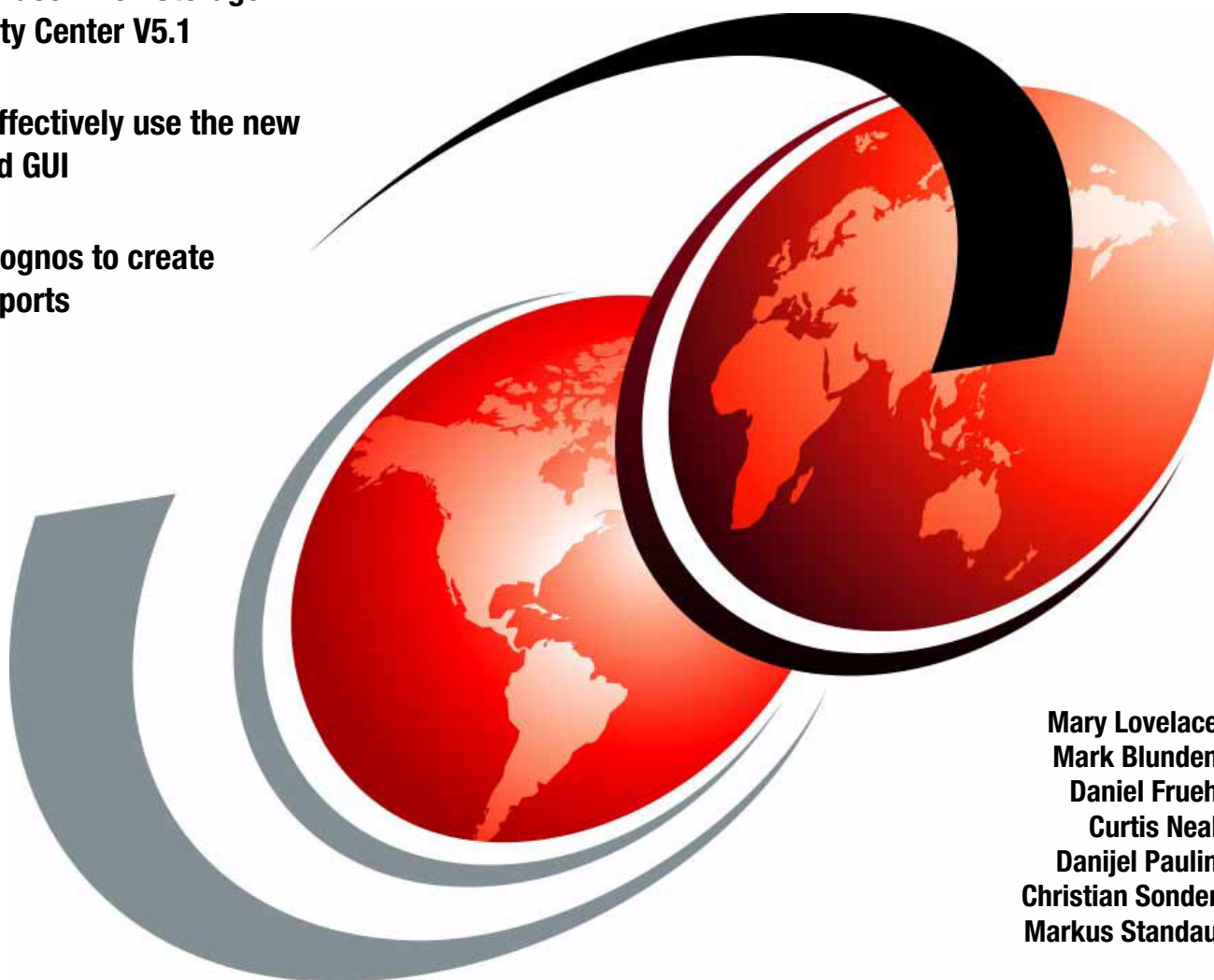


# IBM Tivoli Storage Productivity Center V5.1 Technical Guide

Install and use Tivoli Storage  
Productivity Center V5.1

Learn to effectively use the new  
web-based GUI

Use IBM Cognos to create  
custom reports



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International Technical Support Organization

**IBM Tivoli Storage Productivity Center V5.1 Technical  
Guide**

April 2014

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

#### **First Edition (April 2014)**

This edition applies to Version 5, Release 1 of IBM Tivoli Storage Productivity Center (product number 5608-PC1 and 5608-PC2).

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# Preface

IBM® Tivoli® Storage Productivity Center V5.1 products offer storage infrastructure management that helps optimize storage management by centralizing, simplifying, automating, and optimizing storage tasks associated with storage systems, data disaster recovery, storage networks, and capacity management.

IBM Tivoli Storage Productivity Center V5.1 products include:

- ▶ IBM Tivoli Storage Productivity Center V5.1
- ▶ IBM Tivoli Storage Productivity Center Select Edition V5.1

Tivoli Storage Productivity Center V5.1 is designed to provide device management capabilities, such as automated system discovery, provisioning, data replication, configuration, and performance monitoring for storage systems and storage networks.

Tivoli Storage Productivity Center Select Edition V5.1 offers the same features as Tivoli Storage Productivity Center V5.1 but at attractive entry-level pricing for operations with smaller capacities. It is licensed per storage device, such as disk controllers and their respective expansion units.

This IBM Redbooks® publication is intended for storage administrators and users who are installing and using the features and functions in IBM Tivoli Storage Productivity Center V5.1. The information in this book can be used to plan for, install, and customize the components of Tivoli Storage Productivity Center in your storage infrastructure.

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# Introduction to IBM Tivoli Storage Productivity Center V5.1

IBM Tivoli Storage Productivity Center offers storage infrastructure management that helps optimize storage management by centralizing, simplifying, automating, and optimizing storage tasks associated with storage systems, data disaster recovery, storage networks, and capacity management.

In this chapter, we provide an overview of the new function in Tivoli Storage Productivity Center V5.1. We also describe the new packaging and licensing in the V5.1 release.

## 1.1 Tivoli Storage Productivity Center V5.1

Tivoli Storage Productivity Center V5.1 includes the features and functions listed here. They are described in more detail throughout this book:

- ▶ A next-generation, web-based user interface that is designed to offer ease of use. The new user interface provides a common look and feel that is based on the current user interfaces for IBM XIV® Storage System, IBM Storwize® V7000, and IBM System Storage SAN Volume Controller. It enables quick access to key storage assets, status, and performance information.
- ▶ IBM Cognos®-based reporting that helps create and integrate custom reports on capacity, performance, and utilization.

Tivoli Storage Productivity V5.1 provides better reporting and analytics with no additional cost via integration with Cognos reporting and modeling. Some out-of-the-box reporting is included. Novice users can rapidly create reports with intuitive drag and drop function.

Data abstraction and ad-hoc reporting makes it easy to create high-quality reports and charts. There is easy drill up and drill down for both reporting and charting. Reports can be generated on schedule or on demand in multiple distribution formats, for example, email.

- ▶ Replication features that include support for external failover by external products, allowing users to define Warning and Severe thresholds for recovery point objective (RPO) alerts, and providing the ability to export replication history to a table for analysis.
- ▶ An integrated Install Anywhere wizard to help simplify installation and postinstallation configuration to help accelerate administrator time-to-value. The integrated installer is a major improvement to the installation process. There is now one installer that can do a single-server installation, multiple-server installations, and checks for prerequisites and tells you where to get them if you do not have them.
- ▶ Better user management and integration with external user repositories, like Microsoft Active Directory.
- ▶ Enhanced management for virtual environments provides enhanced reporting for virtual servers (VMware).
- ▶ Tiered Storage Optimization provides integration with the existing storage optimizer and storage tiering reporting. Tiered Storage Optimization is policy-driven ILM leveraging virtualization technology to provide recommendations for storage relocation. It provides recommendations for workload migration based on user-defined policy that is based on file system level data, performance, and capacity utilization. This ensures that only the highest performing workloads are allocated to the most expensive storage.

Enterprise-wide datacenter storage tiering solution complementary to IBM Easy Tier® technology (see Figure 1-1 on page 3).

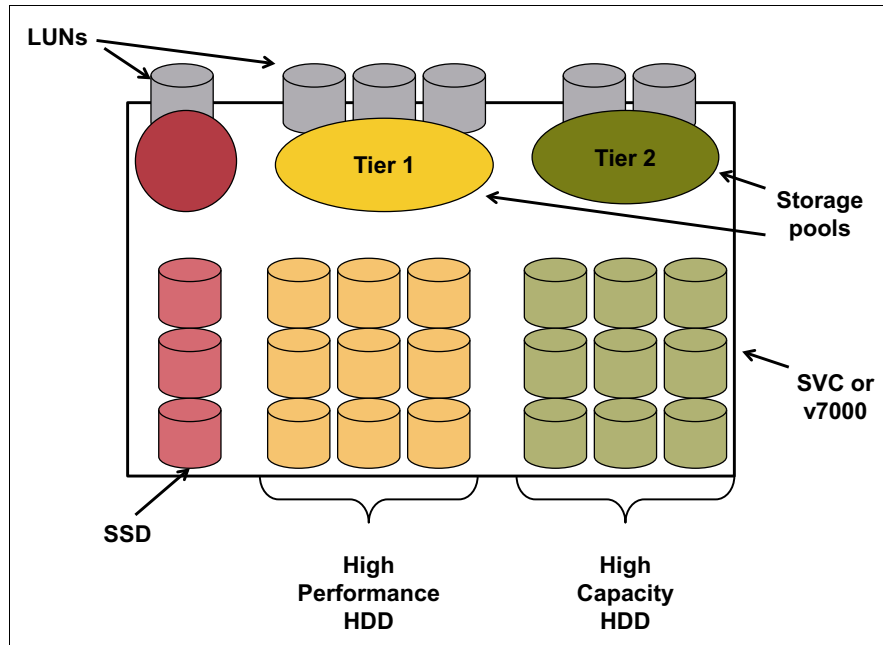


Figure 1-1 Storage tiering

- ▶ Smart Business Storage Cloud brings IBM Scale Out Network Attached Storage (SONAS) under Tivoli Storage Productivity Center management. It allows discovery and visualization of SONAS in the graphical user interface (GUI) and topology enabling Tivoli Storage Productivity Center to manage your SONAS appliance. Smart Business Storage Cloud provides unified storage management in a single GUI for both block and file storage. Smart Business Storage Cloud is key to integration with automation and provisioning for storage cloud.

- ▶ Tivoli Storage Productivity Center V5.1 replication features:

- Support external failover by external products. Tivoli Storage Productivity Center for Replication is designed to manage replication at a storage level. Several products outside of Tivoli Storage Productivity Center for Replication are built to handle site failovers such as VMWare SRM. These products do not manage and set up the storage level replication, but may perform the failover actions to the hardware in order to automatically perform a site switch of their data. Tivoli Storage Productivity Center for Replication V5.1 is able to recognize when an external failover is issued on the storage systems it is managing replication for. This allows you to use Tivoli Storage Productivity Center for Replication to reverse the direction of the copy or restart in the original direction accordingly.

- Support for DS8000 6.3 Extent Space Efficient (ESE) volumes in all Remote Copy Services relationships.

The DS8000 6.3 release will allow clients to use ESE volumes in any role of a Remote Copy Services relationship. Tivoli Storage Productivity Center for Replication will now allow the customer to add copy sets to any DS8000 remote copy session using ESE volumes in the session's various roles.

- Allow user to defined Warning and Severe thresholds for RPO alerts.

In the 5.1 release, you have the ability to set a “warning” and a “severe” threshold on RPO for a Global Mirror session. If the RPO surpasses the warning threshold, a Simple Network Management Protocol (SNMP) event will be thrown and a message issued for the Tivoli Storage Productivity Center for Replication session indicating that the RPO

has passed the warning point and thus might soon pass the severe threshold. If the RPO surpasses the severe threshold, an SNMP event will be thrown, a message issued, and the session should indicate a Severe status until the RPO once again drops below the threshold.

- Allow users to export GM history to a CSV file for RPO/OOS analysis: In the Tivoli Storage Productivity Center V5.1 release, Tivoli Storage Productivity Center for Replication will persist GM RPO history and LSS OOS history so that a customer can export this data to a CSV file. Tivoli Storage Productivity Center for Replication already charts RPO but does not provide a way to export this data, nor does it store the data for an extended period of time. Once exported, the customer can use the CSV file to chart the RPO themselves to determine potential issues that may be affecting their application or replication.
- Provide ability to Start a GM session in Global Copy mode: In the Tivoli Storage Productivity Center V5.1 release, you will be able to issue a Start GC H1 → H2 command on a DS8000 Global Mirror Failover/Failback or a Global Mirror Failover/Failback w/ Practice session. This will start the session only in GC mode. While in GC mode, there will be no disaster recovery capability nor consistency maintained on the remote site. This feature will allow you to better control when the DS8000 begins forming consistency groups on the hardware.
- ▶ Tivoli Storage Productivity Center for Replication for IBM System z® V5.1 features:
  - Support IBM WebSphere® Application Server 7 on z/OS and z/OS 64 bit mode support: The V5.1 release will allow you to run Tivoli Storage Productivity Center for Replication under WebSphere Application Server v7 on z/OS as well as enable WebSphere Application Server to run in 64-bit mode.
  - Support Metro Mirror Hardened Freeze capabilities on z/OS. When running Tivoli Storage Productivity Center for Replication on a z/OS system, it is possible for a Metro Mirror session being managed by Tivoli Storage Productivity Center for Replication to contain system volumes. Prior to this release, if IBM HyperSwap® was not enabled on the session and these system volumes resided in the session, it was possible for the “freeze” operation to end up freezing Tivoli Storage Productivity Center for Replication processing as well. With the 5.1 release, when Tivoli Storage Productivity Center for Replication is running on z/OS, the Tivoli Storage Productivity Center for Replication session will send the Metro Mirror configuration to IOS in the operating system, such that the freeze process becomes hardened, like it does in a HyperSwap session. Any freeze-related operations will then be managed by IOS preventing Tivoli Storage Productivity Center for Replication from being locked up and unable to complete the freeze process. This feature also helps ensure customers that even if Tivoli Storage Productivity Center for Replication is not active at the time of a disaster, that data consistency can still be maintained.

### 1.1.1 SmartCloud Virtual Storage Center

SmartCloud Virtual Storage Center V5.1 offers both a storage virtualization platform and capabilities for storage virtualization management. SmartCloud Virtual Storage Center V5.1 delivers, under one licensed software product, the complete set of advanced functions available in Tivoli Storage Productivity Center, all the sets of functions available with the virtualization, remote-mirroring, and IBM FlashCopy® capabilities of IBM System Storage SAN Volume Controller, and all the capabilities of IBM Tivoli Storage FlashCopy Manager.

#### **Tivoli Storage Productivity Center role**

Tivoli Storage Productivity Center, the management component in SmartCloud Virtual Storage Center V5.1, is designed to provide advanced storage infrastructure and data

management capabilities. The Tivoli Storage Productivity Center component available in SmartCloud Virtual Storage Center V5.1 includes all the capabilities of Tivoli Storage Productivity Center V5.1. It uniquely provides all the advanced functions that were available in the past as part of Tivoli Storage Productivity Center Standard Edition. Unique to SmartCloud Virtual Storage Center V5.1 then is the storage analytics engine that provides data management with file system and database scanning and analysis, data placement, user quotas, and a Tivoli Storage Manager interface. It provides best practices for configuration management, configuration change management, a storage optimizer, tiered storage capacity optimization and reporting, storage area network (SAN) planning, and policy-based management. The Tivoli Storage Productivity Center component also includes management and automation of data replication, and application programming interfaces (APIs) to help manage storage in virtual and cloud environments such as IBM SONAS and IBM Storwize V7000 Unified.

As with the other components of SmartCloud Virtual Storage Center V5.1, you can use the Tivoli Storage Productivity Center component independent of deploying any of the other components. When doing so, rather than counting the capacity to be licensed as the amount of storage managed by the SAN Volume Controller component (as you do with SmartCloud Virtual Storage Center V5.1), count the managed capacity to be licensed the same as you would for a Tivoli Storage Productivity Center V5.1 deployment.

### **Tivoli Storage FlashCopy Manager role**

Tivoli Storage FlashCopy Manager, the data backup and restore component in SmartCloud Virtual Storage Center V5.1, provides fast application-aware backups and restores, leveraging advanced snapshot technologies available with IBM storage systems. It is designed to deliver high levels of data protection for business-critical applications via integrated application snapshot backup and restore capabilities. These capabilities are achieved through the utilization of advanced storage-specific hardware snapshot technology to help create a high performance, low impact application data protection solution. It is easy to install, configure, and deploy, and integrates well with various storage systems such as IBM Storwize V7000, IBM System Storage SAN Volume Controller, IBM System Storage DS8000, and IBM XIV Storage System.

### **IBM System Storage SAN Volume Controller role**

IBM System Storage SAN Volume Controller, the virtualization platform component in SmartCloud Virtual Storage Center V5.1, is designed to deliver storage virtualization in environments from large enterprises to small and mid-size organizations. It can help solve storage requirements growing at a fast rate and reduce the necessary costs to manage storage requirements.

Using the Global Mirror (remote mirror) function, SAN Volume Controller is designed to provide options to help administrators balance network bandwidth requirements and recovery point objectives for applications, helping to reduce operating costs for disaster recovery solutions. It supports higher RPO times, providing the option to use a lower bandwidth link between mirrored sites. This lower bandwidth remote mirroring uses space-efficient, FlashCopy targets as sources in remote copy relationships to increase the time allowed to complete a remote copy data cycle. With the ability to remote mirror from one system to the other, you now have greater flexibility in your expanding environments using both IBM Storwize V7000 and IBM System Storage SAN Volume Controller in remote mirror relationships.

## APIs

Tivoli Storage Productivity Center V5.1 and Virtual Storage Center (VSC) comes with application programming interfaces (APIs) for integration into related Tivoli products providing Tivoli integration (see Figure 1-2).

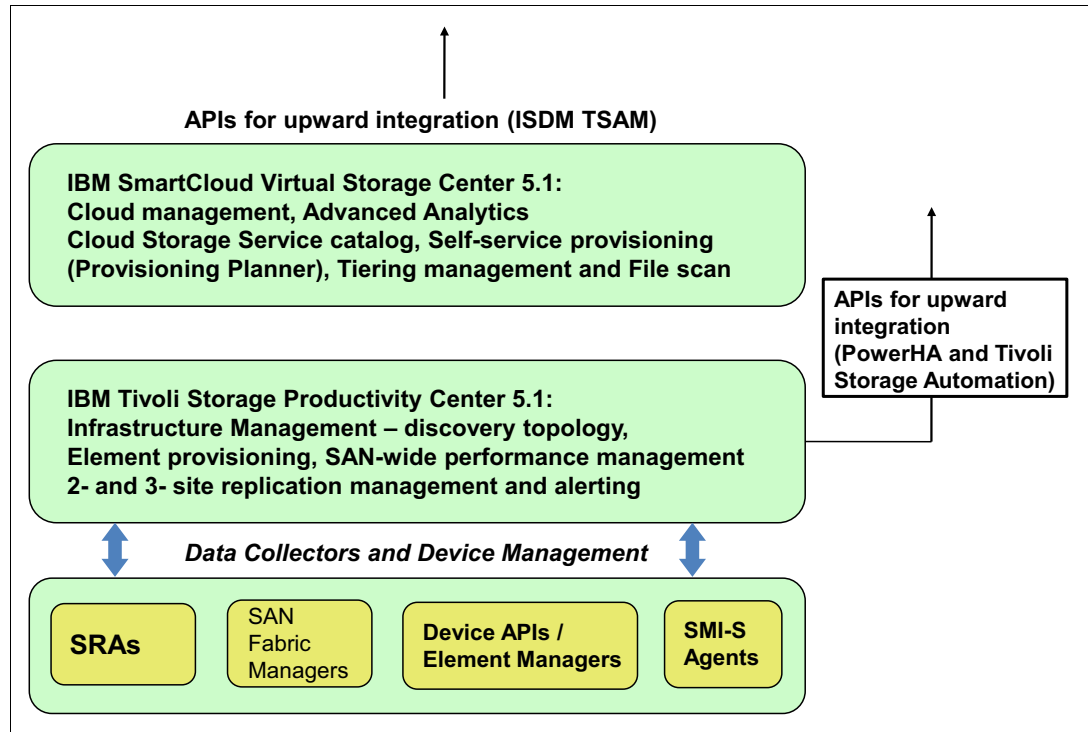


Figure 1-2 API integration

Additional information about IBM SmartCloud® Virtual Storage Center can be found in the IBM SmartCloud Virtual Storage Center V5.1 announcement letter:

<http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=AN&subtype=CA&htmlfid=897/ENUS212-185&apname=USN#h2-prodnx>

## 1.2 Tivoli Storage Productivity Center V5.1 licensing

IBM Tivoli Storage Productivity Center V5.1 products includes two license models:

- ▶ IBM Tivoli Storage Productivity Center V5.1
- ▶ IBM Tivoli Storage Productivity Center *Select* Edition V5.1

Tivoli Storage Productivity Center V5.1 is designed to provide device management capabilities such as automated system discovery, provisioning, data replication, configuration, and performance monitoring for storage systems and storage networks.

Tivoli Storage Productivity Center *Select* Edition V5.1 offers the same features as Tivoli Storage Productivity Center V5.1, but at attractive entry-level pricing for operations with smaller capacities. It is licensed per storage device, such as disk controllers and their respective expansion units.



## 1.2.1 Difference between Tivoli Storage Productivity Center and VSC

Tivoli Storage Productivity Center V5.1 comes with the function for storage administrators found in previous releases. It allows for managing, monitoring, provisioning, and performance on storage devices. VSC is an extension of Tivoli Storage Productivity Center V5.1, which enables for server monitoring, file system monitoring on NAS devices, Tiered Storage Optimization, and new advanced functions for virtual storage and replication. VSC is also intended for use with cloud API:

- Tivoli Storage Productivity Center v4.x versions Tivoli Storage Productivity Center Basic Edition, Tivoli Storage Productivity Center for Disk, Tivoli Storage Productivity Center for Replication, and Tivoli Storage Productivity Center for Disk Select are mapped to Tivoli Storage Productivity Center V5.1.
- Advanced server monitoring, analytics, and automation come with IBM SmartCloud Virtual Storage Center (VSC).

Looking at the different Tivoli Storage Productivity Center V4.x versions, and their functions, we can draw a picture (see Figure 1-3) to see which license and functions get mapped to Tivoli Storage Productivity Center V5.1 and VSC.

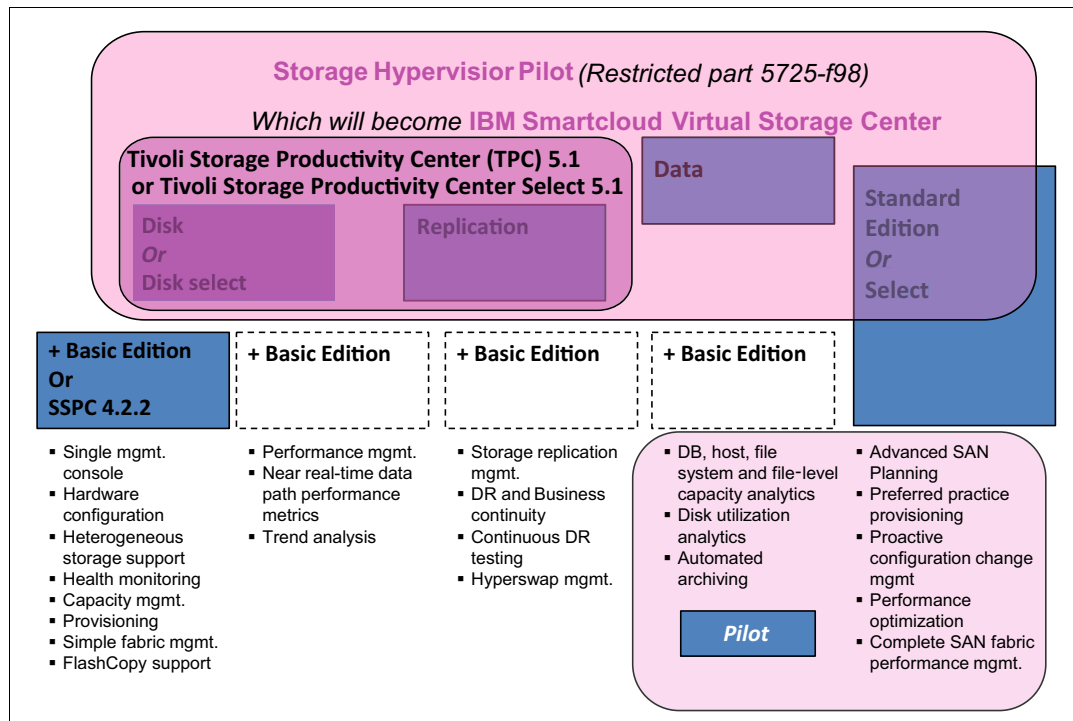


Figure 1-3 Tivoli Storage Productivity Center 4.2.2 transition to 5.1

Looking only at the functions, both existing in Tivoli Storage Productivity Center V4.x and the new advanced version, we can draw a schema to show which functions are available in Tivoli Storage Productivity Center V5.1 and VSC, see Figure 1-4.

	Features	TPC 4.2					TPC 5.1	VSC
		Basic Edition	Disk	Data	Replication	Standard Edition		
Basic	Discovery, topology, monitoring, capacity management, alerting	•	•	•		•	•	•
Disk	Device Performance Management		•			•	•	•
	VMWare Hypervisor		•			•	•	•
Data	File System, NAS, database management			•		•		✓
Standard Edition	Fabric Performance Management					✓	•	•
	Storage Optimizer					✓		✓
	Configuration Change Management and best practices					✓		✓
	SAN Storage Planners and Policy based management					✓		✓
	Storage Tier Reports					✓		✓
Repl	2-site Replication Management				•		•	•
	3-site Replication Management				•		•	•
New Capabilities	Tiered Storage Optimization (Sage)							✓
	Cloud Service API						•	•
	Storage virtualization and replication							✓
	Application snapshot							✓

\*Virtual Storage Center also includes entitlement to use of SVC and FlashCopy Manager

Figure 1-4 Tivoli Storage Productivity Center function comparisons

## 1.2.2 Tivoli Storage Productivity Center Advanced

Tivoli Storage Productivity Center Advanced is mentioned in some Tivoli Storage Productivity Center documentation. The advanced functions of Tivoli Storage Productivity Center not included in Tivoli Storage Productivity Center V5.1 or Tivoli Storage Productivity Center Select V5.1 are referred to in some of the Tivoli Storage Productivity Center documentation as “Tivoli Storage Productivity Center Advanced”. These advanced functions of the V5.1 product are entitled via the IBM SmartCloud Virtual Storage Center, Program Number 5725-F92.

## 1.2.3 Migration from Tivoli Storage Productivity Center V4.x products to Tivoli Storage Productivity Center V5.x

With the introduction of Tivoli Storage Productivity Center V5.1, the current set of Tivoli Storage Productivity Center products have been converged into a simpler and smaller set of license options.

Current Tivoli Storage Productivity Center product licensees are entitled one-to-one in quantity to one of the new Tivoli Storage Productivity Center V5.1 license offerings as described below. If you have software entitlement that is not in IBM Passport Advantage®, the movement of entitlement can be initiated by you through your IBM representative with either new software license purchases or new software subscription and support renewals and reinstatements. If you have Tivoli Storage Productivity Center V4.x entitlement in Passport Advantage, effective immediately you will be converted automatically to the corresponding Tivoli Storage Productivity Center V5.x entitlement as described in this section. This change

does not entitle you to any refunds for software licensing. Executing this change may also require you to transfer entitlement records, which are not currently in Passport Advantage, over to Passport Advantage.

### **Products with a current charge metric of per server**

Tivoli Storage Productivity Center Basic Edition V4.x (5608-WB1).

If you are currently using IBM Tivoli Storage Productivity Center Basic Edition V4.x (typically as part of an IBM System Storage Productivity Center installation), you will continue to have support for this product version and release. The first maintenance release of Tivoli Storage Productivity Center V5.1 (for example 5.1.1, planned for 4Q) will allow you to upgrade to the latest V5.x code build with the new user interface for IBM Tivoli Storage Productivity Center Basic Edition V4.x licensees. However, Tivoli Storage Productivity Center Basic Edition will not release with its own V5.1 product ID when V4.2 is withdrawn from marketing. After V4.x is withdrawn from marketing, new sales of Tivoli Storage Productivity Center Basic Edition will not be offered.

### **Products with a current charge metric of per storage device (enclosure)**

- ▶ Tivoli Storage Productivity Center for Disk Select (also called at one time Tivoli Storage Productivity Center for Disk Midrange Edition, 5608-E14)

If you are current on software subscription and support for Tivoli Storage Productivity Center for Disk Select (also called at one time Tivoli Storage Productivity Center for Disk Midrange Edition), you are entitled to the new Tivoli Storage Productivity Center Select Edition V5.x (5608-PC2) offering with a one-to-one mapping for each storage device entitlement purchased.

For example, a customer currently has a license for 10 storage devices of Tivoli Storage Productivity Center for Disk Select. That customer will show 10 storage devices of Tivoli Storage Productivity Center Select Edition V5.x (5608-PC2) in their entitlement after migration.

- ▶ Tivoli Storage Productivity Center Select (5608-PCS)

Tivoli Storage Productivity Center Select was recently introduced to provide the functions of Tivoli Storage Productivity Center Standard Edition with a per storage device charge metric. If you already have Tivoli Storage Productivity Center Select (5608-PCS), you should contact your IBM representative to discuss migration options that are available to you through the Virtual Storage Center (Storage Hypervisor) Pilot Program.

### **Products with a current charge metric of per tiered terabyte (TB)**

- ▶ Tivoli Storage Productivity Center for Replication Two Site Business Continuity (5608-WB2) and Tivoli Storage Productivity Center for Replication Three Site Business Continuity (5608-WB3)

If you are current on software subscription and support for Tivoli Storage Productivity Center for Replication Two Site Business Continuity (5608-WB2) or Tivoli Storage Productivity Center for Replication Three Site Business Continuity (5608-WB3), you are entitled to the new Tivoli Storage Productivity Center Select Edition (5608-PC2) offering with a one-to-one mapping for each terabyte of entitlement purchased. Note the implications of the licensing direction given in the “Description Section” of the announcement for Licensing Tivoli Storage Productivity Center for inactive storage (use case: replication).

Some examples are provided for clarity:

- Example 1: A customer has 200 TB of storage managed by Tivoli Storage Productivity Center. 100 TB is at a primary data store and 100 TB at a secondary

data store. Therefore, the Tivoli Storage Productivity Center for Replication Two Site Business Continuity license is for 100 TB. The customer only actively manages the primary data store (100 TB), and the secondary data store (100 TB) is inactive with its primary purpose as standby storage in a disaster recovery scenario. The customer will be entitled to 100 TB of Tivoli Storage Productivity Center V5.1.

- Example 2: A customer has 200 TB of storage managed by Tivoli Storage Productivity Center. 100 TB is at a primary data store and 100 TB at a secondary data store. Therefore, the Tivoli Storage Productivity Center for Replication Two Site Business Continuity license is for 100 TB. The customer actively manages and uses all 200 TB of data at both sites. The customer will be entitled to 100 TB of Tivoli Storage Productivity Center V5.1. Assuming the other 100 TB is actively managed under Tivoli Storage Productivity Center, the customer will need to purchase an additional 100 TB of Tivoli Storage Productivity Center V5.1.

► Tivoli Storage Productivity Center for Disk (5608-WC4)

If you are current on software subscription and support for Tivoli Productivity Center for Disk, you are entitled to the new Tivoli Storage Productivity Center (5608-PC1) offering with a one-to-one mapping for each terabyte entitlement purchased:

- For example, a customer currently has a license for 150 TB of Tivoli Storage Productivity Center for Disk that are distributed across multiple tiers (12 TB in tier one, 20 TB in tier two, 32 TB in tier three, 36 TB in tier four, and 50 TB in tier 5). That customer will show 150 TB (100 TB in tier one and 50 TB in tier two) of Tivoli Storage Productivity Center V5.x (5608-PC1) in their entitlement after migration.

► Tivoli Storage Productivity Center Standard Edition (5608-WC0) and Tivoli Storage Productivity Center for Data (5608-WC3)

If you already have Tivoli Storage Productivity Center Standard Edition (5608-WC0) or Tivoli Storage Productivity Center for Data (5608-WC3), you should contact your IBM representative to discuss migration options that are available to you through the Virtual Storage Center.



# Installing and migrating to IBM Tivoli Storage Productivity Center V5.1

In this chapter, we show the installation steps of the Tivoli Storage Productivity Center V5.1 on the Windows 2008 R2 platform.

Unlike previous versions, Tivoli Storage Productivity Center V5.1 no longer gives you the option of a choice between a typical or custom installation. Tivoli Storage Productivity Center V5.1 uses a new installer process and has masked all unnecessary installation steps.

Although we have shown the detailed steps to installing Tivoli Storage Productivity Center on a Windows platform, we have included the pre-Tivoli Storage Productivity Center installation steps for both IBM AIX® and Linux towards the end of this chapter. Once you get to the Tivoli Storage Productivity Center Installer on either AIX or Linux, the installer screens are the same as the Windows screen.

This installation process documented in this book is based on an environment where clean servers are available for the installation, and this is our recommended approach.

## 2.1 Planning for Tivoli Storage Productivity Center

The following sections provide information to help plan your Tivoli Storage Productivity Center environment before you install the product. In a complex environment, good planning helps you avoid delays and problems in getting your system up and running.

Before installing Tivoli Storage Productivity Center for the first time, be familiar with your operating systems, storage devices, communication protocols, and system configurations.

It is recommended that the Tivoli Storage Productivity Center server should be a dedicated system for Tivoli Storage Productivity Center operations and not shared with other applications. Tivoli Storage Productivity Center is supported in a VMware environment, assuming enough resources are provided to provide the performance and capacity requirements.

Figure 2-1 shows the combinations of Tivoli Storage Productivity server and component install configurations.






Installation Type	Components installed on Server A	Components installed on Server B
Single Server Install	 <ul style="list-style-type: none"><li>• TPC Servers (Data, Device and Replication)</li><li>• TIP and TCR (BIRT &amp; Cognos)</li><li>• TPC Database Repository</li><li>• TPC Storage Resource Agent</li><li>• TPC Stand-alone GUI</li><li>• TPC Web GUI</li><li>• TPC CLI</li></ul>	n/a
Multiple Server Install Scenario #1	 <ul style="list-style-type: none"><li>• TPC Servers (Data, Device and Replication)</li><li>• TIP and TCR (BIRT &amp; Cognos)</li><li>• TPC Storage Resource Agent</li><li>• TPC Stand-alone GUI</li><li>• TPC Web GUI</li><li>• TPC CLI</li></ul>	 <ul style="list-style-type: none"><li>• TPC Database Repository</li></ul>
Multiple Server Install Scenario #2	 <ul style="list-style-type: none"><li>• TPC Database Repository</li><li>• TPC Servers (Data, Device and Replication)</li><li>• TPC Storage Resource Agent</li><li>• TPC Stand-alone GUI</li><li>• TPC CLI</li></ul>	 <ul style="list-style-type: none"><li>• TIP and TCR (BIRT &amp; Cognos)</li><li>• TPC Web GUI</li></ul>

Figure 2-1 Multi-Server installation options

### 2.1.1 Hardware requirements

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

For the latest information about the minimum hardware requirements needed for the Tivoli Storage Productivity Center servers and clients, see the following URL:

<https://www-304.ibm.com/support/docview.wss?uid=swg21386446>

## Server and stand-alone GUI

For Windows and Linux on Intel:

- ▶ Machine: Dual Intel class P4/Xeon 3.2 GHz processors
  - Minimum memory: 8 GB of RAM
  - Disk space: 80 GB
  - Operating systems - one of the following:
    - Microsoft Windows 2008 (Standard Edition, Enterprise Edition) (32 bit or 64 bit)
    - Windows 2008 R2 64-bit only (Standard Edition, Enterprise Edition)
    - Red Hat Enterprise Linux (RHEL) Base Server and Advanced Platform 5 (64 bit - compatibility mode)
    - RHEL Base Server and Advanced Platform 6 (64 bit - compatibility mode)
    - As a virtual machine on VMWare ESX and ESXi 3.0.x, 3.5.x, 4.0.x, 4.1.x for the above operating systems

For IBM AIX on IBM System i® and System p:

- ▶ Machine: Dual POWER5, IBM POWER6®, IBM POWER7® processor
- ▶ Minimum space requirement to run:
  - 8 GB of RAM
  - Approximately 80 GB of hard disk space
  - Operating system:  
AIX V6.1 AIX V7.1

Supported Relational Database Management Systems (RDBMSs) for the Enterprise Repository:

- ▶ IBM DB2® UDB V9.5 Fix Pack 4, or later Fix Packs, except Fix Pack 6
- ▶ IBM DB2 UDB V9.7 Fix Pack 4, or later Fix Packs

### 2.1.2 Web browser support

IBM Tivoli Storage Productivity Center starts a web browser when you access web pages from items in the Help menu, start another application using its launch-in-context feature, or start IBM Tivoli Storage Productivity Center for Replication from its user interface.

**Note:** The Tivoli Storage Productivity Center software is bundled with its own IBM Java JRE. When you use the Java Web Start method of remotely accessing the stand-alone GUI, you must use the IBM Java.

The web browsers that are supported by Tivoli Storage Productivity Center for the various components are shown in Table 2-1.

*Table 2-1 Browser support for Tivoli Storage Productivity Center*

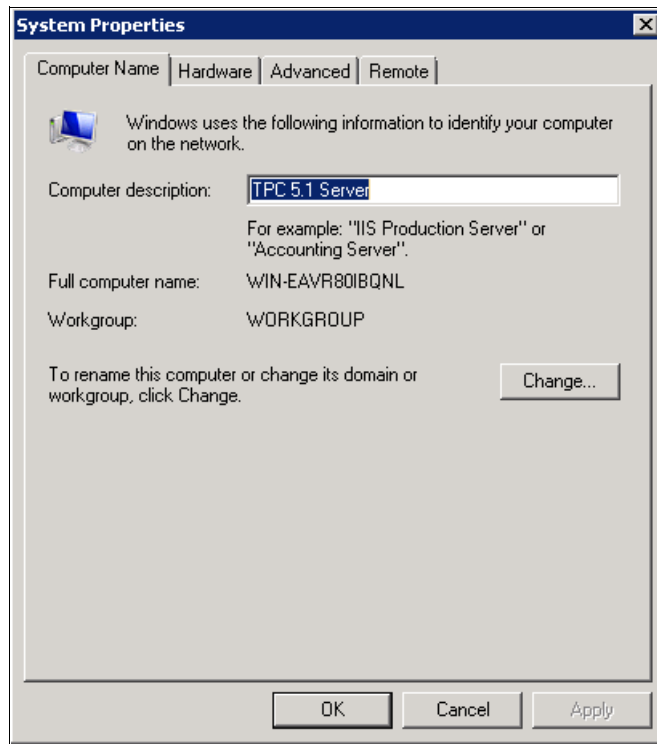
<b>Operating system</b>	<b>Tivoli Storage Productivity Center and stand-alone GUI</b>	<b>Tivoli Storage Productivity Center for Replication</b>	<b>Tivoli Integrated Portal and Tivoli Common Reporting</b>	<b>Web-based GUI</b>
Windows	Internet Explorer 8 and Firefox 3.6 and 4	Internet Explorer 8 and Firefox 3.6	Internet Explorer 8 and Firefox 3.6	Internet Explorer 8 and Firefox 3.6 or later
Linux	Firefox 3.6 and 4	Firefox 3.6	Firefox 3.6	Firefox 3.6 or later
AIX	Firefox 3.6 and 4	Firefox 3.6	Firefox 3.6	Firefox 3.6 or later

## 2.2 Preparing for the installation of Tivoli Storage Productivity Center on Windows 2008

In this section, we document a few of the simple steps that should be made to help ensure a good Tivoli Storage Productivity Center installation process.

Figure 2-2 on page 15 shows that we have a computer name of WIN-EAVR80IBQNL and a computer description of Tivoli Storage Productivity Center 5.1 Server. Throughout this chapter, we have used this computer name. This name is important and will be required in several fields during the installation process. You might like to change this in your environment to a more appropriate name that can be remembered easily.





*Figure 2-2 Setting the server name and description*

Figure 2-3 on page 16 shows that we have elected to use a static TCP/IP address for our Tivoli Storage Productivity Center server. It is up to you whether you do this, or use DHCP, but in Tivoli Storage Productivity Center V5.1 you must ensure that you have a fully qualified domain name (FQDN) because Tivoli Storage Productivity Center will not let you use a TCP/IP address or just the computer name within the installation windows.

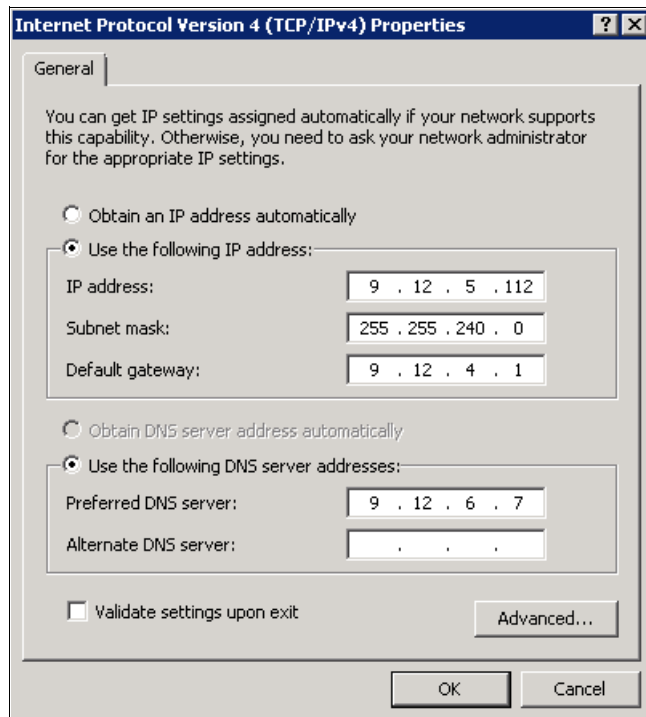


Figure 2-3 TCP/IP settings

During the Tivoli Storage Productivity Center installation, there are some processes that use NetBios, and as such, it is recommended that you go into the Advanced TCP/IP Settings panel, and change the default selection to that of Enable NetBios over TCP/IP, as shown in Figure 2-4 on page 17.

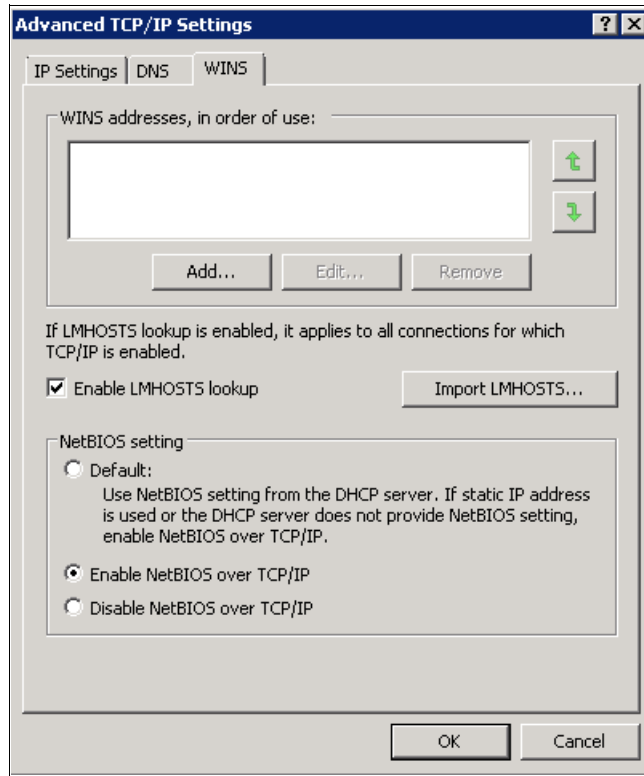


Figure 2-4 NetBios setting

## 2.3 Installing DB2

In this section, we describe the steps involved in the installation of DB2 in a Windows environment.

### 2.3.1 Preparing to install DB2 on Windows

If you have an administrator user ID that you want to use to install DB2 and IBM Tivoli Storage Productivity Center, this user ID must be a member of the DB2ADMNS and the Administrator groups.

When you install DB2, the following groups are created:

- ▶ DB2ADMNS, which has all the required user rights assigned for administrative authority.
- ▶ DB2USERS, which has user rights assigned to DB2 users.

Assign users who need administrative authority to the DB2ADMNS group and DB2 users to the DB2USERS group. When you assign a user ID to either group, the user ID has all the user rights required for that group. You do not have to assign individual user rights to each user ID.

### Important:

The Windows user ID *Administrator* does not have the authority to create the Tivoli Storage Productivity Center database, TPCDB. The DB2 administrator user ID that you need when you install IBM Tivoli Storage Productivity Center must have DB2 administrative rights. The user ID needed to install IBM Tivoli Storage Productivity Center must be a member of the DB2ADMNS and Administrators groups. The DB2 user ID db2admin, which was created when you installed DB2, has the authority for Tivoli Storage Productivity Center. For valid DB2 user IDs and passwords, see the following site:

<http://publib.boulder.ibm.com/infocenter/db2luw/v9r7/index.jsp?topic=/com.ibm.db2.luw.admin.dboobj.doc/doc/c0007248.html>

## 2.3.2 Installing DB2 on a Windows operating system

To install DB2 on a Windows operating system:

1. Log on with a user ID that has Administrator authority on Windows.
2. Insert the DB2 product CD into the CD-ROM drive or use the extracted DB2 installation image.

If you are using Windows Autorun, the installation program should start in 15 - 30 seconds. If the installation program does not start, complete one of the following steps:

- ▶ In a command prompt, type `setup.exe` after changing to the root direct of the CD-ROM.
- ▶ In Windows Explorer, open the root of the CD-ROM, and double-click the `setup.exe` file.

The DB2 Setup Launchpad window will then be presented, as shown in Figure 2-5.

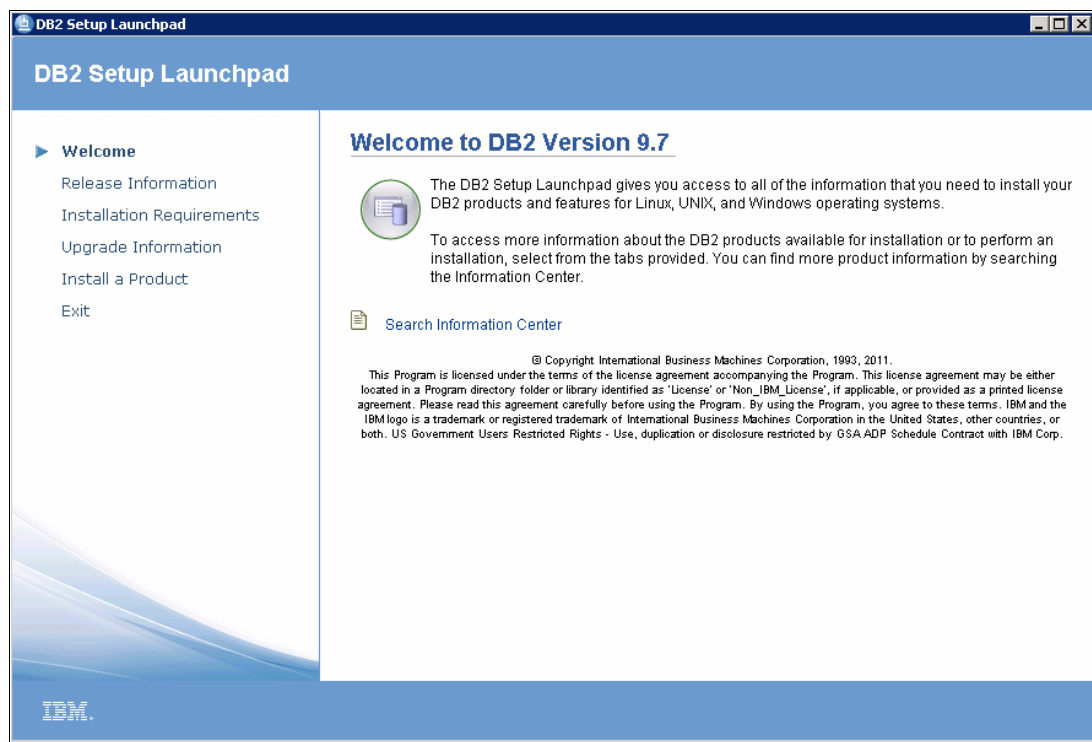


Figure 2-5 DB2 Setup Launchpad

Select **Install a Product** on this window, as shown in Figure 2-6.

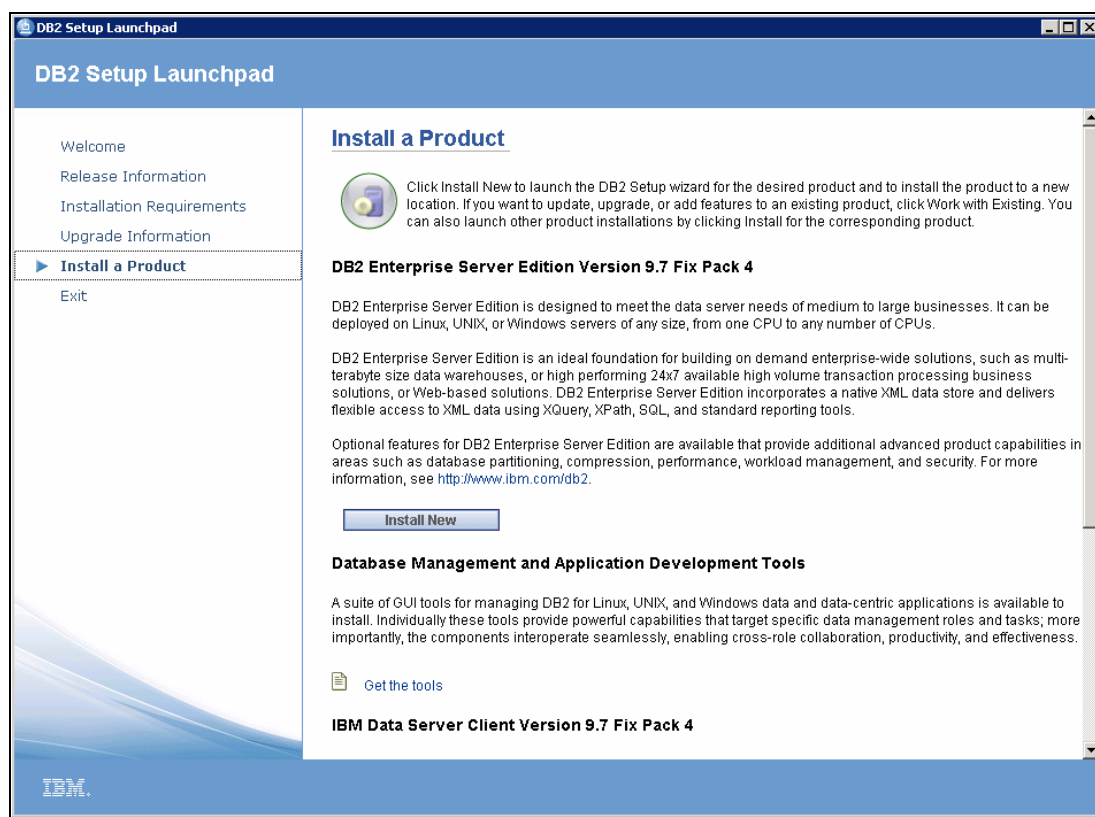


Figure 2-6 DB2 launchpad

In the content pane, click **Install New** for **DB2 Enterprise Server Edition Version 9.7** and you will be presented with the window that is shown in Figure 2-7 on page 20.

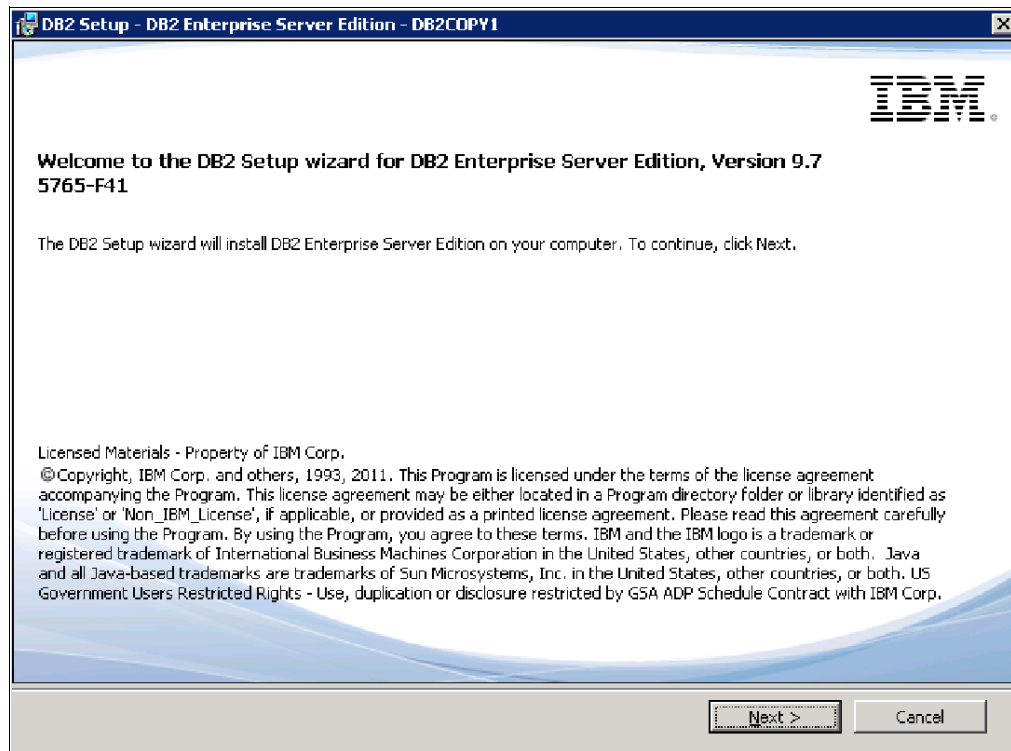


Figure 2-7 Welcome to DB2 Setup wizard

Select **Next** to get to the Software License Agreement window as shown in Figure 2-8.

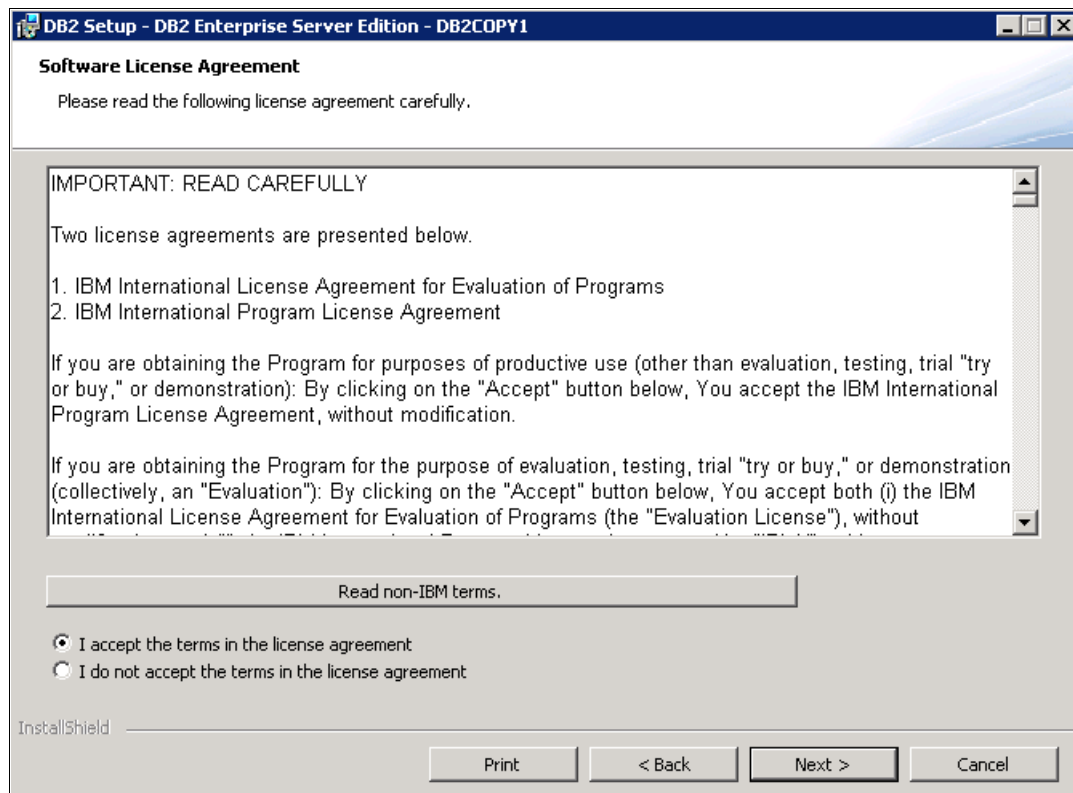


Figure 2-8 DB2 setup Software License Agreement window

On the Software License Agreement page, read, accept the license agreement, and click **Next**.

You will then be presented with the Installation Type window as shown on Figure 2-9.

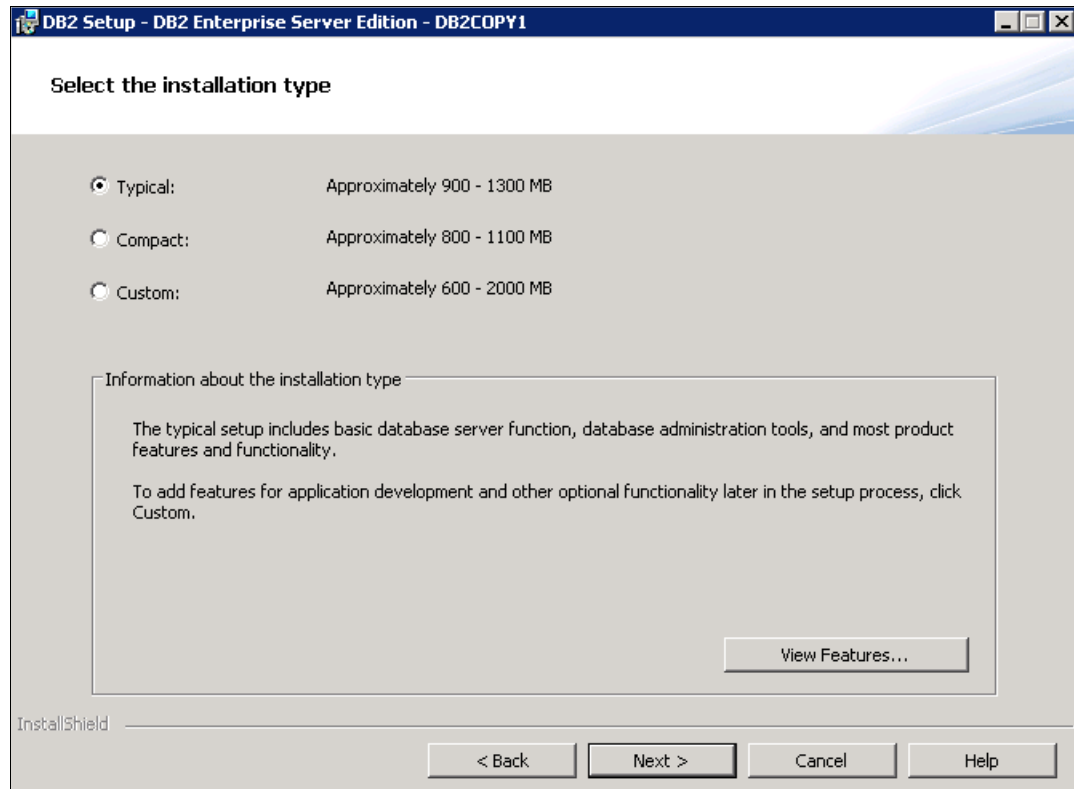


Figure 2-9 DB2 installation type

Select **Typical** and **Next** to progress to the next window that is shown in Figure 2-10 on page 22.

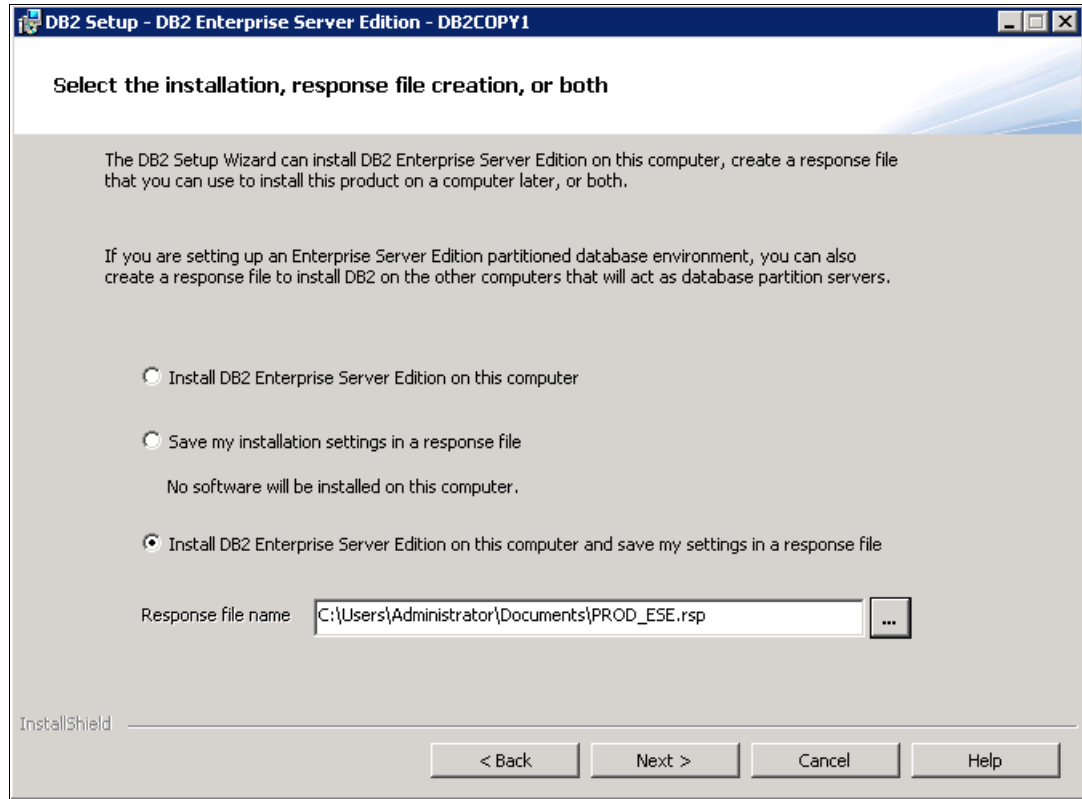


Figure 2-10 DB2 Setup wizard for installation

In the “Select the installation, response file creation, or both” page, select **Install DB2 Enterprise Server Edition on this computer and save my settings in a response file**. Enter a response file location and name, or use the default value as we have. Click **Next** to continue to the “Select the installation folder” window, as shown in Figure 2-11 on page 23.



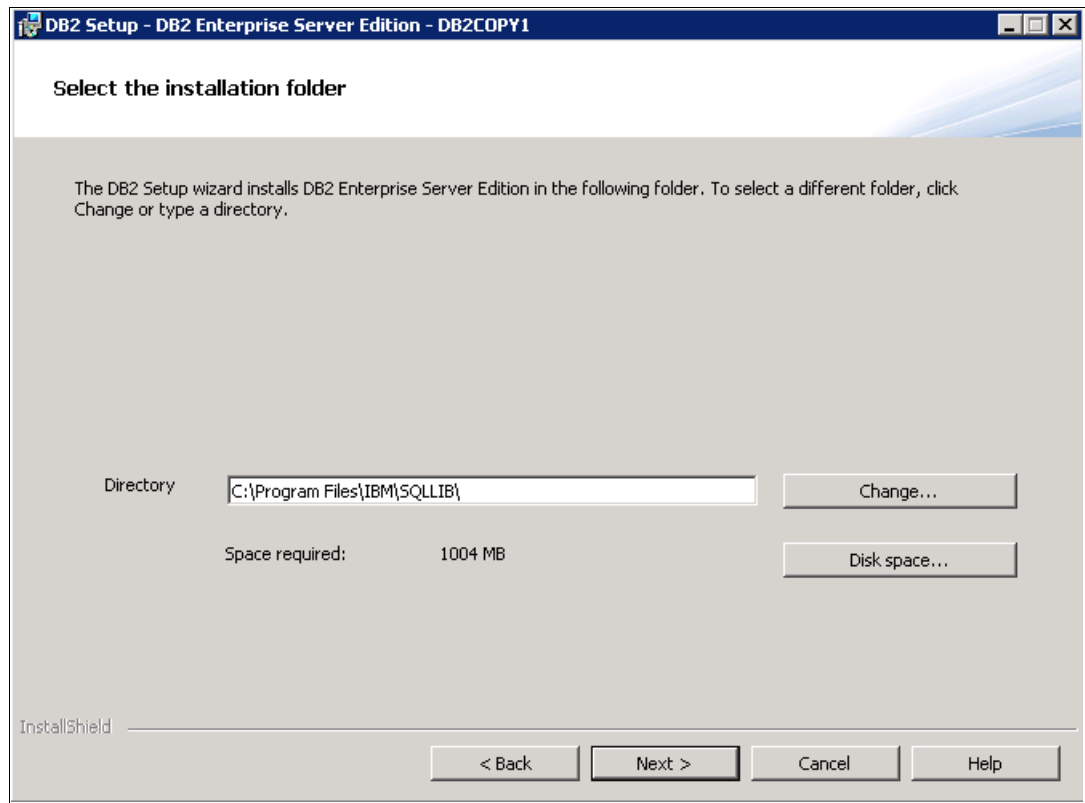


Figure 2-11 DB2 installation folder

On the “Select the installation folder” page, enter a directory or use the default and click **Next**. The “Set user information” window opens, as shown in Figure 2-12 on page 24.

Figure 2-12 Setting the DB2 user and password

In the “Set user information for the DB2 Administration Server” page, enter the following User information:

1. Leave **Domain** blank
2. In **User name**, type a user name of the DB2 user account that you want to use. DB2 adds this user ID to the DB2ADMNS group
3. Type your **Password** and retype to **Confirm password**

Select the **Use the same account for the remaining DB2 services** check box and click **Next** to move to the “Configure DB2 instances” window, as shown on Figure 2-13 on page 25. The user ID and password are used to install Tivoli Storage Productivity Center.

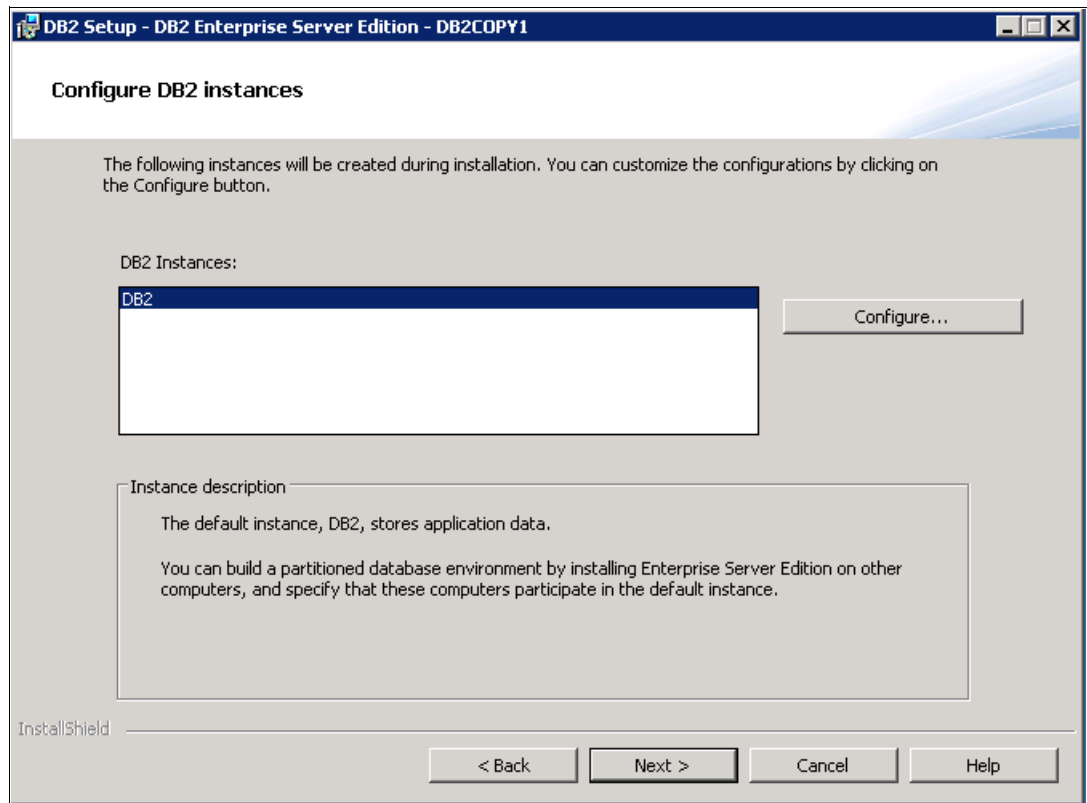


Figure 2-13 Configure DB2 instances

Select **Next** to progress to the tools preparation window as shown in Figure 2-14 on page 26.

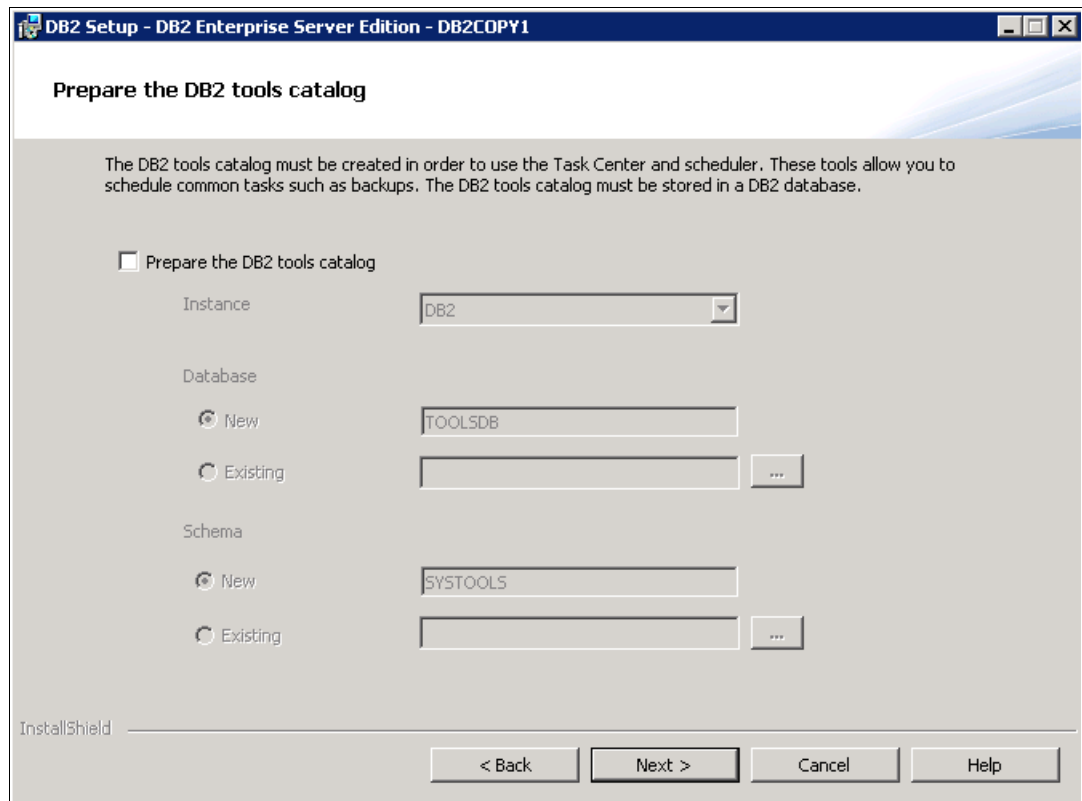


Figure 2-14 DB2 tools

In the “Prepare the DB2 tools catalog” page, accept the defaults, click **Next**, and progress to the notifications screen as shown in Figure 2-15 on page 27.

The default is to *not* prepare the DB2 tools catalog.

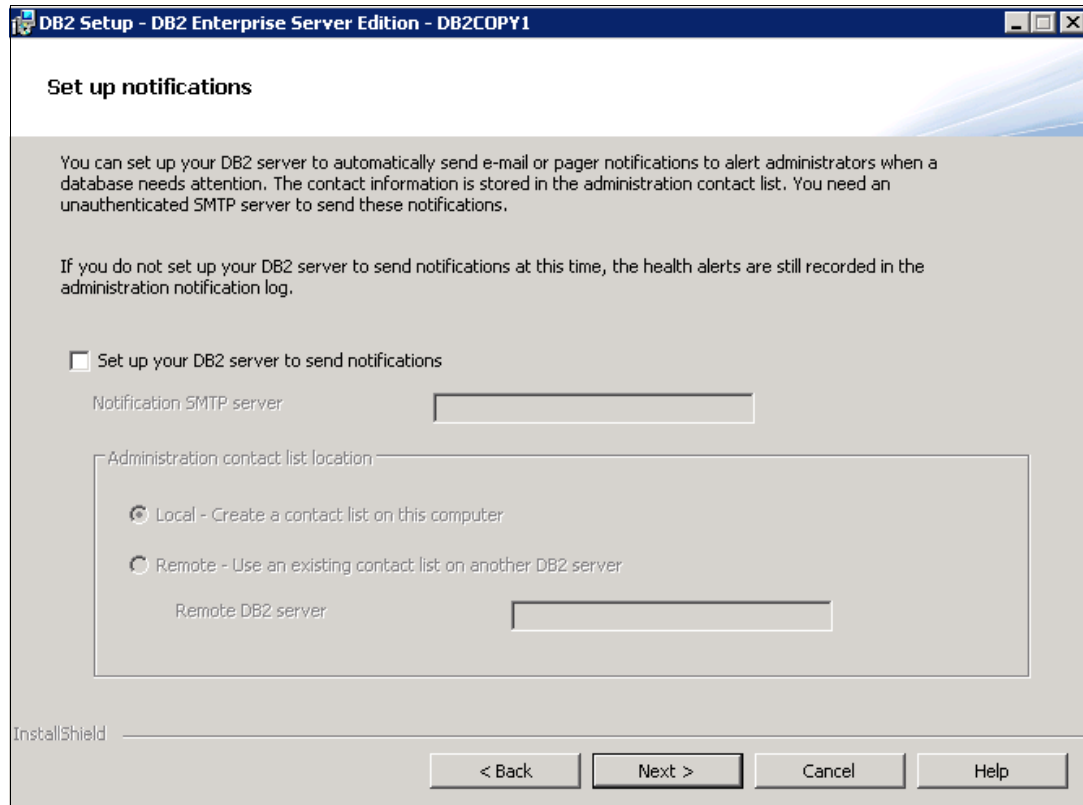


Figure 2-15 Set up notifications

In the “Set up notifications” page, clear the **Set up your DB2 server to send notifications** check box, and click **Next** to move to the window as shown in Figure 2-16 on page 28.

