.6.76 ch	langed to Insta langed to Insta langed to Start	III Succeeded. ing Data Agent. Acont Storted			
5/14/09 4:22:44 PM INS1138I: Status of computer 5/14/09 4:23:05 PM INS1138I: Status of computer 5/14/09 4:23:15 PM INS1138I: Status of computer 5/14/09 4:23:20 PM INS1138I: Status of computer 5/14/09 4:23:35 PM INS1138I: Status of computer 5/14/09 4:23:35 PM INS1138I: Status of computer	9.12.6.76 ch 9.12.6.76 ch 9.12.6.76 ch 9.12.6.76 ch 9.12.6.76 ch 9.12.6.76 ch	ianged to Insta langed to Insta langed to Start langed to Data langed to Ager	III Succeeded. III Succeeded. Ing Data Agent. Agent Started. It registering.			

Figure 8-36 Status column display of Registered

After the Data agent is successfully probed, the Status column displays Probed (see Figure 8-37).

3	IBM Tivoli Storage Productivity Center for D	ata Installati	on				_ 🗆 🗙				
	OS Type	Computer	Status	Directory	Port	Space Reqd	Space Avail				
	Windows(R) Server 2003, Enterprise Edition	9.12.6.76	Probed	C:\Program Files\IBM\TPC\ca	9510	153600 kB	6040396 kB				
		IBM Tiv	voli Storag	e Productivity Center for Dat 🗙							
		Ĵ.	All inst	allations completed successfully.							
				ОК							
	Agent should perform a SCAN when first bill Agent may run scripts sont by server (in ac	rougr	al ecrinte)								
	Agent may run scripts sent by server (in at		ai scripts).								
							Cancel				
P	rogress Log 14/19/4-77/44 PM-INST 1381 STATUSTIC COMMUNE		annen III v	ZENVIND CA							
51	/14/09 4:23:05 PM INS1138I: Status of compute	r 9.12.6.76 ch	anged to I	nstalling Data Agent.			<b>^</b>				
5, 5,	5/14/09 4:23:15 PM INS1138I: Status of computer 9.12.6.76 changed to Install Succeeded. 5/14/09 4:23:20 PM INS1138I: Status of computer 9.12.6.76 changed to Starting Data Agent.										
5/ 5/	/14/09 4:23:30 PM INS1138I: Status of compute /14/09 4:23:35 PM INS1138I: Status of compute	r 9.12.6.76 ch r 9.12.6.76 ch	ianged to ( ianged to /	Data Agent Started. Agent registering.							
5/ 5/	/14/09 4:23:45 PM INS1138I: Status of compute (14/09 4:23:50 PM INS1138I: Status of compute	r 9.12.6.76 ch	anged to F	Registered. Prohe started			222				
5	/14/09 4:24:05 PM INS1138I: Status of compute	r 9.12.6.76 ch	anged to F	Probed.			00000				
15,	r14/09 4:24:10 PM INS1139I: All installations co	mpleted succ	esstully.				•				

Figure 8-37 Probed and completed

- 15. After all the agents have been probed, the installation reports a Completed Successfully message box as shown in Figure 8-37. Click **OK** to continue.
- 16. To view the installation logs, you can double-click a computer name as shown in Figure 8-38.

🛃 IBM Tiyol	i Storage Pro	ductivity (	Center for Data Ins	tallation					
OS Type	Computer	Status	Directory			Port	Space Reqd	Space Avail	
Linux	9.12.5.65	Probed	/opt/IBM/TPC/ca		g	1510	200704 kB	243999588 kB	
	13								
	Installation lo	og for <9.1	2.5.65>.						×
5/15	V09 3:01:08 P	M INS835	31: Stopping Storag	e Resource Agent located at /opt/ll	BM/TPC.				
5/15	709 3:01:11 P	M INS835	I: Storage Resour	ce Agent has stopped.	allation				
5/15	09 3:01:11 P	MINS508	1: Installing comm	e Productivity Center for Data Insta on agent	anauon				
5/15	V09 3:01:39 P	M INS508	51: Checking comm	on agent.					
5/16	i/09 3:01:44 P	M INS508	61: Common agent	installed successfully.					
5/15	V09 3:01:44 P	M INS508	31: Query common	agent.					
5/15	V09 3:01:49 P	MINS407	31: Verifying that the	common agent is active					
5/16	009 3:01:55 P	MINS407:	51: Verifying that the	common agent is active					
5/15	V09 3:01:55 P	MINS209	21: /opt/IBM/TPC/ca/	subagents/TPC/Data//config/agen	 It config configuration file creater	h			
5/16	V09 3:01:55 P	M INS209	21: /opt/IBM/TPC/ca/	subagents/TPC/Data//config/nativ	elog.config configuration file cre	ated.			
5/16	i/09 3:01:55 P	M INS209	21: /opt/IBM/TPC/ca/	subagents/TPC/Data/PROBE_ME	configuration file created.				
M AGE 5/15	V09 3:01:55 P	M INS208	31: TPC for Data Ag	ent start up scripts created.					
Age 5/15	V09 3:02:03 P	MINS406	41: The Data agent '	was successfully installed at /opt/l	IBM/TPC/ca/subagents/TPC/Dat	a in the	common agen	t installed at /opt/IBM/1	TPC/ca.
5/16	009 3.02.19 P	MINS107	DI: THE Data agent DI: IBM Tivoli Storad	e Productivity Center for Data Age	nt (instance 3) started	y starte	eu in me commu	In agent at Jup Dibimi F	-Cica.
5/15	09 3:02:13 P	MINS107	71: Waiting for agen	t.	in (instance 5) stanca.				
5/16	V09 3:02:39 P	M INS107	51: Agent registered						
Progres S/16	i/09 3:02:39 P	MINS107	31: Waiting for Prob	e to complete					
5/15/09 5/15	i/09 3:02:53 P	M INS107	31: Computer probe	d					
 5/15/09 5/15	/09 3:02:58 P	'M /opt/IBM	/TPC/agent/bin/Age	nt -uninstall-serverName colorad	do.itso.ibm.com: <text th="" unavailab<=""><th>le&gt;</th><th></th><th></th><th></th></text>	le>			
 5/15/09 5/15	V09 3:02:58 P	MINS830	31: Uninstalling Sto	rage Resource Agent on colorado.	itso.ibm.com at location /opt/IBN.	MTPC.			
 5/15/09 5/15	009 3:02:59 P	MIN2830	41: Storage Resour	ce Agent uninstall succeeded.					
5/15/09									
5/15/09 5/15/09					ок				
5/15/09									

Figure 8-38 View installation log

17.Click **OK** to continue.

At this stage the installer invokes the Fabric agent installation:

18.A pop-up window opens with the following message is displayed:

Server validation and retrieval of agent list can take several minutes. Click **OK**.

19. The Remote Fabric agent information panel is displayed (see Figure 8-39). This list is a list of Common Agents known to the Agent Manager. You can select one or more remote Common Agents to deploy the Fabric agents, under the **Deploy** column heading.

Make your selection (see Figure 8-39) and click Next.

🕲 IBM Tivoli Storage Pro	ductivity Center - In	staller			
	Remote Fabric age	nt information			
IBM.	Select one or mo remote common specified Device :	re remote common agents are manage server.	agents to deploy th ed by the same age	ne Fabric agent. T ent manager for the	hese e
	Deploy	Hostname	Port	Version	Location
		gallium itso ibm	(9510	1.2.3	file:///C./Progra
	<u>, , , , , , , , , , , , , , , , , , , </u>	< <u>B</u> ack	<u>N</u> ext >	<u> </u>	Dancel

Figure 8-39 Select Fabric agents to install

20.A confirmation panel is displayed listing where the Fabric agents will be installed (see Figure 8-40). Click **Next** to continue.

🕲 IBM Tivoli Storage Produ	uctivity Center - Installer	
	Fabric Agent will be deployed to the following remote hosts:	
IBK.	1. gallium.itso.ibm.com	
	< Back Cancel	

Figure 8-40 Confirmation panel



21. The Status panel is displayed as seen in Figure 8-41.

Figure 8-41 Status panel

22. The Deployment complete panel is displayed (Figure 8-42). Click **Next** to continue.



Figure 8-42 Deployment complete panel

23. The installation is now complete.

# 8.4.2 Deploying Storage Resource agents using the TPC GUI

In this section, we take you through the steps of deploying a Storage Resource agent.

- 1. Launch the TPC GUI.
- 2. Make sure that you are logged in with a superuser role to schedule Storage Resource agent deployments.
- In the Navigation Tree pane, expand Administrative Services → Configuration → Storage Resource agent Deployments. Right-click Storage Resource agent Deployments and click Create Storage Resource agent Deployments. See Figure 8-43.



Figure 8-43 Create Storage Resource agents

4. The *Create Storage Resource Agent Deployments* window opens, displaying the Computers tab. Enter a description (optional) in the Description field and click **Add Host** List as seen in Figure 8-44

-Create Sto	age Besource Agent De	nlovments			
	uge meestive nigen be				
Creator:	tpcsuperuser	Name:	unnamed		
Description:	SRA Deployment Window	s1		—	
		•••			
Computers	When to Run Alert				
	· · · ·				
Enter of	computers to insta	II Stora	ge Resource Agent.		
	Click this button t	o manuallu	enter the names and login credentials of the comput	ers to which you want to install Storage Besource A	aent
Add H	ost List	o manualiy	enter the names and login credentials of the comput	ers to which you want to install storage hesolate A	geni.
	v				
Computers	Targeted for a Remote Ager	it Install			
Host Nar	ne		Installation Location	Force	Status

Figure 8-44 Create Storage Resource agent Deployment

5. The Login Information panel is displayed (see Figure 8-45).

Login Information				X	
Type one or more computer name: installation location and option for	s or IP addresses into the table using daemon service.	e below. All of th	e computers must have a common user l	D, password, certificate location,	
Add Agents from MS Directory	Click this button to instal Windows domain.	ll Storage Resou stall Storage Re	irce Agent on one or more Windows con source Agent on one or more computers	nputers that are members of a listed in a file.	
Remote Agent Machines					
Host Name	Installation Location	Force	Status		
				<b>^</b>	
Total: 50 Displayed: 50 Selected:	0			▼	
				Remove Selected Entries.	
		2			
User					
Password					
Re-type		_			
Certificate Location					
Passphrase					
Port	9510				
Use Daemon Service for Rur	ntime Operation 🕜				
				l✓ Validate before Add	
			Add	Cancel	

Figure 8-45 Login Information

On this panel we are required to add in the login information for the computers to deploy Storage Resource agents to (see Figure 8-46).

You can enter the information in the following ways:

- Click Add Agents from MS Directory to install Storage Resource agents on one or more Windows computers that are members of a Windows domain.
- Click Get Agent List From file to install Storage Resource agents on one or more computers listed in a file. The computers listed in the file must share the same administrative user ID and password.
- Enter the computer names or IP addresses in the Remote Agent Machines table.
- Enter the installation locations for the agents.

**Note:** If you change the default path, be sure to *NOT* add a "/" at the end of the path, or the installation will fail.

- ► The default path for Linux and UNIX is /opt/IBM/TPC/agent
- The default path for Windows is C:/Program Files/IBM/TPC/agent
- The path is filled in automatically by the GUI if you do not supply any value and have checked the box for Validate before save. Otherwise, if you enter a path, the agent is installed in that path.

- Select Force under the following circumstances:
  - If an earlier Storage Resource agent installation failed and there are damaged agent files on the computer that cause further installations to fail. If you select this option, Tivoli Storage Productivity Center attempts to overwrite the previous failed deployment on the computer with a new Storage Resource agent.
  - If you want an existing Storage Resource agent to communicate with an additional Tivoli Storage Productivity Center server. To do this, you must create the deployment job from the additional Tivoli Storage Productivity Center server to which you want the Storage Resource agent to communicate.

In our example, we choose to enter the following information as seen in Figure 8-46.

- IP address: (resource agent target) manually in the Remote Agent Machines table.
- Installation location: left blank.(Default directory will be used)
- Force: Unchecked. This is not needed in our example.
- User: Notice that this user ID must be the same for all computers listed in the Remote Agent Machines list.
- Password: (password for computers on which to deploy Storage Resource agents).
- Retype: password.
- Certificate Location: Not required; we are not using the SSH protocol to deploy the agents. Refer to Chapter 2, "Planning for installation of Tivoli Storage Productivity Center" on page 31 for protocols.
- **Passphrase**: Not required; we are not using the SSH protocol to deploy the agents.

Login Information								
ype one or more compu nstallation location and o	uter names or IP addresse option for using daemon se	s into the table beli ervice.	low.	All of th	ne computers must ha	ave a common user ID, p	assword, certificate I	location
	1 Ctub 444	- Maria ta install Cha						
Add Agents from MS	Directory Windows	domain.	Jayo	e nesu	arce Agent on one of	more windows compare	is that are members	uia
Get Agent List Fr	om File Click on th	nis button to install	Stor	age Re	source Agent on on	e or more computers lister	d in a file.	
Remote Agent Machine	15							
Host Name	Installation Loc	cation	Г	Force	Status			
9.12.5.47								
			-					-1
								-
								-1
					/			
			-					
			-					
Total: 48 Displayed: 48	Selected: 1							-
•			_					▶
						R	emove Selected En	tries.
Jser		administrator						
<sup>D</sup> assword		*****						
Re-type		******						
Certificate Location								
<sup>D</sup> assphrase								
Port		9510						
🔽 Use Daemon Servio	ce for Runtime Operation	0						
							l⊽ Validate befo	ore Ado
						, bhA	Cancel	
							Canoor	

Figure 8-46 Adding computers

6. Click Add.

The server sends the login information to the host for validation, as seen in the progress window (Figure 8-47).

📄 Progr	ess 🗙
i)	Sending host information for validation Completed 0 out of 1
	Cancel

Figure 8-47 Progress window

If the validation succeeds, you will see a message under the status column indicating this as shown in Figure 8-48 on the first line.

The same applies if the validation fails, in this case, you will see an error message as shown in Figure 8-48 on the second line.

To add the server that has failed, you will need to fix the communication or login errors, and retry.

Login Information						×
Type one or more computer names or IP address installation location and option for using daemon	es into the table be service.	<b>slow.</b> All of th	e computers must h	ave a common user	r ID, password, certificate loc	sation,
Add Agents from MS Directory Click this Windows	: button to install St s do <b>main</b> .	orage Reso	urce Agent on one o	r more Windows co	mputers that are members of	fa
Get Agent List From File Click on	this button to instal	I Storage Re	source Agent on on	e or more computer	s listed in a file.	
Remote Agent Machines						
Host Name Installation L	ocation	Force	Status			
9.12.5.47 C:\Program F	iles\IBM\TPC		Host validation suc	ceeded.		
9.12.5.48			Cannot contact rer	note host 9.12.5.48	, host may be down.	_
						- 11
						- 11
						- 11
		Ē				- 11
						_
						_
						- 1
		L T				-
						-
						_
						_
						- 1
Total: 50 Displayed: 50 Selected: 1						- <b>-</b>   ▶
					Remove Selected Entri	es.
User	administrator					
Password	*****					
Re-type	* * * * * * * *					
Certificate Location						
Passphrase						
Port	9510					
Vise Daemon Service for Runtime Operation	?					
					I Validate before	a Add
				Add	Cancel	

Figure 8-48 Validation Status

When all remote agent targets pass the validation, they are added to the **Enter** computers to install Storage Resource Agents panel.

As seen in Figure 8-49, we added a Windows server and an AIX server to the list of Computers Targeted for a Remote Agent Install.

Creator Incouneruser Namo: un			
creator, uposuperuser Name, ur	named		I⊽ E
Description: SRA_Deployment_WinAlX			
omputers when to Bun Alert			
Enter computers to install Storag	e Resource Agent.		
A RELEASE 1. Click this button to manually er	nter the names and login credentials of th	e computers to which you want to install Si	torage Besource Agent
Add Host List		, , , , , , , , , , , , , , , , , , , ,	
Computers Targeted for a Remote Agent Install			
Host Name 🛆	Installation Location	Force	Status
9.12.5.12	/opt/IBM/TPC	No	Host validation succeeded.
3.12.6.75	U:\Program Files\IBM\TPU	No	Host validation succeeded.
Total: 2 Disclaved: 2 Selected: 0			
Total: 2 Displayed: 2 Selected: 0			
Total: 2 Displayed: 2 Selected: 0 List contains 2 host machine(s) largeted for	Storage Resource Agent deploym	rent.	
Total: 2 Displayed: 2 Selected: 0 List contains 2 host machine(s) targeted for You can either add/edit/remove current dat	Storage Resource Agent deploym a or you can save the job definition	nemt. nemt Storage Resource	e Agent deployment.
Total: 2 Displayed: 2 Selected: 0 List contains 2 host machine(s) targeted for You can either add/edit/remove current dat	Storage Resource Agent deploym a or you can save the job definiti	vent. on in order to start Storage Resourc	e Agent deployment.
Total: 2 Displayed: 2 Selected: 0 List contains 2 host machine(s) targeted for You can either add/edit/remove current dat	Storage Resource Agent deploym a or you can save the job definiti	ient. on in order to start Storage Resourc	e Agent deployment.
Total: 2 Displayed: 2 Selected: 0 List contains 2 host machine(s) targeted for You can either add/edit/remove current dat	Storage Resource Agent deployn a or you can save the job definiti	sent. an in order to start Storage Resourc	e Agent deployment.
Total: 2 Displayed: 2 Selected: 0 List contains 2 host machine(s) targeted for You can either add/edit/remove current dat	Storage Resource Agent deployn a or you can save the job definiti	ient. on in order to start Storage Resourc	e Agent deployment.

Figure 8-49 Computers Targeted for a Remote Agent Install

You have two additional options, namely, removing a host or editing a host from the list of computers targeted for the remote agent install. Do this by selecting the host and clicking the **Remove** button, or by selecting the host and clicking the **Edit Selected Entries** button.

7. Click the When to Run tab. Enter the following information as seen in Figure 8-50:

How often to run:

- Specify a time to run:
  - Run now
  - Run once at (specify a date and time to run)

How to handle time zones:

- Specify a time zone to use:
  - Use the time zone that the server runs in
  - Use this time zone (select a time zone)

Create Stora	ge Resource Agent Deployments	
Creator:	tpcsuperuser Name: unnamed	, I⊽ Enabled
Description:	SRA Deployment	
Computers	When to Run Alert	
How often t	o run	
💿 Run No	N	
C Run On	ce at:	
May	▼ 15 ▼ , 2009 ▼ 5 : 10 PM ▼	
,		
How to han	dle time zones	
Spec	ifv which time zone to use:	
	Use the time zone that the server runs in	
	OUse this time zone:	
[	GMT-8:00) America/Los_Angeles US/Pacific US/Pacific·New	V

Figure 8-50 When to run

- 8. Click the Alert tab to specify the following information as shown in Figure 8-51:
  - Triggering-Condition
    - You can specify:
    - Storage Resource agent Deployment Failed
  - Triggered-Actions
  - You can choose from the following options, depending on your requirements:
    - SNMP Trap
    - TEC Event
    - Login Notification
    - Windows Event Log
    - Run Script
    - Email

Create Stor	age Resource Agent Deployments	
Creator:	tposuperuser Name unnamed 🔽	Z Enabled
Description:	SRA Deployment	
Computers	When to Run Alert	
Triggering-	Condition	
Condition: Storage Re	source Agent Deployment Value: Value Units:	
Triggered-A	ctions	
SNMP	Trap	
TEC / C	MNIbus Event	
🗖 Login N	otification Login ID:	
□ Window	s Event Log Event Type: Warning 👻	
🗖 Run Sc	ipt Define	
🔲 Email		
Email Re	cipients Add Del Edit.e-mail	

Figure 8-51 Alerting based on Triggering Conditions and Actions

9. Click File  $\rightarrow$  Save. A window will open requesting a job name as shown in Figure 8-52. Enter a name and click **OK**.



Figure 8-52 Storage Resource agent Deployments name

A Notice is displayed indicating the successful submission as shown in Figure 8-53. Click **OK** to continue.

Notice	×
<b>i</b>	Storage Resource Agent Deployments submitted.
	OK

Figure 8-53 Job submitted

To view the status of the job, navigate to **Administrative Services**  $\rightarrow$  **Configuration**  $\rightarrow$  **Storage Resource Agent Deployments**, expand the Storage Resource Agent Deployment job previously created. An indication of a successful job is the icon color being green. Click the job to see the full status as shown in Figure 8-54.



Figure 8-54 Deployment job log

To verify that the installation completed correctly, log on to the TPC GUI, navigate to **Administrative Services**  $\rightarrow$  **Data Sources**  $\rightarrow$  **Data/Storage Resource Agents**. The installed agent is now present in the list, as shown in Figure 8-55. Notice the Agent Type column.

IBM Tivoli Storage Productivity Center: co	olorado.i	itso.ibm.com Data	a/Storage Res	ource Agen	s					
Elie View Connection Preferences Window Help										
Navigațion Tree	Refre	sh Rate 🛛 💌	Mins La:	st Refresh: 1	4:44:02					
Services     Data Sources	Viev	View Log Configure Tracing Read Config Disable Enable Shutdown Start Check								
CIMOM Agents	Cha	Change Authentication Add Storage Resource Agents Upgrade Agents Delete Disable Auto Upgrade Export Storage Resource Agent List								
	Inband Fabric Agents Data/Storage Resource Agents									
TPC Servers		Agent	IP Address	Version 🔺	Agent Type	State	OS Type	CPU Architecture	Manufacturer	Last Communication Type
	Q	9.12.5.20	9.12.5.20	4.1.0.97	Storage Resource	💷 Up	Linux	IA32	IBM	Running as Service
Discovery		gallium	9.12.6.76	4.1.0.97	Data	💷 Up	Windows	IA32	IBM	
⊞ Configuration		maryl.itso.ibm.com	9.12.4.139	4.1.0.97	Storage Resource	🛛 Up	Windows	IA32	IBM	Windows
∃ IBM Tivoli Storage Productivity Center		9.12.5.11	9.12.5.11	4.1.0.97	Storage Resource	🖬 Up	AIX	POWER	IBM	Running as Service
⊞-Data Manager		colorado.itso.ibm.com	9.12.6.75	4.1.0.97	Storage Resource	≡ I In	Windows	IA32	IBM	Running as Service
Data Manager for Databases		912512	912512	41097	Storage Resource	IIIn	AIX	POWER	IBM	Bunning as Service
Data Manager for Chargeback			4			- 00				
Eshia Manager										
Tape Manager										
E Flement Manager										
Benlication Manager										

Figure 8-55 Data agent and Storage Resource agent status

# Deploying Storage Resource agents locally using the command line

This section describes how to install the Storage Resource agents locally.

You typically install the Storage Resource agents using the Tivoli Storage Productivity Center GUI. However, if you need to install the Storage Resource agents locally, you can do so with limited support.

For example, if you use this method of installation, you will get a return code of zero for a successful installation and a nonzero return code for an unsuccessful installation. If you have an unsuccessful installation, you will need to go through the log files to determine what the problem was for the failure.

The disk 1 or disk2 image contains the installation images for the Storage Resource agents. The images are located in the following directory:

<CD\_installation\_image\_location>/data/sra/<operating\_system>

See Table 8-1 for the Storage Resource agent installation images.

Operating system	Operating system name
AIX	aix_power
Linux x86	linux_ix86
Linux Power	linux_power
Linux s390	linux_s390
Windows	windows

 Table 8-1
 Storage Resource agent installation images

Depending on the decision for running the agent as a daemon or non-daemon service (on-demand service) and on the communication protocol that must be used, various parameters might be required. Refer to the *IBM Tivoli Storage Productivity Center: Installation and Configuration Guide*, SC27-2337 for details.

In our case, the images of the Storage Resource agent are located on both TPC images disks under <DiskImage>/data/sra/windows.

Navigate to the <DiskImage>/data/sra/windows/bin directory. In our environment the communication is between two Windows machines, so the default communication protocol used is Windows (SMB). We have also decided to run the agent as a non-daemon services. As a result, the command we are issuing requires a minimum set of parameters and will look as follows:

Agent -install -serverPort <serverport> -serverIP <serverIP> -installLoc <installLocation> -userID <userID> -password <password>

The meanings and values of these parameters are specified in Table 8-2.

Parameter	Explanation	Value
serverPort	The port of the TPC Data Server. The default value is 9549	9549
serverIP	IP address or fully qualified DNS name of the server	colorado.itso.ibm.com
installLoc	Location where the agent will be installed <sup>a</sup>	c:\tpcsra
userID	The user ID defined on the agent system. This is the user ID that the server can use to connect to the agent system	Administrator
password	Password for the specified User ID	itso13si

Table 8-2 Parameters and values

a. Make sure that when you specify a directory to install the Storage Resource agent into, you do not specify an ending slash mark (\). For example, do not specify C:\agent1\ because this will cause the installation to fail.

Figure 8-55 shows a successful installation of the Storage Resource agent:

📾 C:\WINDOW5\system32\cmd.exe	×
E:\TPC41\data\sra\windows\bin>Agent.exe	
AGT03831 Install completed successfully.	
E:\TPC41\data\sra\windows\bin>_	•

Storage Resource agent successful install

To verify that the installation completed correctly from the TPC GUI, log on to the TPC GUI and go to **Administrative Services**  $\rightarrow$  **Data Sources**  $\rightarrow$  **Data/Storage Resource Agents**. The installed agent is now present in the list, as shown in Figure 8-56.

Navigation Tree	Refresh Rate 1 💽 Mins Last Refresh: 15:26:13								
<ul> <li>⊕-Services</li> <li>⊕-Data Sources</li> <li>CIMOM Agents</li> <li>Data/Storage Resource Agents</li> </ul>	View Log Configure	Tracing	Read Config	Disable ents Upgrad	Enable de Agents	e Shutdi	own Start Disable Auto Upg	Check rade Export	Storage Resource Agent List
	Data/Storage Resource Ager	nts	,					1	
	Agent	IP Address 9.12.6.75	Version ▲ 4.1.0.97	Agent Type Storage Resource	State III Up	OS Type Windows	CPU Architecture	Manufacturer IBM	Last Communication Type Windows

Figure 8-56 SRA Status

# 8.5 Creating Storage Resource Groups

Storage Resource Groups are new objects provided to help storage administrators plan, monitor, and report on the managed environment.

A storage resource group is a set of entities managed by Tivoli Storage Productivity Center. These entities can be servers, switches, storage subsystems, fabrics, storage pools, and storage volumes. Storage resource groups can be a group of heterogeneous objects and can also contain other storage resource groups without any connectivity.

Use Storage Resource Groups to organize logically related storage entities into named groups. For example, a Storage Resource Group that represents a business critical email application might include all the hosts that participate in the e-mail application cluster, the storage subsystems that provide storage to the application, and the switches and fabrics through which the application's data is configured to travel.

For more information about Storage Resource Groups and possible use cases, refer to Chapter 1, "Tivoli Storage Productivity Center architecture and functional overview" on page 1.

Next, we show the steps involved in creating and editing a Storage Resource Group:

- 1. Create a Storage Resource Group, using one of the following methods:
  - In the Navigation Tree, expand IBM Tivoli Storage Productivity Center, click Storage Resource Group Management, then click Create as demonstrated in Figure 8-57.

-		
	📄 IBM Tivoli Storage Productivity Center: colorado.itso.ibm.com	Storage Resource Group Management
	File View Connection Preferences Window Help	
	Element Management	
	Navigation Tree	
	<ul> <li>Administrative Services</li> <li>IBM Tivoli Storage Productivity Center</li> <li>Configuration Utility</li> </ul>	<u>Create</u> Storage Resou Click to create a new item
	i∰Reporting	
	🗄 – Topology	
	i ∰ Monitoring	
	Storage Resource Group Management	
	. Alerting	
	⊞…Data Manager	
	Data Manager for Databases	
	⊞ Disk Manager	
	连 - Tape Manager	
	i⊒Element Manager	
	⊞Replication Manager	

Figure 8-57 Create Storage Resource Group

 In the Navigation Tree, expand IBM Tivoli Storage Productivity Center → Topology, click a node that represents a storage entity, right-click an entity that is displayed in the content pane, and select Add to new Storage Resource Group as demonstrated in Figure 8-58.

Figure 8-58 Create Storage Resource Group

2. The **Create Storage Resource Group** panel is displayed as shown in Figure 8-59. The following fields are listed within the panel; we describe the fields briefly:

# Creator:

Displays the user name of the creator.

# Name:

Displays the name of the storage resource group or unnamed, if it is not yet named.

### **Description:**

Optional: Displays the user defined description for the storage resource group.

#### Selected Elements:

Lists the elements selected to be members of this storage resource group.

# Add:

Adds one or more selected elements to the list. The Storage resource group element selection panel is displayed.

#### Remove:

Removes one or more selected elements from the list.

#### **Default Provisioning Profile:**

Lists the available provisioning profiles which can be associated with storage resource groups. The list also includes **None**. If this storage resource group is used as input to the SAN Planner, the settings defined in this profile will be used to pre-populate the planner inputs.

#### Create a New Profile:

Launches the **Provisioning Profile** creation wizard. When you complete the wizard, the Provisioning Profile list is updated.

# User defined property 1 (UDP1):

Specifies any user-defined properties that will be used by the Topology Viewer to provide custom groupings.

# User defined property 2 (UDP2):

Specifies any user-defined properties that will be used by the Topology Viewer to provide custom groupings.

#### User defined property 3 (UDP3):

Specifies any user-defined properties that will be used by the Topology Viewer to provide custom groupings.

Create Stora	age Resource Group	
Creator:	tposuperuser Name: unnamed	
Description:	SAP Production Environment	
Selecte	id Elements:	
		Add.
		Hemove
	Default Provisioning Profile None Create a New Profile	
	User-defined property 1 (UDP1)	
	User-defined property 2 (UDP2)	
	User-defined property 3 (UDP3)	

Figure 8-59 Create Storage Resource Group

# Click Add.

- 3. The **Storage Resource Group Element Selection** panel is displayed (see Figure 8-60). Use this panel to select the storage entities that you want to include in a storage resource group.
  - The Available elements window displays the storage entities that you can include in a storage group.
  - The Selected elements window displays the storage entities selected to be included in a storage group.

Figure 8-60 Storage Resource Group Element Selection panel

- 4. Select storage entities to add to the storage resource group. To do this, perform the following steps:
  - a. Open a detailed view of a storage entity type on the Topology Viewer's **Overview** page.
  - b. Expand the storage entity type to view the storage entities that are part of that type.
  - c. Select the storage entities you want to include in the storage resource group.
  - d. Click ">>".

As demonstrated in Figure 8-61, we selected storage entities including Computers and Subsystems to be added to the Selected Elements window. and clicked ">>".

Click **OK** when you are satisfied with all your selections to add them to the storage resource group.

Storage Resource Group Element Selection	X
Select the elements from topology	
Available elements:	Selected Elements:
Topology Viewer	B-Computers
△ Overview △ L0.Storage ⑧	gallium
LO:Storage	Subsystems     Systems     Systems
Copology Settings     Copology Settings     Copology Settings	
▲ ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	
▲ [1] DS8000 ES8-210	
Action: Pin   Locate:   Find	
Subsystem Tape Library Alert	
🕒 🗛 😔 Warning	
D         A         Warning         3994-ITSO_DS4700-600         degraded         BM         3994         DS4000         600A0B800           D         A         Warning         5994-ITSO_DS4700-600         degraded         BM         3994         DS4000         600A0B800	
Karning pool-1150_034500-000 pk BM 5884 DS4000 600.408800     Maring DS8000-2107-75BALB1-L. pk BM 922 DS8000 Z5BALB1	
A. Warning ESS-2105-22513-IBM ok IBM 800 ESS 22513	
SVC-2145-1150/SVC-01-IBM(0K IBM) IBM IBM SystemSVC 000002006	
	OK Cancel

Figure 8-61 Select storage entities

5. The **Create Storage Resource Group** panel is displayed, reflecting the selections made under the Selected Elements window, as shown in Figure 8-62.

Create Storage Resource Group	
Creator: tpcsuperuser Name: unnamed Description: SAP Production Environment	
Selected Elements:	
Baltic.itso.ibm.com Subsystems DS8000-2107-75BALB1-IBM SVC-2145-ITSOSVC01-IBM	Add Remove
Default Provisioning Profile None Create a New Profile User-defined property 1 (UDP1) User-defined property 2 (UDP2) User-defined property 3 (UDP3)	

Figure 8-62 Selected Elements
6. Save the Storage Resource Group by clicking the Save button as seen in Figure 8-63.

📑 IBM Tivoli Storage Productivity Center: colorado.itso.ibm.con	n Create Storage Resource Group 📃 🗖
File View Connection Preferences Window Help	
Element Management	
Navigation Tree	Create Storage Resource Group
Administrative Services     Save created or edited obje	a)
BM Tivoli Storage Productivity Center	Descrition CAB Reduction Environment
Configuration Utility	Description: JSAP Production Environment
⊞ Reporting	
⊞ Topology	Selected Elements:
Monitoring	E
Storage Resource Group Management	baltic.itso.ibm.com Add
Analytics	galium
Alerting	E-In Subsystems
Data Manager	DS8000-2107-75BALB1-IBM
Data Manager for Databases	SVC-2145-ITSOSVC01-IBM
H-Data Manager for Chargeback	
H-Disk Manager	
E Table Manager	
Element Manager	
E-Benlication Manager	
	Default Provisioning Profile None  Create a New Profile
	User-defined property 1 (UDP1)
	User-defined property 2 (UDP2)
	User-defined property 3 (UDP3)

Figure 8-63 Save Storage Resource Group

7. We are prompted to specify a name for the new Storage Resource Group as demonstrated in Figure 8-64. Fill in the name and click **OK**.

Save As			X
?	Specify name SAP Prod Env	_	
	OK Cancel		

Figure 8-64 Specify Name

We have completed the steps in creating the Storage Resource Group.

You are able to edit the Storage Resource Groups previously created in one of two ways, as follows:

In the Navigation Tree, expand IBM Tivoli Storage Productivity Center, click Storage Resource Group Management, then click the magnifying glass icon next to the storage resource group you want to edit. This is shown in Figure 8-65.

IBM Tivoli Storage Productivity Center: colorado.itso.ibm.con	n Storage Resource Group Management	
Elle View Connection Preferences Window Help		
Element Management		
Navigation Tree		*
■ Administrative Services	Create Delete	-
BM Tivoli Storage Productivity Center		
Configuration Utility	Storage Resource Group Management	
Reporting	Storage Resource Group Name A State Description	
H Topology	A Warning SAP Production Environment	
± Monitoring		
Storage Resource Group Management		
Analytics		
Alerting		
😥 Data Manager		
🖭 Data Manager for Databases		
Data Manager for Chargeback		
😥 Disk Manager		
⊞-Fabric Manager		
🖭 Tape Manager		
🖭 Element Manager		
Replication Manager		

Figure 8-65 Edit Storage Resource Group

In the Navigation Tree, expand IBM Tivoli Storage Productivity Center → Topology, click Storage Resource Groups, right-click the Storage Resource Group you want to edit in the content pane, and select Launch Detail Panel from the drop down menu. This is shown in Figure 8-66.

Topology Viewer	
△ Overview △ L0:Storage Resource Groups ⊗	
L0:Storage F	Resource Group
△ [1] Storage Resource Groups (Warning) ¥ [1]	
Open Detail View	
Launch Detail Panel	
Launch Planner	
Add to new Storage Reso	urce Group
Pin	
9	

Figure 8-66 Edit Storage Resource Group from Topology Viewer

# 8.6 IBM Tivoli Storage Productivity Center for Replication

This section describes the following considerations relating to TPC-R V4.1 which is installed with TPC SE V4.1.

- Accessing TPC-R
- What to expect to see prior to installing the license
- How to install the TPC-R license
- How to add a subsystem to TPC-R

# 8.6.1 Accessing TPC-R

There are three ways that you can follow to access the TPC-R GUI:

 Directly through the Web interface. Go to the following URL to access the TPC-R GUI (the Web address is case-sensitive). We show this in Figure 8-67:

https://<hostname>:<port>/CSM

Login using the required credentials, as supplied during the installation.

#### Notes:

- 1. The default port is 3443 for open systems and 9443 for z/OS.
- 2. If you modified the default port settings during the installation, replace the port with the port number you selected for the https port.
- 3. If you are using IBM WebSphere Application Server OEM Edition for z/OS for z/OS, the default port is 32200.

Vivoli Storage Productivity Center for Replication - Mozilla Firefox		_ 🗆 🗵
<u>Eile Edit Vi</u> ew Hi <u>s</u> tory <u>B</u> ookmarks <u>I</u> ools <u>H</u> elp		
🔇 🗵 - C 🗶 🏡 🛄 https://azov.itsosj.sanjose.ibm.com:3443/CSM/	☆ • G• Google	P
🔎 Most Visited 🌘 Getting Started 🔊 Latest Headlines 📄 Customize Links 📄 Free Hotmail 📄 Windows Marketplace	e 📄 Windows Media	Windows
	TON	
Tivoli Storage Productivity Center for Replication		
Version: 4.1.0		
Build: T183-U9U32Ud		
Password		
Connected to: arow iterasi saninee ikm com		
Connected to: azovitabaj.aanjoae.ibin.com		
Done	azov.itsosj.sanjose.ibm	.com:3443 🔒 //

Figure 8-67 Accessing TPC-R using the Web interface

 Through the Tivoli Integrated Portal (TIP). This method is achieved by logging into TIP and on the left panel, by clicking Tivoli Storage Productivity Center and then by clicking the Start Tivoli Storage Productivity Center for Replication link within the portlet to the right. We show this in Figure 8-68.

**Note:** When accessing TPC-R through Tivoli Integrated Portal, the Single Sign-On must be enabled by default, thereby allowing you to log on without needing to enter any credentials.



Figure 8-68 Accessing TPC-R through TIP

Through the TPC GUI. In this method, there are multiple launch points within the TPC GUI from which you can access TPC-R:

In the Navigation Tree, expand **Replication Manager** and click **Replication Management** as shown in Figure 8-69.

	Navigation Tree
	Administrative Services
	🗄 IBM Tivoli Storage Productivity Center
	🗄 - Data Manager
	🗄 Data Manager for Databases
Ì	🗄 Data Manager for Chargeback
	🗄 Disk Manager
1	🗄 Fabric Manager
	🗄 - Tape Manager
	🗄 Element Manager
	Replication Manager
	ReplicationManagement
	🗄 Alerting 😼
1	

Figure 8-69 Accessing TPC-R - Navigation Tree Replication Manager

In the Navigation Tree, expand IBM Tivoli Storage Productivity Center  $\rightarrow$  Configuration Utility  $\rightarrow$  Replication Manager tab as shown in Figure 8-70.

Naviga <u>t</u> ion Tree
Administrative Services
🖻 - IBM Tivoli Storage Productivity Center
Configuration Utility
🕀 Reporting
🕀 Topology
🛨 Monitoring
Storage Resource Group Management
<b>⊕</b> Alerting
🗄 Data Manager
🗄 Data Manager for Databases
🗄 Data Manager for Chargeback
🗄 Disk Manager
🗄 Fabric Manager
🗄 - Tape Manager
🗄 Element Manager
Replication Manager

Figure 8-70 Accessing TPC-R - Configuration Utility

In both cases you are presented with the following buttons (see Figure 8-71):

#### **Replication Health Overview:**

The Replication Health Overview button displays the Health Overview panel for IBM Tivoli Storage Productivity Center for Replication.

#### **Replication Sessions Overview:**

The Replication Sessions Overview button lists all sessions defined within the IBM Tivoli Storage Productivity Center for Replication environment, including their state and status.

#### Replication Storage Systems Overview:

The Replication Storage Systems Overview button displays the Storage Systems panel. The Storage Systems panel lists all the known storage systems, and indicates whether the storage systems are communicating normally with the active and remote servers, if enabled.

#### **Replication Paths Overview:**

The Replication Paths Overview button displays the ESS/DS Paths panel. The ESS/DS Paths panel summarizes all the known ESS/DS series paths, listing them by storage system.

#### **Replication Management Servers Overview:**

The Replication Management Servers Overview button displays the Management Servers panel. The Management Servers main panel displays the status of the management servers configuration, lists the management servers in operation (maximum of two), and enables you to define a standby server, or to define the local server as a standby server to an alternate server.

#### **Replication Administration:**

The Replication Administration button displays the Administration panel. The Administration panel displays a list of IBM Tivoli Storage Productivity Center for Replication users and groups and their access privileges, and allows administrators to take actions on users and groups.

#### **Replication Advanced Tools:**

The Replication Advanced Tools button displays the Advanced Tools panel. The Advanced Tools panel enables you to create a diagnostic package and change the automatic refresh rate of the GUI.



Figure 8-71 Replication Manager - Advanced Tools

When you click a button, a new browser window is opened to the TPC-R page.

When launching the TPC-R GUI, you might be required to download the certificate and add an exception to allow a connection to the server as shown in (Figure 8-72), click "Add Exception".



Figure 8-72 Certificate exception

# 8.6.2 Installing the Two Site or Three Site Business Continuity License

Before you can use the full functionality that Tivoli Storage Productivity Center for Replication provides, you are required to install a valid license.

This section describes how to install the Tivoli Storage Productivity Center for Replication Two Site or Three Site Business Continuity (BC) license.

#### What you can expect to see without installing a license

**Look-and-feel**: There is no real difference in the appearance when working with the TPC-R GUI. You will notice that there is an option to enter a Try-and-Buy key under the *Administration* node within the TPC-R GUI as shown in Figure 8-73. This will allow you to request a temporary key from IBM if you do not have a license to install.

Health Overview				
Sessions	Administration			
Storage Systems ESS/DS Paths Administration Advanced Tools	Try-and-Buy			
Console About	Update Key:	Update		
Sign Outroot	Current Key: null Expiration Date: NA Days Left: 0			
Sessions	Add Access			
0 normal	Select Action 💌 Gr	2		
0 severe	▲ Name	\$ Role	Classification	
		Administrates	11 mars	

Figure 8-73 Try-and-Buy key

**Functionality with Try-and-Buy key:** You will be able to launch the TPC-R GUI, Add Storage Subsystems, Monitor Subsystem Health, and Create Paths, however you will *not be able to Create Sessions*. As you can see in Figure 8-74, this option has been greyed out, restricting the user from being able to create sessions.

<i>[[</i> https://9.12.5.35:3443/?	wizardname=CreateSessionWizard - CreateSessionWizard - Windows Internet Explorer	
Create Session		+ <u>i</u> ?
Create Session Choose Session Type Properties Location Results	Choose Session Type	
<back next=""> Finish</back>	Cancel	Page ID 2001-01 v1.00

Figure 8-74 Create Sessions

#### Installing the license

To install the license for IBM Tivoli Storage Productivity Center for Replication, you must run as the root user on Linux or AIX, or as the administrator in Windows:

- 1. Either insert the Two Site or Three Site CD containing the software required to install the license, or alternatively, copy the software needed to install directory on the server.
- 2. Begin the installation program by double-clicking the setup file:
  - Windows: <installation\_source\_directory>\setupwin32.exe
  - Linux: <installation\_source\_directory>\setuplinux.bin
  - AIX: <installation\_source\_directory>\setupaix.bin
- 3. On the Welcome page (Figure 8-75), click Next.



Figure 8-75 Welcome panel

4. The Software License Agreement panel is displayed. Select I accept the terms of the license agreement (Figure 8-76). Click Next to continue.



Figure 8-76 Accept license agreement

5. The Directory Name panel is displayed (Figure 8-77); you are required to enter the absolute path of the directory where TPC-R was installed. We choose the default path because this is what we used at the time of installation. Click **Next** to continue.

IBM Tivoli Storage	Productivity Center for Replication	- Advanced Edition - InstallS	hield Wizard	
	Enter the absolute path of direct	tory where IBM Tivoli Storage	Productivity Center for Re	plication was installed.
	Directory Name:			
	/opt/IBM/replication			
				Browse
IncraliShield				
in overeal of the fer				
		< Back	Next >	Cancel

Figure 8-77 Directory Name

6. The summary information panel is displayed (see Figure 8-78). Review the settings and click **Install**.



Figure 8-78 Tivoli Storage Productivity Center for Replication Summary panel

7. The progress panel is displayed (see Figure 8-79), illustrating the progress made during the deployment of the license file.

🐻 IBM Tivoli Storage Pi	roductivity Center for Replication - Advanced Edition - InstallShield Wizard	
	Installing IBM Tivoli Storage Productivity Center for Replication - Advanced Edition. Please wait	
	Deploying license files for advanced edition	
	30%	
InstaliShield	Cancel	

Figure 8-79 Deployment progress

8. The Summary Information panel is displayed (see Figure 8-80), indicating a successful deployment. Click **Finish**.



Figure 8-80 Summary Information

Seeing that the license has been installed successfully, you are now able to create sessions as shown in Figure 8-81. Additionally, you will notice that the Try-and-Buy option has disappeared from the Administration node as shown in Figure 8-82.

Create Session		←i ?
Choose Session Type	Choose Session Type Choose the type of session to create.	
Properties Location Results	Choose Session Type Point in Time Flash Copy Synchronous Metro Mirror Failover/Failback (ESS/DS/SVC) Metro Mirror Failover/Failback w/ Practice (ESS/DS) Metro Mirror Failover/Failback w/ Practice (SS/DS) Metro Mirror Failover/Failback (VC) Metro Mirror Failover/Failback (ESS/DS) Global Mirror Failover/Failback (ESS/DS) Global Mirror Failover/Failback (SVC) Global Mirror Failover/Failback (SVC) Global Mirror Failover/Failback (SVC) Global Mirror Failover/Failback (SVC) Global Mirror Single Direction (SVC) Global Mirror Single Direction (SVC)	
	Page ID 2001	-01 v1.00
< Back Next > Finish Cance		

Figure 8-81 Create sessions

Sessions	Administration		Las
ESS/DS Paths Administration Advanced Tools Console About	Add Access		
Sign Out dasusr1	▲ Name	♦ Role	
Health Overview	C dasusr1	Administrator	User
O Sessions			

Figure 8-82 No Try-and-Buy

# 8.7 Disabling Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication

If you have less than 8 GB of RAM, you have to run only Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication on the same system because of system load.

Here we describe how to disable either Tivoli Storage Productivity Center or Tivoli Storage Productivity Center for Replication.

#### Disabling Tivoli Storage Productivity Center for Replication

To disable Tivoli Storage Productivity Center for Replication, follow these steps.

#### On Windows:

1. To disable the TPC for Replication server, go to Start  $\rightarrow$  Settings  $\rightarrow$  Control Panel  $\rightarrow$  Administrative Tools  $\rightarrow$  Services. Right-click the following service:

IBM WebSphere Application Server V6.1 - CSM

2. Select Properties, as shown in Figure 8-83.



Figure 8-83 TPC-R Server service properties

3. On the panel shown in Figure 8-84, select **Disabled** under the *Startup type* menu and click the **Stop** button in the *Service Status* section. When the service has been stopped, click **OK** to close this panel.

BM WebSphere A	pplication Server V6.1 - CSM Properties (Loca <mark>?</mark> 🗙
General Log On	Recovery Dependencies
Service name:	IBMWAS61Service - CSM
Display <u>n</u> ame:	IBM WebSphere Application Server V6.1 - CSM
Description:	Controls the running of an IBM WebSphere Application Server V6.1 server named: server1
Pat <u>h</u> to executab "E:\Program File:	le: s\IBM\replication\eWAS\bin\wasservice.exe'' ''IBMWAS
Startup typ <u>e</u> :	Automatic
Service status:	Disabled
<u>S</u> tart	Stop Pause Resume
You can specify f from here.	the start parameters that apply when you start the service
Start parameters:	
	OK Cancel Apply

Figure 8-84 Disabling TPC-R Server

#### On Linux and AIX:

1. To stop the Tivoli Storage Productivity Center for Replication Server on Linux and AIX issue the following command from the command prompt as shown in Figure 8-85:

/opt/IBM/replication/eWAS/profiles/CSM/bin/stopServer.sh server1 -username
<username> -password <password>

2. Here, <username> is the user ID and <password> is the password created during installation.



Figure 8-85 Stop TPC-R Server

3. To *disable* the Tivoli Storage Productivity Center for Replication Server from starting on system reboot, you must edit the /etc/inittab and hash out the line that starts up *Tivoli Storage Productivity Center for Replication*, as shown in Figure 8-86.



Figure 8-86 Edit /etc/inittab

#### Disabling Tivoli Storage Productivity Center

To disable Tivoli Storage Productivity Center Server, follow these steps:

#### On Windows:

 To disable TPC, go to Start → Settings → Control Panel → Administrative Tools → Services. Right-click the following service:

IBM WebSphere Application Server V6.1 - DeviceServer

2. Select Properties, as shown in Figure 8-87.



Figure 8-87 Service properties

3. On the panel shown in Figure 8-88, select **Disabled** under the *Startup type* menu and click the **Stop** button in the *Service Status* section. When the service has been stopped, click **OK** to close this panel.

IBM WebSphere Ap	plication Server V6.1 - DeviceServer Propert ? 🔉	ĸ					
General Log On	Recovery Dependencies						
Service name:	IBMWAS61Service - DeviceServer						
Display <u>n</u> ame:	BM WebSphere Application Server V6.1 - DeviceServer						
Description:	Controls the running of an IBM WebSphere Application Server V6.1 server named: server1						
Pat <u>h</u> to executable '''E:\Program Files'	e: \IBM\TPC\device\apps\was\bin\wasservice.exe'' ''IBM						
Startup typ <u>e</u> :	Automatic						
Service status:	Manual Disabled Statieu						
<u>S</u> tart	Stop Pause Resume						
You can specify the start parameters that apply when you start the service from here.							
Start parameters;							
	OK Cancel Apply						

Figure 8-88 Disable service

- 4. Repeat the same procedure for the following services:
  - IBM Tivoli Storage Productivity Center Data Server
  - IBM Tivoli Common Agent <directory>

(<directory> is where the Common Agent is installed. The default is <TPC\_install\_directory>\ca)

IBM Tivoli Storage Resource agent - <directory>

(<directory> is where the Storage Resource agent is installed. The default is <TPC\_install\_directory>\agent)

Tivoli Integrated Portal - TIPProfile\_Port\_<xxxx>

(<xxxxx> indicates the port specified during installation. The default port is 16310.)

IBM ADE Service (Tivoli Integrated Portal registry)

**Note:** Stop Tivoli Integrated Portal and IBM ADE Service only if no other applications are using these services.

#### **On Linux:**

1. To stop the Tivoli Storage Productivity Center services as seen in Figure 8-89, run these commands in the command prompt window:

Data Server: /<usr or opt>/IBM/TPC/data/server/tpcdsrv1 stop

Device Server: /<usr or opt>/IBM/TPC/device/bin/linux/stopTPCF.sh

2. Depending on whether or not you have a Data agent or Storage Resource agent installed, issue these commands accordingly:

Common Agent: /<usr or opt>/IBM/TPC/ca/endpoint.sh stop

Storage Resource agent: /<usr or opt>/IBM/TPC/agent/bin/agent.sh stop

🛃 root@baltic:/opt/ibm	
[root@baltic ibm]# /opt/IBM/TPC/data/server/tpcdsrv1 stop	
[root@baltic ibm]# /opt/IBM/TPC/device/bin/linux/stopTPCF.sh	
Setting Variables for SANM	
Stopping server1 with default options	
ADMU0116I: Tool information is being logged in file	
/opt/IBM/TPC/device/apps/was/profiles/deviceServer/logs/server1/stopSe	rve
r.log	
ADMU0128I: Starting tool with the deviceServer profile	
ADMU3100I: Reading configuration for server: server1	
ADMU3201I: Server stop request issued. Waiting for stop status.	
ADMU4000I: Server server1 stop completed.	
[root@baltic ibm]#	
	-

Figure 8-89 Stop TPC services on Linux

#### On AIX:

1. To stop the Tivoli Storage Productivity Center services as seen in Figure 8-89, run these commands in the command prompt window:

```
Data Server: stopsrc -s TSRMsrv1
```

Device Server: /<usr or opt>/IBM/TPC/device/bin/aix/stopTPCF.sh

2. Depending on whether or not you have a Data agent or Storage Resource agent installed, issue these commands accordingly:

Common Agent: /<usr or opt>/IBM/TPC/ca/endpoint.sh stop

Storage Resource agent: /<usr or opt>/IBM/TPC/agent/bin/agent.sh stop

3. To *disable* the Tivoli Storage Productivity Center Server from starting on system reboot, you must edit the /etc/inittab and hash out the line that starts up *Tivoli Storage Productivity Center*, as shown in Figure 8-90.

🛃 9.12.5.35 - PuTTY
logsymp:2:once:/usr/lib/ras/logsymptom # for system dumps
perfstat:2:once:/usr/lib/perf/libperfstat_updt_dictionary >/dev/console 2>&1
diagd:2:once:/usr/lpp/diagnostics/bin/diagd >/dev/console 2>&1
rcwpars:2:once:/etc/rc.wpars > /dev/console 2>&1 # Corrals autostart
xmdaily:2:once:/usr/bin/xmwlm -L 2>&1 >/dev/null # Start xmwlm daily recording
ctrmc:2:once:/usr/bin/startsrc -s ctrmc > /dev/console 2>&1
dt:2:wait:/etc/rc.dt
cons:0123456789:respawn:/usr/sbin/getty /dev/console
pconsole:2:once:/usr/bin/startsrc -s pconsole > /dev/null 2>&1
ha_star:h2:once:/etc/rc.ha_star >/dev/console 2>61
tty0:2:off:/usr/sbin/getty /dev/tty0
fmc:2:respawn:/opt/IBM/db2/V9.5/bin/db2fmcd #DB2 Fault Monitor Coordinator
amdb:2345:once:su - db2inst1 -c db2start >/dev/console 2>\$1
am:2345:once:/opt/IBM/AgentManager/AppServer/bin/rc.am >/dev/console 2>\$1
<pre>#TSRMsrv1:2:once:/usr/bin/startsrc -s TSRMsrv1 &gt;/dev/console 2&gt;&amp;1</pre>
:Begin AC Deployment Engine block
:Start the Cloudscape database server
si:23456789:wait:/usr/ibm/common/acsi/bin/acsisrv.sh -start
:End AC Deployment Engine block
wass:2:once:/opt/IBM/replication/eWAS/profiles/CSM/bin/startServer.sh server1

Figure 8-90 Disable TPC

#### Stop Tivoli Integrated Portal on AIX and Linux:

1. To stop Tivoli Integrated Portal, run this command in a command prompt window as shown in Figure 8-91:

```
<install_directory>/tip/profiles/TIPProfile/bin/stopServer server1
-username <tipadmin>
-password <password>
```

Here, <tipadmin> is the administrator user ID and <password> is the administrator password. Wait for the server to complete the operation.

2. To stop the IBM ADE Service, run this command in a command prompt window:

Source the environment:

. /var/ibm/common/acsi/setenv.sh

Run this command:

/usr/ibm/common/acsi/bin/acsisrv.sh stop

**Note:** Stop Tivoli Integrated Portal and IBM ADE Service only if no other applications are using these services.

🛃 root@baltic:/opt/IBM/Tivoli/tip/profiles/TIPProfile/bin	X
[root@baltic bin]# /opt/IBM/Tivoli/tip/profiles/TIPProfile/bin/stopServer.sh server -username root -password itso13sj	1 📥
ADMU0116I: Tool information is being logged in file /opt/IBM/Tivoli/tip/profiles/TIPProfile/logs/server1/stopServer.log	
ADMU0128I: Starting tool with the TIPProfile profile	
ADMU32011: Server stop request issued. Waiting for stop status.	
ADMU4000I: Server server1 stop completed.	
[root@baltic bin]# [root@baltic bin]#	Ţ

Figure 8-91 Stopping TIP

# 8.8 Adding a CIMOM

Now we discuss CIMOMs and how they plug into Tivoli Storage Productivity Center.

SMI-S Providers (CIM agents) are needed by TPC to discover the devices that will be managed by TPC, and collect information from them.

SMI-S uses an architecture called Common Information Model (CIM). Think of CIM in three layers, from bottom up:

- The Provider is the device instrumentation. These providers use an imbedded or proxy model when implementing the Provider. We refer to them as SMI-S Providers. They are also referred to as CIM agents.
- The CIMOM is a middle layer capable of connecting to multiple Providers and responding to CIM client requests. This layer is a combination of SMI-S Provider, data transport, and parts of the TPC server. It encompasses the means of requesting data from a device, getting the data back into TPC, and processing that data.
- The CIM Client is the application using CIM by the CIMOM. This is the TPC server. It is the requester of information from managed devices.

You will need an SMI-S Provider for the following types of devices:

- Storage Subsystems
- Fabric Switches
- Tape Libraries

The common steps that need to be completed to make these devices usable in TPC are to:

- 1. Install the device vendor's SMI-S Provider according to the vendor's instructions, and configure it to communicate with the device(s) to be managed by TPC.
- 2. Manually add any SMI-S Provider agents (CIMOMs) to TPC.
- 3. Run a CIMOM Discovery. After each SMI-S Provider is authenticated, TPC will use that agent to discover devices, and record those devices in the TPC repository.
- 4. Create a device probe for each device or device group. These probes will collect asset information associated with the device, much like a data probe does for computers.
- 5. You can also create performance monitors for storage subsystems and fabric switches.

# 8.8.1 Adding DS Open API to TPC

Here we describe an example of how you can go about adding a DS8000 CIMOM to the Tivoli Storage Productivity Center Server using the common steps:

- 1. Install DS8000 specific SMI-S provider (IBM CIM agent for DS Open API 5.4):
  - a. Download the correct version of the SMI-S for the specific subsystem; consult the vendors download instructions. In our case, we downloaded the required SMI-S for our subsystem being IBM CIM agent for DS Open API 5.4.
  - b. Install the CIM agent following the provided instructions:

Launch the setup program as seen in Figure 8-92.

🗁 C:\Cimom\D58000_E55\IBM-D5-5MI5-Agent-5.4.0.98\W2003									
File Edit View Favorites Iools Help									
🔇 Back 🔹 🕥 🖌 🌮 Search 🌔 Folders 🛛 😰 🎯 🗙 🎽 🛄 -									
Address 🛅 C:\Cimom\D58000_ES5\IBM-D5-5MIS-Agent-5.4.0.98\W2003									
Name A Size	Type	Date Modified	Attributes						
Certificate	File Folder	4/24/2009 12:57 PM							
Cim_utils	File Folder	4/24/2009 12:57 PM							
🚞 config	File Folder	4/24/2009 12:57 PM							
🛅 java	File Folder	4/24/2009 12:57 PM							
🛅 lib	File Folder	4/24/2009 12:56 PM							
Cicense	File Folder	4/24/2009 12:57 PM							
Colog	File Folder	4/24/2009 12:56 PM							
C mof	File Folder	4/24/2009 12:56 PM							
ackages	File Folder	4/24/2009 12:57 PM							
🚞 pegasus	File Folder	4/24/2009 12:57 PM							
asyncexec.exe 161 KB	Application	2/1/2008 3:38 AM	RA						
💿 execexit.bat 1 KB	Windows Batch File	2/1/2008 3:38 AM	RA						
🐨 execpause.bat 1 KB	Windows Batch File	2/1/2008 3:38 AM	RA						
🗊 install.bat 1 KB	Windows Batch File	2/1/2008 3:38 AM	RA						
LaunchPad.bat 1 K8	Windows Batch File	2/1/2008 3:38 AM	RA						
📓 launchpad.jar 132 KB	Executable Jar File	11/5/2008 12:57 PM	A						
LaunchPadOP.properties 3 Ki	PROPERTIES File	2/1/2008 3:38 AM	RA						
🚱 media.inf 1 KB	Setup Information	11/5/2008 1:07 PM	A						
E README.txt 8 KE	Text Document	11/5/2008 12:53 PM	RA						
🖹 responsefile_template.txt 6 Ki	Text Document	11/11/2008 9:45 PM	A						
Setup.exe 267 KB	Application	11/5/2008 1:07 PM	A						
Setus Data Created 11/5/2009 1:07 PM 3,008 KE	Executable Jar File	11/5/2008 1:07 PM	A						
versic Size: 266 KB	PROP File	11/13/2008 5:17 PM	A						
23 objects			3.49 MB	🚽 My Computer 🛛 🖊					

Figure 8-92 Setup Program

The Welcome panel is displayed as shown in Figure 8-93; click **Next**. We choose to accept the defaults in the next few windows and proceed with the installation.



Figure 8-93 Welcome window

As seen in Figure 8-94, the installation has completed successfully.

(IBM System Storage CIM	Agent for DS Open API 5.4 Installer - Finish						
	IBM System Storage CIM Agent for DS Open API 5.4 has been successfully installed.						
	The "IBM System Storage CIM Agent for DS Open API 5.4 Pegasus Server" service was successfully started. The "Service Location Protocol" service was successfully started. The installation log file can be found in "C:\Program Files\IBM\dsagent\log\install.log". Click Finish to exit the installer.						
InstallShield	< <u>B</u> ack <u>N</u> ext > <b>Finish</b>						

Figure 8-94 CIM agent Successfully Installed

We configured the Storage subsystems to the CIM agent as seen in Figure 8-95.



Figure 8-95 Configure Subsystems to CIM agent

We have installed and configured the CIM agent. Next, let us add the CIM agent to TPC.

## 8.8.2 Manually defining CIMOM to TPC

In this section we describe how to manually add the CIMOM to TPC:

a. Log on to TPC, navigate to Administrative Services  $\rightarrow$  Data Sources  $\rightarrow$  CIMOM Agents, and click the Add CIMOM button as shown in Figure 8-96.



Figure 8-96 Add CIMOM

b. Enter all the information required to authenticate the CIMOM to TPC as shown in Figure 8-97. Refer to the *IBM Tivoli Storage Productivity Center Installation and Configuration Guide*, SC27-2338, for Interoperability Namespace information for the CIMOM that you are adding.

🖻 Add CIMOM	×
Host	9.12.6.76
Port	5989
Username	superuser
Password	*****
Password Confirm	*****
Interoperability Namespace	/root/ibm
Protocol	https
Truststore Location	
Truststore Passphrase	
Display Name	DS8000_ESS800
Description	
Test CIMOM connectivity before adding	
Save	Cancel

Figure 8-97 CIMOM Authentication

c. A message is displayed warning that the CIMOM testing can take up to several minutes (see Figure 8-98), click **OK**.



Figure 8-98 Warning message

d. As seen in Figure 8-99, the CIMOM has been added successfully.



Figure 8-99 Verify CIMOM

## 8.8.3 CIMOM Discovery job

Follow these steps:

- 1. Run a CIMOM Discovery job:
  - a. To create a CIMOM Discovery job, navigate to Administrative Services  $\rightarrow$  Discovery  $\rightarrow$  CIMOM, add a description (optional), and choose When to Run. We choose Run Now as seen in Figure 8-100.

BM Tivoli Storage Productivity Center: colorado.itso.ibm.com	n Edit CIMOM	_ 🗆 ×
File View Connection Preferences Vilnow Help		
	Edit Childhi	
-Administrative Services		
-Services	Creator: TPCUser Name: CIMOM Discovery	Enabled
Data Sources	Description: CIMOM Discovery Schedule	
CIMOM Agents	When to Run   Atest   Optional	
Inband Fabric Agents	How offen to run	
Out of Band Fabric Agents		
-TPC Servers	C Run Now	
VMware VI Data Source	C Run Once at:	
=Discovery =CIMOM	January 💌 1 💌 , 2001 💌 3 : 30 AM 💌	
Out of Band Fabric	C Pue Parasteria	
Hetware Filer	Reninview of	
H-Windows Bornain, NAS, and SAN PS		
	January 🗡 1 🝸 , 2001 Y 3 ; 30 AM Y	
HBM Tivoli Storage Productivity Center	C Repest Every 1 VEEK(S) V	
Data Manager		
+ Data Manager for Chargeback	Run on these days:	
🗄 Disk Manager	🔽 Sunday 🔽 Monday 🖾 Tuesday 🖾 Wednesday 💭 Thursday 💭 Friday 💭 Saturday	
🗄 Fabric Manager		
E-Tape Manager		
Element Manager     Element Manager		

Figure 8-100 Choose When to Run

b. Click the **Options** tab, and enter the IP address or addresses for the SLP directory agents to be used during CIMOM discovery, as shown in Figure 8-101.

🗐 IBM Tivoli Storage Productivity Center: colorado.itso.ibm.com -	- Edit CIMOM	
File View Connection Preferences Window Help		
Element Management		
Navigation Tree	Edit CIMOM	
Administrative Services	Creator: TPCLIser Name: CIMOM Discovery	Enabled
-Services	Description (24 (24 Piezewa) Colorbula	je chabica
Data Sources	Description. Clivicial Discovery Schedule	
	When to Run Alert Options	
-Inband Fabric Agents	Manually-Entered SLP Directory Agents	
-Out of Band Fabric Agents		
-TPC Servers	Enter the IP addresses or host names for the SLP directory agents to be used during CIMOM discovery	
Discovery	Add Del	
E-CIMOM		
Out of Band Fabric	9.12.6.76	
Hetware Filer		
Windows Domain, NAS, and SAN FS		
+ Configuration		
IBM Tivoli Storage Productivity Center		
🗄 Data Manager	Scan local subnet	
Data Manager for Databases     Data Manager for Changebrak		
+ Disk Manager		
E Fabric Manager		
🖅 Tape Manager		
Element Manager		
Replication Manager		

Figure 8-101 Add SLP directory agents

c. Click the **Save** button as seen in Figure 8-102. The CIMOM discovery has been submitted.



Figure 8-102 Submit CIMOM Discovery job

Verify the status of the submitted discovery job by navigating to **Administrative Services**  $\rightarrow$  **Discovery**  $\rightarrow$  **CIMOM** and confirm that the submitted job has completed successfully; this is indicated by a green symbol. Click the job to get a detailed view on the status as seen in Figure 8-103.

TBM Tiyoli Storage Productivity Center: colorado.itso.ibm.com	стмс	M Run #2							
File View Connection Preferences Window Help									
Element Management									
Navigation Tree		Run	2	:	Status	Success			
-Administrative Services		Start Time	Anr	24 2000 3:08:28 DM					
Services		Start Time	Mpr 2	24, 2008 3.00.20 PM					
-Data Sources		Finish Time	Apr 2	24, 2009 3:08:49 PM					
CIMOM Agents		# Jobs	1		#failed	0			
Inhand Fabric Agents									
Out of Band Fabric Agents		Computer		Status	Start T	ime	Finish Time	Log File Name	
-TPC Servers		colorado.itso.ibm	.com	Completed successfully	Apr 24,	2009 3:08:29 PM	Apr 24, 2009 3:08:29 PM	E:VProgram Files\IBA	1\TPC\device\log\TPCUser.CIMC
		colorado.itso.ibm	.com	Completed successfully	Apr 24,	2009 3:08:30 PM	Apr 24, 2009 3:08:49 PM	E: Program Files VBA	1\TPC\device\log\TPCUser.CIMC
Discovery		colorado.itso.ibm	.com	Completed successfully	Apr 24,	2009 3:08:30 PM	Apr 24, 2009 3:08:49 PM	E: Program Files IBA	NTPC\device\log\TPCUser.CIMC
CIMOM		colorado.itso.ibm	.com	Completed successfully	Apr 24,	2009 3:08:29 PM	Apr 24, 2009 3:08:49 PM	E: Program Files VEN	1\TPC\data\log\TPCUser.CIMOM
1 - Apr 24, 2009 3:29:00 AM				4					•
2 - Apr 24, 2009 3:08:28 PM									
Out of Band Fabric									
Mendowe Domain NAS and SAN FS									
Windows bonnain, whis, and Shiri S									
+-Configuration									
IBM Tivoli Storage Productivity Center									
🗄 – Data Manager									
🖅 Data Manager for Databases									
Bata Manager for Chargeback									
🕀 Disk Manager									
- Fabric Manager									
Element Manager									
Replication Manager									

Figure 8-103 Status View

We navigate to Administrative Services  $\rightarrow$  Data Sources  $\rightarrow$  CIMOM Agents. You can see that the CIMOM has been added, however, the login has failed as shown in Figure 8-104.

At this stage we have provided no specific authentication information to the TPC Server to allow the server to communicate with the CIMOM.

🔍 http://9.12.6.76:5988 🧧 LOGIN FAIL	ED root/ibm	CIMOM for the DS Open API
Figure 8-104 CIMOM Login	Failed	

Click the magnifying glass icon shown in Figure 8-104. We are able to provide TPC with the required information to log on to the CIMOM. Provide the information and click the **Save** button.

Service URL	http://9.12.6.76:5988
Display Name	[
Description	CIMOM for the DS Open API
Username	superuser
Password	******
Password Confirm	******
Interoperability Namespace	root/ibm
Truststore Location	
User Interface Description	DS Open API CIM Server
Software Level	
Protocol Version	1.2
Authentication Mechanism	
Alias	
Service ID	321529
Protocol	http
SLP Attributes	
Connection Status	LOGIN FAILED
Status Timestamp	May 20, 2009 1:58:51 PM PDT
Test CIMOM connectivity before updating	L.
· · · · · · · · · · · · · · · · · · ·	

Figure 8-105 CIMOM Login information

At this stage you can see the CIMOM added successfully when navigating to **Administrative Services**  $\rightarrow$  **Data Sources**  $\rightarrow$  **CIMOM Agents** as shown in Figure 8-106.



## 8.8.4 CIMOM Managed Devices

**Note:** After adding the CIMOM on TPC using either Method 1 or Method 2, you are required to run a Discovery Job. This allows TPC to communicate with the CIMOM and discover any devices managed by the CIM agent.

Follow these steps:

- 1. To see which devices are managed by the CIMOM added:
  - a. Navigate to Administrative Services  $\rightarrow$  Data Sources  $\rightarrow$  CIMOM Agents
  - b. Select the CIMOM and click Show Managed Devices as shown in Figure 8-107.

Refresh Rate 1 _ Mins Last Refresh: 14:30:17					
Add CIMOM Test CIMOM Connection Remove CIMOM Show Managed Devices					
	Service URL	Connection Status 🔺	Interoperability Namespace	Display Name	Description
Q	http://9.12.4.139:5988	SUCCESS	/interop	DS4500_DS4700	LSI SMI-S
	http://9.12.6.76:5986	SUCCESS	interop	Brocade - B32	WBEM Solutions J WBEM Server
	https://9.12.6.77:5990	SUCCESS	/root/ibm	SVC	SVC Cimom
Q	https://9.12.6.76:5987	SUCCESS	interop		WBEM Solutions J WBEM Server
	http://9.12.6.76-5988		root/ibm		CIMOM for the DS Open API

Figure 8-107 Show Managed Devices

c. We see the managed devices within the CIMOM Managed Devices window as shown in Figure 8-108.

🗧 CIMOM Managed Devices			×
Label	Туре 🔺	IP Address	
DS8000-2107-75BALB1-IBM	DS8000	9.12.6.17	
ESS-2105-22513-IBM	ESS	9.12.6.29	

Figure 8-108 CIMOM Managed Devices

- 2. Run a Probe job:
  - a. Create a Probe job, navigate to IBM Tivoli Storage Productivity Center  $\rightarrow$  Monitoring  $\rightarrow$  Probes, right-click and select Create Probe as shown in Figure 8-109.



Figure 8-109 Create Probe

b. Add devices (subsystems) to probe, as seen in Figure 8-110.

IBM Tivoli Storage Productivity Center: colorado.itso.ibm.com	· Create Probe	_ 🗆 🗵
File View Connection Preferences Window Help		
Element Management		
Navigation Tree	Create Probe	
Navigation Tree         Administrative Services         Having and the Storage Productivity Center         Configuration Utility         Topology         Order Server Probes         Storage Resource Group Management         Andring         Oata Manager for Chatabases         Oata Manager         Topology         Former Ortage For Chargeback         Oata Manager         Tape Manager         Fabric Manager         Fabric Manager         Babric Manager         Star Manager         Babric Manager         Disk Manager         Tape Manager	Create Probe         Orestor:       db2edmin         Neme:       unmamed         Description:	Enabled

Figure 8-110 Add device

c. As seen in Figure 8-111, choose **When to Run the probe**, and add a Description if required. To complete, click the **Save** button, specify a Probe name, and click **OK**.

📄 IBM Tivoli Storage Productivity Center: colorado.itso.ibm.com C	Create Probe	_ 🗆 ×
File View Connection Preferences Window Help		
Element Management		
Navigation Tree	Create Probe	
Bemert Management	Create Probe Creato: do2admi Name: unnamed Description: Storage Subsystem Probe - DS8000,ESS What to PROBE When to Run Alert   rtiow often to run Fun Once at Fun	

Figure 8-111 Save Probe

d. Verify the status of the submitted Discovery job by navigating to IBM Tivoli Storage Productivity Center → Monitoring → Probes. Expand the probe job created, and confirm that the submitted job has completed successfully; this is indicated by a green symbol. Click the job to get a detailed view of the status as seen in Figure 8-112.



Figure 8-112 Verify Probe Status

**Note:** There are many heterogeneous SMI-S providers. Consult the vendor specific documentation when attempting to configure the SMI-S.



# Monitoring your environment using Tivoli Storage Productivity Center

In this chapter, we show how to use the functions of Tivoli Storage Productivity Center to monitor your environment. We focus on the new monitoring capabilities provided by the latest release of Tivoli Storage Productivity Center.

# 9.1 IBM Tivoli Monitoring Agent for TPC

A Universal Agent for TPC is available to gather information from one or more TPC installations to IBM Tivoli Monitoring (ITM). This data is available for display in the Tivoli Enterprise Portal (TEP) for reporting, charting, and establishing situations in Tivoli Monitoring. This solution works with the ITM 6.1 infrastructure and runs on any platform version that is supported by the Universal Agent, including: Windows, AIX, Solaris, HP/UX, and Linux. For additional information about ITM v6.1, refer to:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/index.jsp?topic=/com.ibm.i
tm.doc 6.1/welcome.htm

With TPC V4.1, the amount of data made available to be imported into ITM / TEP has been increased to not only include asset information (as it does with previous releases), but to also include information related to the status of the TPC solution as well. This additional information includes, for example, data related to jobs currently running in TPC, or information about the status of the various internal services and components of the TPC server processes. It can collect information related to the TPC Health, Data Server, and Data Server services information, device information, alert information, and job information.

This includes:

- ► TPC Health, Data Server, and Data Server services Information:
  - Data Server status
  - Device Server status
  - Services status
  - CIMOM connection status
  - CIMOM information such as last Discovery, Managed devices
  - Agent connection status
  - Agent information such as last Discovery and Probe, Managed devices
  - Equivalent information about other Tivoli Storage Productivity Center servers, VMWare servers
- ► Alert Information
  - Amount of all alerts
  - Alerts per component such as Computer, Data, Disk, Fabric, and so on
- Job Information
  - Amount of Jobs, such as Discovery, Probe, Scans, PM
  - Job Status and Details, For example: Start Time, Finish Time, Status, Log File Name
  - Scheduled Jobs and Details, For example: Intervals, Creator, Name

### 9.1.1 How to install and configure the TPC Universal Agent

The image of the Universal Agent is located in the following directory in the TPC Disk1 image:

- For Windows: <TPC\_Disk1\_image>\tool\TPCUA.zip
- For UNIX and Linux: /<opt or usr>/too1/TPCUA.tar

The zip or tar file contains a readme file that describes the required details on how to install and configure the Universal Agent.

Here we describe the procedure to install and configure the Universal Agent:

1. Decompress the TPCUA.zip (or .tar) file to a temporary directory on the machine where ITM is installed.

2. Copy the contents of the TPCUA\scripts\ directory to:

<ITM HOME>\tmaitm6\scripts\

Where <ITM HOME> represents the path where ITM is installed.

3. Copy the TPC\_Network.mdl file located under the TPCUA\metafiles\ directory to:

<ITM HOME>\tmaitm6\metafiles\

**Note:** In this directory, if *metafiles* or *scripts* are not available you can create it under the <ITM HOME>\tmaitm6 subdirectory.

4. Use a text editor to edit the tpcua.properties file in the <ITM HOME>\tmaitm6\scripts\tpcua\config\ directory.

Modify the OUTPUT\_DIRECTORY parameter to indicate the path where you want to store the data collection files. The directory that you define for OUTPUT\_DIRECTORY can contain spaces and must already exist on the system. Take note of this value for the next step. In our environments we used:

On UNIX: OUTPUT\_DIRECTORY=/usr/tmp/tpcua\_log\_output

On Windows: OUTPUT\_DIRECTORY=G:\\IBM\\UA\_DataCollectionFiles

**Note:** On a Windows platform, the back slashes in the directory path must be prefaced with an escape ("\") character.

Under normal operating conditions, you do not need to modify any other parameters in this file.

5. Use a text editor to edit the TPC\_Network.mdl file in the <ITM HOME\tmaitm6\metafiles\ directory. Replace all occurrences of "##CHANGEME##" with the fully qualified path name of the OUTPUT\_DIRECTORY you specified in the previous step. The ITM Universal Agent uses this information to locate the data collection files. For example change:

//SOURCE FILE '##CHANGEME##tpc.computer.out' COPY

to:

//SOURCE FILE 'C:\IBM\TPCUA\tpc.computer.out' COPY

Data files are generated when storage information is collected from the TPC database repository. You can also use the parameters in TPC\_Network.mdl to determine how often data files are required. The default is 3600 seconds (1 hour).

- We now need to define, manage, and collect data from the TPC servers that we want to monitor. Start a command line session and change to the directory,
   <ITM HOME>\tmaitm6\scripts\tpcua, where <ITM HOME> represents the path where ITM is installed.
- 7. Next we run the **-config add** command to add the definition of each TPC server that we want to monitor. The syntax of the command is as follows:

```
TPCUA(.bat\.sh) -config add -tpcDisplay <tpc_server_display_name> -tpcDBIP
<tpc_server_db_ip> -tpcDBPort <tpc_database_server_listening_port> -tpcDBSchema
<tpc_database_schema_name> -tpcDBName <name_of_the_tpc_database> -tpcDBUser
<tpc_database_user> -tpcDBPass <tpc_database_password>
```

Where:

<tpc\_server\_display\_name> is the name that will be displayed in the data sets for owning a record. You must enclose this value in quotes if it contains spaces.

<tpc\_server\_db\_ip> represents IP address of the machine where the TPC database repository is located.

<tpc\_database\_server\_listening\_port> represents the port on which the TPC DB Manager is listening. The default value for this parameter is 50000.

<tpc\_database\_schema\_name> is the name of the repository database schema. A typical default for this parameter is TPC.

<name\_of\_the\_tpc\_database> represents the actual name of the database for the repository. The default value for this parameter is TPCDB. <tpc\_database\_user> is the name of the database user that has access to read/select data from the database.

<tpc\_database\_password> is the password for the <tpc\_database\_user>.

For example:

TPCUA.sh -config add -tpcDisplay Colorado -tpcDBIP 9.12.6.76 -tpcDBPort 50000 -tpcDBSchema TPC -tpcDBName TPCDB -tpcDBUser db2admin -tpcDBPass db2admin

The result is similar to the one shown in Figure 9-1.



Figure 9-1 TPC UA Add a server definition

8. The last TPC UA configuration step consists of importing the metafiles using a command line. The syntax depends on the platform. Here are examples on various platforms:

On Windows systems, the following command must be executed from the <ITM HOME>\tmaitm6 directory:

kumpcon import TPC\_Network.md1

On UNIX systems, the following command must be executed from the <ITM\_HOME>/bin directory:

./um\_console -h /opt/IBM/ITM import /opt/IBM/ITM/tmaitm6/metafiles/TPC Network.mdl

Note: For more information about importing metafiles on UNIX, refer to:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.do
c/betaworkbook3102.htm

After the metadata file has been imported and the Universal Agent is up and running, you can customize the Queries and Workspaces and create Situations.

In order to collect the data from the TPC servers defined previously, you have to run the following command:

TPCUA(.bat\.sh) -collect
An example is shown in Figure 9-2.