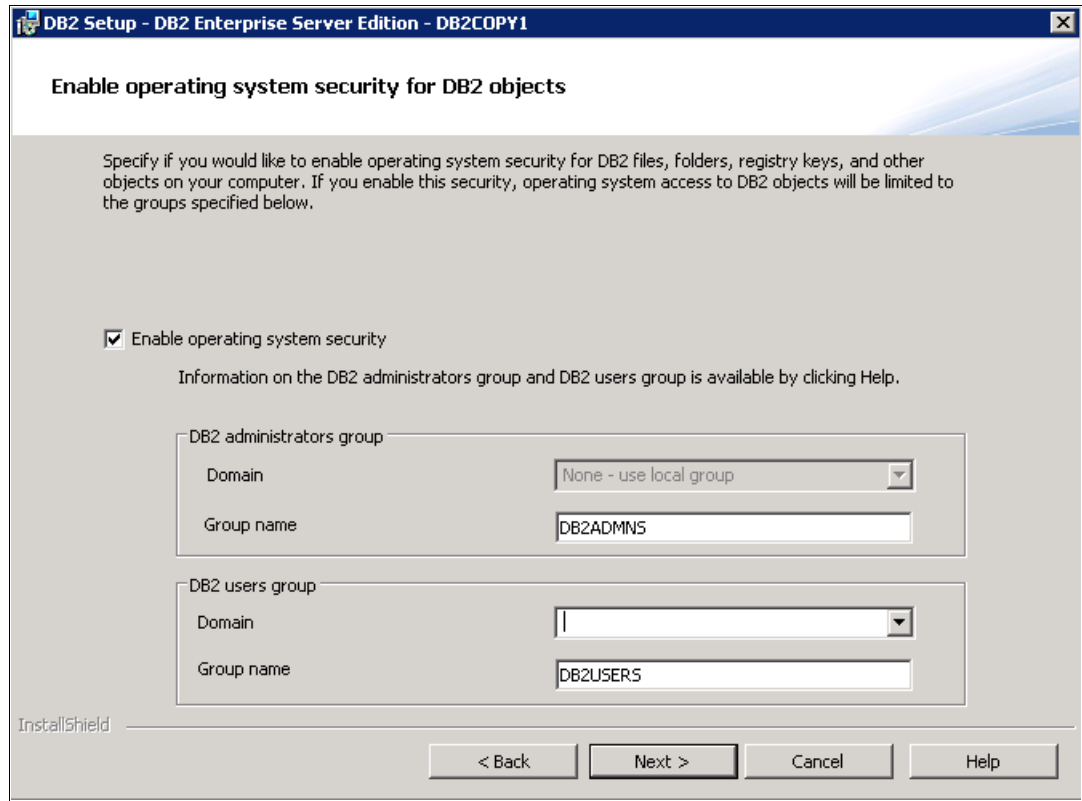


Figure 2-16 Enable security

In the “Enable operating system security for DB2 objects” page, accept the defaults, and click **Next** to move onto the “Start copying files and create response” window, as shown in Figure 2-17 on page 29.

The default is to enable operating system security.

Note: If you have installed DB2 before on this system, and the DB2ADMS group exists, when you click **Next** in the security page, the following message is displayed:

Warning:

The group; name "DB2ADMS" already exists in the system and will be granted complete access to the DB2 folders and objects through the operating system.

Click OK to continue installation, or click Cancel to input another group name.

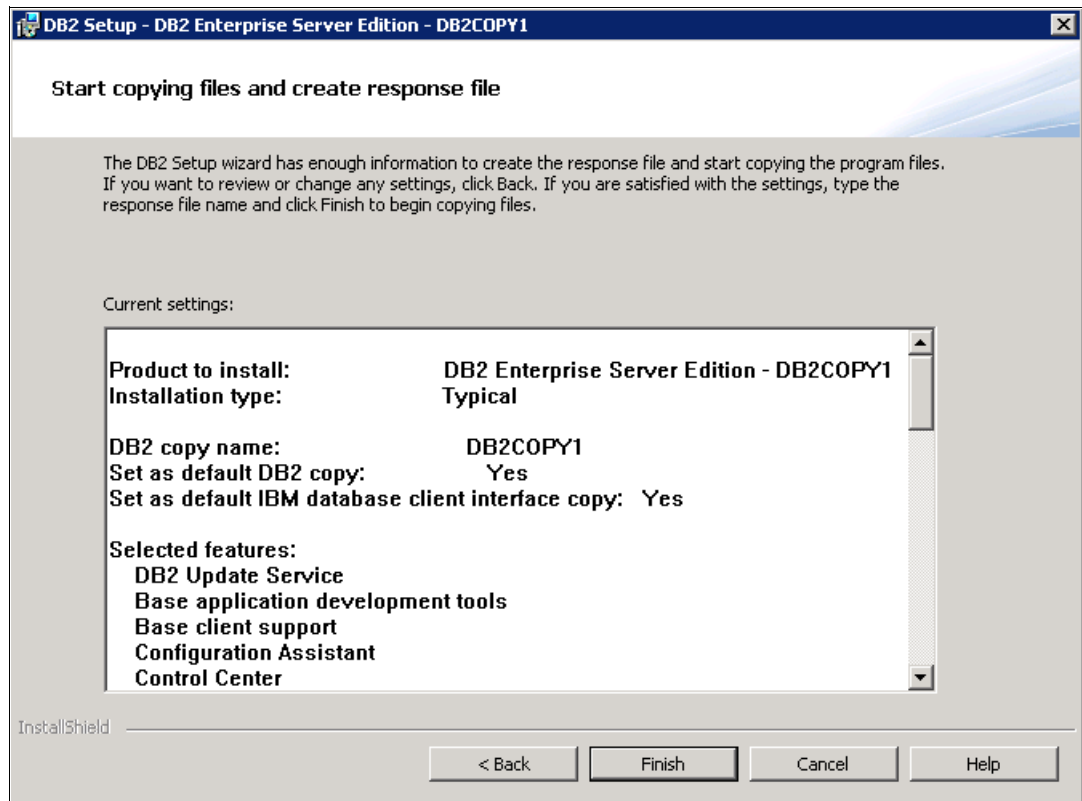
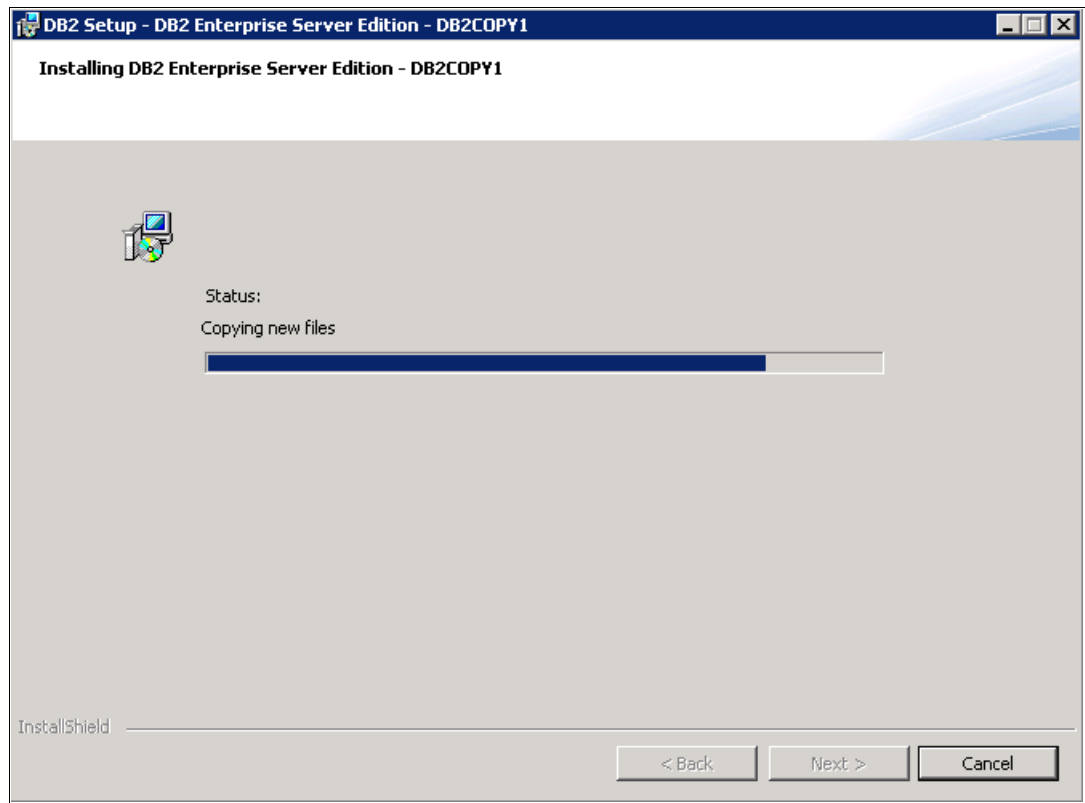


Figure 2-17 Copying files

In the “Start copying files and create response file” page, review the summary information, and click **Finish**.

You will then be presented with the window as shown in Figure 2-18 on page 30.



*Figure 2-18 Installation progress*

This window shows a progress bar until it finishes. When it has finished, click **Next** and you are presented with the “Setup is complete” window, as shown in Figure 2-19 on page 31.



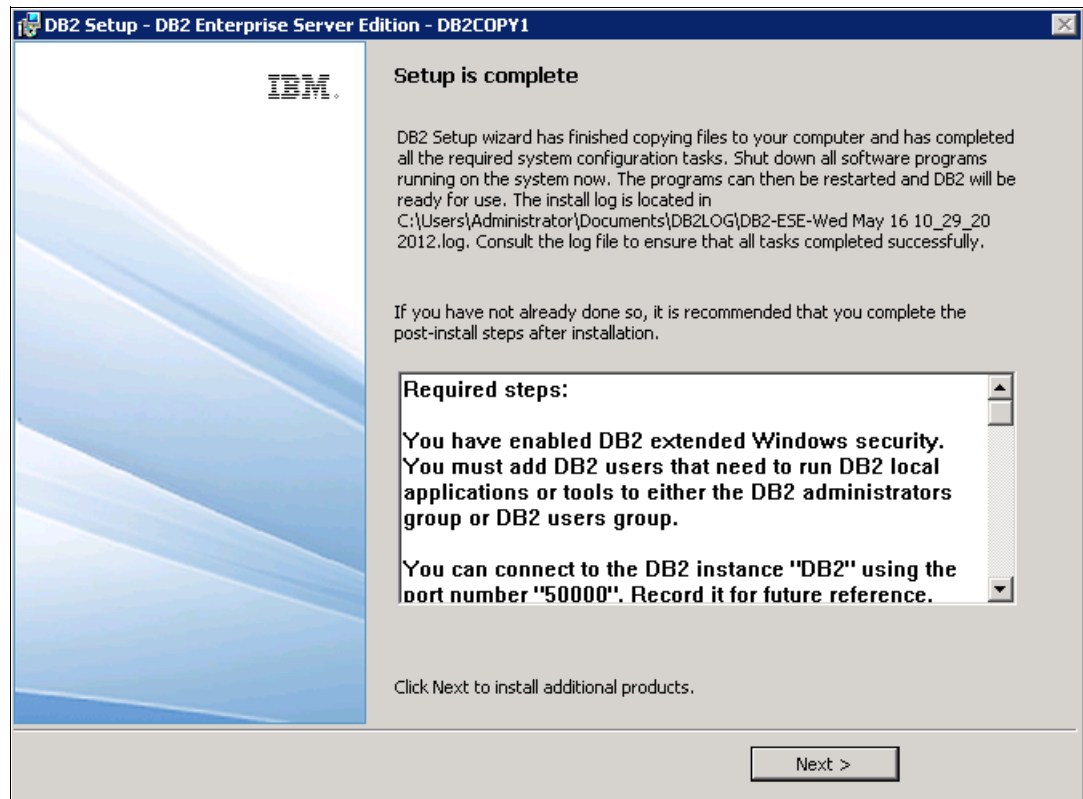


Figure 2-19 Setup complete

From this window, click **Next** to continue onto the “Install additional products” window as shown in Figure 2-21 on page 33.

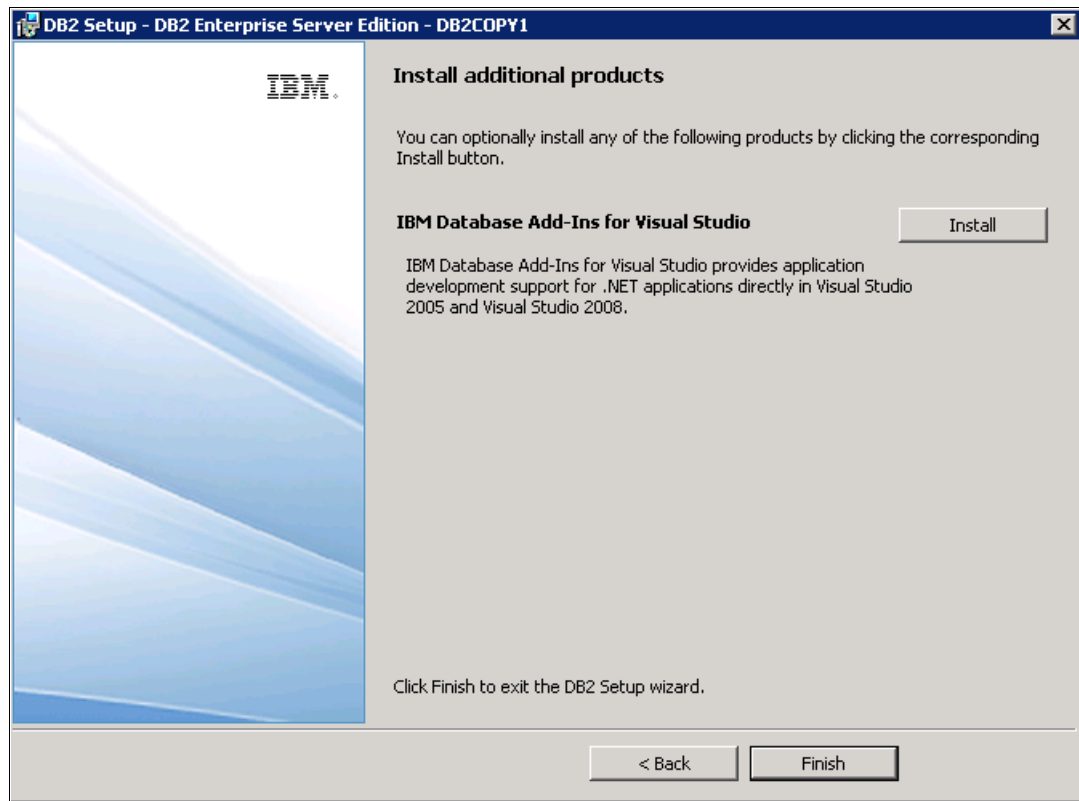


Figure 2-20 Install additional products

In the “Install additional products” page, do *not* install additional products. Click **Finish**.

You will then see the First Steps window, as shown in Figure 2-21.

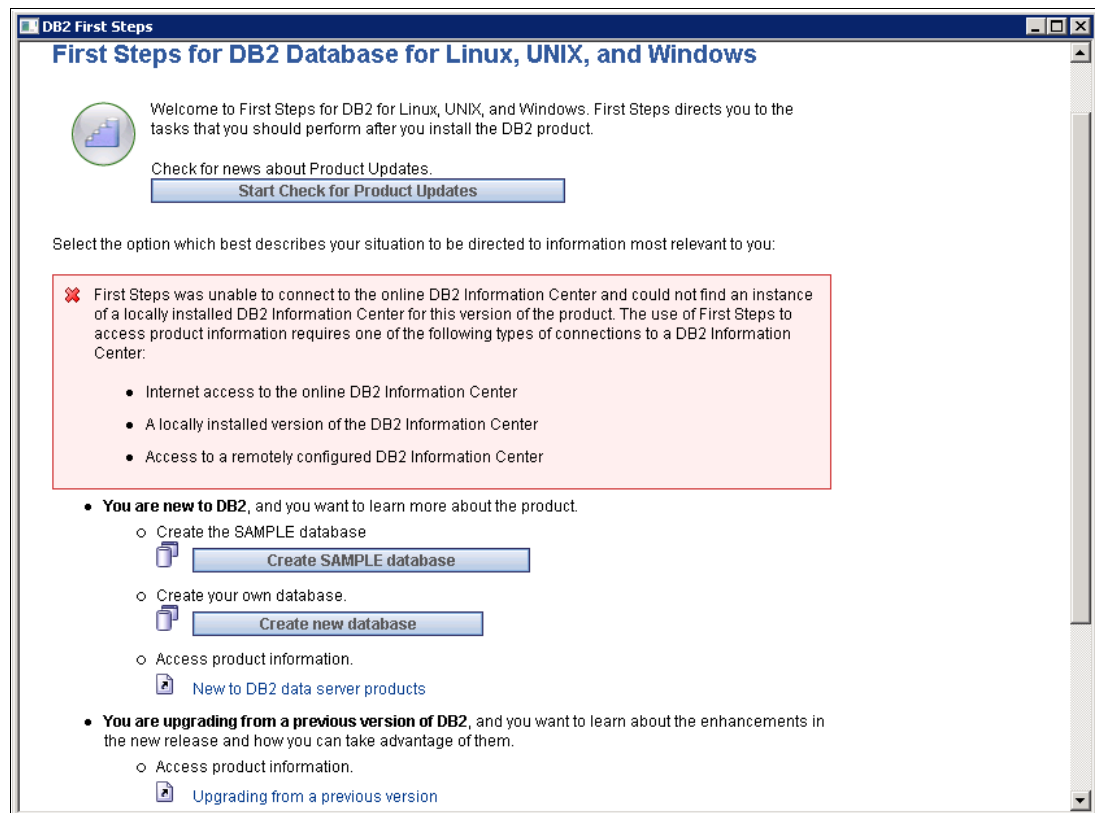


Figure 2-21 DB2 First Steps page

As you can see from the above figure, we did not have Internet access from our server, and as such, we got the warning box.

Assuming that you have Internet access from your new DB2 installation, click **Start Check for Product Updates** to see if there are any updates, and if there are, install any necessary updates, and then **Exit**.

## Verifying that DB2 is installed correctly

At this point, it is worthwhile spending just a few minutes verifying that DB2 was installed properly. To do this, open a DB2 command-line window, by selecting **Start → All Programs → IBM DB2 → DB2COPY1 → Command Line Tools → Command Window**, as shown in Figure 2-22.

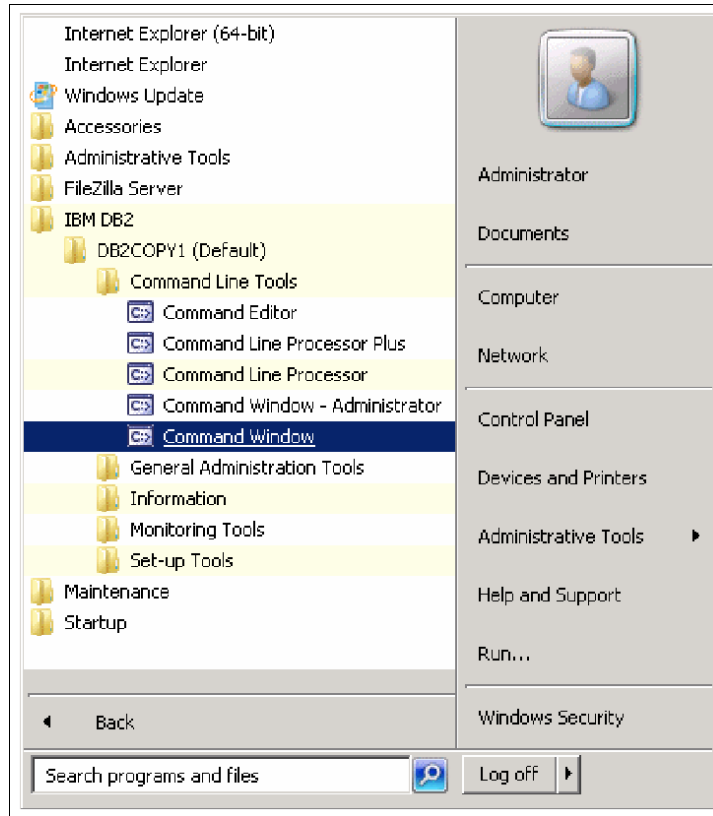


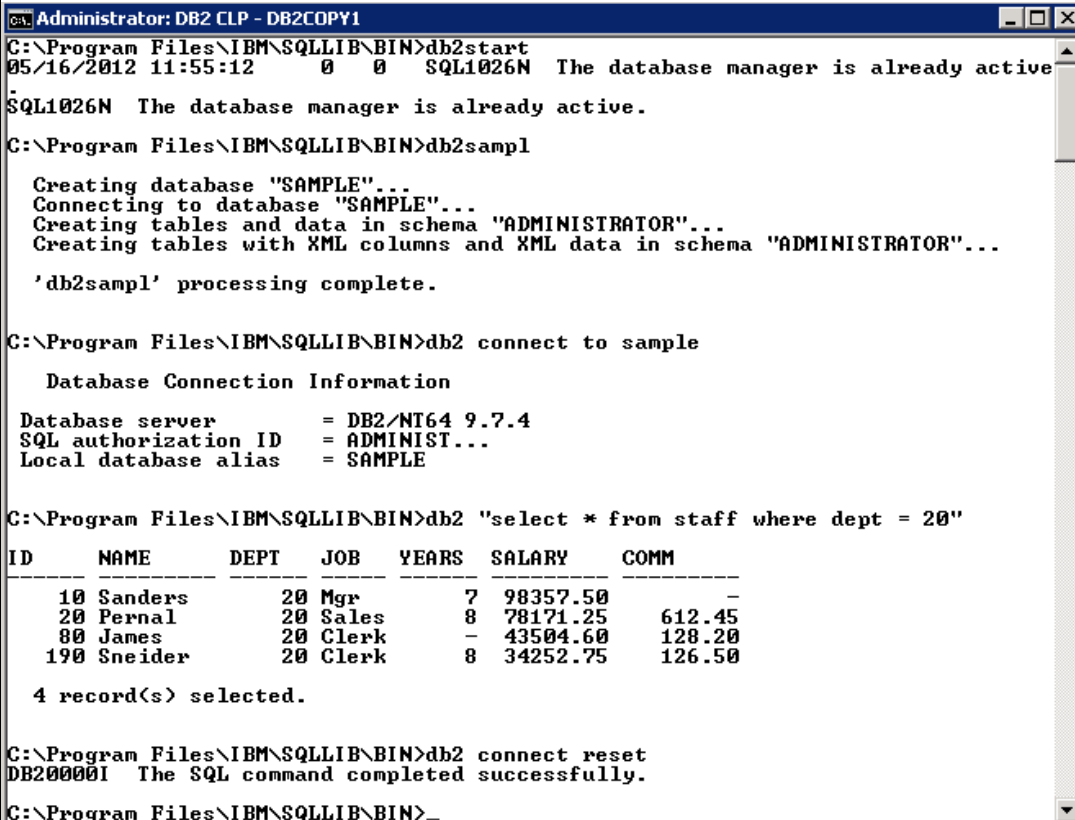
Figure 2-22 Starting DB2 command line

Within the DB2 window, issue the following commands:

1. **db2start** - to ensure the DB2 manager is started
2. **db2sampl** - to create the SAMPLE database, then
  - a. db2 connect to SAMPLE
  - b. db2 "select \* from staff where dept = 20"
  - c. db2 connect reset

After verifying the results and comparing the results to Figure 2-23, you can then remove the SAMPLE database to free up space.

Enter **db2 drop database sample** to drop the SAMPLE database.



```
C:\Program Files\IBM\SQLLIB\BIN>db2start
05/16/2012 11:55:12      0      0      SQL1026N  The database manager is already active.
SQL1026N  The database manager is already active.

C:\Program Files\IBM\SQLLIB\BIN>db2sampl

Creating database "SAMPLE"...
Connecting to database "SAMPLE"...
Creating tables and data in schema "ADMINISTRATOR"...
Creating tables with XML columns and XML data in schema "ADMINISTRATOR"...
'db2sampl' processing complete.

C:\Program Files\IBM\SQLLIB\BIN>db2 connect to sample

Database Connection Information

Database server          = DB2/NT64 9.7.4
SQL authorization ID    = ADMINIST...
Local database alias    = SAMPLE

C:\Program Files\IBM\SQLLIB\BIN>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.

C:\Program Files\IBM\SQLLIB\BIN>db2 connect reset
DB20000I  The SQL command completed successfully.

C:\Program Files\IBM\SQLLIB\BIN>
```

Figure 2-23 Verifying DB2

You have now finished the DB2 installation.

## 2.4 Installation configurations

When you install Tivoli Storage Productivity Center, you can have the following configurations.

### 2.4.1 Single server

All Tivoli Storage Productivity Center components are installed on one server. This is the installation configuration that we show in this chapter.

## 2.4.2 Multiple servers

In the multiple-servers environment, you can have these configurations:

- ▶ DB2 and the Tivoli Storage Productivity Center database repository on a remote server and the rest of the Tivoli Storage Productivity Center components on a local server.
- ▶ DB2 and the Tivoli Storage Productivity Center servers, stand-alone GUI, command-line interface, and Storage Resource agent on one server, and Tivoli Integrated Portal, Tivoli Common Reporting, and web-based GUI on a remote server.

## 2.5 Installing Tivoli Storage Productivity Center in a single-server environment

In this section, we describe the installation steps required to install the Tivoli Storage Productivity Center V5.1 software in a Windows environment. We will be using the installation wizard.

If you want to install Tivoli Storage Productivity Center in a multi-server environment, or on AIX or Linux, see the *IBM Tivoli Storage Productivity Center Version, Installation and Configuration Guide, SC27-4047*.

Tivoli Storage Productivity Center provides an installation program that guides you through the installation process. You can use the installation wizard or the command line in silent mode.

### 2.5.1 Overview

When you install Tivoli Storage Productivity Center, the following occurs:

- ▶ Tivoli Integrated Portal and Tivoli Common Reporting are automatically installed.
- ▶ You can specify a location to install a new instance of Tivoli Integrated Portal.

When you install Tivoli Storage Productivity Center and Tivoli Integrated Portal, you can use the operating system or a Lightweight Directory Access Protocol (LDAP)-compliant directory as the centralized authentication repository. If you select the local OS option, you cannot use any product based on Tivoli Integrated Portal in this instance of Tivoli Integrated Portal.

### Fully qualified domain names

Some systems might be configured to return a short host name such as WIN-EAVR80IBQNL, instead of a fully qualified domain name such as WIN-EAVR80IBQNL.landisk.itso.ibm.com. Tivoli Storage Productivity Center V5.1 requires fully qualified domain names, so you will need to install the software on a computer that has a fully qualified domain name. If you do not have a full DNS environment, you can use the `etc/hosts` file to provide a mask of the FQDN.

### Tivoli Storage Productivity Center installation package

The Tivoli Storage Productivity Center installation image has the following parts:

Disk 1, Part 1	Base Tivoli Storage Productivity Center installation program.
Disk 1, Part 2	Base Tivoli Integrated Portal installation program.
Disk 1, Part 3	Tivoli Common Reporting and Embedded Security Services programs.

Disk 1, Part 4	Tivoli Integrated Portal Program Temporary Fix (PTF) installation program.
Disk 1, Part 5	IBM Tivoli Storage Productivity Center Monitoring Agent installation program for IBM Tivoli Monitoring. This is an optional program and is required only if you are using Tivoli Monitoring.

Each of these images must be concatenated into one installation directory, and that directory name cannot have any special blanks. The best way to perform this process is to create an installation directory; we used TPC51install, and then extracted or copied Part 1 into it, and then extracted or copied Part 2 into that same directory. We then did the same for Part 3 and Part 4. We did not have Tivoli Monitoring already installed, so we did not need part 5.

When you extract or copy Part 3 and Part 4 into your installation directory, you are presented with the message as shown in Figure 2-24. This appears because you are copying a folder (tip) that already exists from Part 1. Ensure that you merge the two folders and not overwrite it. This message should appear twice, once for Part 3 and once for Part 4.

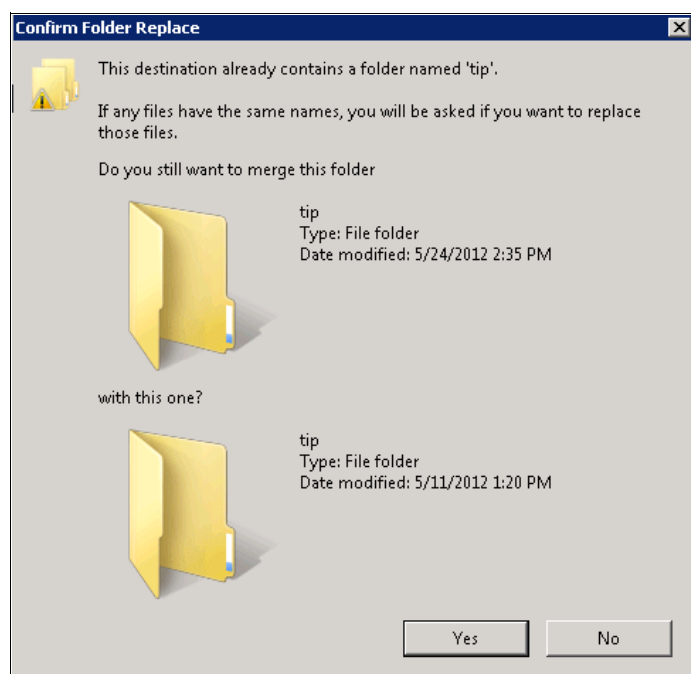


Figure 2-24 Merging common folders

When the copy is complete, you are ready to install Tivoli Storage Productivity Center.

## Starting the installation program on the Windows operating system

When you are ready, locate the Tivoli Storage Productivity Center installation directory that you created earlier, and double-click the **Setup.exe** file. The first screen you see is the screen shown in Figure 2-25 on page 38.

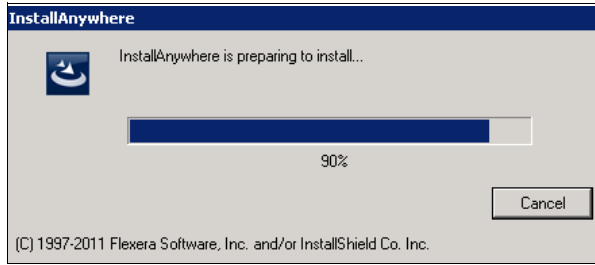


Figure 2-25 *InstallAnywhere screen*

This screen will disappear and be replaced with the window, as shown by Figure 2-26, which allows you to select the language you want to use for the installation.



Figure 2-26 *Language selection*

After selecting your language, click **OK**, and you will be presented with the window as shown in Figure 2-27 on page 39.



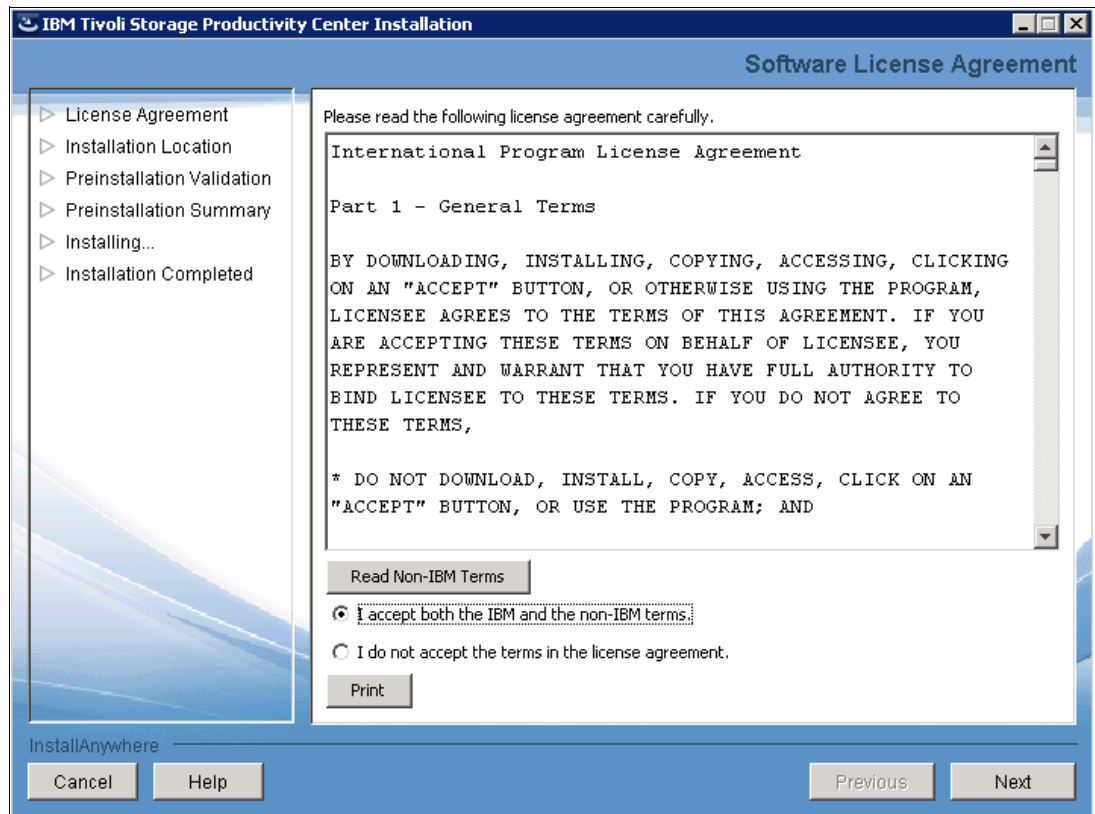


Figure 2-27 License agreement

After reading the license conditions, click **Next** to progress to the window as shown in Figure 2-28 on page 40.

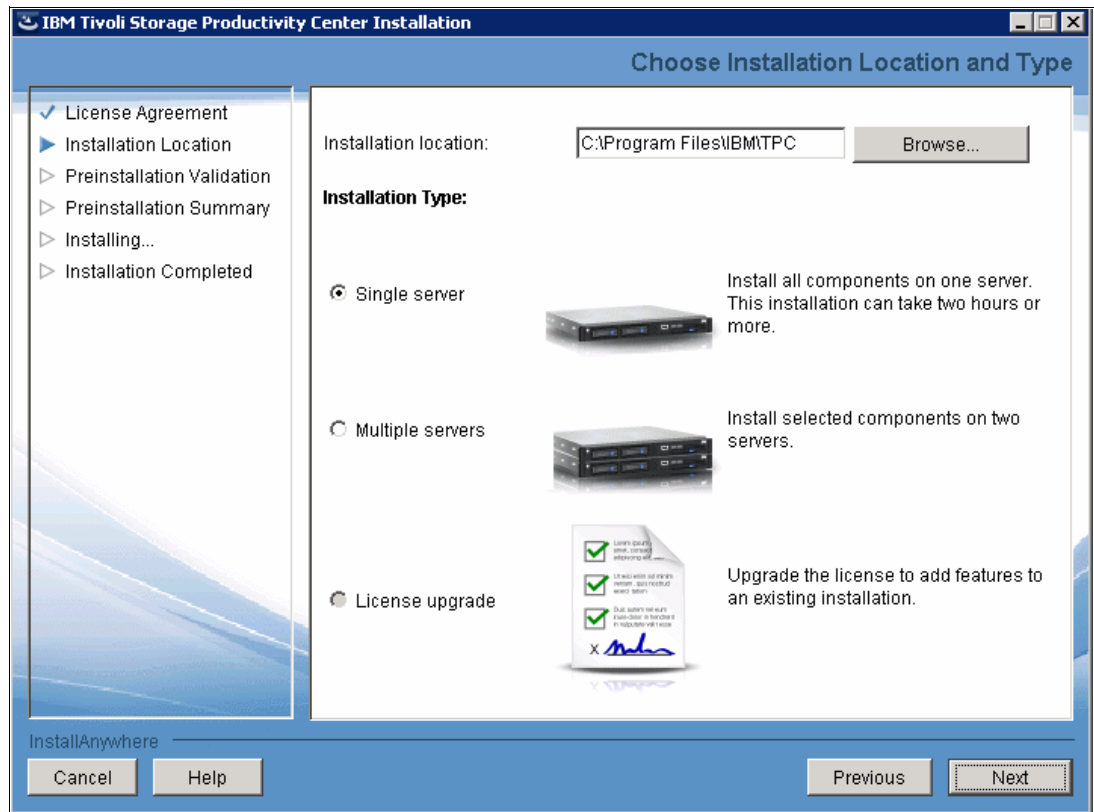


Figure 2-28 Installation location and type

After choosing your installation location, select the installation type that you want to use, and click **Next**.

We selected Single server, which puts all Tivoli Storage Productivity Center components on the same server. If you want to put specific components on a separate server, select the Multiple servers option and follow the prompts. The third option, License upgrade, allows you to upgrade an existing Tivoli Storage Productivity Center V5.1 server to a different license model. This option is not used to upgrade a Tivoli Storage Productivity Center V4 environment to a V5.1 environment. The migration from V4 to V5 is documented in 2.12, “Upgrading Tivoli Storage Productivity Center” on page 70.

After you click Next, you will be presented with the next window, as shown in Figure 2-29 on page 41.

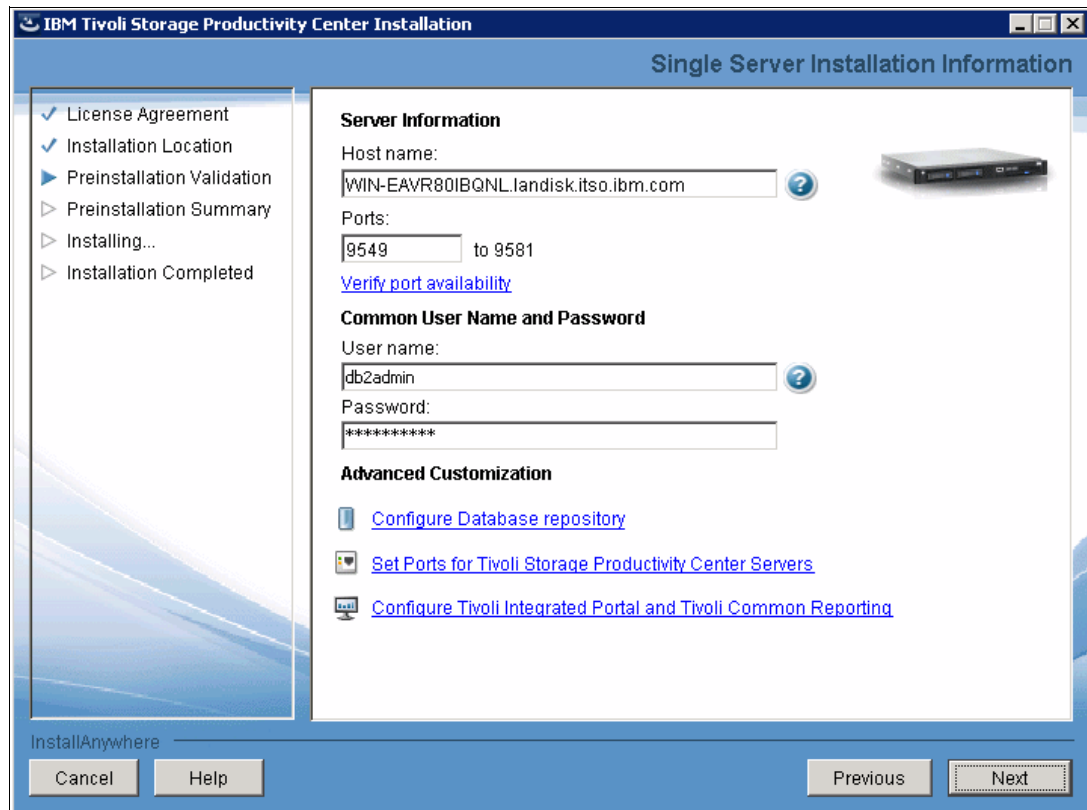


Figure 2-29 Single server installation

In this window, there are several options you will need to reply to:

- Host name** This is the name of the Tivoli Storage Productivity Center server, but it *must* be the FQDN. The short name or the server TCP/IP address are not valid and will not be accepted.
- Ports** These are the ports that Tivoli Storage Productivity Center will use for Data server, Device server Replication server, Storage Resource agent, Tivoli Integrated Portal, and Tivoli Common Reporter. By default, it will select 9549 - 9581. You can check to see if any of these ports are already in use on your server, by clicking the Verify Port Availability button. If any are in use, you can enter another range of ports.
- Common User Name** This is the user name and password that was created in the DB2 installation steps. This user ID has both DB2ADMINS and Windows Administrator authority.

When you complete these fields, click **Next** to continue.

### Advanced Customization

Under Advanced Customization, you will see three selectable options. In our installation, we took the defaults and did not use these, but we included the screen captures here so that you can see what options are provided. If you want to continue without customizing these options, click **Next**, and you are presented with the window that is shown in Figure 2-35 on page 46.

The first option is to “Configure the Database repository”, as shown in Figure 2-30.

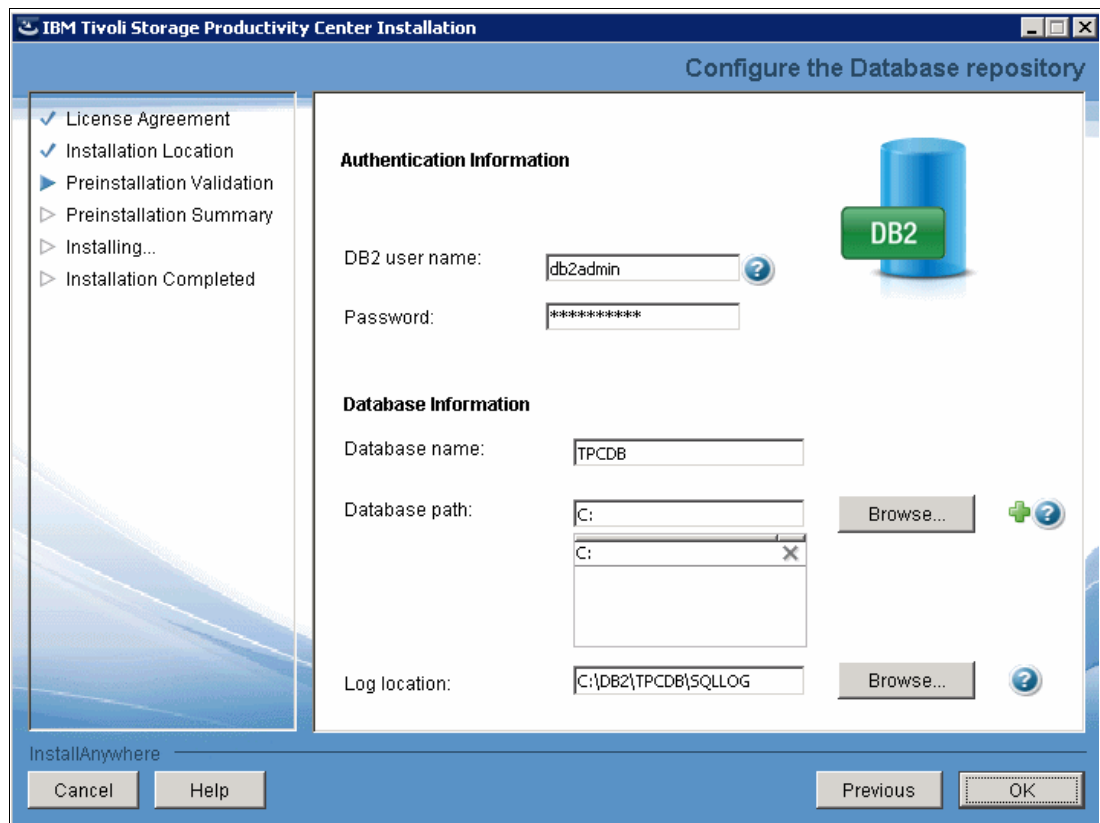


Figure 2-30 Configure the database repository

If you specify a DB2 user name that does not have the DB2SYSADM authority, you will see the error message shown in Figure 2-31.

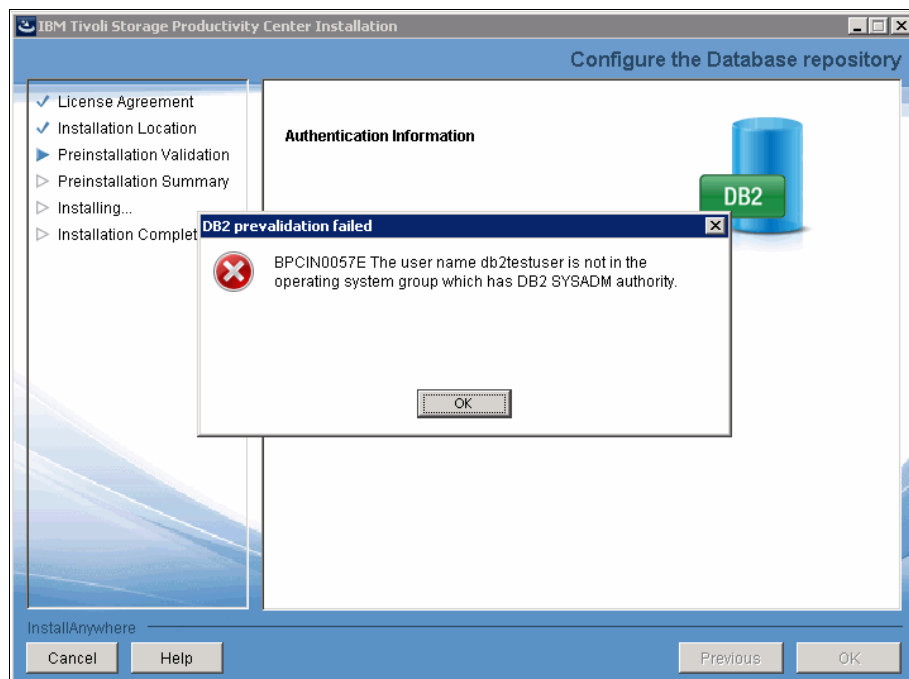


Figure 2-31 DB2 user name validation

The second option is to set the ports for Tivoli Storage Productivity Center, as shown in Figure 2-32.

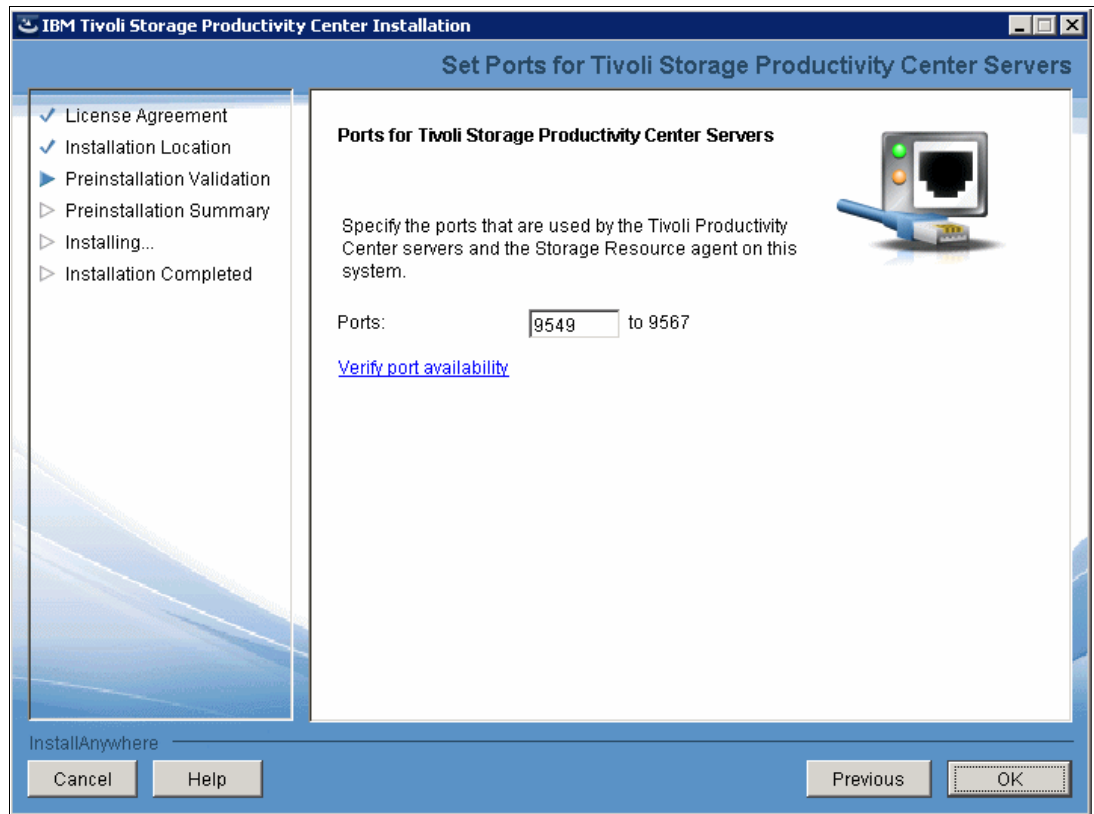


Figure 2-32 Set Tivoli Storage Productivity Center ports

Clicking **Verify port availability** checks the port range that you specified is available, as shown in Figure 2-33.

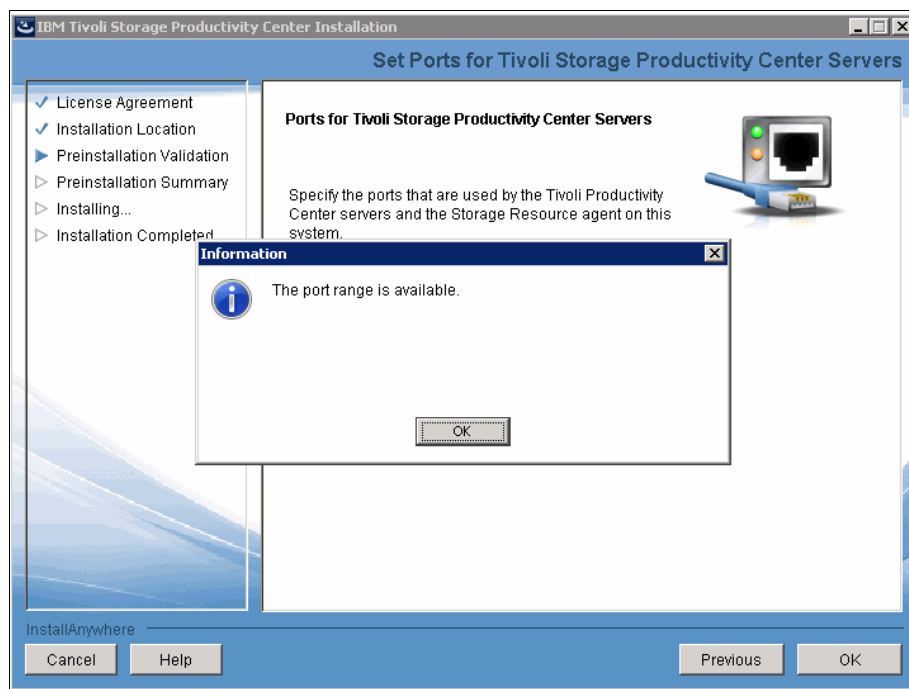


Figure 2-33 Verify port availability

The third option is to configure the Tivoli Integrated Portal and Tivoli Common Reporting, as shown in Figure 2-34.

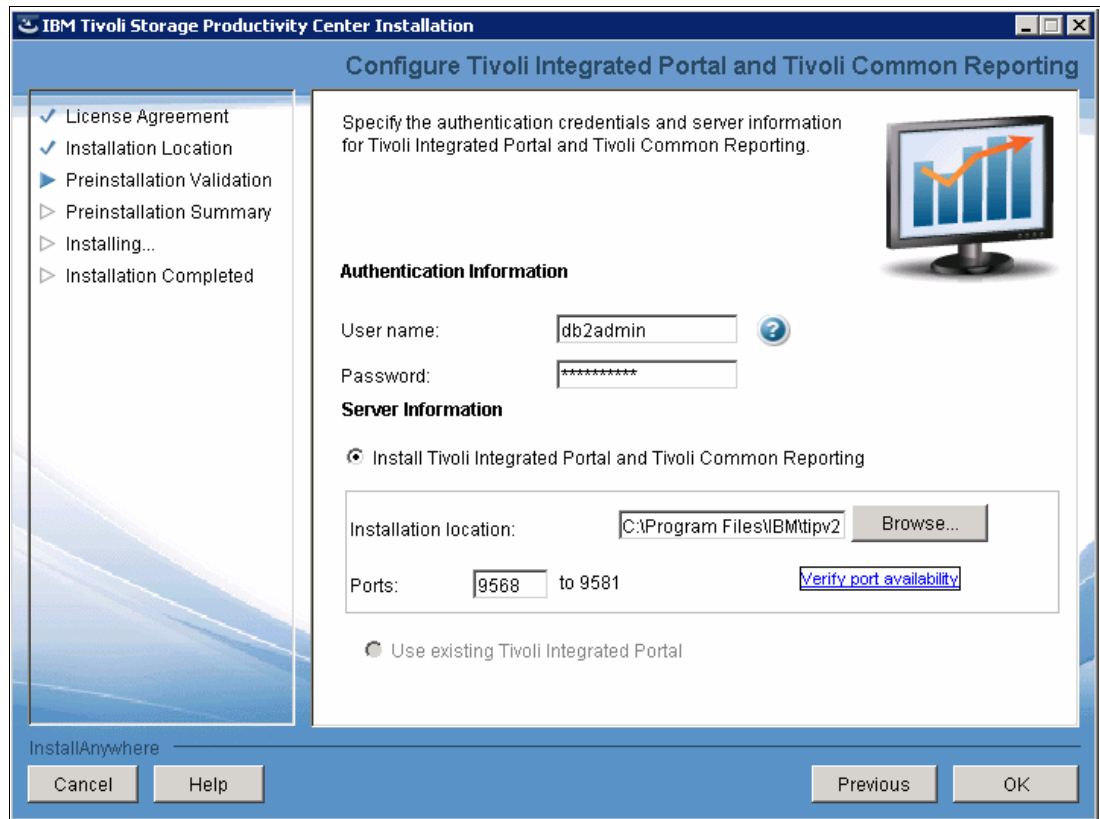


Figure 2-34 Configure Tivoli Integrated Portal and Tivoli Common Reporting

Figure 2-35 shows the next window in the installation process.

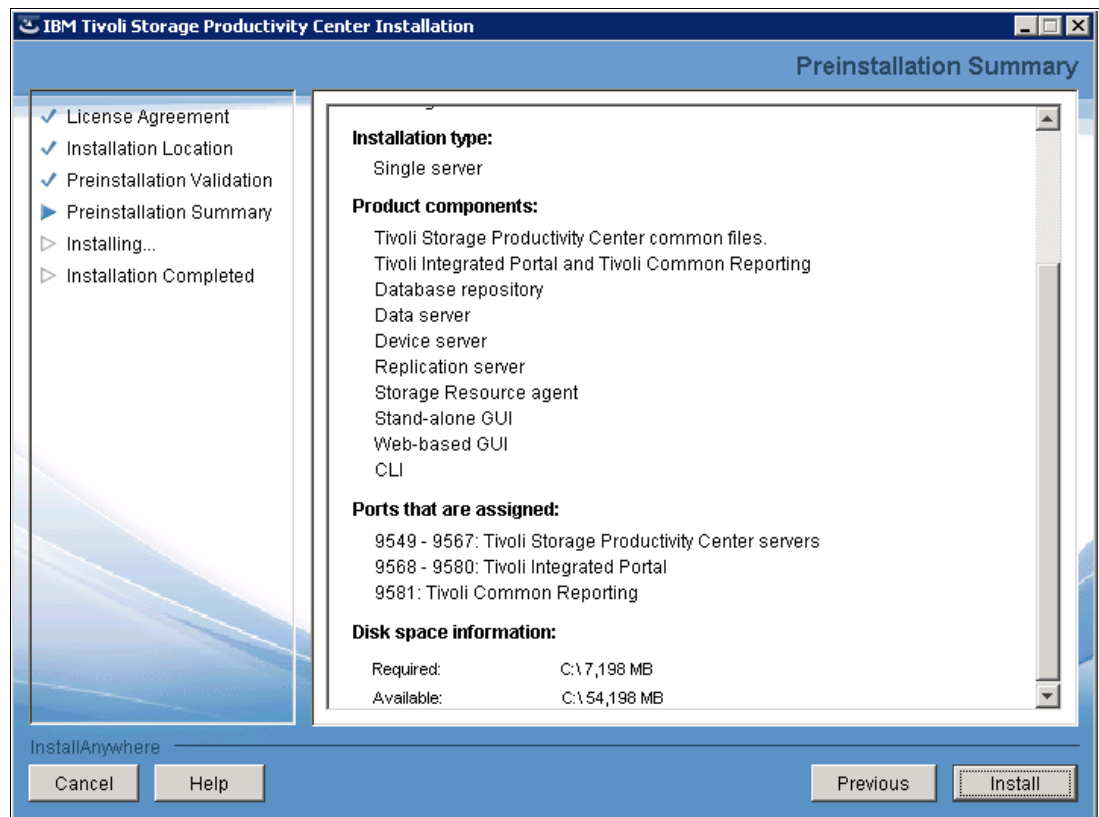


Figure 2-35 Preinstallation Summary window

This window shows you a summary of the installation parameters, components, and details. Scroll up to see the missing information and if you are happy with all the information. Click **Install** to continue.



You will then be presented with a window, as shown by Figure 2-36, which shows you the installation progress bar, as well as the different components as they are installed.

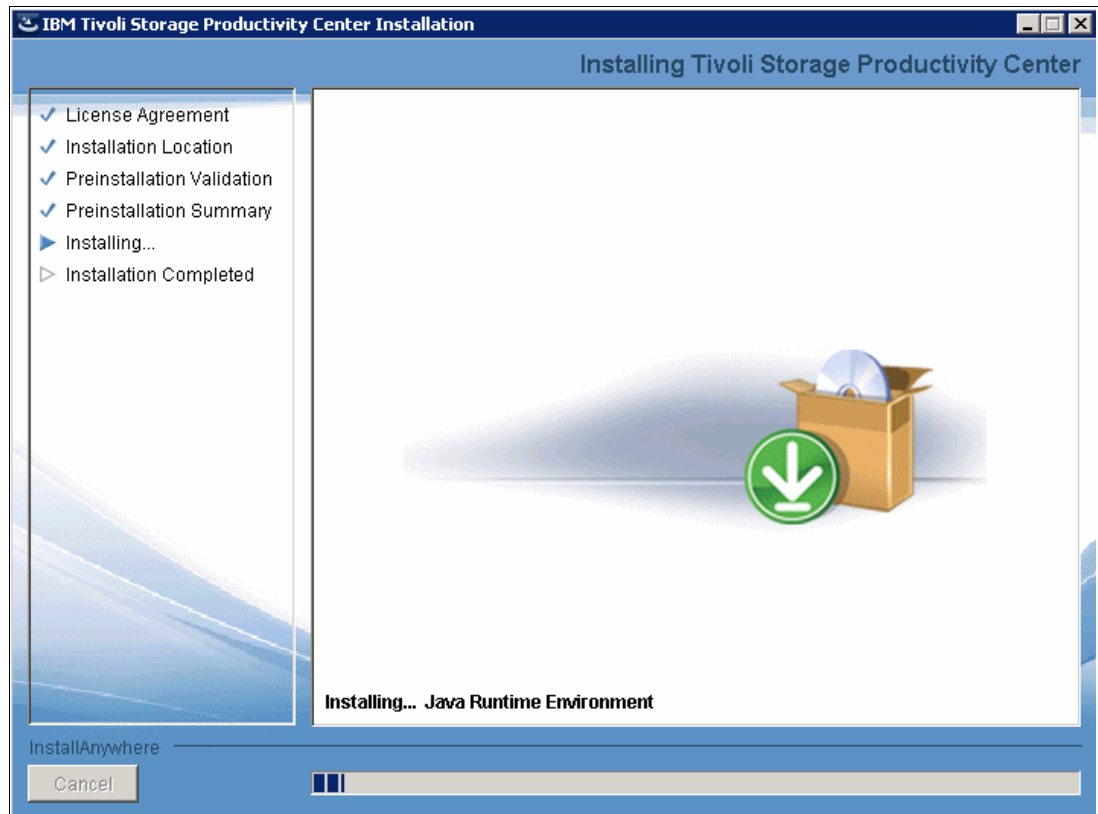


Figure 2-36 Installation progress

After all components are completed, you will be presented with the Installation Completed window, as shown in Figure 2-37.

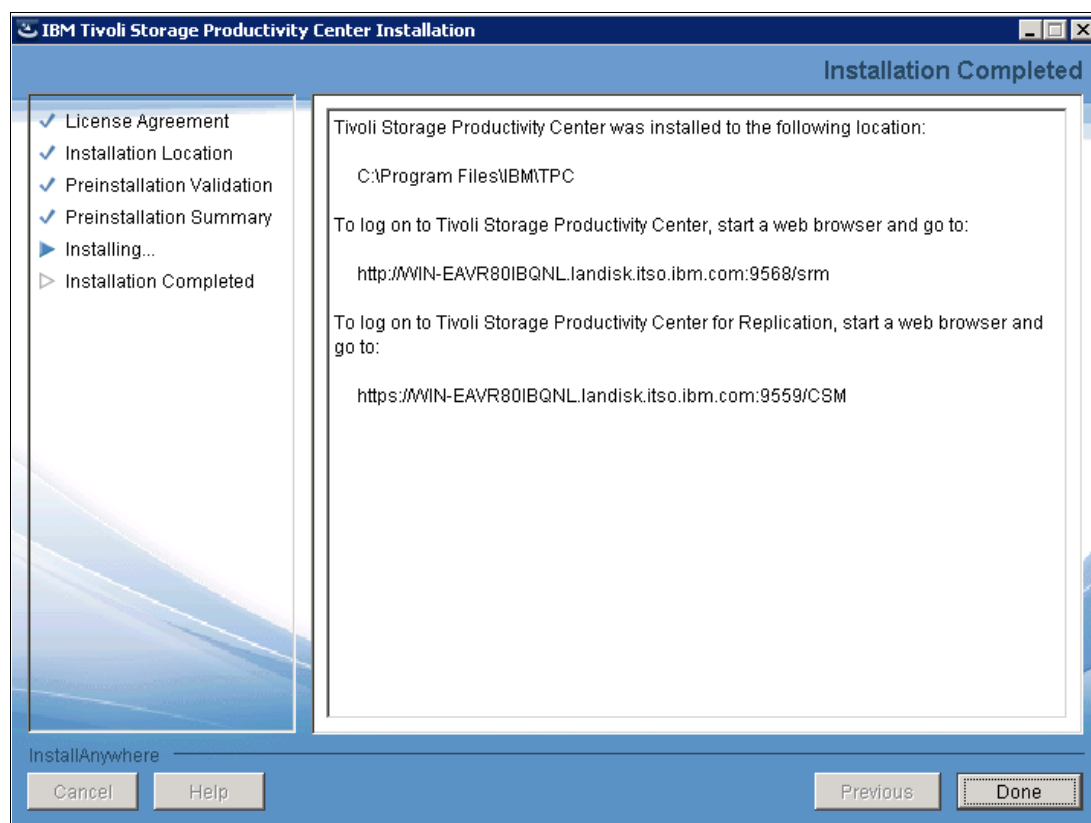


Figure 2-37 Installation completed

Congratulations, you have installed Tivoli Storage Productivity Center V5.1. Click **Done**, and you exit the Installer wizard.

## Verifying the installation

To ensure that everything is installed successfully, it is worthwhile spending a few minutes verifying the entire configuration.

Open a DB2 command-line window and issue the **db2 list db directory** command. This displays the result as shown in Figure 2-38.

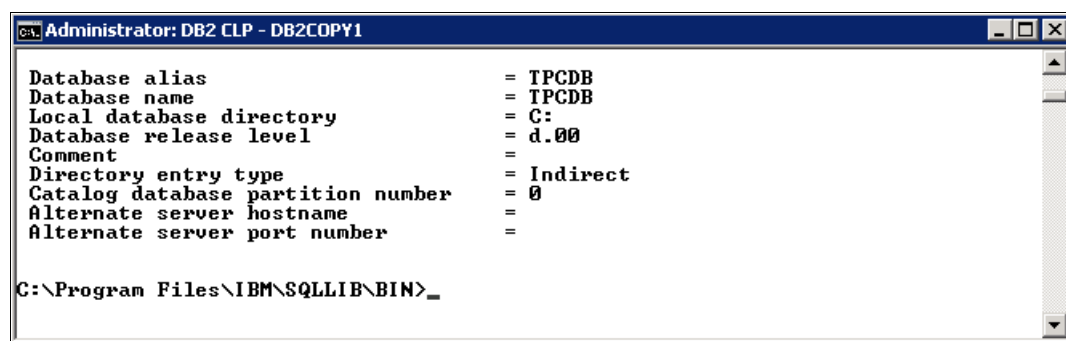


Figure 2-38 db2 list db directory

While you are still in the DB2 window, issue the following commands:

```
db2 connect to TPCDB
db2 list tables for schema TPCDB
db2 disconnect TPCDB
```

The result of the above list command should provide a long list of tables that are already in the Tivoli Storage Productivity Center database.

After you verify the database, open the Windows Services view and ensure the following services are started:

**Tivoli Integrated Portal -V2.2\_TIPProfile\_Port\_9568**  
**IBM Cognos Content Database**  
**IBM WebSphere Application Server V8.0 - TPCDeviceServer**  
**IBM Tivoli Storage Productivity Center - Data Server**  
**IBM WebSphere Application Server V8.0 - TPCReplicationServer**  
**IBM Tivoli Storage Resource Agent**

Figure 2-39 shows that the Tivoli Integrated Portal service is started.

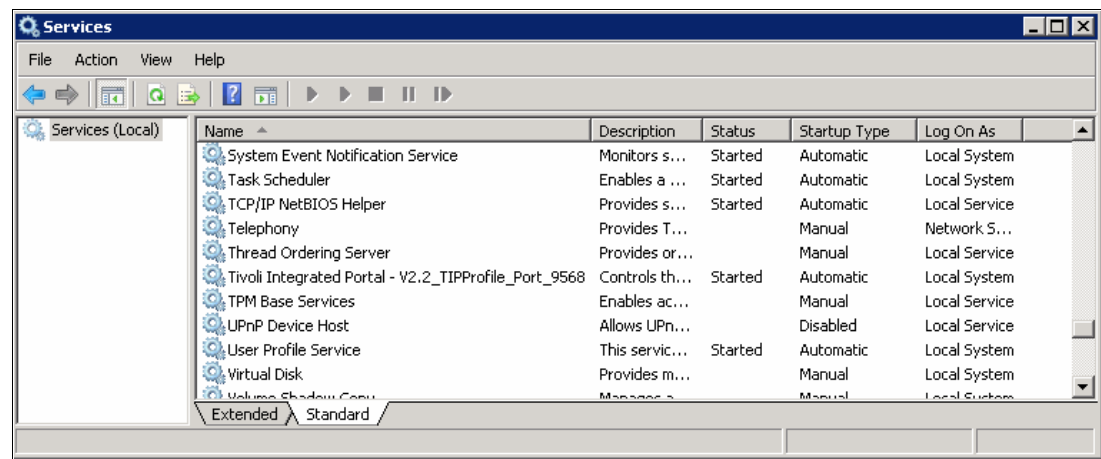


Figure 2-39 Tivoli Integrated Portal service

Figure 2-40 shows that the other five services are started.

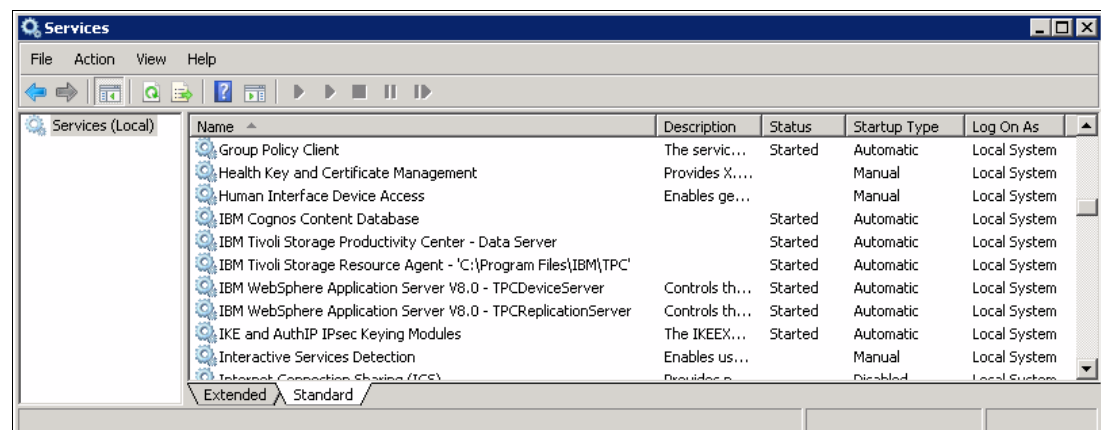


Figure 2-40 Tivoli Storage Productivity Center services

## 2.6 Connecting to Tivoli Storage Productivity Center by using the GUI

In this section, we describe how to connect to the Tivoli Storage Productivity Center GUI.

In the new Tivoli Storage Productivity Center V5.1, there are two GUIs that will need to be used for most of the Tivoli Storage Productivity Center requirements. The new *web-based GUI* and the *stand-alone GUI*. Of course, there is also a Tivoli Storage Productivity Center for Replication GUI, which has not changed in this new version.

There are several ways to open the new GUI:

- ▶ Use your browser to access the new web-based GUI.
- ▶ Use your browser to log on to the Tivoli Integrated Portal, and then choose which GUI you want to use
- ▶ Or, if you are using Remote Desktop Manager, or logged on directly to the Tivoli Storage Productivity Center server, you can use **Start → All Programs → IBM Tivoli Storage Productivity Center** and then choose the required GUI. Using this method is the quickest if you are on the Tivoli Storage Productivity Center server. Figure 2-41 shows the easy menu system from the server.

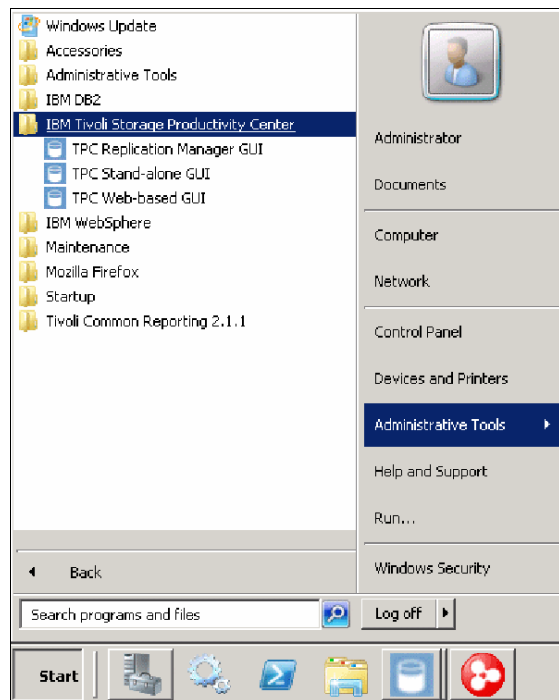


Figure 2-41 Accessing the GUIs

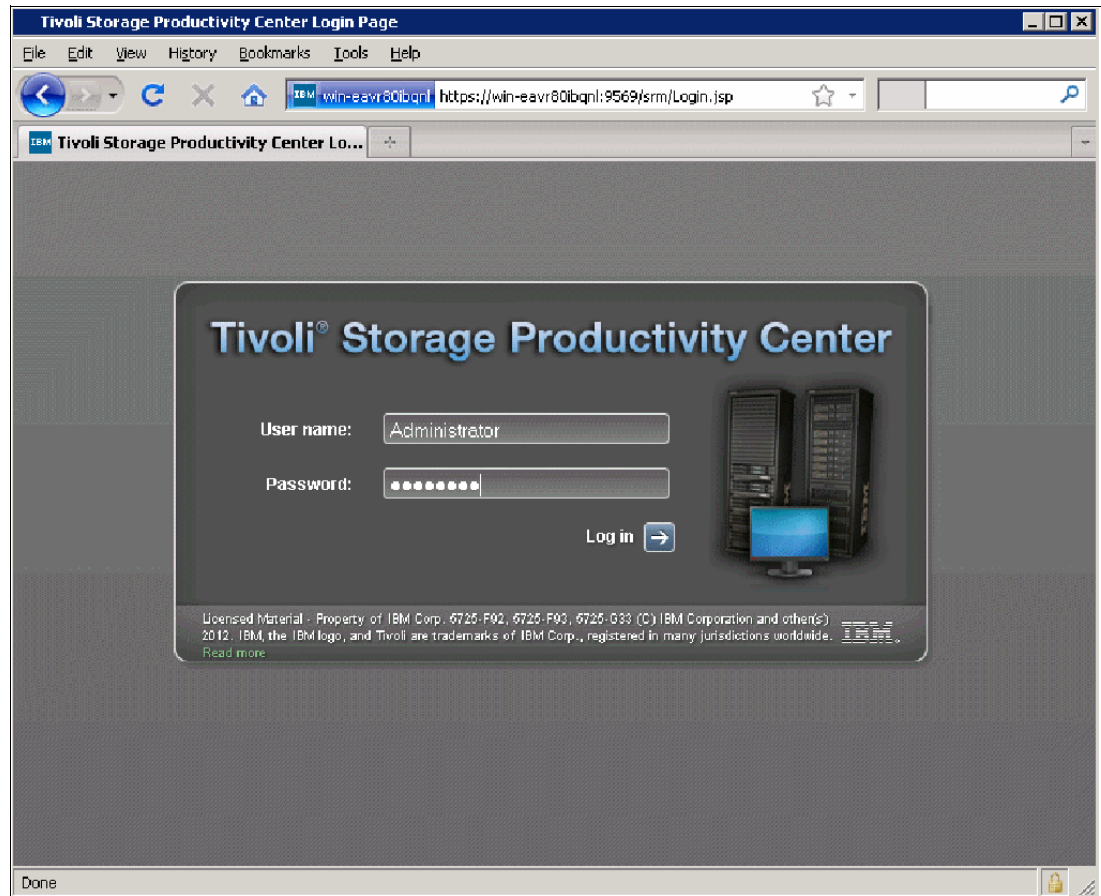
### 2.6.1 Web-based GUI

To connect to the new V5.1 web-based GUI, open your browser and use the following URL:

**<https://servername:9569/srm/Login.jsp>**

Because this is a normal web URL access process, you do not need to put in the FQDN, and you are permitted to use the Tivoli Storage Productivity Center server's TCP/IP address. You can see from Figure 2-42 that we used the following address to get to the Tivoli Storage Productivity Center GUI login panel:

`https://win-eavr80ibqn1:9569/srm/Login.jsp`



*Figure 2-42 Tivoli Storage Productivity Center new web-based GUI login*

After inserting our authorized user name and password, we got our first look at the new GUI. Figure 2-43 on page 52 shows you the Home/Dashboard window of the GUI.