@ C:\WINDOW5\system32\cmd.exe	
G:\IBM\ITM\TMAITM6\scripts\tpcua>TPCUA.bat -collect	-
PBCUA3010I Universal Agent API collector thread started. PBCUA2003I SQL based data collection for IBM Tivoli Storage Productivity Ce server Colorado completed successfully. PBCUA3011I Universal Agent API collector thread terminated. PBCUA2004I Complete.	nter
G:\IBM\IIM\TMAIIM6\scripts\tpcua}_	•

Figure 9-2 TPC UA Data Collection

The collection of the information from the TPC servers must be scheduled to be periodically refreshed. If you do not have any advanced scheduler available in your environment, such as IBM Tivoli Workload Scheduler, you can use the Windows Scheduler on Windows systems or **crontab** on UNIX systems.

#### 9.1.2 TPC Universal Agent information inside TEP

Figure 9-3 shows all the queries related to the TPC Universal Agent that are now available when you log on to the Tivoli Enterprise Portal.



Figure 9-3 TEP view of the TPC queries

The list of queries has been enriched in TPC V4.1 with 14 new queries reported in Table 9-1.

Table 9-1 New TPC queries

Query Name	Description
CIMOM	Shows the CIMOM status
DATA_AGENTS	Shows the Data agents and their status
INBAND_AGENTS	Shows the status of Inband Fabric agent
OUTBAND_AGENTS	Shows the status of Outband Fabric agent
TPC_SERVER	Shows all TPC Servers
VMWARE_VIRTUAL	Shows all VMWare Servers and their status
PROBESTATUS	Shows the status of the latest probes
SCHEDULED_JOBS	Shows the scheduled jobs including values
JOB_STATUS	Shows the job status including start and finish time
SWITCH_ALERTS	Show the Alters for the switches
FABRIC_ALERTS	Show the Alters for the fabrics
COMPUTER_ALERTS	Show the Alters for the computers
SUBSYSTEM_ALERTS	Show the Alters for the subsystems
TAPELIBRARY_ALERTS	Show the Alters for the Tape Libraries

The information that you can access from TEP is the same as stored in the TPC database. As an example, we can show the Fabrics Alerts. Figure 9-4 and Figure 9-5 show the Alert view for the Fabrics in the TPC GUI.



Figure 9-4 TPC Fabric Alerts

The same information can be accessed from TEP.

📰 Report				
Server	Timestamp	Display Name	Alert Time	Alert Message
Colorado	05/12/09 12:35:57	100000051E34E895	04/24/09 17:01:05	ALR4046I: Fabric 100000051E34E895 (100000051E34E895 ) has beer
Colorado	05/12/09 12:35:57	100000051E35D514	04/24/09 17:01:06	ALR4046I: Fabric 100000051E35D514 (100000051E35D514 ) has been
1				

Figure 9-5 TEP view for the Fabric Alerts

In Figure 9-5, notice the server name corresponding to the tpcDisplay name that we provided when we added the server during the TPC Universal Agent configuration. The Timestamp represents the last time the query was executed.

The default queries and workspaces can be modified following the specific environment needs, and new ITM Situations can be defined. For all the information related to these tasks, you can refer to the *IBM Tivoli Monitoring User's Guide* for your specific platform for details. These books can be found at the following URL:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc/itm6
10usersguide.htm

### 9.2 TPC for Replication monitoring and alerting

As discussed in previous chapters, the integration between TPC and TPC for Replication is now very tight. This integration is visible in many contexts.

We have already presented the installation procedure that now includes the installation of both products in a unified flow. We also presented the Single Sign-On feature that allows you to move from TIP and TPC GUI to TPC for Replication Web UI without the need to provide the user credentials every time. We have also provided a description of the various launch points in the TPC GUI from which it is possible to execute a Launch in Context to open specific pages of the TPC for Replication Web UI. For additional details, see 6.2.3, "SSO and LIC from TPC to TPC for Replication" on page 364.

In this section, we present additional integration points between the two products, specifically the behaviors that have been added in order to improve the ease of monitoring and handling the entire SAN from a single point of control.

**Warning:** The integration described hereafter is enabled only if TPC and TPC for Replication are installed and running on the system. No integration is available if the two products are running on separate systems.

#### 9.2.1 TPC for Replication information and behaviors in the TPC GUI

From the TPC GUI, it is now possible to monitor the status of the TPC for Replication server. Under Administrative services  $\rightarrow$  Services, a new Replication Server entry has been added. By clicking it, the panel shown in Figure 9-6 is displayed showing the status of the TPC for Replication server. An additional button is provided to check the connectivity with the server.

Libit rivon storage rivoductivity cente	er: colorado.itso.ib	m.com Repl 💷 🗖 🔀
File View Connection Preferences Window Help		
Element Management		
Navigation Tree       S         - Administrative Services       P         - Services       C         - Data Server       C         - Device Server       L         - Data Sources       - Discovery         - Discovery       - Discovery         - Data Manager for Databases       - Data Manager for Chargeback         - Data Manager       - Fabric Manager         - Fabric Manager       - Tape Manager         - Tape Manager       - Replication Manager	Server Port Connection Status .ast connection status check time Test RM Connection	colorado.itso.ibm.com 5110 Active May 12, 2009 4:15:24 PM

Figure 9-6 Replication server status

Additional information has also been added related to the storage subsystems and their role in the TPC for Replication.

In the TPC GUI under the **IBM Tivoli Storage Productivity Center**  $\rightarrow$  **Configuration Utility** node, on the **Disk Manager** tab, there is new column in the Storage Subsystems section, called Enabled for Replication, which indicates whether a subsystem is enabled for replication or not as shown in Figure 9-7. When a subsystem is added in TPC for Replication, the information is propagated to TPC and visible in the GUI. Because the integration scope is limited to the Storage Subsystems supported by TPC-R (DS8000, SVC, ESS, and DS6000), for all other systems, the value shown in this column is *Not Supported*.

Servio	ces	Data Manager	Disk Manager	abric M	anager T	ape Manag	ger Element	Manager	Replication Manager		^
Refresh Subcustome											
	510	Subsystem	15	Label	Tyne	Status 🔺	Enable	Enabl	Enabled for Benlication		
		3994-ITSO_DS4	700-600A0B8000290	*	DS4000	Normal	Yes	Yes	Not Supported	- \	
		ESS-2105-22513	3-IBM		ESS	Normal	🖬 Yes	🖾 Yes	🖬 Yes	1	
		5884-ITSO_DS4	500-600A0B8000174	*	DS4000	Normal	🛯 Yes	🖾 Yes	Not Supported		=
		DS8000-2107-75	5BALB1-IBM		DS8000	Normal	🖾 Yes	🖾 Yes	O No		
		SVC-2145-ITSO	SVC01-IBM		SVC	Normal	🖬 Yes	🖾 Yes	🛾 Yes	1	
		Show Storage St	ubsystem Details	Show S	Storage Sub	system Asse	t Report	Storage Top	ology	/	
	<ul> <li>A CIM Agent managing storage subsystem needs to be added and a CIMOM discovery job needs to be run to discover storage subsystems. Information about running a CIMOM discovery job can be found in the CIMOM Discovery section.</li> </ul>										
	0	The prerequisite t Detailed informati	to enabling a storage ion on probe jobs can	subsyster be found	n for provisio on the Disk	ning and per Manager tab	formance monito o in the Storage	oring is a prob Subsystem P	pe job of the storage subsystem. Probes section.		
	0	Storage subsyste Guide for details.	m performance functi	on is only	available wit	h certain IBN	1 Tivoli Storage	Productivity	Center packages. See the User		
	<ul> <li>Detailed information about CIM Agents is found on the Services tab.</li> </ul>										
<ul> <li>A storage subsystem can be enabled for replication from the subsystem's details panel found under Disk Manager-&gt;Storage Subsystems-&gt;Subsystem Details</li> </ul>											
÷	CIM	OM Discovery									
+	Sto	rage Subsystem	n Probes								~
<										>	

Figure 9-7 Subsystems enabled for replication

When opening the Storage Subsystem details panel of a subsystem enabled for replication, additional information is now displayed related to its replication information, as shown in Figure 9-8.

File View Connection Preferences Window Help		
Element Management		
Navigation Tree		
Replication Corner	SVC-2145-11 SUSVC01-IBM Detai	
⊕ Data Sources	Storage subsystem	SVC-2145-ITSOSVC01-IBM
	Label	
- Configuration	Status	Normal
Role-to-Group Mappings	Vender	IDM
License Keys	Tupo	SIC .
Log-File Retention		590.12
Quota and Constraint e-mail Address Rules	Available Space (CB)	0.77
Scan/Probe Agent Administration	Lonsumed Space [GB]	9.77
Manual NAS/Netware Server Entry	Configured Real Space (GB)	29.2
Agent Manager Registration	Available Real Space (GB)	19.42
Storage Besource Agent Deployments	Serial number	0000020061E0311C
⊕ - Data/Storage Resource Agent Upgrades NetWare Tree Logins	Revision	4.2.1.6 (build 7.7.0804030000)
	User-defined property 1 (UDP1)	
Resource History Retention	User-defined property 2 (UDP2)	
Removed Resource Retention		
Bemoved Besource Betention for Database	User-defined property 3 (UDP3)	
Configuration History Settings	IP Address	9.12.5.67
BM Tivoli Storage Productivity Center	Element manager	http://9.12.6.77:9080
Configuration Utility		Element Management
- Reporting		Element management
	Replication Information	
Batch Reports		
⊕-System Reports	SVC Cluster	
Rollup Reports	IP Address/Domain Name	9.12.5.67
Database Asset	Username	admin
⊕ Database Capacity		
< ··· >		

Figure 9-8 Replication information in the subsystem panel

When a Volume (or VDisk for SVC) is deleted from TPC, it now checks if the Volume or VDisk is in a replication session or not on the TPC for Replication side, and allows or denies deletion accordingly. An example of the denial message is shown in Figure 9-9.

)	
Metro Mirror Name	Copy Id C
	S
	9
	Metro Mirror Name

Figure 9-9 Deny to delete a volume if in a Replication session.

A similar message is issued when a Storage Subsystem is deleted from TPC. It now checks if the subsystem is used in a replication session or not, and deletion is not allowed if it is used in a replication session.

#### 9.2.2 TPC for Replication Alerts

TPC for Replication alerts are now shown in TPC alert log. Following the path **IBM Tivoli Productivity Center**  $\rightarrow$  **Alerting**  $\rightarrow$  **Alert Log**, there is a new node, **Replication**. By clicking it, a table is displayed with the same "details" panel functionality as other TPC alert logs, where all the TPC for Replication alerts are visible. See Figure 9-10.

	-							
Element Management 🤄 👄 📄 🎒 🗙	8							
vigation Tree	[							
- Analyacs	~							
Econingulation History     Econingulation History	-1		Class				- Dave Dave	Defreeh
			Cica				p Fage Down	Hellesh
Configuration Analysis								
- Alerting								
Authentication Configuration Alerts				Computer	Obj. Type	Object	Alert Type	First Trigger
Alert Log				colorado.itso.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
- O All		a		colorado.itso.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
Alerts Directed to tpcsuperuser		a	Ţ	colorado.itso.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
Authentication Configuration		al	Ť	colorado.itso.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
Replication		a	÷	colorado.itso.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
Storage Subsystem		a	÷	colorado.itso.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
Computer		a	Ť	colorado.itsol.ibm.com	RM Subsystem	colorado.itso.ibm.com	Communication failed	May 13, 2009
DISK Cileanaber		a	Ť	colorado itso ibm com	BM Subsystem	colorado itso ibm com	Communication failed	May 13, 2009
Directory			÷	colorado itso ibm com	BM Subsustem	colorado itso ibm com	Communication failed	May 13, 2009
	H		÷	colorado iteo ibm com	BM Subsystem	colorado itso ibm com	Communication failed	Mau 13, 2009
OSCI OS User Group	-		÷	colorado iteo ibm com	PM Session	best	Session state changed	May 13, 2009
Fabric	-			colorado iteo ibm com	PM Session	test	Session state changed	May 11, 2009
Switch	= -		<u> </u>	colorado.itso.ibin.com	DM Cassion	test	Cassion state changed	May 11, 2000
Endpoint Device	-	9		colorado.itso.ibm.com	DM Session	test	Session state changed	May 11, 2009
External		9	1	colorado.itso.ibm.com	RM Session	test	Configuration changed	May 11, 2009
Tape Library		q	<u>.</u>	colorado.itso.ibm.com	HM Server	colorado.itso.ibm.com	Configuration changed	Apr 23, 2009
Configuration Analysis	-	a		colorado.itso.ibm.com	RM Server	colorado.itso.ibm.com	Configuration changed	Apr 23, 2009 1
Hypervisor			<					
Data Manager								
Data Manager for Databases								
Data Manager for Chargeback	- 1							
Disk Manager								
Storage Optimizer								
SAN Planner								
⊕ Alerting								
-Profile Management	~							

Figure 9-10 TPC for Replication alerts

The details of an alert can be seen by clicking the magnifying glass icon next to the alert. See Figure 9-11. By right-clicking a specific alert, a Launch in Context option is present in the menu. It allows you to move to the TPC for Replication Web UI panels relating to the alert category and context of the alert.

**Warning:** At the time this book is being published, a known problem in the integration between TPC and TPC for Replication exists. In certain cases, TPC for Replication launch points do not show up under the Replication Manager tab of the Configuration Utility node in the TPC GUI also if the TPC for Replication server is correctly configured and running.

Moreover, the Launch in Context feature of the TPC for Replication GUI from the Replication Alerts is not available. The cause of this problem is a result of the TPC for Replication WAR file (CSM-TIP.war) not being installed or corrupted in TIP.

To solve the problem, it is necessary to remove the CSM-TIP.war file from TIP if it is already deployed, and then deploy it again as described in "Procedure to remove and then re-deploy the CSM-TIP.war file" on page 367.

nter: colorado	.itso.ibm.com Alert Detail Session state changed
Detail for Alert	
Computer Alert Type	colorado.itso.ibm.com Session state changed
State Timestamp	Active May 11, 2009 5:09:47 PM
Alert Creator Alert Name	TPCUser Replication Session Change
Alert Text	IWNR1950I [2009/05/11 17:09:47.406 PDT] Session test changed from the Prepared state to th Available state.

Figure 9-11 TPC for Replication alert details

The alerts coming from TPC for Replication and shown in the TPC GUI are related to five SNMP traps that TPC for Replication can issue:

- Communication Failure
- Configuration Change
- Management Server State Change
- Session State Change
- Suspending Event Notification

In the TPC GUI, there is also a new top level node in the TPC Navigation Tree, called Replication Manager, which allows configuration of replication alerts, based on triggering conditions. A sub-node there, called Replication Management, brings up launch buttons for launching to the TPC for Replication GUI as already described in 6.2.3, "SSO and LIC from TPC to TPC for Replication" on page 364.

The additional panels accessible under **Alerting**  $\rightarrow$  **Reporting Alerts** can be used to enable or disable the triggering of the alerts and to set the trigger action for TPC to take if any of these alerts are sent to TPC from TPC for Replication. As an example, Figure 9-12 shows the panel related to the TPC for Replication Communication Failure alerts.

IBM Tivoli Storage Productivity Center: colorado.itso	.ibm.com Edit Replication Alerts TP 💶 🗖
File View Connection Preferences Window Help	
Element Management	
Navigation Tree Edit Replication Alerts TPCL	User.Replication Communication Failure
Navigation Tree  Administrative Services BM Tivoli Storage Productivity Center Data Manager Data Manager for Databases Data Manager for Databases Data Manager for Chargeback Disk Manager Fabric Manager Faplication Manager Replication Manager Replication Management Alerting Replication Management Replication Replication Session Change Replication Replicati	User Replication Communication Failure Name: Replication Communication Failure Replication Communication Failure events alue: Value Units:

Figure 9-12 TPC for Replication Communication Failure alerts panel

# 9.3 Storage Resource Group monitoring and alerting

The Storage Resource Groups concept added in TPC V4.1 offer a way to logically group multiple storage related entities in a single object. The advantages that this new TPC feature offers in terms of reporting and planning activities are presented in other chapters of this book.

Additionally, the Storage Resource Groups can also be used for monitoring purposes. This activity is mainly carried out from the Topology View. L0 and L2 Storage Resource Group views have been added to the Topology View. In Figure 9-13 you can see the Storage Resource Group L2 view.

Notice that there is an icon related to the Storage Resource Group operational status: This information is "propagated" upwards and "health" of the group members becomes the "health" of the group itself. This is extremely helpful to quickly check the status of a group if, for example, the group logically represents an application.



Figure 9-13 L2 Topology View for Storage Resource Groups

The information about the alerts is also propagated from the members upwards to the group. The corresponding graphical indicator is visible next to the Storage Resource Group icon and an alert overlay is made available as shown in Figure 9-14.



Figure 9-14 Alert Overlay for Storage Resource Group

Additionally the Storage Resource Groups health status is reported in the Storage Resource Group Management panel, as shown in Figure 9-15.

BIM Tiyoli Storage Productivity	v Center: colorado itso ibm.com Storage Resource Grou
File View Connection Preferences Window	Help
Navigation Tree	
Administrative Services	Create Delete
	Storage Resource Group Management
CIMOM Agents	Storage Resource Group Name State Description
Data/Storage Resource Agents	Q SVC_BALTIC_DS4500 △ Warning SVC_BALTIC_4500
-Inband Fabric Agents	
Out of Band Fabric Agents	
- IPC Servers	
⊕ Out of Band Fabric	
<b>⊞</b> -Windows Domain, NAS, and SAN FS	
EVMware VI Data Source	
E-Configuration     IPM Tiugli Storage Productivity Conter	
Configuration Utility	
⊕-Reporting	
⊟- Topology	
Computers	
Fabrics	
Storage	
Storage Besource Groups	
Other	
■ Monitoring	
Provide Server Probes	
Endpainties	
H Alerting	
🕀 - Data Manager	

Figure 9-15 Storage Resource Group Management panel

# 9.4 Monitoring additional storage subsystems

In this section, we discuss how TPC can be used to monitor additional storage subsystems.

#### 9.4.1 Basic support for EMC PowerPath V4

With TPC V4.1, you can now also handle EMC PowerPath storage systems such as CLARiiON and Symmetrix. The EMC PowerPath version supported is at Version 4.0 or later. If you are using such storage systems, you can discover host volume information and display detailed information of the volumes for capacity planning purposes. Additionally, connection reports can show the connectivity from the host to the storage subsystems.

From a monitoring point of view in the Topology Viewer, you can now see the disks provided by the EMC Powerpath driver and detected by TPC. Furthermore, you are able to see the correlation of EMC Powerpath provided hdisks to EMC storage subsystems. An example is provided in Figure 9-16.



Figure 9-16 EMC subsystem in the topology view

The health status indicator for the subsystem is easily visible close to the subsystem icon to allow immediately evaluate the subsystem status. The information about the alerts is also available; the corresponding graphical indicator is visible next to the subsystem icon and an alert overlay is available.

Notice that the Data Path Explorer does not show multipathing.

#### 9.4.2 Monitoring IBM N Series and NetApp devices

Previous versions of TPC provided support for the IBM N Series and Network Appliance (NetApp) storage systems through the Data agents. The TPC for Data agent was designated as the "proxy agent" responsible for collecting asset and quota information from assigned filers by SNMP.

TPC V4.1 adds the support for the NetApp SMI-S 1.2 Array profile implementation of the Data ONTAP systems SMI-S Agent V3.0. The proprietary SNMP based TPC functionality works concurrently with the new TPC support for the SMI-S 1.2 Array profile implementation of the Data ONTAP SMI-S Agent 3.0.

The Data ONTAP systems supported through the CIMOM agent are those at release level 7.2.x and 7.3.x. The CIMOM agent is not implemented within the ONTAP system, but it needs to be installed on an external server like any other CIMOM agent. In order to use it within TPC, the user has to install and configure the Data ONTAP SMI-S Agent (CIMOM) and configure the CIMOM by adding filers to its configuration.

**Note:** The Data ONTAP SMI-S Agent 3.0 Download and Configuration information can be found at the following site:

http://communities.netapp.com/docs/DOC-1055%3Bjsessionid=A65BBE797584630BD05E62
17403B3F90

To use the new SMI-S Functionality inside TPC V4.1 after the Data ONTAP SMI-S Agent (CIMOM) has been installed and configured, we need to add the CIMOM to the TPC list of the managed CIMOMs. We can use the standard TPC procedures to accomplish this task, either by adding it manually or running a CIMOM Discovery job. Then we can create and run a probe job for the configured Filers. This collects TPC for Disk data.

In the TPC GUI under the CIMOM Agents panel, we can then check the CIMOM status and the managed devices as shown in Figure 9-17.

Refresh Rate 1 Mins Last	t Refresh: 10:52:35					
Add CIMOM Test CIMOM Connection Remove CIMOM Show Managed Devices						
CIMOM Agents						
Service URL Connectio	on Status Interoperability Namespace	Display Name	Description			
A https://9.11.97.44:5989 SUCCESS	S /interop	n3700	Data ONTAP SMI-S Agent			
A https://9.11.125.232:5989 SUCCES	S /interop		EMC			
	📄 CIMOM Managed Devices 🛛 🗙					
	Label Type 🔺 IP Address					
	zinc NetApp 9.11.98.62					
	oxide NetApp 9.11.98.51					
	Ok					

Figure 9-17 NetApp CMOM and managed devices

TPC V4.1 can receive and store all the alerts related to the newly added NetApp subsystems. They are available from the TPC GUI under **IBM Tivoli Storage Productivity Center**  $\rightarrow$  **Alerting**  $\rightarrow$  **Alert Logs**  $\rightarrow$  **Storage Subsystem** together with the other storage subsystems alerts. See Figure 9-18.

**Note:** Certain alerts are generated only after performing a probe. For this reason, we strongly suggest that you perform a probe right after having added the CIMOM.

BM Tivoli Storage Productivity Center: sandfaye Alert	Histo	ory /	All Storage Subsystems			
File View Connection Preferences Window Help						
Element Management						
Navigation Tree						
- Administrative Services						
Services		Close	Delete Classical Delete All Deres Un	1 Pres		
	_	urgal		Fayer		1811
Configuration						
E-IBM Tivoli Storage Productivity Center			Storage Subsystem	Computer	Disk/Volume	Alert Type
Configuration Utility	al		oxide	9 11 97 44	(N/A)	New Storage Sul
	H	<u> </u>	zine	9 11 97 44	(NIZA)	New Storage Sul
	H		ADM000C420407C	0.11.105.000	0.000	New Storage Su
	별	<u> </u>	AFM00004204376	3.11.123.232	(INZA)	New Storage Su
Storage Resource Group Management	<u>e</u>	-	2882-5 trangDurm-600A08800021AA310000000448C1955-L51	Unknown	(N/A)	New Storage Sut
	Q	<u>.</u>	4884-700-600A0880000F033C00000004609483E-LST	Unknown	[N/A]	New Storage Sut
⊟ Alerting			6091-DS4800-600A0B800011155400000004293ACDA-LSI	Unknown	(N/A)	New Storage Sub
Authentication Configuration Alerts						
Alert Log						
- • All						
Alerts Directed to administrator						
Authentication Configuration						
Replication						
Storage Subsystem						
Computer						
r ilesystem						
- US User Croup						
- Switch						
Endpoint Device						
- Fyternal						
Tane Library						
Configuration Analysis						
Hupervisor						

Figure 9-18 NetApp Alerts

Each NetApp subsystem can also be monitored from the Topology View. Its operational status can be easily checked, due to the graphical indicator on the subsystem icon or through the information provided in the details panel as shown here in Figure 9-19.

Also, the information about the alerts is available; the corresponding graphical indicator is visible on the right next to the subsystem icon and an alert overlay is available, similar to the one shown in Figure 9-14 on page 499.



Figure 9-19 nSeries subsystem status in the Topology View

# 10

# **Reporting through TPC**

In this chapter, we focus on the built-in reporting functions of TPC 4.1. For information about creating customized reports through external tools such as Tivoli Common Reporting / BIRT, see Chapter 11, "Customized Reporting through Tivoli Common Reporting" on page 523.

# 10.1 Reporting overview

TPC collects a wide range of information from the storage environment it is monitoring. All collected data, including configuration data, utilization data, and performance data is stored in a relational DB2 database schema. This chapter provides an overview illustrating the various reports that TPC can generate from this collected data.

In addition to information collected from the storage environment, TPC provides reports on its internal definitions such as Data Sources and Groups, including newly introduced Storage Resource Groups.

There are multiple options available to extract data from TPC:

	TPC GUI	TPC's Graphical User Interface (GUI) provides access to a large number of predefined reports, provides charting and graphing functions, allows customizing reports (up to a certain extent) as well as scheduling them to run on a repeated basis (called "Batch Reports"). In addition, a graphical Topology Viewer is provided to interactively browse the current, as well as historic states of the monitored storage environment (Configuration History).		
	Batch Reports	As already mentioned, the TPC GUI allows definition of Batch Reports which are typically scheduled to run repeatedly, producing output in either CSV (comma separated values), plain text, PDF or HTML format. A subset of the reports available through the GUI can be exported that way in order to allow for automatic publishing or post-processing of TPC data, without having to invoke either GUI or CLI.		
		Batch reports require installation of a TPC Data agent in order to run; thus, they are only available with the TPC for Data or TPC Standard Edition licenses.		
TPC CLI (TPCTOOL)	TPC's Command Line Interface (CLI, also known as TPCTOOL) provides programmatic access to a subset of the reports that are available through the GUI—primarily performance reports, as well as a limited amount of configuration reports.			
		For additional information about reporting by TPC CLI, refer to SAN Storage Performance Management Using TPC, SG24-7364, Chapter 7.1. "CLI - TPCTOOL as a reporting tool." In addition, refer to Reporting with TPCTOOL, REDP-4230 for detailed information about how to use TPC's Command Line Interface to generate reports.		
	TPC Reporter	IBM TPC Reporter is a Java application developed to allow export of historic performance, as well as limited amounts of configuration data for certain subsystems. It produces a white paper style PDF document with all relevant information, which makes sending the information by e-mail very easy.		
		For additional information about using TPC Reporter to generate reports, refer to <i>SAN Storage Performance Management Using TPC</i> , SG24-7364, Chapter 7.2 TPC Reporter.		

Reporting DatabaseIntroduced in TPC 4.1, a set of database views is available to accessViewsdata from DB2 directly using Structured Query Language (SQL). The<br/>views represent the raw data "behind" the reports that can be<br/>produced through GUI and CLI, thus allowing very flexible<br/>customizations.

Notice that the database views do not allow exporting the reports readily available through GUI and CLI directly, but instead provide access to the actual data within the database repository. When generating reports through TPC GUI, for example, additional calculations are performed on the data in the repository.

SQL access to database views are covered in detail in 11.2, "Database repository access" on page 524.

**Note:** All reporting functions just mentioned only allow extracting data that has previously been collected to the database repository. The configured data sources and collection jobs, collection periods, and frequencies, as well as history retention settings, will affect the amount of information that is shown in any kind of report.

# 10.2 Generating reports using TPC GUI

Reports in the TPC GUI are organized into reporting types and reporting categories. Whereas reporting types define how the report is handled by the system (run online or offline, user or system defined), reporting categories are intended to organize the sheer amount of available reports and help users find the information that they are particularly interested in.

The available reporting types are:

- User-defined online reports
- (Pre-defined) system reports
- User ID (saved) reports
- Batch reports

For more detailed information about the various reporting types, refer to *IBM Tivoli Storage Productivity Center User's Guide*, SC27-2338, Chapter 5. Reporting  $\rightarrow$  Choosing a reporting type.

The available reporting categories are:

- Asset reports
- Availability reports
- TPC-wide Storage Space (new in TPC 4.1, previously Capacity reports)
- Usage reports
- Usage violation reports
- Backup reports
- Monitored Computer Storage Space (new in TPC 4.1)
- Storage Subsystem reports
- Storage Subsystem Performance reports
- Switch Performance reports
- Rollup reports
- Data Source reports (new in TPC 4.1)

For more detailed information about the various reporting categories, refer to *IBM Tivoli* Storage Productivity Center User's Guide, SC27-2338, Chapter 5. Reporting  $\rightarrow$  Choosing a reporting category.

**Tip:** For a list of common questions that you might have while managing your storage resources, as well as the corresponding reports that help answer these questions, refer to Chapter 5. "Reporting: What can I find out using reports?" in *IBM Tivoli Storage Productivity Center User's Guide*, SC27-2338.

## 10.3 What is new with TPC Version 4.1

There have been multiple name changes for consistency, Navigation Tree restructuring, as well as completely new reports introduced with Tivoli Storage Productivity Center V4.1. This chapter describes those changes and refers to additional documentation where appropriate.

#### 10.3.1 Navigation Tree restructuring

In TPC's Navigation Tree, the branch named *IBM Tivoli Storage Productivity Center* (formerly IBM TotalStorage Productivity Center) was restructured to be more consistent with the other branches (such as Data Manager, Disk Manager, Fabric Manager, Tape Manager, and so on).

You will now find a sub-branch named *Reporting*, containing elements previously found under the top-level branch:

- My Reports
- System Reports
- Rollup Reports
- Data Source Reports (new in TPC 4.1)

See Figure 10-1 for a detailed comparison of the Navigation Tree structure:



Figure 10-1 Comparison of Navigation Tree structure

#### 10.3.2 Name changes for consistency

The Capacity reporting category, found under the Data Manager  $\rightarrow$  Reporting Navigation Tree branch, has been renamed to *TPC-wide Storage Space*. The included reports have been renamed as well and are now titled:

- Disk Space
- ► File System Space
- Consumed Files System Space
- Available File System Space

See Figure 10-2 for a detailed comparison of the Data Manager Navigation Tree structure, including new Monitored Computer Storage Space reports, which we discuss subsequently.



Figure 10-2 Comparison of Data Manager Navigation Tree structure

In addition, various report columns and labels have been renamed to be more consistent throughout the product. Examples for those resolved inconsistencies include "Volume" in place of "LUN" and "Space" in place of "Capacity".

In order to ease transition, the old column names are still included in the online help panels, accessible from within the TPC GUI by pressing the **<F1>** key. See Figure 10-3 for an example:



Figure 10-3 TPC GUI online help

Because Batch Reports are widely used in custom scripting solutions, it is possible to revert the column names used in Batch Reports to the TPC 3.x terminology. This will assure that scripts parsing Batch Report output will continue to work with TPC Version 4.1. In order to change the column naming for Batch reports, use the **Classic Column Names Specification** option found during definition of a Batch Report under the Options tab. See Figure 10-4 for an example.

IBM Tivoli Storage Productivity Center: color	ado.itso.ibm.com Create Batch Report
File View Connection Preferences Window H	Help
Element Management	X
Navigation Tree	Create Batch Report
⊕ Administrative Services	Service American Stress and
E IBM Tivoli Storage Productivity Center	Lieator: tposuperuser Name: unnamed
Configuration Utility	Description:
□ Reporting	
My Reports	Report Selection Uptions When to Run Alert
+-tpcsuperuser's Reports	Agent Computer Specification
Batter Reports	Choose agent computer where batch report will run and where output file will be created:
Bollun Benorts	
Data Source Reports	Report Type Specification
	Choose type of report that will be generated:
<b>⊕</b> Monitoring	G, CSV File E Include Headers E Include Totals
	C Formatted File
<u>⊕</u> Alerting	C HTML File
Data Manager	
H-Data Manager for Databases	C History CSV File T Include Headers
E-Fabric Manager	
	C PDF Chart
	Customize this chart
Replication Manager	
	Classic Column Names Specification
	I Use classic column Names
	- Script

Figure 10-4 Batch report options

**Note:** This option only applies to the output generated by Batch Reports and not to any GUI panels. Also notice that this will obviously not change the behavior of Batch Reports generating graphical charts.

Refer to *IBM Tivoli Storage Productivity Center User's Guide*, SC27-2338, Chapter 5. "Reporting for additional details on the individual report columns."

#### 10.3.3 New Disk Manager reports

Various new **Storage Subsystem** reports are now available under the Disk Manager Navigation Tree branch. Those reports provide asset-type information for:

- Disks
- Volumes
- Storage Pools
- Array Sites
- Disk Groups
- Ranks

Because the reports are found under the Disk Manager Navigation Tree branch, they are available with TPC Basic Edition or TPC for Disk licenses.

In previous releases of TPC, this information was already available within the **Data Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Asset** branch. The Data Manager branch, however, is only available when a valid TPC for Data or TPC Standard Edition license is in place. Thus, the information was not available to TPC Basic Edition or TPC for Disk installations before.

See Figure 10-5 for a detailed comparison of the Disk Manager Navigation Tree structure.



Figure 10-5 Comparison of Disk Manager Navigation Tree structure

#### 10.3.4 New Data Source reports

As already mentioned, TPC Version 4.1 introduces a new reporting category: Data Source reports. It can be found in the Navigation Tree under **IBM Tivoli Storage Productivity Center**  $\rightarrow$  **Reporting**  $\rightarrow$  *Data Source Reports*. Currently, the only available sub-category is **CIMOM Agents**. The reports contained in this reporting category provide detailed information about the agents from which Tivoli Storage Productivity Center collects data. The information was already available before under the Administrative Services Navigation Tree branch, but now customization of report columns, sorting, filtering, data export, and Batch reporting is also possible.

The **CIMOM Agents**  $\rightarrow$  **By CIMOM Agent** report contains one row for each CIMOM that is registered with TPC. It contains detailed information about the CIMOM itself, but only statistical information about the managed devices (such as "Number of Managed Devices"). See Figure 10-6 for an example.

🗐 IBM Tivoli Storage Productivity Center: co	olorado.itso.ibm.com CI	MOM Agents: By	CIMOM Agent			
File View Connection Preferences Window	Help					
Element Management						
Navigation Tree	Selection CIMOM Agen	nts				
Administrative Services     IBM Tivoli Storage Productivity Center     Configuration Utility	CIMOM Agents: By CIMOM Number of Rows: 4	Agent				
Reporting	Service URL	Display Name	Description	Managed Device Category	Connection Status	Status Timestamp
	http://9.12.4.139:5988	DS4500_DS4700	LSI SMI-S	Storage subsystem	SUCCESS	07.05.2009 02:35:36
System Reports	http://9.12.6.76:5986	Brocade - B32	Brocade SMI-S	Switch	SUCCESS	06.05.2009 10:59:43
H Rollup Reports	http://9.12.6.76:5988	DS8000_ESS800	CIMOM for the D	Storage subsystem	SUCCESS	07.05.2009 02:35:35
	https://9.12.6.77:5990	SVC	SVC Cimom	Storage subsystem	SUCCESS	07.05.2009 02:35:36
By CIMOM Agent		4				
By Managed Device						

Figure 10-6 CIMOM Agents report By CIMOM Agent

The **CIMOM Agents**  $\rightarrow$  **By Managed Device** report, in turn, contains one row for each device managed by a registered CIMOM. It contains detailed information about the device and the CIMOM that is currently being used to access it. See Figure 10-7 for an example.

😑 IBM Tivoli Storage Productivity Center: co	olorado.itso.ibm.com (	IMOM Agents: By Manag	ed Device			
File View Connection Preferences Window	Help					
Element Management						
Navigation Tree	Selection Managed D	evices		>		
Administrative Services     IBM Tivoli Storage Productivity Center     Configuration Utility	CIMOM Agents: By Mana Number of Rows: 7	ged Device				
Reporting	Device Name	Device Category	Device Type	Device Status	Device Operational Status	Device Last Probe 1
	3994-ITSO_D54700-6	00A0B& Storage subsystem	D54000	Normal	ok	07.05.2009 02:45:23
System Reports	5884-ITSO_D54500-6	00A0B& Storage subsystem	DS4000	Normal	ok	07.05.2009 02:45:49
+ Rollup Reports	DS8000-2107-75BALE	1-IBM Storage subsystem	DS8000	Normal	ok	07.05.2009 02:46:12
	ESS-2105-22513-IBM	Storage subsystem	ESS	Normal	ok	07.05.2009 02:45:31
By CIMOM Agent	SVC-2145-ITSOSVC01	-IBM Storage subsystem	SVC	Normal	ok	07.05.2009 02:36:13
By Managed Device	🔍 itsosan01	Switch	N/A	Warning	stressed	N/A

Figure 10-7 CIMOM Agents report By Managed Device

Tip: Note the drill-down option to quickly retrieve additional device specific details.

For a detailed description of the individual report columns, refer to *IBM Tivoli Storage Productivity Center User's Guide*, SC27-2338, Chapter 5. Reporting  $\rightarrow$  Data source reports - CIMOM agents.

#### 10.3.5 New Monitored Computer Storage Space reports

Another new reporting category was introduced in order to provide better reporting on operating system virtualized storage (such as when using Logical Volume Managers), shared storage (such as shared cluster volumes) and Virtual Machine storage (such as when using VMWare hypervisors). It can be found in the Navigation Tree under **Data Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Monitored Computer Storage Space**. Available sub-categories include **Disk Storage** and **Non-Disk Storage**.

The **Monitored Computer Storage Space**  $\rightarrow$  **Disk Storage** reporting category provides information about computer storage space that resides on physical disks, either local hard drives or SAN disks. See Figure 10-8 for an example.

	n.com All Disk Storag	je: By Compu	ter					
File View Connection Preferences Window Help								
Element Management								
avigation Tree	Selection Comput	ers						
🗄 Administrative Services	All Dick Storages Ru C	omputor						
IBM Tivoli Storage Productivity Center	All Disk Storage: By C	omputer						
🖃 Data Manager	Number of Rows: 12							
Monitoring	Computer	Disk Path	Disk Space	Consumed Disk Space	Available Disk Space	Unavailable Disk Space	Computer OS Type	Manufacturer
Alerting	TOTAL	1	496,51 GE	425,52 GB	70,98 GB	6,46 ME	3	
Policy Management	9.12.5.11	/dev/hdisk2	16,95 GE	7,79 GB	9,16 GB	0	AIX	IBM
E Reporting	9.12.5.11	/dev/hdisk1	16,95 GE	2,39 GB	14,56 GB	0	AIX	IBM
H-Groups	9.12.5.11	/dev/hdisk0	16,95 GE	1,64 GB	15,31 GB	0	AIX	IBM
T Mootu T Availability	9.12.5.20	/dev/sdh	N/A	N/A	N/A	N/A	Linux	IBM
Terrandomicy	9.12.5.20	/dev/sdf	4.88 GE	0	4,88 GB	0	Linux	IBM
I Usage	9.12.5.20	/dev/sde	4.88 GE	0	4,88 GB	0	Linux	IBM
Usage Violations	9,12,5,20	/dev/sdb	16.95 GE	16.94 GB	6.15 MB	0	Linux	IBM-ESXS
	9,12,5,20	(dev/sda	16,95,68	16,86 GB	86.53 MB	3.23 ME	3 Linux	IBM-ESX5
🖻 Monitored Computer Storage Space	haltic itso ibm com	(dev/sda	279 40 GE	279.31.68	86.33 MB	3 23 ME	Linux	IBM-ESXS
🖃 Disk Storage	colorado itso ibm com	Disk 0	68 37 68	50.47 GB	17.90 GB	2 50 KB	Windows	IBM-ESXS
- All Disk Storage	gallium	Disk 0	16.05.05	16 44 GB	E10.62 MB	2,50 KE	Windows	IBM-ESYS
By Computer	manul iteo itm com	Dick 0	27,29,00	22,67,00	9.61.CP	2,30 KE	Windows	MAYTOR
By Lomputer Group		DISKO	4	JJJ,07 GL		1,00 KL	1 1100113	INHATOK
By Filesystem/Logical Volume								<u></u>
By Disk/Yolume Group								
Disk Storage On Storage Subsystems								
Disk Storage On Storage Subsystems      Disk Storage Not On Storage Subsystems								
+ Non-Disk Storage								

Figure 10-8 Monitored Computer Storage Space report on Disk Storage

There are two sub-categories available in order to differentiate between local hard drives (Disk Storage Not On Storage Subsystems) and SAN disks (Disk Storage On Storage Subsystems).

The **All Disk Storage** sub-category contains both local hard drives and SAN disks, but the following columns still allow differentiating the disk type:

- Fibre Attached
- Mapped to Storage Subsystem
- Correlated (This indicates whether or not the storage has been correlated to a monitored storage subsystem. In this case, the storage can be correlated to existing Disk Manager reports.)