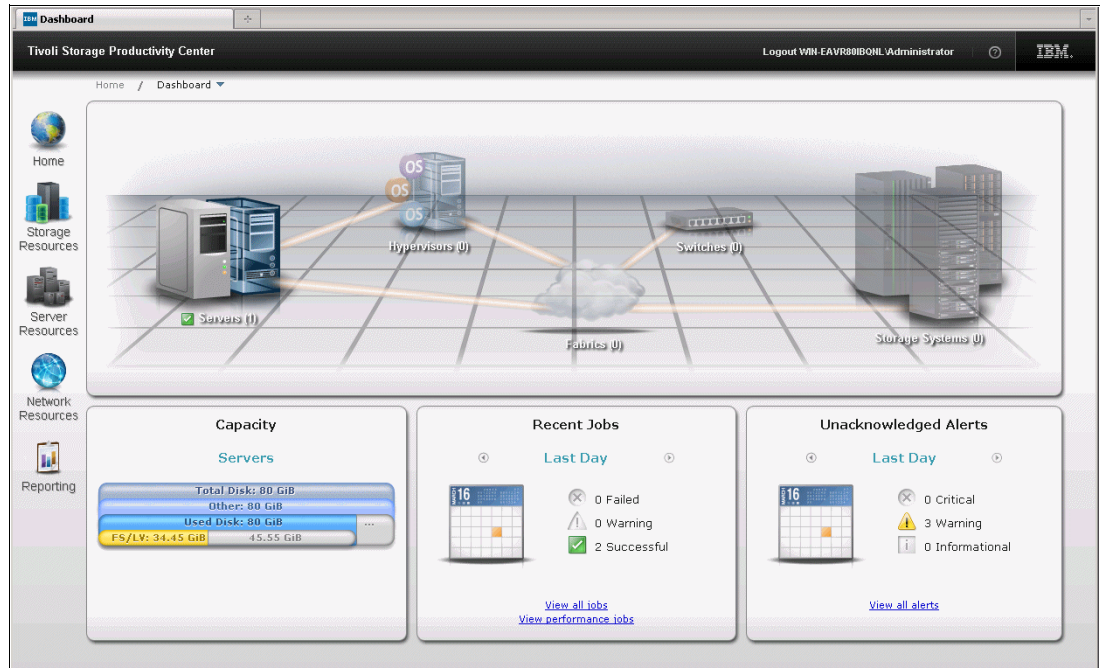


Figure 2-43 Tivoli Storage Productivity Center Home/Dashboard window

Because this is a brand new installation, there is obviously no collection data to be seen. Tivoli Storage Productivity Center automatically installs a Storage Resource Agent (SRA) on the Tivoli Storage Productivity Center server. You will need to set up a probe job and a scan job to enable you to start collecting data.

See Chapter 7, “Advanced administration” on page 459 for more information about configuring your Tivoli Storage Productivity Center server to deliver the reports and data that you require.

## 2.6.2 Stand-alone GUI

At the time of this writing, not all functionality had been ported across to the new web-based GUI, so there is still the need to use the old interface, now known as the *stand-alone GUI*. Because the stand-alone GUI has been “removed” from Tivoli Storage Productivity Center, it is now accessed through the Tivoli Integrated Portal. The Tivoli Integrated Portal is installed as part of the Tivoli Storage Productivity Center installation. To get to the Tivoli Integrated Portal logon window, point your browser at:

**<https://servername:9569/ibm/console/Logon.jsp>**



As you can see from Figure 2-44, the Tivoli Integrated Portal logon window requires an authorized user ID and password.

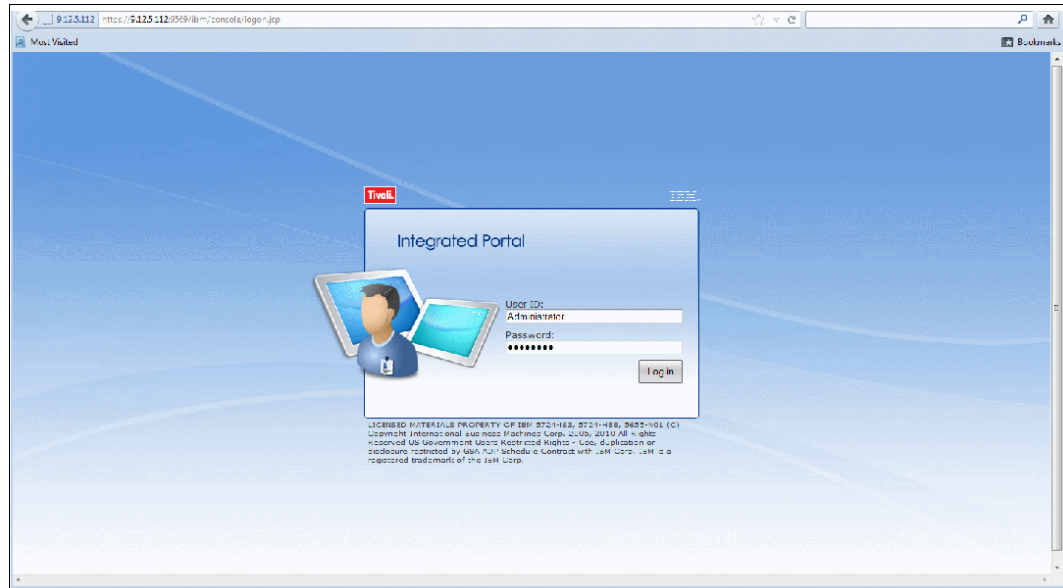


Figure 2-44 Tivoli Integrated Portal logon window

After entering an authorized user ID and password, press **Log in**, and the Tivoli Storage Productivity Center Tivoli Integrated Portal window is presented, as shown in Figure 2-45.

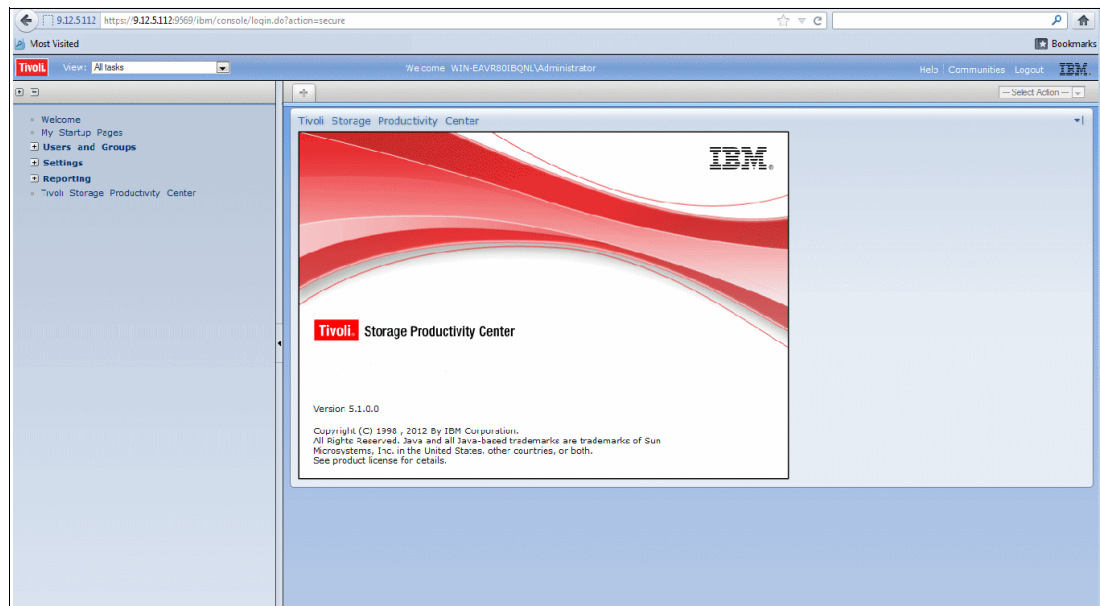


Figure 2-45 Tivoli Integrated Portal window

From this window, select Tivoli Storage Productivity Center at the bottom of the left menu pane, and Figure 2-46 on page 54 shows you the next options.

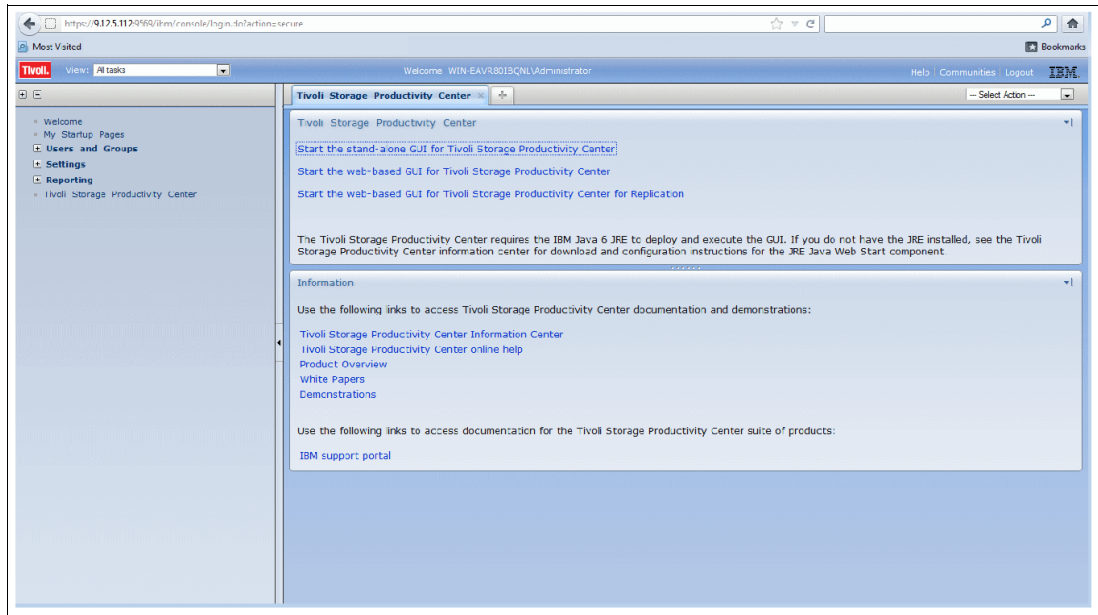


Figure 2-46 Tivoli Storage Productivity Center options window

From this window, you can select to launch three different interfaces:

- ▶ Start the stand-alone GUI for Tivoli Storage Productivity Center
- ▶ Start the web-based GUI for Tivoli Storage Productivity Center
- ▶ Start the web-based GUI for Tivoli Storage Productivity Center for Replication

As we are currently talking about the stand-alone GUI, select the first option: Start the web-based GUI for Tivoli Storage Productivity Center. You will be presented with the following Java window, as shown in Figure 2-48 on page 55.

If you do not get this screen, but instead get an error screen, check to see if you have IBM JRE 1.6 installed. If it is not installed, download and install it from the web, or from the Device Server within Tivoli Storage Productivity Center.

To install IBM Java JRE 1.6 from the Device Server, enter the following URL into your browser:

`http://hostname:9550/ITSRM/app/welcome.html`

Figure 2-47 on page 55 shows the outcome of that URL. Click the appropriate link to download the Java code.



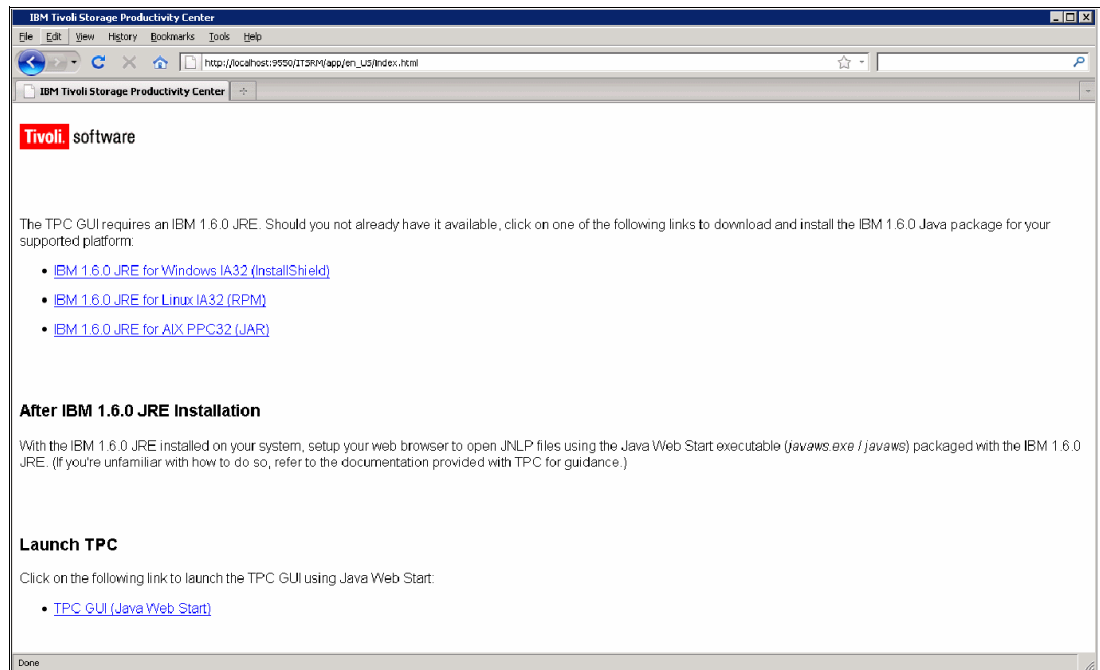


Figure 2-47 Java download from device server

After Java is installed, click the link to the stand-alone GUI, and you will see the window that is shown in Figure 2-48.

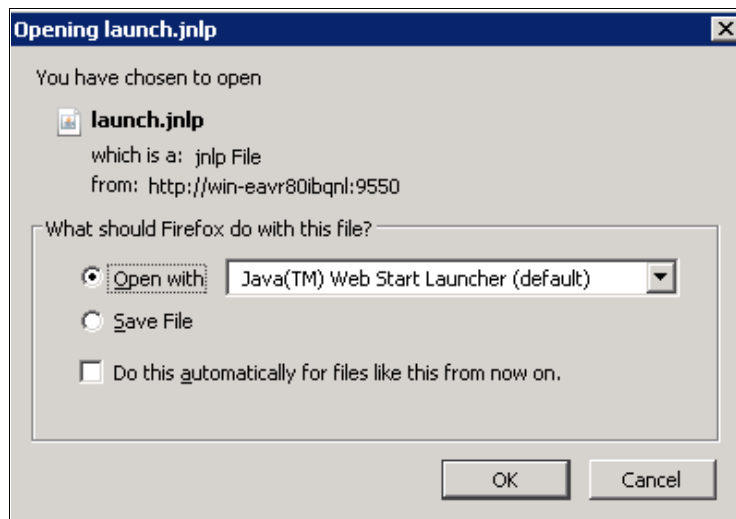


Figure 2-48 JRE launch screen

After a short while, the stand-alone GUI will appear as shown in Figure 2-49. If you used Tivoli Storage Productivity Center in the past, you will recognize this as the old Tivoli Storage Productivity Center server interface.

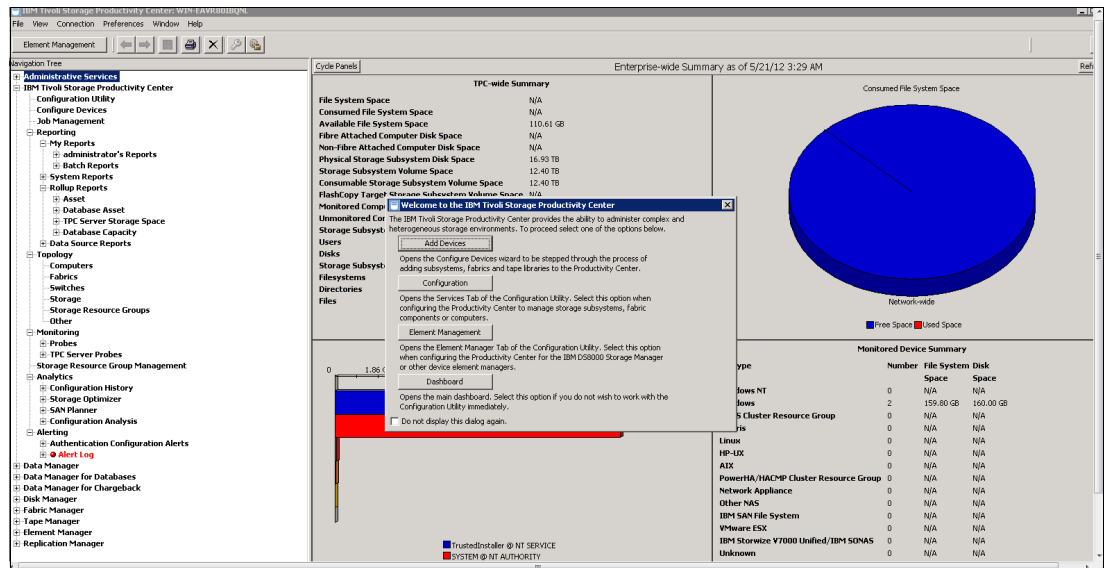


Figure 2-49 Stand-alone GUI Welcome panel

By closing down the Welcome screen, you have access to all the Tivoli Storage Productivity Center functions as shown in Figure 2-50.

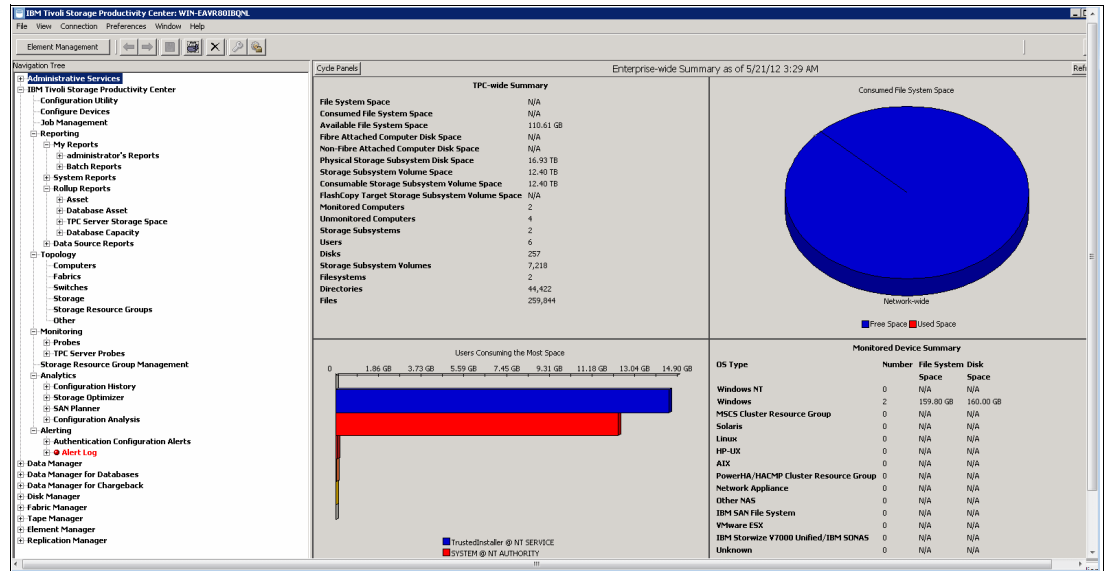


Figure 2-50 Stand-alone GUI

## 2.7 Uninstalling Tivoli Storage Productivity Center

Use the Windows program uninstall. This invokes the Tivoli Storage Productivity Center uninstaller with several warnings, as shown in Figure 2-51 on page 57.

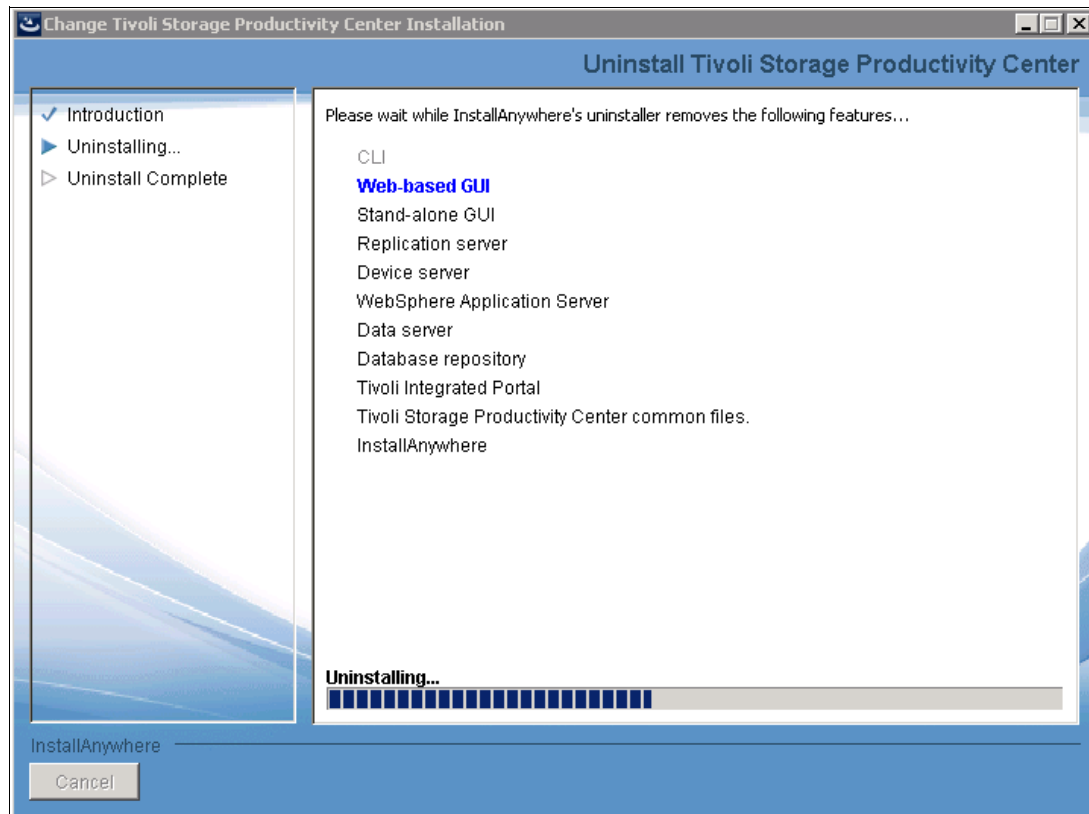


Figure 2-51 Uninstalling Tivoli Storage Productivity Center components

## 2.8 Preparing to migrate your Tivoli Storage Productivity Center environment

With the availability of Tivoli Storage Productivity Center V5.1, there are some specific requirements when you want to migrate from different versions of the Tivoli Storage Productivity Center version family. There are also different components with Tivoli Storage Productivity Center that require specific versions and prerequisites. The most obvious Tivoli Storage Productivity Center software prerequisite is DB2.

If you currently are running on Tivoli Storage Productivity Center V3, you must first upgrade to Tivoli Storage Productivity Center V4, and then you can upgrade to Tivoli Storage Productivity Center V5. Of course, this is only necessary if you want to maintain your current and historical data.

If you no longer need your historical data, it is easier to simply install a new instance of Tivoli Storage Productivity Center, with the supported DB2 version, on a new server. You can then push out SRAs to all the servers you want to monitor, and then set up data collections for your data subsystems and SAN fabrics.

## 2.9 Hardware requirements

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

For the latest information about the minimum hardware requirements needed for the Tivoli Storage Productivity Center servers and clients, refer to the following URL:

<https://www-304.ibm.com/support/docview.wss?uid=swg21386446>

## 2.10 Web browser support

IBM Tivoli Storage Productivity Center starts a web browser when you access web pages from items in the Help menu, start another application using its launch-in-context feature, or start IBM Tivoli Storage Productivity Center for Replication from its user interface.

**Note:** The Tivoli Storage Productivity Center software is bundled with its own IBM Java JRE. When you use the Java Web Start method of remotely accessing the stand-alone GUI, you must use the IBM Java.

Refer to Table 2-1 on page 14 for specific support versions.

## 2.11 Upgrading DB2

Tivoli Storage Productivity Center does not support DB2 that is installed in the LDAP environment. You *must* use a local operating system user name for DB2.

You *can* use the LDAP or domain user ID for the Tivoli Storage Productivity Center administrator.

Our environment was not using LDAP, and as such we used the same local OS user ID and password for both DB2 and Tivoli Storage Productivity Center.

Because we were running a previous version of DB2, which is not supported for our target Tivoli Storage Productivity Center V5.1 installation, the first step we had to do was update our current DB2 V9.7 FP0 to the supported Tivoli Storage Productivity Center V5.1 DB2 V9.7 FP4.

The steps documented here also work for previous versions of DB2 V9.

### 2.11.1 Preparing the DB2 upgrade

Log on with a user ID that has Administrator authority on Windows.

To find out what DB2 level you are currently using, issue **Start → All Programs → IBM DB2 → DB2COPY1 → Command Line Tools → Command Window**, as shown in Figure 2-52.

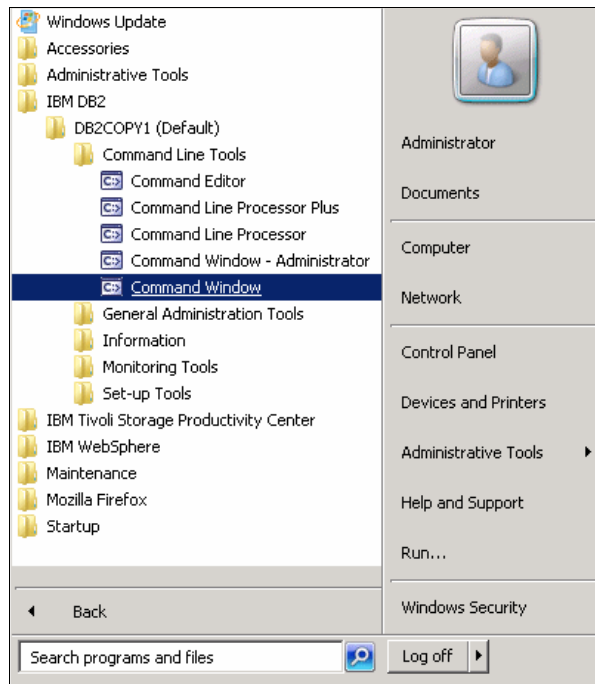


Figure 2-52 Starting DB2 command window

After the window opens, issue the **db2level** command to get the exact details of the installed DB2, as shown in Figure 2-53.

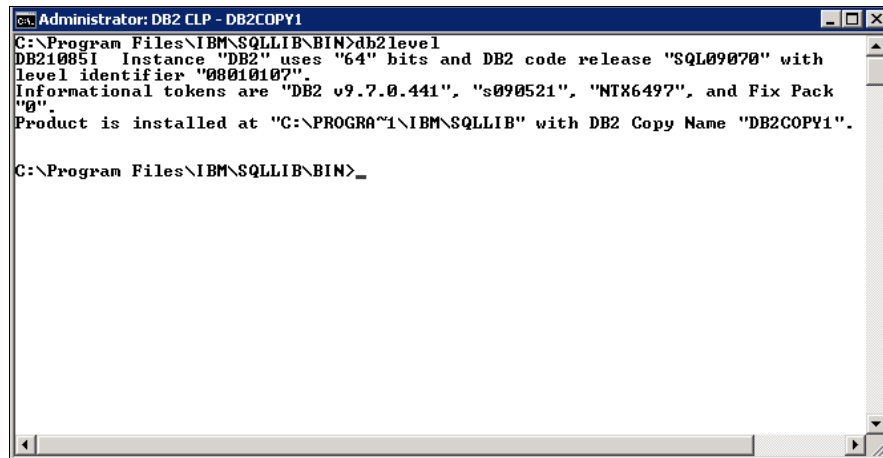


Figure 2-53 db2level command

As you can see, our current version of DB2 was 9.7.0.441 and Fix Pack 0. We are going to upgrade this version to DB2 V9.7 FP4.

As with any major upgrade, we recommend taking a backup of the TPCDB database. You can do this by issuing the following command:

**DB2 BACKUP DATABASE TPCDB USER user\_name USING password TO path\_to\_backup\_folder**

**Note:** The directory where the backup is to be written must already exist, unless you want to put it in the same directory from where you ran the backup command.

## 2.11.2 Installing the DB2 upgrade

Log on with a user ID that has Administrator authority on Windows.

To start the upgrade process, in your DB2 9.7 FP4 installation image, open the DB2\Server directory and click **Setup.exe**. This will start the installer process and you are presented with the window that is shown in Figure 2-54.

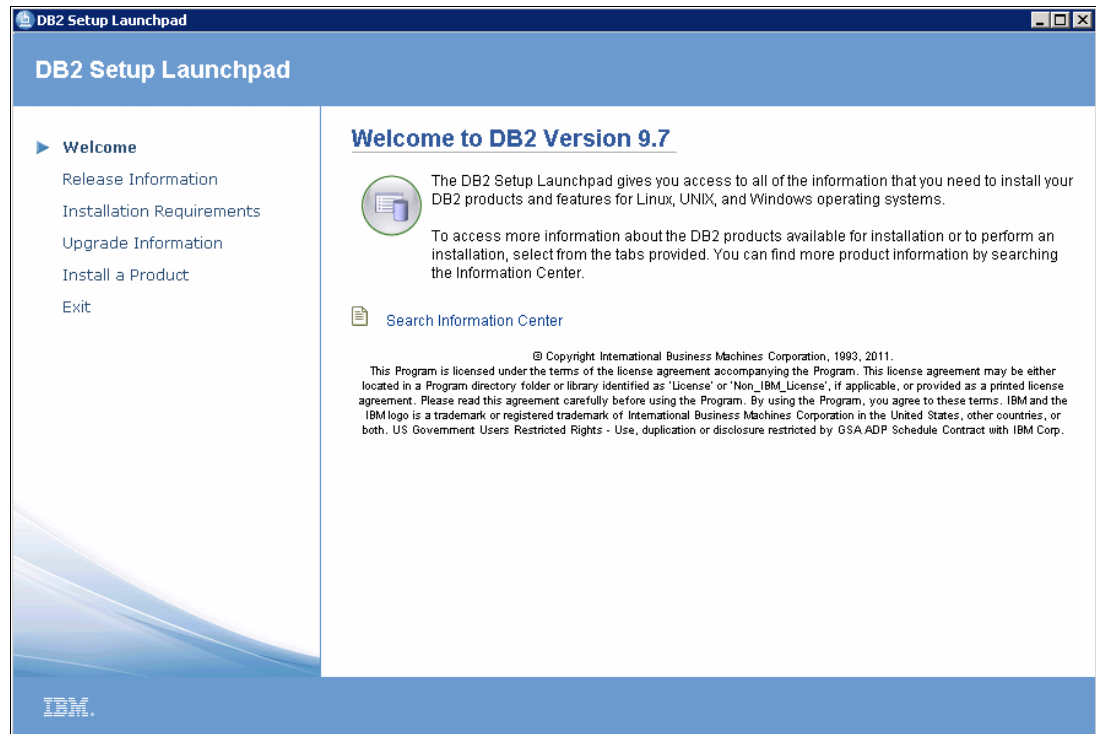


Figure 2-54 Welcome to DB2 9.7

On this window, move down your cursor and click “Install a Product”, and you are directed to the launchpad page as shown in Figure 2-55 on page 61.



Figure 2-55 Install a Product page

Because we are upgrading an existing instance of DB2, select the “Work with Existing” button under the DB2 Enterprise Server Edition Version 9.7 Fix Pack 4 heading. When you do this, the window that is shown in Figure 2-56 on page 62 is presented.

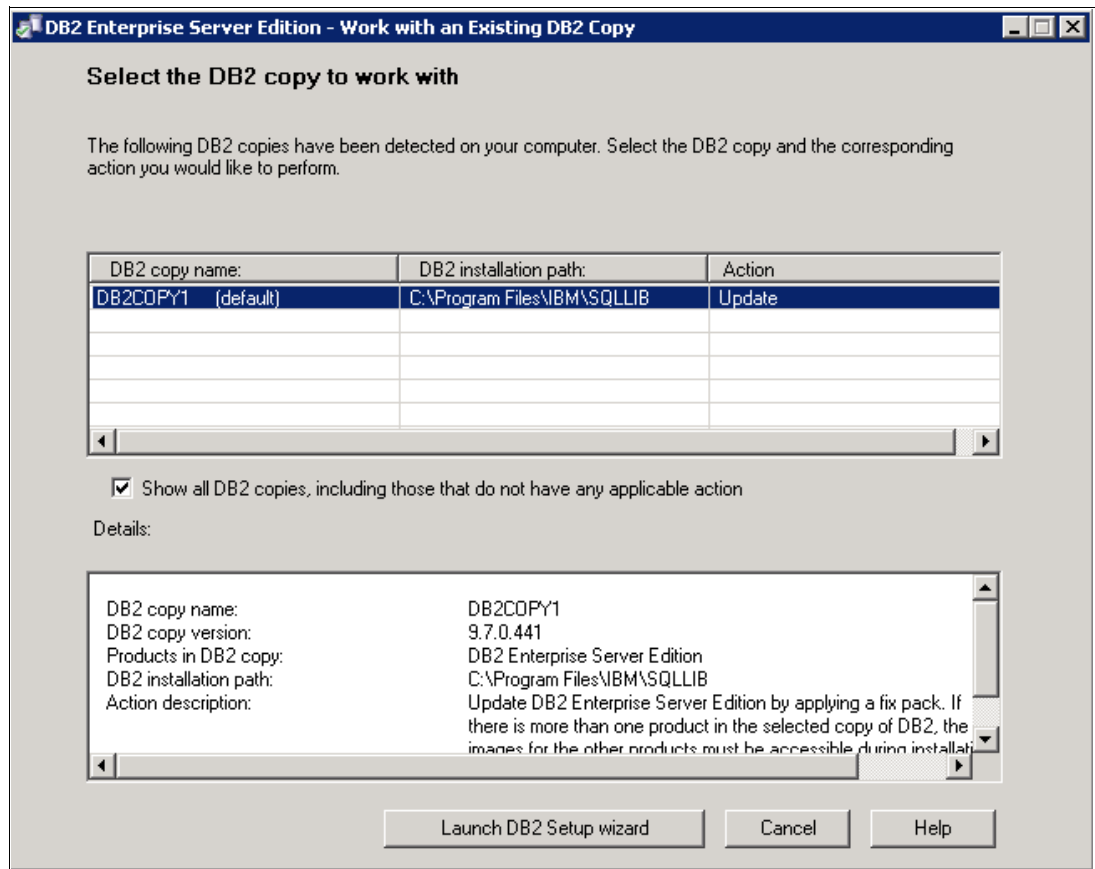


Figure 2-56 Select the DB2 copy

On this window, ensure the DB2COPY1, or whatever copy name you chose in the original installation, is highlighted, and click **Launch DB2 Setup wizard**. When you do this, you should be presented with Figure 2-57 on page 63.



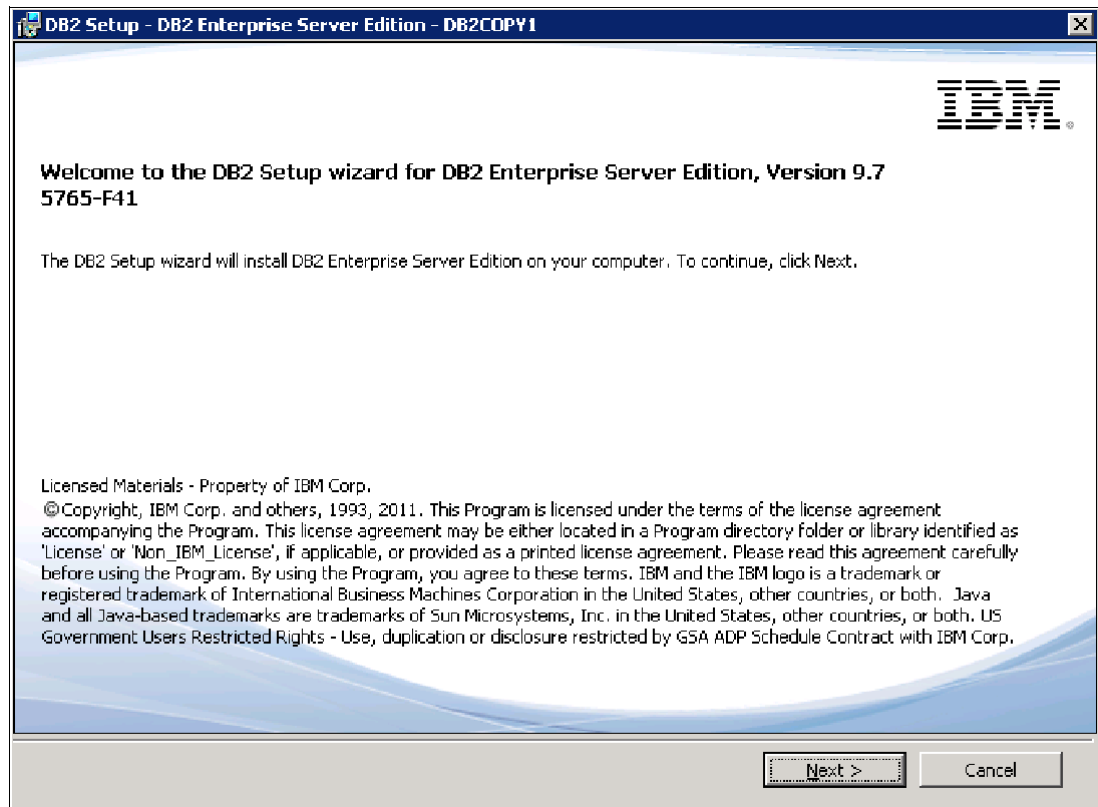


Figure 2-57 DB2 Setup wizard

In our installation, we got an error because we did not close down the Tivoli Storage Productivity Center window before the DB2 upgrade. The window that is received is shown in Figure 2-58 on page 64.

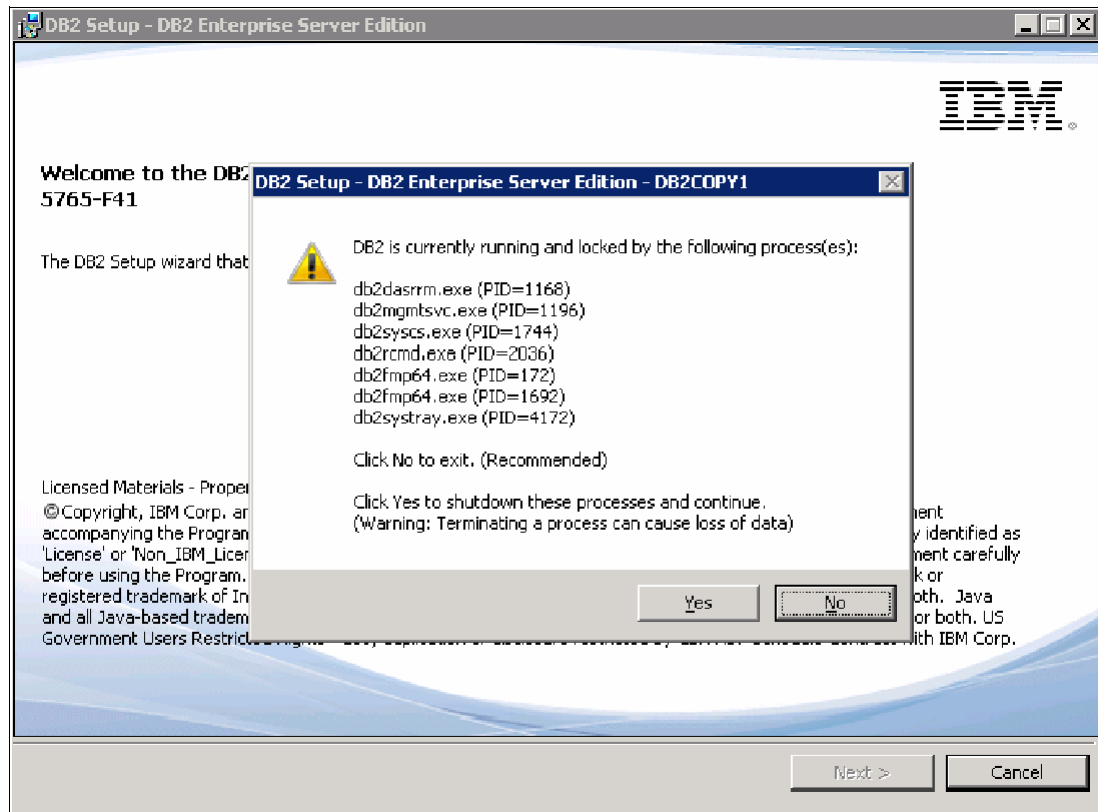


Figure 2-58 Error message

From this screen, we closed down Tivoli Storage Productivity Center, and then selected **Yes** on the panel to shut down the processes that were active, and then clicked **Next** on the underlying panel. Figure 2-59 on page 65 was then shown.

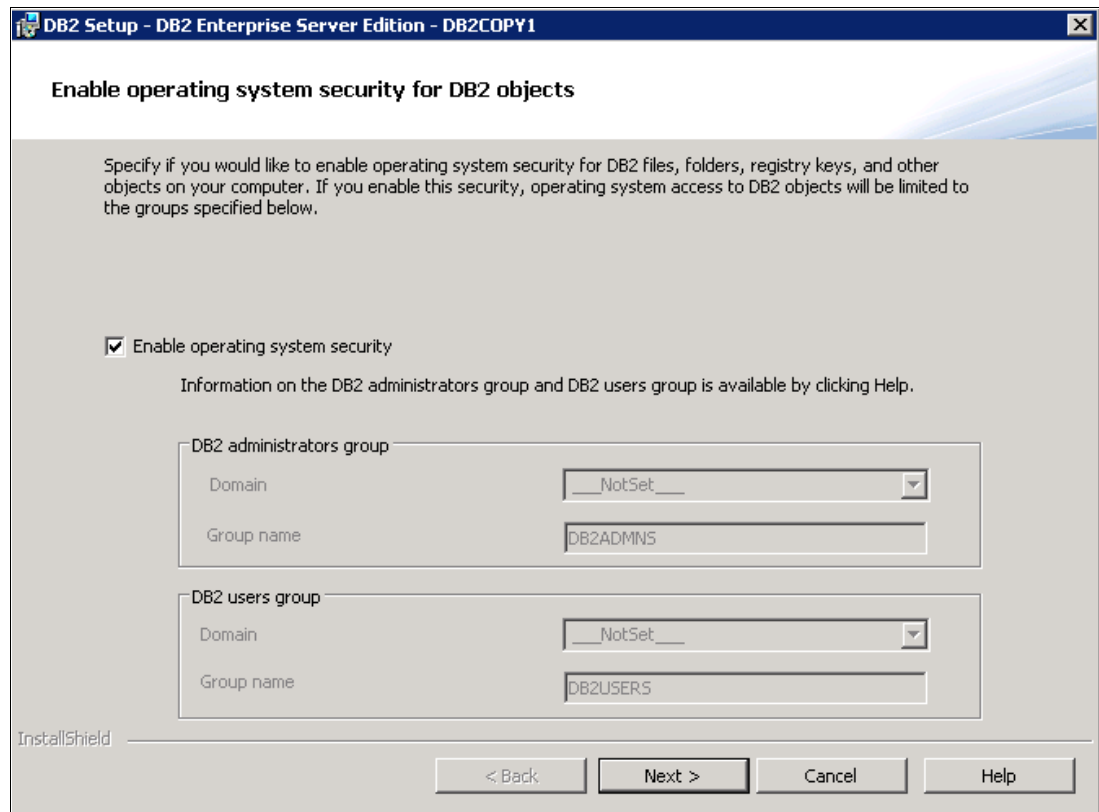


Figure 2-59 Enabling OS security

On this window, ensure that the **Enabling operating system security** check box is ticked, and click **Next** to continue. Figure 2-60 on page 66 then opens.

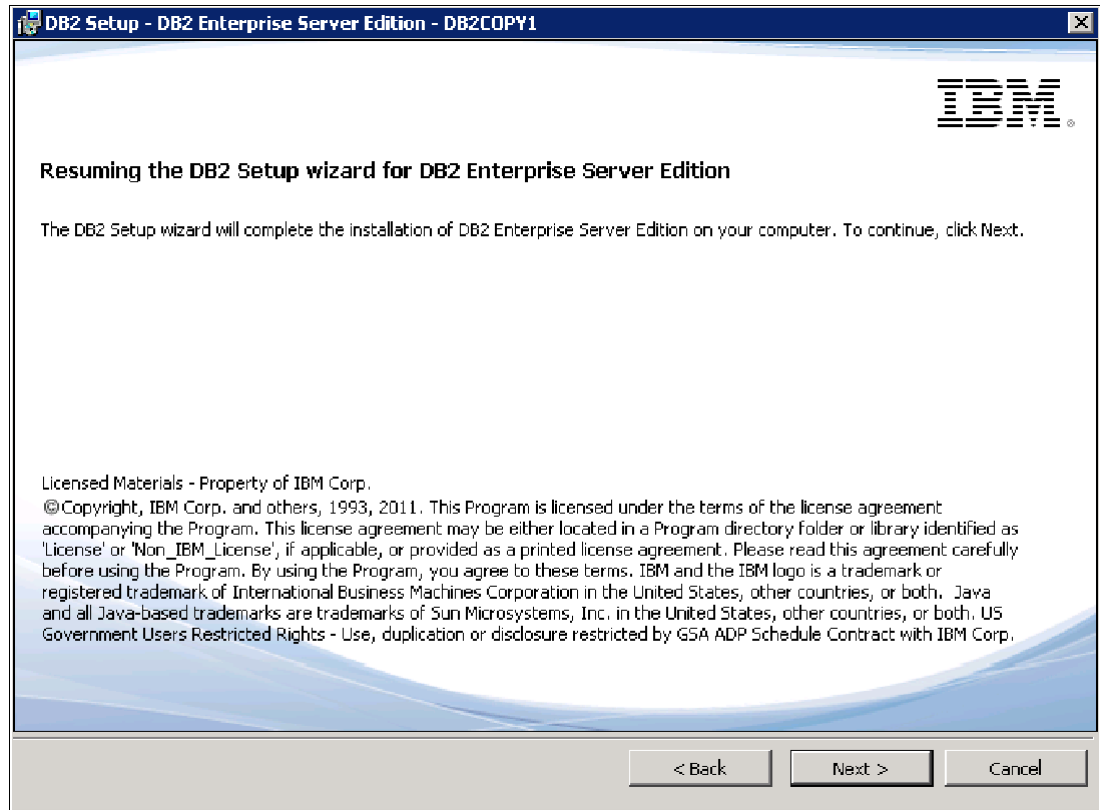


Figure 2-60 Resuming DB2 wizard

Because of our previous error, as you can see the DB2 Wizard resumed from where it was up to, and by clicking **Next** on this window, it then showed the progress bar for the rest of the installation. Figure 2-61 on page 67 shows the progress bar.

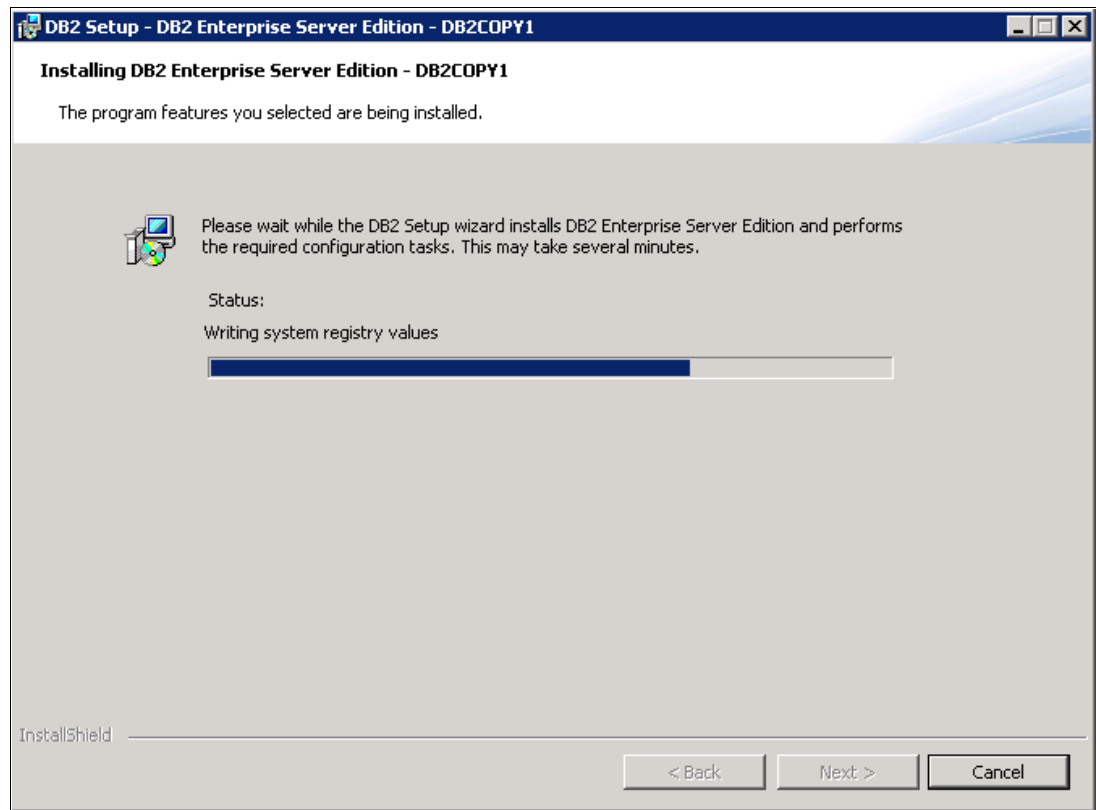


Figure 2-61 Installation progress bar

When the progress bar reaches the end, the panel in Figure 2-62 on page 68 is presented.

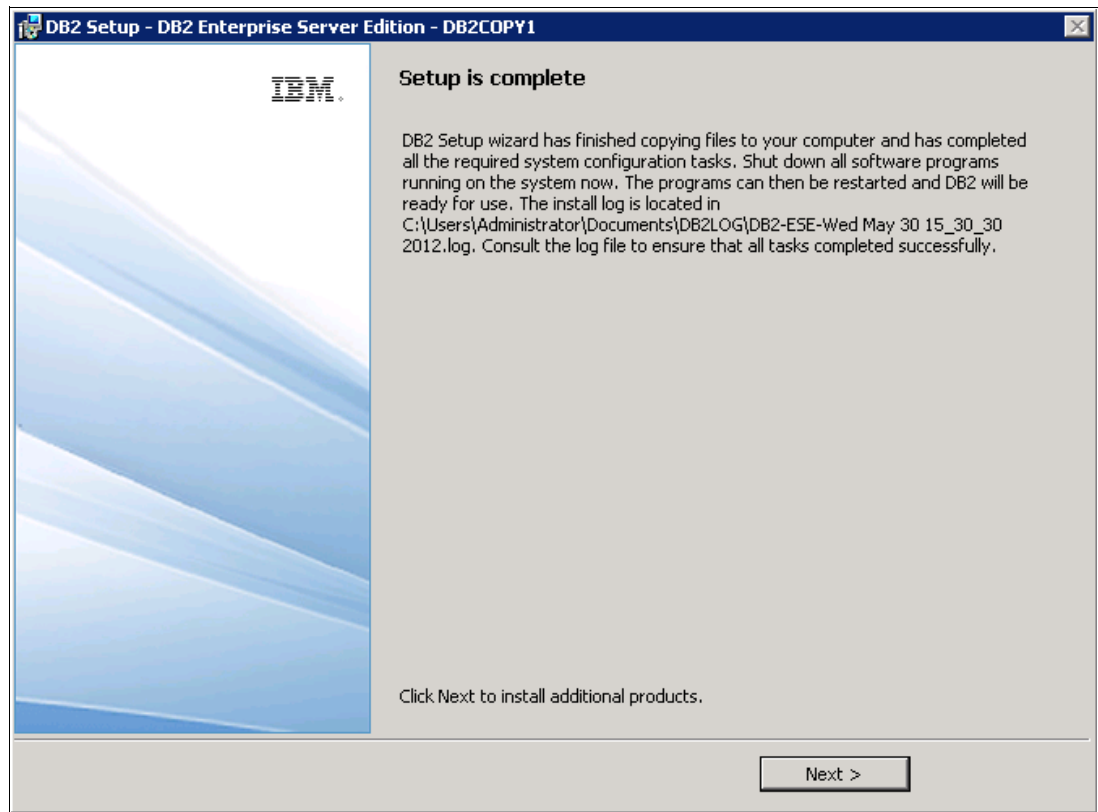


Figure 2-62 Installation is complete

The upgrade of DB2 is now complete. When you click **Next**, you get the chance to install additional products. Figure 2-63 on page 69 shows the window where you can do that.

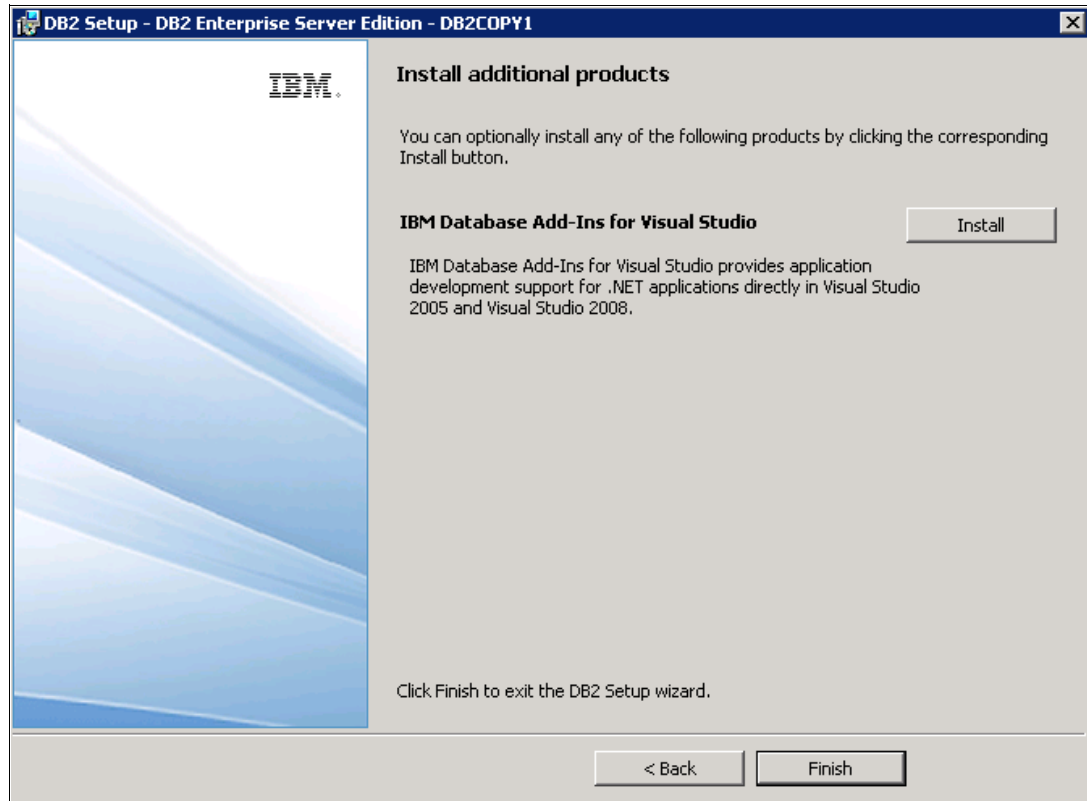


Figure 2-63 Install additional products

The upgrade of DB2 is now complete. Tivoli Storage Productivity Center does not require any add-in products, so click **Finish**. You are then presented with the window that is shown in Figure 2-64.

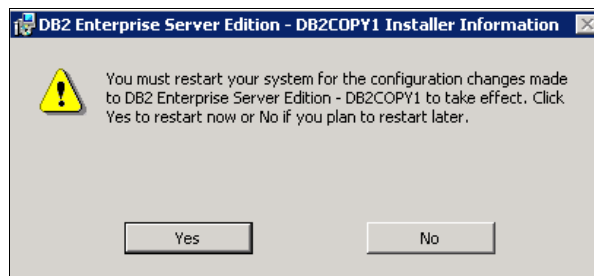


Figure 2-64 Restart server

Any version upgrade to DB2 requires a server restart for the changes to take effect. Restart the system and then you are ready to continue on with the rest of the Tivoli Storage Productivity Center upgrade process. To verify the upgrade process, you can reissue the **db2level** command to check that the new DB2 version is correct. You can also check to ensure that the TPCDB is still available for use on the new DB2 version. Issue the **db2 connect to tpcdb** to verify this. In our upgrade, the output of both of these commands is shown in Figure 2-65 on page 70.

```

Administrator: DB2 CLP - DB2COPY1
C:\Program Files\IBM\SQLLIB\BIN>db2level
DB210851 Instance "DB2" uses "64" bits and DB2 code release "SQL09074" with
level identifier "08050107".
Informational tokens are "DB2 v9.7.400.501", "s110330", "IP23238", and Fix Pack
"4".
Product is installed at "C:\PROGRA~1\IBM\SQLLIB" with DB2 Copy Name "DB2COPY1".

C:\Program Files\IBM\SQLLIB\BIN>db2 connect to tpcdb

Database Connection Information

Database server      = DB2/NT64 9.7.4
SQL authorization ID = ADMINIST...
Local database alias = TPCDB

C:\Program Files\IBM\SQLLIB\BIN>_

```

Figure 2-65 Verifying version upgrade and TPCDB connection

If the above results are reflected in your DB2 upgrade, you can now start the Tivoli Storage Productivity Center upgrade.

## 2.12 Upgrading Tivoli Storage Productivity Center

Now that DB2 is upgraded, the installation of Tivoli Storage Productivity Center can begin. It may have been some time since you performed your previous Tivoli Storage Productivity Center installation, and some things have changed since then, so look through the following considerations and rules.

### Fully qualified domain names

Some systems might be configured to return a short host name such as SSPCSRV15, instead of a fully qualified domain name such as SSPCSRV15.itso.ibm.com. Tivoli Storage Productivity Center V5.1 requires fully qualified domain names, so you need to install the software on a computer that has a fully qualified domain name. If you do not have full DNS environment, you can use the etc/hosts file to provide a mask of the FQDN.

If you do not have a full DNS environment, you can use the c:\windows\system32\drivers\etc\hosts file to provide a mask of the FQDN. Figure 2-66 shows the entry we put in to mask our FQDN.

```

# localhost name resolution is handled within DNS itself.
# 127.0.0.1      localhost
# ::1           localhost
9.12.5.112      WIN-EAVR80IBQNL.landisk.itso.ibm.com

```

Figure 2-66 etc\hosts entry

### SSPC

If you are installing, or upgrading the preinstalled Tivoli Storage Productivity Center on a System Storage Productivity Center (SSPC) device, you might need to run a script to enable the upgrade to happen.

During our installation, we received an error during the upgrade of our Tivoli Storage Productivity Center 4.2.1 version to Tivoli Storage Productivity Center V5.1. This error occurred between the password and summary screens. The message that we received is shown in Figure 2-67 on page 71.



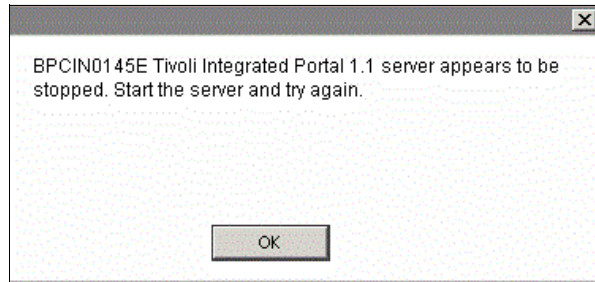


Figure 2-67 Tivoli Integrated Portal error

We verified that the Tivoli Integrated Portal service was started, and we could log on to the Tivoli Integrated Portal.

This error is caused by the need to change the host name of the SSPC when it is deployed. The system is built with a host name of SSPCxx and this host name persists in several configuration files within the Tivoli Integrated Portal. For SSPC 1.3.2, the host name is SSPC01; for SSPC 1.4, it is SSPC03; and for SSPC 1.5, it is SSPC04.

The Tivoli Productivity Center upgrade installer fails to start due to the Tivoli Integrated Portal service not being operational. The Tivoli Integrated Portal service fails to stop first and then fails to start after reboot. This is most likely a result of not running all of the password tools.

IBM technote 21420937 describes this error for older versions of SSPC, and APAR IC73891 addresses the new script that needs to be run for our version 1.5 of SSPC. For the different levels of SSPC, information can be found at the following two URLs:

- ▶ <http://www-304.ibm.com/support/docview.wss?uid=swg21420937>
- ▶ <http://www-304.ibm.com/support/docview.wss?uid=ssg1S4000949>

The error was caused because a server rename had been done last year from the original factory name of SSPC01, to SSPCSR15. The rename did not affect any other software on this machine. It is recommended that you run the script before you commence the Tivoli Storage Productivity Center upgrade process.

## Lightweight Directory Access Protocol

When you install Tivoli Storage Productivity Center and Tivoli Integrated Portal, you *can* use the operating system or an LDAP-compliant directory as the centralized authentication repository. If you select the local OS option, you cannot use any product that is based on Tivoli Integrated Portal in this instance of Tivoli Integrated Portal.

## Tivoli Storage Productivity Center installation package

The Tivoli Storage Productivity Center V5.1 installation image has the following parts:

<b>Disk 1, Part 1</b>	Base Tivoli Storage Productivity Center installation program.
<b>Disk 1, Part 2</b>	Base Tivoli Integrated Portal installation program.
<b>Disk 1, Part 3</b>	Tivoli Common Reporting and Embedded Security Services programs.
<b>Disk 1, Part 4</b>	Tivoli Integrated Portal program temporary fix (PTF) installation program.
<b>Disk 1, Part 5</b>	IBM Tivoli Storage Productivity Center Monitoring Agent installation program for IBM Tivoli Monitoring. This is an optional program and is required only if you are using Tivoli Monitoring.

Each of these images must be concatenated into one install directory, and that directory name cannot have any special blanks. The best way to perform this process is to create an install directory; we used TPC51install, and then extracted or copied Part 1 into it, and then extracted or copied Part 2 into that same directory. We then did the same for Part 3 and Part 4. We did not have Tivoli Monitoring already installed, so we did not need part 5.

When you extract or copy Part 3 and Part 4 into your install directory, you will be presented with the message that is shown in Figure 2-68. This appears because you are copying a folder (tip) that already exists from Part 1. Ensure that you merge the two folders and not overwrite it. This message should appear twice, once for Part 3 and once for Part 4 because they both have a Tivoli Integrated Portal directory.

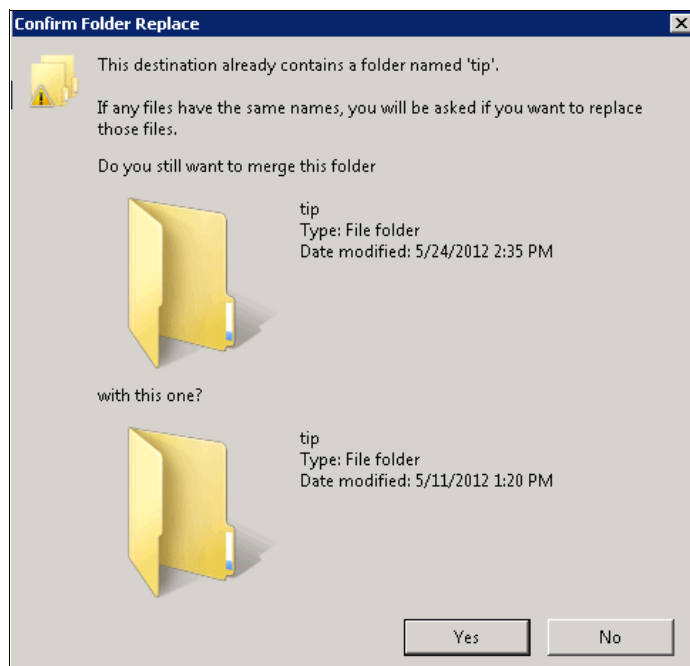


Figure 2-68 Directory merge

When the copy is complete, you are ready to install Tivoli Storage Productivity Center.

## Starting the installation program on the Windows operating system

When you are ready, locate the Tivoli Storage Productivity Center installation directory that you created earlier, and double-click the Setup.exe file. The first screen that you see is the screen shown in Figure 2-69.

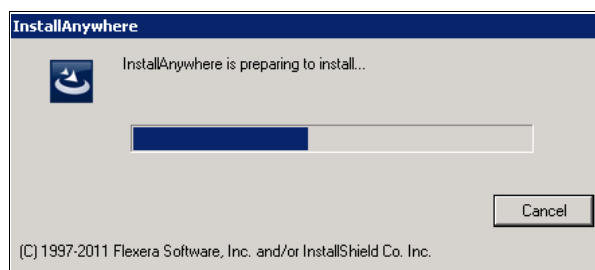


Figure 2-69 InstallAnywhere panel

This screen disappears and be replaced with the window, as shown in Figure 2-70, which allows you to select the language that you want to use for the installation.

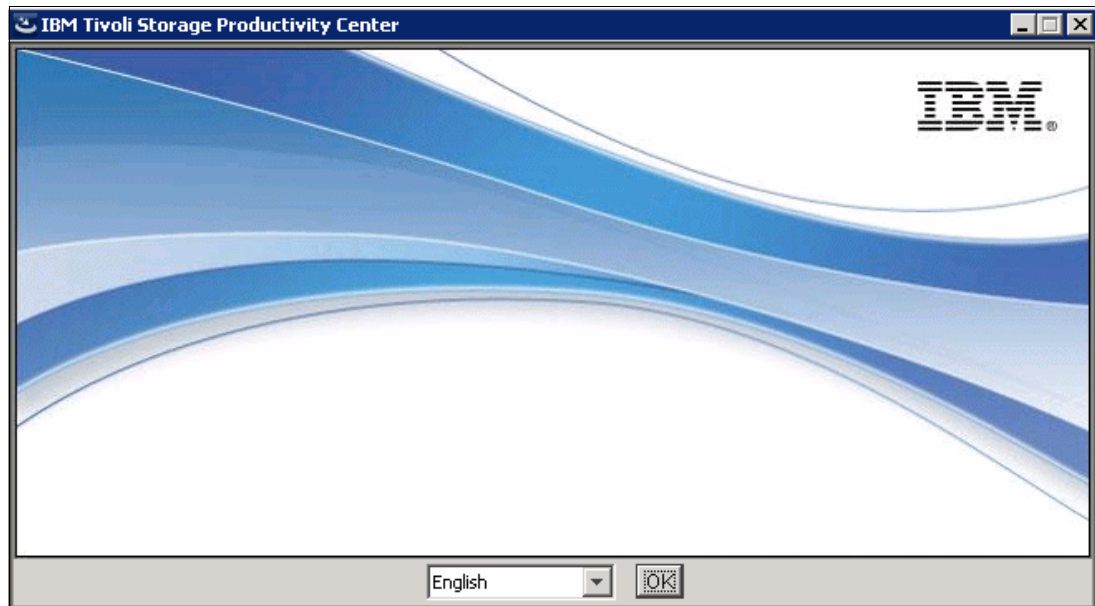


Figure 2-70 Language Selection window

After selecting your language, click **OK**, and you will be presented with the window that is shown in Figure 2-71.

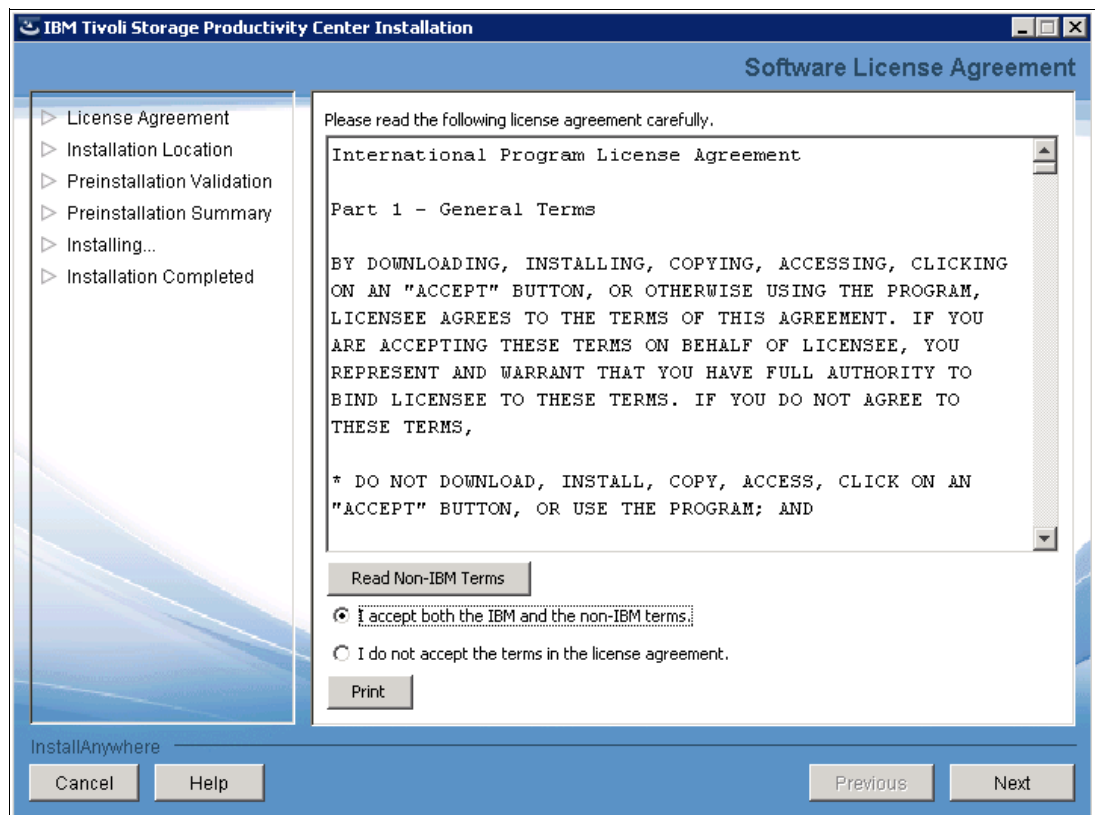
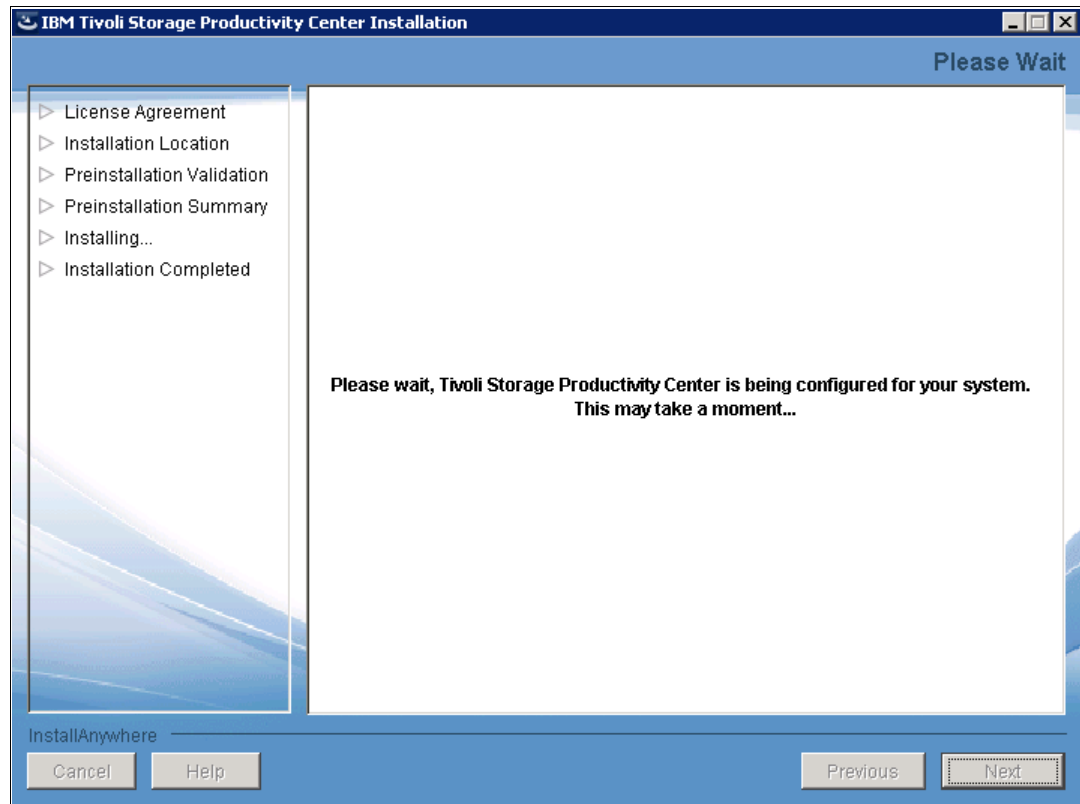


Figure 2-71 Software License Agreement

After reading the license conditions, click **Next** to progress to the window that is shown in Figure 2-72.



*Figure 2-72 Configuring Tivoli Storage Productivity Center*

This window is presented while the upgrade process is working out which components have already been installed, and which ones need upgrading. After clicking **Next**, you will be presented with the Upgrade Tivoli Storage Productivity Center window, as shown in Figure 2-73 on page 75.

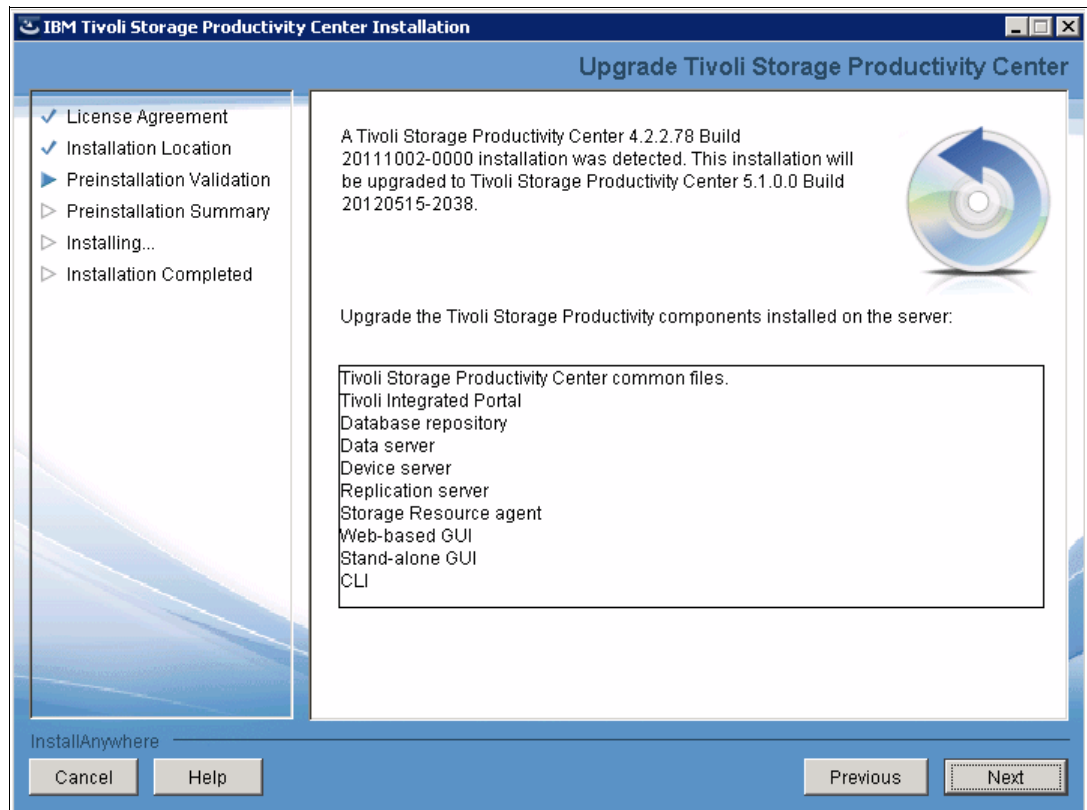


Figure 2-73 Upgraded components

This window shows you that Tivoli Storage Productivity Center will now be upgraded from V4.2.2.78 to V5.1.0.0, and will also show you the components that will be upgraded. When you click **Next**, you see the Preinstallation Validation section of the upgrade process, as shown in Figure 2-74 on page 76.

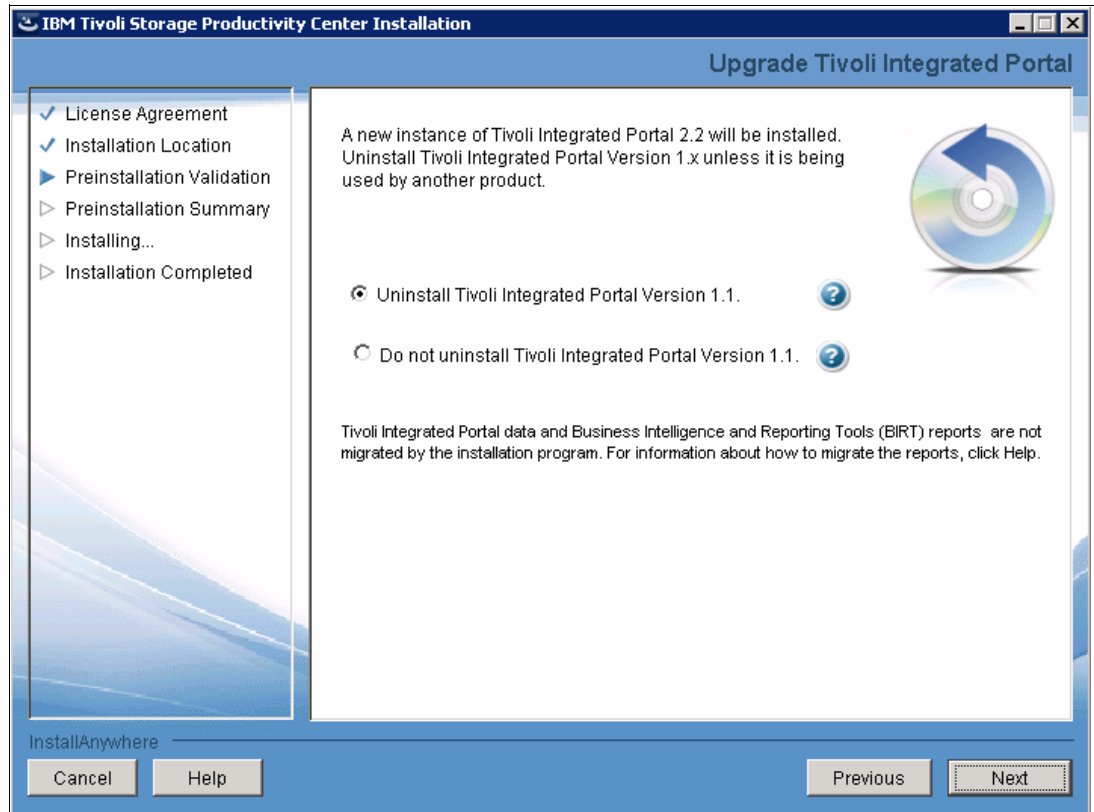


Figure 2-74 Uninstall Tivoli Integrated Portal

This window gives you the option to uninstall Tivoli Integrated Portal Version 1.1. If you are not sharing the Tivoli Integrated Portal with any other Tivoli products, such as Tivoli Storage Manager or Tivoli Common Reporting, you can select the uninstall option. The uninstall V1.1 option removes v1.1 and upgrades it to V2.2.

However, if you used BIRT or Tivoli Storage Manager reporting in the existing Tivoli Integrated Portal, you might like to retain V1.1 because the Tivoli Storage Productivity Center installation tool will not migrate the existing reports. Refer to the online Help screens, or Installation Guide for details about how to migrate these existing reports.

After selecting the appropriate action to suit your requirements, click **Next**. You are then shown the Installation Summary page, as shown in Figure 2-75 on page 77.

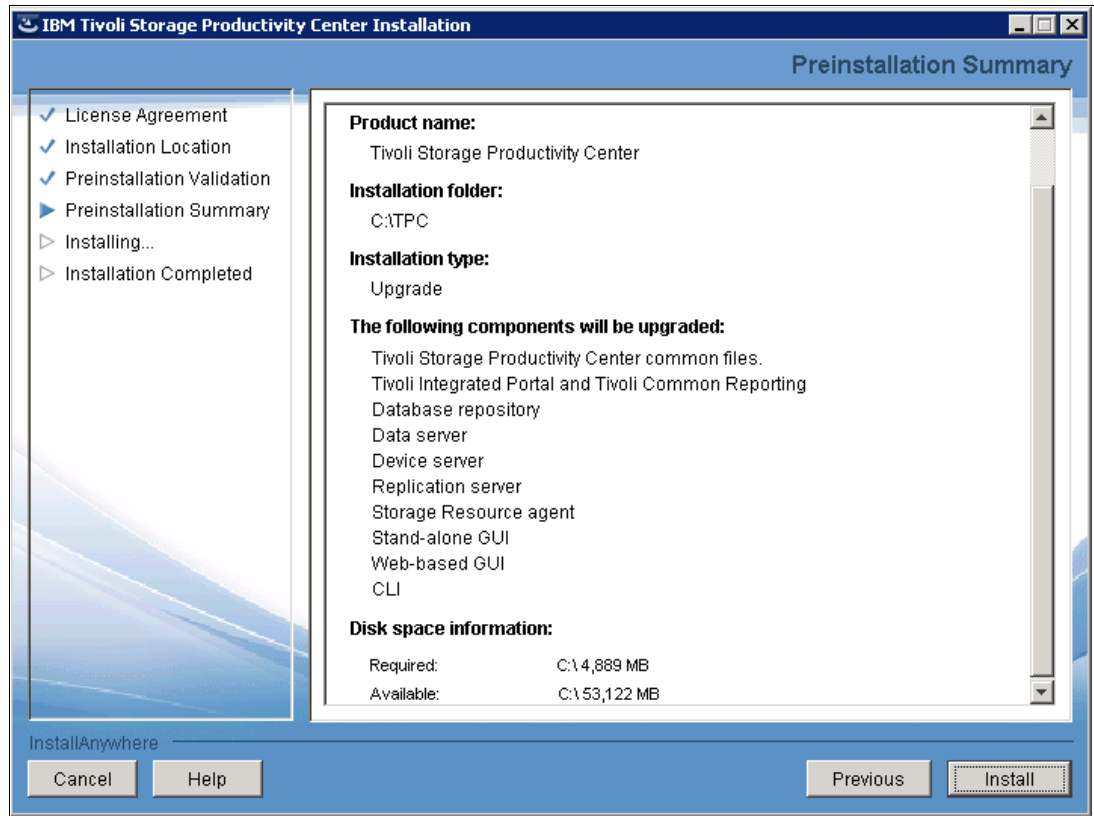


Figure 2-75 Preinstallation summary

This screen shows you a summary of the installation parameters, components, and details. Scroll up to see the missing information and if you are happy that all the information is correct, click **Install**. If you want to make changes, you can click **Previous** to take you back to the previous option screens.

You are then presented with a screen, as shown in Figure 2-76 on page 78, which shows you the configuration window in progress.

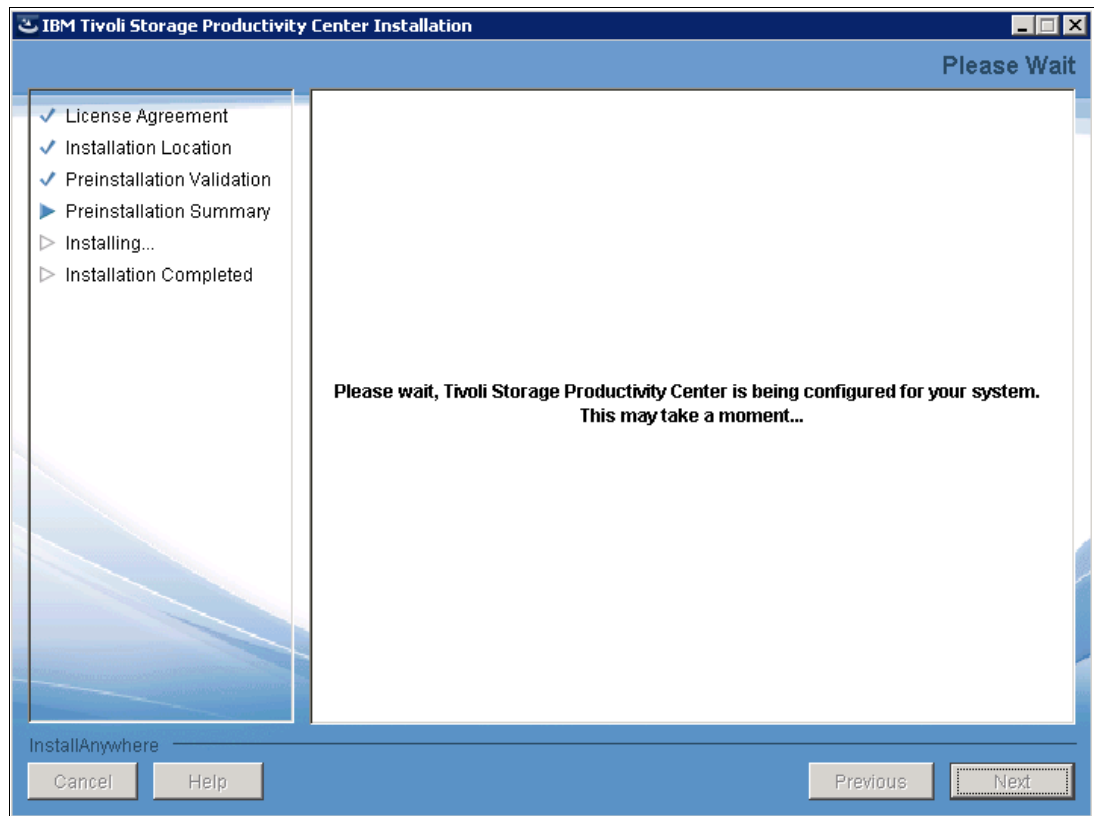


Figure 2-76 Configuration window in progress

After clicking **Next**, you will see the installation progress bar, as well as the different components as they are installed. This screen is shown in Figure 2-77 on page 79.



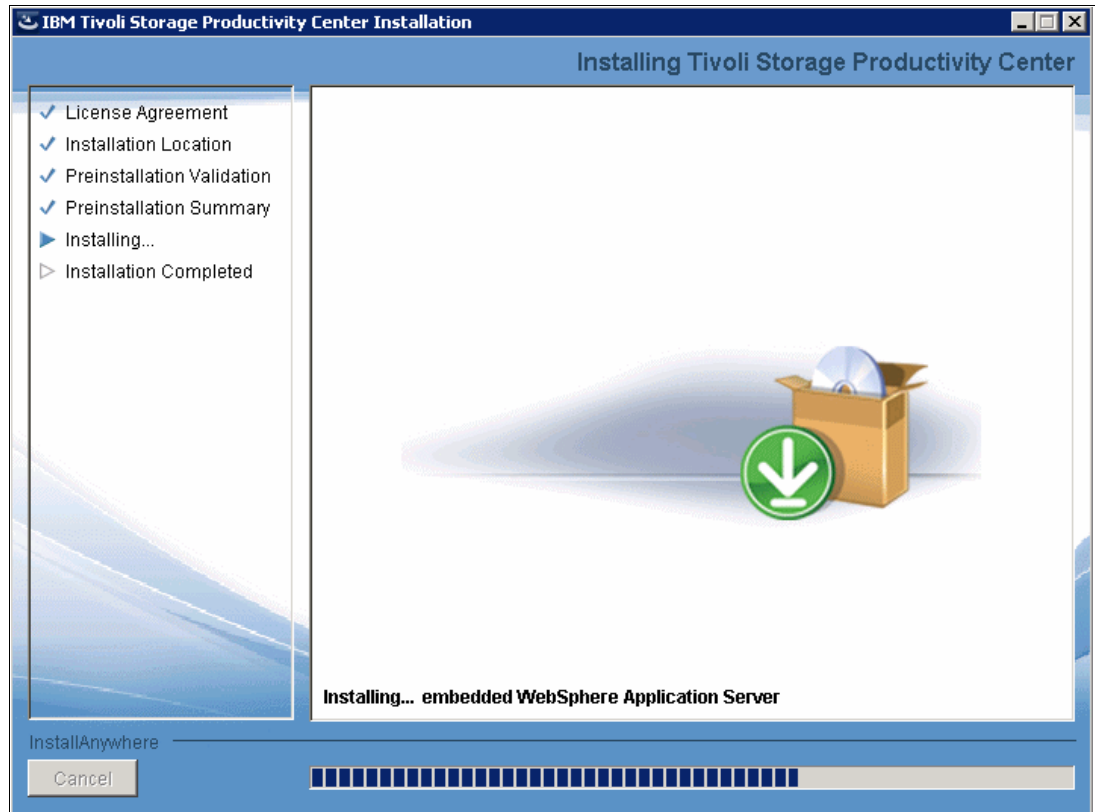


Figure 2-77 Installation in progress

This process could take over an hour to install, depending on the size of your environment. When the process is finished, you will see what is shown in Figure 2-78 on page 80.

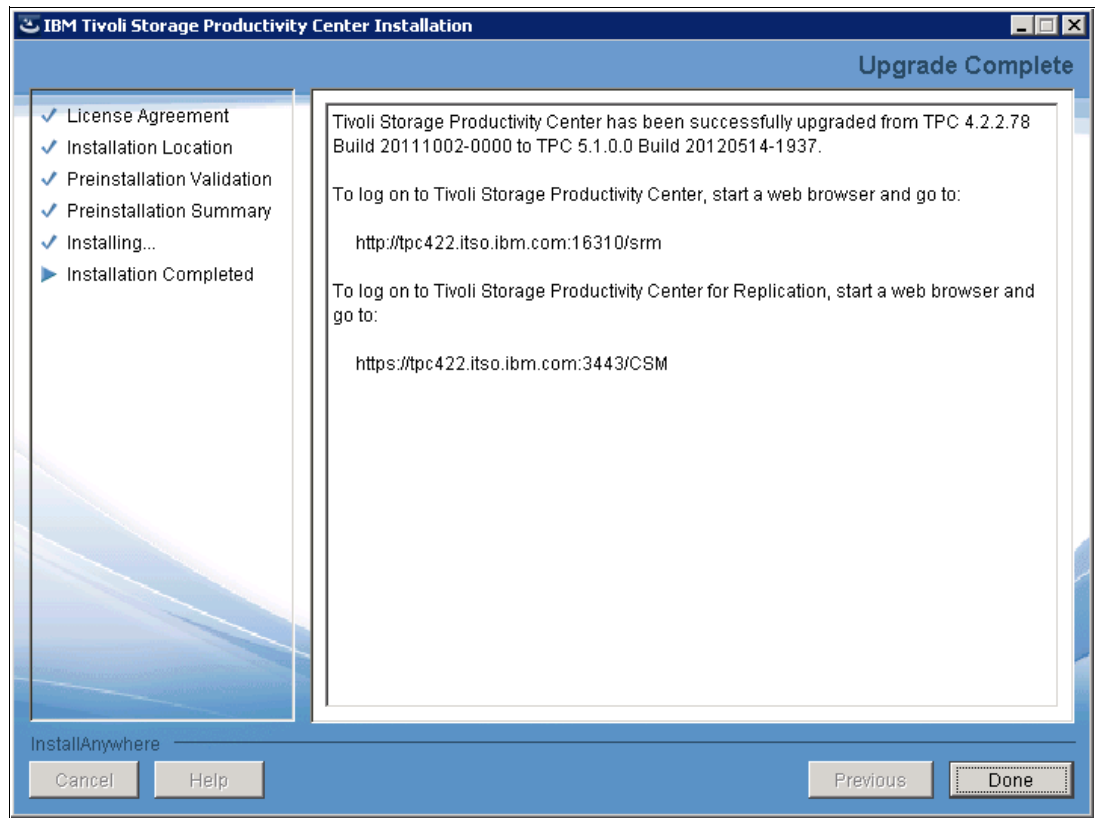


Figure 2-78 Upgrade Complete panel

Congratulations, your Tivoli Storage Productivity Center V5.1 upgrade is complete.

Tivoli Storage Productivity Center V5.1 provides several ways to monitor and configure your environment. Before you start deploying new clients or adding new subsystems, it might be worth spending a few minutes to verify that everything is running.

You should check the Windows services and ensure that the following services are started:

**Tivoli Integrated Portal -V2.2\_TIPProfile\_Port\_9568**  
**IBM Cognos Content Database**  
**IBM WebSphere Application Server V8.0 - TPCDeviceServer**  
**IBM Tivoli Storage Productivity Center - Data Server**  
**IBM WebSphere Application Server V8.0 - TPCReplicationServer**  
**IBM Tivoli Storage Resource Agent**

## 2.13 Connecting to Tivoli Storage Productivity Center using the GUI

In this section, we describe how to connect to the Tivoli Storage Productivity Center GUI.

In the new Tivoli Storage Productivity Center V5.1, two GUIs need to be used for most of the Tivoli Storage Productivity Center requirements. The new *web-based GUI* and the *stand-alone GUI*. Of course, there is also a Tivoli Storage Productivity Center for Replication GUI, which has not changed in this new version.

There are several ways to open the new GUI. You can:

- ▶ Use your browser to access the new web-based GUI
- ▶ Use your browser to log on to the Tivoli Integrated Portal, and then choose which GUI you want to use
- ▶ Or, if you are using Remote Desktop Manager, or logged on directly to the Tivoli Storage Productivity Center server, you can use **Start → All Programs → IBM Tivoli Storage Productivity Center** and then choose the required GUI. Using this method is the quickest if you are on the Tivoli Storage Productivity Center server. Figure 2-79 shows the easy menu system from the server.

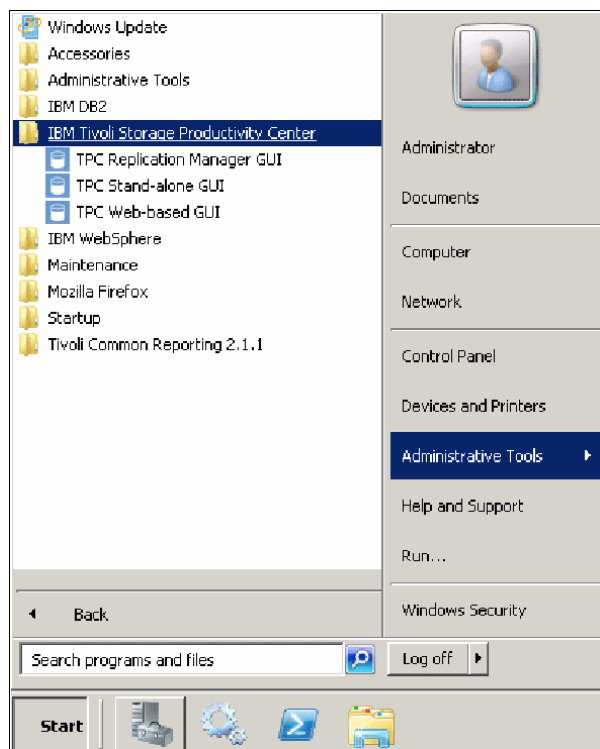


Figure 2-79 Accessing the GUIs from the server

### 2.13.1 Web-based GUI

To connect to the new V5.1 web-based GUI, open your browser and use the following URL:

**<https://servername:9569/srm/Login.jsp>**

Because this is a normal web URL access process, you do not need to put in the FQDN, and you are permitted to use the Tivoli Storage Productivity Center server's TCP/IP address. You can see from Figure 2-42 on page 51 that we used the following address to get to the Tivoli Storage Productivity Center GUI login panel:

<https://SSPCSRV15:9569/srm/Login.jsp>

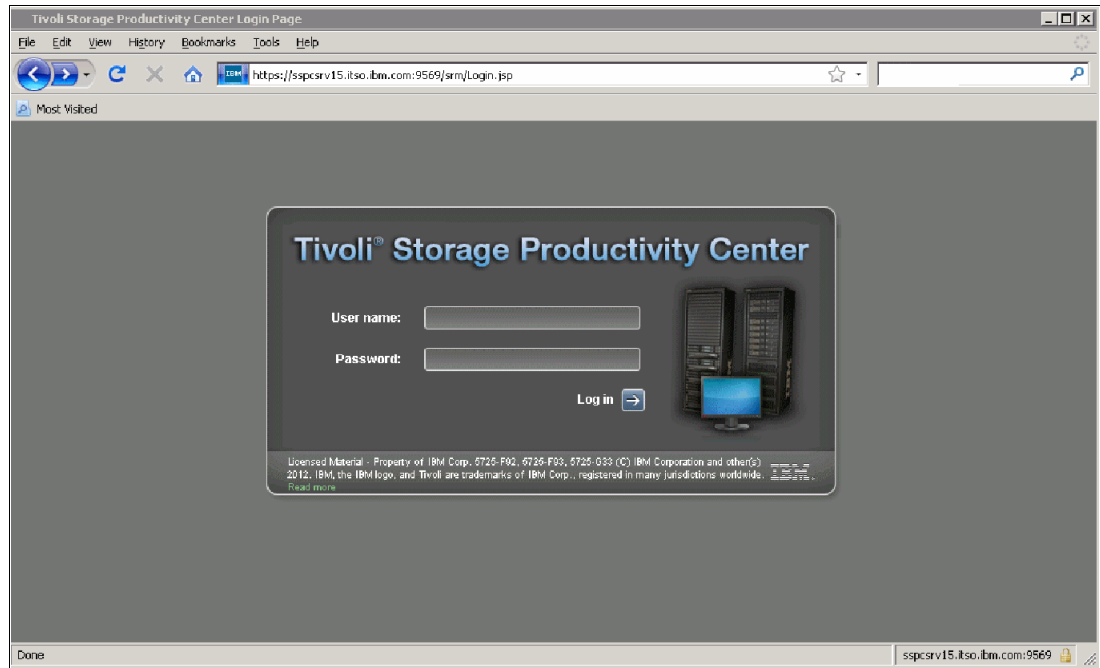


Figure 2-80 Tivoli Storage Productivity Center new web-based GUI login

After inserting our authorized user ID and password, we got our first look at the new GUI. Figure 2-81 shows you the Home/Dashboard screen of the GUI.

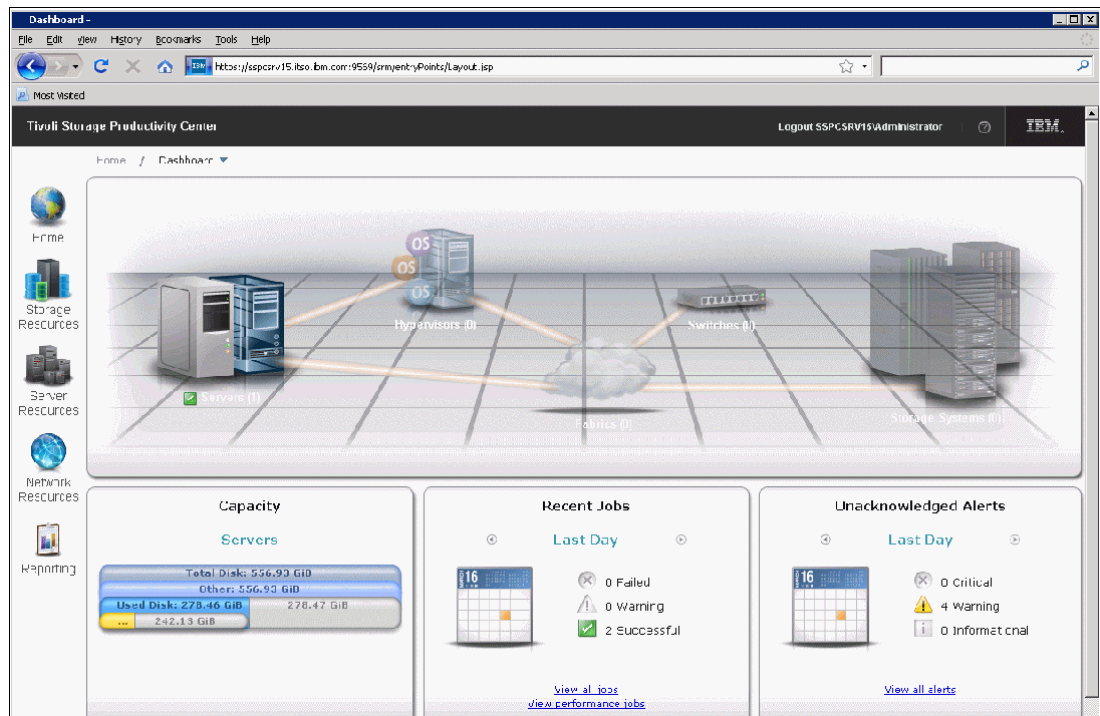


Figure 2-81 Tivoli Storage Productivity Center Home/Dashboard screen

In our upgrade environment, we had no previous collection data. Tivoli Storage Productivity Center automatically installs a Storage Resource Agent (SRA) on the Tivoli Storage

Productivity Center server. You will need to set up a probe job and a scan job to enable you to start collecting data.

## 2.13.2 Stand-alone GUI

At the time of this writing, not all functionality had been ported across to the new web-based GUI, so there is still the need to use the old interface, now known as the *stand-alone GUI*. Because the stand-alone GUI has been “removed” from Tivoli Storage Productivity Center, it is now accessed through the Tivoli Integrated Portal. The Tivoli Integrated Portal is installed as part of the Tivoli Storage Productivity Center installation. To get to the Tivoli Integrated Portal logon screen, point your browser at the following URL:

**`https://servername:9569/ibm/console/Login`**

As you can see from Figure 2-82, the Tivoli Integrated Portal logon screen requires an authorized user ID and password. If you already logged in to the web-based GUI, you will not be required to supply the user ID and password to get into the Tivoli Integrated Portal. You will be taken directly to the screen as shown in Figure 2-83 on page 84.

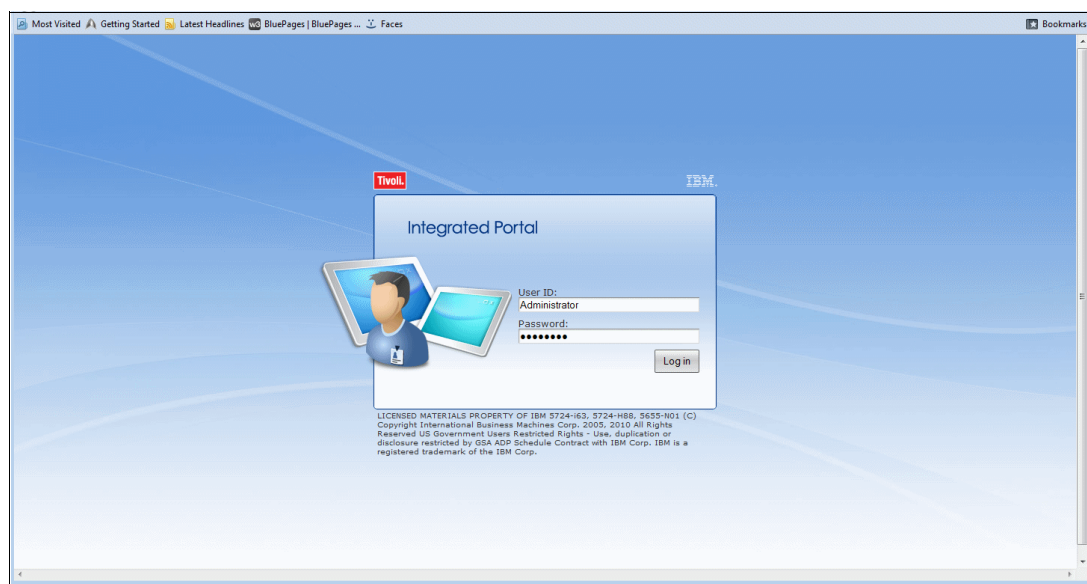


Figure 2-82 Tivoli Integrated Portal logon screen

After entering an authorized user ID and password, click **Log in**, and the Tivoli Storage Productivity Center Tivoli Integrated Portal window is presented, as shown in Figure 2-83 on page 84.

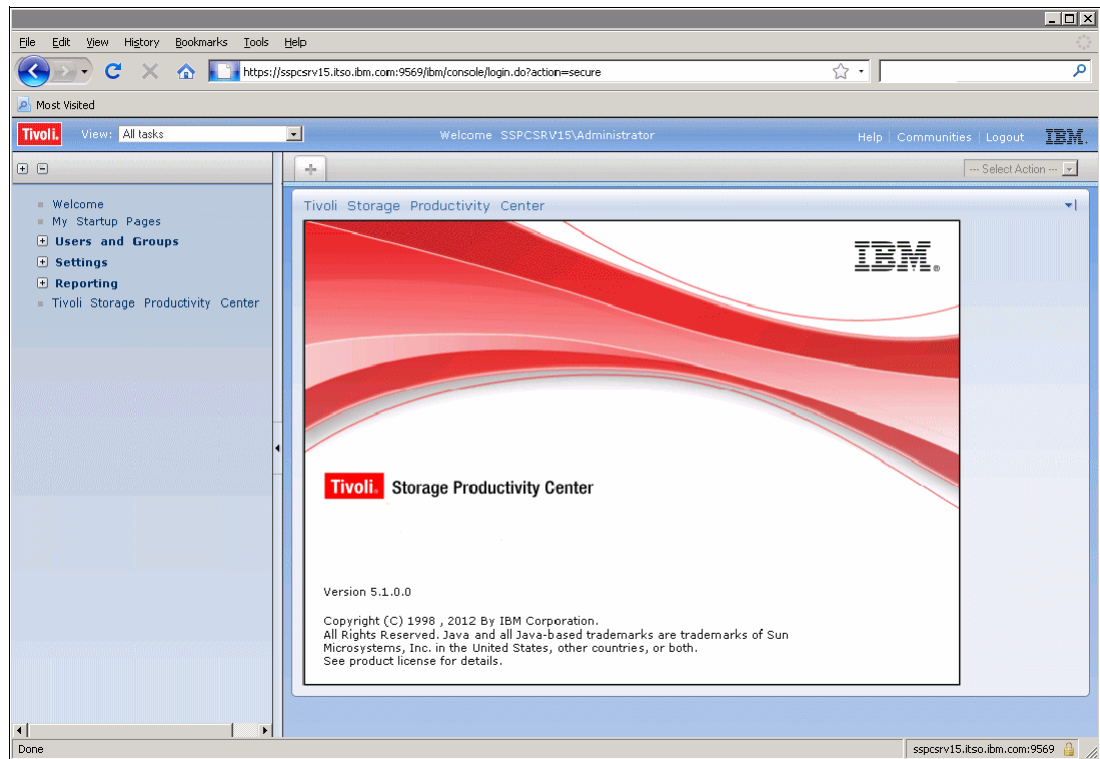


Figure 2-83 Tivoli Integrated Portal window

From this screen, select Tivoli Storage Productivity Center at the bottom of the left menu pane, and Figure 2-84 shows you the next options.

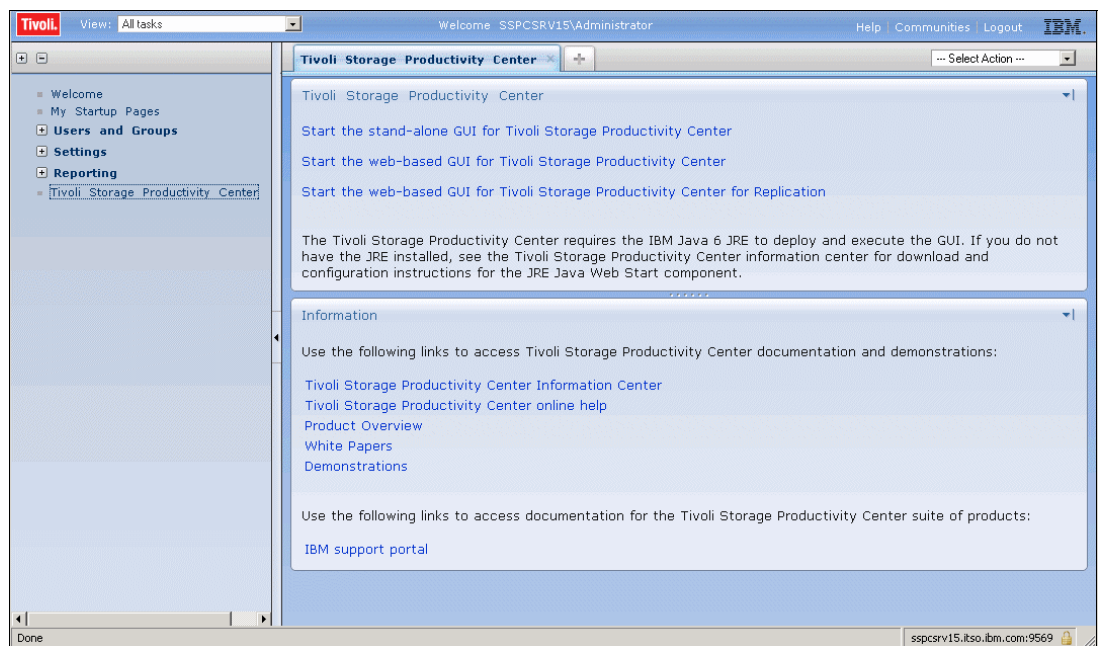


Figure 2-84 Tivoli Storage Productivity Center options window

From this screen, you can select to launch three different interfaces:

- ▶ Start the stand-alone GUI for Tivoli Storage Productivity Center
- ▶ Start the web-based GUI for Tivoli Storage Productivity Center
- ▶ Start the web-based GUI for Tivoli Storage Productivity Center for Replication

As we are currently talking about the stand-alone GUI, select the first option: Start the web-based GUI for Tivoli Storage Productivity Center. You will be presented with the following Java window, as shown in Figure 2-85.

If you do not get this window, but instead get an error window, check to see if you have IBM JRE 1.6 installed. If it is not installed, download and install it from the web, or from the Device Server within Tivoli Storage Productivity Center.

To install IBM Java JRE 1.6 from the Device Server, enter the following URL into your browser:

`http://hostname:9550/ITSRM/app/welcome.html`

Figure 2-85 shows the outcome of that URL. Click the appropriate link to download the Java code.

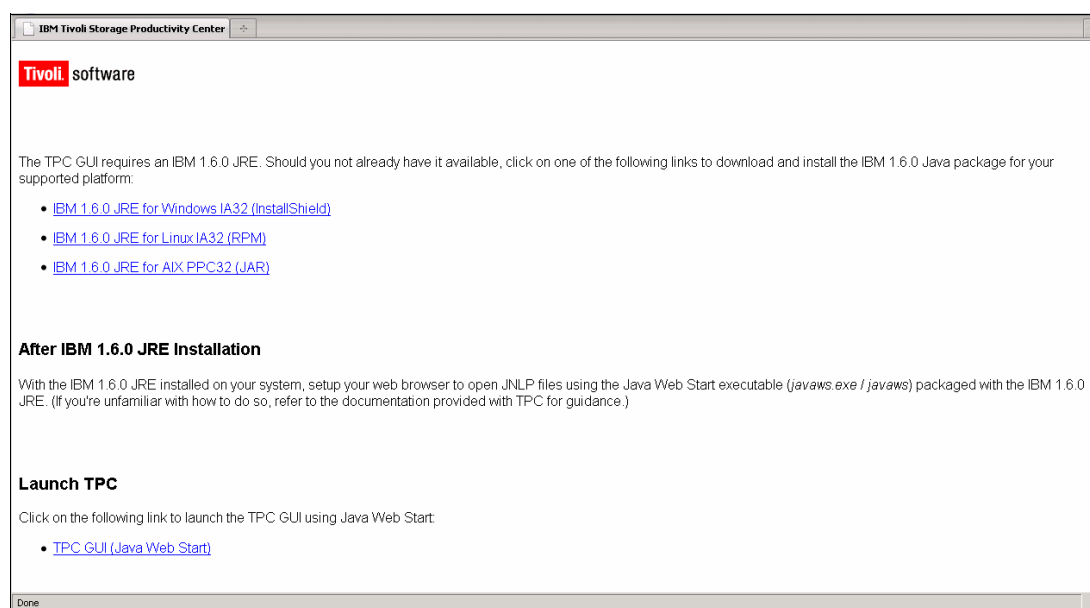


Figure 2-85 Java download from device server

Once Java is installed, click the link to the stand-alone GUI, and you will see the window that is shown in Figure 2-86 on page 86.



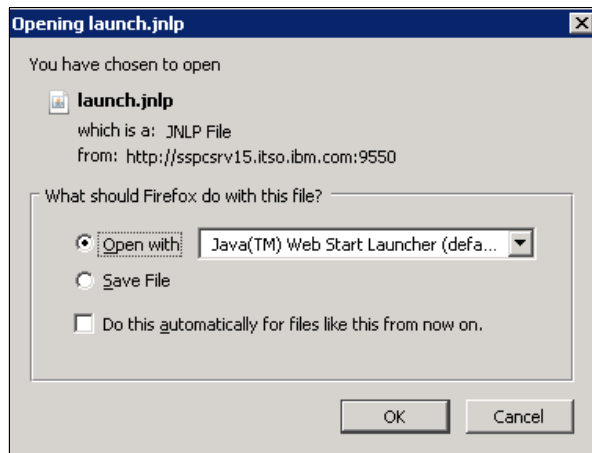


Figure 2-86 JRE launch window

After a short while, the stand-alone GUI will appear as shown in Figure 2-87. If you used Tivoli Storage Productivity Center in the past, you will recognize this as the old Tivoli Storage Productivity Center server interface.

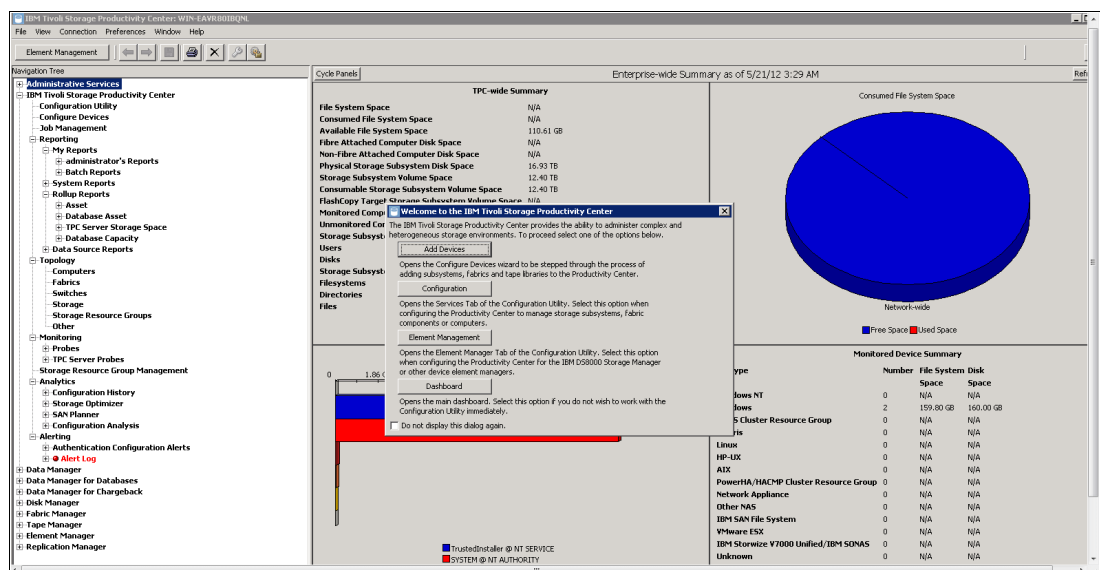


Figure 2-87 Stand-alone GUI welcome panel



By closing down the Welcome screen, you have access to all of the Tivoli Storage Productivity Center functions that are shown in Figure 2-88.

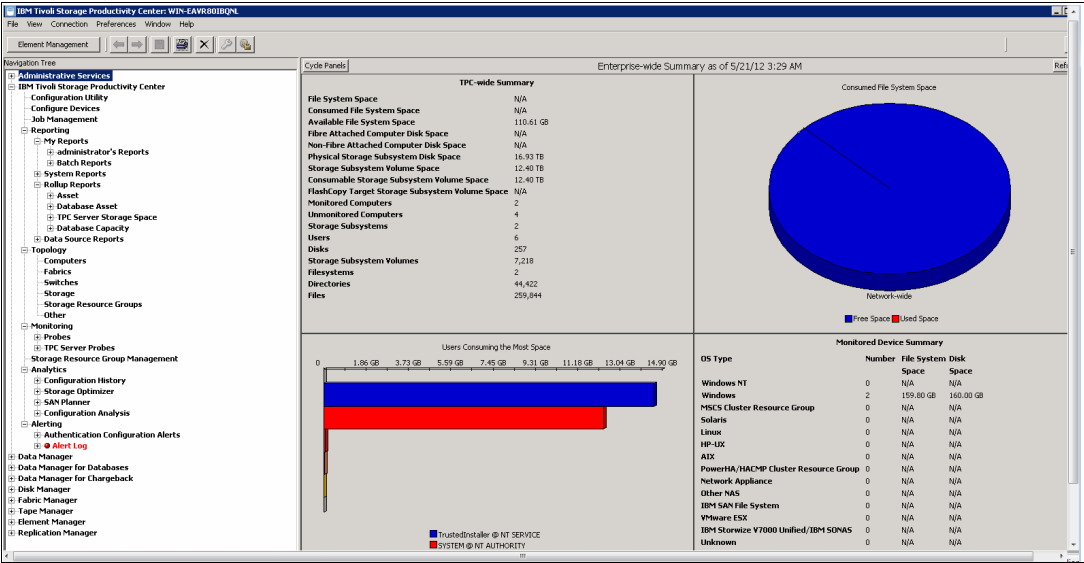


Figure 2-88 Stand-alone GUI





## The new web-based GUI

This chapter provides detailed overview of the content and use of the new web-based GUI introduced with Tivoli Storage Productivity Center V5.1. The functions that are invoked from the legacy stand-alone GUI are reviewed.

## 3.1 Web-based GUI introduction

Tivoli Storage Productivity Center 5.1 introduces a new web-based GUI, which is a top down redesign of the Tivoli Storage Productivity Center user interface. The new web-based GUI offers you simplified navigation, rationalized and regular structure, and a more intuitive user interface.

In Tivoli Storage Productivity Center V5.1, the new web-based GUI is not completely replacing the legacy Tivoli Storage Productivity Center stand-alone GUI. The stand-alone GUI is still required to be used for some existing functions in the product. The stand-alone GUI and the web-based GUI provide different functions and offer different advantages for managing and monitoring the resources in a storage environment. In this chapter, we describe specific tasks that you can complete in each GUI.

### 3.1.1 Architecture overview and components

The new web-based GUI is not completely replacing the legacy Tivoli Storage Productivity Center stand-alone GUI in this release. The stand-alone GUI is still required to be used for some existing functions in the product. The stand-alone GUI and the web-based GUI provide different functions and offer different advantages for managing and monitoring the resources in a storage environment. In this chapter, we describe specific tasks that you can complete in each GUI.

Tivoli Storage Productivity Center is built on client/server architecture and it consists of several key components. The client part of Tivoli Storage Productivity Center includes the stand-alone GUI and web-based GUI, while the Tivoli Storage Productivity Center Server part includes Data Server, Device Server, Tivoli Integrated Portal Server, and Database Server. Those components are related and interdependent and they are required for Tivoli Storage Productivity Center to be operational.

Figure 3-1 on page 91 shows you the Tivoli Storage Productivity Center client/server architecture in Tivoli Storage Productivity Center 5.1 with its components and the relationship between them.

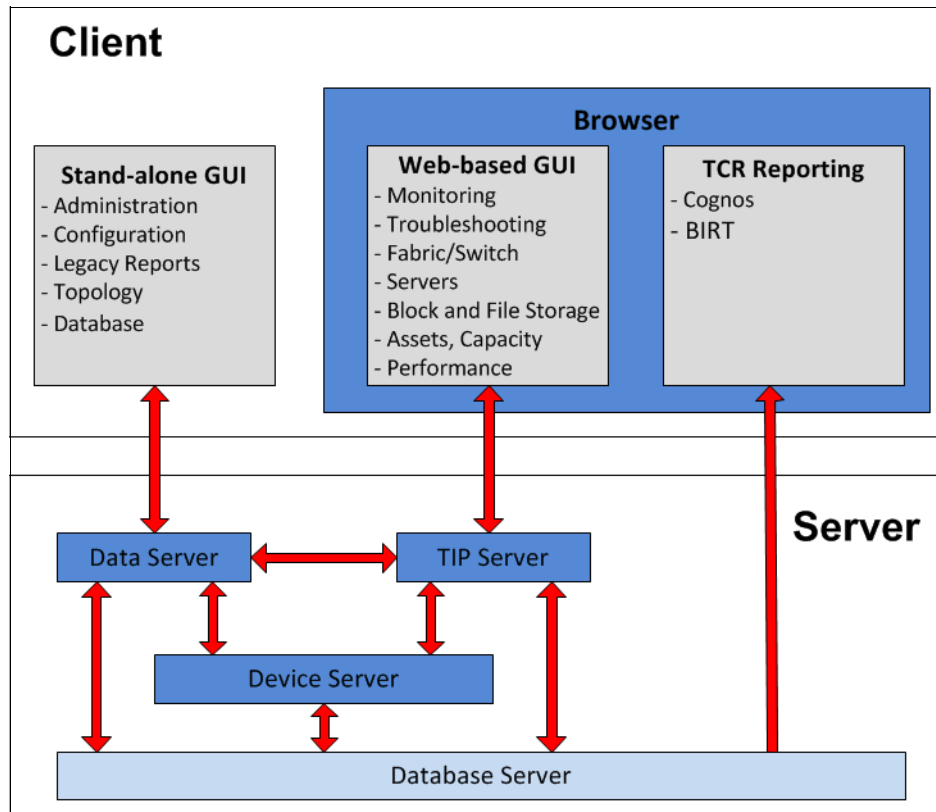


Figure 3-1 Tivoli Storage Productivity Center V5.1 overview architecture

As Tivoli Storage Productivity Center gathers information from your storage (servers, subsystems, and switches) across your enterprise, it accumulates a repository of information into the Database Server about your storage assets and how they are used. The Tivoli Storage Productivity Center web-based GUI enables you to request the information and then generate and display reports with Tivoli Common Reporting based on that information.

The stand-alone GUI is the same interface that is available in previous Tivoli Storage Productivity Center versions, and provides full access to all the functions that were available in those versions. This interface contains the functions that you can use to monitor the condition of storage resources, and all the tools to manage data, disk, fabric, tape, and replication.

The new web-based GUI interface provides quick access to pages that you can use to monitor the status, capacity, and relationships of the managed resources within your storage environment.

### 3.1.2 Web-based GUI features

The web-based GUI is a new improved user interface that provides different functions for working with monitored resources. Compared to the stand-alone GUI, the web-based GUI offers you better and simplified navigation with the following major features:

- ▶ At-a-glance assessment of storage environment
- ▶ Monitor and troubleshoot
- ▶ Rapid problem determination
- ▶ Review, acknowledge, and delete alerts
- ▶ Review and acknowledge health status

- ▶ View Internal and External Resources Relationships
- ▶ Access to Cognos reporting

### ***At-a-glance assessment of storage environment***

When you first log on to web-based GUI, the dashboard is shown and it will provide a concise, detailed overview of your storage environment, which includes the following information:

- The status of monitored resources on the resource diagram (storage systems, servers, hypervisors, fabrics, and switches)
- The overall capacity of monitored resources
- The status of Tivoli Storage Productivity Center jobs
- The status of alerts that were detected on monitored resources

You can use this information to quickly determine the health and state of your environment. Figure 3-2 shows the web-based GUI dashboard.

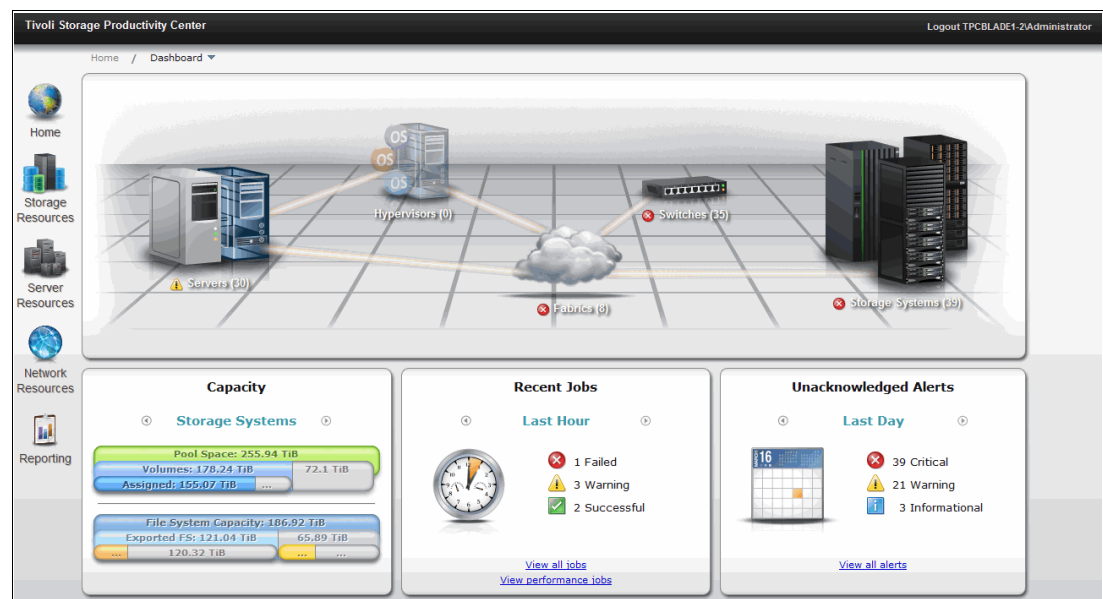


Figure 3-2 Web-based GUI Dashboard

### ***Monitor and troubleshoot***

By using web-based GUI, you can easily monitor and troubleshoot your environment, which includes servers, fabric/switches, and block and file storage systems.

Web-based GUI shows you summary and detailed information about the resources, including properties, storage usage, storage capacity, and several key performance metrics. For example, when migrating large amounts of data, you can identify the target resources that have enough storage capacity to accommodate the data and require the least amount of reconfiguration.

Figure 3-3 on page 93 shows you an example of summary and detailed information about storage systems.

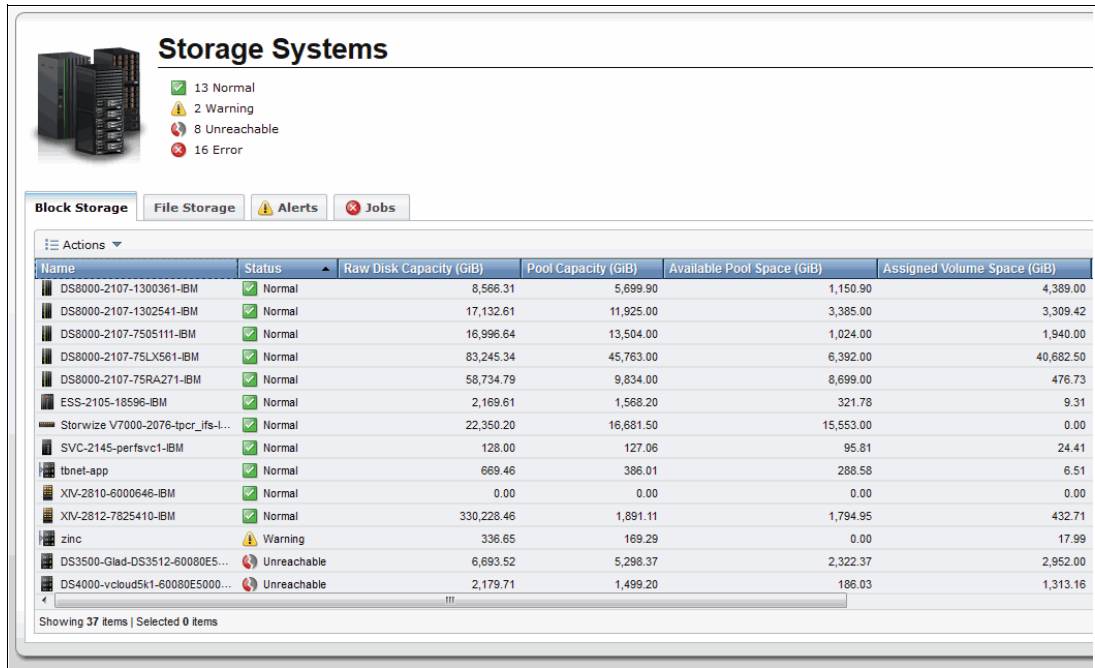


Figure 3-3 Web-based GUI: Storage Systems information

### Rapid problem determination

To identify potential problems and troubleshoot existing problems in a storage environment, web-based GUI will help you to drill down into it. Each managed resource has a status symbol that represents the most critical status that was detected on the internal resources for a resource type. For example, if Tivoli Storage Productivity Center monitors 20 storage systems, and an error was detected on a port for one of those storage systems, a red symbol is shown next to the storage systems icon in the diagram. Figure 3-4 on page 94 shows an example of a storage systems status error.

If no errors, warnings, or unreachable statuses were detected on the internal resources of monitored storage systems, a green symbol is shown. So by knowing the status, you can quickly determine the condition of your storage systems and if any actions must be taken.

The screenshot displays the IBM Tivoli Storage Productivity Center web-based GUI. On the left, a sidebar shows the navigation menu for the storage system **DS8000-2107-1300241-IBM** (IBM DS8000). The **Ports (12)** item is highlighted under the **Internal Resources** section. The main panel on the right is titled **Ports** and shows a summary of port status: 10 Normal (green checkmark), 0 Warning (yellow triangle), and 2 Error (red X). Below this is a table of 12 ports.

Name	Status	Speed (...)	Location	WWPN	Con
0112	Stopped	2	R1-I2-C2-T2	5005076303098016	
0113	Stopped	2	R1-I2-C2-T3	500507630309C016	
0000	Operational	2	R1-I1-C1-T0	5005076303000016	
0001	Operational	2	R1-I1-C1-T1	5005076303004016	
0002	Operational	2	R1-I1-C1-T2	5005076303008016	
0003	Operational	2	R1-I1-C1-T3	500507630300C016	
0040	Operational	2	R1-I1-C5-T0	5005076303040016	
0041	Operational	2	50050763030...	5005076303044016	
0042	Operational	2	R1-I1-C5-T2	5005076303048016	
0043	Operational	2	R1-I1-C5-T3	500507630304C016	
0110	Operational	2	R1-I2-C2-T0	5005076303090016	
0111	Operational	2	R1-I2-C2-T1	5005076303094016	

At the bottom of the table, it says "Showing 12 items | Selected 0 items".

Figure 3-4 Web-based GUI: Storage Systems status errors

### Review, acknowledge, and delete alerts

In the web-based GUI, you can review, acknowledge, and delete alerts that are generated when Tivoli Storage Productivity Center detects certain conditions or events on monitored resources (Figure 3-5 on page 95). Many conditions can trigger alerts so you can set up Tivoli Storage Productivity Center to generate alert notifications for conditions that you specify.



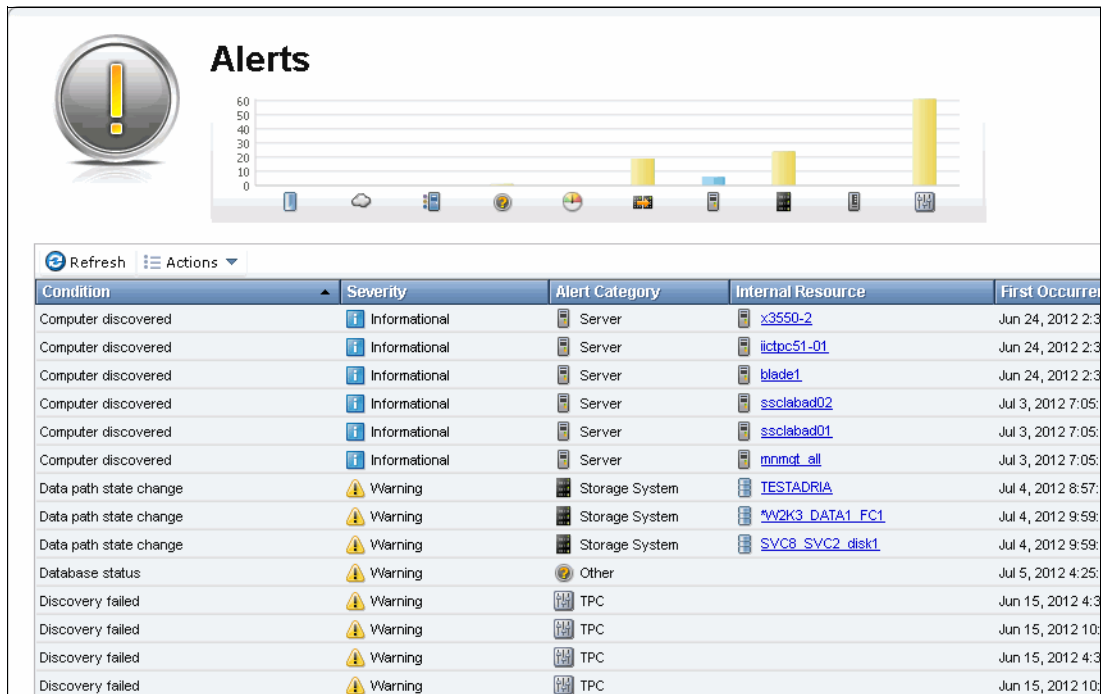


Figure 3-5 Web-based GUI Alerts

### Review and acknowledge health status

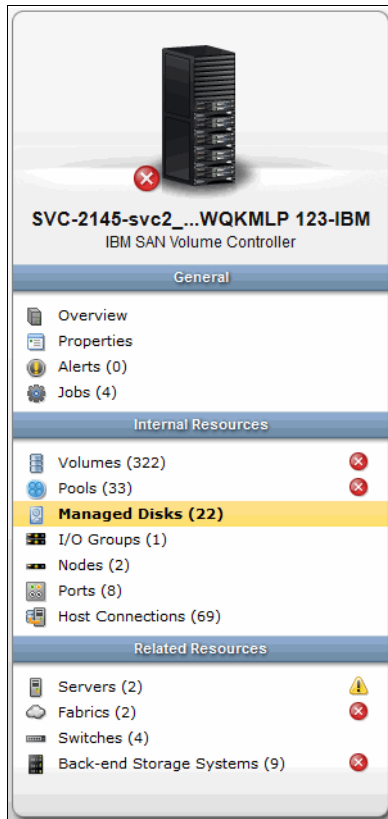
You can use the web-based GUI to monitor the health status of resources and identify potential problem areas in a storage environment. Monitored resources include top-level resources and their internal and related resources. By using the status information (Figure 3-6), you can quickly determine the condition of your storage and if any actions must be taken. Tivoli Storage Productivity Center provides a number of different statuses represented by an icon in the web-based GUI to help you determine the condition of resources.



Figure 3-6 Web-based GUI: Health status

### ***View internal and external resources relationships***

You can use the web-based GUI to monitor storage systems, servers, hypervisors, fabrics, and switches. Information about these top-level resources includes information about their internal resources and related external resources (Figure 3-7). Internal resources are components that exist in a top-level resource. Related resources are external to a top-level resource, but are related to it through assigned storage, a network connection, or virtual hosting.



*Figure 3-7 Web-based GUI: Internal and external related resources*

### ***Access to Cognos reporting***

Web-based GUI provides Cognos reporting to use predefined reports or design custom reports that contain detailed information about the properties and performance of monitored resources. All the performance metrics from the stand-alone GUI are available in the reporting interface. For example, you can drag key metrics into a report to create and generate a performance chart for a specific volume of a storage system. The reporting interface also includes a set of predefined reports that provides quick access to preformatted data about resources. Cognos reporting is described in details in Chapter 4, “Enhanced reporting with IBM Cognos” on page 269.

Figure 3-8 on page 97 shows you web-based GUI reporting options.

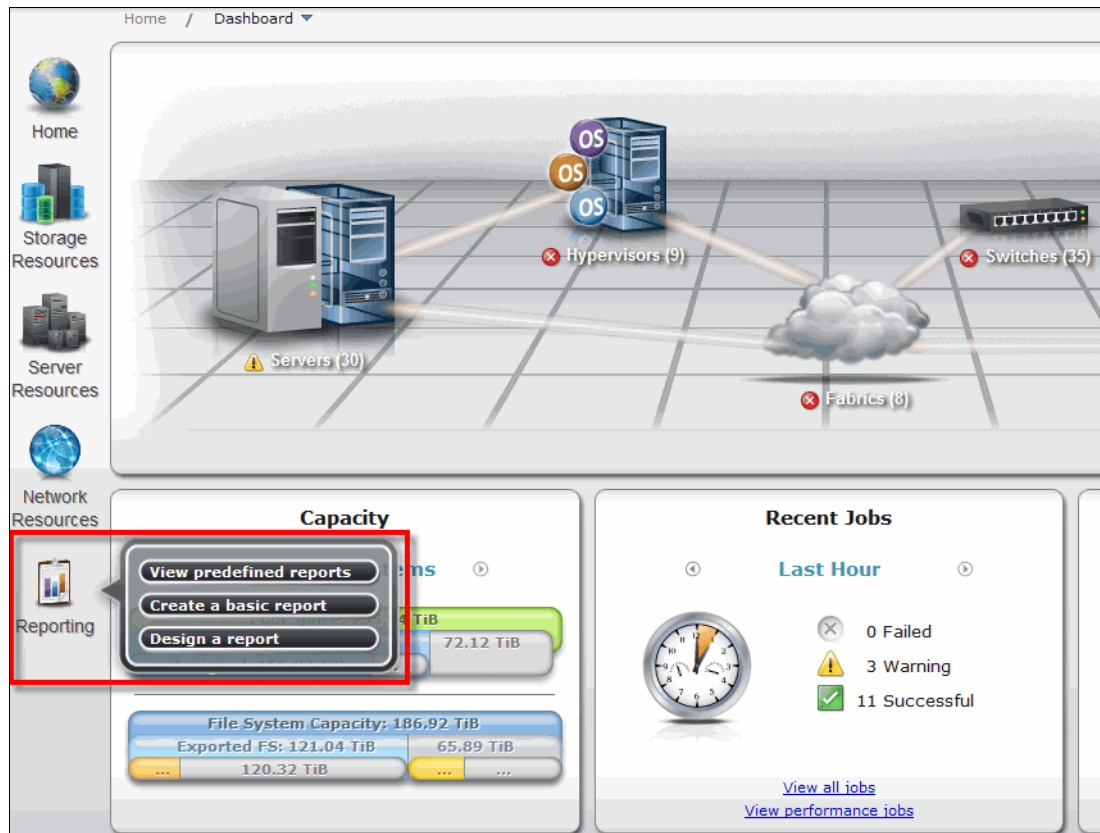


Figure 3-8 Web-based GUI reporting

### 3.1.3 Using the stand-alone GUI and the new web-based GUI

Whereas the Tivoli Storage Productivity Center 5.1 provides two graphical user interfaces for managing the resources in a storage environment, a stand-alone GUI and a web-based GUI, each GUI provides different functions for working with monitored resources.

Usage of each GUI depends on whether you are installing new Tivoli Storage Productivity Center 5.1, or you are upgrading your existing Tivoli Storage Productivity Center V4.x. If you are installing new Tivoli Storage Productivity Center V5.1, you will have to use stand-alone GUI to set up your Tivoli Storage Productivity Center V5.1 to manage the resources and then you can start to use web-based GUI. If you are upgrading your existing Tivoli Storage Productivity Center V4.x, you can immediately use web-based GUI.

In general, the stand-alone GUI is used to perform Tivoli Storage Productivity Center administration and configuration functions, while the web-based GUI is used to view different information, reports, alerts about the managed resources. Depending on your use case, 40 - 80% of the work can be done with the new web-based GUI.

The following tables show you tasks that are available in each GUI.

#### **Configuring and administering tasks**

After you install Tivoli Storage Productivity Center or if your managed resources have changed, you must properly configure your system to get the information you want. Some of the tasks associated with configuring the system include knowing which agents are required, the jobs that must be run, and the alerts you can set. Also, to collect data from the devices and servers that are managed and monitored, different configuration steps are required to

enable these different functions in Tivoli Storage Productivity Center. Most of these tasks must be done in stand-alone GUI. Table 3-1 shows you available configuring and administering tasks in each GUI.

*Table 3-1 Available configuring and administering tasks in each GUI*

Tasks	Available in web-based GUI	Available in stand-alone GUI
Adding and managing data sources, including agents	NO	YES
Discovering resources for monitoring	NO	YES
Configuring resources for monitoring	NO	YES
Configuring Tivoli Storage Productivity Center (users, roles, logs, and so on)	NO	YES
Starting element managers in context: <ul style="list-style-type: none"> <li>▶ Storage systems</li> <li>▶ Switches</li> </ul>	<ul style="list-style-type: none"> <li>▶ NO</li> <li>▶ YES</li> </ul>	<ul style="list-style-type: none"> <li>▶ YES</li> <li>▶ YES</li> </ul>
Administering Tivoli Storage Productivity Center services	NO	YES
Managing Tivoli Storage Productivity Center jobs	NO	YES

### **Monitoring tasks**

Monitoring tasks include creating data collection schedules for managed resources and viewing information about the managed resources. Some of the tasks are available in both GUI and some are still required to be done in stand-alone GUI. Table 3-2 shows you available monitoring tasks in each GUI.

*Table 3-2 Available monitoring tasks in each GUI*

Tasks	Available in web-based GUI	Available in stand-alone GUI
Creating data collection schedules and groups	NO	YES
Creating storage resource groups	NO	YES
Managing replication	NO	YES (Tivoli Storage Productivity Center for Replication GUI)
Viewing information about the following resources: <ul style="list-style-type: none"> <li>▶ Storage systems</li> <li>▶ Servers</li> <li>▶ Hypervisors</li> <li>▶ Switches</li> <li>▶ Fabrics</li> <li>▶ Tape libraries</li> <li>▶ Databases</li> </ul>	<ul style="list-style-type: none"> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ NO</li> <li>▶ NO</li> </ul>	<ul style="list-style-type: none"> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> </ul>

Tasks	Available in web-based GUI	Available in stand-alone GUI
Viewing the following information about resources: <ul style="list-style-type: none"> <li>▶ Status</li> <li>▶ Capacity (including used and available space)</li> <li>▶ Relationships between resources</li> <li>▶ Data paths</li> </ul>	<ul style="list-style-type: none"> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ NO</li> </ul>	<ul style="list-style-type: none"> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> </ul>
Exporting information about resources to a file	NO	YES
Running analytics: <ul style="list-style-type: none"> <li>▶ Configuration history</li> <li>▶ Storage optimizer</li> <li>▶ SAN Planner</li> <li>▶ Configuration analysis</li> </ul>	<ul style="list-style-type: none"> <li>▶ NO</li> <li>▶ NO</li> <li>▶ NO</li> <li>▶ NO</li> </ul>	<ul style="list-style-type: none"> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> <li>▶ YES</li> </ul>
Managing zones and zone sets	NO	YES
Viewing a visual topology of resources	NO	YES
Creating storage policies	NO	YES
Charging back for storage usage	NO	YES

### **Alerting tasks**

You can set up Tivoli Storage Productivity Center so that it examines the data that it collects about your storage infrastructure and writes an alert to a log when an event occurs. You also can specify that an action is initiated, such as sending an SNMP trap, sending an email, or running a script when the event occurs.

Alerts that are triggered based on the data collected by monitoring jobs (for example, pings, scans, and probes) must be defined before the monitoring jobs are run. Alerts that are triggered based on an external source, such as an SNMP trap, must be defined after the SNMP server is configured properly.

You can define an alert in the following ways:

- ▶ As part of a data collection schedule
- ▶ As part of an alert definition

When an event occurs and triggers an alert, the alert is written to a log. You can also select one or more other ways to be notified of the event. These alert notifications include SNMP traps, IBM Tivoli Enterprise Console® events, Tivoli Storage Productivity Center login notifications, operating-system event logs, or email. Table 3-3 shows you alerting tasks that are available in each GUI.

*Table 3-3 Available alerting tasks in each GUI*

Tasks	Available in web-based GUI	Available in stand-alone GUI
Creating alerts	NO	YES

Tasks	Available in web-based GUI	Available in stand-alone GUI
Viewing alert conditions that are detected on monitored resources	YES	YES
Acknowledging the status of alerts	YES	YES
Removing alerts	YES	YES

### **Reporting tasks**

The GUI reports show you information about the storage resources in your environment. These reports are organized into different types and categories and provide both summary and detailed information depending about your needs. Data in reports is based on statistical information accumulated by data collection schedules and stored in the database repository. You can select the specific systems, storage subsystems, switches, fabrics, NAS filters, and so on, upon which you want to report. Stand-alone GUI and web-based GUI offer you specific reporting tasks that you can complete. Table 3-4 shows you available tasks in each GUI.

*Table 3-4 Available reporting tasks in each GUI*

Tasks	Available in web-based GUI	Available in stand-alone GUI
Accessing the web-based reporting interface	YES	NO
Saving reports	YES	YES
Scheduling reports	YES	YES
Resource properties	YES	YES
Performance	YES	YES
Capacity (including used and available space)	YES	YES
Historical capacity	YES	YES
Storage tiering	YES	NO
Policy violations	NO	YES
Rollup servers	NO	YES
File statistics	NO	YES
Tape libraries	NO	YES
Data sources	NO	YES
Databases	NO	YES

## **3.1.4 Planning for the new web-based GUI**

You can install Tivoli Storage Productivity Center in single or multiple-server environments depending on your requirements and environment. In a single-server environment, all components are installed on one server including the new web-based GUI. In a multiple-server environment, you can install web-based GUI together with Tivoli Integrated Portal and Tivoli Common Reporting on a separate server.

### Web browsers specifics

Web-based GUI is a zero installation component, which runs entirely in a web browser on the client system. It does not require IBM Java plug-in and Flash Player, but a PDF document reader is required to view tables exported in PDF format. Some browsers have “native” PDF capabilities like Mozilla Firefox so we recommend using Mozilla Firefox as the standards-based browser. If you use Internet Explorer at the login prompt, you will be notified to use a standards-based web browser for best results (Figure 3-9). But if you use Google Chrome, Safari, or Opera, Tivoli Storage Productivity Center will not complain. There are no known issues with Google Chrome, Safari, and Opera, but they are not certified or supported browsers to use with Tivoli Storage Productivity Center.



Figure 3-9 Web-based login screen in Internet Explorer web browser

Web-based GUI requires JavaScript and cookies to be enabled. Although JavaScript is enabled by default, some sites may disable it. If they are disabled, you will be notified to enable it to access the web-based GUI (Figure 3-10).



Figure 3-10 Logon with error message: Disabled JavaScript and cookies

The browser levels listed in Table 3-5 have been tested and certified by Tivoli Storage Productivity Center.

Table 3-5 Certified web browser versions

Browsers	All components	Additional Tivoli Storage Productivity Center for Replication only
Mozilla Firefox (Windows, Linux)	3.6	10 ESR, 11

Browsers	All components	Additional Tivoli Storage Productivity Center for Replication only
Microsoft Internet Explorer (Windows)	8	9
Google Chrome	None	17

**Note:** No browsers are supported for AIX.

Tivoli Storage Productivity Center support will support later versions of the browsers as long as the vendors do not remove or disable functionality that Tivoli Storage Productivity Center relies upon. For browser levels higher than the levels that have been certified with Tivoli Storage Productivity Center, customer support will accept usage-related and defect-related service requests.

**Note:** For the browser issues, if IBM support cannot re-create the issue in a lab, we might ask you to re-create the problem on a certified browser version in order to determine if a product defect exists. Defects will not be accepted for cosmetic differences between browsers or browser versions that do not affect the functional behavior of the product. If a problem is identified in Tivoli Storage Productivity Center, defects will be accepted. If a problem is identified with the browser, IBM may investigate potential solutions or work-arounds that you can implement until a permanent solution becomes available.

The following link contains all information about Tivoli Storage Productivity Center 5.1 supported web browsers, platforms, OSs, databases, GUI, CLI, and so on:

<http://www-01.ibm.com/support/docview.wss?uid=swg27024859>

### ***Web browsers languages***

When you install Tivoli Storage Productivity Center, you must select one of the following languages:

- English
- Czech
- French
- German
- Hungarian
- Italian
- Japanese
- Korean
- Polish
- Brazilian Portuguese
- Russian
- Spanish
- Chinese (Simplified)
- Chinese (Traditional)

Messages, online help, and text are displayed in the language that you select. You are not required to install a language pack after installation. When you use Tivoli Storage Productivity Center, the language that is displayed is the language setting of the operating system.



If you want to change the language that is displayed in web-based GUI, you can do this by changing language settings in your browser. In the following example, we show you how to change the language in the Firefox browser.

In the Firefox browser, go to menu bar and select **Tools** → **Options** (Figure 3-11).

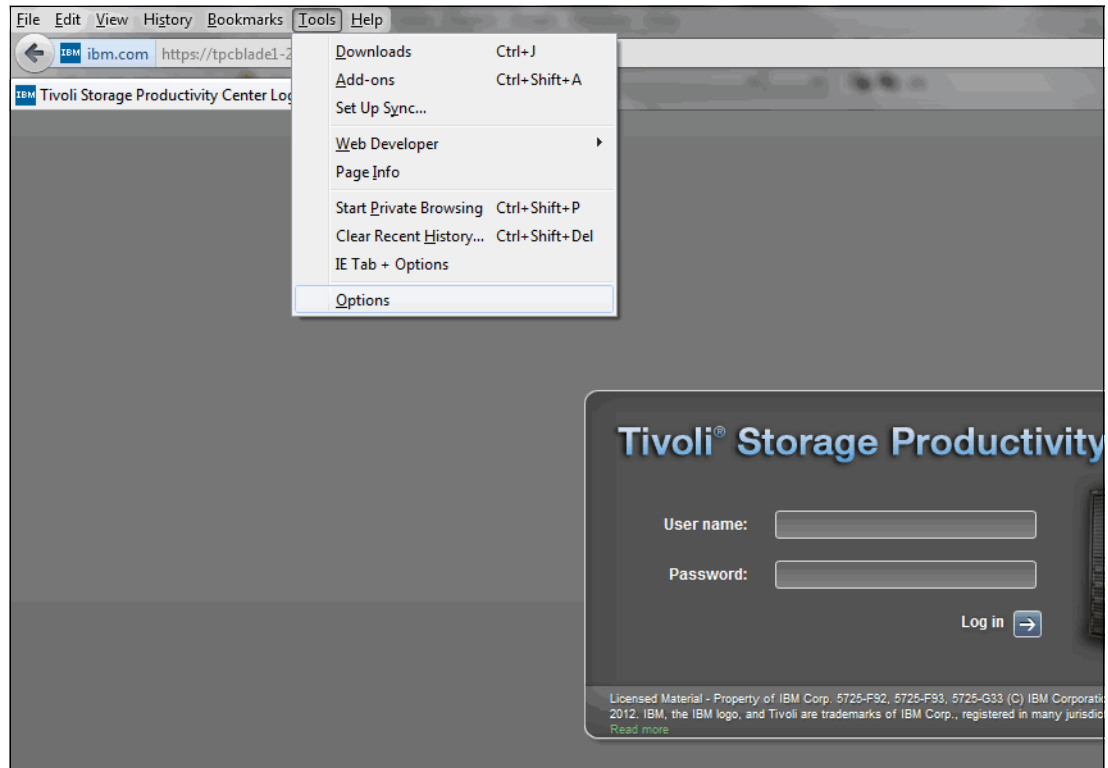


Figure 3-11 Firefox menu bar

In the Options window, click **Choose** (Figure 3-12 on page 104) and select one of the supported Tivoli Storage Productivity Center languages. In our example, we select Japanese (Figure 3-13 on page 104).