The following columns are available to help relate back virtual disks in *VMWare hypervisor* environments:

- VM Disk File
- VMFS Disk
- VMFS Mount Point
- Hypervisor Name

The following report column indicates whether or not the file system or logical volume is shared by more than one computer, such as with *cluster volumes*:

Shared

The following column indicates an *error with the unique identification* of a computer disk:

Overallocated

Attention: Any storage that is overallocated will result in incorrect results in the calculation of the overall storage space ("Total" row)!

The **Monitored Computer Storage Space**  $\rightarrow$  **Non-Disk Storage** reporting category provides information about computer storage space that resides on a remote mount or a network attached server, as well as special devices such as shared memory pseudo-devices (such as /dev/shm). See Figure 10-9 for an example.

📑 IBM Tivoli Storage Productivity Center: colorado.itso.ibm.o	om Non-Disk St	orage: By Computer			_ 🗆 ×
File View Connection Preferences Window Help					
Element Management	]				
Navigation Tree	Selection Comp	uters			
Administrative Services	Non-Disk Storage:	By Computer			
🗄 IBM Tivoli Storage Productivity Center	Number of Rowcu	2			
🖻 Data Manager	Number of Rows.				
Monitoring	Computer	File System/Logical Volume Path	Logical Volume Space	Consumed File System/Logical Volume Space	Available File System/Logical Vol
+ Alerting	TOTAL		308,87 GB	43,96 GB	
Policy Management	9.12.5.20	1	27,68 GB	7,57 GB	
- Reporting	9.12.5.20	/dev/shm	1,83 GB	0	
#-Groups	9.12.5.20	/optim1	4,81 GB	292,19 MB	
	9.12.5.20	/optim2	4.81 GB	3.53 GB	
TPC-wide Storage Space	baltic.itso.ibm.com	J	265.36 GB	32.57 GB	
H-Usage	baltic.itso.ibm.com	/dev/shm	4.39 GB	0	
	7		4	, i i i i i i i i i i i i i i i i i i i	
+ Backup					
Monitored Computer Storage Space					
Disk Storage					
🖃 Non-Disk Storage					
-By Computer					
By Computer Group					
By Filesystem/Logical Volume					
By Filesystem Group					
By Disk/Volume Group					

Figure 10-9 Monitored Computer Storage Space report on Non-Disk Storage

For a detailed description of the available reports and all available columns, refer to *IBM Tivoli* Storage Productivity Center User's Guide, SC27-2338, Chapter 5. Reporting  $\rightarrow$  Monitored Computer Storage Space reports.

#### 10.3.6 New IBM N Series and NetApp reports

The previous versions of Tivoli Storage Productivity Center already provided support for the IBM N Series and Network Appliance (NetApp) storage subsystems through the TPC Data agents. The TPC Data agent was designated as the 'proxy agent' responsible for collecting asset and quota information from assigned filers by SNMP. These information can be gathered also with TPC V4.1 and can be used to generate for example the reports available under **Data Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Asset**  $\rightarrow$  **By OS Type**  $\rightarrow$  **Network Appliance**:

- Controllers
- Disks
- ► File System or Logical Volumes
- Exports or Shares
- Monitored Directories

TPC V4.1 adds support for the NetApp SMI-S 1.2 Array profile implementation of the Data ONTAP systems SMI-S Agent 3.0. The proprietary SNMP based TPC functionality works concurrently with the new TPC support for the SMI-S Agent.

**Tip:** The NetApp SMI-S agent can be obtained from the following URL. Notice that you will need a NOW<sup>™</sup> account in order to download the SMI-S agent:

http://now.netapp.com

After the Data ONTAP Agent (CIMOM) has been installed and configured, you can use it to collect data using Discovery, Probe, and Performance Monitor jobs. Proprietary TPC for Data functionality that relies on the filer being presented as a "computer" will remain in place, whereas the new TPC functionality that relies on SMI-S will display the filer as a "subsystem."

Thanks to the new SMI-S Agent support, in the TPC GUI under **Data Manager**  $\rightarrow$ **Reporting**  $\rightarrow$  **Asset**  $\rightarrow$  **By Storage Subsystem**, a filer is now presented as a subsystem. You can drill down through the storage subsystem configuration in a hierarchical manner to display reports on:

- Storage Pools
- Disks
- Volumes

See Figure 10-10 for an example.

IBM Tivoli Storage Productivity Center: sandfay	ve Storage Subsystem: :	zinc
File View Connection Preferences Window Help		
Element Management		
Navigation Tree		
Alert Log		
🖃 - Data Manager	Detail for Storage Subsystem <zinc></zinc>	
⊕⊶Monitoring	C	TROUGH Defects Changes Cathering Comm
	Group	TPCUser.Derault Storage Subsystem Group
⊕-Policy Management	Manufacturer	NetApp Inc.
Reporting	Model	ONTAP:0084223567:N3700
. H - Groups	Serial Number	0084223567
- Asset	Eirmware Bevision	Data ONTAP Release 7 3BC1: Wed Mar, 5 18:22:59 P9
⊕By Cluster		
+ By Computer	Number of Disks	14
By Hypervisor	Disk Space	470.54 GB
⊞By OS Type	Available Disk Space	135.81 GB
By Storage Subsystem	Physical Disk Space	470.54 GB
	Formatted Space	169.30 GB
	Formatted Space with No Volumes	1.73 GB
€6091-DS4800-600A0B800011155400000004293ACDA-LSI	Overall Unavailable Disk Space	N/A
⊕ APM00064204976		400.00.00
oxide	Configured Real Space	169.30 GB
i⊟⊸zinc	Available Real Space	1.73 GB
Storage Pools	Number of Volumes	49
⊟…aggr0		
⊟-Disks	Volume Space	72.37 GB
⊟	Backand Volume Space	0
- Volumes	backena volume space	0
n ⊕_ 😪 vol/vol9/lun02	Last Probe Time	May 13, 2009 2:47:51 PM
⊕ 🦂 vol/vol8/bcd_test	Last Probe Status	Succeeded
⊕ ~ 🔏 vol/vol6/new_lun4	Probing Agent	sandfaye
🕀 😪 vol/vol5/new_lun3		
🗈 😪 vol/vol45/lun0		
⊕ 😪 vol/vol44/lun0		
🕀 😪 vol/vol43/rod01		
⊕@_vol/vol42/lun0		
⊕ 🙀 vol/vol41/lun0		
⊕∰ vol/vol40/rod01		
B ≪ vol/vol4/zinc23		
€ 😪 vol/vol39/sanbag_zinc2		
⊕ 🥁 vol/vol38/sanbag_zinc1		
🕖 😪 vol/vol37/NETAPP-100MB		

Figure 10-10 NetApp subsystem Pools, Disks and Volumes

Notice that similar information is also available under **Disk Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Storage Subsystems**  $\rightarrow$  **Storage Pools** / **Disks** / **Volumes**. You can, for example, use the **Disk Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Storage Subsystems**  $\rightarrow$  **Storage Pools** report to display the capacity of storage pools for NetApp subsystems, as illustrated in Figure 10-11.

IBM Tivoli Storage Productivi	ty Cei	nter: san	dfaye S	torage	Pools: I	By Storage S	Subsystem	
e View Connection Preferences Window	Help							
Element Management 🛛 🖨 🖨 🗦	<     💿							
vigation Tree	Selec	tion Storage	Subsystems					
⊕-Monitored Computer Storage Space ▲ Data Manager for Databases Data Manager for Chargeback	Storag Numb	ge Pools: By Sto per of Rows: 3	rage Subsystem					
Disk Manager	St	orage S	Storage Pool	Type(s)	Status	Storage Po	Available Stora	Number of Disks N
Storage Optimizer	🖸 🖂	ide	aggr0	RAID 6	, ok	55.67 GB	27.42 GB	3
⊕ SAN Planner	🖸 oxi	ide	aggr1	RAID 4	, ok	56.43 GB	26.70 MB	2
	🔍 zin	C	aggr0	RAID 6	• ok	169.30 GB	1.73 GB	5
⊕ Alerting				<		ш		
Profile Management								
Reporting								
terestorage Subsystems								
-Disks	11							
Volumes								
Storage Pools								
By Storage Subsystem								
By Storage Subsystem Group	11							
Array Sites								
Computer Views								

Figure 10-11 Storage Pools report for NetApp subsystems

NetApp subsystems are now also represented as subsystems in Topology Viewer, where you can see the relation of Volumes, Storage Pools, and Disks. Furthermore, you can now collect and report on performance data from this type of subsystem. After having collected performance samples with a TPC Subsystem Performance Monitor job, you can report on the performance information using pre-existent TPC reports.

Currently, NetApp devices populate the following Storage Subsystem Performance reports:

- ► By Volume
- By Port

See Figure	10-12 for	an example.
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The view connection Trelefences	· · · · · · · · · · · · · · · · · · ·	1 ieip						
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System Reports	🔁	Number of Rows	: 61					
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Data Source Reports		Subsystem		1 ime	Interval	Read I/U	write	Total
E Topology		oxide		May 18, 2009 9:32:01 AM	302 s	U ops/s	U ops/s	1
Lomputers		oxide	voi/test_indicu1/svU1	May 18, 2009 9:32:01 AM	302 s	U ops/s	U ops/s	<u> </u>
	<u>, 1</u>	oxide	vol/vol1/lunU	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	
Switches		oxide	vol/vol1/lun1	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	·
Storage Resource Groups		oxide	vol/vol10/a	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	
Other		oxide	vol/vol100/perf3_18	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	
⊟ Monitoring		oxide	vol/vol101/perf3_19	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	:
+-Probes		oxide	vol/vol102/perf3_20	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	:[]
TPC Server Probes		oxide	vol/vol103/perf3_21	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	1
Storage Resource Group Manag		oxide	vol/vol105/perf4_1	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	1
⊕ Analytics		oxide	vol/vol106/perf4_2	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	1
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∃ Data Manager		oxide	vol/vol108/nerf4_4	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	
Data Manager for Databases		ovide	vol/vol109/perf4_5	May 18, 2009 9:32:01 AM	302 0	0 ops/s	0 ops/s	
Data Manager for Chargeback		ovide	vol/vol11/ABcornet1	May 19, 2009 9:32:01 AM	202 •	0 ops/s	0 opere	-
Disk Manager		ovide	vol/vol110/act/4_C	May 10, 2009 9:32:01 AM	302 8	0 ops/s	0 00575	
Storage Subsystems		Uxide	voi/voirito/peii4_6	May 10, 2003 3.32.01 AM	302 s	U ops/s	U ops/s	
Storage Uptimizer		oxide	Voi/Voi111/perr4_7	May 18, 2009 9:32:01 AM	302 s	U ops/s	U ops/s	<u> </u>
SAN Planner	<u> </u>	oxide	vol/vol112/pert4_8	May 18, 2009 9:32:01 AM	302 s	U ops/s	0 ops/s	<u> </u>
±-Monitoring		oxide	vol/vol113/perf4_9	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	. <u> </u>
BCl- M		oxide	vol/vol114/perf4_10	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	
Profile Management     Provide Management	<b>, , , ,</b>	oxide	vol/vol115/perf4_11	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	
		oxide	vol/vol116/perf4_12	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	:
Storage Subsustems		oxide	vol/vol117/perf4_13	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	: []
Storage Subsystems		oxide	vol/vol118/perf4_14	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ops/s	: T
By Storage Subsystem		oxide	vol/vol119/perf4_15	May 18, 2009 9:32:01 AM	302 s	0 ods/s	0 ops/s	í .
By Controller		oxide	vol/vol12/ABcornet2	May 18, 2009 9:32:01 AM	302 s	0 ons/s	0 ops/s	1
By I/O Group		oxide	vol/vol120/perf4_16	May 18, 2009 9:32:01 AM	302 s	0 ops/s	0 ons/s	
By Node		oxide	vol/vol121/perf4_17	May 18, 2009 9:32:01 AM	302 0			
By Array		ovide	vol/vol122/perf4_18	Mai 18, 2009 9:32:01 AM	202 0	0 ops/s	0 ope/e	<u></u>
By Managed Disk Group		ovide	vol/vol123/perf4_10	Mail 18, 2009 9-32-01 AM	202.5	0 000575	0 00575	
By Volume		ovide	voi/voir20/peri4_13	May 10, 2003 3.32.01 AM	302 \$	0.000	0 0µs/s	
By Managed Disk	<u></u>	Uxide	voi/voirze/peire_zo	May 10, 2003 3.32.01 AM	302 \$	U ops/s		
By Port	1	oxide	voi/voirzo/perro_1	May 10, 2009 9:32:01 AM	302 s	U ops/s	U ops/s	<u> </u>
- Constraint Violations		oxide	Vol/vol12b/perl5 2	May 18, 2009 9:32:01 AM	302 s	I Dops/s	i Ú ops/s	al de la companya de

Figure 10-12 Storage Subsystem Performance By Volume report

Finally, an additional performance reporting overlay is present in Topology Viewer for NetApp subsystem volumes and ports.

#### 10.3.7 New EMC PowerPath reports

Disks provided by the EMC PowerPath driver Version 4.x or later are detected by TPC's Data agent, as well as the newly introduced Storage Resource agent. They will be visible in Topology Viewer and in reports under **Data Manager**  $\rightarrow$  **Reporting**  $\rightarrow$  **Asset**. The reports are accurate in not double counting capacities.

The correlation of EMC Powerpath provided disks to EMC storage subsystems is supported and the relation is visible in the Topology Viewer. Multipathing information, however, is not available for those disks.

#### 10.3.8 New Storage Resource Group reports

Technically, Storage Resource Groups (SRGs) are user-defined groups of storage assets. They can be used, for example, to model applications, geographies, ownerships, projects, or service levels.

Storage Resource Groups can be displayed in the Topology Viewer. There is a L0 and a L2 view for them. The health states of the members of a Storage Resource Group are propagated upwards to become the health of the SRG itself; this allows application health monitoring.

See Figure 10-13 for an example of a Storage Resource Group L2 Topology View:



Figure 10-13 Storage Resource Group in Topology Viewer

**Note:** When adding entities to a SRG, Topology Viewer will also display the related entities as well. This is done on purpose because it allows visualization of the entity's context.

For example, when adding a volume, the related pool and subsystem will be displayed as well. When adding a switch, the related fabric will be displayed, and so on.

There are currently no tabular reports available for Storage Resource Groups.

#### 10.3.9 New XIV Storage Subsystem reports

Tivoli Storage Productivity Center V4.1 introduces basic support for the XIV Storage Subsystem. This includes basic capacity and asset information in tabular reports as well as in Topology Viewer. In addition, LUN Correlation information is available.

TPC Probes collect the following information from XIV systems:

- Storage Pools
- Volumes
- Disks
- Ports
- Host definitions, LUN Mapping and Masking information

**Note:** Space is calculated differently in the XIV Graphical User Interface (GUI) and the Command Line Interface (CLI) than the way it is in TPC. XIV defines 1 Gigabyte as  $10^9 = 1,000,000,000$  Bytes, whereas TPC defines 1 Gigabyte as  $2^{30} = 1,073,741,824$  Bytes.

This is why capacity information might not seem the same (wrong) when comparing the XIV GUI with the TPC GUI, when in fact it is the exact same value.

Due to the fact that the XIV Storage Subsystems provide Thin Provisioning by default, additional columns for the thin provisioning properties of Volumes, Pools, and Subsystems were introduced to the TPC GUI.

Notice that TPC's terminology of *configured* space accords with XIV's terminology of "soft" or "virtual" capacity, whereas TPC's terminology of *real* space accords with XIV's terminology of "hard" or "physical" space.

Additional *Configured Real Space* and *Available Real Space* columns were introduced to report on the hard capacity of a subsystem, whereas the pre-existent *Consumed Space* and *Available Space* columns now report on the soft capacity of a subsystem in the following reports:

- ► Storage Subsystem list under Disk Manager → Storage Subsystems
- ► Storage Subsystem Details panel under **Disk Manager** → **Storage Subsystems**
- ► Storage Subsystem Details panel under Data Manager → Reporting → Asset → By Storage Subsystem
- ► Data Manager → Reporting → Asset → System-wide → Storage Subsystems
- ► Data Manager → Reporting → TPC-wide Storage Space → Disk Space → By Storage Subsystem (Group)

Detail for Storage Subsystem trave					
Group	TPCUser.Default Storage Subsystem Grou				
Manufacturer	IBM				
Model	A14				
Serial Number	1300203				
Firmware Revision	10.0.1				
Number of Disks	180				
Disk Space	158.75 TB				
Available Disk Space	142.35 TB				
Physical Disk Space	158.75 TB				
Formatted Space	34.20 TB				
Formatted Space with No Volumes	16.03 TB				
Overall Unavailable Disk Space	N/A				
Configured Real Space	28.73 TB				
Available Real Space	26.95 TB				
Number of Volumes	116				
Volume Space	19.69 TB				
Backend Volume Space	0				
Last Probe Time	Apr 1, 2009 8:13:02 PM				
Last Probe Status	Succeeded				
Probing Agent	blade3e.tpcdevmz.mainz.de.ibm.com				

See Figure 10-14 for an example of the Storage Subsystem Details panel.

Figure 10-14 Storage Subsystem Details panel

*Configured Real Space* and *Available Real Space* columns, reporting on the hard capacity of a storage pool, were also added to the following report:

Storage Pool Details panel under Data Manager → Reporting → Asset → By Storage Subsystem → <Subsystem Name> → Storage Pools

See Figure 10-15 for an example of the Storage Pool Details panel.

Storage Subsystem	XIV-2810-1300203-IB
Type	RAID 10
Status	OK
Storage Pool Space	128.00 GB
Available Storage Pool Space	31.66 GB
Configured Real Space	96.00 GB
Available Real Space	31.66 GB
Is Space Efficient	true
Number of Disks Number of Volumes Surfaced Volume Space Un-surfaced Volume Space Backend Volume Space	N/A 3 80.00 GB 0

Figure 10-15 Storage Pool Details panel

A *Volume Real Space* column was added to report on the hard capacity of a volume, whereas the pre-existent *Volume Space* columns report on the soft capacity of a volume in the following reports:

- ► Volume Details panel under **Disk Manager** → **Storage Subsystems** → **Volumes**
- ► Disk Manager → Reporting → Storage Subsystems → Volumes
- ► Disk Manager → Reporting → Storage Subsystems → Volume to HBA Assignment
- ► Added Back-End Volume Real Space for XIV volumes as back-end volumes under Disk Manager → Reporting → Storage Subsystems → Volume to Back-End Volume Assignment
- Volume Details panel under Data Manager → Reporting → Asset → By Storage Subsystem → <Subsystem Name> → Volumes
- ► Data Manager  $\rightarrow$  Reporting  $\rightarrow$  Asset  $\rightarrow$  System-wide  $\rightarrow$  Volumes

Storage Subsystem	XIV-2810-1300203-IBM
Volume Space	22.00.GB
Volume Real Space	14.90 GB
Unavailable Volume Space Type	N/A Raw
RAID Level	RAID 10
Flash Copy Attributes Surfaced	None
*tpc_thin_vol1 (ID:0548)	

See Figure 10-16 for an example of the Volume Details panel:

Figure 10-16 Volume Details panel

Due to the XIV architecture and the fact that each volume resides on all disks, certain reports in the TPC GUI will not provide meaningful information for XIV Storage Subsystems. Correlation of disks and volumes, for example under the **Data Manager**  $\rightarrow$  **Reporting**  $\rightarrow$ **Asset**  $\rightarrow$  **By Storage Subsystem** branch, is not possible - TPC will not report any volumes under the branch of a particular disk.

Also, because XIV Storage pools are used to group volumes but not disks, no disks will be reported for a particular storage pool under the reporting branch just mentioned.

Finally, the following reports will not contain any information for XIV Storage Subsystems:

- ► Disk Manager → Reporting → Storage Subsystems → Computer Views → By Computer (Relate Computers to Disks)
- ► Disk Manager → Reporting → Storage Subsystems → Computer Views → By Computer Group (Relate Computers to Disks)
- ► Disk Manager → Reporting → Storage Subsystems → Computer Views → By Filesystem/Logical Volume (Relate Filesystems/Logical Volumes to Disks)
- ► Disk Manager → Reporting → Storage Subsystems → Computer Views → By Filesystem Group (Relate Filesystems/Logical Volumes to Disks)
- ► Disk Manager → Reporting → Storage Subsystems → Storage Subsystem Views → Disks (Relate Disks to Computers)



# 11

# Customized Reporting through Tivoli Common Reporting

In this chapter, we focus on creating customized reports using external tools such as Tivoli Common Reporting / BIRT. For information about using TPC's built-in reporting capabilities, see Chapter 10, "Reporting through TPC" on page 505.

## 11.1 Customized reporting overview

Tivoli Storage Productivity Center provides a vast amount of reports readily available through either Graphical User Interface (GUI) or Command Line Interface (CLI). Pre-defined report definitions can be customized (up to a certain extent) and saved for future reference. In addition, reports can be scheduled to run repeatedly (Batch Reports) allowing automated publication of data without having to invoke TPC GUI or CLI.

For certain usage scenarios, however, those existing reporting functions do not offer sufficient flexibility. Those usage scenarios include:

- Combining and merging information collected through TPC with external data sources, for example, in order to implement custom chargeback solutions
- Complex calculation, transformation, or post-processing of data collected through TPC
- Integration of information collected through TPC into external database repositories, for example, in order to feed custom configuration databases

To work around those limitations, it has always been possible to export data into a machine-readable format such as CSV (comma separated values). Custom scripts or spreadsheet applications such as Microsoft Excel® can then be used to read in (parse) the information prior to performing the desired calculation / transformation. This process, however, is lengthy, complex, error prone, and inefficient.

To address these deficiencies, Tivoli Storage Productivity Center V4.1 provides supported means to access the TPC database repository using Structured Query Language (SQL), as outlined in this chapter.

**Note:** We assume that readers have a certain level of understanding of relational database concepts. Basic principles and terms used throughout this chapter are introduced briefly, but not explained in detail.

### 11.2 Database repository access

IBM Tivoli Storage Productivity Center stores information that it collects from the storage environment, in its DB2 database repository. Data collection jobs define how often data is being read from the available data sources, and history retention settings define how long the collected data has to be stored before it is being aggregated and finally purged (deleted) from the repository.

In addition, TPC-specific definitions such as Data Sources and Groups are stored in the database repository as well. They are, of course, not automatically purged.

In this section, we outline the technical details of how repository access for reporting purposes is implemented, and what needs to be considered when accessing the data. At the end of the chapter, we walk through an example query development process.

#### 11.2.1 Relational database fundamentals

Information in the database repository is organized into a set of *Tables*. Relational database tables can be considered a logical abstraction of the storage space available to the database system. Table rows (data records) can be inserted into tables and removed from tables, without having to consider placement of data on the physical disk.

Tables contain one or more *Columns*, each of a certain data type (such as number or text). Each row that is inserted into the table must follow this definition and contain one value for each of the defined columns (fields). Fields can, however, have default values as well.

In a relational database, the *Schema* defines tables, the fields in each table, and the relationships between fields and tables.

A *View* is a way of describing data that exists in one or more of these tables. A view "behaves" just like a table, even though it does not contain any data, but only refers to information that is stored in tables. Thus, it can be considered an abstraction of the actual table structure; you can use views without having to know in which tables the data is actually stored.

The *Structured Query Language* (SQL) can be used to retrieve information from tables or views. Using SQL statements, you can precisely define which data is to be retrieved from the database repository. The information queried using SQL statements can then be used, for example, to populate a report outside of Tivoli Storage Productivity Center. The SQL language offers a flexible and comprehensive means of doing so.

The SQL language also allows defining complex calculations and post-processing of data retrieved from tables or views, for example, sorting, filtering, merging, statistical operations, and lookups. Those calculations and transformations are performed by the database management system itself without having to invoke additional software. In addition, modern database systems such as IBM DB2 allow definition of *User Defined Functions* (UDFs) to perform custom calculations and complex transformations very efficiently.

#### 11.2.2 TPC database repository access

IBM Tivoli Storage Productivity Center uses a DB2 database repository to store its information. Accessing the TPC repository tables directly (using SQL) while bypassing the server components was already possible in the past, but there were major concerns with doing so:

- The database schema was possibly changed from one TPC release to another in order to address defects or implement improvements. Any statement written against a certain TPC version was not guaranteed to work with subsequent versions.
- Because the TPC internal database schema was not officially documented, writing SQL queries involved reverse-engineering of the table structure which was complex, lengthy, and cumbersome.
- Due to the transaction concept of database systems, querying data from tables usually "locks" the read data records until the transaction is committed. Without according measures, querying data for reporting purposes might interfere TPC server operations because of potential locking issues.

In TPC V4.1 a set of "stable" database views was introduced to address those issues. SQL statements written against the new database views are guaranteed to work also in subsequent versions of TPC. Any changes to the internal database structure can be hidden through adoption of the view definitions.

**Warning:** Insertion of new data or modification of existing data in the repository tables is currently out of scope and generally not possible. Attempting to do so will cause corruption of the database repository.

The only supported way of accessing the repository views is for read-only (SELECT).

The data model, which is based on the SMI-S model, is now fully documented and, in addition, was simplified compared to the internal repository schema. The internal schema is optimized for use by the TPC server, whereas the repository views are intended to be used for reporting. This simplification includes resolution of strings, in turn lifting the requirement to decode complex values manually.

Certain TPC-internal data not having any relevance outside of the TPC server itself, is not surfaced through the reporting views. This further reduces the complexity and size of the database schema.

Notice that the database views do not allow exporting the reports readily available through GUI and CLI directly, but instead provide access to the actual data within the database repository. When generating reports through TPC GUI, for example, additional calculations are performed on the data in the repository.

You can use the Structured Query Language (SQL) to retrieve information from reporting views and then use that information in reports and applications outside of Tivoli Storage Productivity Center. Those applications include, but are not limited to:

- Microsoft Excel or other spreadsheet applications using ODBC, for example
- Tivoli Common Reporting (TCR) / Business Intelligence and Reporting Tools (BIRT)
- Storage Enterprise Resource Planner (SERP)
- ► IBM Cognos®
- Crystal Reports
- ► Any scripting language providing SQL database interfaces, such as Perl, PHP or Ruby.

**Important:** The risk of potential locking issues interfering the TPC server operations was not completely voided with the introduction of stable database views! You must take according measures to avoid conflicts when querying data from the TPC repository!

This is especially true when using low-level SQL interfaces, such as the ones provided by scripting languages. Be sure to always use an isolation level of UR *(Uncommitted Read)* and a *Fetch Only* connection type when connecting to the TPC database repository!

The views are created within a separate DB2 schema when the Database Schema component of the TPC server is installed. The name of the schema containing the reporting views is *TPCREPORT*, whereas all TPC-internal tables are stored in a schema named *TPC*.
Figure 11-1 shows how the reporting schema is displayed in the DB2 Control Center after a fresh TPC installation.

Sontrol Center - DB2COPY1	- II ×
Control Center Selected Edit View Tools Help	
₽ 🕈 ฿ 🖬 ๖ 🔯 🛛 🛣 📮 🤇	
Dbject View	
Control Center	COLORADO - DB2 - TPCDB - Schemas
🗄 🗂 All Systems	Name Authorization Comment
🗄 🗠 🧰 All Databases	
i IBMCDB	SYSPROC SYSIBM
🖃 🗝 🗍 TPCDB	SYSSTAT SYSIBM
Tables	SYSTOOLS SYSIBM
🗁 Views	TPC DB2ADMIN
Aliases	TPCREPORT SYSIBM
Nicknames	
🗄 🗠 🛅 Cache Objects	
Triggers	13 of 13 items displayed 🖓 🔅 🕀 🕀 Default View* View
🗁 Schemas	
🛅 Indexes	
🛅 Table Spaces	Schema Name : TPCREPORT
🛅 Event Monitors	Uwher ID : SYSIBM
🛅 Buffer Pools	Actions:
🗄 🗠 🫅 Application Objects	Schema Privileges
🗄 🗠 🛅 User and Group Objects	Create New Schema
🗄 🗂 🛅 Federated Database Objects	
🔤 XML Schema Repository (XSR)	

Figure 11-1 TPCREPORT schema in DB2 Control Center

In addition to the views, a set of User Defined Functions (UDFs) has been defined in the TPCREPORT schema to perform complex calculations and transformations of data stored in the database repository.

UDFs are provided to allow computation of performance metrics; the database tables only contain raw performance counters and so do the views. In order to calculate the performance metrics that are available when generating reports, for example, by the TPC GUI (such as I/O Rate or Cache Hit Percentage), you will need to apply UDFs on the raw counter data.

### 11.2.3 Available documentation

Detailed documentation about the TPCREPORT database schema can be found at the following URL, which is also available through the TPC support pages:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&uid=swg27015676&loc =en\_US&cs=UTF-8&lang=en

The following files are available for download from this URL:

**Report ingViewERDiagram.jpg** This diagram traces the relationship between a host computer and a storage subsystem disk and shows the views that contain information about the storage entities within that relationship.

> It acts as a starting point to quickly get a high-level overview of the available entities and their relationships. Using the diagram, you can navigate the most relevant views within the TPCREPORT schema.

**TPCREPORT\_schema.zip** The HTML files in this compressed archive provide a complete list and diagrams of all views that exist in the TPCREPORT schema, their relationships, and descriptions of the columns within those views. This file has to be your primary reference on any detail questions.

You will need to extract the contents of this archive to a temporary directory and open index.html with a Web browser to view the contents.

Notice that all diagrams and pages are linked. Diagrams contained in the HTML files directly link to pages providing additional information about the entity clicked, and so on.

 
 PM\_Metrics.xls
 A Microsoft Excel spreadsheet that lists the views containing performance data and shows all performance metrics available within those views. The information is sorted by the device for which performance metrics are available.

> Notice that the database views only provide access to raw performance counters. You will need to apply User Defined Functions (UDFs) on the raw counter data in order to compute performance metrics such as I/O Rate or Cache Hit Percentage. This spreadsheet contains information about all required UDFs as well as their usage.

The TPC InfoCenter provides the following resources on the reporting views:

### Setting up a view only user:

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/topic/com.ibm.tpc\_V41.doc/f qz0\_t\_setup\_viewonly.html?resultof=%22%65%78%70%6f%73%65%64%22%20%22%65%78%70%6f%7 3%22%20%22%76%69%65%77%73%22%20%22%76%69%65%77%22%20

### Planning for SQL access:

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/topic/com.ibm.tpc\_V41.doc/f qz0\_t\_planning\_views\_ig.html?resultof=%22%65%78%70%6f%73%65%64%22%20%22%65%78%70%6 f%73%22%20%22%76%69%65%77%73%22%20%22%76%69%65%77%22%20

#### Accessing views in the repository:

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/topic/com.ibm.tpc\_V41.doc/f qz0\_t\_access\_views.html?resultof=%22%65%78%70%6f%73%65%64%22%20%22%65%78%70%6f%73% 22%20%22%76%69%65%77%73%22%20%22%76%69%65%77%22%20

#### SQL access (what is exposed):

http://publib.boulder.ibm.com/infocenter/tivihelp/v4r1/index.jsp?topic=/com.ibm.tp c\_V41.doc/fqz0\_c\_views.html

In addition to the TPC-specific documentation of the reporting schema, you might need to refer to certain DB2 database documentation. All relevant documents are available from the DB2 Information Center found at the following URL:

#### http://publib.boulder.ibm.com/infocenter/db2luw/v9r5/index.jsp

In particular, you might require detailed information about the DB2 SQL language. Refer to the publication *IBM DB2 Command Reference*, SC23-5846, which is available from the Information Center.

## 11.2.4 Creation of view-only reporting user

Prior to developing SQL queries, we highly recommend that you create a dedicated database user ID for this purpose. The user ID must have view-only rights on the TPC reporting schema only, to avoid any accidental impact to the TPC server operations.

In this section, we walk through the process of creating and authenticating an individual user ID. Alternatively, you can authenticate an operating system or Directory group with DB2; all users that are members of this group are then automatically granted the according privileges. For additional details on doing so, refer to the **DB2 Information Center**  $\rightarrow$  **Database fundamentals**  $\rightarrow$  **Security**, found at the following URL:

http://publib.boulder.ibm.com/infocenter/db2luw/v9r5/index.jsp

The following procedure applies to Windows installations. For details about creating view-only users on AIX or Linux, refer to the DB2 Information Center section mentioned earlier.

To create a view-only user on Windows, follow this procedure:

- 1. Log on to the system as the *Administrator* user. You will need both DB2 administrative authority and operating system administrative authority for the following procedure.
- 2. Create a new operating system user. For example, create a user named TPCRPT.
  - a. Open the *Computer Management* window from the Start menu under **Control Panel** → **Administrative Tools** → **Computer Management**. Alternatively, access the window by right-clicking **My Computer** and then selecting **Manage** from the context menu. The Computer Management window opens up.
  - b. In the left-hand panel, click **Local Users and Groups**. Then, in the right-hand panel, click **Users** as shown in Figure 11-2.



Figure 11-2 Computer Management panel

- c. Open the **Action** menu from the menu bar and click **New User...** to open the New User panel.
- d. Enter information about the new user as shown in Figure 11-3.

lew User		? ×
<u>U</u> ser name:	TPCRPT	
<u>F</u> ull name:		
Description:	View-only user for TPC reporting	
Password:	•••••	
<u>C</u> onfirm passwor	d: •••••	
User must cl	nange password at next logon	
User cannot	change password	
Password ne	ever expires	
C Account is d	isa <u>b</u> led	
	Create	Close

Figure 11-3 New User panel

Enter a User name, a Password (twice), and optionally a Description. Uncheck **User must change password at next logon**. In addition, we recommend that you check the **Password never expires** option to prevent the password from expiring (because this will be a technical user account, only). When you are done, click **Create**.

e. The New User panel will remain open; click Close to close it.

- 3. Use the DB2 Control Center to assign database authority to the new user.
  - a. Start the DB2 Control Center from the Start menu under All Programs  $\rightarrow$  IBM DB2  $\rightarrow$  DB2COPY1 (Default)  $\rightarrow$  General Administration Tools  $\rightarrow$  Control Center.
  - b. Expand the branch with the name of your TPC database (the default is *TPCDB*) in the left-hand panel and select **User and Group Objects**. In the upper right-hand panel, click **Users** as shown in Figure 11-4. In the bottom right-hand panel, click **Add New User** from the list of available Actions. This opens the Add User window.

Scontrol Center - DB2COPY1			
Control Center Selected Edit View Tools Help			
₽ % % ॼ ⋟ @ । % ₽	• = { ?		{
Dbject View			
Control Center	COLORADO - DB2 - TPCDB - Use	ser and Group Objects	
🖅 🗁 All Systems	Name 🛆		
🖻 💼 All Databases			
E- TPCDB			
Tables			
🗁 Views			
Ciases			
Nicknames			
🗄 🛅 Cache Objects	P		
Triggers	2 of 2 items displayed	↓ Ž 🍀 🕀 💬 🖓 🎝 Default View	View
Schemas			
📄 Indexes	DB Users	3	<u>Help</u> X
📄 Table Spaces 🔪	Actions:	Select an object from the list above to display m	ore details.
Event Monitors	Add New Liser		
🛅 Buffer Pools			
🕀 🧰 Application Objects			
🗄 🗁 User and Group Objects			
🖅 🗠 🛅 Federated Database Objects			
🔤 XML Schema Repository (XSR)			

Figure 11-4 Click Add New User from available Actions

c. In the Add User panel, select the previously created operating system user ID from the User drop-down list (TPCRPT in our case). From the list of available Authorities, check the Connect to database entry and make sure all other entries remain unchecked. See Figure 11-5 for an example.

🐾 Add User	×
COLORADO - DB2 - TPCDB	
Database Schema Table Index View Table Space Function Procedure Method Package	
Spenifu a user name. You can select a user name from the list or tupe one in	1
Specily a user name. Tou can select a user name nom the list of type one lin.	
Choose the appropriate authorities to grant to the selected user	
Authorities	
Connect to database	
Create tables	
Create packages	
Register routines to execute in database manager's process	
Database administrator authority	
Create schemas implicitly	
C Access to the load utility	
Create external routines	
Connect to guiesced database	
Security administrator authority	
OK Cancel Apply Reset Show SQL Help	

Figure 11-5 Add User window

d. Select the View tab in the Add User window, as seen in Figure 11-6.

dd User	X
ORADO - DB2 - TPCDB	
itabase Schema Table ndex <sup>View</sup> Table Space Fur	nction Procedure Method Package
View SELECT INSERT UPDATE DELE	TE CONTROL Add View
	Grant All
	Revoke All
<u>د ا</u>	
IVIIeges: SELECT INSERT UPDATE D	DELETE CONTROL
Yes 🔽 Yes 🔽 Yes 🔽 Ye	s 🔻 Yes 🔻
	Davak Chan COL Link
	Teset Suom Sur Helb

Figure 11-6 View tab of Add User panel

You will notice that currently the selected reporting user ID has no authorities to access any views. To grant access to all views in the TPCREPORT schema, click **Add View**. This opens the Add View window.

e. Select **TPCREPORT** from the Schema drop-down list. This will display all available views within that schema. Click any of the views and then press the **<CTRL> + <A>** key combination to select all views, as shown in Figure 11-7.

💑 Add View 🔀
Schema TPCREPORT
View list
TPCREPORT AGGREGATE_DATABASE_SUMMA TPCREPORT AGGREGATE_DATABASE_SUM_H TPCREPORT AGGREGATE_FILESYSTEM_SUMM TPCREPORT BACKENDCONTROLLER TPCREPORT BACKENDDISK_HISTORY TPCREPORT BACKENDDISK_HISTORY TPCREPORT CIMOM_AGENT TPCREPORT CIMOM_AGENT TPCREPORT CLUSTERRESOURCEGROUP TPCREPORT.COMPUTER2ENTITY
OK Cancel Apply Help

Figure 11-7 Add View window

Be sure to select all views in the TPCREPORT schema before clicking OK to continue.

f. The Add User panel now lists all views in the TPCREPORT schema. In order to grant the reporting user view-only privileges on all of them, do the following tasks.

Select one of the entries and then press the **<CTRL> + <A>** key combination to select all views. After all entries are selected, locate the drop-down menu for **SELECT** Privileges. Select **Yes** from the drop-down to grant the reporting user SELECT Privileges on all views in the TPCREPORT schema. The result looks similar to Figure 11-8.

View	SELECT	INSERT	UPDATE	DELETE	CONTROL	Add <u>V</u> iew
TPCREPOR	1	$\otimes$	8	$\otimes$	<u> </u>	Grant All
TPCREPOR	1	$\otimes$	8	$\otimes$	<u> </u>	
TPCREPOR	1	$\otimes$	8	$\otimes$	$\otimes$	Revoke All
TPCREPOR	1	8	8	8	$\otimes$	
TPCREPOR	1.	0	0	0	<u> </u>	
TPCREPOR	1.	0	0	0	<u> </u>	
TPCREPOR	1.	8	8	8	$\otimes$	
TPCREPOR	1	8	8	8	$\otimes$	
TPCREPOR	1	8	8	8	$\otimes$	
TPCREPOR	1	<u> </u>	8	8	$\otimes$	
TPCREPOR	1	8	8	$\otimes$	$\otimes$	
TPCREPOR	1	<u> </u>	0	0	$\otimes$	
TPCREPOR	1	8	8	<u> </u>	$\otimes$	
TPCREPOR	1	8	8	$\otimes$	$\otimes$	
TPCREPOR	1	8	8	<u> </u>	$\otimes$	
TPCREPOR	1	0	<u> </u>	$\otimes$	$\otimes$	
TPCREPOR		8	8	0	$\otimes$	
TPCREPOR		0	0	0		
TPCREPOR		$\otimes$	0			
•						
		NOTET		DELET	CONTRO	u

Figure 11-8 Grant SELECT privileges for all views

Be sure that for all views, there is a green tick mark in the SELECT column, and only in the SELECT column.

g. Next, click the **Function** tab in the Add User window to bring up the Function panel, as illustrated in Figure 11-9.