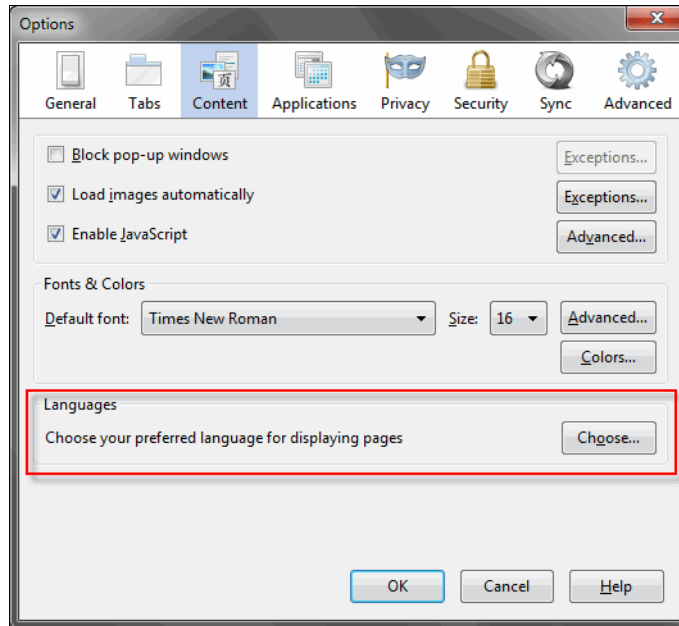


Figure 3-12 Options in a Firefox browser

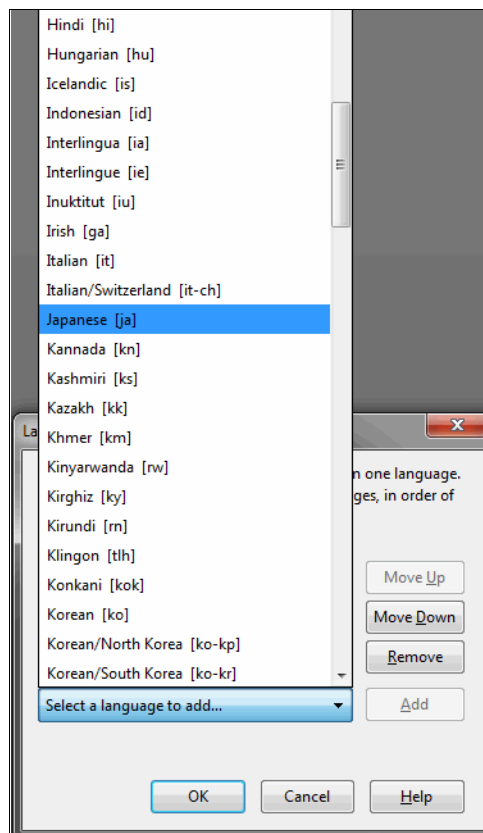


Figure 3-13 Setting language in Firefox browser

After you select the language, click **Add** and then move the language up by clicking **Move Up**. After you moved the selected language, click **OK** to close the window (Figure 3-14 on page 105).

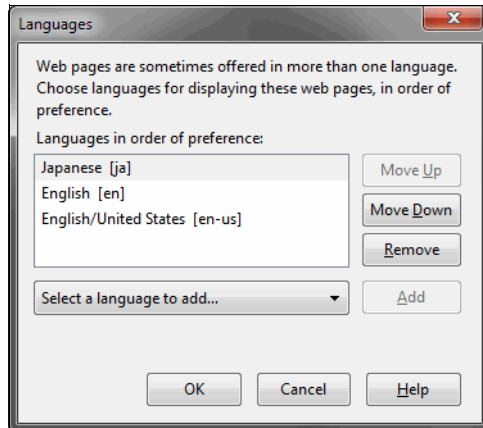


Figure 3-14 Preferred languages

Restart the Firefox browser or reload the browser web page, and you see the Tivoli Storage Productivity Center logon window in the selected language, as shown in Figure 3-15.



Figure 3-15 Tivoli Storage Productivity Center logon in selected language

After you log on to Tivoli Storage Productivity Center, your web-based GUI will be in the Japanese language, as shown in Figure 3-16 on page 106.

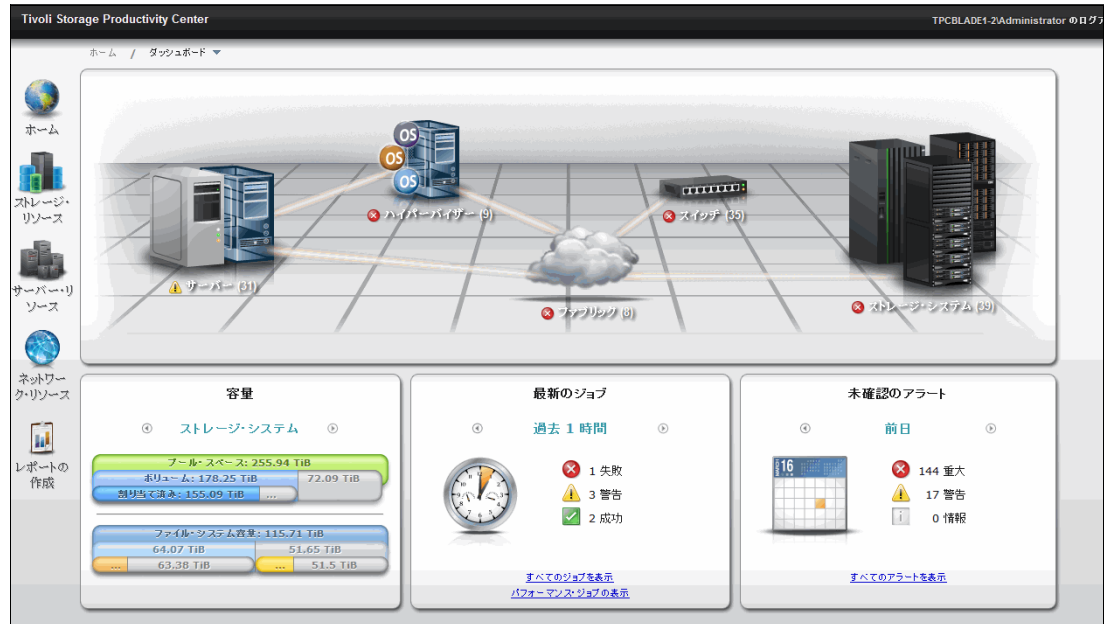


Figure 3-16 Web-based GUI in Japanese language

### Web browsers certificate errors

When you first try to log on to web-based GUI by using Internet Explorer or Mozilla Firefox web browser, you encounter the certificate error. This is normal because web-based GUI is forced into an encrypted connection (https), and by default, web-based GUI is using “self-signed” certificates for encryption. All browsers will initially complain about these “self-signed” certificates but connections are still encrypted and secure. “Self-signed” certificates cannot be authenticated with trusted third party.

If you try to log on to web-based GUI by using unencrypted connection (http) on the unencrypted port, Tivoli Storage Productivity Center will forward you to the encrypted port. This is done to protect passwords and any other user-specific information. This does have a negative side effect of dealing with the certificate errors.

By using Internet Explorer, you get the certificate error warning as shown in Figure 3-17. To bypass this warning, click “Continue to this website” and the web-based GUI logon will show up.

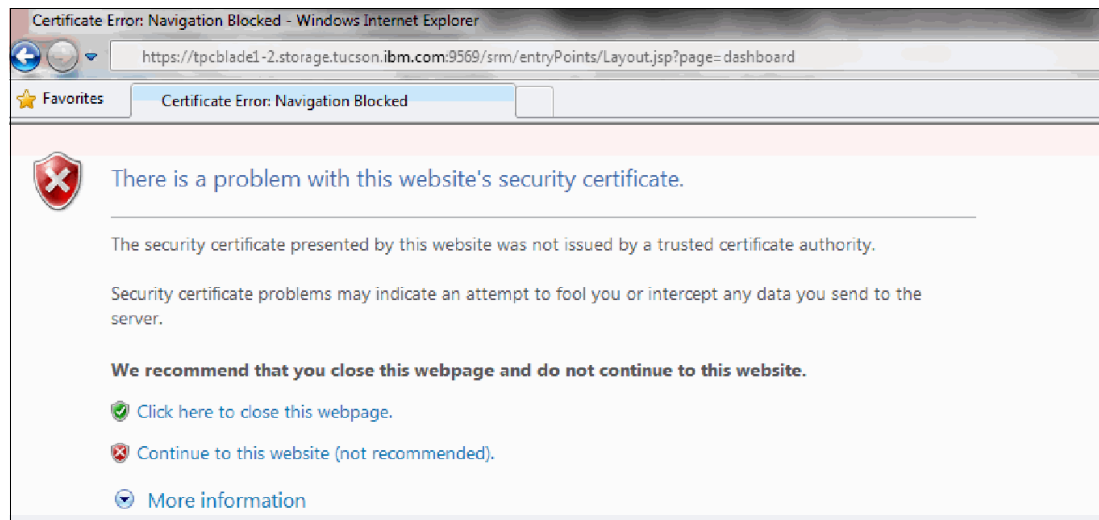


Figure 3-17 Internet Explorer certificate error

Internet Explorer continues to warn about certificate error (Figure 3-18). Therefore, every time you access the web-based GUI, you need to click through the warning.

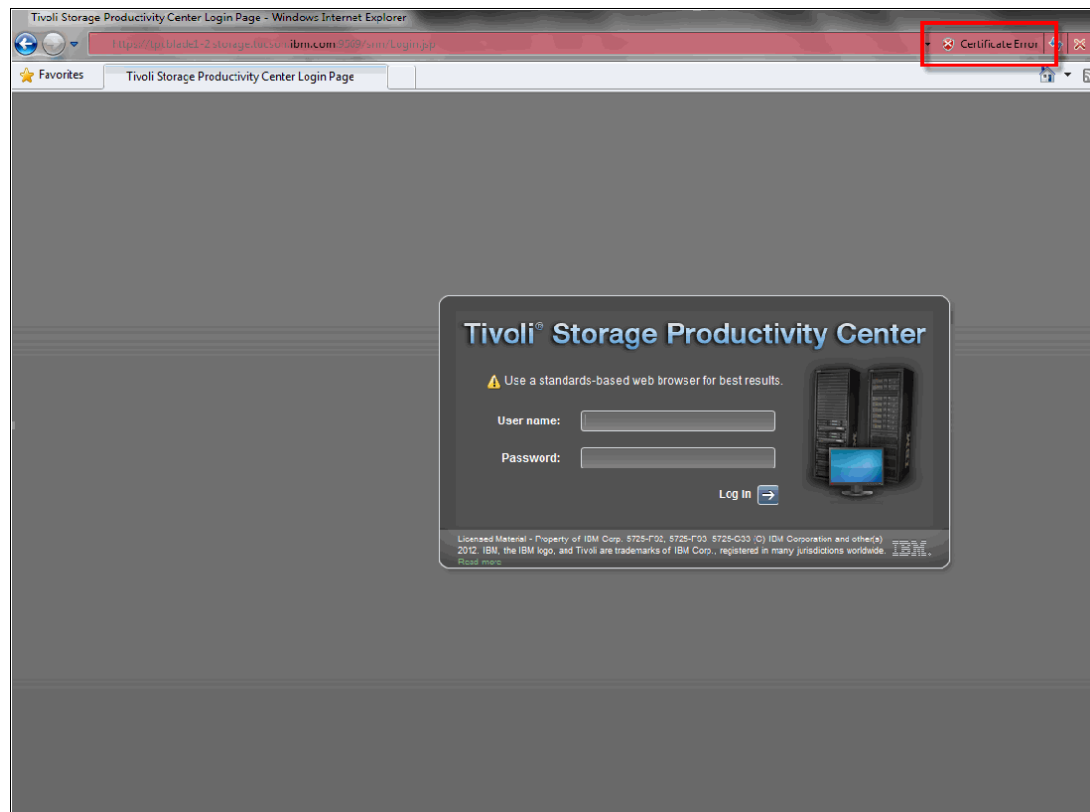


Figure 3-18 Internet Explorer certification error

By using Mozilla Firefox, you get the certificate error warning as shown in Figure 3-19. To bypass this warning, click **Add Exception**, which opens a new window where you confirm the exception and permanently store the certificate (Figure 3-20).

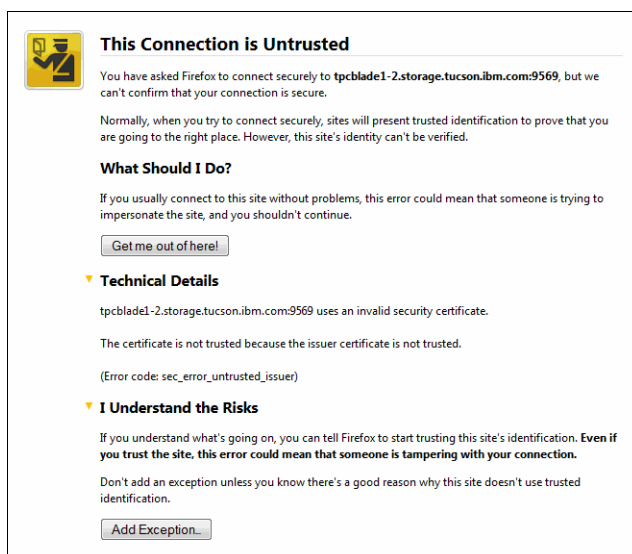


Figure 3-19 Mozilla Firefox certification error

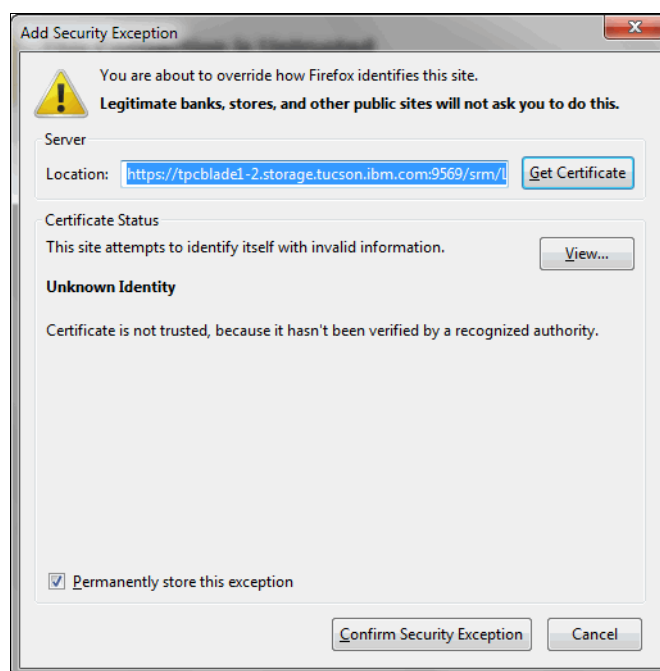


Figure 3-20 Confirm security exception in Mozilla Firefox

### **Web-based GUI session timeout**

If your web-based GUI session is timed out, the login page is displayed and you need to log in again (Figure 3-21).



*Figure 3-21 Web-based GUI timeout*

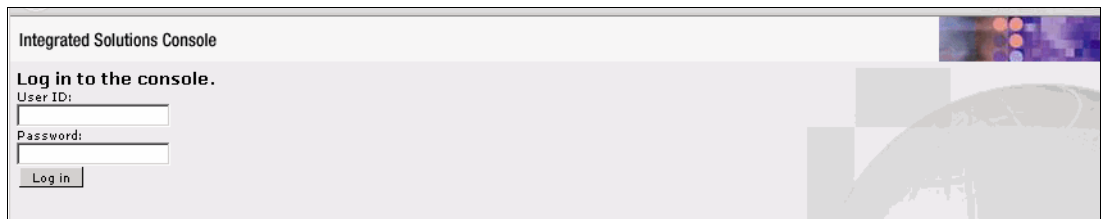
Default web-based GUI timeout is 480 minutes. If you want to change this value, you need to log in to eWAS (Integrated Solutions Console) where you can change the Lightweight Third Party Authentication (LTPA) timeout value.

**Note:** LTPA is an authentication technology used in IBM WebSphere. When the user has been authenticated, its browser will have received a session cookie: a cookie that is only available for one browsing session. The timeout value is set up for that session cookie.

To log in to eWAS, use the following link:

**`https://<hostname>:9574/ibm/console/logon.jsp`**

The window in Figure 3-22 opens.



*Figure 3-22 eWAS (Integrated Solutions Console)*

After you log in to eWAS with your Tivoli Storage Productivity Center user, go to the **Security** menu and select **Global security**. In the panel on the left side, select and click **LTPA** (Figure 3-23).

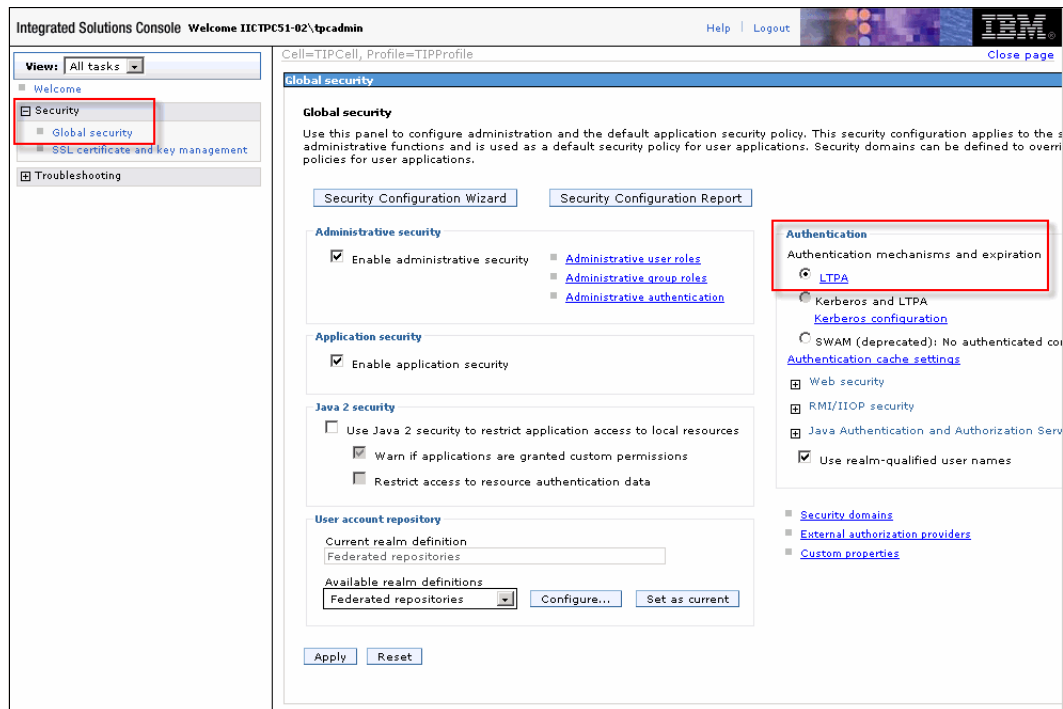


Figure 3-23 eWAS: Global security

After you click the LTPA link, the following panel opens where you can change the timeout value (Figure 3-24 on page 111).



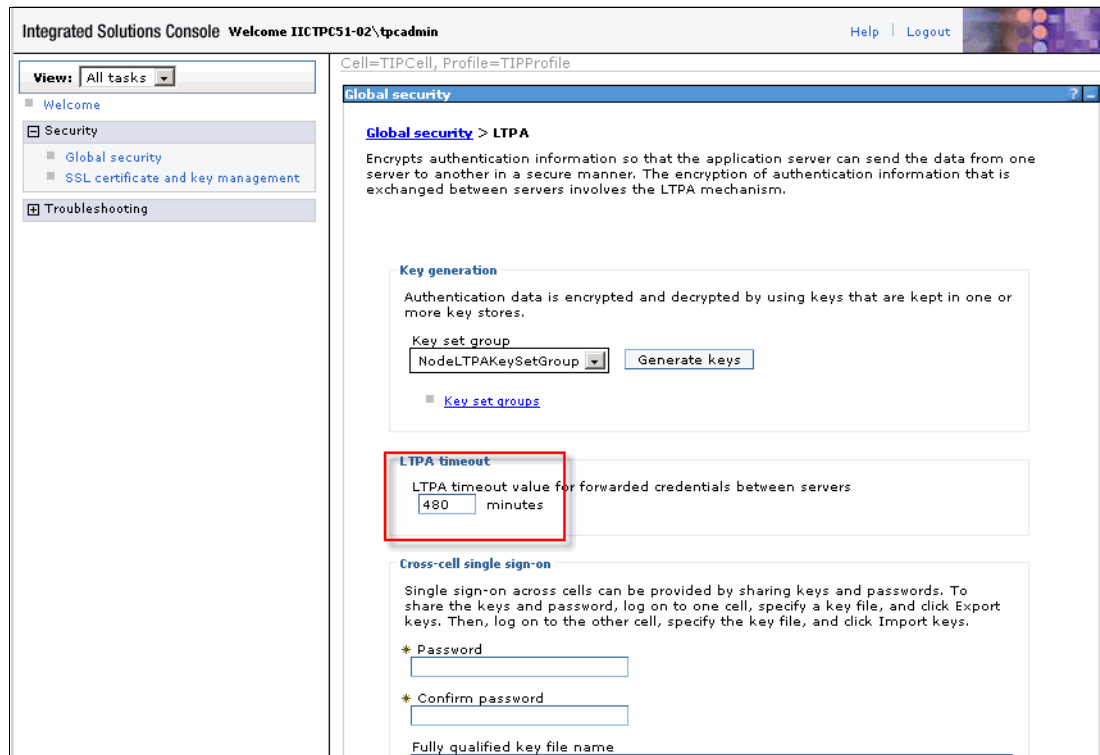


Figure 3-24 Web-based GUI timeout value

### Web-based GUI: User access rights

To access the web-based GUI, you can use your defined Tivoli Storage Productivity Center users. At the time of the writing of this book, there are no user access rights for the web-based GUI interface. All users logged on to web-based GUI have read-only access.

## 3.1.5 Starting the new web-based GUI

There are several ways to start the web-based GUI. You can use one of the following methods:

- ▶ Use your browser to access the new web-based GUI
- ▶ Use your browser to log on to the Tivoli Integrated Portal, and then choose web-based GUI
- ▶ Use Remote Desktop Manager to log on to Tivoli Storage Productivity Center server. Or, if you are logged on directly to Tivoli Storage Productivity Center server, you can go to **Start** → **All Programs** → **IBM Tivoli Productivity Center** and then choose **Web-based GUI**.

To use your browser to access the new web-based GUI, open your browser and use the following URLs:

**https://hostname:9569/srm**

**https://hostname:9569/srm/Login.jsp**

Because this is a normal web URL access process, you do not need to put in the Fully Qualified Host Name (FQHN), and you are permitted to use the Tivoli Storage Productivity Center server's TCP/IP address. You can see from Figure 3-25 on page 112 that we used the host name in the address **https://iictpc51-02:9569/srm/Login.jsp** to get to the Tivoli Storage Productivity Center GUI login panel.

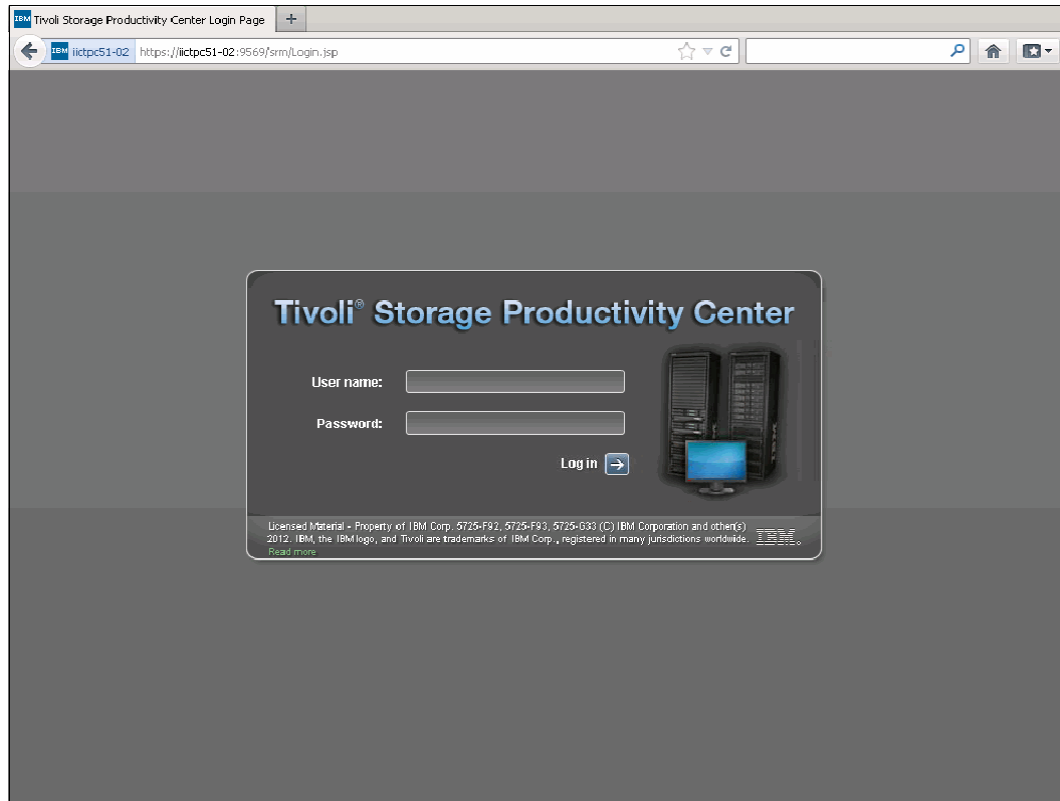


Figure 3-25 Web-based GUI: Browser login

To use the Tivoli Integrated Portal to access the new web-based GUI, open your browser and use the following URL to log on to Tivoli Integrated Portal:

**`https://hostname:9569/ibm/console`**

Figure 3-26 on page 113 shows you the Tivoli Integrated Portal login screen.

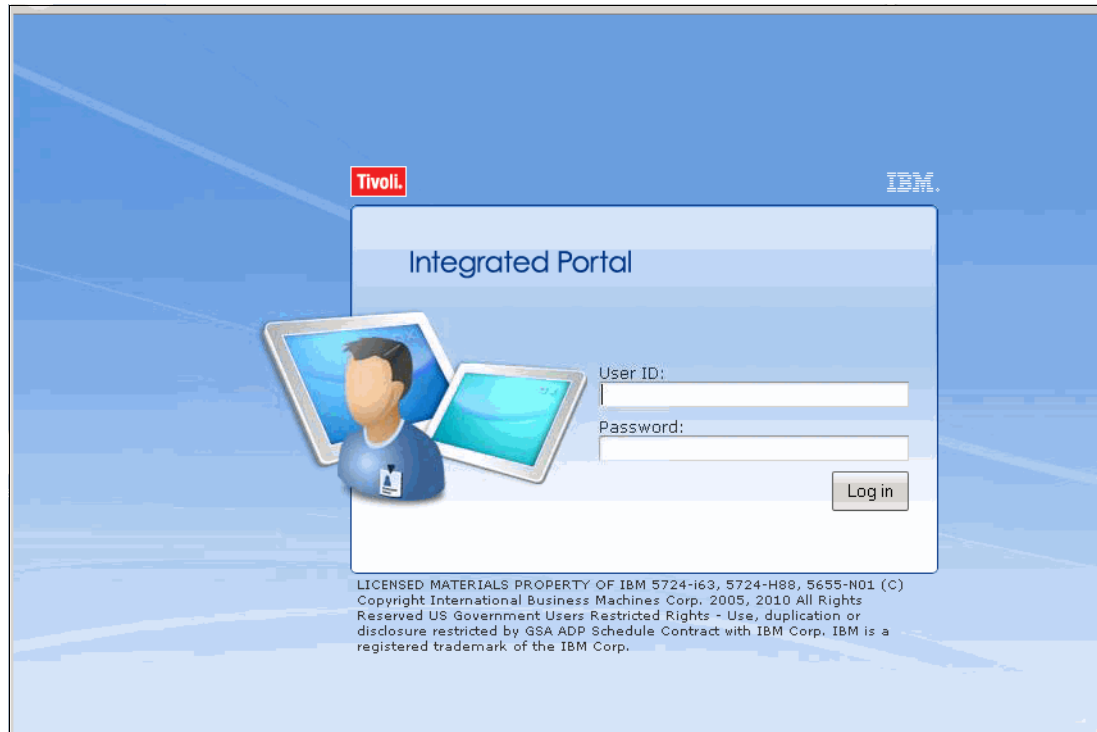


Figure 3-26 Tivoli Integrated Portal login screen

After you log on to Tivoli Integrated Portal, the panel in Figure 3-27 opens.

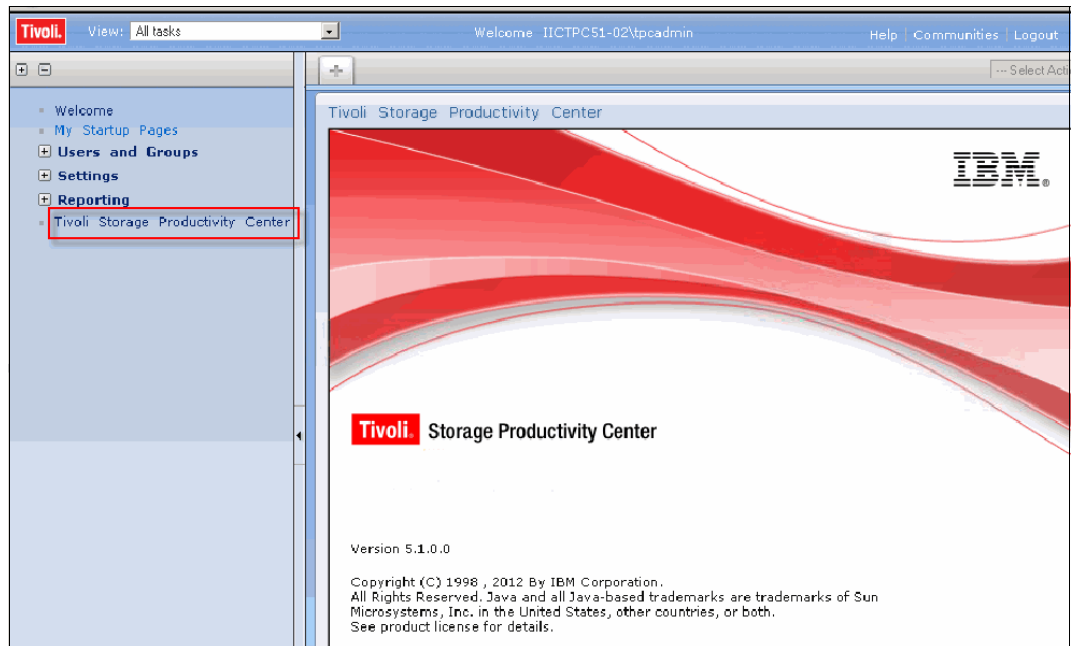


Figure 3-27 Tivoli Storage Productivity Center link in Tivoli Integrated Portal

Click the **Tivoli Storage Productivity Center** link, which is shown in the red box in Figure 3-27, and the panel with Tivoli Storage Productivity Center GUI links opens. See Figure 3-28 on page 114.

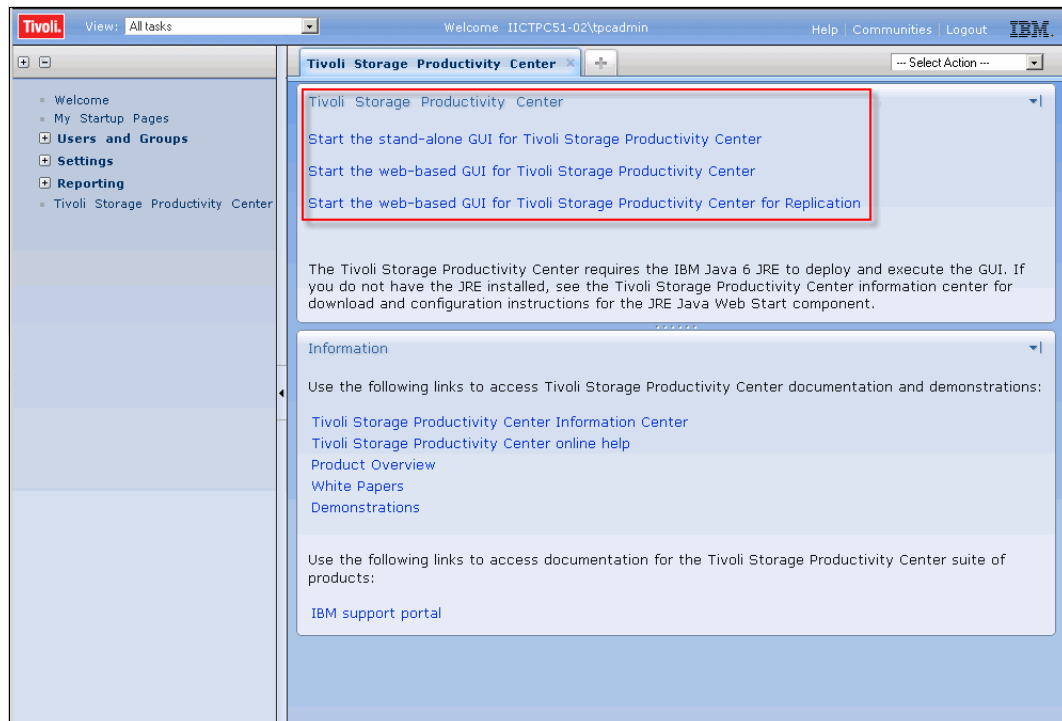


Figure 3-28 Tivoli Storage Productivity Center GUI links in Tivoli Integrated Portal

Click **Start the web-based GUI for Tivoli Storage Productivity Center** and the new Web-based GUI opens in a new window.

You can also use Remote Desktop Manager to connect to the Tivoli Storage Productivity Center server. Or, if you are logged on directly to the Tivoli Storage Productivity Center server, you can go to **Start → All Programs → IBM Tivoli Storage Productivity Center** and then choose **Web-based GUI**. If you are on the Tivoli Storage Productivity Center server, using this method is the quickest. Figure 3-29 on page 115 shows you the Start menu from the Tivoli Storage Productivity Center server.

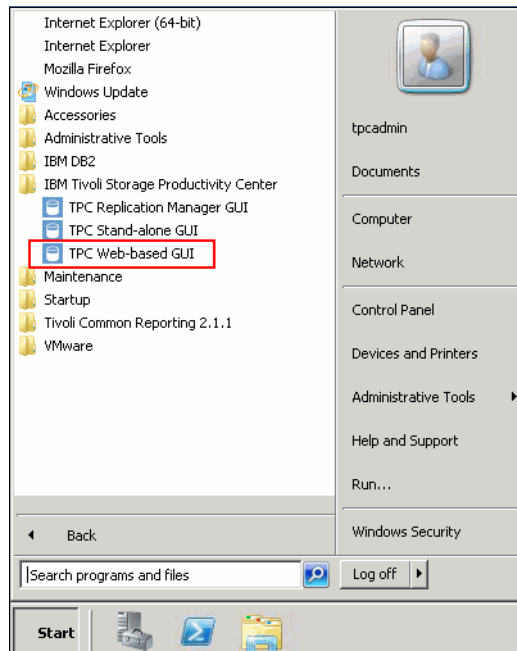


Figure 3-29 Web-based GUI program from the Start menu

## 3.2 The new web-based GUI details

In this section, we describe the new web-based GUI in more detail with its key functions and we show how easily, quickly, and intuitively you can navigate through the new web-based GUI to display structured information, acknowledge alerts and health status, and export required information.

### 3.2.1 Storage environment basics

In a typical storage environment, several components are involved. Server systems communicate over a storage area network (SAN) or over an Ethernet network with the storage systems. Figure 3-30 on page 116 shows this principle and the terms used in the new web-based GUI. The new web-based GUI uses the terms: *Storage System*, *Fabric*, *Switch*, *Hypervisor*, and *Server* and categorizes those as top-level resources. Use Tivoli Storage Productivity Center to monitor the resources in your environment (storage related).

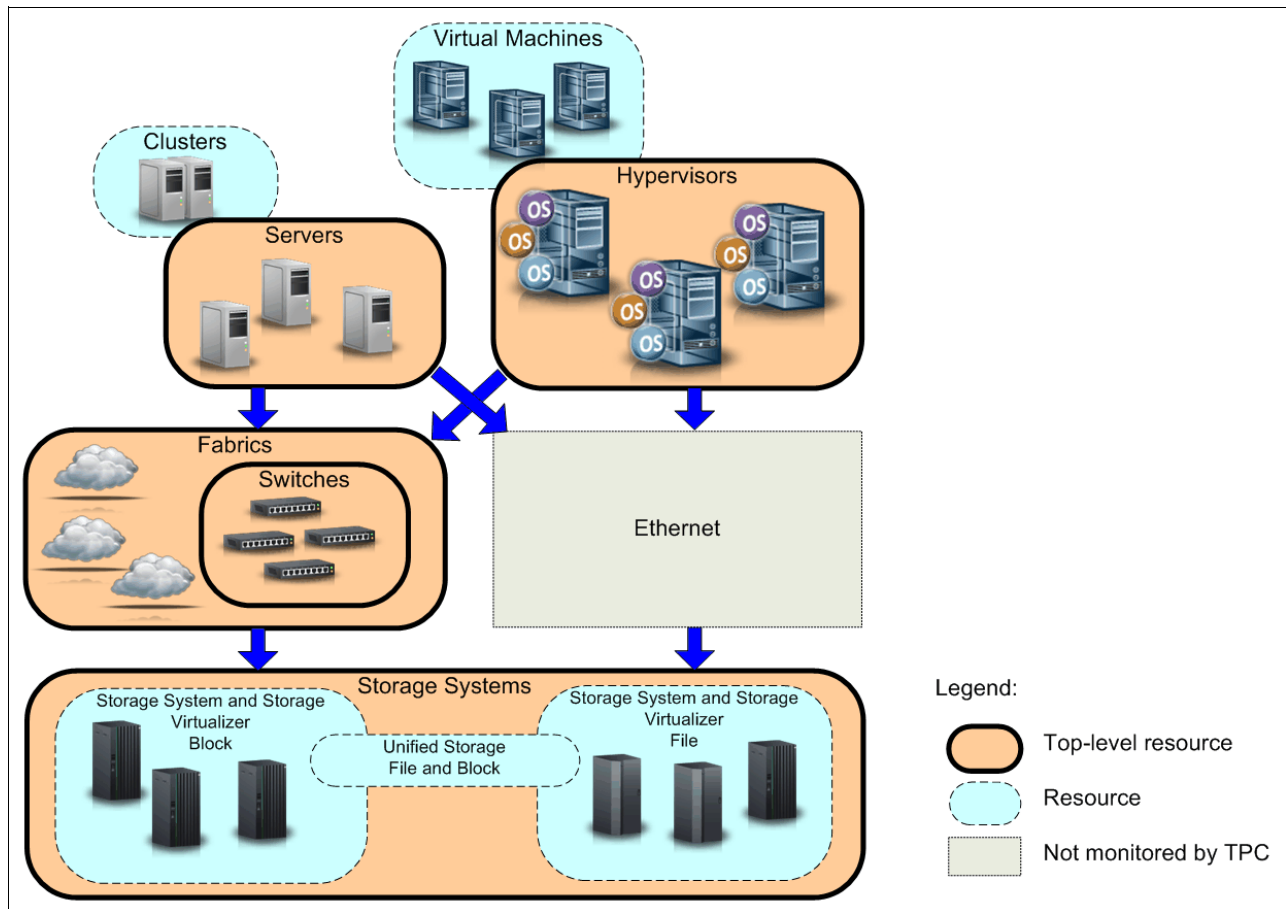


Figure 3-30 Storage Environment overview

A *Storage System* can be just a storage virtualizer or a storage system with internal physical disks, or it can be a mixture of both. The new web-based GUI divides between Block Storage and File Storage and shows the related information. Block Storage Systems typically provide the iSCSI and Fibre Channel (FC) protocols, whereas File Storage Systems provide, for example, the protocols Common Internet File System (CIFS) and Network File System (NFS).

A *Hypervisor* is a layer of software or a physical device that manages multiple, virtual instances of operating systems on the same hardware. Hypervisors include VMware vSphere data sources such as ESX, ESXi, and vCenter servers.

*Virtual machines* (VMs) are virtual servers associated to a Hypervisor. Those are also shown in the new web-based GUI when the Hypervisor is monitored by Tivoli Storage Productivity Center. In addition, a virtual machine is also shown as a *Server* in case the virtual machine is monitored by Tivoli Storage Productivity Center, which means, it requires a Storage Resource Agent (SRA) installed on the virtual machine.

Besides the virtual machines, Tivoli Storage Productivity Center is also able to identify cluster resources. If a Server belongs to a supported cluster software, the new web-based GUI shows cluster-related information for that server.

A *Server* can be a VM on a Hypervisor or a physical server. A server may have FC controllers (HBAs) to access Block Storage over the SAN. An SRA on the server is required to be monitored by Tivoli Storage Productivity Center.

The *Fabric* belongs to a storage area network (SAN), which enables the communication between the connected devices. A Fabric typically is a set of SAN Switches that are interconnected by inter-switch links (ISLs). For redundancy, often two Fabrics are used in a SAN.

The SAN *Switches* belong to a Fabric. Devices such as Storage Systems, other Switches in the Fabric, Hypervisors, Servers, Tape Libraries, and more can be connected to it.

The *Ethernet* network is typically used for data communication, for example, between servers and clients, but it also can be used to access file storage data on a storage system. The Ethernet network can contain several routers, gateways, and switches. Those components are not intended to be monitored or managed by Tivoli Storage Productivity Center.

To get the best picture of your storage environment, we recommend collecting as much information as possible with the Tivoli Storage Productivity Center server. Therefore, Tivoli Storage Productivity Center is able to link and display all the related resources and information. In the new web-based GUI, you can find many hyperlinks and tables that help you to navigate from one resource to the next related resource.

### 3.2.2 Structure and navigation

The new web-based GUI contains several helpful components and functions, which are described here.

The new web-based GUI is structured into following sections:

- ▶ Banner (1)
- ▶ Bread Crumbs (2)
- ▶ Navigation pane (3)
- ▶ Working space(4)

Refer to Figure 3-31 on page 118 and the following sections for more details about these sections in the web-based GUI identified by the numbers from one to four.

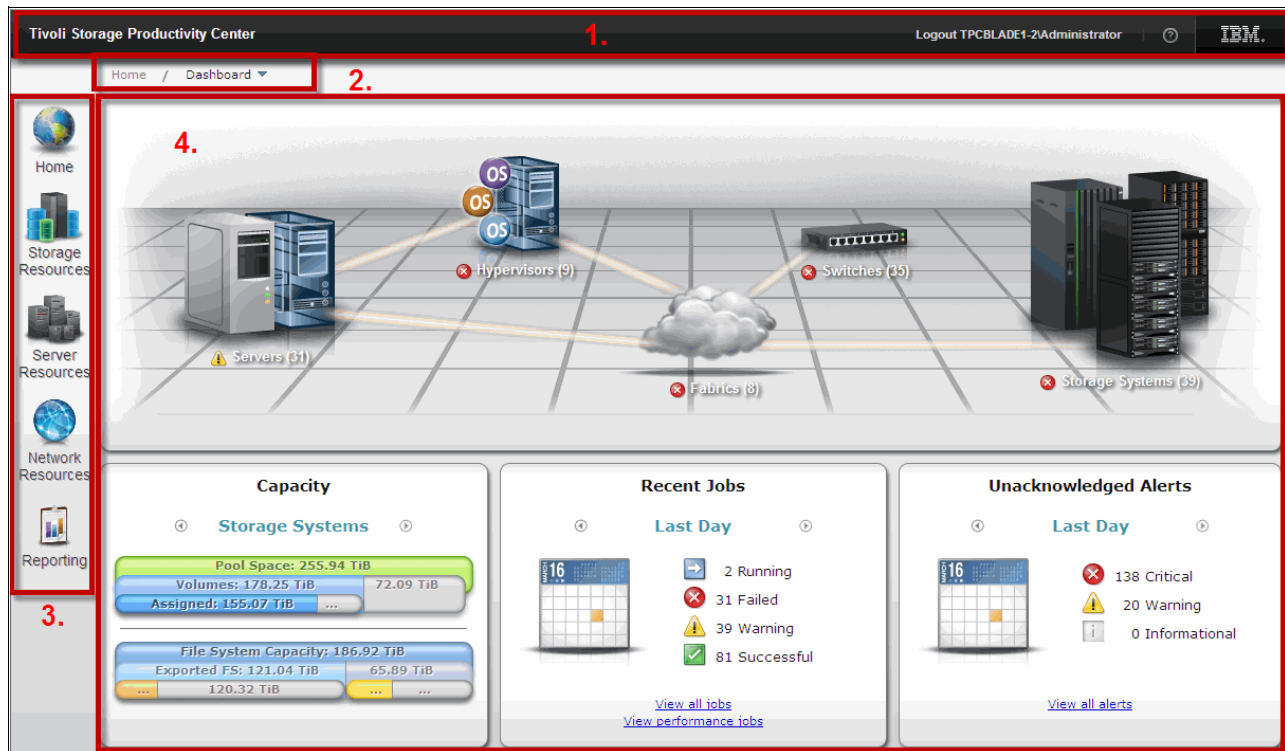



Figure 3-31 The new web-based GUI structure

### The banner (1)

The *banner* (see Figure 3-31, section number 1) is permanently displayed during the user session and shows beside the product name, the user name of the currently logged in user. This can be a local user or a domain user. There are three functions provided by the banner:

- ▶ Log out the current user by clicking the logout button in the upper-right corner  
TPCBLADE1-ZAdministrator
- ▶ Displays the connection status of the web-based GUI to the Tivoli Storage Productivity Center server at the lower-right corner below the banner in case data is loading **Loading...** or the web-based GUI cannot connect to the Tivoli Storage Productivity Center server anymore **Offline**
- ▶ Open the Tivoli Storage Productivity Center Help for the current window by clicking the **Help** icon  in the upper-right corner in the banner

### Bread crumbs (2)

The *bread crumbs* (see Figure 3-31, section number 2) is related to the *navigation pane* in the new web-based GUI and helps to quickly navigate through the web-based GUI. The bread crumbs is a GUI element showing the path of the current location of the user in the web-based GUI. With the bread crumbs, you can drill-up one level by clicking the upper level in the path or click the lowest element in the path, which opens a drop-down menu where you can select another item from the list.

**Note:** The bread crumbs show up to 20 resources in the drop-down list. If the number of entries exceeds 20, the bread crumbs will show 20 entries and the label **More...** at the end of the list. By clicking the label **More...** you will be forwarded to the complete resource list.



Table 3-6 shows the available paths provided by the bread crumbs function. For example, for the hypervisor **tpcvm2.storage.ibm.com**, the path would be: **Server Resources / Hypervisors / tpcvm2.storage.ibm.com**. The bread crumbs can have the following path elements.

Table 3-6 Navigation paths

Category	Resource group	Top-level resource
Home	Dashboard	None
	Alerts	
	Jobs	
Storage Resources	Storage Systems	Specific Storage System
	Volumes	
	Pools	
Server Resources	Servers	Specific Server
	Hypervisors	Specific Hypervisor
Network Resources	Switches	Specific Switch
	Fabrics	Specific Fabric

Figure 3-32 shows an example of bread crumbs for a specific storage system. To choose another storage system, click the displayed storage system name in the bread crumbs, which opens a drop-down list.

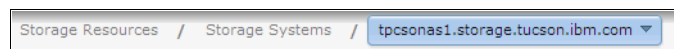


Figure 3-32 Example bread crumbs

You easily can swap to another system by clicking the drop-down menu at the bread crumbs and select another storage system, as shown in example Figure 3-33.

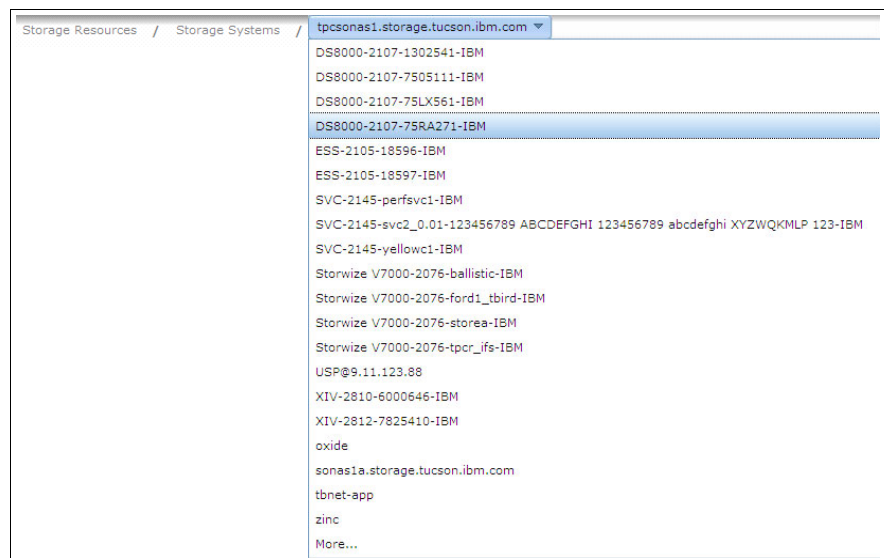


Figure 3-33 Example bread crumbs drop-down list

### Navigation pane (3)

The *navigation pane* (see Figure 3-31 on page 118, section number 3) is displayed all the time during the user session. It shows the category icons and provides a quick navigation to the data levels 1 and 2.

To access a *resource group* at level 2, hover your mouse over the resource icon, for example over **Storage Resources** in the navigation pane, which automatically opens a list of the related items, as shown in the example Figure 3-34. Click one item in the list, which forwards you to the selected resource group.



Figure 3-34 Example navigation pane for Storage Resources

Figure 3-35 on page 121 shows all available navigation paths from the navigation pane to the items at data level 1 and 2 in the new web-based GUI. On the left side of the figure, you see the Navigation Pane; in the middle, the data level 1; and on the right, the data level 2 items. From the Navigation Pane, the data level 3 (Detail View) cannot be reached directly. The “Reporting” icon at the bottom of the Navigation Pane offers hyperlinks to the reporting (Tivoli Common Reporting).

At data level 1, you can access the Dashboard, the Alerts, and Jobs by using the **Home** icon in the Navigation Pane. The data level 1 gives you the overall information of your storage environment.

At data level 2, you can access the Storage Systems, Servers, Hypervisors, Fabrics, and Switches by using the **Resource** icons in the Navigation Pane. The data level 2 gives you the overall information per resource type.

**Note:** The data level 2 items **Pools** and **Volumes** are exclusive accessible by the Navigation Pane or bread crumbs and include all monitored Pools and Volumes of the storage environment.

Refer to “Data levels” on page 122 for more explanations about the data levels in the new web-based GUI.

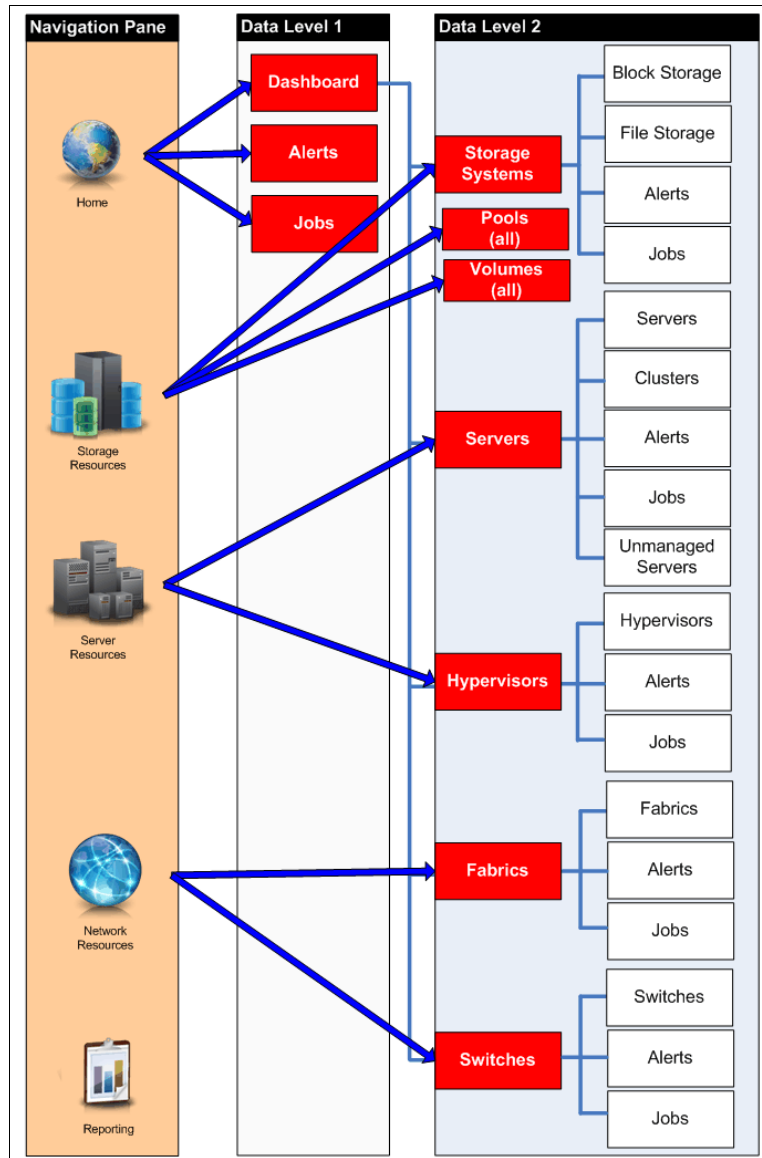


Figure 3-35 Direct paths when using the navigation pane

## Working space (4)

The *working space* (see Figure 3-31 on page 118, section number 4) is the area in the new web-based GUI where the actual information is displayed and where actions can be performed.

The *dashboard* view is the first displayed panel in the working space after a login and can also be reached over the **Home** icon in the Navigation Pane. The dashboard provides an overall view of the complete managed environment. Use the dashboard to monitor the overall status of monitored resources and identify potential problem areas in a storage environment. You can learn about the status and capacity of resources, the jobs that are running monitoring actions, and the unacknowledged alert conditions that were detected.

**Tip:** The *working space* often provides hyperlinks to related items. You can open the hyperlinks in a new browser tab or new browser window if you want. For example, you can open several level 3 views of storage systems in parallel. Since the standard browser right-click does not work in the web-based GUI, use the keyboard short keys instead. For example, for the Firefox browser, use **<Ctrl>** and **left-click** the hyperlink to open it in a new tab in the browser.

Beside the dashboard, each level in the web-based GUI uses the working space to display information and to provide functions. Refer to 3.2.4, “The new web-based GUI data level 1: The dashboard” on page 144 and further for more information about the working space.

## Relations

The Figure 3-36 shows all major components of the new web-based GUI. The data source for the web-based GUI is the Tivoli Storage Productivity Center database whereas the Tivoli Common Reporting (Cognos) is used to create reports. The figure also shows the relationships between the components and therefore it is possible to follow these relations through the new web-based GUI.

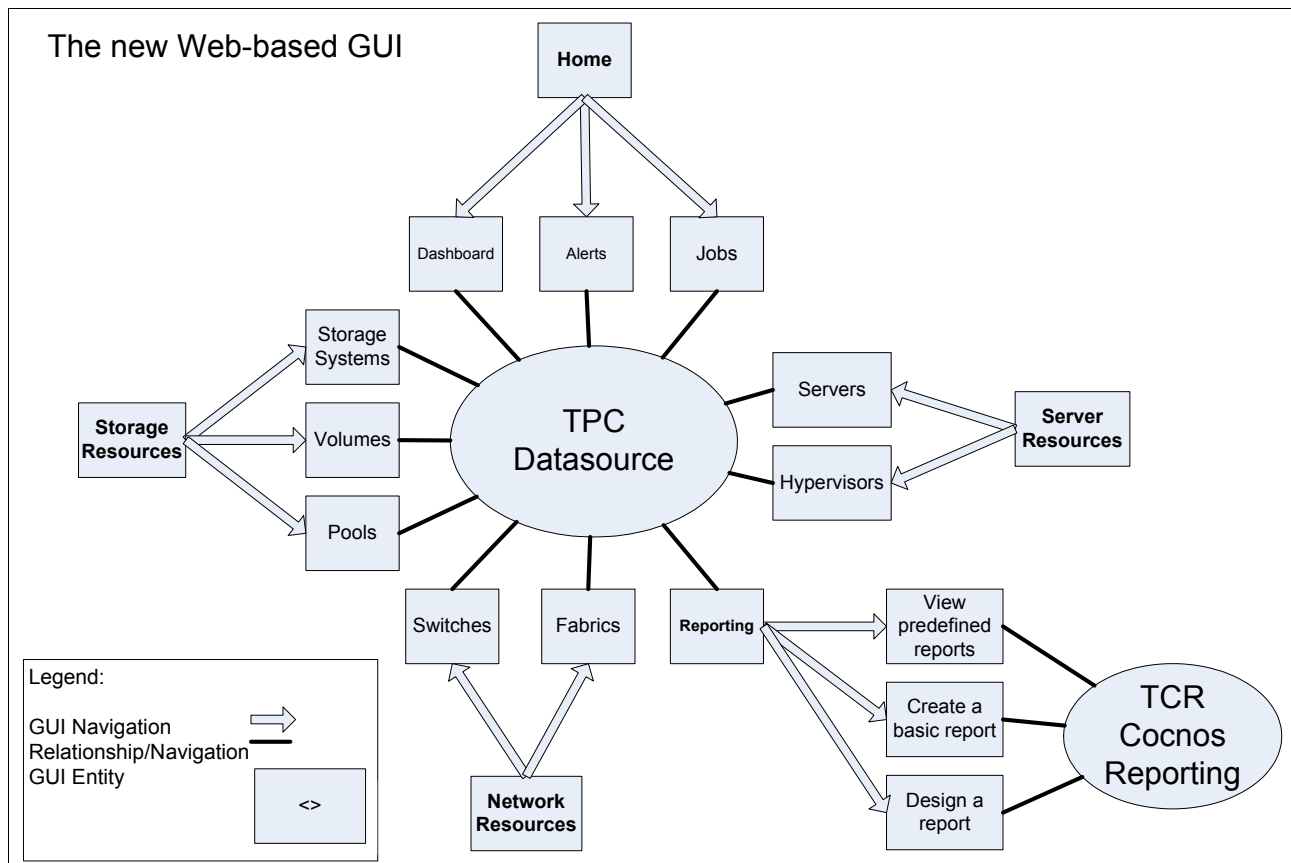


Figure 3-36 The new web-based GUI: Components and relations

## Data levels

The new web-based GUI provides the information in different levels. The higher the level, the more consolidated and filtered is the amount of information. You easily can navigate through all the levels within the web-based GUI. The following data levels are available:

- Data Level 1: Dashboard, Alerts, Jobs

- Data Level 2: Table view per resource type
- Data Level 3: Detail view of a specific top-level resource

*Data Level 1* is the highest level in the web-based GUI, which gives you an overall view of your environment. Figure 3-37 shows an example of a dashboard at level 1.

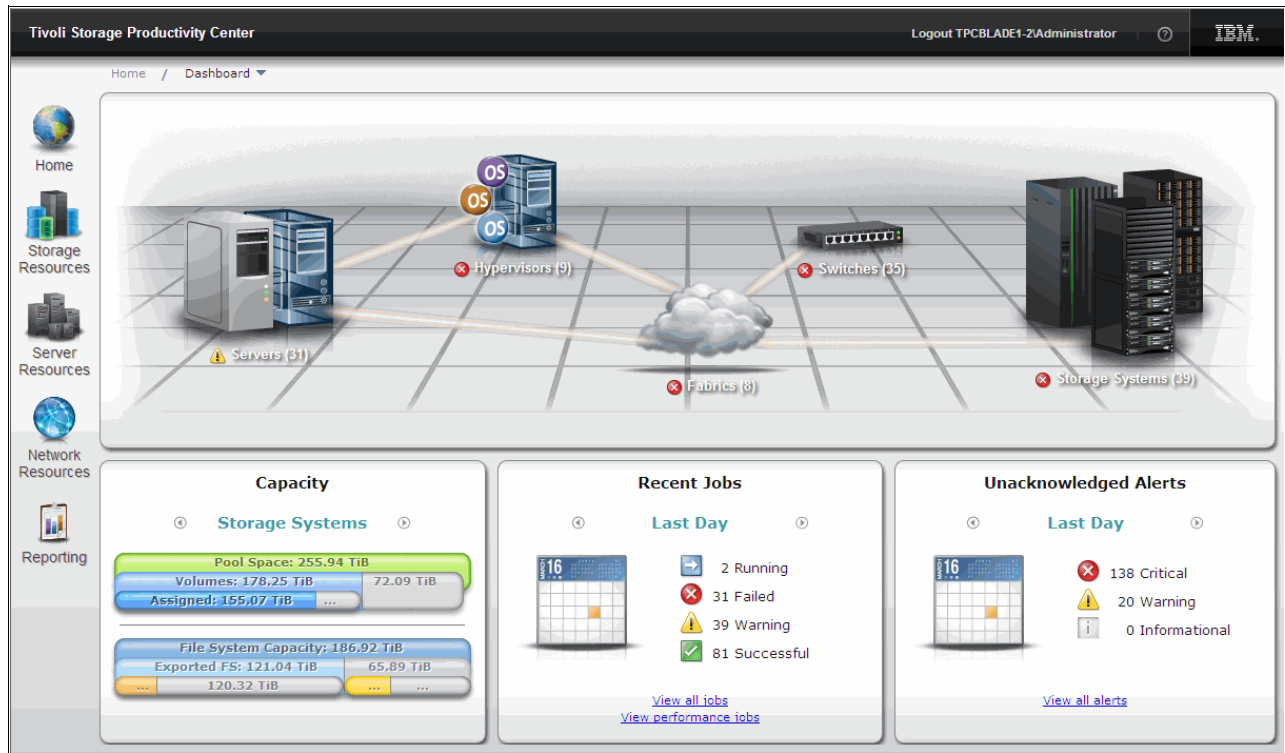


Figure 3-37 Level 1: Dashboard

*Data Level 2* provides a view that is based on the resource type. For example, all servers can be listed in a table including several properties such as host name, OS type, IP address, disk space, and much more. Figure 3-38 on page 124 shows an example of the hypervisors at level 2.

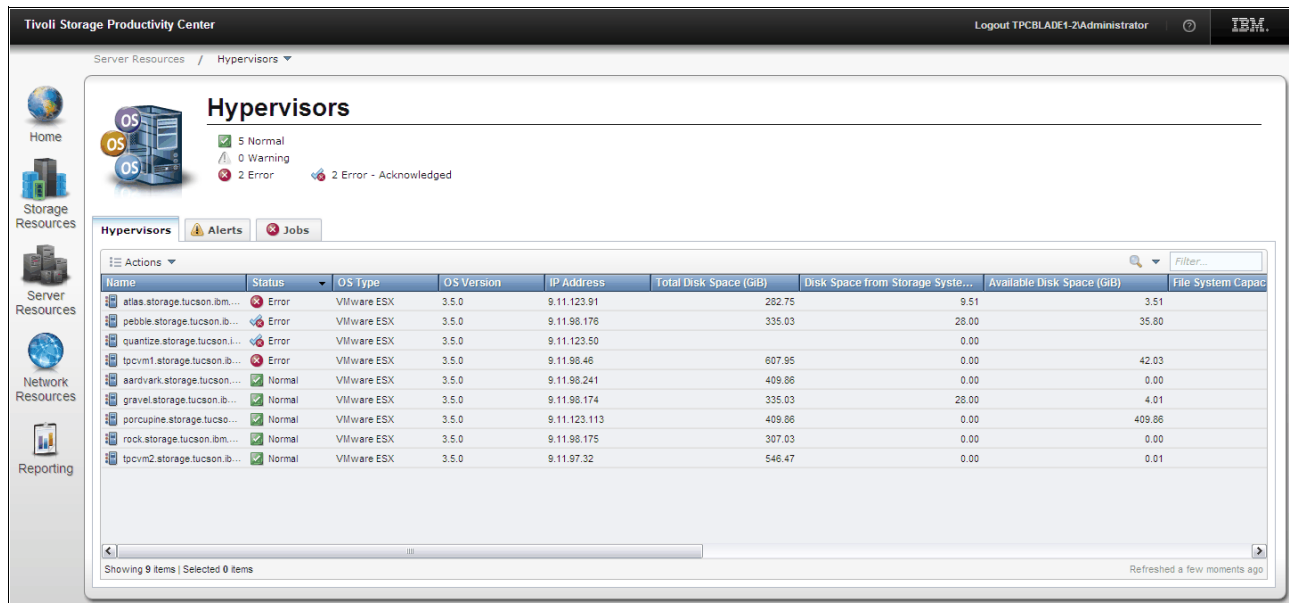


Figure 3-38 Level 2: Hypervisors

*Data Level 3* provides the details about a top-level resource. A top-level resource can be a storage system, server, hypervisor, fabric, or switch. Level 3 is also called the *Detail View*. For example, you see a specific server historical space capacity chart, a capacity pyramid graph, file system details, related resources such as SAN ports, and much more. Figure 3-39 shows an example of a specific hypervisor called *atlas* at level 3.

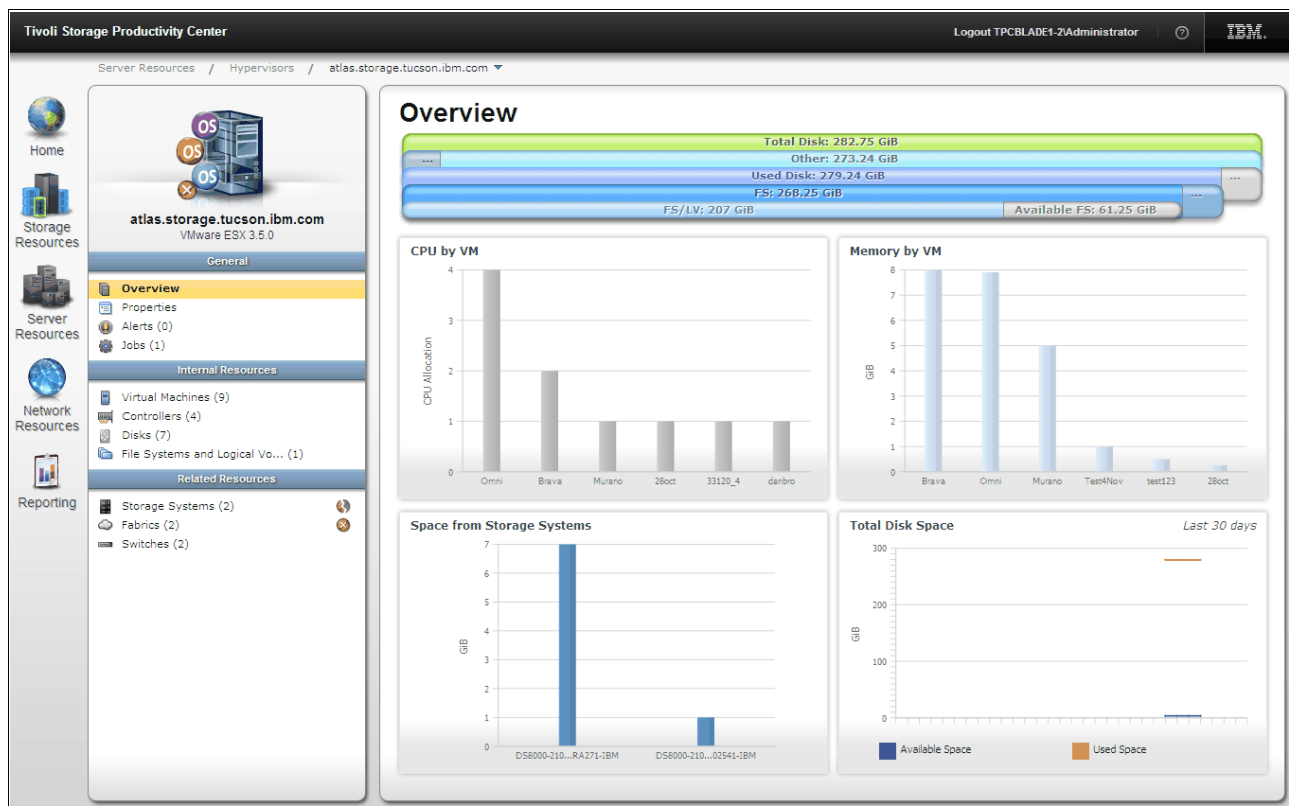


Figure 3-39 Level 3: Hypervisor

See Figure 3-40 for details about the data levels within the web-based GUI. The figure shows all three levels from the left to the right, including the components and relations.

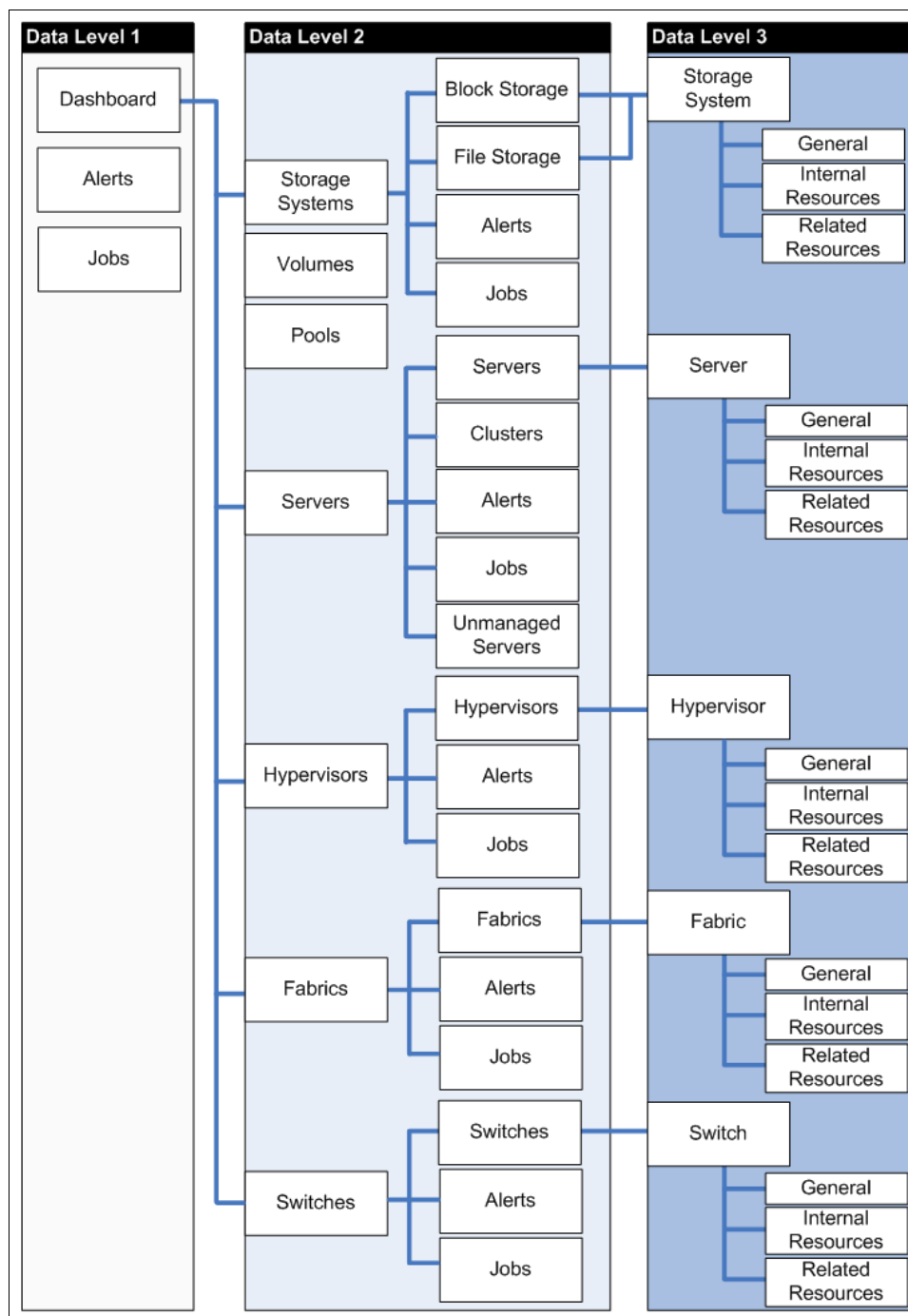




Figure 3-40 The Web-based GUI data levels

## Carousels

*Carousels* were introduced with Tivoli Storage Productivity Center Version 5.1. It reduces the required space in the web-based GUI and logically keeps correlated information together. It allows you to cycle a component in the chart, which displays you different views of the same subject.

Figure 3-41 shows a schematic example of such a carousel. By clicking the  or  icon, you can change the displayed chart. In this example, you can display the chart called *Overall System Activity* with different metrics by cycling the carousel. In this example, you can display the chart with: Data Rate, Response Time, Cache Hits, or I/O Rate.

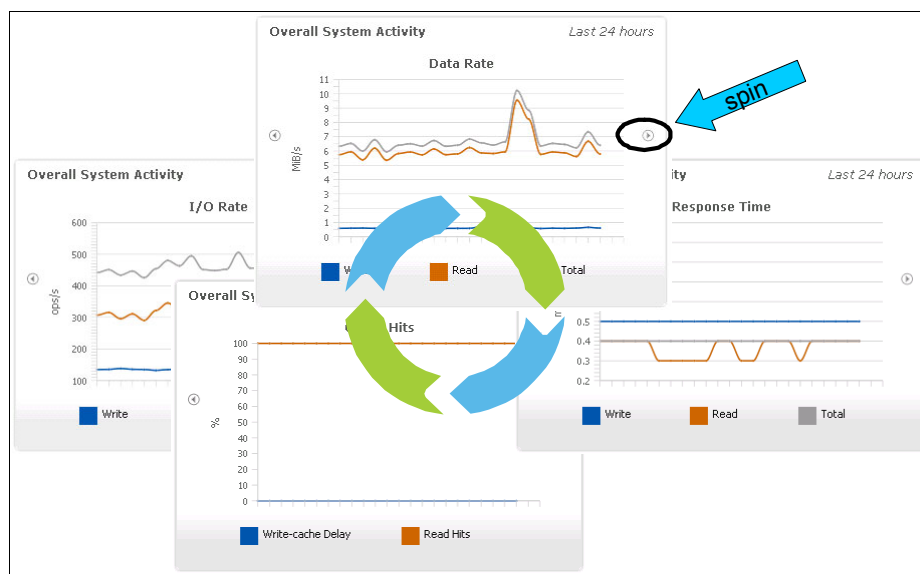



Figure 3-41 Cycle the carousel

## Refreshes

By default, the web-based GUI is refreshed with data from the Tivoli Storage Productivity Center server automatically every 120 seconds. Large tables are not automatically updated to avoid pause times for the user. At large tables, the user needs to refresh the data manually if needed by clicking the refresh button  Refresh on the upper-left corner of the table.

On tables, the web-based GUI shows the last data refresh time at the right-bottom corner.

## 3.2.3 Major web-based GUI elements

In this section, we describe elements in the web-based GUI that will help you use the information provided and navigate through the GUI.

### GiB versus GB

To avoid miscalculations and surprises, it is important that you understand the measurement units in which computing capacities are expressed. We have bits and bytes, megabytes, and gigabytes. How large is a gigabyte? It depends how you calculate it. When disk vendors discuss storage capacity, they usually are presenting it in powers of 10 so that 1 Gb is  $10^9$  (ten to the power of 9) or 1,000,000,000 bytes. When you format or report on the capacity of a storage device, the numbers are generally represented in a binary scale based on  $2^{10}$  or 1,024 bytes also termed a *kilobyte*.

Using this notation, 1 Gb of space in a file system is calculated as  $1024^3$ , which is equivalent to  $2^{30}$ , or 1,073,741,824 bytes. So if you format your new 1 Gb decimal drive, you will see only 0.93 GB binary. You are missing 7% of your space, and the effect gets more pronounced as the capacity grows. The table in Figure 3-42 on page 127 shows how space is calculated using the decimal and binary notation and the percentage that they differ calculated as the binary representation divided by the decimal representation minus one.



U n i t	d e c 1 0 ^ 3	b i n 2 ^ 1 0	b i n _ d e c %
1 - k i l o	1 0 ^ 3	2 ^ 1 0	2 %
2 - m e g a	1 0 ^ 6	2 ^ 2 0	5 %
3 - g i g a	1 0 ^ 9	2 ^ 3 0	7 %
4 - t e r a	1 0 ^ 1 2	2 ^ 4 0	1 0 %
5 - p e t a	1 0 ^ 1 5	2 ^ 5 0	1 3 %
6 - e x a	1 0 ^ 1 8	2 ^ 6 0	1 5 %
7 - z e t t a	1 0 ^ 2 1	2 ^ 7 0	1 8 %

Figure 3-42 Space difference with binary and decimal notations



Note that at the terabyte scale, we are off by around 10% that grows to 13% at the petabyte scale. That is also the reason why you only get around 55 GB of space on your notebook's 60 GB drive.

**Note:** Tivoli Storage Productivity Center presents all capacity value units consistently in kibibyte (KiB), mebibyte (MiB), gigibyte (GiB), or tebibyte (TiB) to avoid any confusions. Those units exclusively use the binary notation:

1 KiB =  $2^{10}$   
1 MiB =  $2^{20}$   
1 GiB =  $2^{30}$   
1 TiB =  $2^{40}$

### Quick context help

The new Tivoli Storage Productivity Center web-based GUI offers help information by just hovering the mouse over specific areas in the web-based GUI. It provides you related help information for an element in the GUI.

By hovering the mouse over specific elements in the web-based GUI, additional quick context help information is displayed. For example, hover the mouse over **Warning**; this action will display in this example the  icon. Then, hover the  icon to get the message displayed for this context, as shown in Figure 3-43.

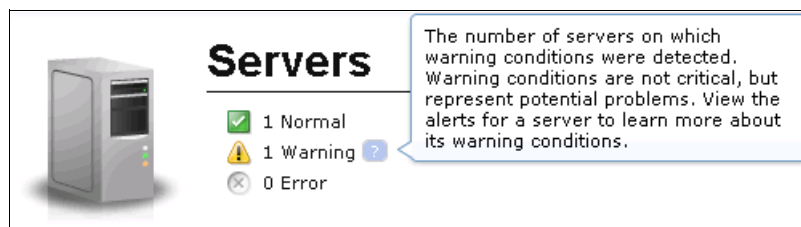


Figure 3-43 Example hover over warning

The hover function also works to display hidden text in the bar or line charts and capacity pyramids that cannot be displayed by default because of lack of space. Furthermore, it also can show the exact values at line and bar charts. See example Figure 3-44 on page 128, which shows the “Largest Pools” on a V7000 in a bar chart. When you hover the bar **internal\_mdg0**, it opens the quick context help with the details about this specific bar.

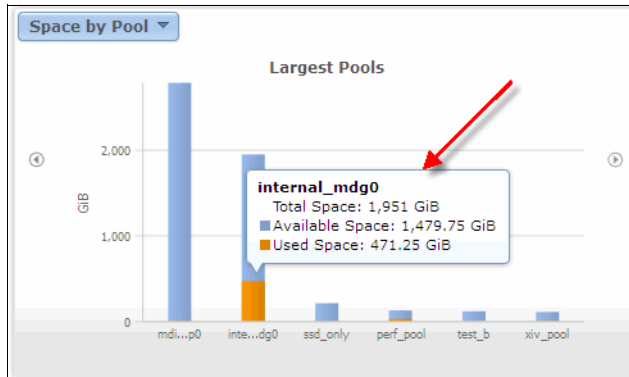


Figure 3-44 Example hover over bar

In addition, the hover function can also provide the alert message and number of each alert in the Alerts panel, including a hyperlink to the online help, which describes the message number in more detail. See example Figure 3-45.



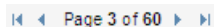
Figure 3-45 Example hover over alert

This included function provides a simple and fast explanation for an item, it improves validity of the information, and reduces research activities by the user.

## Tables

Tables are used to provide much information in a structured way and are widely used within the new web-based GUI. The layout of a table can be customized. The data in the table may contain text, numbers, and links to other items. The table content can be listed, filtered, selected, sorted, and if required, exported to a file. The tables contain relations to other items and related tables, and because of that, we can follow the relations through the GUI. Below, we explain the capabilities of the tables.

### Table size in the web-based GUI

The web-based GUI displays a maximum of 500 rows from the table. If you have more than 500 rows in a table, the web-based GUI shows the number of pages on the right-bottom of the table, whereas each page contains 500 rows. By clicking the forward or backward icon  , you can scroll through the pages.

**Note:** The table export, filter, and sort functions are not affected by this number. It only affects the number of displayed rows in the web-based GUI.

### Table tabs

A table can contain several tabs. Therefore, related tables are shown in the same view and you can easily swap between the tabs by selecting them. The example that is shown in Figure 3-46 shows the data level 2 view for Storage Systems where you can see the related table tabs:

- ▶ Block Storage
- ▶ File Storage
- ▶ Alerts
- ▶ Jobs

The screenshot shows the 'Storage Systems' table in a web-based GUI. At the top left, there is a summary of system status: 15 Normal, 2 Warning, 10 Unreachable, and 12 Error. Below this, a row of four tabs is visible: 'Block Storage', 'File Storage', 'Alerts', and 'Jobs'. A red rectangular box highlights these tabs, and a red arrow points from the status summary area to the 'Block Storage' tab. The main table below has columns: Name, Status, Acknowledged, Raw Disk Capacity (GiB), Pool Capacity (GiB), Available Pool Space (GiB), and Assigned. It lists various storage systems with their respective capacities and statuses. At the bottom, it shows 'Showing 37 items | Selected 0 items' and 'Refreshed a few moments ago'.

Figure 3-46 Example table: Tabs

### Modify the layout of the table

Sometimes it is required to change the default layout of a table. The adjustment of the tables column can be performed by right-clicking the header of the table. This opens a list where you can check the columns to be shown in the table. To reset the layout of the table to *default*, select **Reset Table Preferences** on the bottom of the list, which shows the default table layout after the next reload. See Figure 3-47 on page 130 for an example.

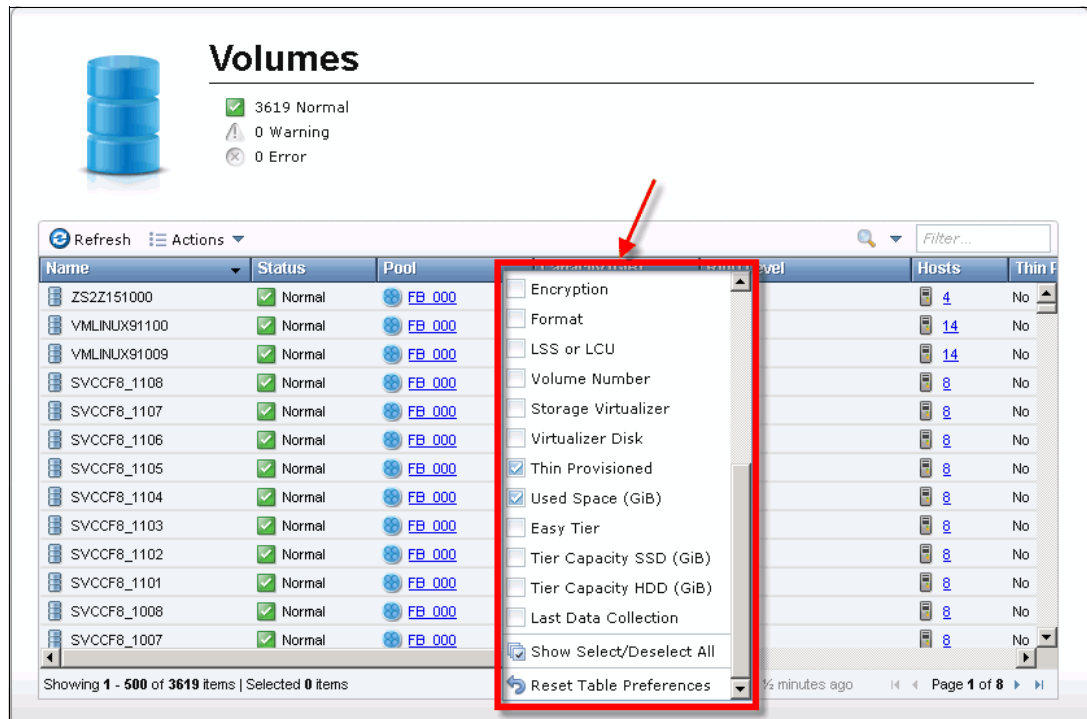


Figure 3-47 Example table: Define the columns

Furthermore, you can rearrange the table columns to the order you want. Left-click the header of the wanted column, keep it, and move the column with your mouse to the location in the table you want. To set the column at this location, release the left-click.

You also can change the width of a column. To do that, hover the mouse pointer to the right-border of the wanted column header. The mouse pointer symbol is now changing to a left-right arrow. Now left-click, keep it, and move the mouse pointer to the width you want. To set the width, release the left-click.

### The Actions menu

Each table provides the Actions menu. This menu is on the upper-left corner of the table. Click the Actions button to get a drop-down list providing several functions. The drop-down menu is dynamic and only provides the current available functions. For example, you do not select any row in the table. The result is that the Actions menu only offers the “Export” function. If you select a row, the list of functions in the drop-down list will change. See Figure 3-48 on page 131 for an example that shows the Actions menu drop-down list and provides the “Acknowledge Status” and “Export” functions.

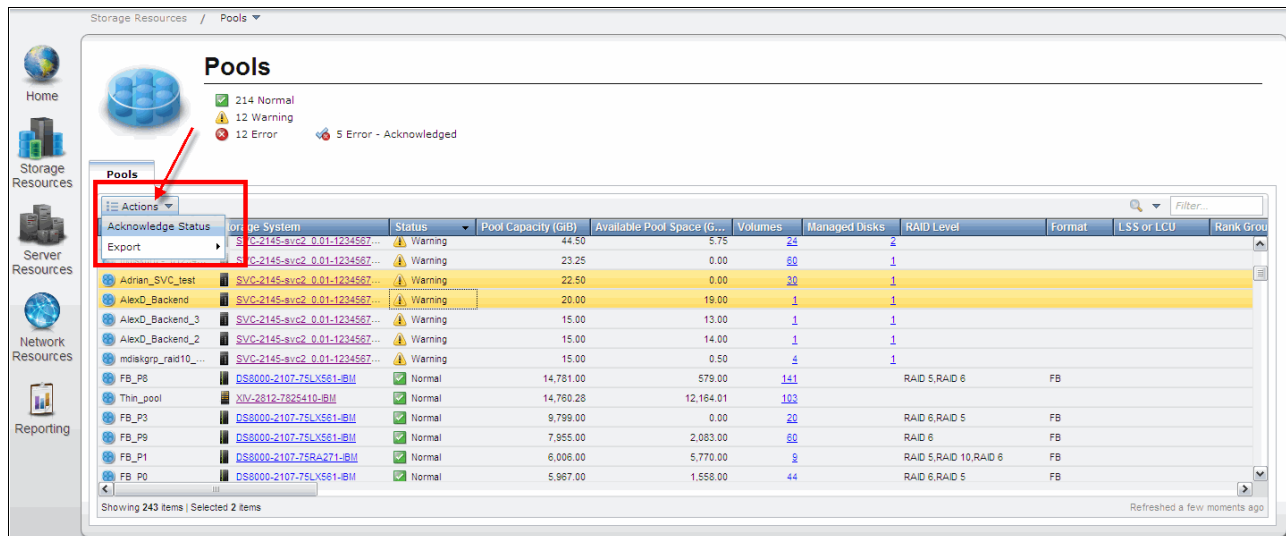


Figure 3-48 Example table: Actions menu

The following drop-down items are available in the Actions menu.

Table 3-7 shows the available functions in the drop-down menu related to “Information”.

Table 3-7 Actions menu: Information

Functions
View Properties
View Details
Export
Show all associated host ports

Table 3-8 shows the available functions in the drop-down menu related to “Status”.

Table 3-8 Actions menu: Status

Functions
Unacknowledge Status
Acknowledge Status

Table 3-8 shows the available functions in the drop-down menu related to “Alerts”.



Table 3-9 Actions menu: Alerts

Functions
View Alert
Remove alerts
Remove all alerts
Remove acknowledge alerts
Unacknowledge alerts

Functions
Acknowledge informational alerts
Acknowledge all alerts

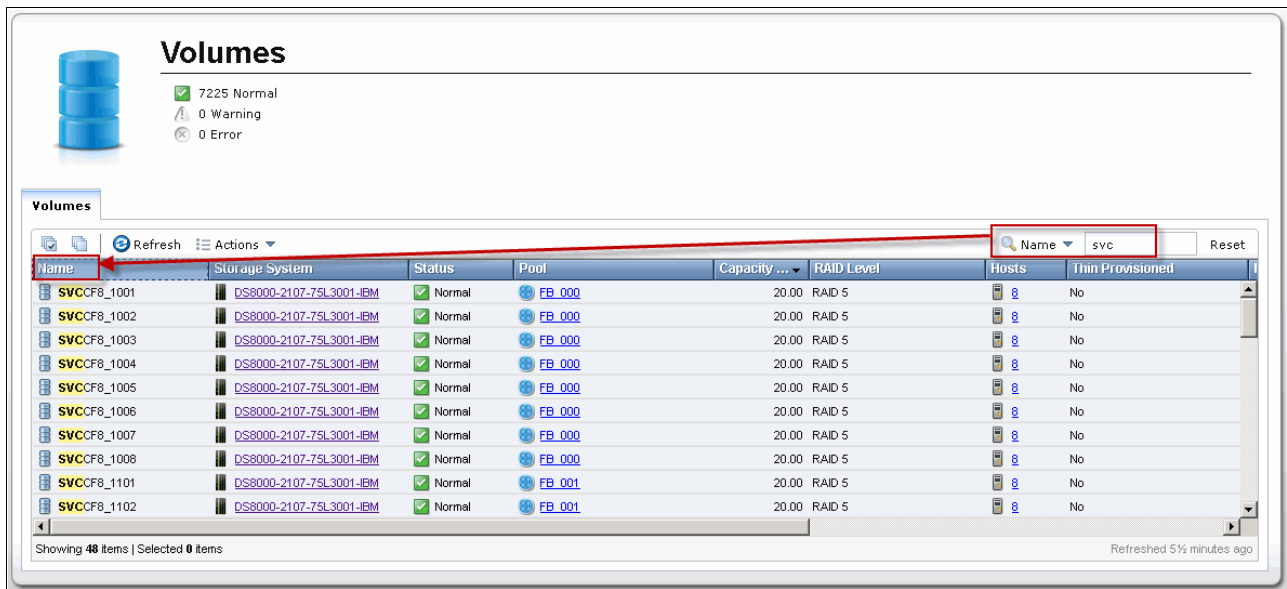
**Note:** Alternatively to the Actions menu, you also can directly right-click an item in the table, which provides you a list of available functions for that item. Select the function from the list you want to perform.

### Filter the data

Especially in large environments, tables might get very big. Therefore a filter function exists to filter the required information. Thus, only the required data is displayed. The filter function is placed at the right-upper corner at each table  . You can insert a string into the text-box and press Enter to activate the filter. You can type letters, whole words, partial words, and numbers. The filter ignores the difference between upper and lowercase letters. You also can define which columns the filter should affect by clicking the lens  and selecting a column. Some columns already have predefined filter values. For example, if you filter the column **Status** , the filter shows you all predefined status values in a drop-down list. Therefore, you just select the wanted status value to activate this filter. After you activated a filter, a reset button appears next to the filter text box. Click the button to reset the filter.

**Note:** The filter does not provide logical functions to define complex filters. Use one filter string.

After activating the filter, the table shows only the entries that match the filter and it marks the found strings yellow in each row. The following example (Figure 3-49) shows a filtered table by the volume name containing the string **SVC**.



**Volumes**

7225 Normal  
0 Warning  
0 Error

**Volumes**

Refresh Actions

Name  Reset

Name	Storage System	Status	Pool	Capacity	RAID Level	Hosts	Thin Provisioned
SVC8_1001	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1002	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1003	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1004	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1005	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1006	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1007	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1008	DS8000-2107-75L3001-JEM	Normal	FB_000	20.00	RAID 5	8	No
SVC8_1101	DS8000-2107-75L3001-JEM	Normal	FB_001	20.00	RAID 5	8	No
SVC8_1102	DS8000-2107-75L3001-JEM	Normal	FB_001	20.00	RAID 5	8	No

Showing 48 items | Selected 0 items

Refreshed 5 minutes ago

Figure 3-49 Example table: Filter volumes by name

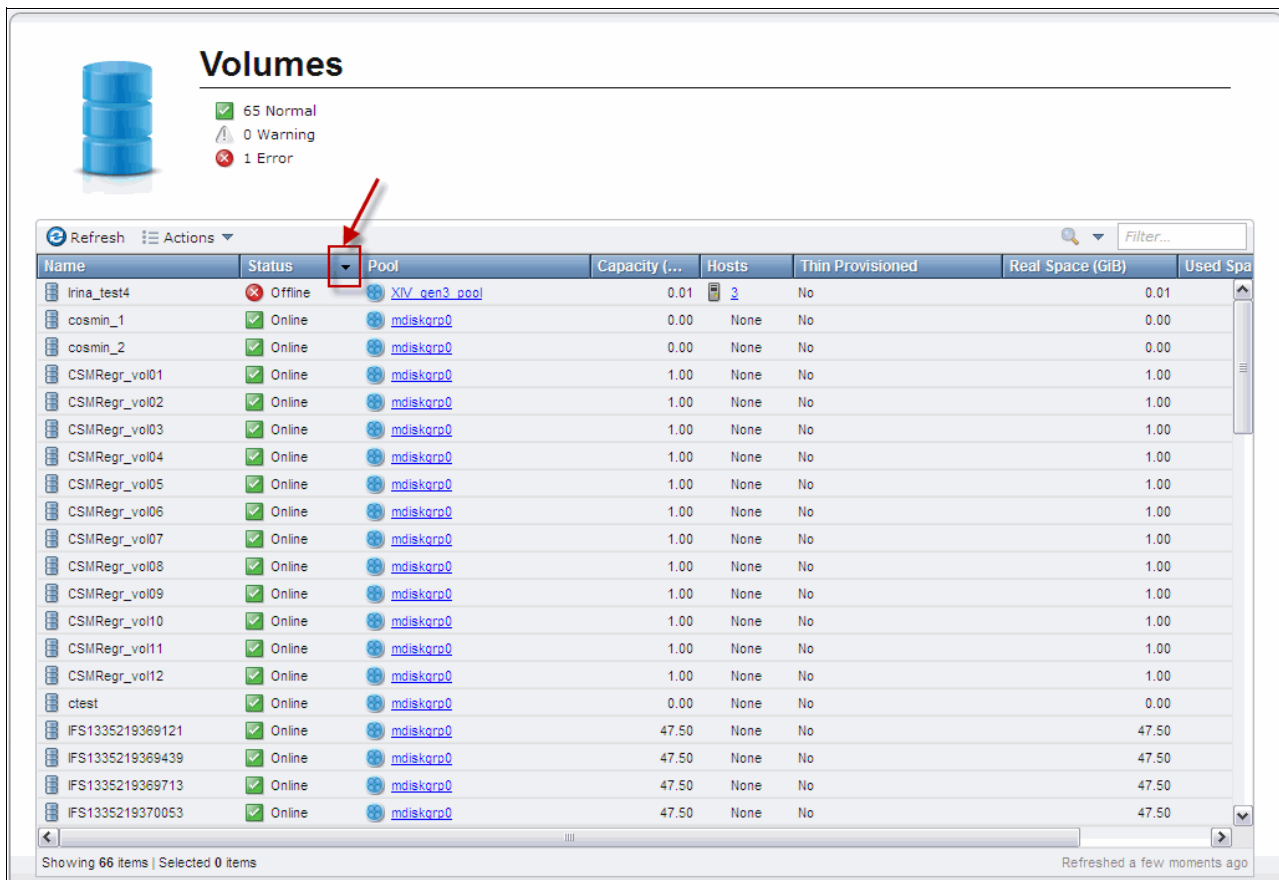
## Sort the data

Tables in the web-based GUI support sorting. Left-click the wanted column header. The first time it sorts it ascending, the second left-click sorts it descending.

By default, the table is sorted by “Status”. Therefore, components having an issue are displayed on the top of the table and therefore can be quickly identified.

**Note:** Columns including different types of units cannot be sorted.

See Figure 3-50 for an example of a default-sorted table by the Status column.



**Volumes**



65 Normal  
0 Warning  
1 Error

Name	Status	Pool	Capacity (...)	Hosts	Thin Provisioned	Real Space (GiB)	Used Spa
lrina_test4	Offline	XIV_gen3_pool	0.01	3	No		0.01
cosmin_1	Online	mdiskgrp0	0.00	None	No		0.00
cosmin_2	Online	mdiskgrp0	0.00	None	No		0.00
CSMRgr_vol01	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol02	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol03	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol04	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol05	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol06	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol07	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol08	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol09	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol10	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol11	Online	mdiskgrp0	1.00	None	No		1.00
CSMRgr_vol12	Online	mdiskgrp0	1.00	None	No		1.00
ctest	Online	mdiskgrp0	0.00	None	No		0.00
IFS1335219369121	Online	mdiskgrp0	47.50	None	No		47.50
IFS1335219369439	Online	mdiskgrp0	47.50	None	No		47.50
IFS1335219369713	Online	mdiskgrp0	47.50	None	No		47.50
IFS1335219370053	Online	mdiskgrp0	47.50	None	No		47.50

Showing 66 items | Selected 0 items

Refreshed a few moments ago



Figure 3-50 Example table: Sort the table by “Status”

Each list of resources in the web-based GUI has a column or set of columns (up to three) that determines the order of its rows. A visual indicator  or  is shown next to the primary column that determines this sort order.

**Tip:** When you click a column other than the primary sort column, that column becomes the new primary sort column. However, the previous primary column maintains its sort order (ascending or descending). For example, if a list of resources is ordered by the Name column in ascending order and you click the Status column, the rows are sorted according to the statuses of resources. At the same time, the resources for each type of status are still sorted in ascending order by the Name column. There is a maximum of three columns that can be sorted upon at the same time.

To reset the order of the rows for a column to the default setting, right-click the heading row in the list and select **Reset Table Preferences**.

### Select rows

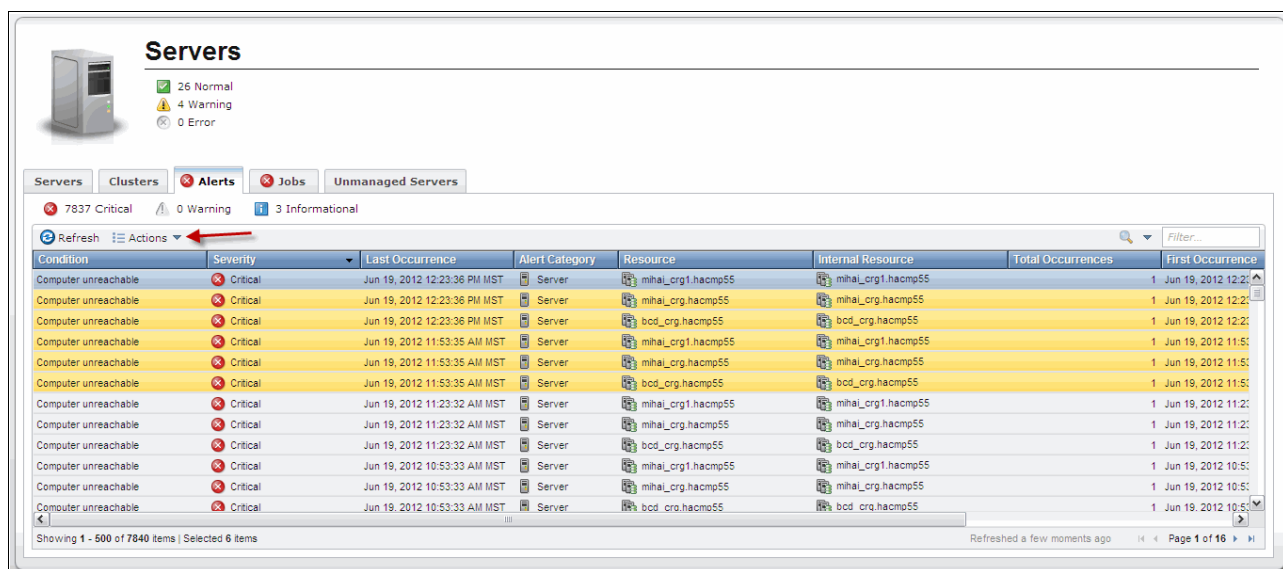
The tables in the Tivoli Storage Productivity Center web-based GUI allow you to select one or multiple rows. This can be used, for example, to acknowledge several alerts in one step. Depending on which rows you are selecting, the possible **Actions**  **Actions**  in the drop-down menu on the upper-left side of the table are automatically adapted with the possible functions.

To select one row, left-click into a single row.

To select multiple continuing rows, select the first row, press and hold the Shift key, and select the last row and release the Shift key again. All rows between the two selections are selected.

To select multiple independent rows, select the first row, press and hold the Ctrl key, and select the rows that you want to select and release the Ctrl key at the end.

In the example below (see Figure 3-51), we select several computer alerts. The selected rows are shaded orange in the background. In this example, we choose **Actions** → **Acknowledge Alerts** to acknowledge them. Refer to 3.3.3, “Alerts” on page 247 for more details about alerting.



**Servers**

26 Normal  
4 Warning  
0 Error

Servers Clusters Alerts Jobs Unmanaged Servers

7837 Critical 0 Warning 3 Informational

Refresh Actions

Condition	Severity	Last Occurrence	Alert Category	Resource	Internal Resource	Total Occurrences	First Occurrence
Computer unreachable	Critical	Jun 19, 2012 12:23:36 PM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 12:23:36 PM MST
Computer unreachable	Critical	Jun 19, 2012 12:23:36 PM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 12:23:36 PM MST
Computer unreachable	Critical	Jun 19, 2012 12:23:36 PM MST	Server	bcd_org.hacmp55	bcd_org.hacmp55	1	Jun 19, 2012 12:23:36 PM MST
Computer unreachable	Critical	Jun 19, 2012 11:53:35 AM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 11:53:35 AM MST
Computer unreachable	Critical	Jun 19, 2012 11:53:35 AM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 11:53:35 AM MST
Computer unreachable	Critical	Jun 19, 2012 11:53:35 AM MST	Server	bcd_org.hacmp55	bcd_org.hacmp55	1	Jun 19, 2012 11:53:35 AM MST
Computer unreachable	Critical	Jun 19, 2012 11:23:32 AM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 11:23:32 AM MST
Computer unreachable	Critical	Jun 19, 2012 11:23:32 AM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 11:23:32 AM MST
Computer unreachable	Critical	Jun 19, 2012 11:23:32 AM MST	Server	bcd_org.hacmp55	bcd_org.hacmp55	1	Jun 19, 2012 11:23:32 AM MST
Computer unreachable	Critical	Jun 19, 2012 10:53:33 AM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 10:53:33 AM MST
Computer unreachable	Critical	Jun 19, 2012 10:53:33 AM MST	Server	miha_lrg1.hacmp55	miha_lrg1.hacmp55	1	Jun 19, 2012 10:53:33 AM MST
Computer unreachable	Critical	Jun 19, 2012 10:53:33 AM MST	Server	bcd_org.hacmp55	bcd_org.hacmp55	1	Jun 19, 2012 10:53:33 AM MST

Showing 1 - 500 of 7840 items | Selected 6 items

Refreshed a few moments ago Page 1 of 16

Figure 3-51 Example table: Select multiple rows

### Properties window

The properties window is a pop-up window that contains property information for a specific resource. You can open the property window by using the **Actions** menu for a selected row in the table or right-click a row, or click a hyperlink in a cell of a table, which content must not be a third level resource. If the hyperlink represents a third level resource such as Storage System, Server, Hypervisor, Switch, or Fabric, the hyperlink click opens the **Detail View** (third level view) instead of the properties window. The properties window content and structure depends on the resource and device type.

In some cases, it would be helpful to show multiple information in one cell in a table. For such cases, the tables in the web-based GUI use the properties pop-up window, which provides



additional tables and tabs of a single entry (nested tables). That properties window again may have links to other properties windows or to detail views of a single resource.

For example, we want to see all hosts that are mapped to a specific volume in the table volume. See Figure 3-52 for this example. We opened the level 2 view of all volumes. Each row represents a volume. In the table column called **Hosts** we can see the host name, in case it is only one server, otherwise it shows the string “None” or the number of hosts that are mapped to this volume. In case it shows the number of hosts, there is a hyperlink underneath that opens a new window called “Properties”, which provides us an additional table with all mappings for that specific volume, as you can see in the example.

Alternatively, the same Properties window can also be opened by selecting the specific volume (row) and left-click **Actions** → **View Properties** or right-click the row and choose **View Properties**.

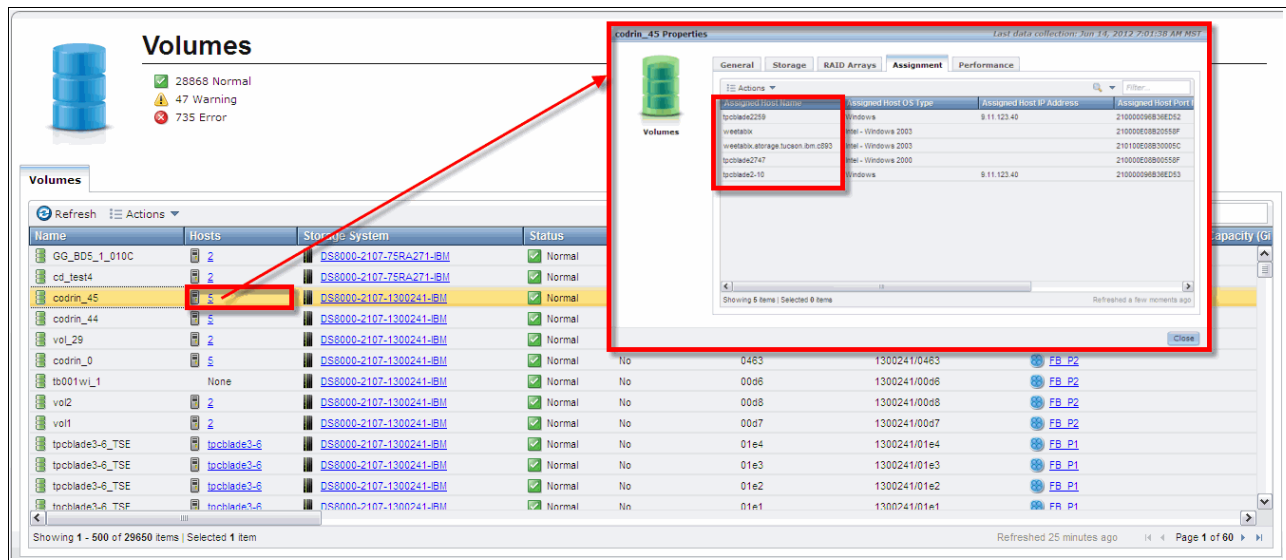


Figure 3-52 Example: Properties window

### Open Detail View

Use **View Details** to get to the third level view of a resource from your table at level 2. The detail view can be opened by selecting a row in the table and run **Actions** → **View Details**, as shown in example Figure 3-53 on page 136, or by right-clicking the column in the table and choosing **View Details** from the menu, which opens the Detail View (level 3) window of the specific resource. The Detail View is available for all top-level resources: Storage System, Server, Hypervisor, Fabric, and Switch.

Actions	ID	Status	Acknowledged	Raw Disk Capacity (GiB)	Pool Capacity (GiB)	Available Pool Space (GiB)	Assigned
View Properties	160	✓ Normal	No	1,607.25	1,071.48	273.34	
View Details	30A0B800047423E000000048638940-LSI	✓ Normal	No	126,590.39	94,010.78	0.00	
Export	DS8000-1750-13AAD1A-IBM	✓ Normal	No	6,526.71	4,104.00	1,173.00	
	DS8000-1750-13AAW2A-IBM	✓ Normal	No	6,526.71	4,104.00	2,838.00	
	DS8000-1750-13AB1WA-IBM	✓ Normal	No	4,351.14	2,564.00	2,048.00	
	DS8000-2107-1300361-IBM	✓ Normal	No	8,566.31	5,899.90	1,147.90	
	DS8000-2107-1302541-IBM	✓ Normal	No	16,996.64	11,925.00	3,358.00	
	DS8000-2107-7505111-IBM	✓ Normal	No	16,860.66	13,504.00	1,024.00	
	DS8000-2107-75LX561-IBM	✓ Normal	No	83,245.34	45,763.00	6,392.00	
	DS8000-2107-75RA271-IBM	✓ Normal	No	58,734.79	9,834.00	8,698.00	
	ESS-2105-18596-IBM	✓ Normal	No	2,169.61	1,568.20	321.78	
	Storwize V7000-2076-tpcr_ifs-IBM	✓ Normal	No	22,350.20	16,681.50	15,553.00	

Figure 3-53 View Details panel

In addition to the **View Details** action from the actions menu, the table cells in the Web-based GUI may contain hyperlinks in case the cell content shows a monitored third level resource. In such case, you can click the hyperlink to open the Detail View of this resource.

### Export table content

Every table in the new web-based GUI provides the function to export the current displayed table content to a file. If a table contains more than 500 rows, the web-based GUI shows 500 entries and the other entries are hidden in the next pages. But the export function includes the complete table including the pages. Therefore, you can first modify the table to meet your requirements and then export that data to a file. The data can be exported to the following known formats:

- ▶ CSV (comma-separated values)
- ▶ PDF (Portable Document Format)
- ▶ HTML (Hypertext Markup Language)

To export the table content, choose **Actions** → **Export** → **Export as**.

In the example below, we create a report showing all volumes in offline status and export it to a CSV file. Therefore, we define the table headers and filter all volumes with the **Status** of offline. The filter selects 732 volumes out of about 30,000 volumes, as you can see from the example shown in Figure 3-54 on page 137.

**Note:** A selection of rows in the table cannot be exported. The export action always includes the data content of the current filtered table.

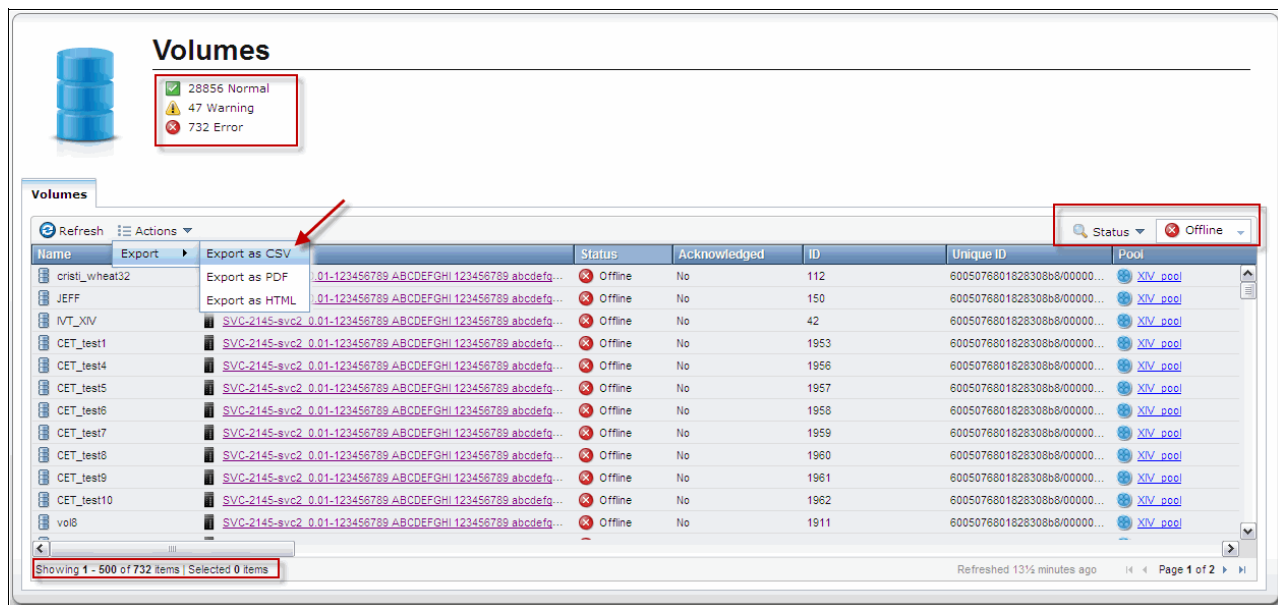


Figure 3-54 Example table: Export the table

Afterward (see Figure 3-55), define where you want to save the file or if you want to open it directly and edit it.

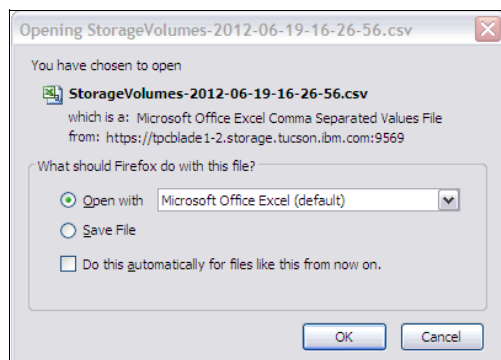


Figure 3-55 Example table: Open or save the export file

After opening the CSV file in MS Excel, you can use the Excel function **Data → Text to columns** to split the comma delimited data to the columns in the Excel.

**Important for PDF:** When you export a table of data that contains many columns, the rows in that table might span multiple pages in the resulting PDF. For example, if a table contains 20 columns, the row for a specific resource might be shown on more than one page (10 columns on the first page and 10 columns on the second page).

To work around this issue, before you select the export action, hide the columns that you do not want to include in the PDF. Continue hiding columns until the table no longer spans multiple pages.

### Table content help

The new web-based GUI contains many tables. To get a description about the content of the tables, refer to the Tivoli Storage Productivity Center online help. You can access the online help of the Tivoli Storage Productivity Center server by using one of the following methods:

- Click the  icon in the banner of the Tivoli Storage Productivity Center web-based GUI, which opens the online help for the current panel.
- Open the hyperlink <https://<tpc-server-hostname-or-IP>:9569/ibm/help> for general help.

Figure 3-56 shows an example of the online help for hypervisors at level 2.

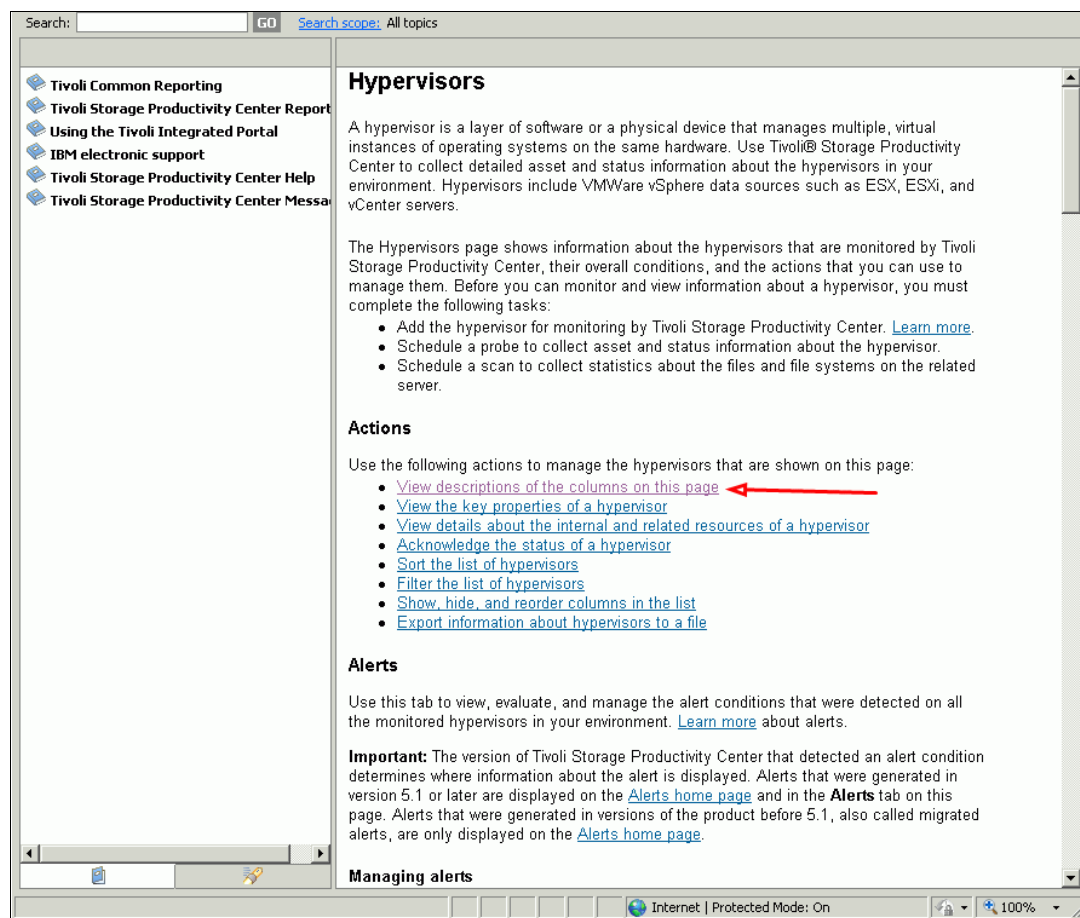


Figure 3-56 Tivoli Storage Productivity Center online help for hypervisors at level 2

Click the link “**View descriptions of the columns on this page**”, which forwards you to the table description. See Figure 3-57 on page 139.

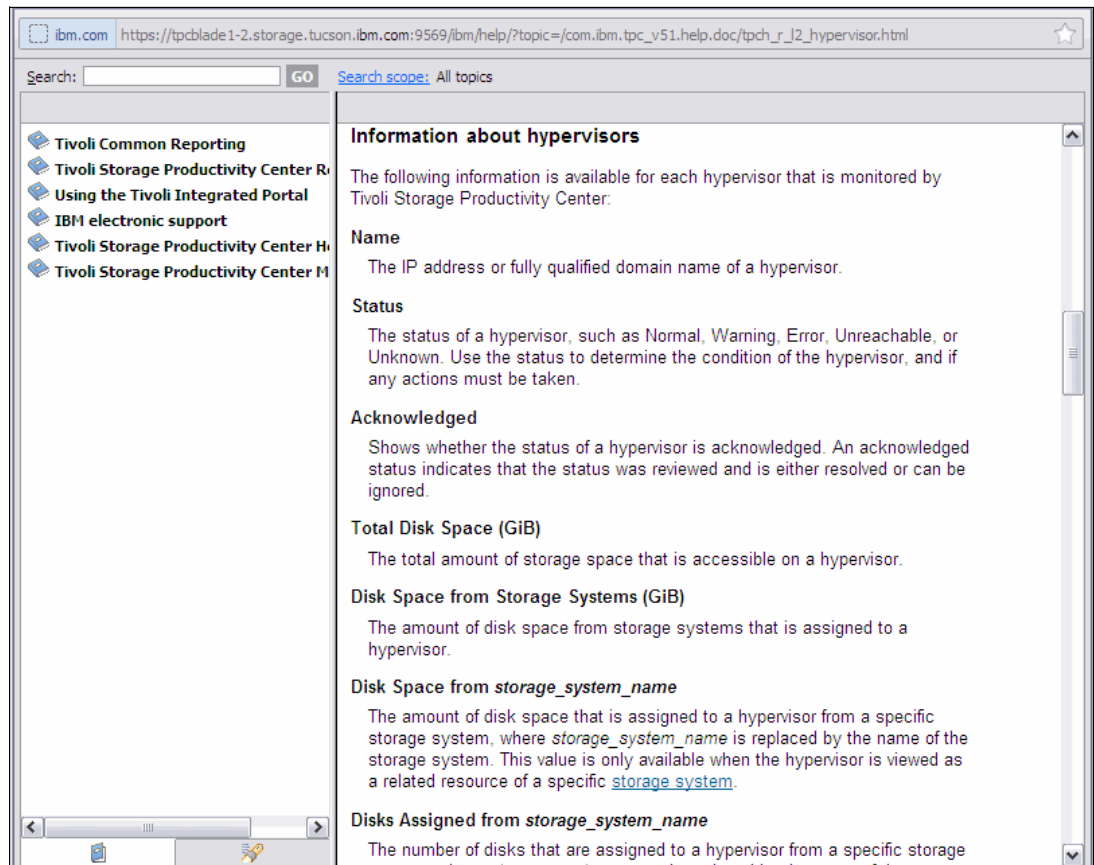


Figure 3-57 Tivoli Storage Productivity Center online help for hypervisor at level 2 table description

## Charts

Another new element in the Web-based GUI is the dynamic charts. Several charts are already predefined with key metrics. The dynamic charts are automatically updated with information from the Tivoli Storage Productivity Center server. There are two types of charts, which are explained in this section: bar charts and line charts. Each chart offers you a drop-down menu on the upper-left corner where you can select the category of the content that you want to display. Furthermore, the carousel function is integrated, which allows you to cycle the chart with different metrics.

### Bar charts

The bar chart visualizes categorized data with vertical bars. The larger the value the higher the bar. In case of multiple values, for example, used and available space, it shows it with different colors in the same bar. To display the details of a bar, hover the mouse over it.

See the example that is shown in Figure 3-58 on page 140, which shows the quick context help with 40.49 GiB disk space for the virtual machine called *Omni*.

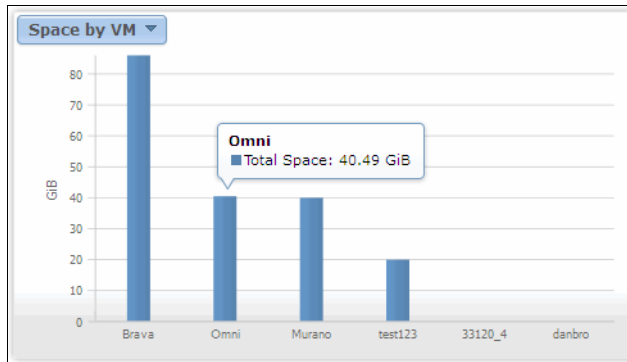


Figure 3-58 Example bar chart: Space by VM

### Line charts

The line chart visualizes categorized data with lines from the left to the right. It is used to present the historic data up to the actual value. The line charts are used, for example, for capacity and performance information over a certain time frame. The larger the value the higher the line in the chart. To display the details of a specific line and point in time, hover the mouse over a sample.

Within the line chart, you can filter which lines that you want to display. Select or clear the check boxes at the bottom of the line chart. Figure 3-59 is an example of a performance line chart. Each bubble in the line represents an hourly performance measurement. For performance data, hourly is used. Hover over a bubble to get the details at this time. In this example, we have 265.67 ops/s (Write) at the 19th of June 21:00. In this example, we disabled the **Total** line by clearing the Total check box on the lower right of the line chart.

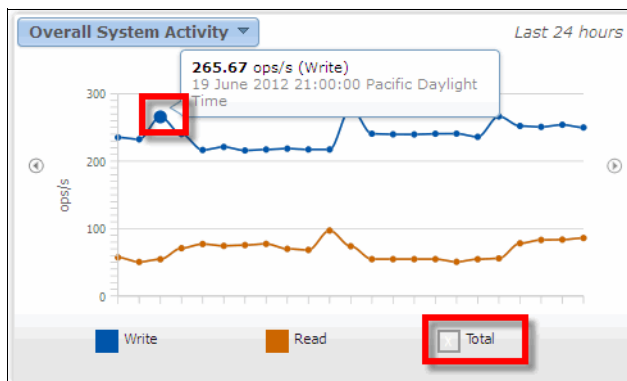


Figure 3-59 Example line chart: Overall System Activity

### Capacity pyramids

The *capacity pyramid* is a new element in the web-based GUI that provides a quick view on the capacity breakdown through the allocation levels. The pyramid is a set of horizontal bars and shows the capacity distribution for each level. Each bar shows a label, value, and unit. In the web-based GUI, the capacity pyramids are available at the Dashboard and at the Detail Views (third level) for:

- ▶ Storage System, Block Storage
- ▶ Storage System, File Storage
- ▶ Server
- ▶ Hypervisor

The capacity pyramid is in the Dashboard at the capacity section at the left-bottom corner. See the example of the Dashboard at Figure 3-65 on page 145. Furthermore, the capacity pyramid is used at the Detail View of a single top-level resource. At the Detail View, it is displayed at the top of the panel at **General** → **Overview**. See example Figure 3-60, which shows two pyramids of an IBM Storwize V7000 Unified. The upper pyramid represents the Block Storage, whereas the lower pyramid represents the File Storage.

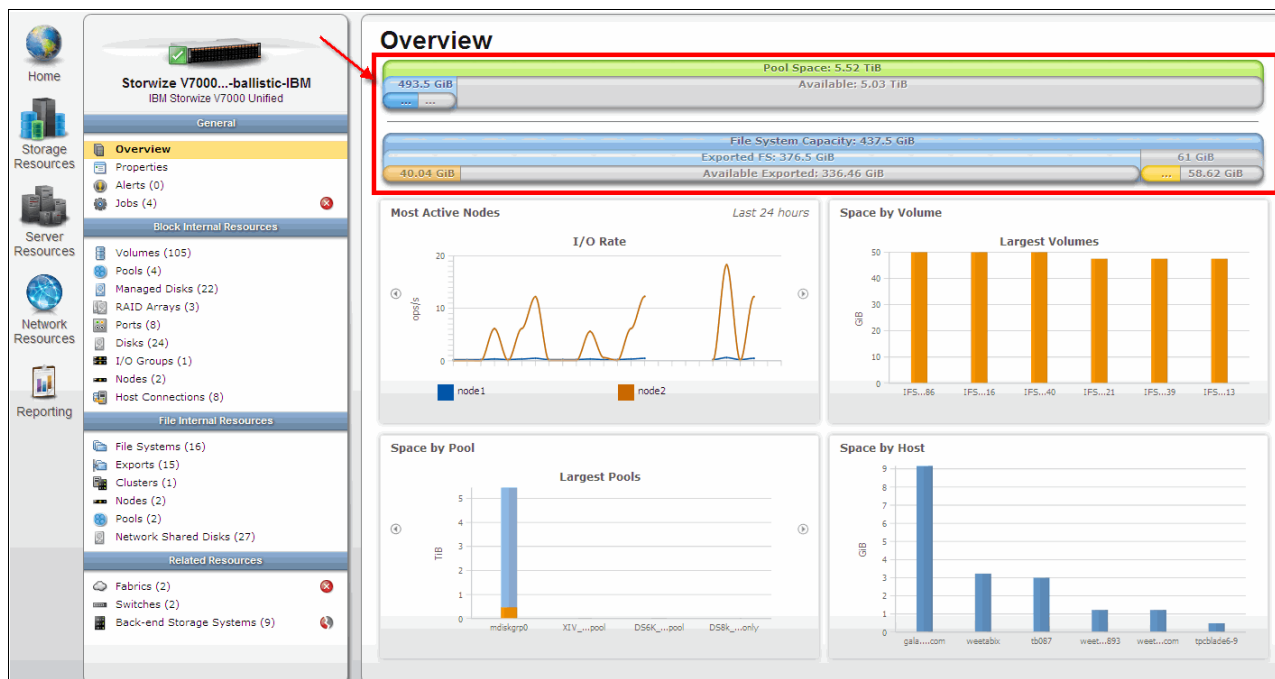


Figure 3-60 Example Capacity Pyramid at Detail View at level 3

If the storage system is a Block or File Storage System depends on the type of protocol it provides. For example, Fibre Channel and iSCSI are typical Block protocols, whereas Common Internet File System (CIFS) and Network File System (NFS) are typical File protocols. If a device provides both types, the web-based GUI provides for each type its own capacity pyramid.

Sometimes it happens that the pyramid is not able to show complete labels and values because of too short horizontal bars or too long labels. In such cases, the Web-based GUI tries to optimize it by only showing the values without the label. But in case even this is not possible, it replaces the label and the value with "...". Hover it to get the label and value information for such bars. See the example shown in Figure 3-61 on page 142 where we hover the "..." to get the information of the unassigned GiB.

### Storage System, Block Storage

The Storage System (block) pyramid displays different levels of capacity break downs. This type of pyramid shows:

- ▶ **Pool space:** Total amount of storage space in the storage pools or pools that are associated with monitored storage systems. For SAN Volume Controller, this value represents the amount of managed disk space that is assigned to the managed disk group. For XIV systems, this value represents the physical capacity of the pool, not the virtual capacity. For other storage systems, this value might also include overhead space if the pool is unformatted.
- **Volumes:** Total amount of unique storage system volume space or virtual storage volume space on monitored storage systems. For thin-provisioned volumes, this value

is the physical capacity of the volume. In an XIV system, this value is referred to as the *real space*, or *physical* (“hard”) *size*, and not the potentially much larger virtual (“soft”) size, that is allocated. For NetApp devices, this value represents the total amount of storage space on the Fibre Channel (FC) LUNs that are associated with the devices:

- **Assigned:** Total volume space within monitored storage systems that is mapped or assigned to host systems.
- **Unassigned:** Total volume space within monitored storage systems that is not mapped or assigned to host systems.
- **Available:** Total amount of available capacity (free) in the storage pool space.

See Figure 3-61 for an example that shows a V7000 with a cumulated pool space of 5.94 TiB, and 893.69 GiB of used volume capacity is assigned to servers whereas 108.14 GiB is unassigned.

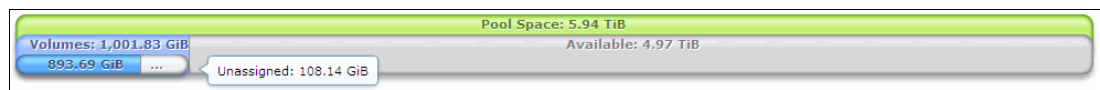


Figure 3-61 Example Storage System capacity pyramid Block Storage

### Storage System, File Storage

The Storage System (file) pyramid displays different levels of capacity break downs. This type of pyramid shows:

- **File System Capacity:** Total amount of storage space on all the file systems on a storage system or filer:
  - **Exported FS:** The amount of storage space from file systems on storage systems that is exported to servers. An export is a file system that is made available to remote servers over a network.
    - **Used Exported:** The amount of exported file system space that is used by objects in the file systems, such as files and directories.
    - **Available Exported:** The amount of exported file system space that is unused and available for use by objects in the file systems.
  - **Unexported FS:** The amount of storage space in file systems on storage systems that is not exported to remote servers.<sup>1</sup>
    - **Used Unexported:** The amount of unexported file system space that is used by objects in the file systems, such as files and directories.
    - **Available Unexported:** The amount of unexported file system space that is unused and available for use by objects in the file systems.

See Figure 3-62 on page 143 for an example that shows a SONAS device with a cumulated File System Capacity space of 25.08 TiB, and 639.7 GiB is really used of the exported FS.

<sup>1</sup> **Restriction:** For a NetApp filer, Tivoli Storage Productivity Center uses a Storage Resource agent to determine the file systems that are exported from the filer. Depending on the operating system of the computer where the Storage Resource agent is deployed, some exported file systems might not be detected during a probe. Specifically, a UNIX Storage Resource agent might not detect the file systems that are exported with CIFS; a Windows Storage Resource agent might not detect the file systems that are exported with NFS. Because of this limitation, the value for Unexported FS might include both the space of unexported file systems and the space of exported file systems. To work around this limitation, set up multiple Storage Resource agents on different operating systems to probe the NetApp filer. For example, deploy a Storage Resource agent to a Windows system and another Storage Resource agent to a UNIX system. Then, use both Storage Resource agents to probe the NetApp filer.



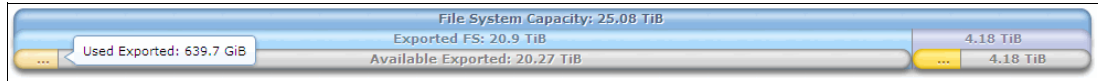


Figure 3-62 Example Storage System capacity pyramid (file)

## Server

The server pyramid displays different levels of capacity break downs. This type of pyramid shows:

- **Total Disk:** The total disk space for all the local and SAN-attached storage (from storage systems) on the server:
  - **Storage Systems:** The amount of storage space that is assigned to the server from storage systems. The value is only available when SAN-attached storage is assigned to the server.
  - **Other:** The amount of storage space on the local disks and other non-SAN-attached disks in the server:
    - **Used Disk:** Total amount of used disk capacity (Storage System and Others)
      - **FS / LV:** Total amount of used capacity in the filesystem/logical volume
      - **Available FS:** Total amount of available (free) capacity in the file system. This value does not include unused file system space that is reserved for the operating system. For example, the unused space for tmpfs on UNIX operating systems is not included in the value for this column.
    - **Available Disk:** Total amount of available (free) disk capacity

See Figure 3-63 for an example that shows a Windows server device with a cumulated disk capacity space including storage system disks and other disks (internal disk) space of 879.38 GiB, whereas 568.35 GiB is allocated to Windows drives, and 194.66 GiB is really used in the FS itself.

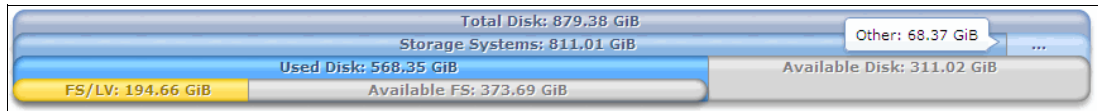


Figure 3-63 Example Server capacity pyramid

## Hypervisor

The hypervisor pyramid displays different levels of capacity break downs. This type of pyramid shows:

- **Total Disk:** The total disk space for all the local and SAN-attached storage (from storage systems) on the hypervisor:
  - **Storage Systems:** The amount of storage space that is assigned to the hypervisor from storage systems. The value is only available when SAN-attached storage is assigned to the hypervisor.
  - **Other:** The amount of storage space on the local disks in the hypervisor:
    - **Used Disk:** Total amount of used disk capacity (Storage System and Others)
      - **FS:** Total amount of capacity used by the hypervisor (for example, capacity of data stores)
      - **FS / LV:** Total amount of used capacity in the filesystem/logical volume (for example, used capacity in the data store)
      - **Available FS:** Total amount of available (free) capacity in the filesystem/logical volume (for example, available space in the data stores)

→ **Direct:** Total amount of disk capacity that is directly assigned to a virtual machine and is not managed by the hypervisor

- **Available Disk:** Total amount of available (free) disk capacity

See Figure 3-64 for an example that shows an ESX server (hypervisor) with a cumulated disk capacity space, including storage system disks and other disks (internal disk), of 335.03 GiB, whereas the ESX is using 299.24 GiB of the disk capacity. 296 GiB is used by the ESX for data stores, whereas virtual disks of 122.58 GiB from the data store are used for virtual machines. A small disk capacity of 2 GiB is directly attached to virtual machines.

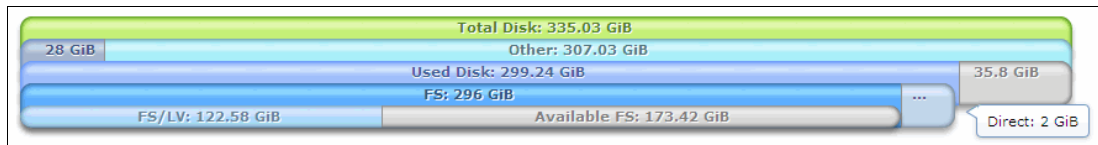


Figure 3-64 Example hypervisor capacity pyramid

## Exporting data

Exporting of data can be done either by exporting of the table contents (see “Export table content” on page 136), by creating reports with Tivoli Common Reporting (see Chapter 4, “Enhanced reporting with IBM Cognos” on page 269), or by using the already in previous Tivoli Storage Productivity Center version existing methods. The following methods exist:

- ▶ New Web-based GUI table export
- ▶ New Web-based GUI Cognos
- ▶ DB2 table views
- ▶ IBM Tivoli Storage Productivity Center Reporter for Disk
- ▶ TPCTOOL
- ▶ Stand-alone GUI

### 3.2.4 The new web-based GUI data level 1: The dashboard

Use the dashboard to monitor the overall status of monitored resources and identify potential problem areas in a storage environment. You can learn about the status and capacity of resources, the jobs that are running monitoring actions, and the unacknowledged alert conditions that were detected on resources.

When you first log on to Tivoli Storage Productivity Center or select “Dashboard” from the Home icon in the navigation pane, the dashboard is shown. The dashboard provides a concise, yet detailed overview of your storage environment, which includes the following information:

- ▶ The **status** of monitored resources
- ▶ The overall **capacity** of monitored resources
- ▶ The status of Tivoli Storage Productivity Center **jobs**
- ▶ The status of **alerts** that were detected on monitored resources

**Important:** The information that is shown on the dashboard is gathered by data collection jobs. To ensure that the latest information is available, run data collection jobs regularly. Data collection jobs must be defined in the stand-alone GUI.

Figure 3-65 shows an example of a dashboard. From the dashboard, you quickly can access the level 2 of each type of resource such as Storage Systems, Servers, Hypervisors, Fabrics, and Switches by clicking the displayed resource group symbol. On the button, there are three sections: Capacity breakdown, jobs status, and unacknowledged alerts.

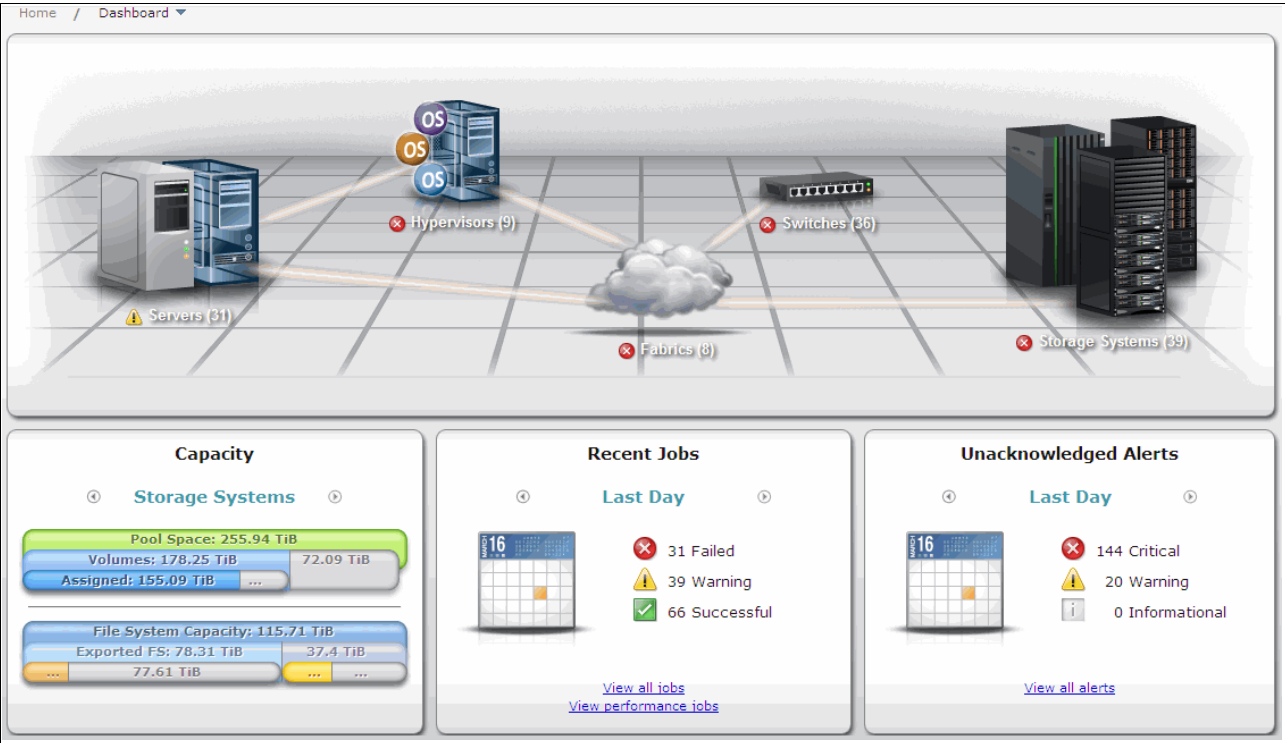



Figure 3-65 Dashboard

### Health Status

Figure 3-65 shows an example of a dashboard. Each resource group such as Servers, Hypervisors, Fabrics, Switches, and Storage Systems are presented in the web-based GUI by a symbol in the upper section of the Dashboard. The status icon at the lower-left on each resource group symbol shows the overall health status. For example, the resource group **Hypervisors** shows in this example the health status **Error** .

When you hover the health status icon, you get the information about how many of the resources are in which health status. The number in brackets shows the total number of devices in that category. The example that is shown in Figure 3-66 shows 36 switches, whereas 6 are in an error state, 3 unreachable, 14 have warnings, and 13 are in a normal status.

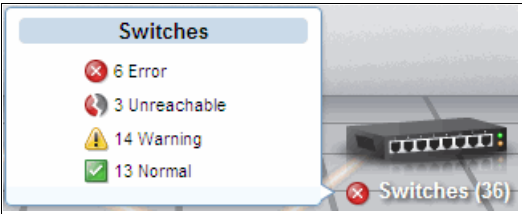









Figure 3-66 Health status Switches

Refer to Table 3-10 for the details about the health status icons. The health status is not only available at the dashboard. This health status concept is used at all levels through the entire web-based GUI.

Table 3-10 Health status description



Status icons	Description
 Error	An error status was detected on one or more of the monitored resources for a resource type. Error statuses represent serious problems on a resource. Resolve these problems as soon as possible. View the details of a resource to learn more about the status of its internal resources.
 Unreachable	One or more of the monitored resources for a resource type are not responding. This status might be caused by a problem in the network or by a Storage Resource agent that is no longer running and did not communicate that it was shutting down.
 Warning	A warning status was detected on one or more of the monitored resources for a resource type. Warning conditions are not critical, but represent potential problems. View the details of a resource to learn more about the status of its internal resources.
 Normal	No warnings or errors were detected on the monitored resources for a resource type.
 Unknown	One or more of the monitored resources for a resource type have an unknown status. This status might occur if no data was collected about a resource. To change an unknown status, use a data collection job to collect status information about the resource.

## Overall capacity status

The dashboard shows the overall capacity break-down by each type of resource in the section at the left-lower corner in the web-based GUI. See example Figure 3-65 on page 145. Click the  or  icon to cycle to the next overview. The following capacity overviews are available:

- ▶ Storage Systems: Block and File Storage
- ▶ Servers
- ▶ Hypervisors

## Recent Jobs status

The dashboard shows the overall recent jobs status in the section at the bottom-middle of the web-based GUI. It shows a status summary of the recent Tivoli Storage Productivity Center jobs that were run in your environment during the selected time period. This summary includes the number of jobs that have the following statuses: Running, Error, Warning, and Normal. See example Figure 3-65 on page 145. Click the  or  icon to cycle to the next overview. The following overviews are available:

- ▶ Last Hour
- ▶ Last Day
- ▶ Last Week

In addition to these views, a hyperlink to “View all Jobs” and “View performance jobs” is provided. The “View all jobs” hyperlink forwards you to the panel **Home** → **Jobs** → **tab Jobs**, whereas “View performance jobs” forwards you to **Home** → **Jobs** → **tab Performance**.

Use those links to check the monitoring jobs performed by Tivoli Storage Productivity Center. See example Figure 3-67 which shows the jobs.

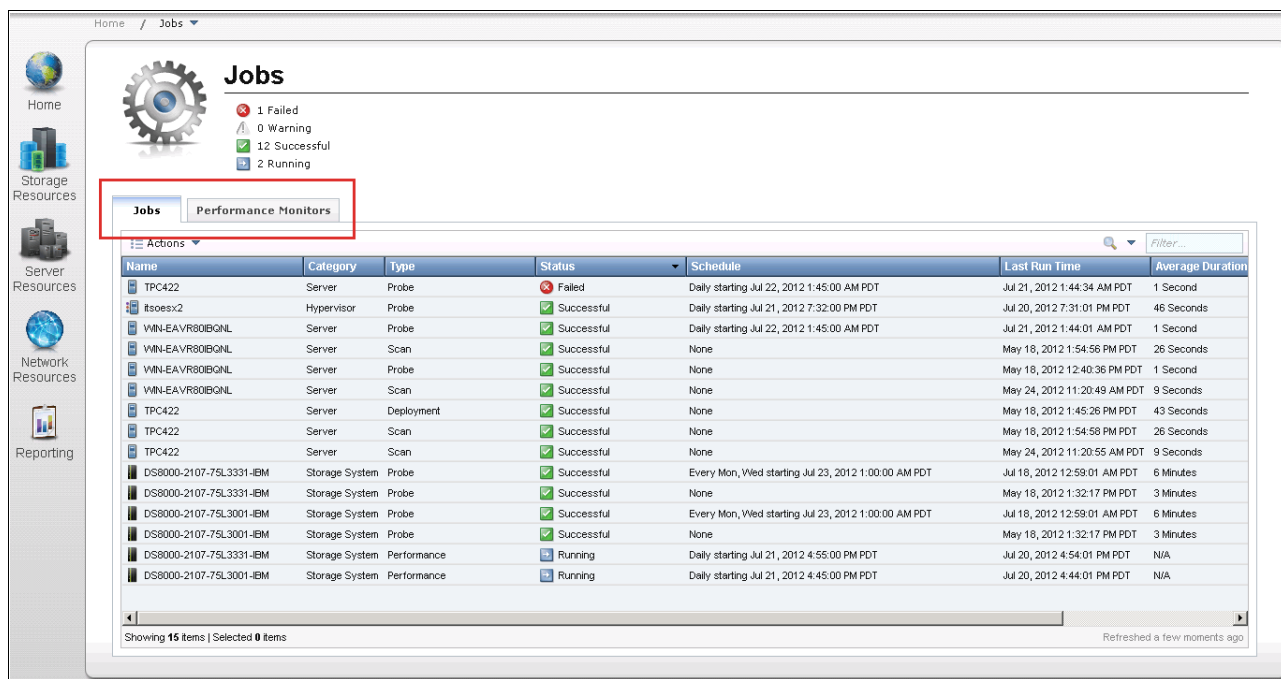


Figure 3-67 Example: View all jobs

## Unacknowledged Alerts status

The dashboard shows the overall unacknowledged alerts at the section at the lower-right in the web-based GUI. Alerts are generated when Tivoli Storage Productivity Center detects certain conditions or events on monitored resources. The Unacknowledged Alerts section of the dashboard shows a status summary of the unacknowledged alerts that were detected in your environment during a specified time period. This summary includes the number of alerts that have the following statuses: Critical, Warning, and Informational. An unacknowledged alert is an alert that was not reviewed or resolved by a Tivoli Storage Productivity Center user. See example Figure 3-65 on page 145. Click the ⏪ and ⏩ icons to cycle to the next overview. The following overviews are available:

- ▶ Last Hour
- ▶ Last Day
- ▶ Last Week

In addition to these views, a hyperlink to “View all alerts” is provided. The “View all alerts” hyperlink forwards you to the **Home → Alerts** panel. Use this link to check the alerts. See the example for “View all alerts” at Figure 3-68 on page 148.

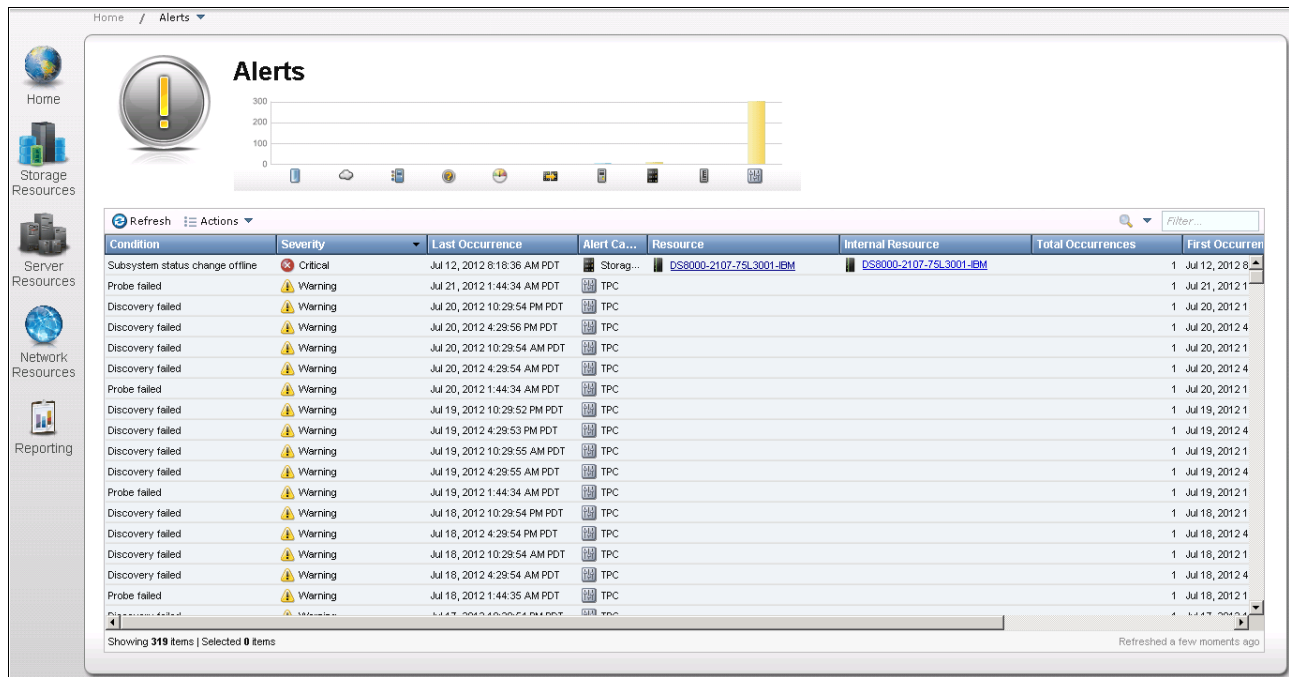


Figure 3-68 Example: View all alerts

### 3.2.5 The new web-based GUI data level 2

The level two in the web-based GUI is that level where you can see all resources per resource type. Additionally, the overall Pools and Volumes view is integrated to quickly get a list of all pools and volumes that are available in the storage environment. At the top of each level 2 view, the summary of the health status is displayed including the number of resources that have the same status. Figure 3-69 shows an example of a level 2 view of all pools in the storage environment.