🏪 Change User - TPCRPT			×	
COLORADO - DB2 - TPCDB -	TPCRPT	$\frown$		
Database Schema Table	Index View Table Spac	Function Procedure	Method Package	
Function			Add Function	
Privileges: EXECUTE				
	OK Cance	H Reset Sł	no <u>w</u> SQL Help	

Figure 11-9 Add user: Function panel

Again, you will notice that no authorities to execute functions have been granted to the reporting user, yet. Click **Add Function** to add such authorities.

h. Select **TPCREPORT** from the Schema drop-down list. This will display all available functions within that schema. Click any of the functions and then press the 

Add Function		
TPCREPORT       Function list       TPCREPORT.GET_ACCESS_LD_TYPE(CHAR(I))       TPCREPORT.GET_ACCESS_LD_TYPE(CHAR(I))       TPCREPORT.GET_ALERT_CON(SMALLINT)       TPCREPORT.GET_ALERT_CON(SMALLINT)       TPCREPORT.GET_ALERT_CON(SMALLINT)       TPCREPORT.GET_ALERT_CON(SMALLINT)       TPCREPORT.GET_ARRAY_NAME(INTEGER)       TPCREPORT.GET_ARRAY_NAME(INTEGER)       TPCREPORT.GET_ARRAY_NAME(INTEGER)       TPCREPORT.GET_ARRAY_NAME(INTEGER)       TPCREPORT.GET_BOOL_STRING(CHAR(I))       V       OK     Cancel	Add Function	×
Function list         TPCREPORT.GET_ACCESS_LD_TYPE(CHAR())         TPCREPORT.GET_ACCESS_LD_TYPE(CHAR())         TPCREPORT.GET_ACCESS_LD_TYPE(CHAR())         TPCREPORT.GET_ALERT_CON(SMALLINT)         TPCREPORT.GET_ALERT_TYPE(SMALLINT)         TPCREPORT.GET_ARRAY_NAME(INTEGER.INT)         TPCREPORT.GET_ARRAY_NAME(INTEGER.INT)         TPCREPORT.GET_ARRAY_NAME(INTEGER.INT)         TPCREPORT.GET_ARRAY_NAME(INTEGER.INT)         TPCREPORT.GET_ARRAY_NAME(INTEGER.INT)         TPCREPORT.GET_BACKEND_MODE(INTEGER.INT)         TPCREPORT.GET_BOOL_STRING(CHAR())         V         OK       Cancel       Apply       Help		
Function list TPCREPORT_EPOCH_T0_TS(DOUBLE) TPCREPORT_GET_ACCESS_LD_TYPE(CHAR(I)) TPCREPORT_GET_ALERT_CON(SMALLINT) TPCREPORT_GET_ALERT_TYPE(SMALLINT) TPCREPORT_GET_ARERT_TYPE(SMALLINT) TPCREPORT_GET_ARRAY_NAME(INTEGER,INT) TPCREPORT_GET_ARRAY_NAME(INTEGER,INT) TPCREPORT_GET_ARRAY_NAME(INTEGER,INT) TPCREPORT_GET_ARRAY_NAME(INTEGER,INT) TPCREPORT_GET_BACKEND_MODE(INTEGER) TPCREPORT_GET_BOOL_STRING(CHAR(I)) CK Cancel Apply Help	Schema   IPCREPURT	<u> </u>
TPCREPORT EPOCH_TO_TS(DOUBLE) TPCREPORT GET_ACCESS_LO_TYPE(CHAR(I)) TPCREPORT GET_ALERT_CONISMALLINT) TPCREPORT GET_ALERT_CONISMALLINT) TPCREPORT GET_ARCH_STATUS(CHAR(I)) TPCREPORT GET_ARCH_STATUS(CHAR(I)) TPCREPORT GET_ARRAY_NAME(INTEGER,INTI TPCREPORT GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_BOOL_STRING(CHAR(I)) CK Cancel Apply Help	Euroption list	
TPCREPORT EPOCH_TO_TS(DOUBLE)     ▲       TPCREPORT.GET_ACCESS_LD_TYPE(CHAR(I))     TPCREPORT.GET_AGENT_STATE(CHAR(I))       TPCREPORT.GET_ALERT_CON(SMALLINT)     TPCREPORT.GET_ACCESS_LD_TYPE(SMALLINT)       TPCREPORT.GET_ARCH_STATUS(CHAR(I))     TPCREPORT.GET_ARCH_STATUS(CHAR(I))       TPCREPORT.GET_ARCH_STATUS(CHAR(I))     TPCREPORT.GET_ARCH_STATUS(CHAR(I))       TPCREPORT.GET_ARCH_STATUS(CHAR(I))     TPCREPORT.GET_ARCH_STATUS(CHAR(I))       TPCREPORT.GET_ARCH_STATUS(CHAR(I))     TPCREPORT.GET_BACKEND_MODE(INTEGER)       TPCREPORT.GET_BOOL_STRING(CHAR(I))     ▼       OK     Cancel     Apply		
IPCREPORT.GET_AGENT_STATE(CHARI())       IPCREPORT.GET_AGENT_STATE(CHARI())       IPCREPORT.GET_ALERT_CON(SMALLINT)       IPCREPORT.GET_ALERT_TYPE(SMALLINT)       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_ARCH_STATUS(CHARI())       IPCREPORT.GET_BOOL_STRING(CHARI())       I       OK     Cancel       Apply       Help	TPCREPORT.EPOCH_TO_TS(DOUBLE)	4
TPCREPORT.GET_ALERT_CON(SMALLINT) TPCREPORT.GET_ALERT_CON(SMALLINT) TPCREPORT.GET_ALERT_TYPE(SMALLINT) TPCREPORT.GET_ARRAY_NAME(INTEGER.INTI TPCREPORT.GET_ARRAY_NAME(INTEGER.INTI TPCREPORT.GET_ATRIBUTES(INTEGER) TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BOOL_STRING(CHAR()) ■ OK Cancel Apply Help	TPCREPURI.GET_ACCESS_LD_TYPE(CHAR())	
TPCREPORT GET_ALERT_CONISMALLINT) TPCREPORT GET_ALERT_TYPE(SMALLINT) TPCREPORT GET_ARRAY_NAME(INTEGER.INTI TPCREPORT GET_ARRAY_NAME(INTEGER.INTI TPCREPORT GET_AVAILABILITY(SMALLINT) TPCREPORT GET_BACKEND_MODE(INTEGER) TPCREPORT GET_BOOL_STRING(CHAR(I))	TPCREPURT.GET_AGENT_STATE(CHAR())	
TPCREPORT.GET_ARCH_ITYPE(SMALLINT) TPCREPORT.GET_ARCH_STATUS(CHAR()) TPCREPORT.GET_ARCAY_NAME(INTEGER.INTI TPCREPORT.GET_ATTRIBUTES(INTEGER) TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BOOL_STRING(CHAR()) ▼ OK Cancel Apply Help	TPUREPORT.GET_ALERT_CON(SMALLINT)	
TPCREPORT GET_ARRAY_NAME(INTEGER,INTI TPCREPORT GET_ARRAY_NAME(INTEGER,INTI TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BOOL_STRING(CHAR(I)) ▼ OK Cancel Apply Help	TPUREPURT.GET_ALERT_ITPE(SMALLINT)	
TPCREPORT.GET_ATRIBUTES(INTEGER) TPCREPORT.GET_ATRIBUTES(INTEGER) TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BOOL_STRING(CHAR(I))		
TPCREPORT.GET_AVAILABILITY(SMALLINT) TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BOOL_STRING(CHAR()) COK Cancel Apply Help	TPOREPORT GET ATTRIBUTES(INTEGER)	
TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BACKEND_MODE(INTEGER) TPCREPORT.GET_BOOL_STRING(CHAR())	TPCBEPORT GET_AVAILABILITY(SMALLINT)	
TPCREPORT.GET_BOOL_STRING(CHAR())	TPOBEPORT GET BACKEND MODE(INTEGER)	
OK Cancel Apply Help	TPCBEPORT GET BOOL STRING(CHAB())	-1
OK Cancel Apply Help		Ľ.
OK Cancel Apply Help		1
OK Cancel Apply Help		
	OK Cancel Apply Hel	р

Figure 11-10 Add Function: Schema drop-down list

Be sure to select all functions in the TPCREPORT schema before clicking  $\ensuremath{\text{OK}}$  to continue.

 The Add User panel now lists all functions in the TPCREPORT schema. Select one of the entries and then press the <CTRL> + <A> key combination to select all functions. With all entries selected, locate the drop-down menu for EXECUTE Privileges. Select Yes from the drop-down to grant the reporting user EXECUTE Privileges on all functions in the TPCREPORT schema. The result looks similar to Figure 11-11.

COLOBADO - DB2	- TPCRPT	CBPT	X
Database Sche	ma Table In	dex View Table Space Function Procedure	Method Package
Function	EXECUTE		Add Function
TPCREPOR	1		Crent All
TPCREPOR	1		
TPCREPOR	1	<b></b>	Revo <u>k</u> e All
TPCREPOR	1		
TPCREPOR	1	-	
Privileo	TITE		
Yes			
		OK Cancel <u>R</u> eset Sh	io <u>w</u> SQL Help

Figure 11-11 Change User privileges

Be sure that for all functions, there is a green tick mark in the EXECUTE column. Click **OK** when you are done.

j. Back in the Control Center window, you can now see an entry for the reporting user (TPCRPT in our case) when expanding TPCDB → User and Group Objects → DB Users, as seen in Figure 11-12.

Control Center - DB2C0PY1	
Control Center Selected Edit View Tools Help	
₽ 😚 የ\$ 🖬 ๖ 🔯 🛛 🐕 📮 🤇	
Dbject View	
Control Center	COLORADO - DB2 - TPCDB - DB Users
🗄 🫅 All Systems	Name
🖻 🗂 🛅 All Databases	
Em IBMCDB	
E TPCDB	
Tables	
Views	
Aliases	
🛅 Nicknames	
🕀 💼 Cache Objects	
Triggers	3 of 3 items displayed ↓ 2 SP 32 B4 2 Default View. View
Schemas	A Licer - TPCPPT
indexes	
Table Spaces	Actions:
Event Monitors	A Change User Privileges
Buffer Pools	
Application Objects	Add New User
User and Group Objects	
DB Users	
DB Groups	
Federated Database Objects	
🛅 XML Schema Hepository (XSR)	

Figure 11-12 New view-only user authority

The reporting user ID is now given view-only access to the TPCREPORT schema, and has no access to the TPC-internal database schema. Use this user ID for all reporting activities to avoid any accidental impact to the TPC server operations.

**Important:** It is still possible to interfere with the TPC server by issuing SELECT statements locking data records! In order to avoid this, be sure to always use an isolation level of UR (*Uncommitted Read*) and a *Fetch Only* connection type when connecting to the TPC database repository!

## 11.2.5 Using TPCREPORT schema documentation

Prior to being able to develop SQL queries, you will typically want to refer to the TPCREPORT schema documentation to identify the views that you are particularly interested in, containing the piece of information you are looking for.

Follow this procedure to do so:

1. Download the file TPCREPORT schema.zip from the following URL:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&uid=swg27015676& loc=en\_US&cs=UTF-8&lang=en Extract the file to a temporary directory and open index.html using your Web browser of choice. The following page is displayed, as shown in Figure 11-13.



Figure 11-13 TPC Views documentation Welcome panel

2. Click the link underneath the graphic to navigate to the main overview page, as seen in Figure 11-14.



Figure 11-14 TPC Views documentation overview page

The left-hand panels provide direct access to all Diagrams and Elements (database views) available in the TPCREPORT schema. Scroll down the bottom left-hand panel until you locate a view named **STORAGESUBSYSTEM**. Click it to open the detail page providing information about this particular view.

The right-hand panel provides you with a list of all available columns in the view, their data type, as well as a description and possible values. Notice that you can always use hyperlinks to directly navigate to additional information, for example, on a certain column.

You can also select a diagram from the left-hand panels to get a better overview about the relationships between entities described in views, such as the **StorageSubsystems View Diagram**. See Figure 11-15 for an example.



Figure 11-15 TPC Views documentation diagram

Notice that all diagrams contain direct links to pages containing detailed information about the entity which has been clicked.

## 11.2.6 Sample SQL query development process

In this section, we briefly walk through the process of creating a simple SQL statement querying information from the TPC reporting views.

There are various tools available to assist you in developing SQL statements. In this example we illustrate a sample workflow using standard DB2 tools only.

**Note:** Tivoli Common Reporting (TCR) / Business Intelligence and Reporting Tools (BIRT) is not specifically intended to be used for development of SQL statements. We recommend that you develop and test SQL statements using external tools first, and start building TCR / BIRT reports after SQL statement development is (nearly) complete.

To start developing SQL queries using DB2 tools, follow this procedure:

1. Open DB2 Command Editor, a component of the DB2 Control Center.

If you installed DB2 on Windows, you will find a shortcut in the Start menu under All Programs  $\rightarrow$  IBM DB2  $\rightarrow$  DB2COPY1 (Default)  $\rightarrow$  Command Line Tools  $\rightarrow$  Command Editor.

If you installed DB2 on Linux, you can run the graphical DB2 Command Editor by entering the following command (you need to source the db2profile prior to being able to use DB2 tools such as Command Editor):

db2ce

**Note:** You must have the X11 graphical capability installed before running DB2 Command Editor on Linux. Refer to Appendix C, "Worksheets" on page 641.

If you installed DB2 on AIX, there is no DB2 Command Editor available. You need to install the DB2 client on either a Windows or Linux machine, and then remotely connect to the DB2 instance on AIX. For additional information about this procedure, consult the DB2 documentation on Database administration  $\rightarrow$  Administrative interfaces  $\rightarrow$  Control Center found at the following URL:

http://publib.boulder.ibm.com/infocenter/db2luw/v9r5/index.jsp

2. The DB2 Command Editor window is displayed, looking similar to Figure 11-16.

🗃 Command Editor 1 - D82COPY1
Command Editor Selected Edit View Tools Help
유 😚 😘 🗔 🖆 🗐 🦉 📮 🧹 🕜
Commands
🕨 🔲 🚺 Target 🔄 🔄 🖂 🖂 🖓 🖋 🖻 👔
Statement termination character

Figure 11-16 DB2 Command Editor window

Notice the drop-down menu in the toolbar on top of the window, labeled **Target**. When brought up initially, the drop-down menu does not contain any available targets. In order to add a target database, click the **Add** button right next to the drop-down.

3. The panel shown in Figure 11-17 is displayed, allowing you to choose a local database to connect to. Choose the TPC database (the default name is *TPCDB*) and make sure that **Use implicit credentials** is unchecked. Instead of using the implicit credentials of the user currently logged on (in turn providing administrative authority), enter the user ID and password for the view-only reporting user created previously (*TPCRPT* in our case). For details, refer to 11.2.4, "Creation of view-only reporting user" on page 529.

🖾 Specify Target 🛛 🗙
Target type DB2 Database for Linux, UNIX and Windows
Available targets
ВМССВ
🗍 ТРСОВ
Use implicit credentials
Password
OK Cancel Help

Figure 11-17 Specify Target window

**Note:** Only local databases are displayed in the list of Available Targets. If you need to make a connection to a remote database, you have to create a local alias prior to using the DB2 Command Editor with it.

Refer to the DB2 documentation on Database administration  $\rightarrow$  Administrative interfaces  $\rightarrow$  Control Center found at the following URL:

http://publib.boulder.ibm.com/infocenter/db2luw/v9r5/index.jsp

Click **OK** to add the database connection.

4. The DB2 Command Editor will automatically select the database connection that you just added and attempt to connect to it. The results are shown in the output panel (the lower part of the Command Editor window). If the connection attempt was successful, then the displayed message looks similar to Figure 11-18.

🖼 Command Editor 1 - DB2COPY1	
Command Editor Selected Edit View Tools Help	
┣ ヤ ☆ ⊑ >  ▣ ☆ ⊑ < ፼ < ?	
Commands Query Results Access Plan	
🕨 🗏 📩 🕺 Target 🗍 TPCDB (TPCRPT) 💽 Add 🖾 😂	🖶 🎰 🇰 💰 🗈 🖍 🥙
Commands Entered	
connect to TPCDB user TPCRPT using ********;	
connect to TPCDB user TPCRPT using	
Database Connection Information	
Database server = DB2/NT 9.5.3	
SQL authorization ID = TPCRPT	
Local database alias = TPCDB	
A JDBC connection to the target has succeeded.	
Statement termination character ;	

Figure 11-18 Successful connection message

- 5. After you have successfully connected with the database, you can query information from the reporting views. You will typically want to refer to the TPCREPORT schema documentation at this point to identify the views that you are interested in, containing the piece of information that you are looking for. See 11.2.5, "Using TPCREPORT schema documentation" on page 537 for details about doing so.
- 6. After identification of the view that you are particularly interested in, you can start writing the initial SQL query. Go back to the DB2 Command Editor and enter the following command into the top panel:

```
select
```

from

TPCREPORT.STORAGESUBSYSTEM for fetch only with UR

See Figure 11-19 for an example.

**Important:** To avoid locking issues and interference with the TPC server, always use an isolation level of UR (*Uncommitted Read*) and a *Fetch Only* connection type!

You can set those parameters per statement by appending the following line to any SQL statement you issue against the TPC database repository:

for fetch only with UR

🗃 Command Editor 1 - DB2COPY1			
Command Editor Selected Edit View Tools Help			
Commands Query Results Access Plan			
🕑 🛛 🗞 🚴 Target 🗻 TPCDB (TPCRPT) 🔄 🛕dd 🖾 🕼	; 🖬 📥 🗰 🖌 🖻	💼 🥙 🕮 <	
select *			
from			
TPCREPORT. STORAGESUBSYSTEM			
for fetch only with UR			
Commands Entered			
connect to TPCDB user TPCRPT using ********;			
Connect to Frend user Frendri using			
Database Connection Information			
Database server = DB2/NT 9.5.3			
Local database alias = TPCDB			
A JDBC connection to the target has succeeded.			
Statement termination character			

Figure 11-19 Click green arrow in toolbar to execute query

7. When you click the green arrow found in the toolbar area of the Command Editor window, the SQL query gets issued against the selected target database. You will see a progress indicator (Figure 11-20) while the database system fetches the requested data. Wait until the process finishes.

Progress	×
Elapsed time	
00:00:06	0
Clos	e

Figure 11-20 Progress indicator

8. As soon as the query is complete, the DB2 Command Editor window switches to the Query Results tab, as shown in Figure 11-21.

Command Editor 1 - DB2LUP¥1							
Command Editor Selected Edit View	Loois Help						
남 😗 않 🖬 🏼 🔯 🔋	🔏 🖵 { 🖻	] { ?					
Commands Query Results Access Plan							
Edits to these results are performed as posi	tioned UPDATEs a	and DELETEs. Use th	he Tools Settings notebook to cl	hange the form o	f editing.		
SUBSYSTEM_ID	NAME 👙	NAME_FORMAT ⇔	USER_PROVIDED_NAME \$	UDP1 🗧	UDP2	⇔ UDP3 ÷	Add Row
66466 SVC-2145-ITSDSV	9.12.5.67:0000	Other					
12836 5884-ITSO DS450	600A0B80001	NAA					Delete How
12817 3994-ITSO DS470	600A0B80002	NAA					
4322 ESS-2105-22513-I	2105.22513	Other					
4332 DS8000-2107-758	2107.75BALB1	Other					
	1						
							$\langle \cdot \rangle$
							$\sim$
						Þ	
Commit Roll Back					F	etch More Rows	
Automatically commit updates					5 rov	v(s) in memory	

Figure 11-21 Query Results tab

This panel allows you to quickly view and verify the output that your query has produced. In this case, the query simply displayed the raw contents of the STORAGESUBSYSTEM reporting view. You can now switch back to the **Commands** tab, refine your statement, and run it again. Developing SQL statements has to be an iterative process.

You can, for example, specify only the columns you are specifically interested in, and add clauses for filtering and sorting. See Figure 11-22 for an example showing further refinement of the subsystem query.

Command Editor 1 - D82COPY1
Command Editor Selected Edit View Tools Help
\$ <mark>6</mark> \$7 \$6 5 ≥ 10 \$7 10 \$1 10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$1
Commands Query Results Access Plan
E Solution (TPCDB (TPCRPT) _ Add
select
VENDOR,
TYPE,
TYPE_DESCRIPTION,
MODEL,
SERIAL_NUMBER,
IP_ADDRESS,
NAME,
DISPLAY_NAME,
FIRMWARE_REV
from
TPCREPORT. STOPAGESUBSYSTEM
where
VENDOR = 'IEM'
order by
TYPE, MODEL, SERIAL_NUMBER asc
for fetch only with UR

Figure 11-22 Further refined SQL query

9. If you are unfamiliar with the SQL syntax in general, you might find the *SQL Assist* feature of the DB2 Command Editor helpful. To launch the SQL Assist window, locate the SQL icon from the Command Editor toolbar, as shown in Figure 11-23.



Figure 11-23 Click this button in toolbar to open SQL Assist

10. The SQL Assist window is displayed, as shown in Figure 11-24.

🖾 SQL Assist		×
Outline	Details         Statement Type         SELECT       Queries the data in one or more tables         INSERT       Insert a new row in a table         UPDATE       Updates existing rows in a table         DELETE       Removes rows from a table         Database       TPCDB         User ID       TPCRPT	
SQL code SQL validated SELECT * FROM	Clear Undo Edit Check <u>R</u> un	
	OK Cancel Help	

Figure 11-24 SQL Assist window

You can use SQL Assist to develop various SQL statement types, such as SELECT queries. The top left-hand panel shows the statement structure including all possible clauses, as well as a brief description. Click any of the clauses to display a list of possible values for that particular clause.

Clicking the FROM clause, for example, will display all possible tables / views that can be used to query data from. See Figure 11-25 for an example.

🗃 50L Assist		
Outline	Details	
Outline SQL statement properties SELECT statement FROM (Source tables) SELECT (Result columns) WHERE (Row filter) GROUP BY (Row groups) HAVING (Group filter) CRDER BY (Sort criteria)	Details  Available tables  STORAGEEXTENT_SI  STORAGEPOOL STORAGEPOOL_SNA  STORAGESUBSYSTE STORAGESTE STORAGESTE STORAGESTE STORAGESTE STORAGESTE STORAGESTE ST	Selected source tables Table Name TPCREPORT.STORA ISTORAGESUBSYSTEM
SQL code SQL validated SELECT * FROM TPCREPORT.STORAGESUBSYST	EN AS STORAGESUBSYSTEM	Clear Undo Edit Check Run
		OK Cancel Help

Figure 11-25 SQL Assist inserts values into SQL code

The top right-hand panel allows you to browse all possible values (such as tables / views to be used in the FROM clause). Select the view that you are interested in and click the > button to add it to the list of Selected source tables. SQL Assist will automatically insert the name of the selected view / table to the appropriate position in the SQL code. You can preview the generated SQL code in the bottom panel of the SQL Assist window.

11. When clicking **OK** to close the SQL Assist window, the generated SQL code is transferred back to the DB2 Command Editor window, where it can be run as outlined previously.

**Important:** SQL Assist will not automatically add clauses to set the isolation level and connection type! Before running a statement generated with SQL Assist, be sure to append the following line to avoid interference with the TPC server:

for fetch only with UR

# 11.2.7 Performance SQL query development process using UDFs

In this section, we briefly walk through the process of creating a more complex SQL statement querying performance information from the database reporting views. To achieve this, we utilize User Defined Functions (UDFs). Because the basics of using DB2 tools to develop and run SQL queries against the TPC database repository were covered in the previous chapter, here we focus on SQL query writing and do not discuss the used toolset.

When browsing the TPCREPORT schema documentation, you will notice a variety of views describing physical assets in the storage environment such as **SWITCH**, **STORAGESUBSYSTEM**, or **COMPUTERSYSTEM**.

You will also find views describing logical entities such as **ZONE**, **STORAGEVOLUME**, or **STORAGEPOOL**. Those views and their relationships mainly describe the physical and logical configuration of the monitored storage environment.

Use the diagrams from the TPCREPORT schema documentation to get an overview of the available views and their relationships with each other, such as **StorageSubsystem\_View\_Diagram**.

In addition, various views are available to report on TPC-internal configuration, such as **TPC\_GROUP**, **TPC\_ALERT\_LOG**, or **CIMOM\_AGENT**. They do not describe entities found in the monitored storage environment, but the logical configuration of the TPC server and related agents, and so on.

Performance data, however, is stored in separate views, all starting with the **PRF\_** or **LATEST\_PRF\_** prefix, such as **PRF\_SWITCH** or **LATEST\_PRF\_DSSYSTEM**. Notice that performance views do not contain configuration or asset information about the device reported on; you will most likely want to join the performance views with configuration views using the **DEV\_ID** column (internal device identifier) in order to retrieve additional information, such as device serial number or volume name.

Notice that views starting with **PRF\_HOURLYDAILY\_** contain both Hourly and Daily summation levels of the performance data (according to the SUMMATION\_TYPE column), whereas views with the **PRF\_** prefix (without \_HOURLYDAILY\_) contain non-summarized "By Sample" performance data for the device. In all cases, the INTERVAL\_LEN column indicates the length of the particular performance data interval in either seconds (By Sample) or minutes (Hourly, Daily).

The following procedure develops an example performance query imitating the Storage Subsystem performance reports from the TPC GUI:

1. Issue the following SQL query to retrieve information about the latest measured Storage Subsystem performance values for DS6000, DS8000 and ESS devices:

```
select
  *
from
  TPCREPORT.LATEST_PRF_DSSYSTEM
fon fatch only with UP
```

for fetch only with UR The output looks similar to Figure 11-26.

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Commands Query Results Access Pla	n							
Edits to these results are performed as p	Edits to these results are performed as positioned UPDATEs and DELETEs. Use the Tools Settings notebook to change the form of editing.							
DEV_ID	SNAPSHOT_ID ⇔	INTERVAL_LEN ⇔	NUM_PORTS\$	NUM_ARRAYS⇔	NUM_VOLS 🖨	PORT_SEND_I0 ⇔	PC	Add Row
4322 May 15, 2009 11:22:	3059	600	14	16	687	532147		Dalata Davi
4332 May 15, 2009 11:22:	3055	604	32	16	1473	750741		Delete How

Figure 11-26 Simple performance query output

You will notice that it is difficult to relate the values back to a particular subsystem, because the subsystem name as it is displayed in the TPC GUI is not part of the LATEST\_PRF\_DSSYSTEM view.

2. In order to retrieve the Display Name of the device, you will need to join the performance view with the correlating configuration view, in this case STORAGESUBSYSTEM, using the DEV\_ID column (the TPC internal identifier of the device).

See the following example:

```
select
    s.DISPLAY_NAME,
    p.PRF_TIMESTAMP,
    p.INTERVAL_LEN,
    p.FRNT_READ_NRM_IO,
    p.FRNT_READ_SEQ_IO,
    p.FRNT_WRITE_NRM_IO,
    p.FRNT_WRITE_SEQ_IO
from
    TPCREPORT.LATEST_PRF_DSSYSTEM as p,
    TPCREPORT.STORAGESUBSYSTEM as s
where
        p.DEV_ID = s.SUBSYSTEM_ID
for fetch only with UR
```

Multiple changes have been implemented here:

- In order to retrieve the device's Display Name, the LATEST\_PRF\_DSSYSTEM view was joined with the STORAGESUBSYSTEM view. To do so, the column DEV\_ID from the performance table is matched with the column SUBSYSTEM\_ID from the subsystem table.
- When joining more than one table, the asterisk operator (\*) cannot be used any more. Thus, the requested columns have to be specified individually, such as DISPLAY\_NAME, PRF\_TIMESTAMP and INTERVAL\_LEN.

The output of this query looks similar to Figure 11-27.

Command Editor 1 - DB2C0PY1						
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Commands Query Results Access Plan						
Edits to these results are performed as position	ned UPDATEs and D	ELETEs. Use the Tools Set	tings notebook to change th	e form of editing.		
DISPLAY_NAME  PRF_TIMESTAMP	INTERVAL_LEN⇔	FRNT_READ_NRM_I0 ⇔	FRNT_READ_SEQ_IO ⇔	FRNT_WRITE_NRM_I0 ⇔	FRNT_WRI1	Add Row
ESS-2105-22513-I May 15, 2009 12:02:	601	176320	11063	92196		Dalata Rau
DS8000-2107-75B May 15, 2009 12:02:	597	553346	225981	48380		Delete How

Figure 11-27 Refined performance query output

3. You will notice that the metrics displayed in the TPC GUI, such as **Read I/O Rate** (overall), Write I/O Rate (overall) and Total I/O Rate (overall) are not stored in the performance view directly. Instead, you need to calculate the performance metrics from the raw counter data found in the database view.

In this example, the following rules apply (just for reference; you will not need to implement them manually):

- Overall I/O = Random I/O + Sequential I/O
- Total I/O = Read I/O + Write I/O
- I/O Rate = I/O / Interval Length

A set of User Defined Functions (UDFs) is provided to ease implementation of those calculations. The UDFs automate all required transformations. You do not need to be aware of the details of individual values in order to generate performance metrics using the UDFs. Usage of the UDFs is documented in the Excel Sheet PM\_Metrics.xls, which is available from the following URL:

http://www-01.ibm.com/support/docview.wss?rs=40&context=SSBSEX&uid=swg27015676& loc=en US&cs=UTF-8&lang=en The Excel Sheet contains a tab for each device category (**DS8K\_DS6K\_SVC** in this example). You can filter for the particular performance category (the aggregation level; **DSSYSTEM** in this example) and will then be presented with all available views, metrics and UDFs.

See Figure 11-28 for an example.

Microsoft Excel	- PM_Metrics.xls								
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1									
2 Category 🔻	Views 🗸	Metric -	Units -	UDF & Parameters					
	PRF_DSSYSTEM,								
299 DSSYSTEM	LATEST_PRF_DSSYSTEM	Read I/O Rate (normal)	(Ops/Sec)	PM_RATE(INTERVAL_LEN , FRNT_READ_NRM_IO)					
	PRF_DSSYSTEM,								
300 DSSYSTEM	LATEST_PRF_DSSYSTEM	Read I/O Rate (sequential)	(Ops/Sec)	PM_RATE( INTERVAL_LEN, FRNT_READ_SEQ_IO)					
201 DOOVOTEM	PRF_DSSYSTEM,	Dead I/O Date (suprall)	(000)[200]	DM OVERALL IO RATE/INTERVALLEN ERNT READ NOM IO ERNT READ SEO IO					
JUI DSSTOTEIM	PRE DSSYSTEM	Read I/O Rate (overall)	(Ops/Sec)	PM_OVERALL_IO_RATE(INTERVAL_LEN, FRINT_READ_NRIM_IO, FRINT_READ_SEG_IO)					
302 DSSYSTEM	LATEST PRF DSSYSTEM	Write I/O Rate (normal)	(Ops/Sec)	PM_RATE(INTERVAL_LEN_FRNT_WRITE_NRM_IO)					
	PRF_DSSYSTEM,	, ,	(						
303 DSSYSTEM	LATEST_PRF_DSSYSTEM	Write I/O Rate (sequential)	(Ops/Sec)	PM_RATE(INTERVAL_LEN, FRNT_WRITE_SEQ_IO)					
	PRF_DSSYSTEM,								
304 DSSYSTEM	LATEST_PRF_DSSYSTEM	Write I/O Rate (overall)	(Ops/Sec)	PM_OVERALL_IO_RATE(INTERVAL_LEN , FRNT_WRITE_NRM_IO, FRNT_WRITE_SEQ_IO)					
DOD DOOVOTEM	PRF_DSSYS1EM,	T-t-LVO D-t- (como D	(0	PM OVER MULIO RATE/INTERVALUENT FRANK READ NOM IO FRANK WRITE NOM IO					
305 DS5151EM	DE DEVETEM	Total I/O Rate (normal)	(Ups/Sec)	PM_UVERALL_IU_RATE(INTERVAL_LEN_FRN1_READ_NRM_IU, FRN1_WRITE_NRM_IU)					
306 DSSYSTEM	LATEST PRE DSSYSTEM	Total I/O Rate (sequential)	(Ons/Sec)	PM OVERALL IO BATE(INTERVALLEN, ERNT READ SEQ IO ERNT WRITE SEQ IO)					
	PRF DSSYSTEM,	Total # O Hate (11411	(oporeili,						
307 DSSYSTEM	LATEST_PRF_DSSYSTEM	Total I/O Rate (overall)	(Ops/Sec)	PM_TOT_OVR_IO_RATE(INTERVAL_LEN , FRNT_READ_NRM_IO, FRNT_READ_SEQ_IO, FR -					
H A P H SVC D	S8K_DS6K_ES5 / B5P_DS4K / S4	witch /							
Filter Mode									

Figure 11-28 Performance metrics documentation PM\_Metrics.xls

Most importantly, the Excel Sheet provides information about the required parameters of a specific UDF, such as shown in Table 11-1.

Table 11-1 Example performance metric documentation

Metric	Units	UDF & Parameters
Read I/O Rate (normal)	(Ops/Sec)	PM_RATE(INTERVAL_LEN, FRNT_READ_NRM_IO)

This reads as follows: The UDF with name **PM\_RATE**, requiring two parameters **INTERVAL\_LEN** and **FRNT\_READ\_NRM\_IO**, produces values that are presented in the unit **(Ops/Sec)**; this corresponds to the TPC GUI Metric **Read I/O Rate (normal)**.

Using the information from the Excel Sheet, you can now transform the SQL query:

```
select
```

```
s.DISPLAY_NAME,
p.PRF_TIMESTAMP,
p.INTERVAL_LEN,
TPCREPORT.PM_OVERALL_IO_RATE(p.INTERVAL_LEN,
    p.FRNT_READ_NRM_IO,p.FRNT_READ_SEQ_IO),
TPCREPORT.PM_OVERALL_IO_RATE(p.INTERVAL_LEN,
    p.FRNT_WRITE_NRM_IO,p.FRNT_WRITE_SEQ_IO),
TPCREPORT.PM_TOT_OVR_IO_RATE(p.INTERVAL_LEN,
    p.FRNT_READ_NRM_IO,p.FRNT_READ_SEQ_IO,
    p.FRNT_WRITE_NRM_IO,p.FRNT_WRITE_SEQ_IO)
from
TPCREPORT.LATEST_PRF_DSSYSTEM as p,
TPCREPORT.STORAGESUBSYSTEM as s
where
    p.DEV_ID = s.SUBSYSTEM_ID
```

```
for fetch only with UR
```

The output looks similar to Figure 11-29.

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Edits to these results are perfo	ormed as positioned UPDAT	Es and DEl	ETEs. Use the Tool	ls Settings nol	ebook t	to change the f	orm of editing.		
DISPLAY_NAME 🛛 👙	PRF_TIMESTAMP	÷.	INTERVAL_LEN ⇔	4	\$ 5	÷	6 ♦		Add Row
ESS-2105-22513-IBM	May 15, 2009 12:42:15 P	PM 000000	601	316	694	170.91	487.60	4	Dalata Davi
DS8000-2107-75BALB1-IBM	May 15, 2009 12:42:16 F	PM 000000	605	1,284	846	478.382	1,763.22	3	Delete How

Figure 11-29 Further refined query output using UDFs

4. Compare the query output to the corresponding TPC GUI report in order to validate the query. See Figure 11-30 for an example.

📑 IBM Tivoli Storage Product	🛛 IBM Tivoli Storage Productivity Center: colorado.itso.ibm.com Storage Subsystem Performance: By Storage Subsystem 💶 🖂 🗙							
File View Connection Prefe	Elle <u>View</u> <u>Connection</u> <u>Preferences</u> Window <u>H</u> elp							
Selection Storage Subsys	tems							
Storage Subsystem Performance	e: By Storage Subsystem							
Number of Rows: 2								
Subsystem	Time	Interval	Read I/O Rate (overall)	Write I/O Rate (overall)	Total I/O Rate (overall)			
DS8000-2107-75BALB1-IBM	May 15, 2009 12:42:16 PM	605 s	1,284.85 ops/s	478.38 ops/s	1,763.23 ops/s			
ESS-2105-225134BM May 15, 2009 12:42:15 PM 601 s 316.69 ops/s 170.91 ops/s 487.6 ops/s								

Figure 11-30 TPC Storage Subsystem performance report

As you can see, UDFs allow calculating performance metrics from the raw performance counter data very easily and efficiently. You do not need to know the internal calculation algorithms in order to perform complex transformations. Using this approach, you can perform all kinds of statistical operations on the performance data.

Refer to the following document for additional information about available functions and operators in the SQL language: *IBM DB2 Command Reference*, SC23-5846. The document is available from the following URL:

http://publib.boulder.ibm.com/infocenter/db2luw/v9r5/index.jsp

# 11.3 Tivoli Common Reporting

Tivoli Common Reporting (TCR) is a component provided by the Tivoli Integrated Portal (TIP). It is one possible option to implement customized reporting solutions using SQL database access, providing output in HTML, PDF, or Microsoft Excel.

**Important:** TPC Version 4.1 only supports a TIP instance that is exclusively used by TPC and TPC-R, but no other application exploiting TIP. Support for multiple applications using a shared TIP instance might be provided in a future release.

Notice that Tivoli Common Reporting is intended to produce certain predefined reports that are to be run repeatedly, typically on a daily, weekly, or monthly basis. It does not provide any online report creation or report customization features. The effort of creating a new report is relatively high, compared to when creating reports through the TPC GUI. After being defined, reports can then be run and accessed very easily by the Web interface or the command line.

In this section we briefly discuss the most important concepts and usage scenarios of Tivoli Common Reporting.

## 11.3.1 Tivoli Common Reporting and BIRT overview

BIRT (Business Intelligence Reporting Tools) is an open source Eclipse Foundation project, hosted at Eclipse.org and released under the Eclipse Public License (EPL). Visit the following URL for additional information:

#### http://www.eclipse.org/birt

On a high level, BIRT consists of two main components; a *Report Designer*, as well as a *Runtime Engine*. Although the Report Designer is used by report developers to create new reports or modify existing ones, the Runtime Engine will execute reports and make them available to end-users.

If you are a report developer and want to create new reports, you will typically want to install the BIRT Report Designer component on your workstation or mobile computer. Refer to 11.4, "Report creation workflows" on page 572 for additional information.

After you have created a report, or if you received reports from someone else, you will want to deploy them and make them accessible to end-users. You need to use the BIRT Runtime Engine in order to do so; typically the Runtime is installed on a server machine and accessed by Web browser.

Tivoli Common Reporting (TCR) uses the BIRT Runtime Engine and incorporates it into the Tivoli Integrated Portal (TIP) infrastructure. In fact, TCR 1.2 (the version that comes with TPC 4.1) includes the BIRT Runtime Engine version 2.2.1.

Because TIP / TCR is installed as part of the Tivoli Storage Productivity Center server components, each TPC server instance automatically provides the necessary runtime environment to run BIRT reports.

For additional information about Tivoli Common Reporting, including overview presentations and community forums, refer to the following URL:

http://www.ibm.com/developerworks/spaces/tcr

In addition, the TCR Information Center contains detailed documentation and style guidelines to follow when developing reports:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=/com.ibm.ti
voli.tcr.doc/tcr\_welcome.html

**Tip:** A copy of the *TCR User's Guide* is also available in the installation location after installing TIP / TPC in the following directory:

<TIP-InstallDir>\products\tcr\docs\tcr\_users\_guide.pdf

A copy of the TCR Development and Style Guide is available in the following directory:

<TIP-InstallDir>\products\tcr\style\tcr\_style\_guide.pdf

Here, <TIP-InstallDir> is the installation location of Tivoli Integrated Portal. On Windows, the default installation path is:

C:\Program Files\IBM\Tivoli\tip

On Linux and UNIX, the default TIP installation path is:

/opt/IBM/Tivoli/tip

### 11.3.2 Importing security certificates

In order to establish encrypted communication with the TIP / TCR server, secure hypertext transfer protocol (HTTPS) is used per default. In this section, we explain how to establish secure HTTPS communication between TIP / TCR and the Web browser.

Internet Explorer 7 is used as an example, but the general procedure also applies to other Web browsers such as Mozilla Firefox. For further details, check the documentation available with your Web browser of choice.

1. Open a new browser window and navigate to the following URL:

http://<TIP-Servername>:16310

Here, <TIP-Servername> is the (resolvable) host name of the server running TIP / TPC. If you changed the default base port during TIP installation, then you need to replace 16310 with this value.

2. When logging in, you will see the panel shown in Figure 11-31.



Figure 11-31 Security certificate warning

This warning is caused by the fact that during installation, the TIP server created (self-signed) security certificates that are not known to the Web browser used to access the server, yet. To resolve this situation, you will need to import the certificates on every Web browser that you intend to use with TIP (upon first usage, only).

Click **Continue to this website (not recommended)** in order to ignore the warning for the time being.

 You are presented with the Tivoli Integrated Portal logon panel. However, the address line of the browser window is marked red. In addition, there is a red field that reads Certificate Error right next to the address panel. Click this field to open the menu as illustrated in Figure 11-32.



Figure 11-32 Certificate error

4. Click **View Certificates** found at the bottom of the context menu you just opened. This opens a new panel, such as the one shown in Figure 11-33.

ertificat					
General	Details   Certification Path				
	Certificate Information				
This	This CA Root certificate is not trusted. To enable trust, install this certificate in the Trusted Root Certification				
Aut	horities store.				
	Issued to: colorado.itso.ibm.com				
	Issued by: colorado.itso.ibm.com				
	Valid from 22.04.2009 to 18.04.2024				
	Install Certificate				

Figure 11-33 Certificate information panel

Notice the host name found in the line starting with **Issued to:** and **Issued by:** Your Web browser will only accept the security certificates when accessing the TIP URL using the host name specified here. When accessing it using another host name or using the IP address, it will not associate the security certificates.

Click Install Certificate to permanently store the presented security certificate.

5. The Certificate Import Wizard is displayed. Read the welcome message and click **Next** on the panel shown in Figure 11-34.



Figure 11-34 Welcome message

6. Accept the default to **Automatically select the certificate store**, as seen in Figure 11-35. Then click **Next** to continue.

Windows can automa	ically select a certificate s	tore, or you can spe	cify a location fo
Automatically s	elect the certificate store	based on the type o	f certificate
C Place all certific	ates in t <b>he follo</b> wing store		
Certificate stor	e:		
			Browse

Figure 11-35 Certificate store panel

7. The panel seen in Figure 11-36 allows you to review the specified settings. Click **Finish** to continue.

Certificate Import Wizard		×
	Completing the Certificate Import Wizard You have successfully completed the Certificate Import wizard.	
	You have specified the follow Certificate Store Selected Content	wing settings: Automatically determined by t Certificate
	< Back	Finish Cancel

Figure 11-36 Summary panel

8. A final security warning such as the one shown in Figure 11-37 will ask you for your confirmation. Click **Yes** to finish the installation of the TIP server's security certificate.



Figure 11-37 Confirmation to import certificates

9. Expect to be presented with a success message, similar to Figure 11-38. Click **OK** to close it.

Certificat	e Import Wizard	×
į)	The import was succes	ssful.
	ОК	

Figure 11-38 Certificates successfully imported

10. When returning to the logon panel (you might need to close and re-open your Web browser for the changes to take effect), you can now see a light-blue lock field right next to the address bar, as seen in Figure 11-39. This indicates that communication with TIP is now secured and trusted.

C Tivoli Integrated Portal - Windows Internet Explorer		×
🚱 🕤 👻 https://colorado.itso.ibm.com:16316/ibm/console/logon.jsp	Google	•
File Edit View Favorites Tools Help		
😪 🍄 🌈 Tivoli Integrated Portal	🏠 🔹 🔜 👻 🖶 🔹 🚱 Page 🔹 🎯 Tools 🔹	»
		4

Figure 11-39 Light-blue lock indicates secured communication

**Note:** The security certificates will only be associated when accessing TIP using the host name that is stored in the certificates. Accessing the TIP URL using another host name or the IP address of the server will still result in security errors!

## 11.3.3 Initial configuration and user management

User administration for Tivoli Common Reporting is based on the user and group management features of TIP. Individual users or groups can be granted role-based authorization to access Tivoli Common Reporting resources, such as reports and report sets.

In order to be able to access Tivoli Common Reporting inside TIP, a user needs to be associated with a TCR user role. The TPC superuser group, as well as the WebSphere Application Server admin ID specified during installation of TPC, are automatically associated with the *tcrSuperAdmin* role, allowing full administrative access to all Tivoli Common Reporting functions.

When the TPC Role-To-Group mappings are modified, TIP user roles are modified accordingly, giving new groups access to Tivoli Integrated Portal (in order to be able to launch the TPC GUI from within TIP). This does, however, not include association with any Tivoli Common Reporting roles; access to TCR needs to be granted manually. In order to access Tivoli Common Reporting, a user ID must be associated with either the *tcrSuperAdmin* or *tcrOperator* role; otherwise the user will not see the Reporting branch in the TIP Navigation Tree.

**Important:** Notice that with a default installation of TPC V4.1, security is not enabled in Tivoli Common Reporting! This means that any user having access to TCR (granted by associating the *tcrOperator* role, for example) can view, modify, and delete any report.

For additional information about TCR user management, including enabling security, refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 4. "Administering Tivoli Common Reporting."

Also notice that upon switching between OS-based and LDAP-based authentication, you will lose all existing role associations. For additional information, refer to "LDAP authentication support and Single Sign-On" on page 335.

### Creating a reporting user and group

To grant users access to Tivoli Common Reporting without granting them access to TPC or giving them administrative rights in TIP, we recommend that you create a dedicated reporting group and associate the *tcrOperator* role with that group. Any user ID that is member of this group is granted access to Tivoli Common Reporting.

Notice that this is an optional step that will most likely be required only in environments with a large number of users.

Be aware that when TCR security is enabled, associating the *tcrOperator* itself will not enable the users to access or modify reports or perform any other related actions. In a default installation, however, TCR security is disabled allowing any user to view, modify and delete any report.

In order to associate an existing operating system or Directory group with a TCR role, follow this procedure:

1. Open a new browser window and navigate to the following URL:

http://<TIP-Servername>:16310

Where <TIP-Servername> is the (resolvable) host name of the server running TIP / TCR. If you changed the default base port during TIP installation, then you need to replace 16310 with this value.

2. You are presented the logon panel, as shown in Figure 11-40. Log on to TIP with an administrative user ID. Initially, the TPC superuser group (the default on Windows is *Administrators*; the default on Linux and UNIX is *root*) and WebSphere Application Server admin ID specified during installation are granted administrative access to TCR.



Figure 11-40 Specify user ID and password to log on to TIP

3. Upon logon, you will see the TPC Welcome panel. From the left-hand navigation panel, expand the branch titled **Users and Groups** and click **Administrative Group Roles** as illustrated in Figure 11-41.



Figure 11-41 Select Administrative Group Roles from navigation panel

4. As seen in Figure 11-42, the Administrative Group Roles panel opens, indicating that currently only the group associated with the TPC superuser role is granted access to Tivoli Common Reporting (in this example: root).



Figure 11-42 Administrative Group Roles panel

If you have already specified additional groups in TPC's Role-To-Group mapping, they will also be displayed in this list. However, they will not be associated with any TCR roles, thus not being able to access Tivoli Common Reporting from the Navigation Tree. To associate additional roles with those groups, click the group name from the list.

We add a new, dedicated group for TCR reporting activities. Click Add to do so.

5. The panel shown in Figure 11-43 allows you to specify the name of the group and pick one or more roles to associate with it.

Tivoli. View: All tasks	Velcome dasusr1	Help Logout IBM.
+ =		Select Action 💌
<ul> <li>Welcome</li> <li>My Startup Pages</li> <li>Security</li> <li>Users and Groups <ul> <li>Administrative User Rc</li> <li>Administrative Group F</li> <li>Manage Users</li> <li>Manage Groups</li> </ul> </li> <li>Troubleshooting <ul> <li>Reporting</li> <li>Tivoli Storage Productivity</li> <li>Settings</li> </ul> </li> </ul>	Administrative Group Roles          Administrative Group Roles       ? •         Administrative Group Roles       > Group         Use this page to add, update or to remove administrative roles to groups. Assigning administrative roles to groups enables them to administer application servers through the administrative console or through weadmin scripting.         General Properties         Group         © Enter group name         reportgroup         © Select from special subjects         Special subjects         EVERYONE         * Role(s)         tcrSuperAdministrator         tcrStuperAdministrator         Apply         OK         Reset         Cancel	Close page  Field help Specifies level of administration authority granted. Page help More information about this page

Figure 11-43 Associate TCR Roles with a Group name

Enter the name of an existing operating system or Directory group you want to associate with TCR. Choose the **tcrOperator** role to grant members of the group access to TCR. When you are done, click **OK** to save your changes and return to the previous panel.

**Note:** Unless you manually enable TCR security after installation, associating any role starting with **tcr** will grant full access to all TCR functions!

 Notice that after making changes to the TIP / TCR configuration, you will see a panel similar to the one shown in Figure 11-44. You can either save the changes or review them first. Click Save to apply the changes right away.



Figure 11-44 Click Save to apply changes

7. When returning to the Administrative Group Roles panel, you can see that the group you just associated is displayed in the list (see Figure 11-45 for an example). Users that are members of this group will be able to log on to TIP and access the Reporting branch from the Navigation Tree. They will not be able to access TPC or perform administrative actions inside TIP, however, unless you associated additional roles with those groups.

Tivoli. View: All tasks	•	Welcome dasusr1	Help Logout IBM.
<ul> <li>Welcome</li> <li>My Startup Pages</li> <li>Security</li> <li>Users and Groups</li> <li>Administrative User Rc</li> <li>Administrative Group F</li> <li>Manage Users</li> <li>Manage Groups</li> <li>Troubleshooting</li> <li>Reporting</li> <li>Tivoli Storage Productivity</li> <li>Settings</li> </ul>	Administrative Group R Administrative Group I Administrative Group Use this page to ad groups. Assigning a administer application or through weadmin Add Remove Select Group Select Group reportgroup root Total 2	Roles       ? -         up Roles	Close page  Close page  Field help For field help information, select a field label or list marker when the help cursor appears.  Page help More information about this page

Figure 11-45 Administrative Group Roles now contains new group

If you need to further restrict access, for example, to certain reports or report sets, refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 4. "Administering Tivoli Common Reporting."

 Any user ID that is now created as member of the specified reporting group is given access to Tivoli Common Reporting. You must now create such a user ID in either the operating system or Directory service, depending on the configured authentication method.

Refer to the operating system or Directory service documentation for additional information about creating user IDs as members of groups.

### **Configuring Common Reporting as a startup page**

Tivoli Integrated Portal can be configured to automatically open the Common Reporting view whenever a certain user ID logs in. This can be especially helpful for reporting-only user IDs, such as the one created in the previous chapter.

To set the startup page for a certain user ID, follow this procedure:

- 1. Log on to TIP with the user ID you plan to set a startup page for, such as the previously created reporting use.
- If no startup page has been defined, yet, the TPC welcome page is displayed as seen in Figure 11-46. From the left-hand navigation panel expand the **Reporting** branch and click **Common Reporting**.

Tivoli. View: All tasks	Welcome TPCSuperuser Help Logout
+ -	Select Action 🔽
<ul> <li>Welcome</li> </ul>	About Tivoli Storage Productivity Center
<ul> <li>My Startup Pages</li> </ul>	Tivoli Storage Productivity Center
Security     Isers and Groups	
Troubleshooting	
Reporting	
Common Reporting	
Settings	9

Figure 11-46 Select Common Reporting from navigation panel

 The Tivoli Common Reporting main window is displayed. Locate the drop-down menu in the top toolbar which reads -- Select Action --. Select Add to My Startup Pages from the drop-down as shown in Figure 11-47.

Tivoli. View: All tasks		Welcome TPCSuperuser	Help Logout <b>IBM</b> .
E      Welcome     My Startup Pages     Security     Users and Groups	Common Repo × Reports Tivoli Common http://www.ibm.com/devel	Reporting operworks/spaces/tor	Select Action Select Action Close Page Add to My Startup Pages Manage Open Pages
Troubleshooting     Reporting     Common Reporting     Tivoli Storage Productivity     Settings	Navigation Search Report Sets 🔄 Tivoli Products	Reports	Description

Figure 11-47 Select Add to My Startup Pages

4. The panel shown in Figure 11-48 will prompt you for confirmation.



Figure 11-48 Confirmation to set startup page

Click **Add** to add the Common Reporting page to the startup pages for the current user ID. When you log on to TIP the next time, the Common Reporting page immediately opens.

## 11.3.4 Working with reports

In this section, we briefly outline the process of using Tivoli Common Reporting (TCR) to run existing reports. You will need a user ID that is associated with a TCR role. Refer to 11.3.3, "Initial configuration and user management" on page 556 for additional information.

You will need to import report packages prior to running the contained reports. Sample report packages are provided as part of the additional Web material that accompanies this book. Refer to 11.3.5, "Importing report packages" on page 567 for information about importing report packages.

In this section, we assume you have not imported any report packages, yet. Thus, we are working with the default report that ships with a fresh Tivoli Storage Productivity Center installation.

**Tip:** Even though this section outlines working with reports from the TCR Web interface, all functions mentioned are also available through the TCR Command Line Interface. The CLI offers a powerful means of automating report generation, for example.

For information about using the command line, refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 5. "Tivoli Common Reporting command reference."

Follow this procedure in order to run existing reports:

1. Open a new browser window and navigate to the following URL:

http://<TIP-Servername>:16310

Here, <TIP-Servername> is the (resolvable) host name of the server running TIP / TCR. If you changed the default base port during TIP installation, then you need to replace 16310 with this value.

- 2. You are presented the logon panel. Log on to TIP with a user ID associated with a TCR role, such as the previously created reporting user.
- 3. Unless you specified another startup page, you will see the TPC Welcome panel. From the left-hand navigation panel, expand the **Reporting** branch and click **Common Reporting**.
4. The TCR main window is displayed, as seen in Figure 11-49.

Tivoli. View: All tasks		Welcome reportuser	Help Logout IBM.
+ -	Common Repo ×		Select Action
<ul> <li>Welcome</li> <li>My Startup Pages</li> <li>Security</li> <li>Users and Groups</li> </ul>	Reports Tivoli Common R http://www.ibm.com/develor	eporting perworks/spaces/tor	Ez Z Z = D
Troubleshooting	Navigation Search	Reports	
Common Reporting	E-Report Sets	•	
<ul> <li>Tivoli Storage Productivity</li> </ul>		Title	Description
Settings			

Figure 11-49 Tivoli Common Reporting main window

**Tip:** You can hide the left-hand Navigation frame to have more room for the Common Reporting panels by clicking the vertical bar with the arrow.

The Tivoli Common Reporting window is made up of three main panels:

- The *Navigation panel* (left) provides access to all installed *Report Sets* (individual reports are hierarchically organized into Report Sets). You can see the top-level branch titled Report Sets, and a sub-branch titled Tivoli Products; in a fresh installation, this is the only available Report Set.
- The *Reports panel* (top-right) provides access to individual reports inside the selected report set (from the Navigation panel).
- The *Report Snapshots panel* (bottom-right) provides access to snapshots taken of the selected report (from the Reports panel).

In a fresh installation, the only available Report Set is titled Tivoli Common Reporting. Expand the **Tivoli Products** branch in the Navigation panel and click **Tivoli Common Reporting** to display the contained reports.

5. In the Reports panel, you can now see a report titled **Tivoli Common Reporting Overview**. This is the only report currently available.

Right-click the report title to open the report's context menu, as shown in Figure 11-50.

Tivoli. View: All tasks	▼ Welcome reportuser	Help Logout IBM.
Common Repo ×		Select Action 💌
Reports Tivoli Common Reportin http://www.ibm.com/developerworks/spa	g ces/tor	
Navigation Search ➡ Report Sets ➡ Tivoli Products ➡ Tivoli Common Reporting	Reports	on the Tivoli Common Reporting system. HTML PDF Adobe PostScript Selected: 0, Total: 1

Figure 11-50 Right-click report to open context menu

Select View  $As \rightarrow HTML$  from the context menu to run the report.

**Tip:** To run the report as HTML, you can alternatively click the icon to the left of the report's title, without having to open the report's context menu.

6. Because the report can be customized using parameters, a new panel is displayed allowing you to modify those parameters; see Figure 11-51 for an example. Accept the defaults for the moment and click **Run** to execute the report.

	Panorts		
Ravigation Search	On-Demand Report Parameters	۵	
Tivoli Products	This dialog allows you to define the parameter(s) to		
Tivoli Common Report	Common Reporting Overview report.	×	
	After similar and establish is discussed		Common Reporting system.
	After viewing, report output is discarded.		
	Number of most recent reports run		
			7
	*Number of most popular reports		Selected: 0. Total: 1
	*Number of longest-running report snapshots		
	10		
	Run Cancel		
			a

Figure 11-51 Report Parameters panel

7. The report is opened in a new browser window. Wait until report generation is finished; the result looks similar to Figure 11-52.



Figure 11-52 Final report output

8. TCR Reports cannot only be run On-Demand, as in the previous example, but can also be saved for later reference. This requires taking *Snapshots*.

Go back to the Tivoli Common Reporting main window, right-click the report to open its context menu and select **Create Snapshot™...** as shown in Figure 11-53.

Tivoli. View: All tasks		Welcome rep	ortuser	Help Logout	IBM.
Common Repo ×				Select Action	💌
Common Reports         Tivoli Common Reporting         http://www.ibm.com/developerworks/spr         Navigation         Search         Report Sets         Tivoli Products         Tivoli Common Reporting	g cces/tor Reports Title II: Tivoli Common Report	view As	Description	n Reporting system	
		Create Snapsho Properties Parameters Data Sources Refresh Cut Copy Delete Schedules		Selected: C	), Total: 1

Figure 11-53 Select Create Snapshot from report's context menu

- 9. Again, you are prompted for the report's parameters. Accept the defaults and click **Run** to execute the report.
- 10. You will notice a new entry in the Report Snapshots panel; the report output is not displayed right away, as with On-Demand report generation, but instead the Snapshot is stored in TCR's internal repository.

Wait for the Report Snapshot to complete, then right-click the snapshot title to open its context menu as seen in Figure 11-54.

Ti	voli. View:	All tasks		Welcome rep	portuser	Help Logout	BM.
	Common R	epo ×				Select Action	•
	Reports Tivoli Co http://www.il	ommon Reporti	ng baces/tor	-		C2 • ? About	
	Navigation	Search	Reports				
	E- Report S	ets Products	$\odot$				
		oli Common Reporting	Title	0	Description		
			-			Selected: 0, 1	▼ ► Total: 1
			Report Snapsho	ts			_
			$\odot$		-		
			Status	Start	C End	User	
			Completed	May 15, 2009 1:19:1 AM View As Parameters Delete Refresh	9 May 15, 2009 1:19:25 AM oft Excel PostScript	reportuser	× •
						Selected: 0, 1	Fotal: 1

Figure 11-54 Snapshots can be viewed in various formats

**Note:** Report Snapshots can be viewed in various formats, such as HTML, PDF, and so on. The Snapshot data is stored internally in an intermediate format.

Notice that when viewing the Snapshot, no data is fetched from the report's data source (such as the TPC database repository). The Snapshot represents the state of the data source at the point in time when it was created.

It is also possible to automatically create Report Snapshots at certain time intervals; typically you will want to schedule them to run repeatedly such as daily-, weekly-, or monthly. For further information about scheduling Report Snapshots, refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 3. Working with reports  $\rightarrow$ Scheduling reports. The document is available from the following URL:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=/com.ibm .tivoli.tcr.doc/tcr\_welcome.html

# 11.3.5 Importing report packages

In this section, we show how to import new report packages into Tivoli Common Reporting.

With a fresh Tivoli Storage Productivity Center installation, no reports packages are included except for the default report. You will need to import report packages before being able to use Tivoli Common Reporting. Sample report packages are provided as part of the additional Web material that accompanies this book.

A report package is a .zip file containing all of the data necessary for defining one or more reports, including the required designs and resources and the hierarchy of report sets to contain the reports. For additional information about the format of report packages, refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 3. Working with reports  $\rightarrow$  Report packages.

In order to import a report package, follow this procedure:

1. Open a new browser window and navigate to the following URL:

http://<TIP-Servername>:16310

Where <TIP-Servername> is the (resolvable) host name of the server running TIP / TCR. If you changed the default base port during TIP installation, then you need to replace 16310 with this value.

- 2. You are presented the logon panel. Log on to TIP with a user ID associated with a TCR role, such as the previously created reporting user.
- 3. Unless you specified another startup page, you will see the TPC Welcome panel. From the left-hand navigation panel, expand the **Reporting** branch and click **Common Reporting**. The TCR main window is displayed.

**Tip:** You can hide the left-hand Navigation frame to have more room for the Common Reporting panels by clicking the vertical bar with the arrow.

4. In order to import new report packages, right-click the top-level branch (root node titled Report Sets) in the Navigation panel. Click **Import Report Package...** from the context menu; see Figure 11-55 for an example.

Tivoli. View: All tasks		Welcome reportuser	Help Logout IBM.
Common Repo ×			Select Action
Reports			□_ ? \ 2 <sup>5</sup>
Tivoli Common Report	ing <sup>spaces/tor</sup>		About
Navigation Search	Reports		
E- Report Soto	$\odot$	•	
Authorizations	Title	O Description	
🔗 Refresh	<u> </u>		
Properties			
C Add Report Set			
Cut			
Paste Paste Shortout	<u>~</u>		
Delete			Selected: 0, Total: 1

Figure 11-55 Select Import Report Package from root node's context menu

 A panel opens, as seen in Figure 11-56, allowing you to specify the report package to import. Click **Browse** to browse the local workstation's file systems. Notice that you can browse the file systems available to the machine running the Web browser, not the TCR server.

You can, for example, download the sample reports that are provided with this book. To do so, download the file titled SampleReports.zip from the additional Web material that accompanies this document.

Common Report	Tivoli. View: All t	asks 🔽 Welcome reportuser	Help Logout <b>IBM</b> .
Reports         Tivoli Com         Import Report Package         Tivoli Com       Import Report Package         This dialog allows you to import a report package from the local file system to the TCR data store.       About         Navigation       See       *Local File       C:Sample_TCR_Reports.zip       Browse         Provide       Advanced Options       Report Set Base       Operation       Selected: 0, Total: 1         Overwrite       Overwrite       Selected: 0, Total: 1       Selected: 0, Total: 1	Common Repo	×	Select Action 💌
	Common Repo Reports Tivoli Com http://www.ibm.u P-Report Sets E-Report Sets E-Tivoli Proc	Import Report Package  This dialog allows you to import a report package from the local file system to the TCR data store.  *Local File C:\Sample_TCR_Reports.zip  Advanced Options Report Set Base Design Name Base Overwrite Ov	Selected: 0, Total: 1

Figure 11-56 Import Report Package panel

**Note:** Using the Tivoli Common Reporting Web interface, you can easily import report packages from remote machines without manually having to copy the package to the TCR server.

You can use the *Advanced Options* menu to change the location and namespace of the imported objects or overwrite existing objects. For additional information about the available options, refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 4. Administering Tivoli Common Reporting  $\rightarrow$  Importing and exporting report packages.

When you are done, click **Import** to load the new reports from the report package to TCR's datastore.

6. When the import is complete, you will notice that the Navigation panel now lists additional Report Set entries. Expand them to navigate the newly available reports; see Figure 11-57 for an example.

Tivoli. View: All tasks	Welcome reportus	er Help Logout <b>IXM</b> .
Common Repo ×		Select Action 💌
Reports Tivoli Common Reportin http://www.ibm.com/developerworks/spa	g ices/tor	62 × ? _ 0
Navigation Search	Reports	
Asset Reports Capacity Reports	Title         O         Descr           In TPC Storage-Subsystem Assets         In TPC Storage-Virtualizer Assets         In TPC Storage-Virtualizer Assets	iption
	T	Selected: 1, Total: 2

Figure 11-57 New reports and report sets available after import

7. After importing reports you might need to modify the Data Source definition of those reports in order to properly connect to the databases in your specific environment. To do so, right-click a report and select **Data Sources...** from its context menu. See Figure 11-58 for an example.

Tivoli. View: All tasks	Welco	me reportuser	Help Logout IBM.
Common Repo ×			Select Action 💌
Reports Tivoli Common Reportin	ng laces/tor		62 × ? _ □
Navigation Search Report Sets TPC 4.1 Samples Asset Reports Capacity Reports Tivoli Products	Reports		Selected: 0, Total: 2

Figure 11-58 Select Data Sources from report's context menu

8. The panel shown in Figure 11-59 opens, allowing you to edit the report's Data Source definitions. Select the Data Source you want to modify and click **Edit**.

T	ivol	<b>i.</b> View	: All ta	sks	•		Welcome reportuser	Help Log	gout <u>IBM.</u>
	C	ommon	Repo.	×				Select	Action 💌
	R	eports							0 - 2 - 25
	Т	ivoli (	Con	Report Dat	a Sources			8	
	ht	ttp://www	v.ibm.i	This dialog Storage-	g allows you to Subsystem As	update the	e JDBC/JNDI data source(s) of the rt.	TPC ×	About
	N	Vavigation	S	Report Data	Sources				
	E	- Report	Sets	Туре	Name	0	Comments		
		E- TPC	4.1 9	jdbc	TPCDB				
			sset						
		⊡- Tivo	di Proc						
								le	ected: 0, Total: 2
M									
								~	
				4				Þ	
				Edit Cancel					

Figure 11-59 Select Data Source to edit

9. The next panel allows you to modify the Data Source profile of the report. You can modify the Database URL to specify another host name, port, or database name. You will most likely need to modify the User ID and Password and replace it with a user having database authorities in your specific environment, such as the view-only reporting user (see 11.2.4, "Creation of view-only reporting user" on page 529 for details).

See Figure 11-60 for an example. When you are done adopting the required settings, click **Save**.

Tivoli. View: All f	tasks	Welcome reportuser	Help Logout IEM.
Common Repo	×		Select Action
Reports	Proved Data Courses		
http://www.ibm.	Edit the TPC Storage-Su	bsystem Assets report JDBC/JNDI data source.	× About
Navigation S	Display Name TPCDB	JDBC Driver com.ibm.db2.jcc.DB2Driver	
EF Report Sets	User ID TPCRPT	JDBC URL jdbc:db2://127.0.0.1:50000/TPCDB	
Capac	Password	JNDI Name	
	Additional comments to defin	ne data source.	lected: 0, Total:
	Enabling a JDBC Driver		0
	Save		

Figure 11-60 Modify Data Source parameters and click Save

**Note:** The default installation of TIP / TCR includes DB2 JDBC Drivers. You only have to import additional drivers if you plan to connect to a Data Source other than DB2. In this case, read the instructions under *Enabling a JDBC Driver*.

10. When the imported report package makes proper use of Libraries, the changed Data Source is propagated to all other reports in the package. If not, you need to repeat the previous procedure for each individual report in the package.

# 11.3.6 Exporting report packages

With the current version of Tivoli Common Reporting, it is not possible to export individual reports or report sets from the TCR Web interface. Instead, you will need to use TCR's Command Line Interface to export report sets.

Refer to *IBM Tivoli Common Reporting User's Guide*, SC23-8737, Chapter 5. Tivoli Common Reporting command reference for detailed information about using the command line.

Before being able to use the TCR Command Line Interface, change to the directory containing the command line tool trcmd.bat. It resides in the following directory: <TIP-InstallDir>\products\tcr\bin, where <TIP-InstallDir> is the installation location of Tivoli Integrated Portal. On Windows, the default installation path is:

C:\Program Files\IBM\Tivoli\tip\products\tcr\bin

Issue the following command to list all available report sets:

trcmd.bat -list -reportSets -user <user> -password <password>

Here, <user> is a valid TCR user and <password> is the corresponding password.

Issue the following command to export the report set titled TPC\_41 to the file C:\export.zip:

trcmd.bat -export -bulk C:\export.zip -reportSets TPC\_41 -user <user> -password<
password>

Here, <user> is a valid TCR user and <password> is the corresponding password.

# 11.4 Report creation workflows

This section provides an overview of the tools involved when creating new Tivoli Common Reporting (TCR) reports. As already mentioned, TCR is one possible option to implement customized reporting solutions using SQL database access, providing output in HTML, PDF or Microsoft Excel.

Notice that Tivoli Common Reporting is intended to produce certain predefined reports that are to be run repeatedly; typically on a daily, weekly or monthly basis. It does not provide any online report creation or report customization features. The effort of creating a new report is relatively high, compared to when creating reports through the TPC GUI. After being defined, reports can then be run and accessed very easily by the Web interface or the command line.

**Note:** Tivoli Common Reporting (TCR) / Business Intelligence and Reporting Tools (BIRT) is not specifically intended to be used for development of SQL statements. We recommend that you develop and test SQL statements using external tools first and start building TCR / BIRT reports after SQL statement development is (nearly) complete.

For additional information about BIRT and TCR, refer to 11.3.1, "Tivoli Common Reporting and BIRT overview" on page 551.

# 11.4.1 BIRT Designer download and installation

In order to develop reports for TCR you will need to use the BIRT Report Designer. The appropriate version of the Designer, as well as all required documentation for usage with Tivoli Common Reporting is available from the following URL:

http://www.ibm.com/developerworks/spaces/tcr

**Important:** It is essential to use the correct version of BIRT Designer when developing reports for Tivoli Common Reporting. TCR version 1.2 includes the BIRT Runtime Engine version 2.2.1. Be sure to use the BIRT Report Designer version 2.2.1 if you plan to publish your reports on Tivoli Common Reporting.

To be sure to download the correct version of the BIRT Designer, you must use the version from the foregoing URL. You find the link to the Report Designer in the rightmost column at the bottom of the page under **Key Resources**  $\rightarrow$  **Report Designer**.

Alternatively, you can use this direct URL:

http://www-01.ibm.com/software/brandcatalog/portal/opal/details?catalog.label=1TW1
00T02&S TACT=105AGX01&S CMP=LP

Notice that the following procedure applies to Windows, only. From the Eclipse site, the BIRT Designer is also available for other platforms such as Linux. Be sure to download version 2.2.1 of the Report Designer when obtaining it from there! Refer to the following URL for addition information:

http://download.eclipse.org/birt/downloads/build\_list.php

After you have downloaded the BIRT Report Designer, follow this procedure to install it on Windows:

- 1. Change to the directory where you downloaded BIRTDesigner221.zip and extract the archive.
- 2. Change to the directory you extracted from the archive and run **BIRTDESIGNER221.exe** either from the command line or by double-clicking the file in an Explorer window. The graphical installer is displayed, as illustrated in Figure 11-61.



Figure 11-61 BIRT Designer graphical installer

Choose a language for the installer and click **OK** to proceed with the installation.

3. The next panel, shown in Figure 11-62, presents you with a welcome message. Read the message text and click **Next** when you are ready.



Figure 11-62 Welcome message

4. You are prompted to review the license agreement as shown in Figure 11-63.



Figure 11-63 License Agreement

Read the license terms and, if you agree with it, click **I accept the terms in the license** agreement. Click **Next** to proceed with the installation. 5. The next panel, shown in Figure 11-64, allows you to choose an installation folder.

	Choose Install Folder
	Please select any valid directory for installation. If the selected directory does not exist it will be created.
D Install Complete	Where would you like to install?
	E:\Program Files\ibm\BIRTDesigner221
	<u>R</u> estore Default Folder Ch <u>o</u> ose
nstallAnywhere by Macrovision	
Cancel	Previous

Figure 11-64 Choose Install Folder

Click **Choose...** to browse the local file systems and directories. Select a location with sufficient free space - you will require about 1 GB of available capacity. When you are done, click **Next** to continue with the installation.

6. The summary panel allows you to review all specified parameters, as seen in Figure 11-65.



Figure 11-65 Installation summary panel

If you agree with the settings click **Install** to continue with the installation.

7. You will see a progress panel as the installer copies the required files. Wait for the installation to complete.

8. When the installation was successful, you will see a panel such as Figure 11-66. Click **Done** to close the graphical installer.

📲 BIRT Designer 2.2.1 for IBM Tivoli Common Reporting			
	Installation Complete		
<ul> <li>License Agreement</li> <li>Choose Install Folder</li> <li>Pre-Installation Summary</li> <li>Installing</li> <li>Install Complete</li> </ul>	Congratulations! BIRT Designer for IBM Tivoli Common Reporting has been successfully installed in the following location: E:\Program Files\ibm\BIRTDesigner221 Press "Done" to quit the installer.		
InstallAnywhere by Macrovision — <u>C</u> ancel	Previous Done		

Figure 11-66 Installation Complete

9. The installer might not create a shortcut to the appropriate executable. To manually do so, locate the eclipse.exe executable found here:

<BIRT-InstallDir>\eclipse\eclipse.exe, where <BIRT-InstallDir> is the installation location of BIRT Designer. The default path is:

#### C:\Program Files\IBM\BIRTDesigner221\eclipse\eclipse.exe

We recommend that you manually create a Desktop or Start Menu shortcut to this executable for faster reference.

You have now successfully completed BIRT Report Designer installation.

## 11.4.2 Working with BIRT Report Designer

This section provides a basic usage overview of the BIRT Report Designer software. Initial configuration steps are covered, and afterwards we walk through the process of creating a new TCR project and a simple report querying the TPC database repository. The report is then exported from BIRT Designer and can be imported into Tivoli Common Reporting as already outlined in 11.3.5, "Importing report packages" on page 567.

The BIRT Report Designer makes use of the Eclipse platform as its user interface component; strictly speaking, BIRT Designer is a plug-in for Eclipse, providing the "Report Design" Perspective.

The following Eclipse-specific terms are used in the BIRT Report Designer, as well as throughout this chapter:

Workspace	The directory path that is used to store all user data, such as configuration settings as well as project files
Workbench	The main window with all its panels
Perspective	Definition of the Workbench layout and the panels it contains

Project	A directory inside the Workspace used to organize files; all report definitions are created in the context of a project	
Library	Used to share reusable elements between reports in a project	
Data Source	Database connection information	
Data Set	An individual SQL query issued against a Data Source	
Data Binding	Report elements need to be bound to a Data Set in order to visualize the data it produces	

Notice that this chapter outlines the recommended way of creating TCR compatible reports that follow the official Tivoli style guidelines. In order to achieve a common look and feel between all TCR reports, a *Style Package* is provided with Tivoli Common Reporting. For further information about the Tivoli style guidelines, refer to *IBM Tivoli Common Reporting Development and Style Guide*, SC23-8861.

For additional introductory information about using the BIRT Designer to develop reports, follow the tutorials at the following URL:

#### http://www.eclipse.org/birt/phoenix/tutorial/

**Note:** When using information from the Eclipse Web site, keep in mind that, when developing reports that are to be used with Tivoli Common Reporting, additional aspects such as style guidelines and proper usage of libraries need to be considered, as outlined In this section.

Before being able to create reports that are compatible with Tivoli Common Reporting / Tivoli Storage Productivity Center, the following configuration steps need to be performed:

- Install the proper version of the DB2 JDBC drivers. Refer to "Driver installation and initial configuration" on page 578.
- Modify the Eclipse configuration file. Refer to "Driver installation and initial configuration" on page 578.
- Configure the Report Designer for use with TCR Style Package. Refer to "Workspace configuration with TCR Style Package" on page 579.

After completing the foregoing configuration steps, you can then create a new project and start developing reports.

Creating a new report package from scratch can be a complex task if you follow the Tivoli guidelines to use the official Style Package. Instead of creating a completely new report package, you might rather want to import the sample Workspace provided with this book and modify the existing reports. Refer to 11.4.3, "Importing sample BIRT Workspace" on page 615 for instructions.

The following steps must be performed in order to create a new project from scratch:

- 1. Create the project structure including custom resources folder. Refer to "Project creation and configuration" on page 587.
- 2. Create a Library and a Data Source inside that library. Refer to "Creation of Library and Data Source" on page 591.
- 3. For each individual report, refer to "Creation of Report and Data Source import" on page 597):
  - Import the Data Source from the library.
  - Create Data Sets based on the Data Source.
  - Use fields from the Data Set in report elements.

### Driver installation and initial configuration

In order to install the proper version of the DB2 JDBC drivers, follow this procedure:

- 1. Log on to the server machine that has the DB2 instance installed that you plan to query data from (containing the TPC database repository, such as TPCDB).
- Locate the files db2jcc.jar and db2jcc\_license\_cu.jar to be found in the DB2 installation path: <DB2-InstallDir>\java, where <DB2-InstallDir> is the installation location of DB2. On Windows, the default path is:

C:\Program Files\IBM\SQLLIB\java

On Linux and UNIX the default path is:

/opt/ibm/db2/V9.5/java

3. Copy the files db2jcc.jar and db2jcc\_license\_cu.jar from the DB2 directory on the server machine and place them into the following directory on the machine where you installed BIRT Designer (your local workstation or mobile computer): <BIRT-InstallDir>\eclipse\plugins\org.eclipse.birt.report.data.oda.jdbc\_2.2.1.r 22x\_v20070919\drivers, where <BIRT-InstallDir> is the installation location of BIRT Designer. The default path is:

C:\Program Files\IBM\BIRTDesigner221\eclipse\plugins\org.eclipse.birt.report.da ta.oda.jdbc\_2.2.1.r22x\_v20070919\drivers

 In addition to copying the JDBC driver files, you need to modify the Eclipse configuration eclipse.ini file found in the following directory: <BIRT-InstallDir>\eclipse\eclipse.ini, where <BIRT-InstallDir> is the installation

location of BIRT Designer. The default path is:

C:\Program Files\IBM\BIRTDesigner221\eclipse\eclipse.ini

Open the file with a text editor and modify its contents in the following way:

**Note:** Do not edit the Eclipse configuration file with Notepad, because it will not display line breaks correctly. Instead, use WordPad.

```
-showsplash
org.eclipse.platform
--launcher.XXMaxPermSize
256m
-vm
C:\progra~1\IBM\BIRTDesigner221\jre\jre\bin\javaw.exe
-vmargs
-Xms40m
-Xmx512m
```

Be sure that the path provided with the **-vm** parameter is valid with your specific environment; if you installed the BIRT Designer in a location other than the default path, modify this line accordingly.

See Figure 11-67 for an example of the eclipse.ini configuration file contents.

📋 eclipse.ini - WordPad	
<u>File Edit View Insert Format H</u> elp	
-showsplash org.eclipse.platform launcher.XXMaxPermSize 256m -vm C:\progra~1\IBM\BIRTDesigner221\jre\jr -vmargs -Xms40m -Xms512m	re\bin\javaw.exe
For Help, press F1	

Figure 11-67 Modified Eclipse configuration file contents

### Workspace configuration with TCR Style Package

In order to achieve a common look and feel between all TCR reports, a *Style Package* is provided with Tivoli Common Reporting. To configure BIRT Designer to use that Style Package, follow this procedure:

- 1. Log on to the server machine where you installed TIP / TCR. The Style Package is copied as part of the TPC server component installation.
- 2. Locate the file TCRStylePackage\_V1.2.zip to be found in the TCR installation path: <TIP-InstallDir>\products\tcr\style, where <TIP-InstallDir> is the installation location of Tivoli Integrated Portal. On Windows, the default path is:

C:\Program Files\IBM\Tivoli\tip\products\tcr\style

- 3. Copy the file TCRStylePackage\_V1.2.zip from the TCR directory on the server machine and place it into a temporary directory on the machine where you installed BIRT Designer (your local workstation or mobile computer). You do not need to extract the file.
- 4. Launch the BIRT Designer. If the installer did not create a shortcut, manually launch eclipse.exe from the following directory: <BIRT-InstallDir>\eclipse\eclipse.exe, where <BIRT-InstallDir> is the installation location of BIRT Designer. The default path is:

C:\Program Files\IBM\BIRTDesigner221\eclipse\eclipse.exe

5. The panel shown in Figure 11-68 is displayed, asking you for the location of a *Workspace*.

🖨 Workspace Launcher	X
Select a workspace	
Eclipse SDK stores your projects in a folder called a workspace. Choose a workspace folder to use for this session.	
Workspace: C:\Documents and Settings\Administrator\workspace  Browse Browse	
Use this as the default and do not ask again	
OK Cancel	

Figure 11-68 Eclipse Workspace Launcher

Eclipse stores all user information in a *Workspace directory*. This includes configuration settings as well as all project-related files; the report definitions that you create are hierarchically organized into Projects, which are stored in the Workspace directory.