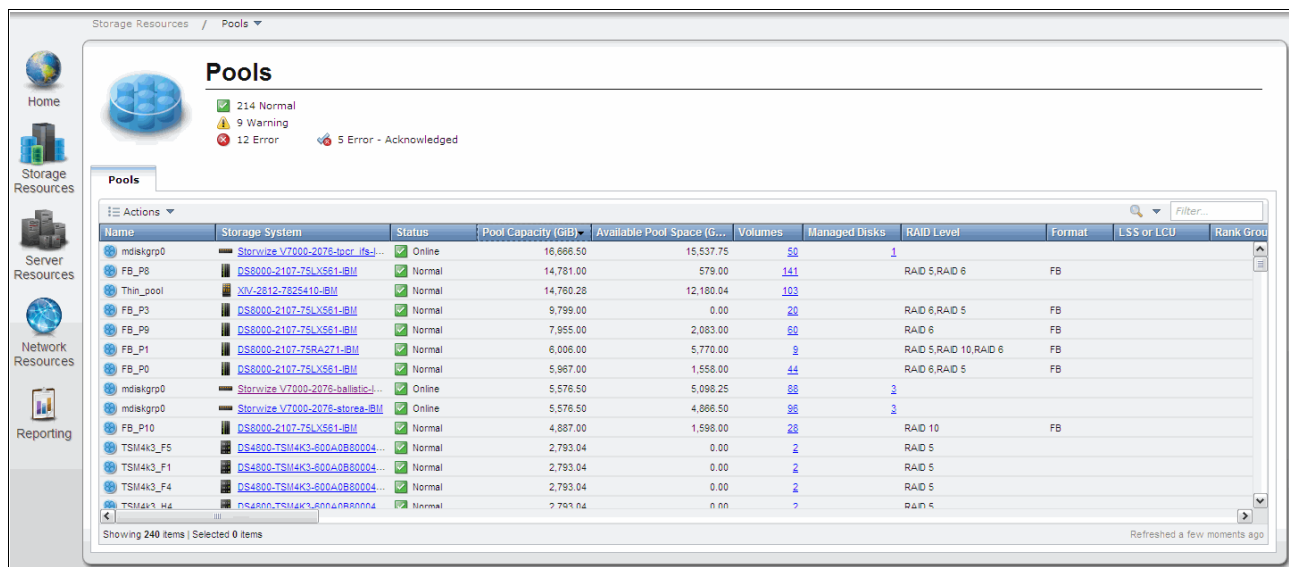


Figure 3-69 Example: Level 2 of pools

At the level 2, all resources of a resource type are listed in a table. Tables may contain several tabs. For example, the level 2 table for Storage Systems divides the Storage Systems into the tab **Block Storage** and **File Storage**. Each row in the table represents a specific resource of that type. Each column in the table displays a property of that resource type. A table cell may contain text, numbers, a hyperlink to level 3, or a hyperlink that opens a new pop-up window called **Properties**, which shows the properties for that resource. In addition, the properties window is also able to provide additional tables with related information (nested tables). For example, the pop-up properties window for a specific pool is able to show another table with a tab of all volumes within this specific pool. And continuing the same principle at this table of volumes you can select a specific volume and open again the properties window to get a new table with tabs showing, for example, which hosts are mapped to that volume.

Level 2 views are available for:

- ▶ Storage Systems
- ▶ Volumes
- ▶ Pools
- ▶ Servers
- ▶ Hypervisors
- ▶ Fabrics
- ▶ Switches

Those level 2 views are explained below in more detail.

## Storage systems

A storage system is a device that provides a storage service, including data capacity and functions to the clients. Use Tivoli Storage Productivity Center to collect detailed asset, performance, and status information about the storage systems in your environment. Tivoli Storage Productivity Center logically divides the storage systems into Block Storage and File Storage depending on the provided storage service protocol.

**Note:** Information about Block Storage and File Storage is organized into separate tabs. If there is no monitored File Storage, the File Storage tab is not shown.

Figure 3-70 shows an example of a level 2 view for storage systems. In the example, we selected the tab **File Storage**. Each monitored File Storage device in the storage environment is listed in this table.

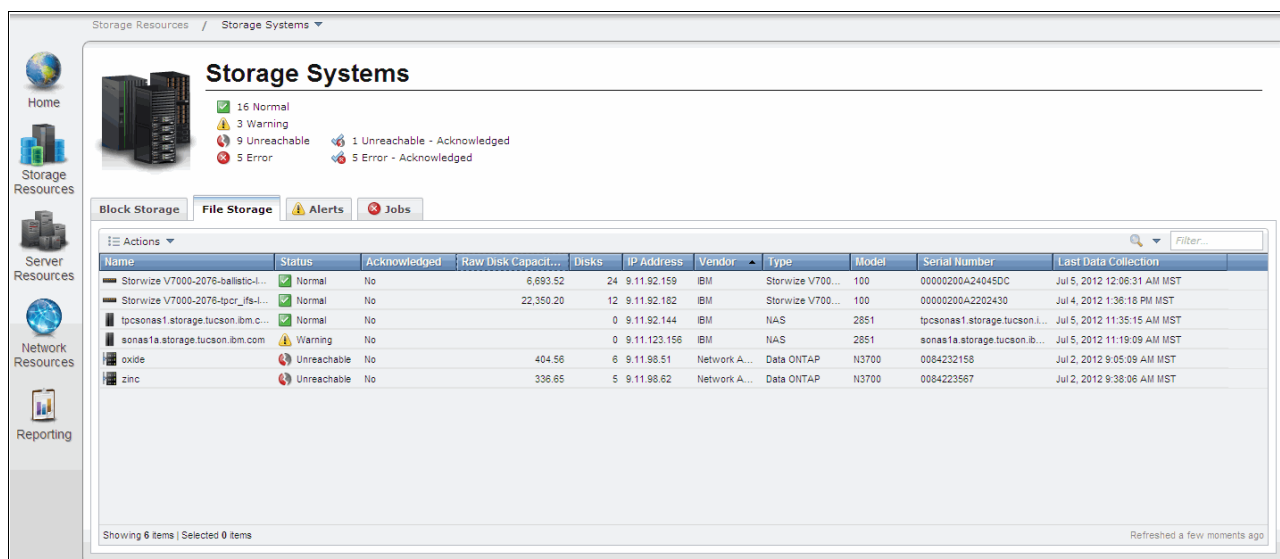


Figure 3-70 Example: Level 2 of Storage Systems

Furthermore from this table view, you can check the **Alerts** and **Jobs** tabs for all storage systems, go to the level 3 view (Detail View) of a single device, open the properties window for a specific device, or export the table to a file.

The level 2 view for storage systems contains the following table tabs:

- ▶ Block Storage
- ▶ File Storage
- ▶ Alerts
- ▶ Jobs

Refer to Table 3-11 to get a complete available property list in Tivoli Storage Productivity Center for each tab at storage systems level 2.

Table 3-11 Available properties for storage systems

Block Storage	File Storage	Alerts	Jobs
Name	Name	ID	Name
Status	Status	Condition	Category
Acknowledged	Acknowledged	Severity	Type
Raw Disk Capacity (GiB)	Raw Disk Capacity (GiB)	Acknowledged By	Status
Pool Capacity (GiB)	Disks	Last Occurrence	Schedule
Available Pool Space (GiB)	IP Address	Alert Category	Last Run Time
Available Pool Space (GiB)	Vendor	Resource	Average Duration



Block Storage	File Storage	Alerts	Jobs
Assigned Volume Space (GiB)	Type	Internal Resource	View Logs <sup>a</sup>
Unassigned Volume Space (GiB)	Model	Total Occurrences	
Total Volume Capacity (GiB)	Serial Number	First Occurrences	
Allocation (%)	Last Data Collection	Alert Name	
Realizable Allocation (%)		Alert Creator	
Pools			
Volumes			
Disks			
Managed Disks			
Ports			
Read Cache (GiB)			
Write Cache (GiB)			
IP Address			
Vendor			
Type			
Model			
Serial Number			
Firmware			
Last Data Collection			
Time Zone			
Custom Tag 1			
Custom Tag 2			
Custom Tag 3			

a. Hyperlink to the job log

## Volumes

A *volume* is a discrete unit of storage on disk, tape, or other data recording medium that supports some form of identifier and parameter list, such as a volume label or input/output control. Use Tivoli Storage Productivity Center to collect detailed asset and status information about the storage system volumes in your environment.

The level 2 view for volumes shows all volumes from the monitored storage environment.

Figure 3-71 shows an example of a level 2 view for volumes.

Name	Storage System	Status	ID	Pool	Capacity (GiB)	RAID Level	Hosts	Encryption	Thin Provisioned	Format
codrtn_44	DS8000-2107-1300241-B11	Normal	0461	FB_P2	0.50	RAID 10	5	TSE	No	FB
pafn_0_11	DS8000-2107-1300241-B11	Normal	8e02	FB_P2	0.50	RAID 10	odan.s...	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	0055	FB_P0	0.50	RAID 5	tucsonx4	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	0054	FB_P0	0.50	RAID 5	3	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	0053	FB_P0	0.50	RAID 5	2	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	0052	FB_P0	0.50	RAID 5	10	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	0051	FB_P0	0.50	RAID 5	3	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	0050	FB_P0	0.50	RAID 5	3	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	004f	FB_P0	0.50	RAID 5	3	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	004e	FB_P0	0.50	RAID 5	3	No	No	FB
tucsonx4	DS8000-2107-1300241-B11	Normal	004d	FB_P0	0.50	RAID 5	3	No	No	FB

Figure 3-71 Example: level 2 of volumes

From this table view, you can open the properties window for a specific volume to see, for example, all the hosts that are mapped to the volume, or to get the properties of the related storage pool. Use the **Actions** menu to export the table to a file or follow the hyperlink at the Storage Systems column to the level 3 view (Detail View) of the related storage system.

The volume level 2 view contains the table with the tabs:

► Volumes

Refer to Table 3-12 to get a complete available property list in Tivoli Storage Productivity Center for each tab at volume level 2.

Table 3-12 Available properties for volumes

Volumes
Name
Storage System
Status
Acknowledged
ID
Unique ID
Pool
Capacity (GiB)
RAID Level
Controller
I/O Group
Thin Provisioned
Preferred Node






Volumes
Hosts
Encryption
Format
LSS or LCU
Volume Number
Virtual Disk Type
Formatted
Last Write State
Copies
Storage Virtualizer
Virtualizer Disk
Real Space (GiB)
Used Space (GiB)
Grain Size (KiB)
Warning Level (%)
Auto Expand
Easy Tier
Tier Capacity SSD (GiB)
Tier Capacity HDD (GiB)
Last Data Collection

## Pools

A storage pool or pool is a grouping of storage space consisting of volumes, logical unit numbers (LUNs), or addresses that share a common set of administrative characteristics. Use Tivoli Storage Productivity Center to collect detailed asset and status information about the pools that are configured in storage systems in your environment.

The pools view at level 2 shows all pools within the storage environment.

Figure 3-72 shows an example of a level 2 view for pools.

 Home
  Storage Resources
  Server Resources
  Network Resources
  Reporting


Storage Resources / Pools ▼

## Pools

✓ 214 Normal

⚠ 9 Warning

✖ 12 Error

 5 Error - Acknowledged

Actions ▼ <span style="float: right;">Filter...</span>											
Name	Storage System	Status	Pool Capacity (GiB)	Available Pool Space (GiB)	Volumes	Managed Disks	RAID Level	Format	LSS or LCU	Rank Group	
mdiskgrp0	Storage V7600-2076-100r-FB-3	✓ Online	16,666.50	15,537.75	50	1					
FB_P8	DS8000-2107-75LX561-BW	✓ Normal	14,781.00	579.00	141		RAID 5, RAID 6	FB			
Thin_pool	XIV-2812-7826410-BW	✓ Normal	14,760.28	12,180.04	103						
FB_P3	DS8000-2107-75LX561-BW	✓ Normal	9,799.00	0.00	20		RAID 6, RAID 5	FB			
FB_P9	DS8000-2107-75LX561-BW	✓ Normal	7,955.00	2,083.00	90		RAID 6	FB			
FB_P1	DS8000-2107-75RA271-BW	✓ Normal	6,006.00	5,770.00	9		RAID 5, RAID 10, RAID 6	FB			
FB_P0	DS8000-2107-75LX561-BW	✓ Normal	5,967.00	1,558.00	44		RAID 6, RAID 5	FB			
mdiskgrp0	Storage V7600-2076-ballistic-3	✓ Online	5,576.50	5,098.25	88	3					
mdiskgrp0	Storage V7600-2076-storage-BW	✓ Online	5,576.50	4,886.50	96	3					
FB_P10	DS8000-2107-75LX561-BW	✓ Normal	4,887.00	1,598.00	28		RAID 10	FB			
TSM4K3_F5	DS4600-TSM4K3-600A0B800004	✓ Normal	2,793.04	0.00	2		RAID 5				
TSM4K3_F1	DS4600-TSM4K3-600A0B800004	✓ Normal	2,793.04	0.00	2		RAID 5				
TSM4K3_F4	DS4600-TSM4K3-600A0B800004	✓ Normal	2,793.04	0.00	2		RAID 5				
TSM4K3_H4	DS4600-TSM4K3-600A0B800004	✓ Normal	2,793.04	0.00	2		RAID 5				

Showing 240 items | Selected 0 items
Refreshed a few moments ago

Figure 3-72 Example: level 2 of pools

From this table view, you can open the properties window for a specific pool to see, for example, the volumes in that pool, or to get the managed disks within that pool. You can export the table to a file or follow the hyperlink to the related storage system at level 3 (Detail View).

The level 2 view for pools contains the table with the tabs:

- Pools

Refer to Table 3-13 to get a complete available property list in Tivoli Storage Productivity Center for each tab at pools level 2.

*Table 3-13 Available properties for pools*

Pools
Name
Status
Acknowledged
Pool Capacity (GiB)
Volumes
Managed Disks
RAID Level
Format
Controller
LSS or LCU
Rank Group
Extent Size (MiB)

Pools
Encryption
Encryption Group
Solid State
Soft Space (GiB)
Available Soft Space (GiB)
Assigned Volume Space (GiB)
Unassigned Volume Space (GiB)
Total Volume Capacity (GiB)
Real Volume Space (GiB)
Used Volume Space (GiB)
Allocation (%)
Realizable Allocation (%)
Repository Capacity (GiB)
Available Repository Space (GiB)
Easy Tier
Tier Capacity SSD (GiB)
Tier Capacity HDD (GiB)
Tier Available Space SSD (GiB)
Tier Available Space HDD (GiB)
Back-End Storage System Type
Back-End Storage RAID Level
Back-End Storage Disk Type
Back-End Storage Disks
Read I/O Capability
Last Data Collection

## Servers

A *server* is a computer or host that is connected to a network and provides an access point to that network. Use Tivoli Storage Productivity Center to collect detailed asset and status information about the servers and clusters in your environment. Use Tivoli Storage Productivity Center to collect information about the cluster nodes and cluster resource groups for Microsoft Cluster Server (MSCS) and IBM PowerHA® (formally known as IBM HACMP™).

**Note:** Information about servers and clusters are organized into separate tabs. If there are no monitored servers that are part of a cluster, the Cluster tab is not shown.

The servers view at level 2 shows all servers (virtual and physical) for the complete storage environment.

**Note:** Tivoli Storage Productivity Center requires the Storage Resource Agent (SRA) installed on the servers to be identified as a server resource. Virtual servers on monitored hypervisors are identified as virtual machines at the hypervisor panel, but are not identified as servers as long as they have no SRA installed.

Figure 3-73 shows an example of a level 2 view for servers.

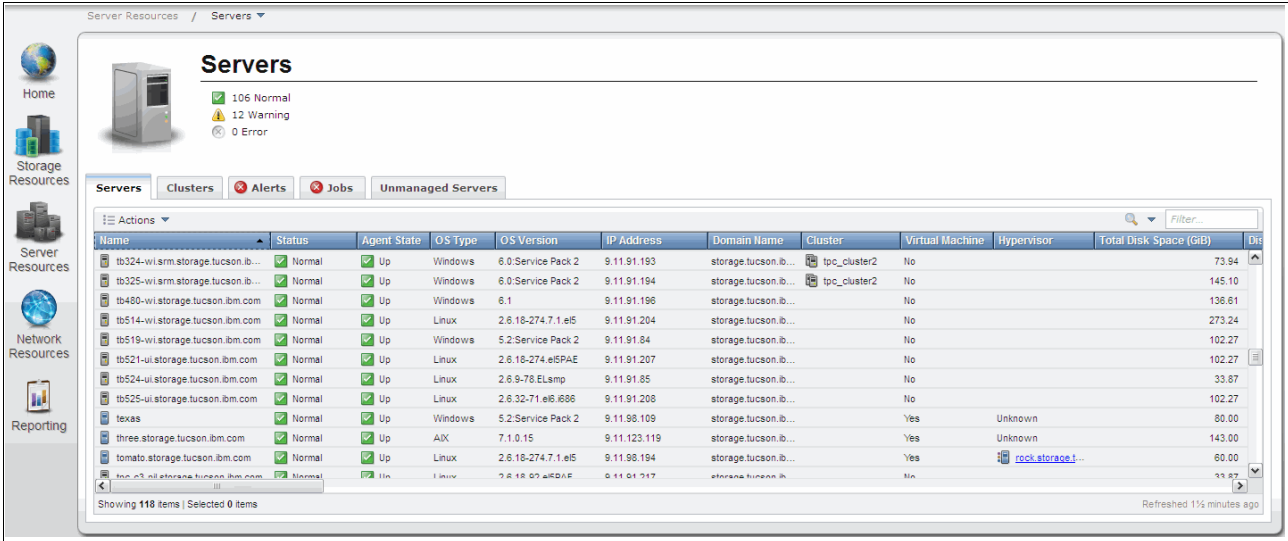


Figure 3-73 Example: Level 2 of servers

From this table view, you can open the properties window for a specific server, the Detail View (level 3) of a specific server, export the table to a file, or in case the server is a virtual machine follow the hyperlink to the related top-level resource hypervisor.

Beside the **Servers** tab, the table also shows the **Clusters** tab, which provides information about cluster configurations. See Figure 3-74 on page 157 for an example for the Clusters tab. By clicking a hyperlink in the **Cluster Resource Groups** column, we get the properties window of the cluster and see the individual resource groups.

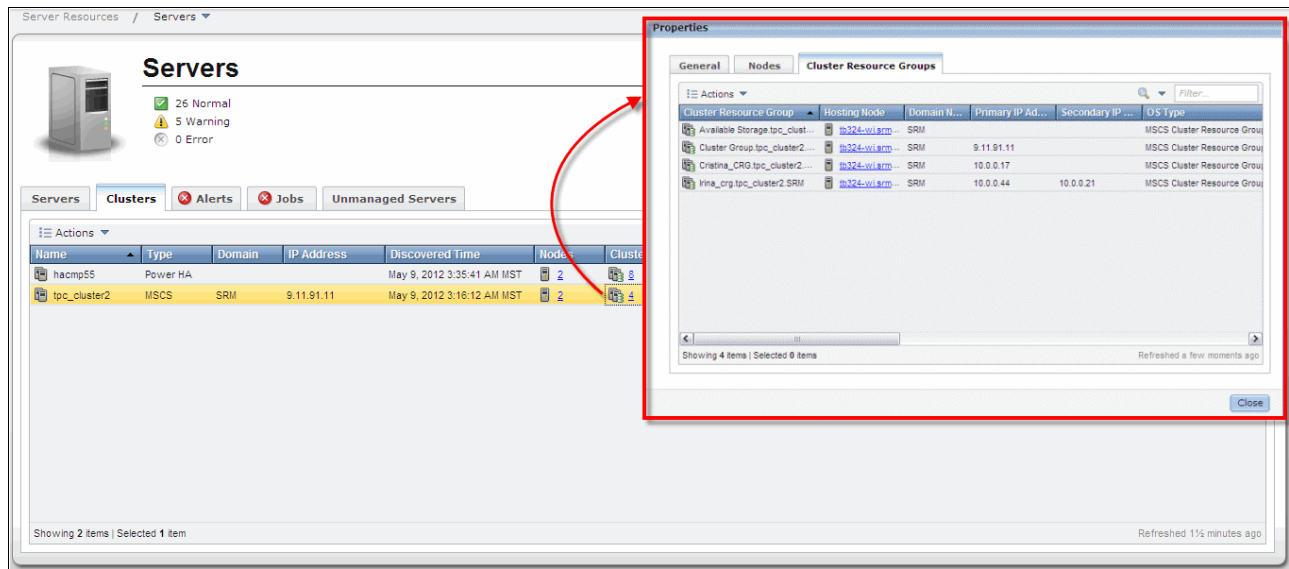


Figure 3-74 Example: Level 2 of server clusters

From the servers level 2 table view, you can check the alerts and jobs for all servers. For that, select the **Alerts** or **Jobs** tab.

The last tab in this table is labeled **Unmanaged Servers**. This table contains all known servers by Tivoli Storage Productivity Center without an SRA. Those servers were found during a Windows Domain Discovery job or are virtual machines on a monitored hypervisor.

The level 2 view for servers contains the table with the following tabs:

- ▶ Servers
- ▶ Clusters
- ▶ Alerts
- ▶ Jobs
- ▶ Unmanaged Servers

Refer to Table 3-14 to get a complete available property list in Tivoli Storage Productivity Center for each tab at servers level 2.

Table 3-14 Available properties for servers

Servers	Clusters	Alerts	Jobs	Unmanaged Servers
Name	Name	ID	Name	Name
Status	Type	Condition	Category	Hypervisor Name
Acknowledged	Domain	Severity	Type	Domain Name
Agent State	IP Address	Acknowledged By	Status	IP Address
OS Type	Discovered Time	Last Occurrence	Schedule	OS Type
OS Version	Nodes	Alert Category	Last Run Time	Discovered Time
IP Address	Cluster Resource Groups	Resource	Average Duration	

Servers	Clusters	Alerts	Jobs	Unmanaged Servers
Domain Name		Internal Resource	View Logs <sup>a</sup>	
Cluster		Total Occurrences		
Virtual Machine		First Occurrences		
Total Disk Space (GiB)		Alert Name		
Disk Space from Storage Systems (GiB)		Alert Creator		
Available Disk Space (GiB)				
File System Capacity (GiB)				
File System Space from Storage Systems (GiB)				
Available file System Space (GiB)				
RAM (GiB)				
Swap Space (GiB)				
Agent Version				
Agent Installation Location				
Agent Runtime Mode				
Agent Port				
Run Scripts on Agent				
Vendor				
Model				
Serial Number				
Processor Type				
Processor Speed (GHz)				
Processor Count				



Servers	Clusters	Alerts	Jobs	Unmanaged Servers
Processor Architecture				
GUID				
Last Start Time				
Last Data Collection				
Last Scan Time				
Last Update Time				
Time Zone				
Custom Tag 1				
Custom Tag 2				
Custom Tag 3				

a. Hyperlink to the job log

## Hypervisors

A *hypervisor* is a layer of software or a physical device that manages multiple, virtual instances of operating systems on the same hardware. Use Tivoli Storage Productivity Center to collect detailed asset and status information about the hypervisors in your environment. Hypervisors include VMWare vSphere data sources such as ESX, ESXi, and vCenter servers.

The hypervisors view at level 2 shows all monitored hypervisors for the complete storage environment.

Figure 3-75 shows an example of a level 2 view for hypervisors.

Name	Status	Acknowledged	OS Type	OS Version	IP Address	Total Disk Space (GiB)	Disk Space from Storage System	Available Disk Space (GiB)	File System Capacity (GiB)
atlas.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.123.91	282.75	9.51	3.51	
rock.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.98.175	307.03	0.00	0.00	
gravel.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.98.174	335.03	28.00	4.01	
aardvark.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.98.241	409.86	0.00	0.00	
porcupine.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.123.113	409.86	0.00	409.86	
tpcvm2.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.97.32	546.47	0.00	0.01	
tpcvm1.storage.tucson.ibm.com	Normal	No	VMware ESX	3.5.0	9.11.98.46	607.95	61.47	42.03	
quantize.storage.tucson.ibm.com	Error	Yes	VMware ESX	3.5.0	9.11.123.50		0.00		
pebble.storage.tucson.ibm.com	Error	Yes	VMware ESX	3.5.0	9.11.98.176	335.03	28.00	35.80	

Figure 3-75 Example: Level 2 of hypervisors

From this table view, you can open the properties window for a specific hypervisor, go to the Detail View (level 3) of a specific hypervisor, or export the table to a file. You also can check the alerts and jobs for all hypervisors by selecting the Alerts and Jobs tabs.

The level 2 view for hypervisors contains the table with the following tabs:

- Hypervisors
- Alerts
- Jobs

Refer to Table 3-15 to get a complete available property list in Tivoli Storage Productivity Center for each tab at hypervisor level 2.

*Table 3-15 Available properties for hypervisors*

Hypervisors	Alerts	Jobs
Name	ID	Name
Status	Condition	Category
Acknowledged	Severity	Type
OS Type	Acknowledged By	Status
OS Version	Last Occurrence	Schedule
IP Address	Alert Category	Last Run Time
Domain Name	Resource	Average Duration
Total Disk Space (GiB)	Internal Resource	View Logs <sup>a</sup>
Disk Space from Storage Systems (GiB)	Total Occurrence	
Available Disk Space (GiB)	First Occurrence	
File System Capacity (GiB)	Alert Name	
File System Space from Storage Systems (GiB)	Alert Creator	
Available File System Space (GiB)		
RAM (GiB)		
Swap Space (GiB)		
Vendor		
Model		
Serial Number		
Processor Type		
Processor Speed (GHz)		
Processor Count		
Processor Architecture		
Last Start Time		
Last Data Collection		

Hypervisors	Alerts	Jobs
Time Zone		
Custom Tag 1		
Custom Tag 2		
Custom Tag 3		

a. Hyperlink to the job log

## Switches

A *switch* is a network infrastructure component to which multiple nodes attach. Use Tivoli Storage Productivity Center to collect detailed asset, performance, and status information about the SAN switches in your environment.

The switches view at level 2 shows all monitored switches for the complete storage environment.

Figure 3-76 shows an example of a level 2 view for switches.

Name	Status	Domain ID	Ports	Connected Ports	Fabric	Principal Switch of Fabric	Virtual	WWN	Element Manager
tin	Normal	1	32	14	Stable Brocade	sestra	No	100000051E02E082	<a href="http://9.11.123.111/">http://9.11.123.111/</a>
tpcblade4fc	Normal	68	16	14	Stable Brocade	sestra	No	100000051E02B78C	<a href="http://9.11.98.75/">http://9.11.98.75/</a>
byron	Normal	7	32	20	unstable Brocade	tpc-212swt-brc	No	100000060990036F	<a href="http://9.11.98.127/">http://9.11.98.127/</a>
Raven48	Normal	199	32	20	unstable Brocade	tpc-212swt-brc	No	100000051E02E07A	<a href="http://9.11.98.136/">http://9.11.98.136/</a>
tpcblade2fc2	Normal	30	16	5	unstable Brocade	tpc-212swt-brc	No	100000051E341306	<a href="http://9.11.123.131/">http://9.11.123.131/</a>
tpc-212swt-brc	Normal	47	16	12	unstable Brocade	tpc-212swt-brc	No	100000051E03A818	<a href="http://9.11.91.238/">http://9.11.91.238/</a>
Cswitch4	Normal	100	32	16	unstable Brocade	tpc-212swt-brc	No	1000000609900B72	<a href="http://9.11.124.68/">http://9.11.124.68/</a>
Ruffy	Normal	1	64	2	unstable Brocade	tpc-212swt-brc	No	1000000609E209CC	<a href="http://9.11.92.169/">http://9.11.92.169/</a>
mdm-y76-sw7	Normal	10	32	6	unstable Brocade	tpc-212swt-brc	No	100000051E347790	<a href="http://9.11.91.241/">http://9.11.91.241/</a>
Nova	Warning	1	8	7	100000C0D00079F	Nova	No	100000C0D00079E	<a href="http://9.11.97.65/">http://9.11.97.65/</a>
ity_P0	Warning	16	96	4	10000008082E5C00	ity_P0	No	10000008082E5C00	

Figure 3-76 Example: Level 2 of switches

From this table view, you can open the Detail View (3rd level) of a specific switch or you can open the properties window for a specific switch, export the table to a file, or follow the hyperlinks to related items such as fabric, principal switch, or launch the element manager URL for a specific switch. You also can check the alerts and jobs for all switches by selecting the Alerts and Jobs tab.

The level 2 view for switches contains the table with the following tabs:

- Switches
- Alerts
- Jobs

Refer to Table 3-16 on page 162 to get a complete available property list in Tivoli Storage Productivity Center for each tab at switches level 2.

Table 3-16 Available properties for switches

Switches	Alerts	Jobs
Name	ID	Name
Status	Condition	Category
Acknowledged	Severity	Type
Domain ID	Acknowledged By	Status
Ports	Last Occurrence	Schedule
Connected Ports	Alert Category	Last Run Time
Fabric	Resource	Average Duration
Principal of Fabric	Internal Resource	View Logs <sup>a</sup>
Vendor	Total Occurrences	
Model	First Occurrence	
Serial Number	Alert Name	
Firmware	Alert Creator	
Virtual		
Parent Switch		
WWN		
IP Address		
Element Manager		
Last Data Collection		

a. Hyperlink to the job log

## Fabrics

A *fabric* is a network of hubs, switches, adapter endpoints, and connecting cables that support a communication protocol between devices. Use Tivoli Storage Productivity Center to collect detailed asset and status information about the fabrics in your environment.

The fabrics view at level 2 shows all monitored fabrics for the complete storage environment.

Figure 3-77 on page 163 shows an example of a level 2 view for fabrics.

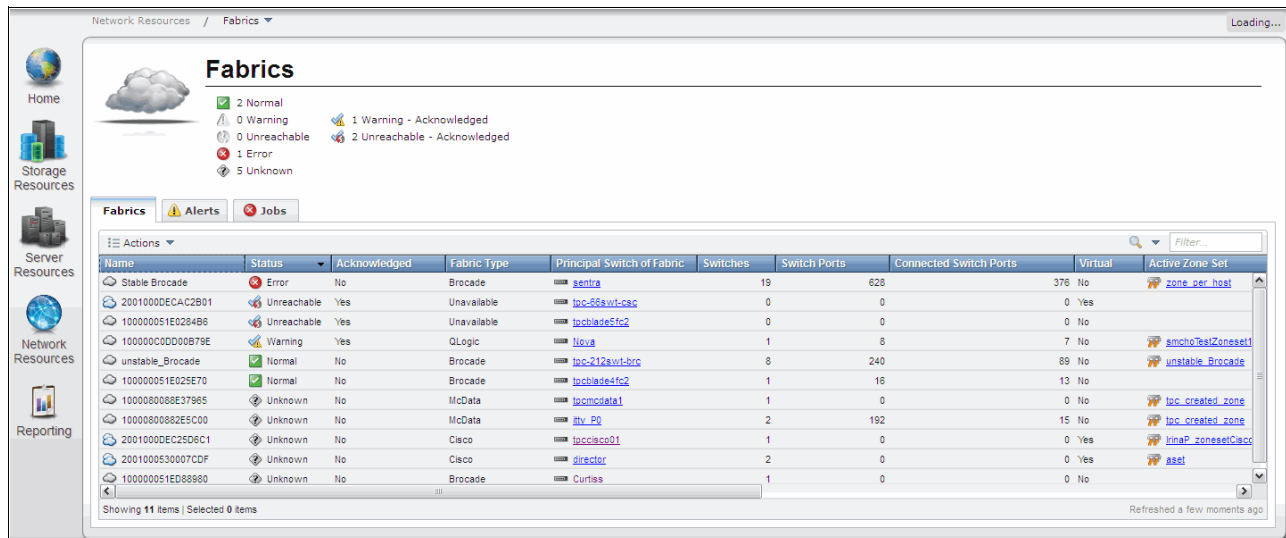


Figure 3-77 Example: Level 2 of fabrics

From this table view, you can open the properties window for a specific fabric, go to the Detail View (level 3) of a specific fabric, export the table to a file, or follow the hyperlink to the third level view (Detail View) of the related principal switch. You also can check the alerts and jobs for all fabrics by selecting the Alerts and Jobs tab.

The level 2 view for fabrics contains the table with the tabs:

- ▶ Fabrics
- ▶ Alerts
- ▶ Jobs

Refer to Table 3-17 to get a complete available property list in Tivoli Storage Productivity Center for each tab at Fabrics level 2.

Table 3-17 Available properties for fabric

Fabrics	Alerts	Jobs
Name	ID	Name
Status	Condition	Category
Acknowledged	Severity	Type
Fabric Type	Acknowledged by	Status
Principal Switch of Fabric	Last Occurrence	Schedule
Switches	Alert Category	Last Run Time
Switch Ports	Resource	Average Duration
Connected Switch Ports	Internal Resource	View Logs <sup>a</sup>
Virtual	Total Occurrences	
Active Zone Set	First Occurrence	
WWN	Alert Name	
Last Data Collection	Alert Creator	

Fabrics	Alerts	Jobs
Custom Tag 1		
Custom Tag 2		
Custom Tag 3		

a. Hyperlink to the job log

### 3.2.6 The new web-based GUI data level 3

The data level 3 (Detail View) in the web-based GUI is that level where you can see all the details and relations of a specific resource. Depending on the device type, firmware level, and configuration of the device and available data collections, this view may vary.

The level 3 at the web-based GUI structures all information using the same principle. The details of each top-level resource are structured into following segments:

- ▶ General
- ▶ Internal Resources
  - Common Internal Resources<sup>2</sup>
  - Block Internal Resources<sup>2</sup>
  - File Internal Resources<sup>2</sup>
- ▶ Related Resources

**General** provides overall information about a top-level resource. **Internal resources** are components that exist within a top-level resource. Depending on the resource type, the internal resources may be divided into further sections. **Related resources** are external resources but are related to it, for example, through assigned storage, a network connection, or virtual hosting.

#### Structure at data level 3

The web-based GUI at level 3 contains four areas. Refer to Figure 3-78 on page 165 and below to get an overview of the areas.

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<sup>2</sup> Only displayed if the resource is providing it

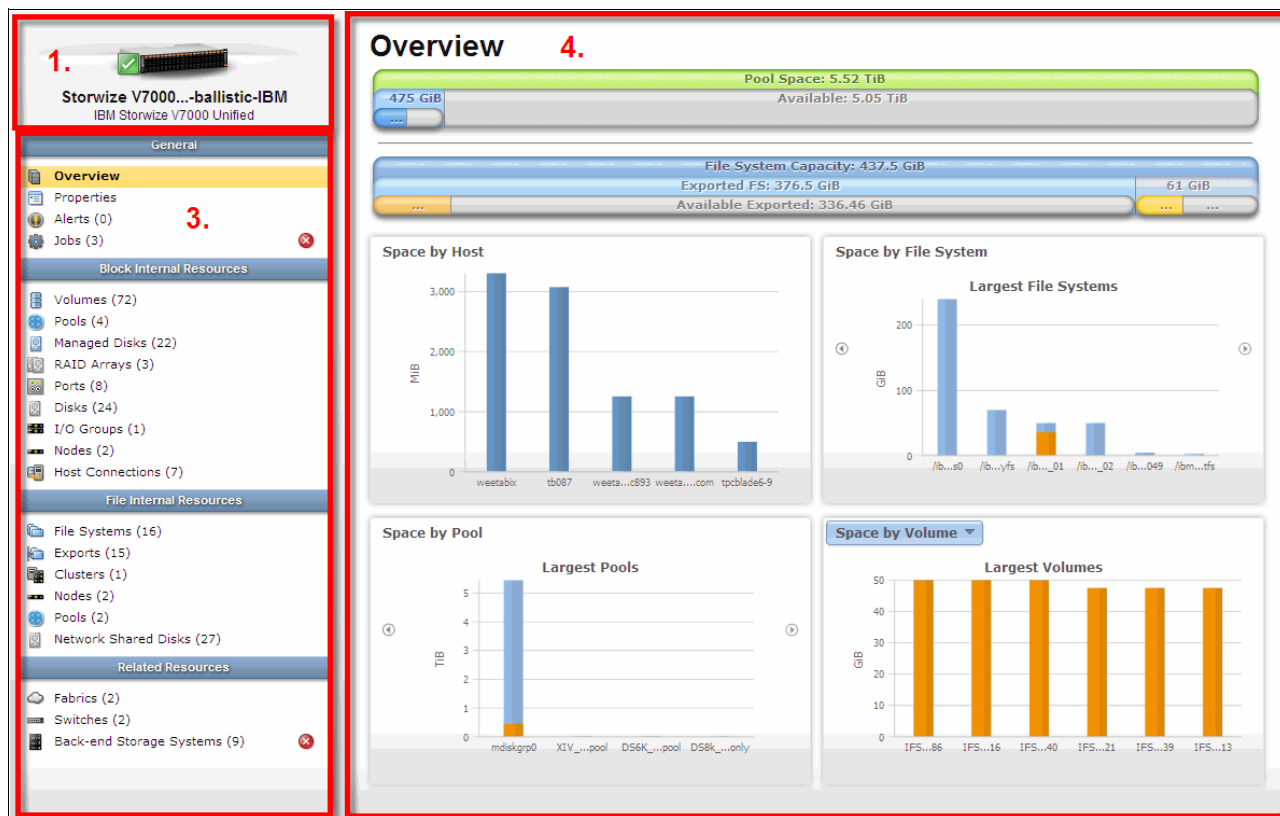


Figure 3-78 Example level 3 overview

### Top-level (1)

The top-level area (see Figure 3-78, section number 1) contains an icon that graphically shows the type of the resource whenever possible. For example, for a DS8000, a DS8000 icon is shown, or for the V7000, a V7000 icon is shown. Top-level resources are: storage system, hypervisor, server, switch, and fabric.

Left to the icon you can see the health status of the resource. Below this icon you can see the label within Tivoli Storage Productivity Center or the host name. Below that, you can see the type or OS level of the resource.

### Bread crumbs (2)

Use the bread crumb above the working space to quickly navigate from one resource to another within the same resource group at level 3. The bread crumb is not shown in Figure 3-78. See Figure 3-79 for an example of a bread crumb.

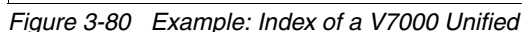


Figure 3-79 Example: Bread crumb

### Working space (4)

The working space (see Figure 3-78, section number 4) is the area where the information for each entry in the quick access index is displayed and actions can be performed. Use the quick access index to open views in the working space.

The quick access index (see Figure 3-78 on page 165, section number 3) is split into three main sections, which were described here. Use the index to open the details in the working space at the right side of the index. Figure 3-80 shows an example of an index for a V7000 Unified. Select the item of interest in the index to open the details in the working space to the right. In this example, we select Exports, which symbolically opens the table **Exports** on the right side.



## General


## General → Overview

- Capacity breakdown (Storage System, Server, Hypervisor)
- Number of switch ports connected (Switch, Fabric)




- ▶ Total capacity usage over the last 30 days (Storage System, Server, Hypervisor)
- ▶ Resource allocations to virtual machines (Hypervisor)
- ▶ Performance data over the last 24 hours (Storage Systems, Switch, Fabric)

### General → Properties

Select properties in the index to show more details about the device itself. The information is provided within a table with different tabs in the working space. When you hover the mouse over a row of the table, the icon  appears. Hover the icon to get information about the displayed value. To prove the currentness of the information, you can check the upper-right side in the window. There, you see the time stamp of the last data collection. The information displayed at those properties tables is related to:


- ▶ Health Status (Storage System, Server, Hypervisor, Switch, Fabric)
- ▶ IP addresses (Storage System, Server, Hypervisor, Switch)
- ▶ Firmware/OS levels (Storage System, Server, Hypervisor, Switch)
- ▶ Configurations/Hardware (Storage System, Server, Hypervisor, Switch, Fabric)
- ▶ Capacity/Usage (Storage System, Server, Hypervisor, Switch, Fabric)
- ▶ Agent (Server)
- ▶ Average performance (Storage System, Switch)
- ▶ Element Manager (Switch)

### General → Alerts

At the **Alerts** subsection in the index, the number of alerts in brackets are shown, and on the right side an icon is displayed, which shows the worst severity of not acknowledged and not removed alerts. For example,  in the index shows a total of 7 alerts for this top-level resource where the worst severity is an error.

Click **Alerts** in the index to show all alerts for the resource. The information is provided within a table in the working space. Refer to 3.3.3, “Alerts” on page 247 for more details about alerts.

### General → Jobs

At the **Jobs** sub-section in the index, the number of jobs in brackets is shown, and on the right side an icon is displayed, which shows the worst status of a job. For example,  in the index shows a total of three jobs for this top-level resource where all statuses are Successful or Running. In such a case no status is displayed in the index.

Select “Jobs” to show all jobs for a device. The information is provided within a table in the working space. Refer to 3.3.2, “Jobs” on page 230 for more details about jobs.

### Internal resources (common, block, file)

The internal resources section in the index contains information about the internal resources within a device configuration. This section varies for each type of device. Depending on what the device is supporting, the internal resource section may be split into **Common internal resources**, **block internal resources**, and **file internal resources**. To each type of internal resources the health status and the number of resources in brackets is displayed. Click an item in the internal resource section to open the detail view in the working space. The information is provided in tables. Refer to Figure 3-81 on page 168 through Figure 3-85 on page 170 to see all available internal resources.

### Related resources

The related resources section in the index contains information about the resources that are related to another resource. A related resource is external to a high-level resource, but is

related to it, for example, through assigned storage, a network connection, or virtual hosting. To each type of external resources the health status and the number of resources in brackets are displayed. Click an item in the related resources section to open the detail view in the working space. The information is provided in tables. Refer to Figure 3-81 through Figure 3-85 on page 170 to see all available related resources.

The following tables show what information (internal and related) is available per top-level resource such as storage system, hypervisor, server, switch, and fabric.

Figure 3-81 provides the available internal and related resource information for the storage systems.



























Top-level resource icon	Internal resources	Related resources
	<b>Block storage resources</b> <ul style="list-style-type: none"> <li> Controllers</li> <li> Disks</li> <li> External disks</li> <li> Host connections</li> <li> I/O groups</li> <li> Managed disks</li> <li> Modules</li> <li> Nodes</li> <li> Pools</li> <li> Ports</li> <li> RAID arrays</li> <li> Volumes</li> </ul> <b>File storage resources</b> <ul style="list-style-type: none"> <li> Controllers</li> <li> Clusters</li> <li> Disks</li> <li> Exports</li> <li> File systems</li> <li> Network shared disks</li> <li> Nodes</li> <li> Pools</li> </ul>	<ul style="list-style-type: none"> <li> Back-end storage systems</li> <li> Fabrics</li> <li> Hypervisors</li> <li> Servers</li> <li> Switches</li> </ul>

Figure 3-81 Available internal and related resource information for the storage system

Figure 3-82 on page 169 provides the available internal and related resource information for the hypervisors.









Top-level resource icon	Internal resources	Related resources
	<ul style="list-style-type: none"> <li> Virtual machines</li> <li> Disks</li> <li> Controllers</li> <li> File systems and logical volumes</li> </ul>	<ul style="list-style-type: none"> <li> Storage systems</li> <li> Fabrics</li> <li> Switches</li> </ul>

Figure 3-82 Available internal and related resource information for the hypervisor

Figure 3-83 provides the available internal and related resource information for the servers.












Top-level resource icon	Internal resources	Related resources
	<ul style="list-style-type: none"> <li> Disks</li> <li> Controllers</li> <li> Volume groups</li> <li> File systems and logical volumes</li> <li> Hypervisors</li> <li> Shares and exports</li> <li> Monitored directories</li> </ul>	<ul style="list-style-type: none"> <li> Storage systems</li> <li> Fabrics</li> <li> Switches</li> </ul>

Figure 3-83 Available internal and related resource information for the server

Figure 3-84 provides the available internal and related resource information for the switches.

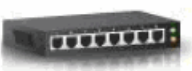











Top-level resource icon	Internal resources	Related resources
	<ul style="list-style-type: none"> <li> Blades</li> <li> Fabrics</li> <li> Logical switches</li> <li> Parent switches</li> <li> Ports</li> </ul>	<ul style="list-style-type: none"> <li> Fabrics</li> <li> Hypervisors</li> <li> Servers</li> <li> Storage systems</li> <li> Switches</li> <li> Unknown resources</li> </ul>

Figure 3-84 Available internal and related resource information for the switch

Figure 3-85 provides the available internal and related resource information for the fabrics.










Top-level resource icon	Internal resources	Related resources
	<ul style="list-style-type: none"> <li> Blades</li> <li> Ports</li> <li> Switches</li> <li> Zone sets</li> </ul>	<ul style="list-style-type: none"> <li> Hypervisors</li> <li> Servers</li> <li> Storage systems</li> <li> Unknown resources</li> </ul>

Figure 3-85 Available internal and related resource information for the fabric

### 3.2.7 Examples from data level 3 (Detail View)

Since the number of possible views is very large at level 3 and the view is also depending on the type of the resource, we decided to show several examples and not explain each possible view, which would completely overload this book. In principle, the navigation and information structure is mostly similar.

#### Example SAN Volume Controller at level 3

In this section, we provide four level 3 examples with the storage system of the type SAN Volume Controller.

In the first example, we provide the overview of an SAN Volume Controller Cluster. To open the overview, click the link called **Overview** in the index.

##### General → Overview

The Overview (see Figure 3-86 on page 171) of the SAN Volume Controller Cluster provides a quick overview of the storage system. The overview window includes a capacity pyramid on the top that shows the used space (assigned and unassigned) and the available (free) space. In a V7000 Unified, which provides Block and File Storage, a second pyramid would be shown for the File Storage part. Below this pyramid, four charts are displayed. A chart can be a bar-chart or line-chart.

In the example that is shown in Figure 3-86 on page 171, we select the charts about performance “**Overall System Activity → Response Time**”, and “**Most Active Nodes → CPU utilization**” over the last 24 hours. We also select the capacity-related charts by selecting **Space by Pool → Fullest pools** and the capacity usage over the last 30 days. All those charts give a quick overview about the capacity and performance of this SAN Volume Controller Cluster. In addition to this information you see the health status of the entire SAN Volume Controller Cluster and the status of the internal and related resources in the index pane on the left side.

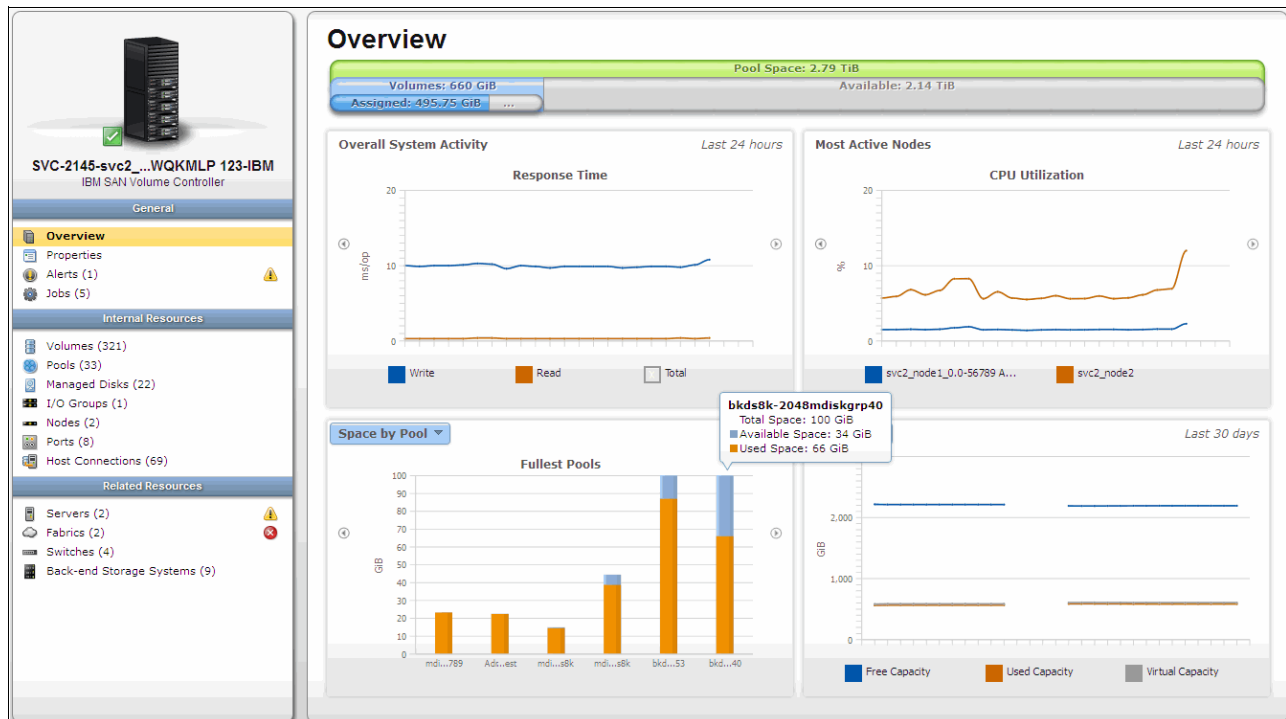


Figure 3-86 Example level 3 SAN Volume Controller (SVC) General, Overview

See the line chart example in Figure 3-87. Each chart uses the drop-down menu (1.) to change the displayed chart and uses the carousel cycle function (2.) to show the metric of interest. Use the hover function (3.) to display information about a component or sample in the chart. Furthermore, you can hide and unhide lines in the line chart (4.) by checking and clearing the boxes at the legend.

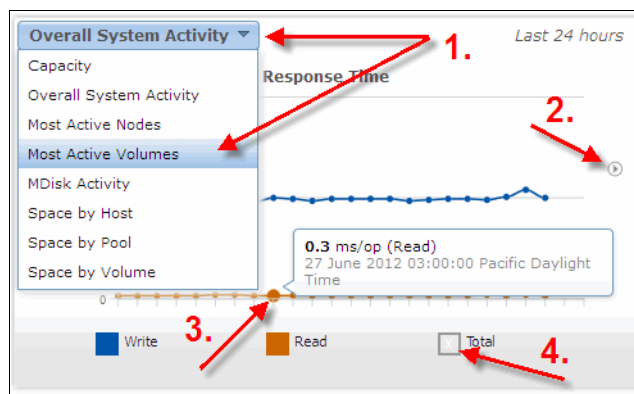


Figure 3-87 Example: Level 3 overview line chart

In the next example, we show all *host to volume mapping* for a specific SAN Volume Controller Cluster. To open this table, click the following link at level 3 for an SAN Volume Controller Cluster:

**Internal Resources → Host Connections → tab Volume Mappings**

The selected window, as you can see in Figure 3-88, shows a table containing all host to volume mappings of an entire SAN Volume Controller Cluster. Each row in the table represents one host to volume mapping. The table shows the host name, the assigned volume name or volume ID, the number of ports (HBAs) to which the volume is mapped to, and characteristics of the volume, such as capacity, thin provisioned, or the related pool of the volume.

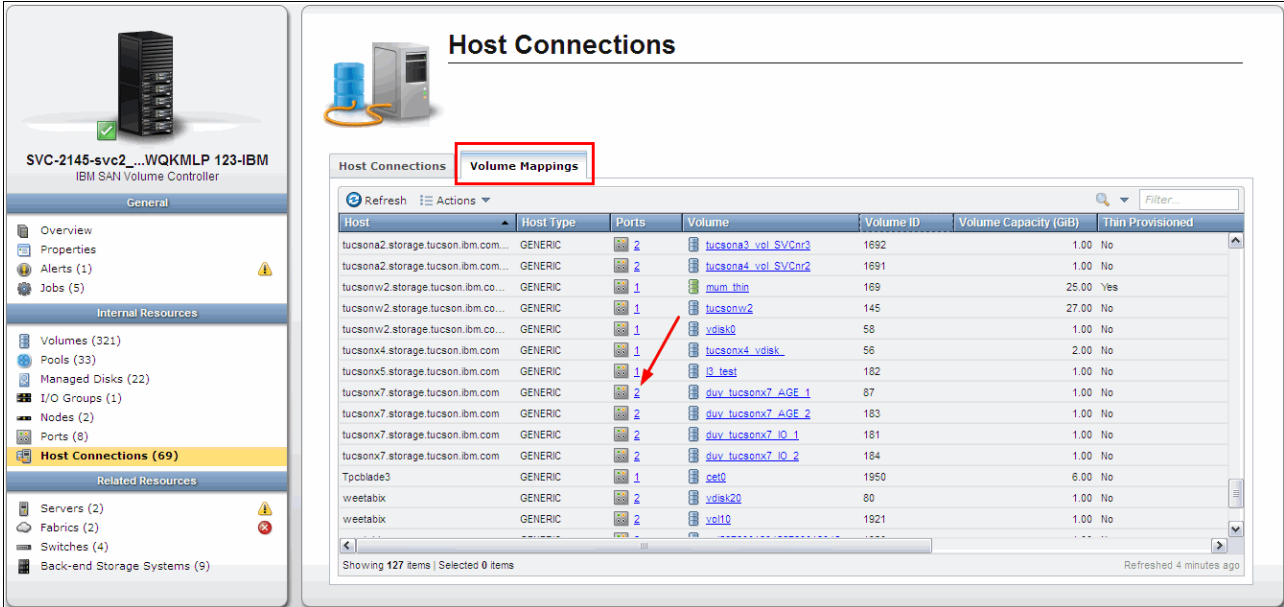


Figure 3-88 Example level 3 SAN Volume Controller (SVC) Related Resources, Host Connections, Volume Mappings

To see all worldwide port names (WWPNs) of a host, click the number in the **Ports** column or select a row of interest and run **Actions** → **Show All Associated Host Ports**. In this example, we click the number **2** in the **Ports** column, which is marked with an arrow in Figure 3-88. This opens a new properties window for this specific host showing all WWPNs. See Figure 3-89 for an example.

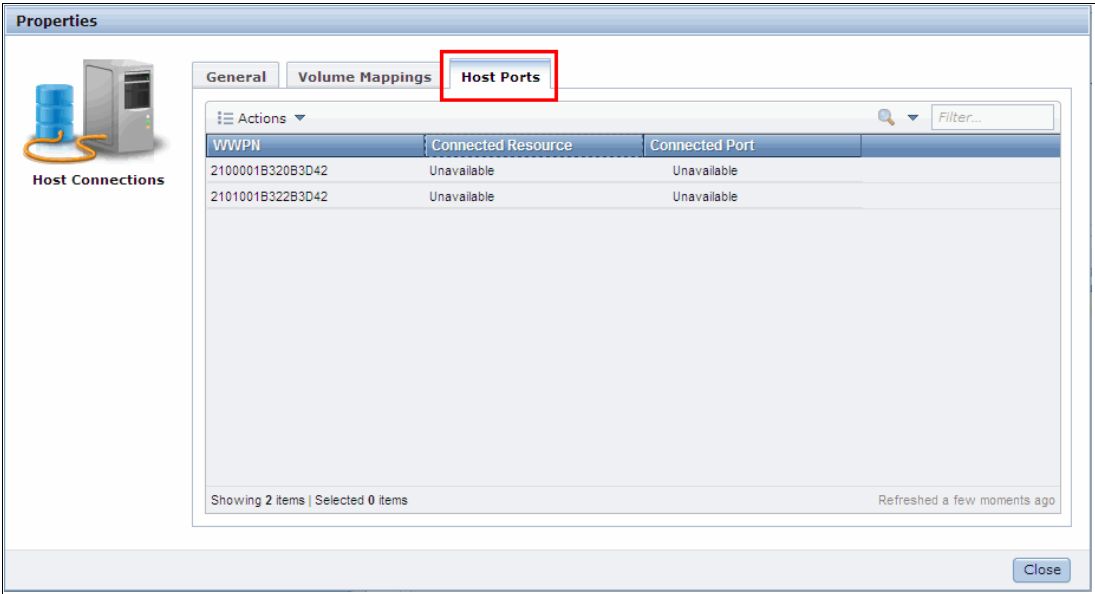


Figure 3-89 Example level 3 SAN Volume Controller Related Resources, Volume Properties, Host Ports

To see all volumes that are mapped to this host, move to the **Volume Mappings** tab at the properties window to see all volumes mapped to that host on that SAN Volume Controller Cluster. See Figure 3-90. Alternatively, you also can filter the host name in the table tab **Volume Mappings** at Figure 3-88 on page 172 to get the same result.

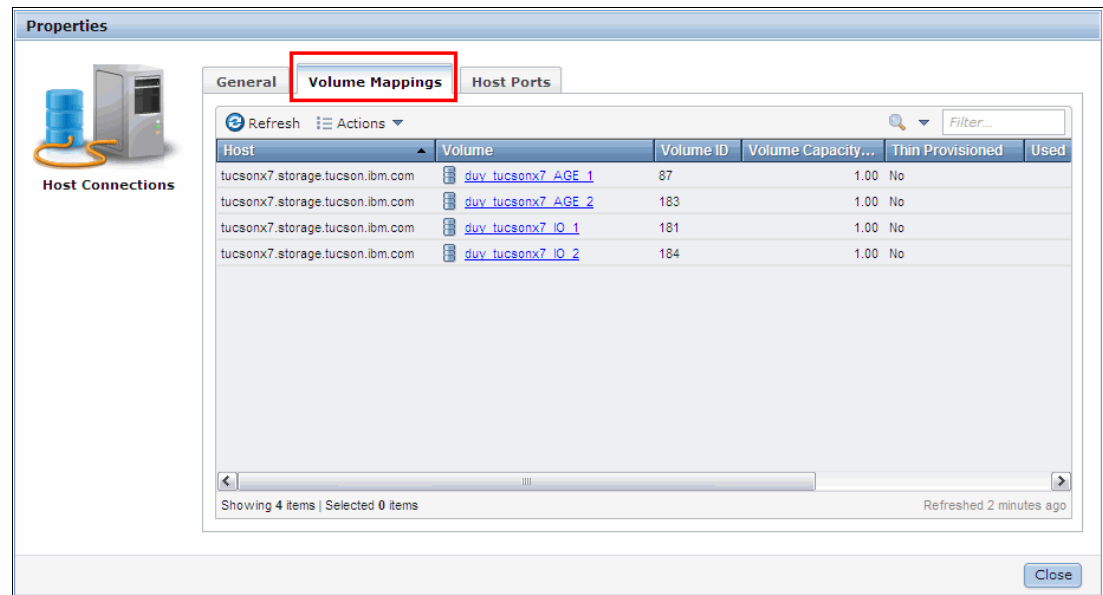


Figure 3-90 Example level 3 SAN Volume Controller Related Resources, Volume Properties, Volume Mapping

In the next example, we want to show all volumes on a specific SAN Volume Controller Cluster. To open this table, run the following link at level 3 for an SAN Volume Controller Cluster:

#### Internal Resources → Volumes

The selected window, as you can see in Figure 3-91 on page 174, shows a table containing all volumes that are defined on the SAN Volume Controller Cluster. The table provides many columns. Use the scroll bar at the bottom and to the right of the table to scroll the table within the window. Each row represents a volume on that SAN Volume Controller Cluster. Each column provides a property. The table shows properties such as: Volume name, status of the volume, the UID of the volume, to which pool it belongs, to which I/O Group it is assigned, which SAN Volume Controller node is the preferred node, volume capacity, which host object or number of hosts are mapped to it, if the volume is copied within SAN Volume Controller, thin provisioning, and more.

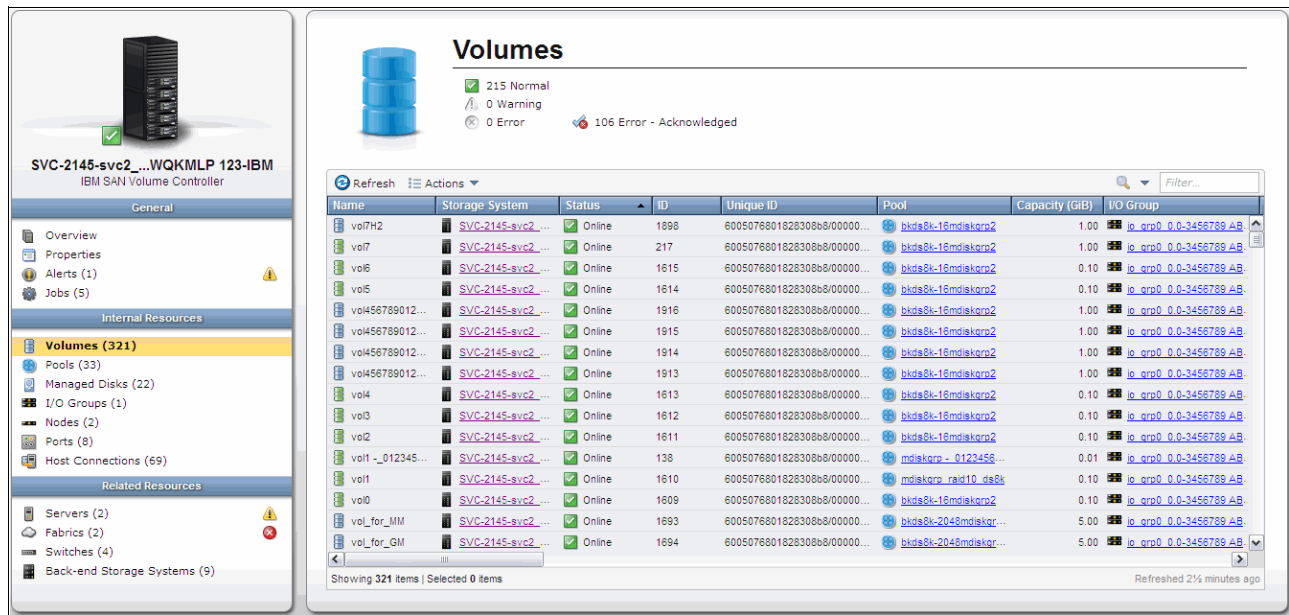


Figure 3-91 Example level 3 SAN Volume Controller (SVC) Internal Resources, Volumes

Use the hyperlinks in the cells to open the **Detail View** (third level) or the **properties** window for a specific resource. For top-level resources, it directs you to the third level view (Detail View) of the resource, and for all others it opens a properties window. For example, click a hyperlink in the **I/O Group** column, which opens the properties window for this specific I/O Group since I/O Group is not a top-level resource within Tivoli Storage Productivity Center. Top-level resources are: Storage System, Hypervisor, Server, Fabric, and Switch. In the properties window, you see information that is related to this I/O Group in table tabs, such as: which volumes are assigned to this I/O Group, which nodes belong to this I/O Group, to which SAN ports is the I/O Group cabled, and more. See Figure 3-92 for an example. The properties windows again provides you further hyperlinks in the tables in the same principle.

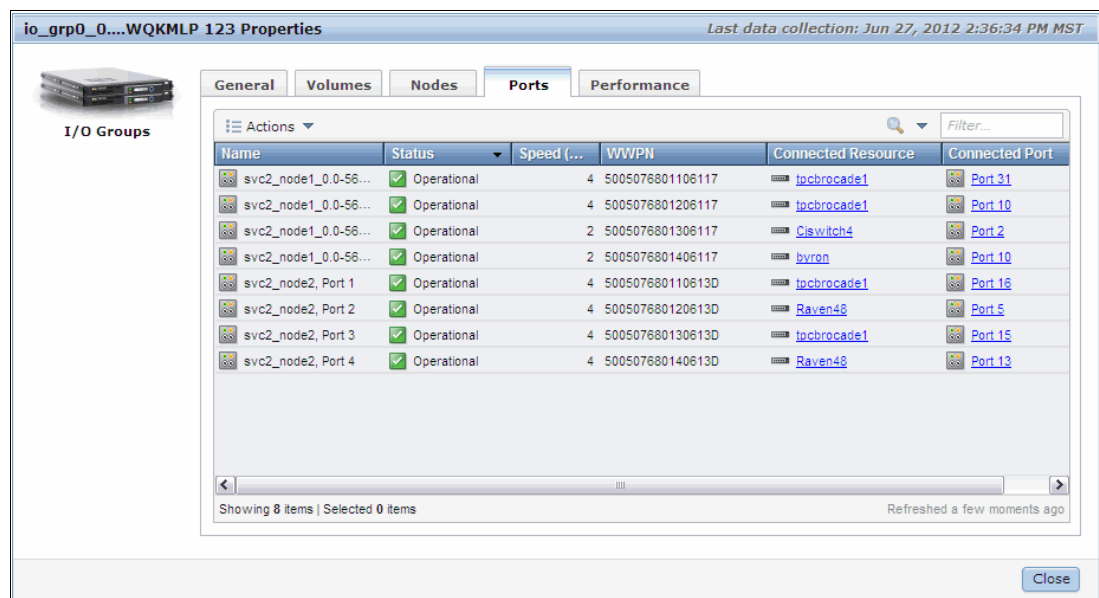


Figure 3-92 Example level 3 SAN Volume Controller (SVC): Properties window I/O group



In the next example, we want to show all back-end storage systems, which provide the storage capacity to a specific SAN Volume Controller Cluster. To open this table, follow the path:

**Related Resources** → **Back- end Storage Systems** at level 3 for an SAN Volume Controller Cluster.

The selected window, as you can see in Figure 3-93, shows a table containing all storage systems that provide back-end storage to the SAN Volume Controller Cluster. The table provides several columns. Each row represents a back-end storage system. Each column provides a property. The table shows properties such as: storage system name, health status, information about capacities, asset information, and more.

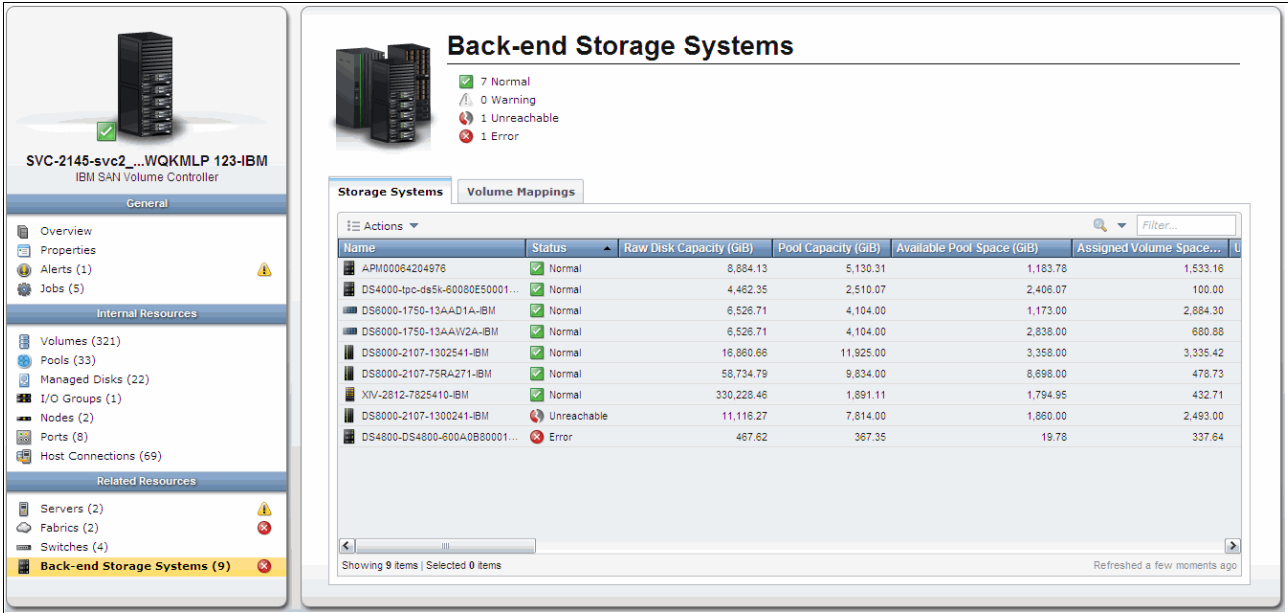


Figure 3-93 Example level 3 SAN Volume Controller (SVC) Related Resources, Back-end Storage Systems

Move to the **Volume Mappings** tab as shown in Figure 3-94 on page 176 to get more details about the backend-volume mapping to the SAN Volume Controller Cluster. In this table, each mapped backend-volume is listed. The columns: Volume, Volume ID, Backend Pool, and Storage System show the information of the back-end storage system. The Pool and Managed Disk columns show how the backend-volume is shown at the SAN Volume Controller Cluster.

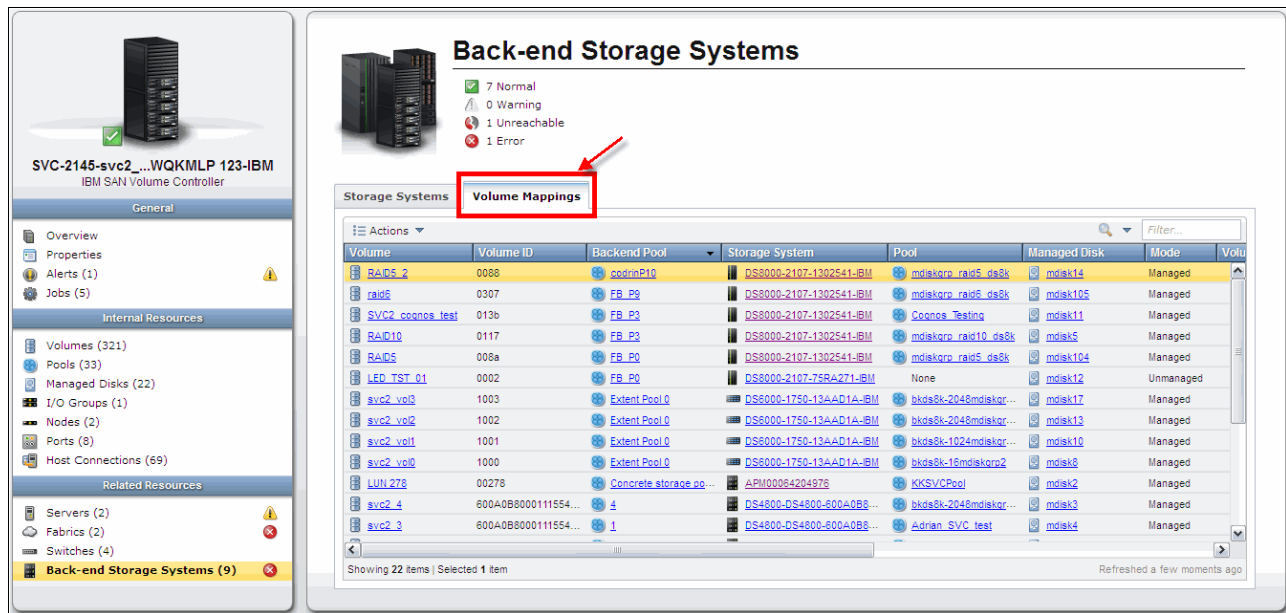


Figure 3-94 Example level 3 SAN Volume Controller (SVC) Related Resources, Back-end Storage Systems, Volume Mappings

Click a hyperlink in a cell of a related resource or use the **Actions** menu to open the properties window. The properties window shows the details for the specific backend-volume. See Figure 3-95 for an example with the volume called RAID5\_2.

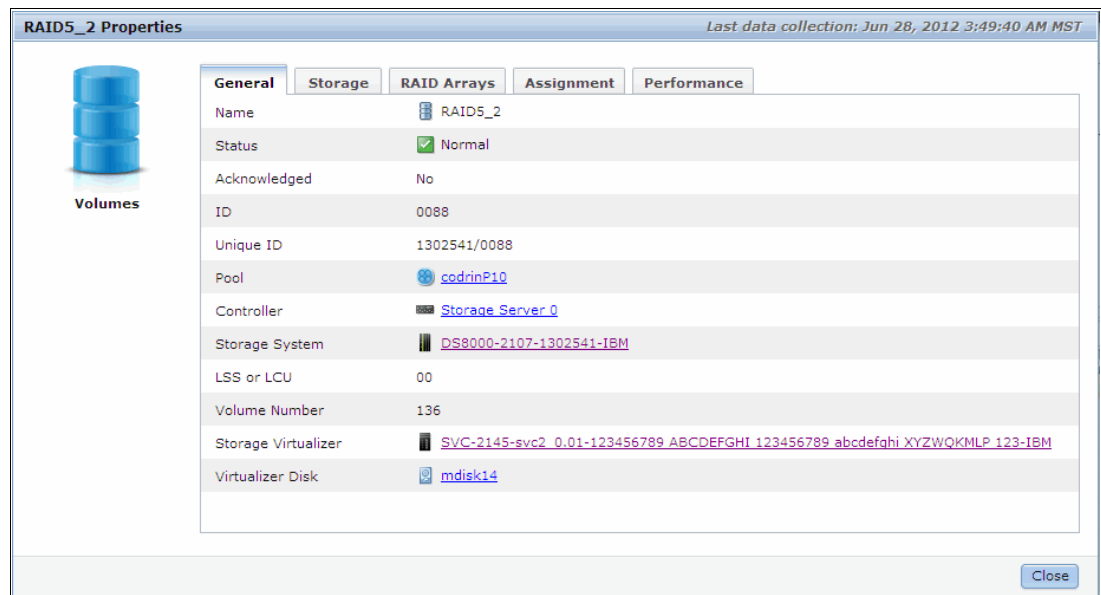


Figure 3-95 Example level 3 SAN Volume Controller (SVC), Properties window: Volumes

### Example V7000 Unified at level 3

In this section, we provide several level 3 examples with the storage system of the type V7000.

In the first example, we show all pools that are defined at a specific V7000. To open this table, click the following path at level 3 for a V7000:

### Block Internal Resources → Pools

The selected window, as you can see in Figure 3-96, shows a table containing all block storage pools of a V7000 Unified. The table provides several columns. Each row represents a pool. Each column provides a property. The table shows properties such as: Pool name, health status, information about capacities, volumes allocated in the pool, back-end volumes used to create the pool, and more. At the V7000, the pool can consist out of internal disks or use external volumes from another storage system. Click the hyperlinks in the **Volumes** and **Managed Disks** columns or open the properties window by the **Actions** menu to get more information about a pool's related volumes and managed disks.