You can specify a custom directory or accept the default. The directory will be created if it does not already exist. In addition, you can choose to save this location as the default; otherwise you will be prompted for the Workspace location each time BIRT Designer starts.

**Tip:** We recommend that you create a Workspace directory outside of a specific user's home directory, such as C:\workspace, for example.

6. The Eclipse window is displayed, displaying the Welcome panel as illustrated in Figure 11-69. Click the rightmost arrow icon in order to close the Welcome panel and proceed to the Workbench.



Figure 11-69 Eclipse Welcome panel

7. Eclipse's main window, the *Workbench*, is displayed. The Workbench can display various *Perspectives*. You will need to switch to the *Report Design Perspective* to start working with the BIRT Designer.

Locate the button in the top-right corner of the Workbench that reads **Java**. This button indicates that currently the Java Perspective is being displayed. Click the icon to the left of the Java button to open an additional Perspective. A drop-down menu opens, allowing you to select the **Report Design Perspective** as shown in Figure 11-70.



Figure 11-70 Open the Report Design Perspective

Alternatively, you can select **Window**  $\rightarrow$  **Open Perspective**  $\rightarrow$  **Report Design** from the menu to switch to the Report Design Perspective.

8. After switching to the Report Design Perspective, the Workbench now looks similar to Figure 11-71.



Figure 11-71 Workbench layout after switching to Report Design Perspective

Next, you will need to import the TCR Style Package into the Workspace. In order to do so, click **File**  $\rightarrow$  **Import...** from the menu.

9. The Import Wizard is displayed, as seen in Figure 11-72. To choose the import source, expand the branch titled **General** and click **Existing Projects into Workspace**. When you are done, click **Next** to proceed.

Emport Select Create new projects from an archive file or directory.	
Select an import source:  type filter text	
→ Control       Archive File         Breakpoints       ■         ■       Existing Projects into Workspace         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ■       ●         ●       ●         ●       ●         ●       ●         ●       ●         ●       ●         ●       ●         ●       ● </td <td></td>	
Back         Next >         Einish	Cancel

Figure 11-72 Import Wizard

10.On the Import Projects panel, click **Select archive file** in order to be able to specify a compressed archive. Then, click **Browse** and locate the TCR Style Package file TCRStylePackage\_V1.2.zip that you previously downloaded from the TCR server machine. See Figure 11-73 for an example.

<b>€</b> Import	
Import Projects Select a directory to search for existing Eclipse projects.	
C Select root directory: C Select archive file: C:\tcrtemp\TCRStylePackage_V1.2.zip Projects:	Browse
TCRStylePackage_V1.2	Select All
Copy projects into workspace	
② < <u>Back</u> <u>M</u> ext > <u>Einish</u>	Cancel

Figure 11-73 Choose to import TCR Style Package

Be sure that **TCRStylePackage\_V1.2** is checked in the list of projects, prior to clicking **Finish** to start importing the contained files.

11. The Import Wizard will close. Back in the Workbench, the **Navigator** panel in the bottom left corner of the window now lists a new Project named TCRStylePackage\_V1.2. If you expand it, the contents look similar to Figure 11-74.



Figure 11-74 Imported TCR Style Package contents

- 12.Next, you will need to point the BIRT Designer to the imported resources and templates. To do so, click **Window** → **Preferences...** from the menu to open the Preferences panel.
- 13. In the Preferences panel, expand **Report Design** from the left-hand navigation tree and click **Resource**. See Figure 11-75 for an example.

Preferences		
type filter text	Resource	$\Leftrightarrow \bullet \Rightarrow \bullet$
General Ant Connectivity Fielp Finstall/Update Finstall/Update Finstall/Update Finstall/Update Finstall/Update Finstall/Update Finstall/Update Finstall/Update Finstall/Update Field Fiel	Type or select the default resource folder to use for the library exproperty files, and so on.          Resource folder       <	korer, images,
	Restore Defau	ts <u>A</u> pply
0	ОК	Cancel

Figure 11-75 Report Design Resource Preferences

14. Click **Select...** and locate the **TCRStylePackage\_V1.2/resources** folder inside the Workspace you specified during startup, as seen in Figure 11-76.

Browse For Folder	? ×
Please select the default resource folder:	
🗉 🧮 Start Menu	•
🗉 🛅 UserData	
🖂 🫅 workspace	
🕀 🧰 .metadata	
E CRStylePackage_V1.2	
🗈 🗁 resources	
🔲 templates	
All Osers	<u> </u>
Folder: resources	
Make New Folder OK Cancel	
	<b>-</b> //

Figure 11-76 Browse for resources folder inside TCR Style Package

Notice that you need to specify the absolute path to the resources directory inside the project folder. If you accepted the default Workspace location upon startup, the path is:

C:/Documents and Settings/<user>/workspace/TCRStylePackage\_V1.2/resources/

Here, <user> is the user name of the user currently logged on. Refer to Figure 11-68 for additional details.

**Note:** Because you have to specify the absolute path to the project inside the Workspace, you need to adopt this setting when moving the Workspace in the future. When transferring the Workspace to another machine, you also need to modify this setting accordingly because the absolute path is likely to change in this case.

When you are done, click Apply to save the new configuration.

15. Select **Report Design** → **Templates** from the left-hand navigation panel. Click **Select...** and choose the **TCRStylePackage\_V1.2/templates** directory. If you accepted the default Workspace location upon startup, the path is:

C:/Documents and Settings/<user>/workspace/TCRStylePackage\_V1.2/templates/

Here, <user> is the user name of the user currently logged on.

Again, be aware of the fact that you have to specify an absolute path here; you might need to adopt it accordingly when moving the Workspace. When you are done, click **Apply** to save your changes. See Figure 11-77 for an example.

Preferences		
type filter text	Template	$\Leftrightarrow \bullet \Rightarrow \bullet$
⊕- General ⊕- Ant	Please select the template folder.	
Help     Help     Install/Update     Install/Update     Internet     Java     Plug-in Development     Report Design     - Chart     - Comment Template     - Crosstab     Data Set Editor     - Element Names     Preview     Resource     Template     Resource     Template     Senurce     Senurce     Senurce	Iemplate folder titings/Administrator/workspace/	TCRStylePackage_V1.2/templates/
B - Team - Validation B - Web and XML B - Web Services B - XDodet		
		Restore Defaults Apply
0		OK Cancel

Figure 11-77 Report Design Template Preferences

- 16. After you have set both the Resource folder and the Template folder for Report Design, expand the **Report Design** → **Data Set Editor** branch from the navigation tree and click **JDBC Data Set**.
- 17. In the JDBC Data Set panel, change the value for **Maximum number of tables in each** schema to display to 999, which is the maximum allowed value. See Figure 11-78 for an example.

e Preferences		
type filter text	JDBC Data Set	
General Gener	Ouery Page ✓ Prefetch all Schemas from database Maximum number of gchemas to display: Maximum number of tables in each schema to display: Resi	20 999
0		OK Cancel

Figure 11-78 JDBC Data Set Preferences

Click **Apply** when you are done. You can now click **OK** to close the Preferences window.

### Project creation and configuration

After you have installed the proper version of the DB2 JDBC drivers, modified the Eclipse configuration file and configured Report Designer for use with the TCR Style Package, you can now create a Project to hold your report designs.

An individual project will typically result in an individual report package .zip file to be imported to Tivoli Common Reporting afterwards. You might use separate projects to group reports for example by customer, by department or by line of business. You will, however, have to create at least one project to start developing BIRT reports.

Creating a new report package from scratch can be a complex task if you follow the Tivoli guidelines to use the official Style Package. Instead of creating a completely new report package, you might rather want to import the sample Workspace provided with this book and modify the existing reports. Refer to 11.4.3, "Importing sample BIRT Workspace" on page 615 for instructions.

Creating a new project from scratch involves the following steps:

- Create the project structure including custom resources folder. Refer to "Project creation and configuration" on page 587.
- Create a Library and a Data Source inside that library. Refer to "Creation of Library and Data Source" on page 591.
- For each individual report, refer to "Creation of Report and Data Source import" on page 597):
  - Import the Data Source from the library.
  - Create Data Sets based on the Data Source.
  - Use fields from the Data Set in report elements.

Follow these steps to create a new Report Design Project:

- 1. From the menu, select **File**  $\rightarrow$  **New**  $\rightarrow$  **Project...**. The New Project Wizard is displayed.
- 2. Expand the **Business Intelligence and Reporting Tools** branch and select **Report Project**, then click **Next**. See Figure 11-79 for an example.

e New Project		
Select a wizard Creates a new Report Project.		
<u>W</u> izards:		
type filter text		
Java Project Java Project from Existing Ant Buildfile Project from Existing Ant Buildfile Business Intelligence and Reporting Tools BIRT Charting Web Project ODA Designer Plug-in Project ODA Designer Plug-in Project ODA Designer Plug-in Project ODA Designer Plug-in Project Web Project Beacher State Web Project Designer Plug-in P		×
(?) < <u>B</u> ack	<u>N</u> ext > Einish	Cancel

Figure 11-79 New Project Wizard

3. On the next panel you are required to specify a **Project name**. Specify a name as seen in Figure 11-80, then click **Finish** to create the project.



Figure 11-80 Specify Project name

4. After you have created the project, the **Navigator** panel in the bottom left corner of the Workspace now lists a new Project with the name you just specified, as seen in Figure 11-81.



Figure 11-81 New empty project

 You have to copy the resources folder from the TCR Style Package to your new project. To do so, from the Navigator panel, right-click the **resources** folder inside the **TCRStylePackage\_V1.2** project imported earlier. From the context menu, select **Copy** as seen in Figure 11-82.



Figure 11-82 Copy resources folder from TCR Style Package

6. Next, right-click your new project in the Navigator panel. From the context menu, select **Paste** to start copying the resources folder selected earlier. See Figure 11-83 for an example.

Report Design - Eclipse SDK		
File Edit Navi New	▶ bw Help	
Go Into Open in New Window		Report Design »
Sonv		
A palette is not		
🗙 Delete 📈		
Mo <u>v</u> e		
Rename		
🚵 Import		
🛃 Exp <u>o</u> rt		
8 Refresh		
Close Project		
Close <u>U</u> nrelated Projects		
Validate		
<u>R</u> un As	•	
Debug As		
To- Navigato 2 Profile As		
Compare With	•	
Restore from Local History		
tes ≦ource	>	
ter	rty Editor 🛛 🛃 Problems	
······X .pr Properties	erty editor is not available.	
L .project		
]  ☐ <sup>◆</sup> TPC_Samples		🗠 💖 💌 🎑 🕋

Figure 11-83 Paste resources folder into new project

7. You might see a progress panel while the files are being copied. After the copy process has finished, the structure of your new project looks similar to Figure 11-84.



Figure 11-84 New project containing resources folder

**Note:** It is essential to create the project's directory structure exactly as outlined here. Your project needs to have a folder titled **resources**, and in that folder there needs to be a sub-folder titled **tcr\_common**. If you do not follow this structure, your resulting report package .zip file might become incompatible with Tivoli Common Reporting! Now you need to configure the BIRT Report Designer to use the resources folder that you just copied to your project, rather than the generic resource folder from the TCR Style Package specified earlier. To achieve this, click **Window**  $\rightarrow$  **Preferences...** from the menu.

 Select Report Design → Resource from the left-hand navigation tree to open the Resource folder panel. Click Select and browse to the resources folder inside your new project, as shown in Figure 11-85.

Bro	owse For Folder	? ×
F	Please select the default resource folder:	
	Ci SendTo	•
	🕀 🛅 Start Menu	
	🛅 Templates	
	🕀 🛅 UserData	
	🗆 🛅 workspace	
	🕀 🛅 .metadata	
	🗄 🛅 TCRStylePackage_V1.2	
	🗆 🧰 TPC_Samples	
	🕀 🗁 resources	
	🕀 🫅 All Users	-
F	Folder: resources	
	Make New Folder	»

Figure 11-85 Browse for resources folder inside new project

When you are done, click Apply and OK to close the Preferences window.

**Note:** Be sure to change the Report Design Preferences to point to the custom resources folder inside the project you are currently working on. If you do not do so, the resulting report package .zip file might become incompatible with Tivoli Common Reporting!

### **Creation of Library and Data Source**

To be able to share elements between multiple reports in a project or report package, we highly recommend that you create a *Library*. This is especially useful to share database connection information (called *Data Sources*) between multiple reports.

To create a Library and a Data Source in your project, follow these steps:

- 1. From the menu, select File  $\rightarrow$  New  $\rightarrow$  Library. The New Library panel is displayed.
- 2. You need to specify a parent folder and a filename. Enter a name such as *TPC.rptlibrary* and select the **resources** directory of your project as the parent folder. This way, the library is placed inside the custom resources folder prepared earlier. See Figure 11-86 for details. When you are done, click **Finish** to create the library.

New Library	-	
l <b>ew Library</b> Create a new library		
inter or select the parent folder:		
TPC_Samples/resources		
$\hat{\Phi} \leftarrow \Rightarrow$		
TCRStylePackage_V1.2		
E - C Jampes		
ile name:   IPC.rptlibrary		
Advanced >>		

Figure 11-86 Create new library inside custom resources folder

3. The panel shown in Figure 11-87 informs you that you need to access elements in your library from the outline view. After reading the message text, click **OK** to close the panel.

🖨 Libra	ary			×
į)	To view elements of th To add visual elements palette or use insert m	e library, click on a to library, drag and enu	report item in outline d drop report items ir	view. h from the
Don	't show this message ag	ain		OK

Figure 11-87 Library information message

4. Verify that the library was created inside the **resources** folder of your project on the same level as the **tcr\_common** folder, as seen in Figure 11-88.



Figure 11-88 Project structure containing new library inside resources folder

5. To create elements in your new library, switch from the Navigator panel to the Outline panel by clicking the **Outline** tab in the panel in the bottom left corner of your Workbench. The panel looks similar to Figure 11-89.



Figure 11-89 Switch to outline view

6. Right-click **Data Sources** in the outline panel; this opens a context menu that allows you to create a **New Data Source** inside the library. See Figure 11-90.



Figure 11-90 Create New Data Source

 You are prompted for the Data Source Type that you want to create. Because we plan to connect to the TPC database repository using JDBC, select JDBC Data Source as seen in Figure 11-91.

🖨 New Data Source	_ 🗆 X
Select a Data Source Type or Choose a Connection Profile Provide all the settings for a new data source, or choose a pre-defined connection profile	Ĩ
• Create from a data source type in the following list	
C Create from a connection profile in the profile store	
Classic Models Inc. Sample Database Elat File Data Source	
JDBC Data Source	
Scripted Data Source Web Services Data Source	
XML Data Source	
Data Source Name: TPCDB	
O < Back Next > Einish	Cancel

Figure 11-91 Select JDBC Data Source type

In addition, specify a name for your new Data Source such as **TPCDB**. When you are done, click **Next** to proceed.

**Tip:** For Data Sources, we recommend that you choose names that indicate the database you plan to connect to. The default name of the TPC database is *TPCDB*.

 You will now be prompted for the connection information of the Data Source Profile you are about to create. First, verify that the DB2 JDBC drivers which you copied earlier have been properly loaded by clicking Manage Drivers. The Manage JDBC Drivers panel is displayed as seen in Figure 11-92.

File Name	Original Location
db2jcc_license_cu.ja db2jcc.jar	<ul> <li>E:\Program Files\IBM\BIRTDesigner221\eclipse\plugins\org.eclipse.birt.rej</li> <li>E:\Program Files\IBM\BIRTDesigner221\eclipse\plugins\org.eclipse.birt.rej</li> </ul>
•	
- This file does not exist	n the ODA JDBC drivers directory.
<ul> <li>This file does not exist</li> <li>This file has been restored</li> </ul>	n the original location. red.

Figure 11-92 Manage JDBC Drivers

You can see the two files, db2jcc.jar and db2jcc\_license\_cu.jar, that you copied earlier. If those two files are not displayed in the list, click **Add...** to manually add them in. When you are done, click **OK** to close the Manage JDBC Drivers panel.

9. Back in the New JDBC Data Source Profile panel, locate the **Driver Class** drop-down menu and expand it. Select the following entry:

```
com.ibm.db2.jcc.DB2Driver(v3.53)
```

If you do not find this entry, this means that you did not load the proper DB2 JDBC drivers. Click **Manage Drivers** to fix this problem, as outlined in the previous step.

After selecting the appropriate Driver Class, fill in the other fields as illustrated in the New JDBC Data Source Profile.

틎 New JDBC D	ata Source Profile	
Create a ne	w data source	$\rightarrow$
Create a new c	lata source	
Driver <u>⊂</u> lass:	com.ibm.db2.jcc.DB2Driver (v3.53)	•
Database <u>U</u> RL:	jdbc:db2://colorado.itso.ibm.com:50000/TPCDB	
User N <u>a</u> me:	TPCRPT	
Password:	••••••	
JNDI URL:		
	Manage Drivers	
?	< Back Mext > Einish	Cancel

Figure 11-93 New JDBC Data Source Profile

You need to provide the following information:

Database URL:	Specify the URL in the following format:
	jdbc:db2:// <hostname>:<port>/<database></database></port></hostname>
	Here, <hostname> is the (resolvable) host name or IP address of the server that has DB2 installed, <port> is the TCP/IP port DB2 is using (default is 50000), and <database> is the name of the database that you plan to connect to.</database></port></hostname>
	The URL, for example, looks like this:
	jdbc:db2://colorado.itso.ibm.com:50000/TPCDB
User Name:	Specify a user ID that has database authority on the target DB2 instance you plan to connect to. We highly recommend that you use a view-only user when connecting to the TPC database repository, such as <i>TPCRPT</i> . See 11.2.4, "Creation of view-only reporting user" on page 529 for additional details.
Password:	Specify the password for the database user.
JNDI URL:	Leave this field empty.

10. After you have selected the appropriate DB2 JDBC Driver Class and filled in all fields, click **Test Connection** to verify the specified parameters. The result looks similar to Figure 11-94.



Figure 11-94 Connection Test results

If, instead, you see an error message regarding the connection attempt, go back and review the specified parameters.

After the connection test was successful, click **Finish** to store the parameters and create your new Data Source.

11. Verify that the Data Source was created in the **Outline** view. The contents of this panel now look similar to Figure 11-95.



Figure 11-95 New Data Source in outline view

### Creation of Report and Data Source import

Now that the project was created and the structure was prepared, including a Data Source inside the Library, you can now start developing individual reports. We walk through the process of creating a new report from a Template definition out of the TCR Style Package.

On a high level, you must perform the following steps in order to do so:

- 1. Import the Data Source from the library.
- 2. Create Data Sets based on the Data Source.
- 3. Use fields from the Data Set in report elements.

To create a new BIRT report, follow this procedure:

- 1. From the menu, select **File**  $\rightarrow$  **New**  $\rightarrow$  **Report**. The New Report panel is displayed.
- You need to specify a parent folder and a filename. Enter a name such as Subsystem\_Overview.rptdesign and select the root directory of your project as the parent folder. See Figure 11-96 for details. When you are done, click Next to proceed.

틎 New Report						_ 🗆 🗙
New Report						
Create a new report						
					-	
Enter or select the parent folder:						
TPC_Samples						
TCRStylePackage_V1.2						
HIME TPC_Samples						
File pamer Subsusteen Oursuite	u rotdosia-					
rile name: [ bdbsystem_overviev	virpcuesign					
0	< Back	Ne	vt >  [	Finish		Cancel
	< Back			- Lunsu		Cancor

Figure 11-96 Specify report name and parent folder

**Note:** Be sure not to create the new report in the **resources** folder, which might still be selected from creating the Library previously. Instead, create the report in the root folder of your project.

3. The next panel allows you to choose a report template to start from. Choose **TCR\_Table** from the list of available templates and click **Finish** to create a report based on this template. See Figure 11-97 for an example.

🖶 New Report	
New Report Select a report to copy	
Report templates: Blank Report My First Report Simple Listing Grouped Listing Dual Column Listing Chart & Listing Dual Column Chart & Listing Side by Side Chart & Listing TCR_Chart TCR_Chart TCR_GroupTable(2_Groups) TCR_Table	Preview:
<ul> <li>Show report creation creat sheet</li> </ul>	
?	K Mext > Einish Cancel

Figure 11-97 Create new report based on template

4. Verify that the new report was created and is selected as the active document. To do so, switch the bottom left panel back to **Navigator** view (if it is still set to Outline view) and verify that the new report file is available in the root folder of your project. The panel looks similar to Figure 11-98. Double-click the new report to open it and set it as the active document.



Figure 11-98 Verify new report was created in project root directory
5. To have more room for editing report elements, maximize the Layout panel by double-clicking the tab with the report title as shown in Figure 11-99.

Report Design - TPC_Samples/Subsystem_0	/erview.rptdesign - Eclipse SDK	
<u>File E</u> dit <u>I</u> nsert Element <u>D</u> ata Page <u>N</u> avigate	Se <u>a</u> rch <u>P</u> roject <u>R</u> un <u>W</u> indow <u>H</u> elp	
] 📸 • 📰 🚔   🇌   🖓   🆓 •   隆 •	] &   ◎   目   2 - 2 - 4 - 4	😭 😡 Report Design
🚱 Pale 🛛 😫 Data 🏛 Libr 🗖 🖬 TPC	.rptlibrary 🔚 Subsystem_Overview.rptdasign 🛛 🔪	
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ab Label	Sample Table Report Title	
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ab Dynamic Text	Sample Table Report Secondary Title	
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Image -	Parameter1 [Param 1]	Long Parameter [Param

Figure 11-99 Double click tab to maximize layout panel

All other panels are temporarily minimized, leaving more panel space for the Layout panel. To restore the panels, double-click the tab with the report name again.

6. The selected report template contains many elements that we are not currently interested in. Because we do not plan to use them in our example report, we simply delete them. To do so, click somewhere in the white space inside the report's Grid structure, as illustrated in Figure 11-100.

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E Sample Table	Report Title			
Sarameter 1	[Param 1]	Long Parameter	[Param 2]	
Longer	[Param 3]	2		

Figure 11-100 Click in the white space inside the report's grid structure

You will now see horizontal and vertical tabs around the (highlighted) grid structure of the report. By clicking those tabs, you can easily select entire rows or columns of the grid.

7. Select the tab to the left of the cell containing the parameter fields (Param1 through Param3), as illustrated in Figure 11-101.

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<mark>*}</mark> • ≧     100% ▼	9   J   Q +   Q	• ] 🖋 ] 🎱 ] 🔋	] ½ × 원 × ← ⇔ + →	• •	Report Design Java
🖉 🏛 TPC.rptlibra	ary 🚺 Subsystem_Over	riew.rptdesign 🛛			- P
	Sample Table R Sample Table R Parameter 1 Longer Parameter 3	Report Title port Secondary Title [Param 1] [Param 3]	Long Parameter 2	[Param 2]	
4 - - - -	Parameter Grou Parameter4	p 2 [Param 4]			

Figure 11-101 Click tab to select entire grid cell

If you now press the **<Delete>** key, you will delete this entire cell with all report elements contained in it. Delete the cell that contains the label **Sample Table Report Secondary Title**.

- 8. Repeat the previous procedure to also delete the cell that contains the label **Parameter Group 2**.
- Scroll down, leaving the cell that contains the label Sample Table Report Section 1 Sub-text Heading untouched. *Do not delete this cell;* we use it later on.
- 10. Delete the cell that contains the label **Sample-Table with Multi-Column Header Section 2 Sub-text Heading** as well as the cell underneath it, containing the table. The report now looks similar to Figure 11-102.

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	÷ · · · · · · · · · · · · · · · · · · ·			
- -D				
	Sample Table Report T	Title		
:	Sample Table Report Set	ction 1 Sub-text Heading		
∾ •				
	Customer Name	Phone	Postal Code	
	[CUSTOMERNAME]	[PHONE]	[POSTALCODE]	
	Footer Row			

Figure 11-102 Resulting report layout after deleting unnecessary elements

11. We are using the remaining table report element to display the information in our report. The table does, however, still contain sample columns from the template definition. To remove them, click the table cell that reads [CUSTOMERNAME] to select it and then press the <Delete> key. Do this for all three columns (delete [PHONE] and [POSTALCODE] as well). The report now looks similar to Figure 11-103.

Eile Edit	Design - TPC_Samples/Subsystem_Overview.rp Insert Element Data Page Navigate Search	ptdesign - Eclipse SDK <u>P</u> roject <u>R</u> un <u>W</u> indow <u>H</u> e	elp	_ 🗆 X
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4	Sample Table Report descriptive	e text. Multi-line display of	purpose and description of the report.	
	ut Master Page Script XML Source Preview			• •
] [\$			🐴   🍳 💌	१ 🕸 🔶 📔 हा 👔

Figure 11-103 Resulting report layout after deleting table contents

- 12. We can now start adding in our own data to the table. To do so, we first need to import the defined Data Source. Double-click the tab containing the report title to restore the initial Workbench and display the other panels.
- 13. We need to link the Data Source from the Library into the report definition. To do so, switch the top left panel to the Library Explorer view by clicking the tab labeled Library Explorer. Locate the Data Source you created earlier, in our case TPCDB. See Figure 11-104 for an example.



Figure 11-104 Library Explorer panel

14. In the bottom left panel, switch to the **Outline** view, as shown in Figure 11-105. Be sure your new report definition is still the active document.



Figure 11-105 Outline panel

You will notice that the report already defines a Data Source named **SampleDataSource**. This is defined in the template definition; you can ignore it.

15. In order to add a link to the Data Source definition from the Library, click and drag the Data Source element (for example, **TPCDB**) from the Library Explorer panel (top left) to the **Outline** panel (bottom left). While dragging the element to the Data Source branch of the Outline panel, you can see a little + sign as shown in Figure 11-106.



Figure 11-106 Drag Data Source from Library Explorer to Outline view

16. After dropping the Data Source element (**TPCDB**) to the Outline view, it is displayed there in addition to the SampleDataSource (from the template definition). Be sure that the Outline view looks similar to Figure 11-107 before proceeding.

🕾 Navigator 🔠 Outline 🛛 🦳 🗖
🖃 🔚 TCR_Table.
🖻 👩 Data Sources
- SampleDataSource
🕀 🗟 Data Sets
🖓 Data Cubes
🗄 🙀 Report Parameters
🗄 🛅 Body
🗄 🗅 MasterPages
🗄 🔛 Styles
Embedded Images
TivoliCommonReporting_v1.T
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Figure 11-107 Outline view containing link to Data Source

17.Next, we need to create a *Data Set*. Data Sets represent database queries that produce columns, which can then be used to populate report elements such as tables.

Switch the top-left panel from the Library view to the Data Explorer view, by clicking the **Data Explorer** tab as shown in Figure 11-108.



Figure 11-108 Switch to Data Explorer

As Data Sources, you can see the SampleDataSource from the template definition as well as the linked Data Source from the Library (*TPCDB*). As Data Sets, you can see a *SampleDataSet*; this is defined in the template definition as well. You can ignore it.

18. Right-click the **Data Sets** branch to open a context menu and select **New Data Set**, as seen in Figure 11-109.



Figure 11-109 Create New Data Set

19. The New Data Set wizard is displayed, allowing you to specify a Name, a Data Source and a Type for the new Data Set you are about to create. Remember that a Data Set will represent an individual SQL query; the name reflects the purpose of the particular query, such as **Subsystems**. Select your custom Data Source, such as **TPCDB**, and be sure that Data Set Type is set to **SQL Select Query**. See Figure 11-110 for an example.

틎 New Data Se	t	
New Data So Create a new da	et ata set.	G
Data Set Na <u>m</u> e:	Subsystems	
Data <u>S</u> ource:	ТРСОВ	<b>-</b>
Data Set <u>T</u> ype:	SQL Select Query	•
?	< Back Next > Enish	Cancel

Figure 11-110 Net Data Set wizard

**Tip:** For Data Sets, we recommend that you choose names that indicate the used base tables or views of the corresponding query.

When you are ready, click Next to proceed.

20. The next panel allows you to specify the corresponding SELECT query for the Data Set you are about to create.

You can use the left-hand navigation tree to browse the available database schemas and all tables and views it contains, as well as their columns. You can optionally limit the amount of shown tables and views by applying filters to the navigation tree.

After you have identified a schema, table, view, or column that you plan to use in your query, the name of this particular item can be dragged to the right-hand panel showing the SQL query; the name is inserted at the position where you drop the item. Alternatively, you can manually edit the query text and add clauses, and so on.

Modify the query text as follows:

```
select
    VENDOR,
    TYPE,
    SERIAL_NUMBER
from
    TPCREPORT.STORAGESUBSYSTEM
for fetch only with UR
```

See Figure 11-111 for an example.

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Query		
Define a sql query text using available items		
Available Items:	1select	<b>A</b>
	2 VENDOR,	
E SYSCAT	з түре,	
SYSIBM	4 SERIAL_NUMBER	
E SYSIBMADM	Sfrom	
E SYSSTAT	7 for fetch only with UP	
E TEC	And recent only with on	
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Filte <u>r</u> :		
Turner All Market Silver		
Type: I-All-		
🔲 Use identifier quoting		
0	< Back Nevt > Finish (	ancel
0	Contraction Contraction	

Figure 11-111 Simple SELECT query for new Data Set

**Note:** Remember that BIRT is not specifically intended to be used for development of SQL statements. We recommend that you develop and test SQL statements using external tools first and insert (Copy and Paste) the final statement into this panel afterwards.

Click Finish when you are ready.

21. The panel shown in Figure 11-112 is displayed, showing the columns that the specified query will produce.

Output Columns	Define output column	s:				
Computed Columns	Name	Туре	Alias	Display Name	Display Name Key	<u>E</u> dit
-arameters Silvers	VENDOR	String		VENDOR		
nicers	TYPE	String		TYPE		
roperty Binding	SERIAL_NUMBER	String		SERIAL_NUMBER		
iettings						
review Results						
	•					

Figure 11-112 Data Set Output Columns

22. From the left-hand navigation tree, click **Preview Results** to verify the data produced by the specified query. The result looks similar to Figure 11-113.

Edit Data Set - Subsystems	Preview Br	esults		
Query				<b>v</b> -v
Output Columns	VENDOR	TYPE	SERIAL_NUMBER	
- Computed Columns	IBM	FAStT	600A0B800017443	
- Parameters	IBM	ESS	22513	
Filters	IBM	FAStT	600A0B80002904D	
Property Rinding	IBM	DS8000	75BALB1	
Cable as	IBM	SVC	0000020061E0311C	
Settings				
Preview Results				
2				
2)				OK Cancel

Figure 11-113 Data Set Preview Results

Click **OK** to close the Data Set panel. You can always re-open this panel, for example, to further refine your SQL code, by double-clicking the Data Set from the Data Explorer panel of Workbench.

23. Verify that in the Data Explorer panel of Workbench you now see your new Data Set. When expanding it, you can see a list of all columns the Data Set produces, as illustrated in Figure 11-114.



Figure 11-114 Data Set Output Columns displayed in Data Explorer panel

Those Output Columns can now be used to populate report elements, such as the prepared table. Alternatively, you can, for example, display them in a chart; doing so will, however, we do not cover this method.

24. Before you are able to use columns from the new Data Set with the existing table report element, you need to modify the table's *Data Binding*. A report element can only be bound to one Data Set at any given time.

To modify the existing Data Binding of the table element, right-click any cell inside the table and select **Edit Data Binding** from the context menu. See Figure 11-115 for details.



Figure 11-115 Right-click table cell and choose Edit Data Binding from context menu

25. The panel that is displayed now allows you to modify the table's Data Binding. Locate the drop-down menu next to the **Data Set** label; currently it is set to SampleDataSet, as seen in Figure 11-116.

Data Set: Sampl	ieDataSet	💌 💽 taset Pa	arameter Binding	
Report Item:				
ata Colump Binding:				
ica column omanig.				
Name	Data Type	Expression	Aggregate On	Add
CUSTOMERNAME	String	dataSetRow["CUSTOMER	N/A	
PHONE	String	dataSetRow["PHONE"]	N/A	E <u>d</u> it
POSTALCODE	String	dataSetRow["POSTALCO	N/A	
				<u>R</u> emove

Figure 11-116 Modify report element's Data Binding

Expand the drop-down and select your custom Data Set instead to modify the report element's Data Binding. When doing so, the warning message shown in Figure 11-117 is displayed, asking you for confirmation about clearing the element's Data Binding.

🖨 Chan	ige data set?						×
۰.	You are about to Do you wish to cle	change ti ear all exi	he elemen sting data	it's data b i field info	oinding. ormation?		
			Y	≘s	No	C <u>a</u> ncel	

Figure 11-117 Warning message

Click **Yes** to confirm clearing the element's existing data binding. Back in the Data Binding panel, you can now see the output columns of your custom Data Set being bound to the report element. Click **OK** when you are done.

26. You can now drag columns from your custom Data Set in Data Explorer view (top left panel) into the table cells to display them. While dragging the column to the table, you can see a little + sign. Be sure to drag the columns into the Detail row (middle row) of the table element; see Figure 11-118 for an example:

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Data Sources     SampleDataSource	$\begin{array}{c} & & & & \\ \hline & & & \\ \hline \\ \hline$	• • • •
Er 😸 IPCDB Er 😸 Data Sets Er 🔂 SampleDataSet		
Subsystems	Sample Table Report Section 1 Sub-text Heading	
SERIAL_NUMBER  Report Parameters  Data Cubes	Customer Name Phone I	Postal
	· · · · · · · · · · · · · · · · · · ·	
😪 Navigator 🗴 🔚 Outline 🗖 🗖		
←     →     ♠     ➡     ♥       TCRStylePackage_V1.2     ➡     ➡     TPC_Samples	Layout Master Page Script XML Source Preview	

Figure 11-118 Drag Data Set columns into table's Detail row

27.Drag and drop all three Data Set columns to the three available table columns. The result looks similar to Figure 11-119.

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P     P     Data Sources     SampleDataSource     SmpleDataSource     P     TPCD8     P     P     SourceSource     Subsystems     VENDOR     P     TYPE	aSource Sample Table Report Section 1 Sub-text Heading			
SERIAL_NUMBER	Customer Name	Phone	Postal Code	
🛄 🗑 Data Cubes	[VENDOR]	[TYPE]	[SERIAL_NUMBER]	
	Footer Row			
<u><u><u></u><u>ि</u>-Navi ଥ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ ଆ </u></u>	<font color="</p>			<b>-</b>
TCRStylePackage_V1.2	Layout Master Page Script XML Sour	ce Pre <u>v</u> iew		

Figure 11-119 Table report element containing all three Data Set columns

28. The last step in this example is to remove the *Report Parameters* from the report definition. They were also defined in the template definition but are not used in our example report. To remove them, expand the **Report Parameters** branch in the Data Explorer view, as shown in Figure 11-120.



Figure 11-120 Report Parameters in Data Explorer panel

- 29.Right-click one of the parameters (**Param1** through **Param4**) and click **Delete** from the context menu. Do this for all four report parameters.
- 30. You can now run the report to preview the output. To do so, click the **Preview** tab of the Layout panel, as illustrated in Figure 11-121.

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TPC.rptlibrary	Subsystem_Ov	_	ava 🎝	
Sample Table Re	port Title	erview.rptdesign & • • • • • 4 • • • • 1 Sub-text Heading	9	
Customer Name [VENDOR] Footer Rc	DW	Phone [TYPE]	Postal Code	<u></u>
<b><font< p=""> .ayout Master Page Script Property Editor - Paramet Properties</font<></b>	t color=" XML Source   F ter & La	revien		
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Figure 11-121 Click Preview tab to run report

Report Design - TPC\_Samples/Subsystem\_Overview.rptdesign - Eclipse SDK \_ 🗆 🗙 <u>File Edit Page Navigate Search Project Run Window Help</u> | 🐴 | 🔕 | 🗞 • | 💊 • | 🔗 | 🥹 | 🗉 | ½ + ½ + 🤄 • 📑 🔬 Report Design 🐉 Java - -🗰 TPC.rptlibrary 🗄 Subsystem\_Overview.rptdesign 🛛 8 Show Report Parameters ٩ 않 -臝 Tivoli IEM。 Sample Table Report Title 8 Sample Table Report Section 1 Sub-text Heading **Customer** Name Phone Postal Code IBM FAStT 600A0B800017443100000000498C95B6 IBM ESS 22513 IBM FAStT 600A0B80002904DE0000000047974EFC IBM DS8000 75BALB1 0000020061E0311C IBM SVC Sample Table Report descriptive text. Multi-line display of purpose and description of the report May 19, 2009 9:37:53 PM PDT 1 / 1 Layout Master Page Script XML Source Preview | 🐴 | 🔍 💌 💖 🔶 || ह 🛒 🚼 

The resulting report preview looks similar to Figure 11-122.

Figure 11-122 Preview of the resulting report

**Note:** The static text elements of the report, such as table column headings or descriptive paragraphs, have not been adopted properly. Modification of the report text elements, including configuration for various output languages (Native Language Support), is beyond the scope of this example.

For further information about Native Language Support, refer to the *IBM Tivoli Common Reporting Development and Style Guide*, SC23-8861, section 5.3 "Globalization / Localization," as well as the tutorial available at the following URL:

http://www.eclipse.org/birt/phoenix/tutorial/

#### Export of report package from BIRT Designer

In this section, we explain how to export report packages from BIRT Report Designer. The created report packages can later be imported into Tivoli Common Reporting as outlined in 11.3.5, "Importing report packages" on page 567.

For additional information about the format of TCR report packages, refer to *IBM Tivoli Common Reporting Development and Style Guide*, SC23-8861, Chapter 4. "Creating reports and report packages."

Follow these steps to export an existing project from BIRT Report Designer:

- 1. If you did not do so already, switch the bottom left panel to **Navigator** view.
- Right-click the project you want to export into a report package from the Navigator view. A context menu is displayed, as shown in Figure 11-123. Select Export... from the context menu to open the Export wizard.



Figure 11-123 Right-click project in Navigator view to export

3. The Export wizard will prompt you to specify the export type. Expand the **General** branch and select **Archive File**, as illustrated in Figure 11-124. Click **Next** to continue.

Export Select Export resources to an ar	chive file on the l	local file system.		2	×
Select an export destinat	ion:				
type filter text					1
General     Ant Buildfile     Arthue File     System     File System     File System     Preferences     Solution     J2EE     Java     Plug-in Develop     Contemport     Contemport     Contemport     Web     E     Web     E     Web	nent				
0	< <u>B</u> ack	<u>N</u> ext >	Einish	Cancel	

Figure 11-124 Select export type

4. The panel shown in Figure 11-125 allows you to specify details of the archive file you are about to create. Per default, all files in the selected project must be included; verify that there is a check mark next to all files in the project you want to export. Be sure that you do not include files from other projects, such as the TCR Style Package.



Figure 11-125 Specify archive file details

In addition, you need to specify a name of the archive file you are about to create. From the available options, be sure to select **Save in zip format** as well as **Compress the contents of the file**.

Click **Finish** when you are done. The created report package .zip file now contains all reports and related resources, and so on. It can be imported into Tivoli Common Reporting. Refer to 11.3.5, "Importing report packages" on page 567 for instructions about doing so.

#### 11.4.3 Importing sample BIRT Workspace

Creating a new report package from scratch can be a complex task if you follow the Tivoli guidelines to use the official Style Package. Instead of creating a completely new report package, you might rather want to import the sample Workspace provided with this book and modify the existing reports.

Be sure to complete the configuration steps outlined in "Driver installation and initial configuration" on page 578 before importing the sample Workspace. You will need to copy the DB2 JDBC drivers and modify the Eclipse configuration file.

To import the sample BIRT Workspace provided, follow these steps:

- 1. Download the file titled Samp1eWorkspace.zip from the additional Web material that accompanies this book.
- 2. Extract the compressed archive to a directory, such as:

C:\SampleWorkspace

3. Launch the BIRT Designer; when prompted for the location of the Workspace, specify the directory that you extracted from the archive .zip file, as illustrated in Figure 11-126.

🖶 Workspace Launcher			×
Select a workspace			
Eclipse SDK stores your projects in a folder called a we Choose a workspace folder to use for this session.	orkspace.		
Workspace: C:\SampleWorkspace		-	Browse
▶ <u>C</u> opy Settings			
		_	
(2)	ОК		Cancel

Figure 11-126 Select sample Workspace

If you already have the BIRT Designer running with another Workspace specified, select File  $\rightarrow$  Switch Workspace  $\rightarrow$  Other... to switch the current Workspace directory.

4. The Workbench is displayed. You will need to edit the Data Source that is defined in the Library to match your environment. To do so, make sure the Library TPC.rptlibrary is selected as the current active document, then locate the Data Source titled TPCDB from the Data Explorer view, as shown in Figure 11-127.

Report Design - TPC_41/resources/TPC/TPC.	rptlibrary - Eclipse SDK
<u>File E</u> dit <u>I</u> nsert Element <u>D</u> ata Page <u>N</u> avigate	Se <u>a</u> rch <u>P</u> roject <u>R</u> un <u>W</u> indow <u>H</u> elp
🗂 • 🗒 ≜   🇌   🥥   🍇 •   🖋     💽 ▼	③ ] □ ] ½ → ⅔ → ☆ → → → E E SVN Reposito Report Design
🚱 Palette 🔀 Data Ex 🛛 🏛 Library 🗖 🗖	💼 TPC.rptlibrary 🛛 🦳 🗖
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Image: Subsystem_Assets.rptdesign       Image: Subsystem_Assets.rptdesign       Image: Subsystem_Assets.rptdesign       Image: Subsystem_Assets.rptdesign	
Pool_Capacity.rptdesign     Subsystem_Capacity.rptdesign     Wirtualizer_Capacity.rptdesign	Property Editor - Data Source 🛛 🔝 Problems 🗔 Properties 📮 Console 🛛 🔣 🗖 🗖
resources	General
	Event Handler Name: TPCDB
.project	Advanced
] 0*	

Figure 11-127 Data Source defined in Library

 Double-click the TPCDB Data Source in Data Explorer view to open the properties panel. You might need to change the Database URL, User Name, and Password to match your specific environment. See Figure 11-128 for an example.

Connection Profile	Edit the selected data source	
Property Binding	Driver Class: com.ibm.db2.jcc.DB2Driver (v3.53)	
	Database URL: jdbc:db2://127.0.0.1:50000/TPCDB	
	User Name: TPCRPT	
	Password:	
	JNDI URL:	
	Manage Drivers	

Figure 11-128 Data Source properties

Be sure to click **Test Connection...** to validate your settings prior to clicking **OK** to return to the Workbench.

- 6. In addition to adopting the Data Source to your environment, you might need to modify the resource and template folder location depending on the location of your Workspace. To do so, from the menu click **Window** → **Preferences...**. The Preferences window is displayed.
- From the left-hand navigation tree, select Report Design → Resource. Click Select... and navigate to the TPC\_Sample/resources folder inside the SampleWorkspace directory you extracted earlier. Notice that you need to specify the absolute path to the directory, as shown in Figure 11-129.

🚝 Preferences	
Preferences  type filter text  General Ant Connectivity Help Install/Update Internet Java Plug-in Development Report Design Chart Comment Template Comment Tem	Resource       Image: Comparison of the library explorer, images, property files, and so on.         Resource folder       C:/SampleWorkspace/TPC_Sample/resources/I         Select       Select
Crosstab     Data Set Editor     Element Names     Preview     Resource     Team     Validation     Web and XML     Web Services     XDoclet	Restore Defaults Apply
0	OK Cancel

Figure 11-129 Specify Resource folder location

Click Apply when you are ready.

 Next, select Report Design → Template from the left-hand navigation tree. Click Select... and navigate to the TCRStylePackage\_V1.2/templates folder inside the SampleWorkspace directory you extracted earlier, as shown in Figure 11-130.

🖶 Preferences		
type filter text	Template	$\Leftrightarrow \bullet \Rightarrow \bullet$
General Gener	Please select the template folder.  Iemplate folder C:/SampleWorkspace/TCRStylePackage_V1.2/te Select  Restore Defau	mplates/
0	OK	Cancel

Figure 11-130 Specify Template folder location

Click **Apply** when you are ready, prior to clicking **OK** to close the Preferences window.

You are now ready to run (preview) the existing reports, modify them, or create new ones either from scratch or based on the provided templates. You can finally export the reports package as outlined in "Export of report package from BIRT Designer" on page 612.

#### 11.4.4 Further reading

This section gives you an overview of the available documentation about Tivoli Common Reporting and the BIRT Report Designer.

For your primary source of information regarding usage of the BIRT Report Designer to develop reports that are compatible with TCR, using provided Style Packages and Guidelines, refer to the *IBM Tivoli Common Reporting Development and Style Guide*, SC23-8861, which is available from the following URL:

http://publib.boulder.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=/com.ibm.ti
voli.tcr.doc/tcr\_welcome.html

**Tip:** A copy of the TCR Development and Style Guide is also available in the installation location after installing TIP / TPC in the following directory:

<TIP-InstallDir>\products\tcr\style\tcr\_style\_guide.pdf

Here, <TIP-InstallDir> is the installation location of Tivoli Integrated Portal. On Windows, the default installation path is:

C:\Program Files\IBM\Tivoli\tip

On Linux / UNIX, the default TIP installation path is:

/opt/IBM/Tivoli/tip

For additional information about Tivoli Common Reporting, including report examples, forums, and downloadable material, refer to the following URL:

http://www.ibm.com/developerworks/spaces/tcr

For additional introductory material about using the BIRT Designer to develop reports, follow the tutorials at the following URL:

http://www.eclipse.org/birt/phoenix/tutorial/

**Note:** When using information from the Eclipse Web site, keep in mind that when developing reports that are to be used with Tivoli Common Reporting additional aspects such as style guidelines and proper usage of libraries need to be considered, as outlined In this section,.

In addition, the BIRT Exchange Web site provides information and community tools such as Wikis, Forums, and Tutorials:

http://www.birt-exchange.com

Furthermore, you can refer to the WebSphere Information Center to access the BIRT Report Developer Guide:

http://publib.boulder.ibm.com/infocenter/iadthelp/v7r0/index.jsp?topic=/org.eclips e.birt.doc/birt/birt-01-1.html



# Α

# Report and Data Source Import Configuring X11 forwarding

In this appendix, we show the step-by-step installation and configuration of tools used to achieve X11 forwarding in a firewalled environment. This includes the installation of the prerequisite components on the UNIX/Linux side as on the Windows workstation side. Following the instructions, you can use the graphical installers of the UNIX/Linux distributions of TPC V4.1 from your Windows workstation.

# Preparing the display export

The various installers used to install the products described in this book use a graphical user interface by default.

There are two methods described in this section, X11 forwarding using a program such as Cygwin running on a Windows server (see "Preparation of the Windows workstation" on page 623) or VNC Server running on the AIX host system (see "VNC Server" on page 634). You can choose whichever method best suits you.

The -silent or -console options are not supported with the Tivoli Storage Productivity Center V4.1.

The solution to achieve a display export described here is one of many possible ways to do it. Our servers and the environment we use are behind a firewall. It does not allow connections to be made from the AIX server behind the firewall to the outside machines in front of the firewall. Therefore we decided to implement the following solution, which is based on the use of **ssh**, **ss1**, **rpm**, **cygwin**, and **PuTTY**. The solution is described utilizing an AIX server and a Windows workstation. It will also work with other UNIX distributions and Linux if the involved tools are applied properly.

#### Preparation of the AIX server

To install various tools used on AIX, we utilize the tool **rpm**. Most Linux distributions already have **rpm** preinstalled, you have to separately install it for AIX.

▶ rpm

The tool **rpm** for AIX is part of the *AIX Toolbox for Linux Applications*. It contains open source packages available for installation on AIX  $5L^{TM}$ . You can find the **rpm** tool and more information about the *AIX Toolbox for Linux Applications* on:

http://www.ibm.com/servers/aix/products/aixos/linux/download.html

Or you can directly download the rpm tool from:

ftp://ftp.software.ibm.com/aix/freeSoftware/aixtoolbox/INSTALLP/ppc/rpm.rte

After download, install the rpm tool using smitty / installp.

openss1

Also part of the *AIX Toolbox for Linux Applications* but within the section *Cryptographic Content for AIX* is the **openss1** package for AIX (Figure A-1). To download cryptographic content, you have to log on to the download site with your IBM ID. If you do not have an IBM ID already, you can apply for one on the site, it is free:

https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=aixbp

R	OpenSSL Version 0.9.8.x	AIX 6 AIX V5.x	download
	Languages: English		

Figure A-1 OpenSSL menu

After download, install the openss1 package for AIX using rpm.

#### ▶ openssh

The third component that is used on AIX in this solution is the *OpenSSH on AIX* package. It is available as part of the *AIX 5L Expansion Pack and Web Download Pack* or on the open source software Web site, sourceforge.

The *AIX 5L Expansion Pack and Web Download Pack* is a collection of extra software that extends the base operating system capabilities. It is available at:

http://www.ibm.com/servers/aix/expansionpack/index.html

The open source software project *OpenSSH on AIX* can be reached via:

https://sourceforge.net/projects/openssh-aix/

Access **OpenSSH on AIX**  $\rightarrow$  **openssh-5.0\_r2** and download the package.

After download, install the *OpenSSH on AIX* package using smitty / installp.

#### Preparation of the Windows workstation

We use the tool **PuTTY** to connect to the AIX server utilizing **ssh** and enabling X11 forwarding. This tool is optional, because you can also achieve a successful X11 forwarding with the use of only **cygwin**.

► PuTTY

**PuTTY** is a client program for the SSH, Telnet, and Rlogin network protocols. It is available for download at:

http://www.chiark.greenend.org.uk/~sgtatham/putty/

Download and install the tool by either executing the installer or simply by extracting or copying the files to a folder of your choice, depending your download selection.

► cygwin

cygwin is a Linux-like environment for Windows. It is available for download at:

http://www.cygwin.com/

#### cygwin installation

Download the setup.exe as follows:

1. On the Windows workstation you want to use to receive the X11 forwarding, double-click **setup.exe**. The **cygwin** setup will start and welcome you with a panel similar to the one shown in Figure A-2.

E Cygwin Setup	
	Cygwin Net Release Setup Program
	This setup program is used for the initial installation of the Cygwin environment as well as all subsequent updates. Make sure to remember where you saved it.
	The pages that follow will guide you through the installation. Please note that Cygwin consists of a large number of packages spanning a wide variety of purposes. We only install a base set of packages by default. You can always run this program at any time in the future to add, remove, or upgrade packages as necessary.
	E
	Setup.exe version 2.573.2.3
	Copyright 2000-2007
	http://www.cygwin.com/
	< <u>Back</u> Cancel

Figure A-2 Cygwin setup

 Click Next to continue with the installation. A new window similar to Figure A-3 displays and asks you to choose your installation type. Assuming that this is the first time you are installing cygwin, you select the option Install from Internet to access the product source files from an online repository. Click Next.



Figure A-3 Cygwin source install

3. The installation asks you to choose an installation directory. Best practice is to leave the options selectable here at their default value as shown in Figure A-4. Try to avoid adding additional directory levels, other drive locations, or spaces in the directory name and path. Click **Next** to continue.

Cygwin Setup - Choose Installation Direc	tory
Select Root Install Directory Select the directory where you want to instal installation parameters.	all Cygwin. Also choose a few
Root Directory	
C:\cygwin	Browse
Install For	Default Text File Type
All Users (RECOMMENDED)	Unix / binary (RECOMMENDED)
Cygwin will be available to all users of the system. NOTE: This is required if you wish to run services like sshd, etc.	No line translation done; all files opened in binary mode. Files on disk will have LF line endings.
C Just Me	O DOS / text
Cygwin will only be available to the current user. Only select this if you lack Admin. privileges or you have specific needs.	Line endings will be translated from unix (LF) to DDS (CR-LF) on write and vice versa on read. <u>Read more about file modes</u>
	< <u>B</u> ack <u>N</u> ext > Cancel

Figure A-4 Cygwin root directory install

4. This dialog prompts you for a local package directory (see Figure A-5). It is used to save the download files to hard disk for the current installation and also provides the possibility for further installations and local network distribution. Choose a folder that has enough space left and click **Next** to continue.

Cygwin Setup - Select Local Package Directory	
Select Local Package Directory Select a directory where you want Setup to store the installation files it downloads. The directory will be created if it does not already exist.	E
Local Package Directory	Browse
< <u>B</u> ack <u>N</u> ext>	Cancel

Figure A-5 Cygwin local package directory

5. This dialog lets you specify your type of Internet connection. If you use a proxy or other special settings to connect to the Internet, you can specify that in Figure A-6. Click **Next** to continue.

Cygwin Setup - Select Connection Type	<
Select Your Internet Connection Setup needs to know how you want it to connect to the internet. Choose the appropriate settings below.	
Direct Connection	
O Use [E5 Settings	
O Use HTTP/FTP Proxy:	
Proxy <u>H</u> ost	
Port 80	
< <u>B</u> ack <u>N</u> ext > Cancel	

Figure A-6 Cygwin Setup Internet connection type

6. The installation starts to connect to the Internet and downloads a list of possible mirror sites from which you will be able to choose (see Figure A-7).

P	ogress This page displays the progress of the download or installation.
	Downloading mirrors.lst Connecting Package:

Figure A-7 Cygwin Setup download progress

7. If you use a firewall product, make sure that the installer is allow to connect to the Internet (see Figure A-8).

Symantec Client I	Symantec Client Firewall 🛛 🛛				
Program Co	Program Control				
🔔 Low Risl	Low Risk				
setup.exe is att information on http://w3.ibm.	setup.exe is attempting to access the Internet. For more information on Symantec Client Firewall, please visit: http://w3.ibm.com/virus/products/symantec_client_security/scf				
Hide Details	Hide Details				
Time: Date:	11:34 AM 5/3/2007				
Program: Path:	setup.exe D:\				
What do you wa	What do you want to do?				
Permit Always (Re	Permit Always (Recommended)				
	ОК				

Figure A-8 Symantec Client Firewall settings

8. The installer prompts you to choose a download site (see Figure A-9). Besides choosing one from the list that is shown, you can also specify your own, which you can look up on the cygwin Web page. To speed up your installation, you can choose a mirror site close to the location of your installation. Select a mirror site and click Next to continue.

E Cygwin Setup -	Choose Download Site(s)		
Choose A Dow Choose a site	nload Site e from this list, or add your own sites to the list		E
	Available Download Sites:		
liser I IBI -	http://www.goh4.com http://www.yery-clever.com http://mirrors.xmission.com http://mirrors.xmission.com http://mirror.cps.cmich.edu ftp://ftp.gtlib.gatech.edu ftp://ftp.gtlib.gatech.edu ftp://mirror.cs.vt.edu http://mirror.cs.vt.edu http://mirror.cs.vt.edu		Add
User URL:	I		Add
	< <u>B</u> ack	<u>Njyt</u> >	Cancel

Figure A-9 Cygwin download site

9. This dialog lets you select the packages to install. Scroll through the packages and open All → X11 → xwinwm (see Figure A-10). Make sure that it is selected for installation. Additional required packages will automatically be installed. Click Next to continue.

If you need any additional packages installed other than the ones already chosen, make sure that you select them here. In our case, we needed to install additional font packages as seen in Figure A-11; this was due to an error received when invoking the Tivoli Storage Productivity Center V4.1 installer. Refer to Chapter 4, "Tivoli Storage Productivity Center installation and upgrade on AIX" on page 179 to see the error.

Category         New         Bin?         Src?         Size         Package           Image: Skip         n/m         n/m         fill         Skip         ssrit         Strip         str			С <u>К</u> еер	C <u>P</u> rev	Θ <u>C</u>	urr C E <u>x</u> p	Categor
Okip         n/a         n/a </th <th>Category</th> <th>New</th> <th></th> <th>Bin?</th> <th>Src?</th> <th>Size</th> <th>Package</th>	Category	New		Bin?	Src?	Size	Package
⊕ Skip         n/a         n/a         8k         xstdcmap: Xorg stand           ⊕ Skip         n/a         n/a         246k         xterm: X11 terminal er           ⊕ Skip         n/a         n/a         52k         xtrans: X.0rg XTrans           ⊕ Skip         n/a         n/a         17k         xwd: X.0rg X window           ⊕ Skip         n/a         n/a         17k         xwd: X.0rg X window           ⊕ Skip         n/a         n/a         19k         xwininfo: X.0rg X window           ⊕ Skip         n/a         n/a         19k         xwininfo: X.0rg X window           ⊕ Skip         n/a         n/a         19k         xwininfo: X.0rg X window           ⊕ Skip         n/a         n/a         19k         xwininfo: X.0rg X window           ⊕ Skip         n/a         n/a         15k         xwud: Xorg X window		-erskip AngSkip		.γ.» η/α	.γ.» η/α	42k	xsri: X Set Root Ima
€ Skip		Skip		n/a	n/a	8k.	xstdomap: Xorg star
⊕ Skip         n/a         for		Skip		n/a	n/a	246k	xterm: X11 terminal
<ul> <li>              € Skip</li></ul>		🚯 Skip		nja	n/a	52k	xtrans: X.Org XTran
<ul> <li>⊕ Skip n/a n/a 19k xwininfo:X.0rg X win</li> <li>⊕ 0.0.5-2 ⊠ □ 86k xwinwm:Window ma</li> <li>♠ Skip n/a n/a 15k xwud:Xorg X window</li> </ul>		🚯 Skip		ηία	n/a	17k	xwd: X.Org X windo
⊕ 0.0.5-2      □ 86k xwinwm: Window ma ℜ Skip n/a n/a 15k xwud: Xora X window		🚯 Skip		ηία	n/a	19k	xwininfo: X.Org X w
🗣 Skip n/a n/a 15k xwud: Xora X window		0.0.5-2		$\boxtimes$		86k	xwinwm: Window m
		🚯 Skip		ηία	n/a	15k	xwud: Xorg X windo

Figure A-10 Packages to install

font-bh-dpi100	1.0.0 - 1
font-bh-dpi75	1.0.0 - 1
font-bh-lucidatypewriter-dpi100	1.0.0-1
font-bh-lucidatypewriter-dpi75	1.0.0-1
font-bh-ttf	1.0.0-1
font-bh-type1	1.0.0-1
font-encodings	1.0.2-1
fontconfig	2.6.0-1

Figure A-11 Additional packages

The installation starts downloading data from the Internet and installing it to your hard drive as shown in Figure A-12.

E 0% - Cygwin Setup		_ <b>_</b> ×
Progress This page displays the	progress of the download or installation.	E
Downloading		
ash-20040127	-4.tar.bz2 from http://www.goh4.com/cygwin//r	
0 % (0k/47k)	0.0 kb/s	
Package:		
Total:		
Disk:		
	< <u>B</u> ack <u>N</u> ext	Cancel

Figure A-12 Cygwin Setup progress

After the installation is finished, you are prompted to choose whether to create a desktop icon and a start menu icon. Select what suits you best and click **Finish** to end the installation (see Figure A-13).

Create Icons     Create Icons     Create Icons     Tell setup if you want it to create a few icons for convenient access to the     Cygwin environment.
Create icon on Desktop Add icon to Start Menu
< Back Finish Cancel

Figure A-13 Cygwin Setup -Create Icons panel

Congratulations, you have successfully installed **cygwin**. Click **OK** to end the installation (see Figure A-14).

Cygwin Setup 🛛 🔀
Installation Complete
ОК

Figure A-14 Cygwin Installation Complete

#### X11 forwarding from AIX to Windows

The second part of this solution is optional. To achieve X11 forwarding from the AIX system to your Windows workstation, you have to open an **ssh** connection to the AIX system. This can be done using **cygwin** or using **PuTTY**.

To open an ssh connection to the AIX server using cygwin, open a cygwin bash shell:

```
Start \rightarrow All Programs \rightarrow cygwin \rightarrow Cygwin Bash Shell
```

From within the newly opened cygwin bash shell window, issue the command:

Xwin -multiwindow

To start the X11 server on your Windows workstation, the -multiwindow option to the XWin command will make all X11 windows forwarded from any server be displayed in their own, separate Windows window. If you prefer to have all the X11 forwardings be displayed in one single Windows window, just start XWin without any options.

Now open a local **xterm** window:

```
Start \rightarrow All Programs \rightarrow Cygwin-X \rightarrow xterm
```

From within the newly opened xterm window, enter the following command:

 $Start \rightarrow Run...$ 

Then enter:

C:\cygwin\bin\run.exe -p /usr/X11R6/bin xterm -display 127.0.0.1:0.0 -ls

From within the newly created xterm window, enter the following commands:

xhost +

This command will disable security and allow all external hosts to forward X11 to your machine.

ssh -X root@9.43.86.101

This command will create an **ssh** connection to the remote machine 9.43.86.101 as root user and enable X11 forwarding through that tunnel.

After successfully connecting to the remote machine, start a graphical terminal window from the remote host to verify that X11 forwarding is working by issuing the following command (see Figure A-15):

xterm &

X~	X
Administrator@colorado ~ \$ ssh -X root@9.12.5.35 The authenticity of host '9.12.5.35 (9.12.5.35)' can't be established. RSA key fingerprint is ea:82:eb:ff:90:34:d3:01:fe:d3:28:34:d3:76:81:2a. Are you sure you want to continue connecting (yes/no)? yes Warning: Permanently added '9.12.5.35' (RSA) to the list of known hosts. root@9.12.5.35's password: Last unsuccessful login: Sun May 10 13:52:53 PDT 2009 on ssh from 9.145.145. Last login: Tue May 12 16:57:56 PDT 2009 on /dev/pts/2 from 9.12.6.76	174
* * * Welcome to AIX Version 6.1!	* * *
* *	* *
<ul> <li>Please see the KEADME file in /usr/lpp/bos for information pertinent to</li> <li>this release of the AIX Operating System.</li> </ul>	* * *
* ************************************	* ***
# xterm & [1] 250108 #■	

Figure A-15 Start a graphical terminal window

This will open a graphical terminal window from the remote machine exported to your local workstation. Congratulations, you have successfully configured X11 forwarding.

#### **PuTTY installation**

If you want to use **PuTTY** to achieve X11 forwarding, you first need to install it. Download the executable from:

#### http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

Then put it into a directory on your workstation or download and use the **PuTTY** installer.

Either way, you will be able to start **PuTTY** by simply executing the command:

putty.exe

Enter the connection information to the AIX machine and make sure to choose **ssh** as protocol as shown in Figure A-16.

😤 PuTTY Configura	tion	? 🔀
Category:		
⊡ Session	^	Basic options for your PuTTY session
		Specify your connection by host name or IP address
- Keyboard		Host Name (or IP address) Port
Bell		azov.itsosj.sanjose.ibm.com 22
Features ⊡Window		Protocol: O Raw O Telnet O Rlogin O SSH
Appearance Behaviour Translation		Load, save or delete a stored session Saved Sessions
Selection	≡	azov
Colours		Default Settings
Data		azov x11 export
Proxy		faroe
Telnet		nellum sj-firewall
Riogin		brocade
Kex Auth X11		Close window on exit: Always Never Only on clean exit
- Tunnels	~	
About	Help	Open Cancel

Figure A-16 PuTTY session options

On the left side of the PuTTY windows, browse to Connection  $\rightarrow$  SSH  $\rightarrow$  X11 and check the Enable X11 forwarding check box (see Figure A-17).

😵 PuTTY Configuration 🔹 🛛 🔀		
Category:		
	~	Options controlling SSH X11 forwarding
Logging		-X11 forwarding
Teminal		Enable X11 forwarding
Keyboard		Y display location
Eesturee		
		Remote X I I authentication protocol
Appearance		
Behaviour		
Translation		
- Selection	=	
Colours		
Data		
Proxy		
Telnet		
Key		
Auth		
X11		
Tunnels	~	
About Help Open Cancel		

Figure A-17 PuTTY configuration options

You are now done. It is considered a best practice to browse back to **Session** and specify a name for the session to save it for further reuse. Click **Save** to save the session. Then click **Open** to initiate the connection to the AIX server.

### Setup for the AIX server

Edit the /etc/ssh/sshd\_config file and make sure the following lines are in present and not commented out:

X11Forwarding yes X11DisplayOffset 10 X11UseLocalhost yes

Restart the **ssh** daemon by issuing this command:

kill -HUP <processnumber of sshd>

To determine the process number of the **sshd**, issue:

ps -ef | grep sshd

Carefully browse through the results of the command and identify the ssh daemon.

```
root@azov.itsosj.sanjose.ibm.com:/>ps -ef | grep sshd
root 225430 237866 0 13:57:59 pts/2 0:00 grep sshd
root 180584 197108 0 13:43:04 - 0:00 sshd: root@pts/2
root 197108 102788 0 May 02 - 0:05 /usr/sbin/sshd
root 225712 197108 0 10:03:22 - 0:03 sshd: root@pts/0
```

In our example, the **ssh** daemon has the process number 197108. To restart our **ssh** daemon, issue:

kill -HUP 197108

You might have to disconnect your ssh session now and reconnect to enable the new settings for your session.

Then, on the Windows workstation, start cygwin by clicking Start  $\rightarrow$  All Programs  $\rightarrow$  cygwin  $\rightarrow$  Cygwin Bash Shell.

From within the newly opened cygwin bash shell window, issue Xwin -multiwindow to start the X11 server on your Windows workstation. The -multiwindow option to the XWin command will make all X11 windows forwarded from any server be displayed in their own, separate Windows window. If you prefer to have all the X11 forwardings be displayed in one single Windows window, just start XWin without any options.

With the **cygwin** bash shell window still open and the X11 server on your Windows workstation running, go back to the **PuTTY** window, which still remains open, and issue:

xterm &

A remote **xterm** window will open on your local workstation as shown in Figure A-18.



Figure A-18 Remote xterm window

Congratulations, you have successfully configured X11 forwarding.

## **VNC Server**

If you do not want to use programs such as Cygwin running on the windows server, then you can install and configure a VNC server on the AIX server, allowing the user to export the display to a WEB UI. We describe the steps needed to achieve this.

VNC permits you to access a remote AIX desktop GUI. The AIX system runs the VNC Server; the user runs a VNC viewer (or IE6 w/Java).

The VNC server for AIX5L is available for download from:

ftp://ftp.software.ibm.com/aix/freeSoftware/aixtoolbox/RPMS/ppc/vnc/vnc-3.3.3r2-3. aix5.1.ppc.rpm

Follow these installation steps:

- 1. Install the RPM (on AIX5L) using the command: rpm -Uhv vnc\*
- 2. Edit: /usr/bin/X11/vncserver

```
Chg to: $cmd .= " -ac";
Chg from: $cmd .= " -auth $xauthorityFile";
Chg to:
$cmd .= " -fp /usr/lib/X11/fonts/,/usr/lib/X11/fonts/misc/,/usr/lib/X11/fonts/75dpi/";
Chg from: # $cmd .= " -fp /usr/lib/X11/fonts/misc/,/usr/lib/X11/fonts/75dpi/";
Chg to: $vncClasses = "/opt/freeware/vnc/classes";
Chg from: $vncClasses = "/usr/local/vnc/classes";
```

- 3. Log on as a regular (non-root) user and enter the command: vncserver
- 4. You will be prompted to enter (create) your VNC password, and the program will exit.
5. Start the VNC server using the command: vncserver

New 'X' desktop is azov.itsosj.sanjose.ibm.com:1

Starting applications specified in //.vnc/xstartup

Log file is //.vnc/azov.itsosj.sanjose.ibm.com:1.log

 In IE6's address bar (Firefox can be used), enter the complete URL for the VNC server instance. The "trick" is to know that you must translate the assigned display ID (:1) to the correct port number.

Examples:

:1 translates to :5801 :2 translates to :5802 :3 translates to :5803

7. Log on using the password created in step 4, as seen in Figure A-19.

Swaatle V daelitan (anau ikaasi saniaga ibm ganat). Windows Takawa ta Funlaway	
C root s x desktop (azovitsos).sanjose.ibm.com:1) - windows Internet Explorer	
C C V http://azov.itsosj.sanjose.ibm.com:5801/	
<u>Eile E</u> dit <u>V</u> iew F <u>a</u> vorites <u>T</u> ools <u>H</u> elp	
🖕 Favorites 🛛 🍃 🏈 Suggested Sites 🔻 🙋 Free Hotmail 🙋 Web Slice Gallery 👻	
@root's X desktop (azov.itsosj.sanjose.ibm.com:1)	
Disconnect Options Clipboard Send Ctrl-Alt-Del VNC Authentication	
Password: ********	

Figure A-19 VNC Authentication

8. Export the display on the AIX server and test by issuing **xclock**. You will see the clock displayed within the VNC viewer, as shown in Figure A-20.



Figure A-20 VNC Viewer

9. Based the VNC startup message; the correct/complete URL is: http://azov.itsosj.sanjose.ibm.com:5801 Hint: It will fail if you omit the http://

You are now able to run the installation program using the VNC viewer.

# Β

## **DB2 table space considerations**

In this appendix, we discuss the trade-offs to consider when determining which type of table space to use to store your data—either system managed space (SMS), or database managed space (DMS).

#### Selecting an SMS or DMS table space

There are a number of trade-offs to consider when determining which type of table space to use to store your data. A table space can be managed using either system managed space (SMS), or database managed space (DMS). For an SMS table space, each container is a directory in the file space of the operating system, and the operating system's file manager controls the storage space. For a DMS table space, each container is either a fixed size pre-allocated file, or a physical device such as a disk, and the database manager controls the storage space.

Tables containing user data exist in regular table spaces. The system catalog tables exist in a regular table space.

Tables containing long field data or large object data, such as multimedia objects, exist in large table spaces or in regular table spaces. The base column data for these columns is stored in a regular table space, whereas the long field or large object data can be stored in the same regular table space or in a specified large table space. Indexes can be stored in regular table spaces or large table spaces.

Temporary table spaces are classified as either system or user. System temporary table spaces are used to store internal temporary data required during SQL operations such as sorting, reorganizing tables, creating indexes, and joining tables. Although you can create any number of system temporary table spaces, we recommend that you create only one, using the page size that the majority of your tables use. User temporary table spaces are used to store declared global temporary tables that store application temporary data. User temporary table spaces are not created by default at database creation time.

#### Advantages of an SMS table space

These are a few of the advantages of an SMS table space:

- Space is not allocated by the system until it is required.
- Creating a database requires less initial work, because you do not have to predefine containers.
- A container is a physical storage device and is assigned to a table space.
- A single table space can span many containers, but each container can belong to only one table space.

#### Advantages of a DMS table space

These are the advantages of a DMS table space:

- The size of a table space can be increased by adding containers. Existing data is automatically rebalanced across the new set of containers to retain optimal I/O efficiency.
- A table can be split across multiple table spaces, based on the type of data being stored:
  - Long field data
  - Indexes
  - Regular table data

You might want to separate your table data for performance reasons, or to increase the amount of data stored for a table. For example, you can have a table with 64 GB of regular table data, 64 GB of index data, and 2 TB of long data. If you are using 8 KB pages, the table data and the index data can be as much as 128 GB. If you are using 16 KB pages, the table data and the index data can be as much as 256 GB. If you are using 32 KB pages, the table data and the index data can be as much as 512 GB.

- The location of the data on the disk can be controlled, if this is allowed by the operating system.
- If all table data is in a single table space, a table space can be dropped and redefined with less overhead than dropping and redefining a table.
- ► In general, a well-tuned set of DMS table spaces will outperform SMS table spaces.

In general, small personal databases are easiest to manage with SMS table spaces. On the other hand, for large, growing databases, you will probably only want to use SMS table spaces for the temporary table spaces, and separate DMS table spaces, with multiple containers, for each table. In addition, you will probably want to store long field data and indexes in their own table spaces.



С

## Worksheets

In this appendix, we provide worksheets that are intended for you to use during the planning and the installation of the Tivoli Storage Productivity Center. The worksheets are meant to be examples. Therefore you can decide whether you need to use them, for example, if you already have all or most of the information collected somewhere.

**Note:** If the tables are too small for your handwriting, or you want to store the information in an electronic format, simply use a word processor or spreadsheet application, and use our examples as a guide, to create your own installation worksheets.

This appendix contains the following worksheets:

- User IDs and passwords
- Storage device information:
  - IBM TotalStorage Enterprise Storage Server® (ESS)
  - IBM Fibre Array Storage Technology (FAStT)
  - IBM San Volume Controller

#### **User IDs and passwords**

We created a table to help you write down the users IDs and passwords that you will use during the installation of Tivoli Storage Productivity Center for reference during the installation of the components and for future add-ons and agent deployment. Use this table for planning purposes.

You need one of the worksheets in the following sections for each machine where at least one of the components or agents of Productivity Center will be installed. This is so, because you can have multiple DB2 databases or logon accounts and you need to remember the IDs of each DB2 individually.

#### Server information

Table C-1 contains detailed information about the servers that comprise the Tivoli Storage Productivity Center environment.

Table C-1 Productivity Center server

Server	Configuration information
Machine	
Host name	
IP address	

In Table C-2, simply mark whether a manager or a component will be installed on this machine.

Table C-2 Managers/components installed

Manager/component	Installed (y/n)?
Productivity Center for Disk	
Productivity Center for Replication	
Productivity Center for Data	
Tivoli Agent Manager	
DB2	

#### User IDs and passwords for key files and installation

Use Table C-3 to note the password that you used to lock the key file.

Table C-3	Password	used to	lock the	key files
-----------	----------	---------	----------	-----------

Default key file name	Key file name	Password
agentTrust.jks		

Enter the user IDs and passwords that you used during the installation in Table C-4. Depending on the selected managers and components, certain lines are not used for this machine.

Table C-4 User IDs used on this machine

Element	Default/ recommended user ID	Enter user ID	Enter password
DB2 DAS User	db2admin <sup>a</sup>		
DB2 Instance Owner	db2inst1		
DB2 Fenced User	db2fenc1		
Resource Manager	manager <sup>b</sup>		
Common Agent	AgentMgr <sup>b</sup>		
Common Agent	itcauser <sup>b</sup>		
Host Authentication			
Tivoli Storage Productivity Center Admin user <sup>c</sup>	tpcsuid <sup>a</sup>		
IBM WebSphere <sup>c</sup>			
TPC for Replication Administrator <sup>c</sup>			

a. This account can have any name you choose.

b. This account name cannot be changed during the installation.

c. If LDAP Authentication is selected this value is overwritten.

#### LDAP information

If you plan to use an LDAP compliant directory server for authentication, you will be required to provide additional information during the installation of TPC. Contact your LDAP administrator and gather the required information.

IADIE C-S LDAF IIIIOIIIIAIIOII	Table C-5	LDAP information
--------------------------------	-----------	------------------

Element	Default / recommended value	Actual value
LDAP Server Hostname		
LDAP Port Number	389	
Bind Distinguished Name		
Bind Password		
Relative DN for user names		
Attribute to use for user names	uid	
Relative DN for groups		
Attribute to use for groups	cn	
LDAP TPC Administrator user name		
LDAP TPC Administrator password		
LDAP TPC Administrator group		

#### Storage device information

This section contains worksheets that you can use to gather important information about the storage devices that will be managed by Tivoli Storage Productivity Center. You need to have this information during the configuration of the Tivoli Storage Productivity Center. You need part of the information before you install the device specific Common Object Model (CIM) Agent, because this sometimes depends on a specific code level.

Determine if there are firewalls in the IP path between the server or servers and the devices, which might not allow the necessary communication. In the first column of each table, enter as much information as possible to identify the devices later.

#### IBM System Storage Enterprise Storage Server/DS6000/DS8000

Use Table C-6 to collect the information about your IBM System Storage devices.

Important: Check the device support matrix for the associated CIM agent.

Subsystem type, Name, location, organization	Both IP addresses	LIC level	User name	Password	CIM agent host name and protocol
			÷		

Table C-6 Enterprise Storage Server/DS6000/DS8000

#### **IBM DS4000**

Use Table C-7 to collect the information about your DS4000<sup>™</sup> devices.

Table C-7 IBM DS4000 devices

Name, location, organization	Firmware level	IP address	CIM agent host name and protocol

#### **IBM SAN Volume Controller**

Use Table C-8 to collect the information about your SVC devices.

Table C-8 SAN Volume Controller devices

Name, location, organization	Firmware level	IP address	User ID	Password	CIM agent host name and protocol



# D

## **Additional material**

This book refers to additional material that can be downloaded from the Internet as described here.

#### Locating the Web material

The Web material associated with this book is available in softcopy on the Internet from the IBM Redbooks Web server. Point your Web browser at:

ftp://www.redbooks.ibm.com/redbooks/SG247725

Alternatively, you can go to the IBM Redbooks Web site at:

ibm.com/redbooks

Select the **Additional materials** and open the directory that corresponds with the IBM Redbooks form number, SG247725.

#### Using the Web material

The additional Web material that accompanies this book includes the following files:

File name SampleReports.zip SampleWorkspace.zip Description Sample Reports Report Sample Workspace

#### System requirements for downloading the Web material

The following system configuration is recommended:

Hard disk space: 1 MB minimum

#### How to use the Web material

Create a subdirectory (folder) on your workstation, and unzip the contents of the Web material zip file into this folder.

## **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 publications**

For information about ordering these publications, see "How to get Redbooks publications" on page 652. Note that various documents referenced here might be available in softcopy only:

- TotalStorage Productivity Center V3.3 Update Guide, SG24-7490
- ► Certification Guide Series: IBM Tivoli Storage Productivity Center V4.1, SG24-7809
- SAN Storage Performance Management Using TotalStorage Productivity Center, SG24-7364
- IBM System Storage DS8000: LDAP Authentication, REDP-4505

#### Other publications

These publications are also relevant as further information sources:

- IBM Tivoli Storage Productivity Center: Installation and Configuration Guide, SC27-2337
- IBM Tivoli Storage Productivity Center User's Guide Version 4.1, SC27-2338
- IBM Tivoli Common Reporting User's Guide, SC23-8737

#### **Online resources**

These Web sites are also relevant as further information sources:

- Tivoli Storage Productivity Center support site:
  - https://www-01.ibm.com/software/sysmgmt/products/support/IBMTotalStorageProduct
    ivityCenterStandardEdition.html
- Partner World Technical Delivery Assessment:

https://www-304.ibm.com/jct09002c/partnerworld/wps/servlet/ContentHandler/LLIE-6M7NYY/lc=en\_US

Tivoli Integrated Portal demonstration:

http://www14.software.ibm.com/webapp/download/demo.jsp?id=Tivoli+Integrated+Por tal+Walkthrough+Aug08&locale=en

Tivoli Integrated Portal documentation:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/index.jsp?topic=/com.ib
m.tip.doc/ctip\_install\_overview.html

LDAP information:

http://en.wikipedia.org/wiki/IBM\_Lightweight\_Third-Party\_Authentication

► Tivoli Storage Productivity Center Standard Edition Web site:

http://www.ibm.com/systems/support/storage/software//tpc

Tivoli Enterprise Portal site:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/topic/com.ibm.itm.doc/i
tm610usersguide.htm

IBM Tivoli Monitoring:

http://publib.boulder.ibm.com/infocenter/tivihelp/v15r1/index.jsp?topic=/com.ib
m.itm.doc\_6.1/welcome.htm

DB2 install requirements:

http://www.ibm.com/software/data/db2/udb/sysreqs.html

IBM Certification Web site:

certify@us.ibm.com

IBM training site:

http://www.ibm.com/training

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## IBM Tivoli Storage Productivity Center V4.1 Release Guide



Exploit customized reports, Single Sign-On, and storage optimization

Learn the new features and functions in TPC V4.1

Implement TPC V4.1 on supported platforms IBM Tivoli Storage Productivity Center is a storage infrastructure management software product that can centralize, automate, and simplify the management of complex and heterogeneous storage environments.

This IBM Redbooks publication is intended for administrators or users who are installing and using IBM Tivoli Storage Productivity Center and IBM Tivoli Storage Productivity Center for Replication. It describes the hardware and software requirements for installing the products and provides an overview of the installation procedures.

The new features and functions introduced in this version are also covered, as well as working scenarios showing how to take advantage of the product.

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