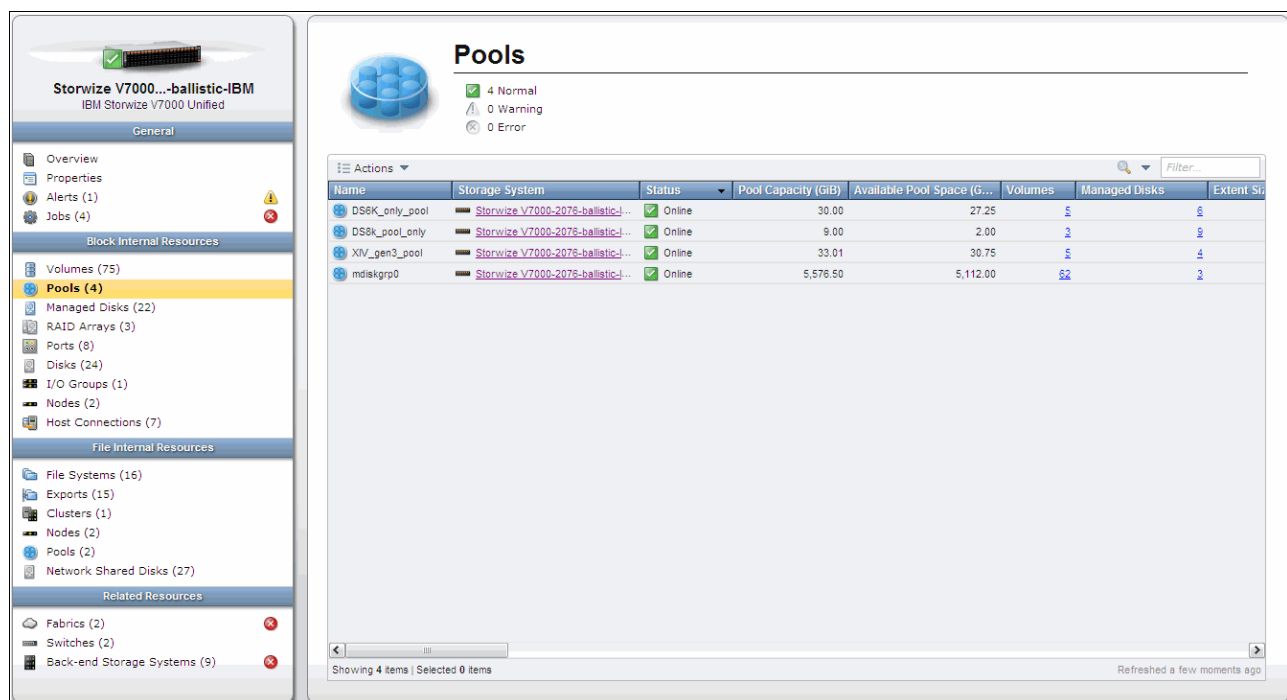


Figure 3-96 Example level 3 V7000 Block Internal Resources, Pools

In the next example, we show all Network Shared Disks (NSDs) that are defined at a specific V7000. To open this table, follow this path level 3 for a V7000-Unified:

### File Internal Resources → Network Shared Disks

The selected window, as you can see in Figure 3-97 on page 178, shows a table containing all NSDs of a V7000 Unified. The table provides several columns. Each row represents an NSD. Each column provides a property. The table shows properties such as: NSD Name, Storage System, Cluster, Pool, ID, Status, Type, Capacities, Probe Time, File Systems, Correlated Storage Volumes, and more. Click the hyperlinks in the columns: Cluster, Pool, File Systems, and Correlated Storage Volumes, or use the **Actions** menu to open the properties window with related information.

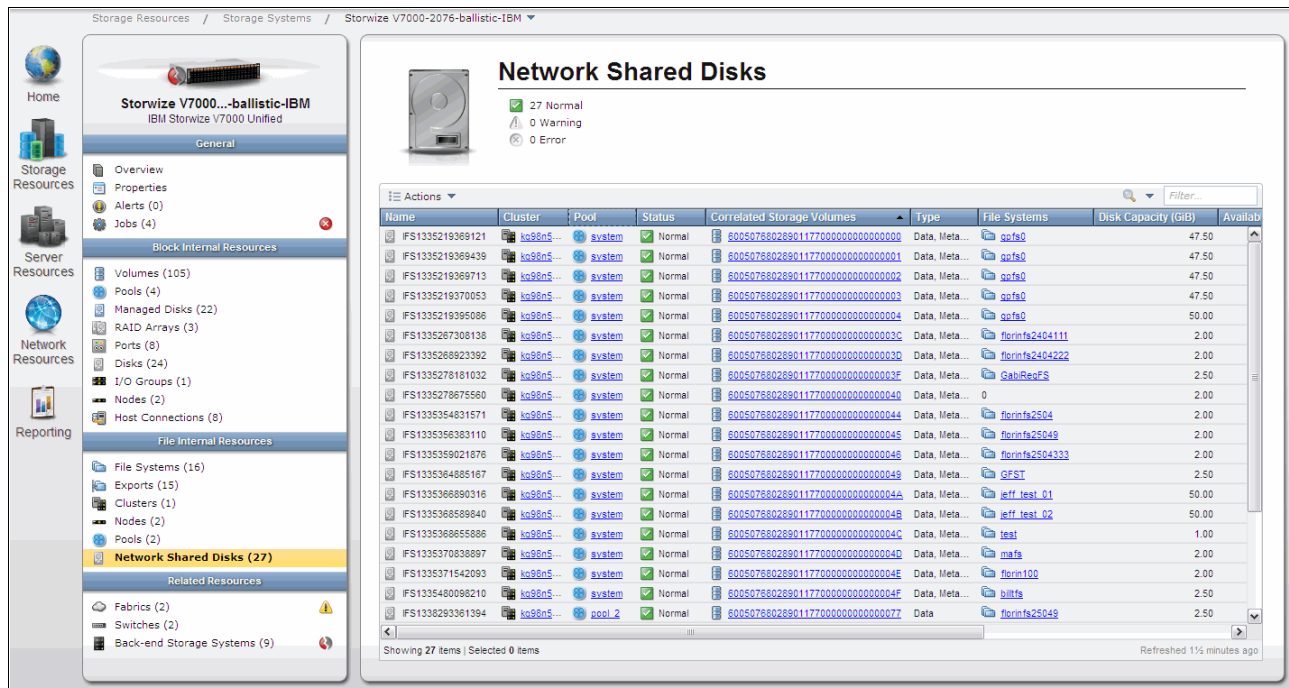


Figure 3-97 Example level 3 V7000 File Internal Resources, Network Shared Disks

In the next example, we show all file storage pools that are defined at a specific V7000. To open this table, click the following link at level 3 for a V7000-Unified:

### File Internal Resources → Pools

The selected window, as you can see in Figure 3-98 on page 179, shows a table containing all file storage pools of a V7000 Unified. The table provides several columns. Each row represents a pool. Each column provides a property. The table shows properties such as: Pool Name, Storage System, Cluster, Capacity, Available Space, File Systems, NSDs. Click the hyperlinks in the Cluster, File Systems, and NSDs columns or use the Actions menu to open the properties window with related information.

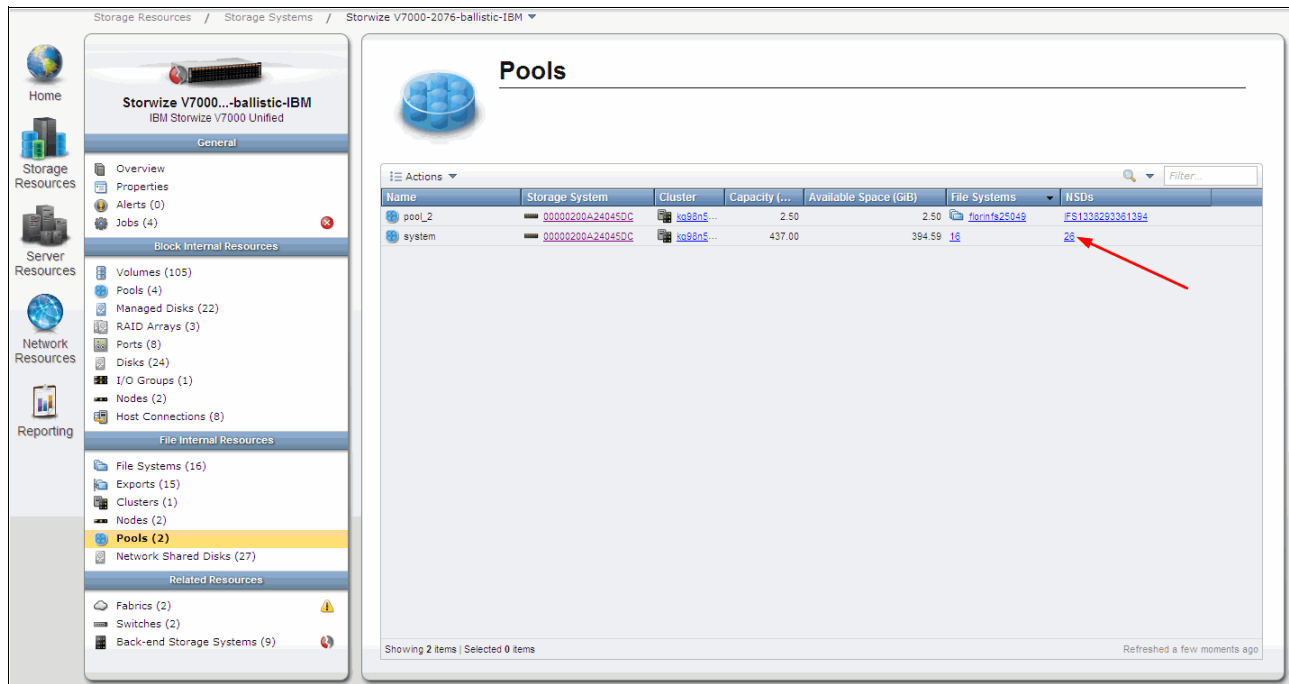


Figure 3-98 Example level 3 V7000 File Internal Resources, Pools

Click, for example, the hyperlink in the NSDs column at the row named **system** to open the properties window showing all NSDs for the pool called *system*. See the example of the properties window in Figure 3-99.

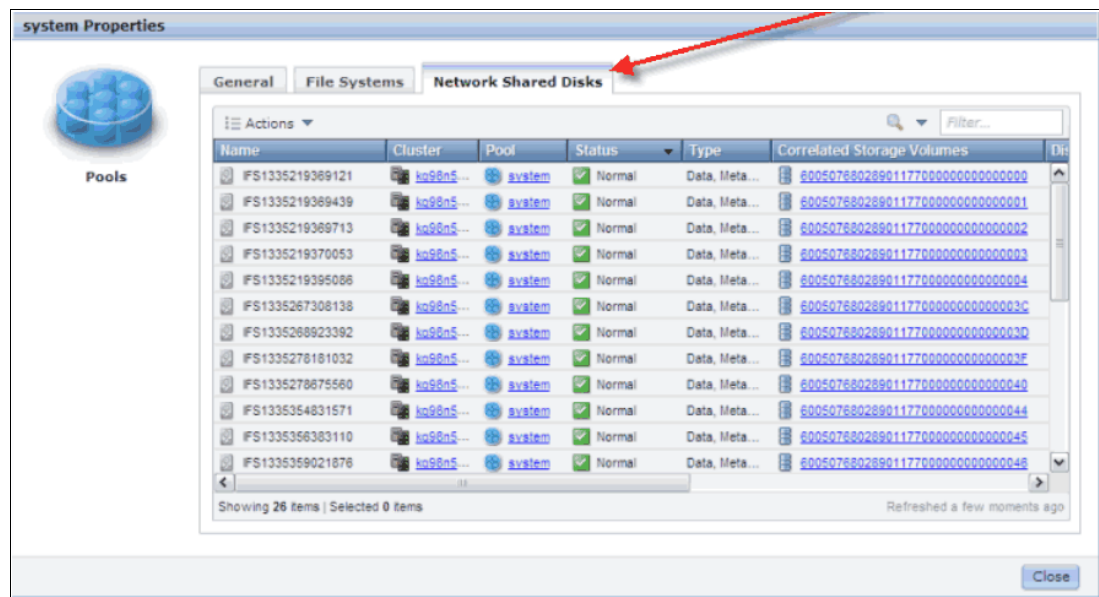


Figure 3-99 Example level 3 V7000 File Internal Resources, properties window NSD

In the next example, we show all nodes that are defined at a specific V7000. To open this table, follow this path at level 3 for a V7000-Unified:

**File Internal Resources → Nodes**

The selected window, as you can see in Figure 3-100, shows a table containing all nodes of a V7000 Unified. The table provides several columns. Each row represents a node. Each column provides a property. The table shows properties such as: Node name, cluster, description, IP address, role, and health status. Click the hyperlinks in the Cluster column or use the **Actions** menu to open the properties window.

**Nodes**

2 Normal  
0 Warning  
0 Error

Name	Storage System	Cluster	Description	IP Address	Role	Status	Acknowledged
mgmt001st001	90000200A24045DC	vs68n5b.ibm	mgmt001st001	9.11.92.165,9.11.92.166	Managem...	Normal	No
mgmt002st001	90000200A24045DC	vs68n5b.ibm	mgmt002st001	9.11.92.167,9.11.92.168	Managem...	Normal	No

Showing 2 items | Selected 0 items

Refreshed a few moments ago

Figure 3-100 Example level 3 V7000 File Internal Resources, Nodes

In the next example, we show all file clusters that are defined at a specific V7000. To open this table, follow the path at level 3 for a V7000-Unified:

### File Internal Resources → Clusters

The selected window, as you can see in Figure 3-101 on page 181, shows a table containing all file clusters of a V7000 Unified. The table provides several columns. Each row represents a cluster. Each column provides a property. The table shows properties such as: Name, ID, and Type.

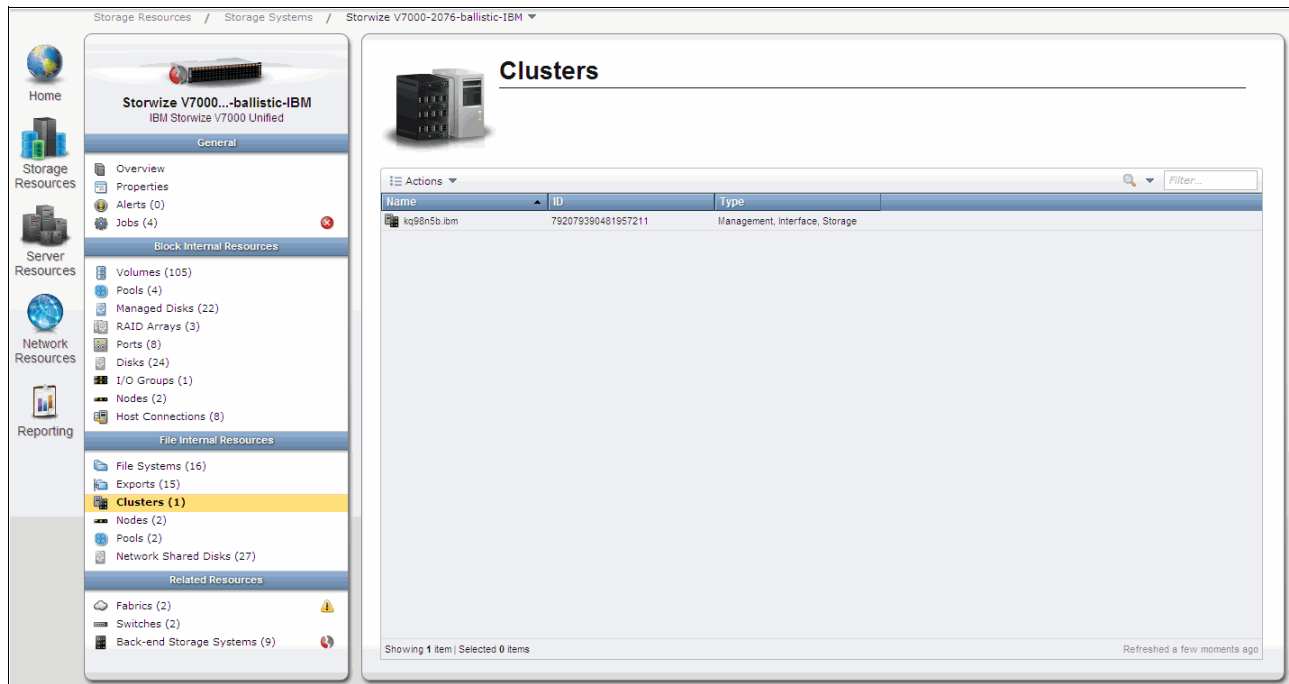


Figure 3-101 Example level 3 V7000 File Internal Resources, Exports

In the next example, we show all exports that are defined at a specific V7000. To open this table, click the following link at level 3 for a V7000-Unified:

#### File Internal Resources → Exports

The selected window, as you can see in Figure 3-102 on page 182, shows a table containing all exports of a V7000 Unified. The table provides several columns. Each row represents an export. Each column provides a property. The table shows properties such as: Name, Path, Protocol, Shared Servers, Cluster, State, and Discovered Time. Click the hyperlinks in the Cluster column or use the **Actions** menu to open the properties window.

**Exports**

Name	Path	Protocol	Discovered Time	Shared Servers	Cluster	State
anu_test_no_owner	/ibm/gofs0	CIFS	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
anu_test_owner	/ibm/forin100	CIFS	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
bfs	/ibm/billfs/billfiset	NFS, CIFS	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
eugen_test	/ibm/forinfs2504	NFS	Jun 7, 2012 12:08:38 AM MST	0	kg88n5b.ibm	Active
eugen_test1	/ibm/forinfs25049	NFS	Jun 7, 2012 12:08:38 AM MST	0	kg88n5b.ibm	Active
InnaShare	/ibm/gofs0/inna	NFS, CIFS, HTTP, FTP, SCP	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
JIM_test	/ibm/jeff_test_01	CIFS	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
marius	/ibm/gofs0	CIFS, HTTP, FTP, SCP	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
mumexp1	/ibm/mafs/mumexp	CIFS, FTP, SCP	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
Salad	/ibm/alex_salad	NFS, CIFS, HTTP, FTP, SCP	Jun 13, 2012 6:24:05 AM MST	0	kg88n5b.ibm	Active
shirleyexp1	/ibm/shirleyfs/shirleyfs1	NFS	Jun 2, 2012 12:08:01 AM MST	0	kg88n5b.ibm	Active
shirleyexp1_cifs	/ibm/shirleyfs/shirleyfs1	CIFS	Jun 2, 2012 12:08:00 AM MST	0	kg88n5b.ibm	Active
shirleyexp2	/ibm/shirleyfs/shirleyfs2	NFS	Jun 2, 2012 12:08:01 AM MST	0	kg88n5b.ibm	Active
test	/ibm/test	CIFS, FTP, SCP	May 9, 2012 2:22:41 AM MST	0	kg88n5b.ibm	Active
test11	/ibm/billfs/billfiset/test11	NFS	May 9, 2012 2:22:42 AM MST	0	kg88n5b.ibm	Active

Showing 15 items | Selected 0 items

Refreshed a few moments ago

Figure 3-102 Example level 3 V7000 File Internal Resources, Exports

In the next example, we show all file systems that are defined at a specific V7000. To open this table, click the following link at level 3 for a V7000-Unified:

### File Internal Resources → File Systems

The selected window, as you can see in Figure 3-103 on page 183, shows a table containing all file systems of a V7000 Unified. The table provides several columns. Each row represents a file system. Each column provides a property. The table shows properties such as: Name, path, storage system, file system type, capacities, maximum file count, used inodes, file sets, available inodes, last probe and scan time, cluster, pools, and NSDs. Click the hyperlinks in the column File Sets, Cluster, Pools, NSDs, or use the **Actions** menu to open the properties window with related information.





Figure 3-103 Example level 3 V7000 File Internal Resources, File Systems

### Example SONAS system at level 3

Refer to 6.1.1, “Connecting Tivoli Storage Productivity Center to SONAS” on page 392 for examples.

### Example NetApp system at level 3

In this section, we provide two level 3 examples with the storage system of the type NetApp. NetApp is using different terms for the filer than Tivoli Storage Productivity Center. Tivoli Storage Productivity Center uses generic terms for all storage systems. The following table compares some terms between Tivoli Storage Productivity Center and the NetApp FAS. For example, a **Pool** in Tivoli Storage Productivity Center is called an **Aggregate** at the NetApp device.

Table 3-18 Terms Tivoli Storage Productivity Center: NetApp FAS

Tivoli Storage Productivity Center	NetApp FAS
Pool	Aggregate
File System	Volume
Volume	LUN

In the first example, we show all volumes on a NetApp device. To open this table, follow this path at level 3 for a NetApp device:

#### Block Internal Resources → Volumes

The selected window, as you can see on Figure 3-104 on page 184, shows a table containing all volumes defined on the NetApp device. Each row represents a volume. Each column provides a property. The table shows properties such as: Volume name, storage system

name, status of the volume, ID, the pool name to where the volume belongs, the capacity of the volume, the RAID level, the hosts that are mapped to it, and more. Click the hyperlinks in the **Pool** and **Hosts** columns or use the **Actions** menu to open the properties window to get more information about the pools and hosts for a specific volume.

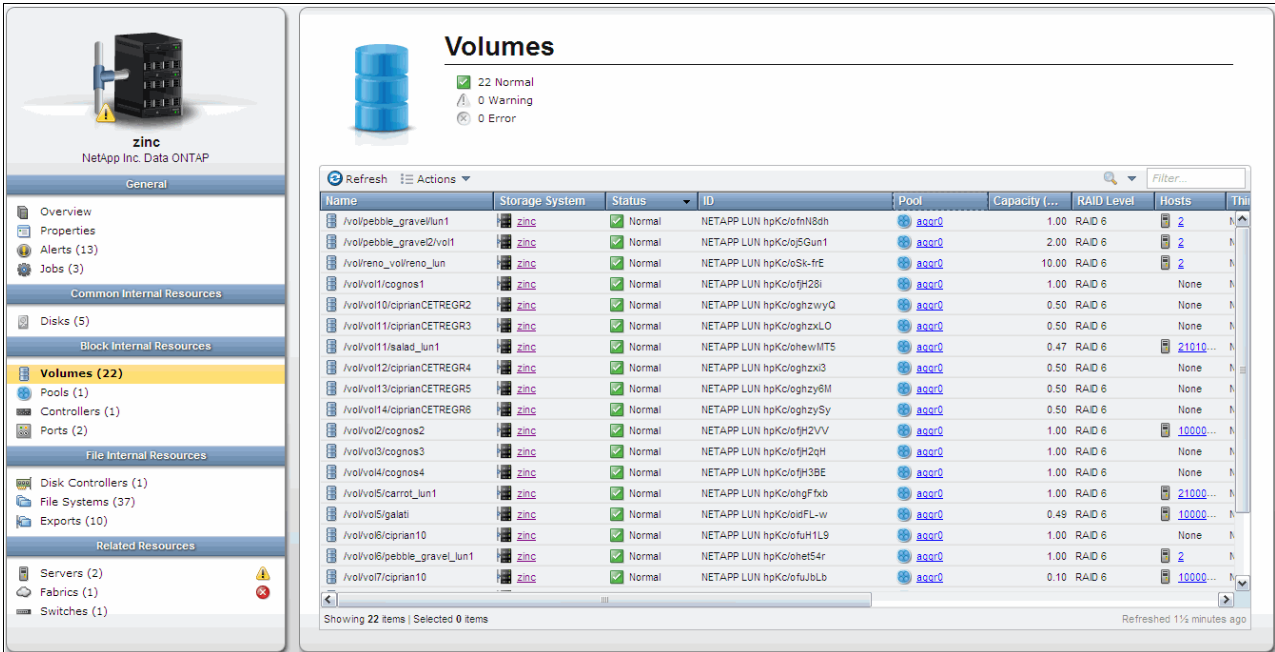


Figure 3-104 Example level 3 NetApp Block Internal Resources, Volumes

In the next example, we show all file systems of a NetApp device. To open this table, follow this path at level 3:

### File Internal Resources → File Systems

The selected window, as you can see in Figure 3-105 on page 185, shows a table containing all file systems that are defined on the NetApp device. Each row represents a file system. Each column provides a property. The table shows properties such as: Path, storage system, file system type, file system capacity, used space, available space, physical capacity, maximum file count, used and available inodes, last probe and scan time, and the use count.

Use the **Actions** menu or right-click a row to open the properties window to get more information about a specific file system.

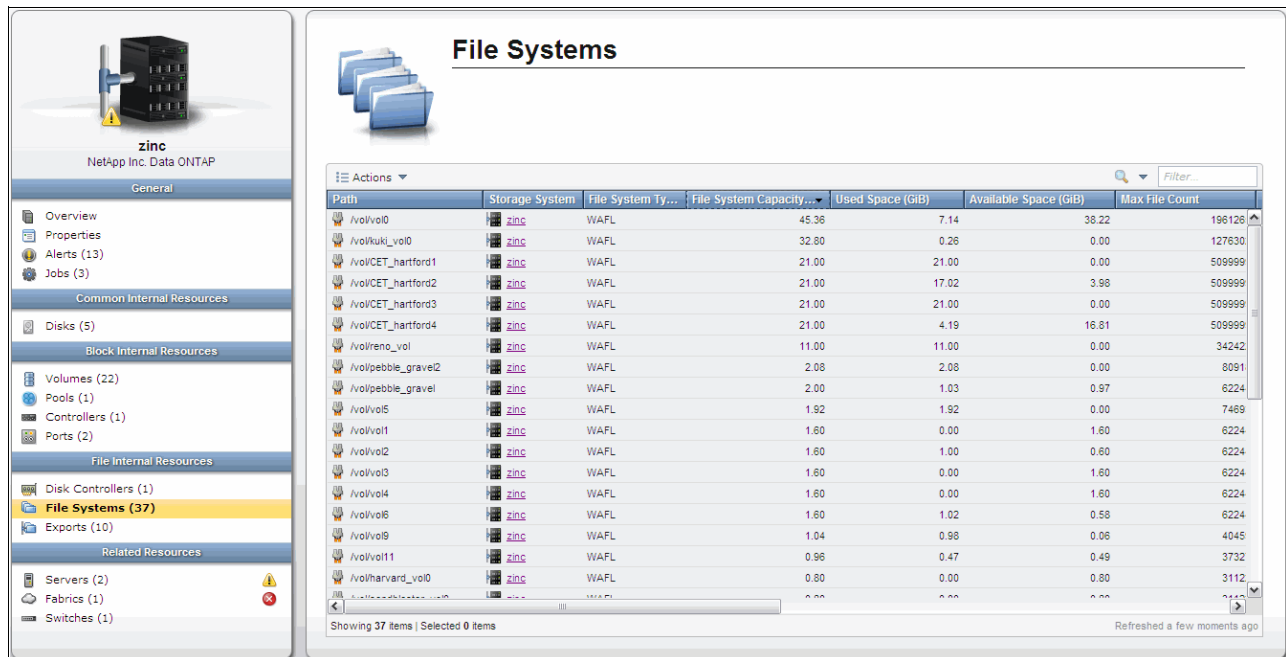


Figure 3-105 Example level 3 NetApp File Internal Resources, File Systems

### Example EMC CLARiiON system at level 3

Tivoli Storage Productivity Center also supports non IBM Storage Systems. Below, you can see an example with an EMC CLARiiON.

#### General → Overall

The Overview window (see Figure 3-106 on page 186) of the EMC CLARiiON provides a quick overview of the storage system. The overview window includes a capacity pyramid on the top that shows the used space (assigned and unassigned) and the available (free) space. Below this pyramid, four charts are displayed that provide various information about performance and capacity. Use the drop-down menus and the carousel function in the charts to change the displayed information in the chart. Hover the mouse over the charts to get detailed information. In this example, we hover the mouse over a sample at the line chart “Overall System Activity → I/O Rate”, which is on the upper-right in the window. This provides us the performance information of read activity of 717.09 ops/s on the 28th of June at 05:00, as you can see in the example.

At the capacity line chart on the right-bottom, you can see a break in the line. This is because Tivoli Storage Productivity Center did not collect capacity information (probe) over some time. After the problem was fixed the line continues.

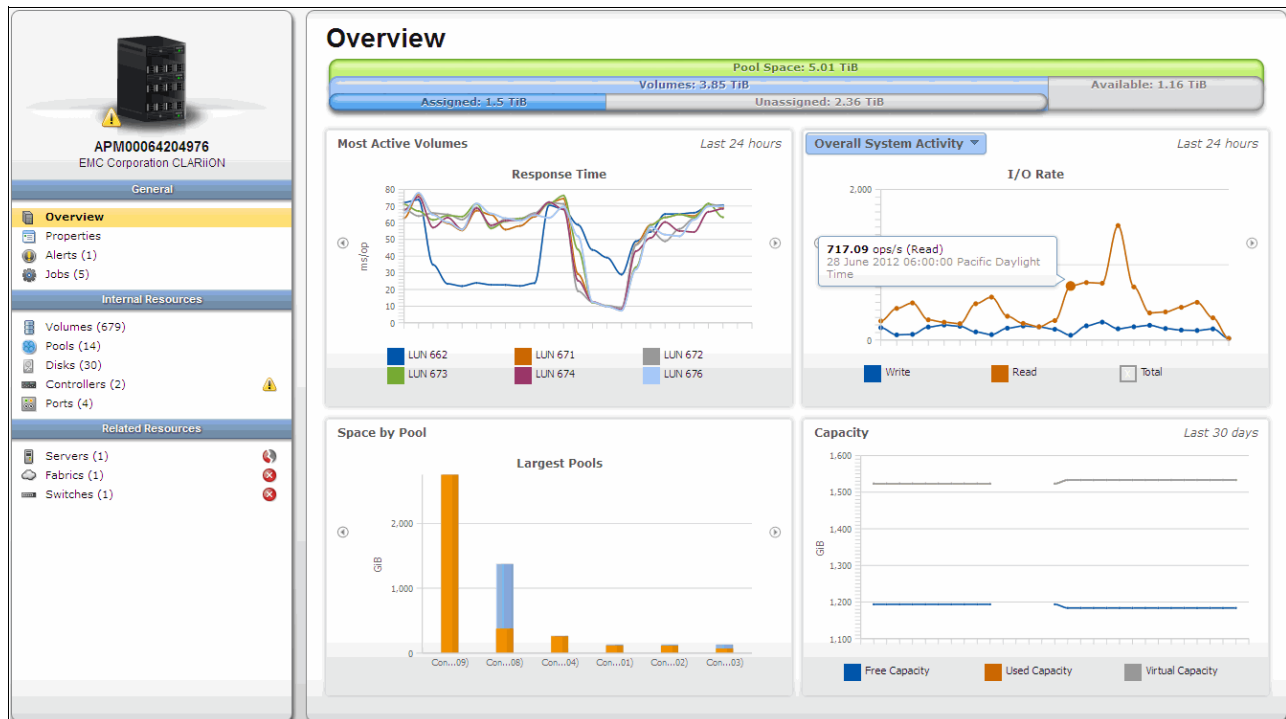


Figure 3-106 Example level 3 EMC General, Overview

### Example hypervisor at level 3

In this section, we provide three level 3 examples with a hypervisor.

In the first example, we provide the overview of a hypervisor. To open the overview, click the Overview link in the index.

#### General → Overview

The Overview window (see Figure 3-107 on page 187) of the hypervisor provides a quick overview of the hypervisor. The overview window includes a capacity pyramid on the top that shows the space usage on different levels. Below this pyramid, four charts are displayed that provide information about hypervisor storage capacity and assigned resources to virtual machines (VM) such as CPU, memory, and disk space. Hover the mouse over the line or bars in the charts to get more information. In the example, we hover the mouse over the bar labeled **tpcvm1-w2** in the chart **Space by VM**. This shows that the Total Space for the tpcvm1-w2 virtual machine is 53 GiB.

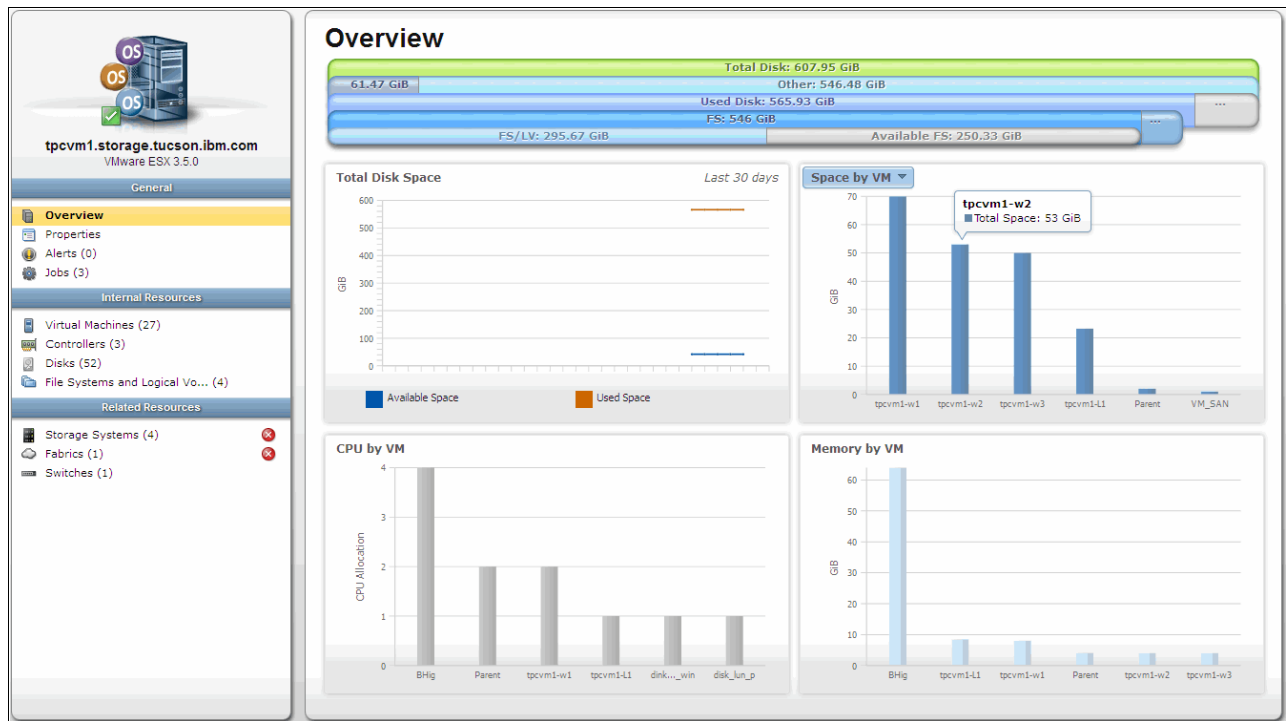


Figure 3-107 Example level 3 Hypervisor General, Overview

In the next example, we show all virtual machines (VMs) residing on a hypervisor. To display that window, select the following entry in the index:

#### Internal Resources → Virtual Machines

The Virtual Machines window (see Figure 3-108 on page 188) of the hypervisor provides a table including all VMs. Each row represents a single VM. Each column provides a property. In this example, we filtered the virtual machines by the status of **Normal**, as you can see in the example. The table shows properties such as: Host name, health status, data store, configuration file, OS type, disk capacity, processor counts, RAM, and if a Storage Resource Agent (SRA) is installed or not. If an SRA is installed on a VM, Tivoli Storage Productivity Center recognizes a VM also as a server object that provides you more detailed information at the server level. You can click the hyperlink in the Name column or use the Actions menu and select Detail View to get from the VM to the server level 3 view. In the example that is shown in Figure 3-108 on page 188, you see one VM with the host name **tpcvm1-L1** that uses the SRA. Therefore, you can see the hyperlink and the server symbol for that VM in the table.



Figure 3-108 Example level 3 Hypervisor Internal Resources, Virtual Machines

In the next example, we show all file systems and logical volumes on a hypervisor. To display that window, select the following entry in the index:

#### Internal Resources → File Systems and Logical Volumes

The File Systems and Logical Volumes window (see Figure 3-109) provides a table including all file systems. Each row represents a file system. Each column provides a property. The table shows properties such as: File system, logical volume, file system type, logical volume type, used and available capacity, and more.

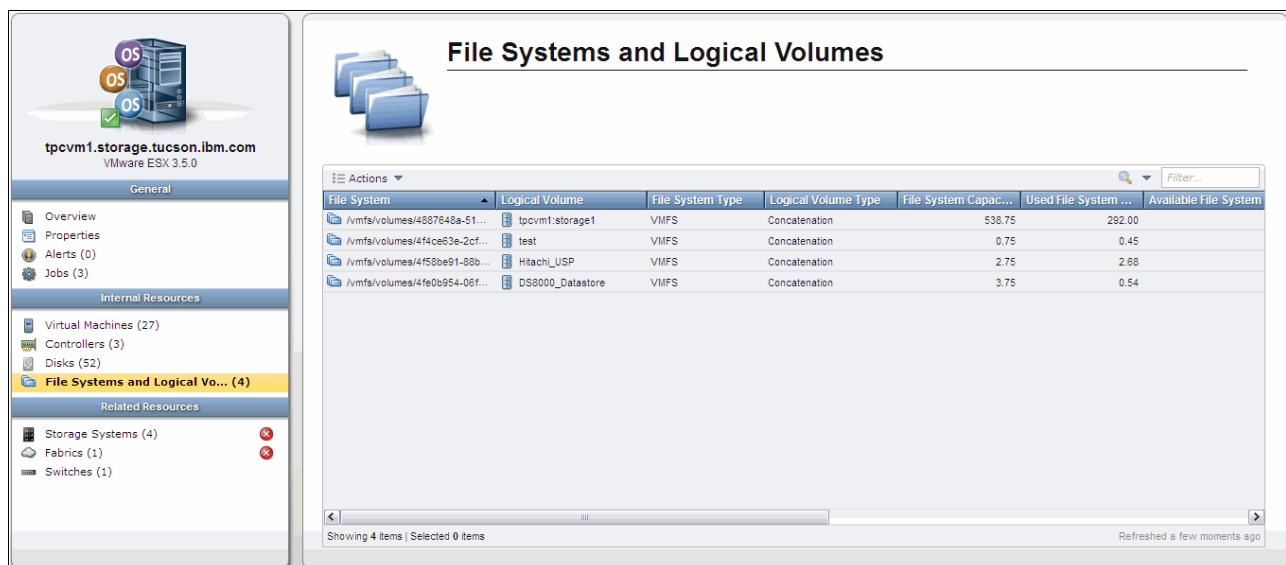


Figure 3-109 Example level 3 Hypervisor Internal Resources, File Systems, and Logical Volumes

## Example server

In this section, we provide several level 3 examples with a server.

In the first example, we provide the overview of a server. To open the overview, click the Overview link in the index:

### General → Overview

The Overview window (see example Figure 3-110) of the server provides a quick overview of the server. The Overview window includes a capacity pyramid on the top, which shows the used and available space. Below this pyramid, three charts are displayed: A history chart about the “Total File System Space” over the last 30 days, and two usage charts labeled “Space from Storage Systems” and “Distribution of File Systems”. The two usage charts show the used and available space for the file systems ordered by file system size. Hover the mouse over the charts to get more information about it. In this example, we hover the mouse of the Filesystem /opt bar and get the information about available and used space.

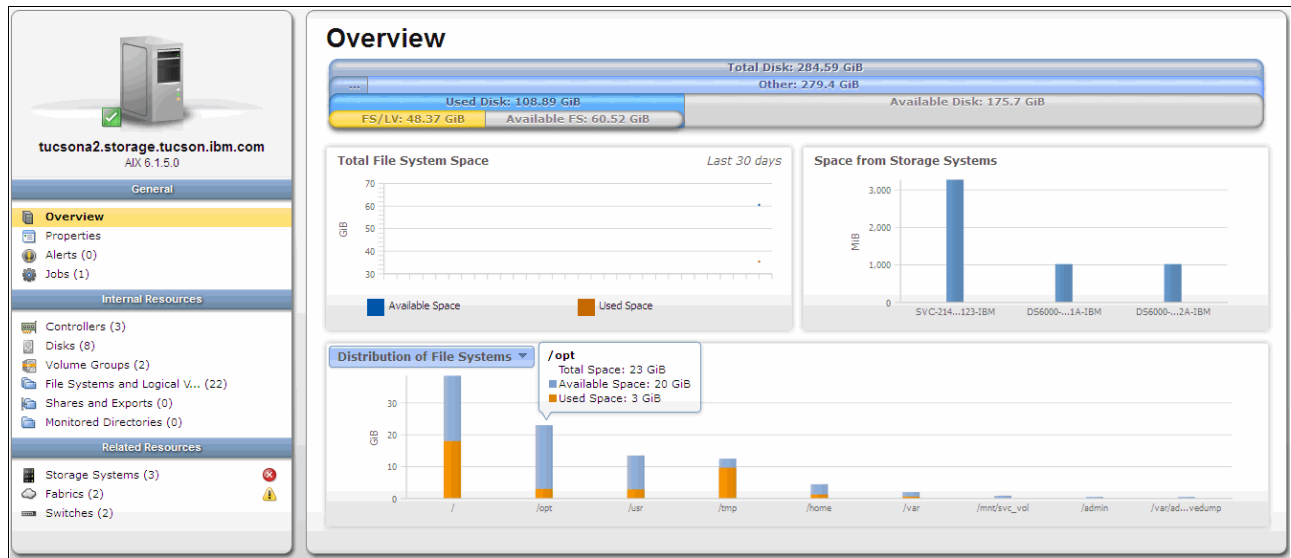


Figure 3-110 Example level 3 Server General, Overview

In the next example, we show the Properties information from a server. To display that window, select the following entry in the index:

### General → Properties

The Properties window (see examples Figure 3-111 on page 190 through Figure 3-114 on page 191) of the server provides information in different tabs such as General, Hardware, Storage, and Agent. The tables show information about name, health status, OS type and version, IP address, domain name, cluster name, if it is a virtual machine, last start time of the server, serial number, processor, RAM, swap space, disk capacity, storage resource agent information, and more.

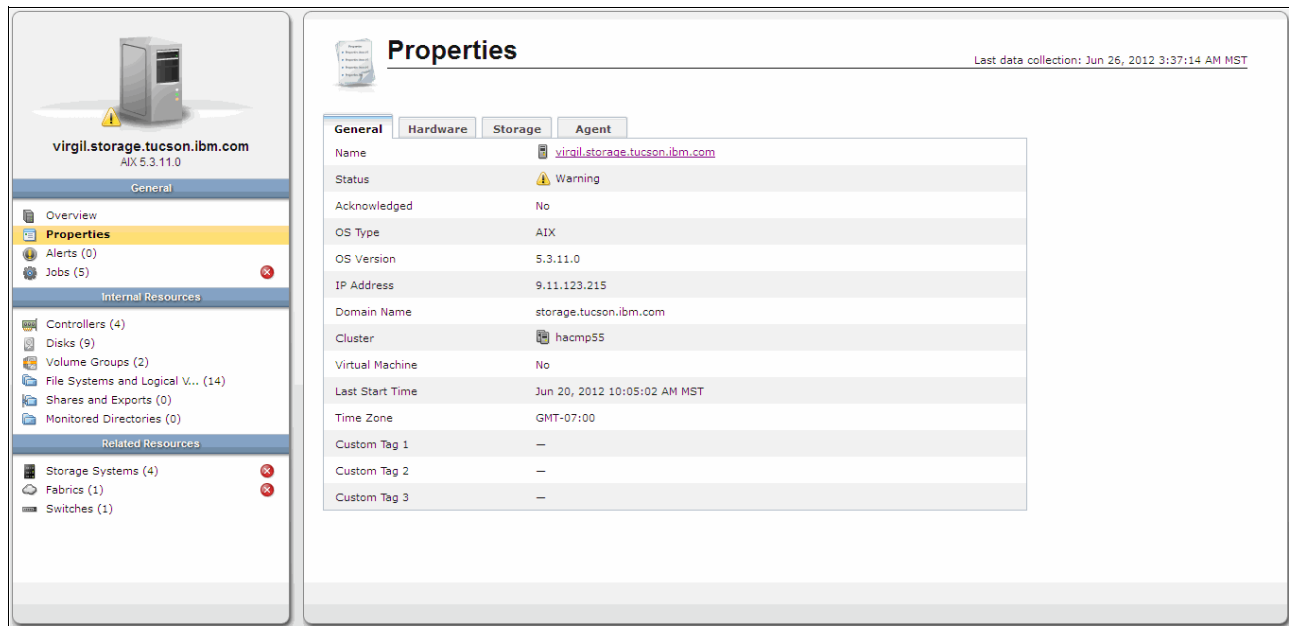


Figure 3-111 Example level 3 Server General, Properties: General tab

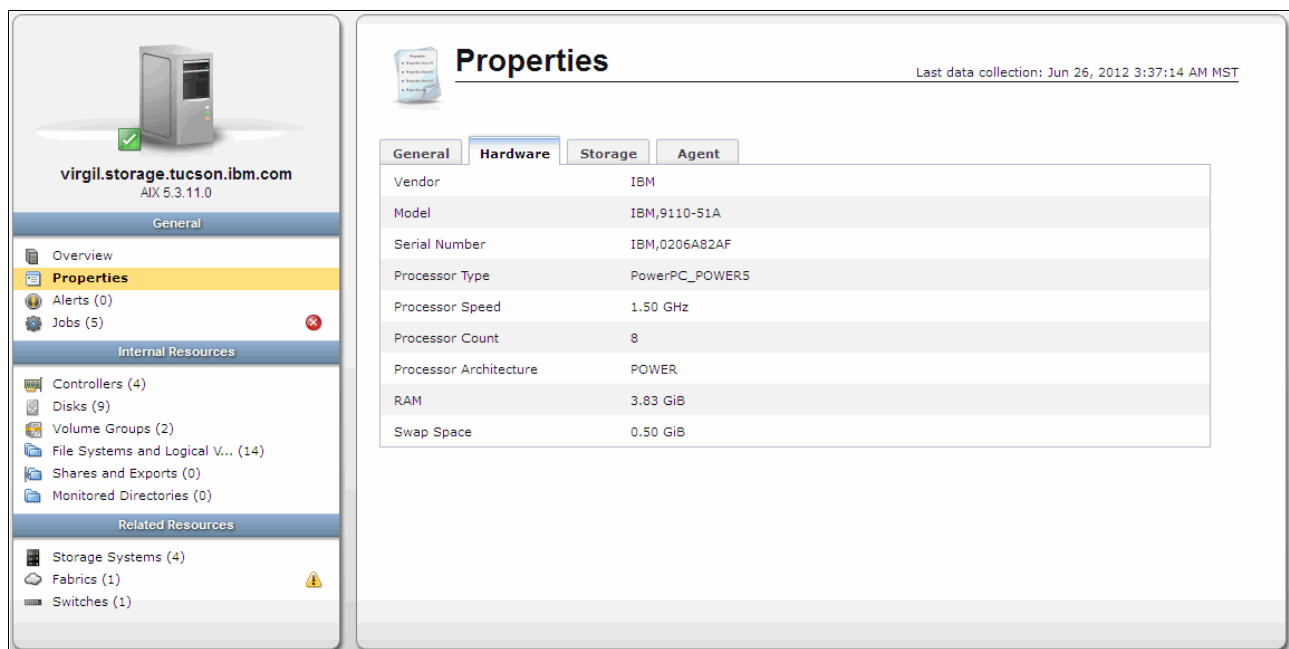


Figure 3-112 Example level 3 Server General, Properties: Hardware tab



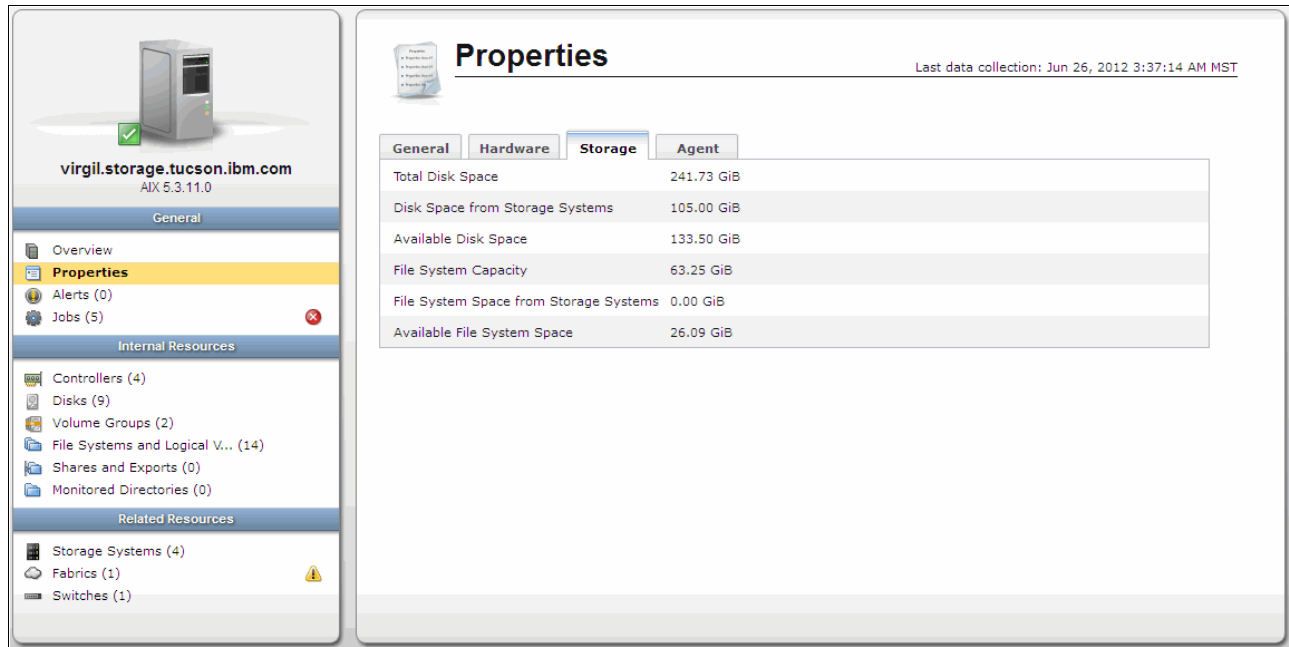


Figure 3-113 Example level 3 Server General, Properties: Storage tab

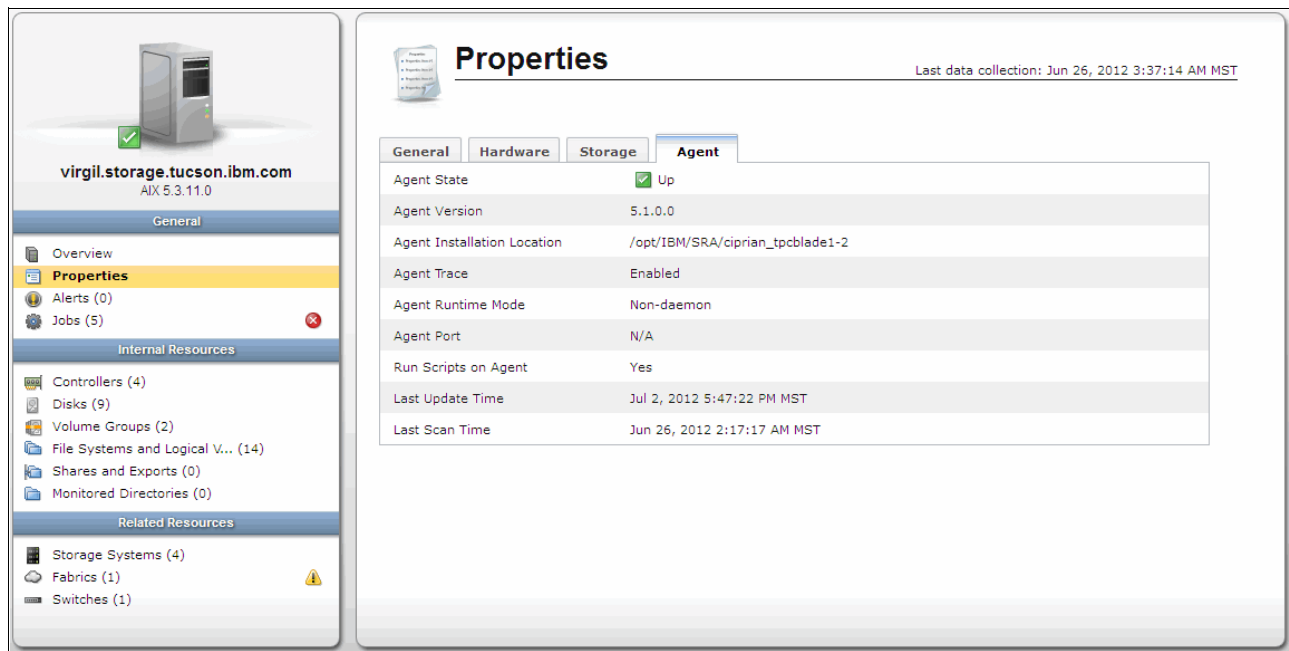


Figure 3-114 Example level 3 Server General, Properties: Agent tab

In the next example, we show all controllers on a server. To display that window, follow this path in the index:

#### Internal Resources → Controllers

The Controllers window (see Figure 3-115 on page 192) of the server provides a table including all controllers in the server. Each row represents a controller. Each column provides a property. The table shows properties such as: Name of the controller, health status, description, type, driver version, firmware, ROM version, associated disks, HBA worldwide

name (WWN), and more. Open the Properties windows of a specific controller by selecting a row and using the **Actions** menu, or click the hyperlink at the column **Associated Disks**, or double-click the row.

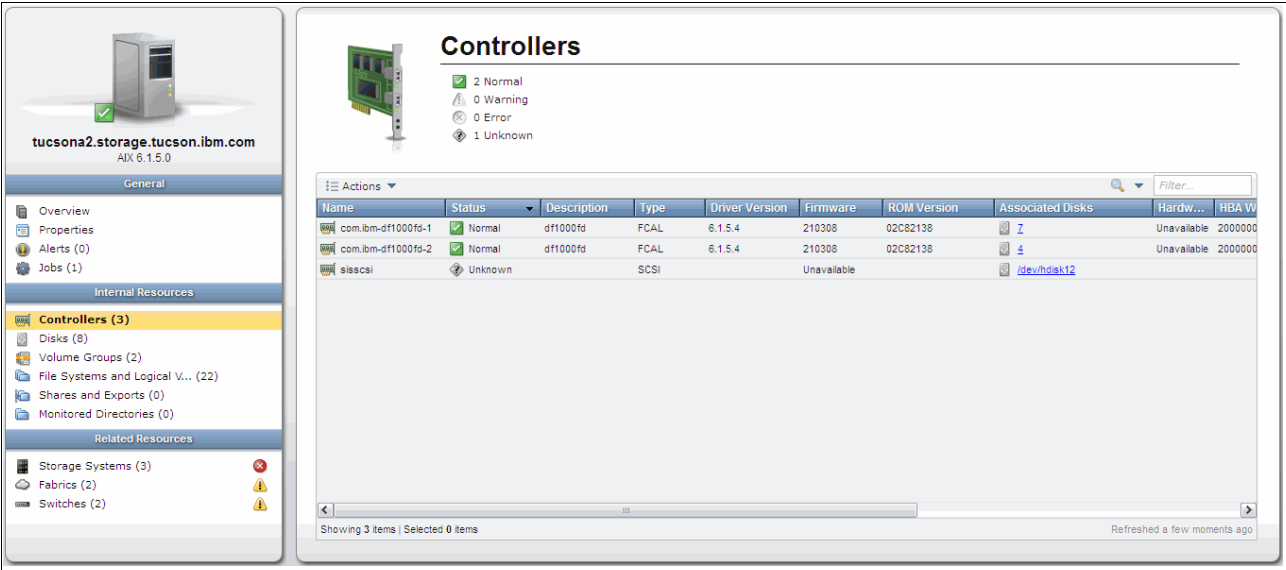


Figure 3-115 Example level 3 Server Internal Resources, Controllers

The controller properties window shows the information about that controller. It splits the information into three tabs labeled “General”, “Disks” and “Ports”. Figure 3-116 shows an example for the tab “General” for general information such as health status, type, driver version, firmware, HBA WWN, and more.

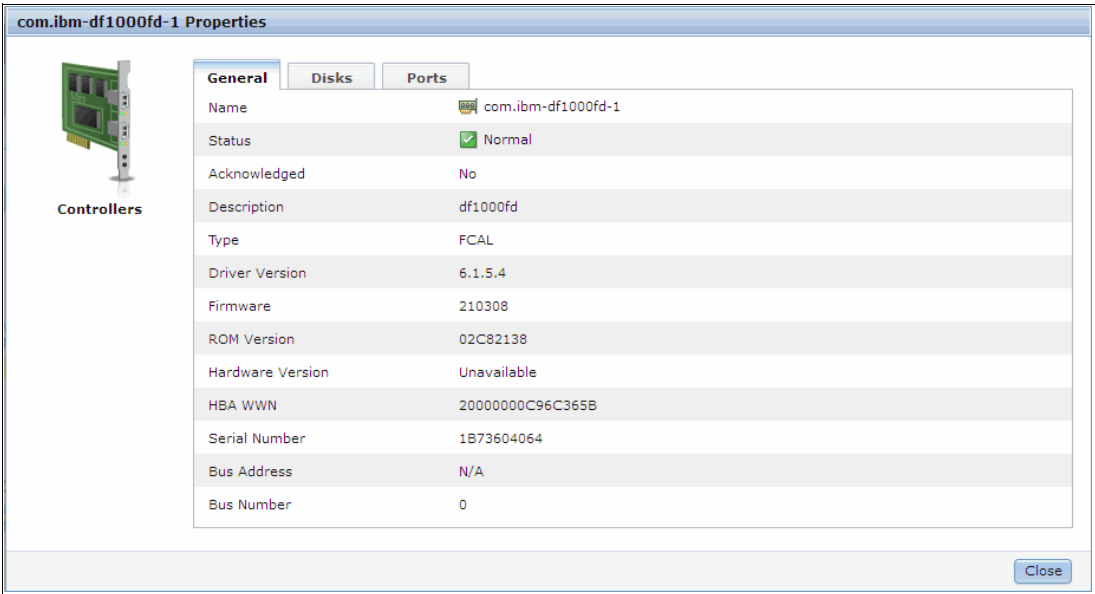


Figure 3-116 Example level 3 Server, Properties window Controllers: General tab

Figure 3-117 on page 193 shows an example for the table tab labeled “Disks”. In that tab, you see all disks that are visible by this controller. Each row represents one disk. Each column provides a property. The table shows properties such as: Disk name, number of paths to the disk, vendor and model, serial number, capacity, available disk space, used space, and speed

(RPM). Click the hyperlink in the Paths column for a specific disk to get detailed information about the paths of that disk. See example Figure 3-119 on page 194 for paths.

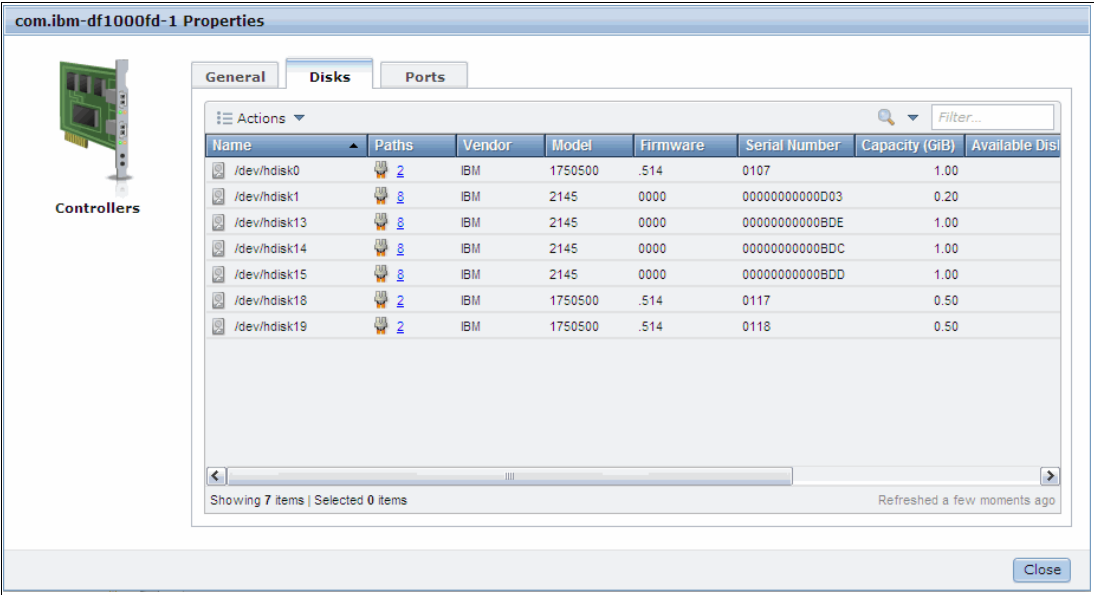


Figure 3-117 Example level 3 Server, Properties window Controllers: Disks tab

Figure 3-118 shows an example for the table tab labeled “Ports”. This table shows to which SAN ports a controller is cabled to. In this example, the controller is cabled to the SAN switch **sentra** on **port 6**. The WWPN of the controller port is shown in the **WWPN** column. The port health status is **Operational**. Click the switch hyperlink in the **Connected Resource** column to get the Detail View (level 3) of the switch or click the **Port 6** hyperlink in the **Connected Port** column, which opens a new properties window for that specific switch port including information such as: Switch name, fabric name, port and slot number, domain ID, port health, port type, port status, port speed, and more.

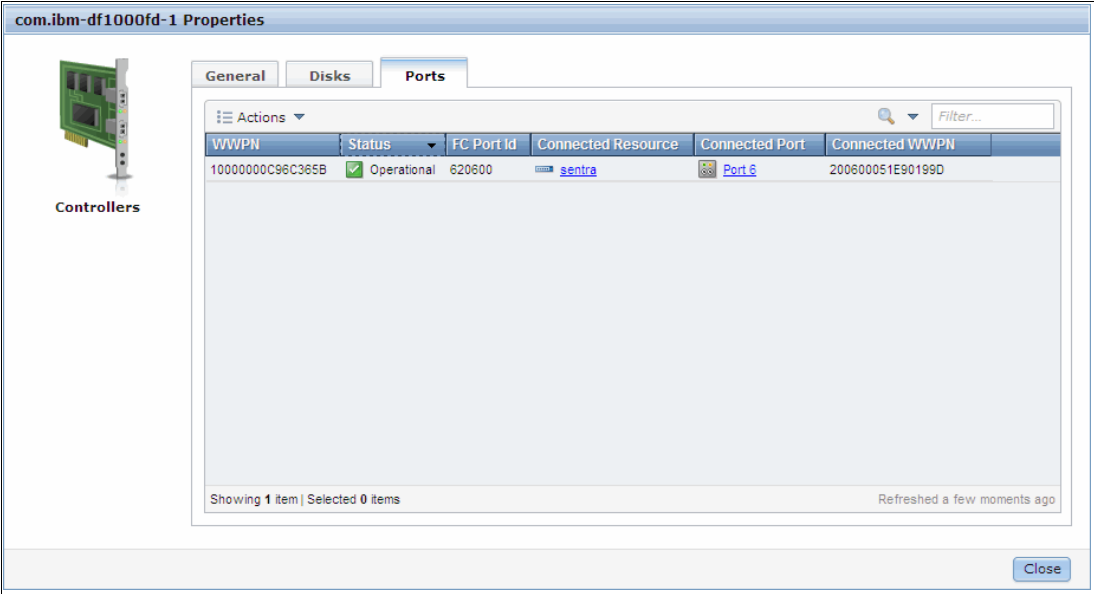


Figure 3-118 Example level 3 Server, Properties window Controllers: Ports tab

When you click the hyperlink in the column **Paths** in the tab **Disks** you get a new properties window including the path. Figure 3-119 shows an example of the properties window for paths for a single disk labeled *hdisk1*. Each row in the table shows one path. Therefore, the *hdisk1* has eight paths. Each column provides a property. The table shows properties such as: Disk name, controller, volume name, storage system name, volume capacities, and more. Use the hyperlinks in the table to follow the links to related items.

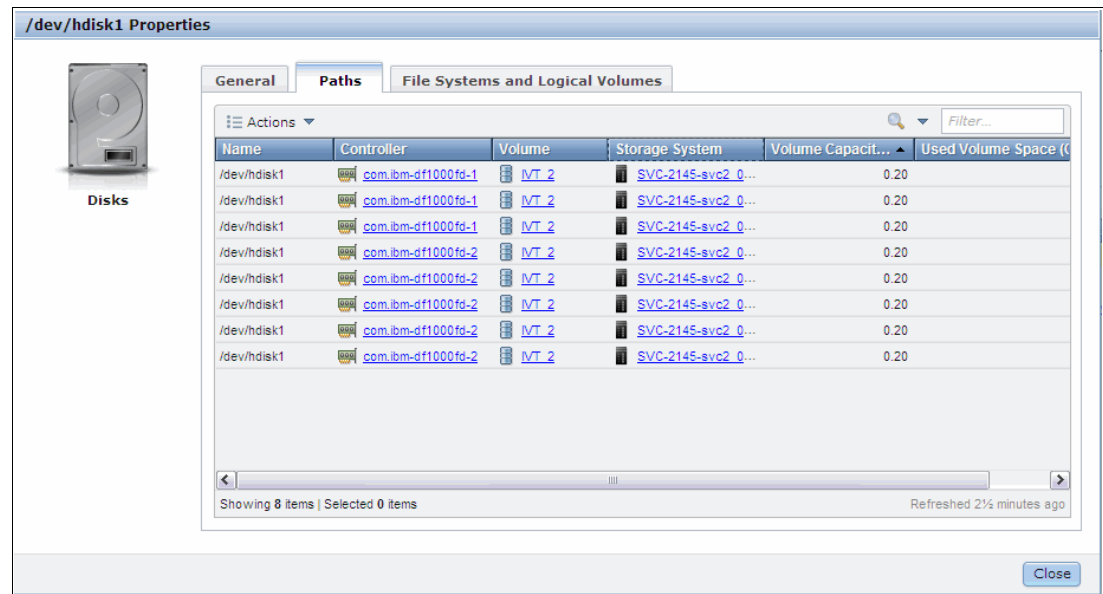


Figure 3-119 Example level 3 Server, Properties window Disks: Paths tab

From this table, you can move to the table tab **File Systems and Logical Volumes** to get information about what logical volumes and file systems reside on that disk. For that, see the example that is shown in Figure 3-120 on page 195 for the disk *hdisk14*. Each row in the table shows one file system or logical volume. Each column provides a property. The table shows properties such as: File system, logical volume, file system type, logical volume type, file system capacity, used and available file system space, logical volume capacity, used and available inodes, and if it is used as swap space.

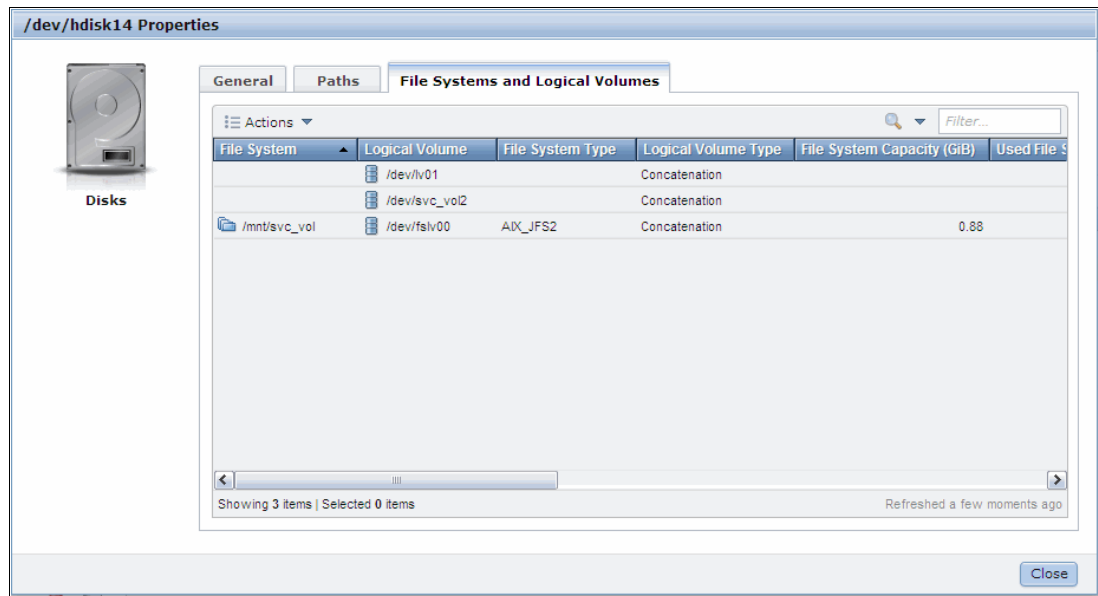


Figure 3-120 Example level 3 Server, Properties window Disks: File Systems and Logical Volumes

In the next example, we show all disks from a server. To display that window, select the following entry in the index:

### Internal Resources → Disks

The Disks window (see example Figure 3-121) of the server provides a table including all disks of a server. Each row represents a disk. Each column provides a property. The table shows properties such as: Disk name, number of paths to the disk, vendor and model, serial number, capacity, available disk space, used space, and speed (RPM). In this example, hdisk12 is a server internal disk, whereas the other disks are from SAN-attached storage systems, such as SAN Volume Controller (Model 2145) and DS6000 (Model 1750).

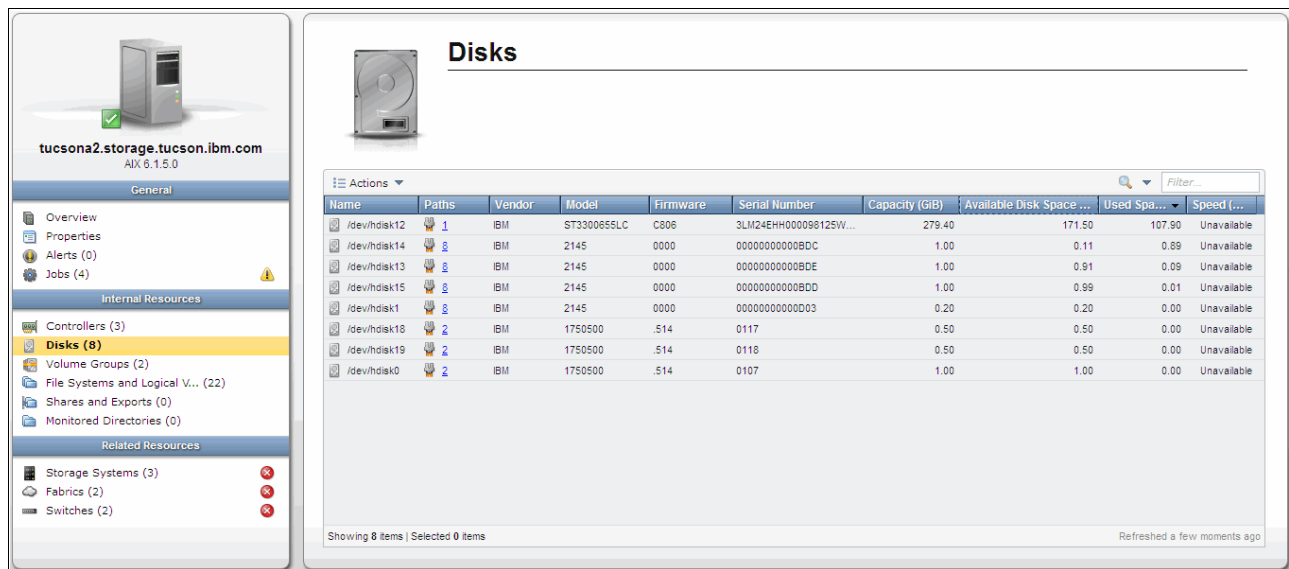


Figure 3-121 Example level 3 Server Internal Resources, Disks

In the next example, we show all volumes groups (VGs) from a server. To display that window, select the following entry in the index:

### Internal Resources → Volume Groups

The Volume Groups window (see example Figure 3-122) of the server provides a table including all volume groups of a server. Each row represents a volume group. Each column provides a property. The table shows properties such as: Name of the volume group, health status, type, number of disks or in case of a single disk the name of the disk, number of file systems or logical volumes, volume group capacity, used space, and available space. Click the hyperlink in the **Disks** column to get a properties window showing all disks within this volume group. Click the hyperlink in the **File Systems or Logical Volumes** column to get a properties window showing all file systems and logical volumes within that volume group. Alternatively, you also can select a row in the table and use the **Actions** menu or double-click the row to open the properties window for a volume group.

**Note:** Volume groups are UNIX-specific. Therefore, volume groups are not shown in the index for servers with other OS types, such as Microsoft Windows.

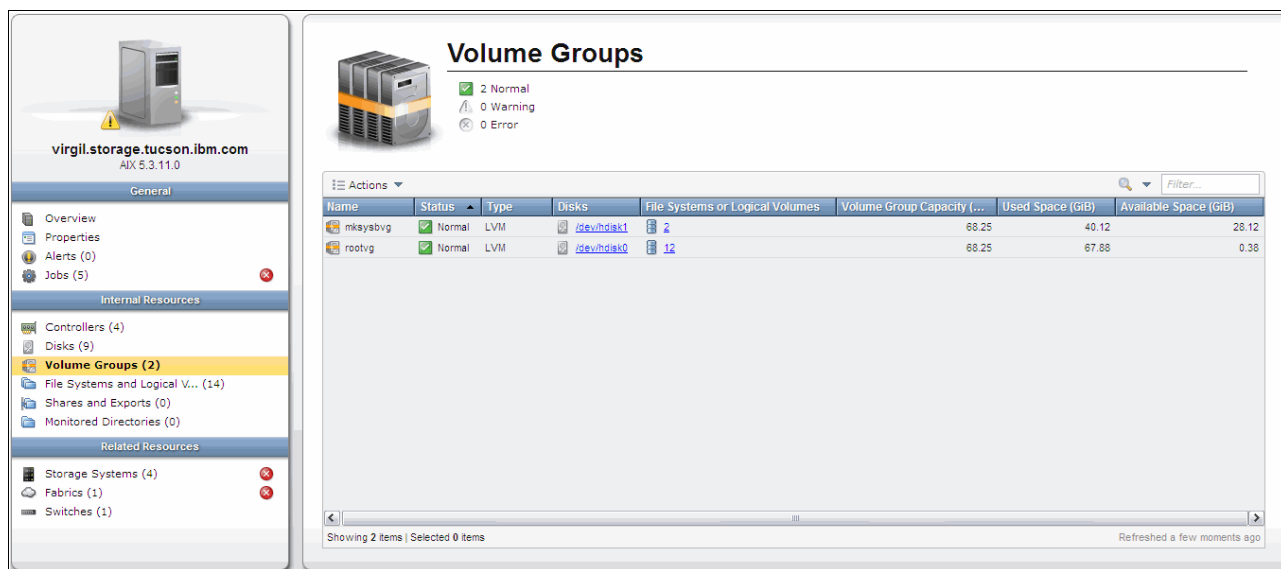


Figure 3-122 Example level 3 Server Internal Resources, Volume Groups

In the next example, we show all file systems and logical volumes from a server. To display that window, select the following entry in the index:

### Internal Resources → File Systems and Logical Volumes

The File Systems and Logical Volumes window (see example Figure 3-123 on page 197) of the server provides a table including all file systems and logical volumes of a server. Each row represents a file system or logical volume. Each column provides a property. The table shows properties such as: File system, logical volume, file system type, logical volume type, file system capacity, used file system space, available file system space, logical volume capacity, used inodes, available inodes, and if it is used as swap space.

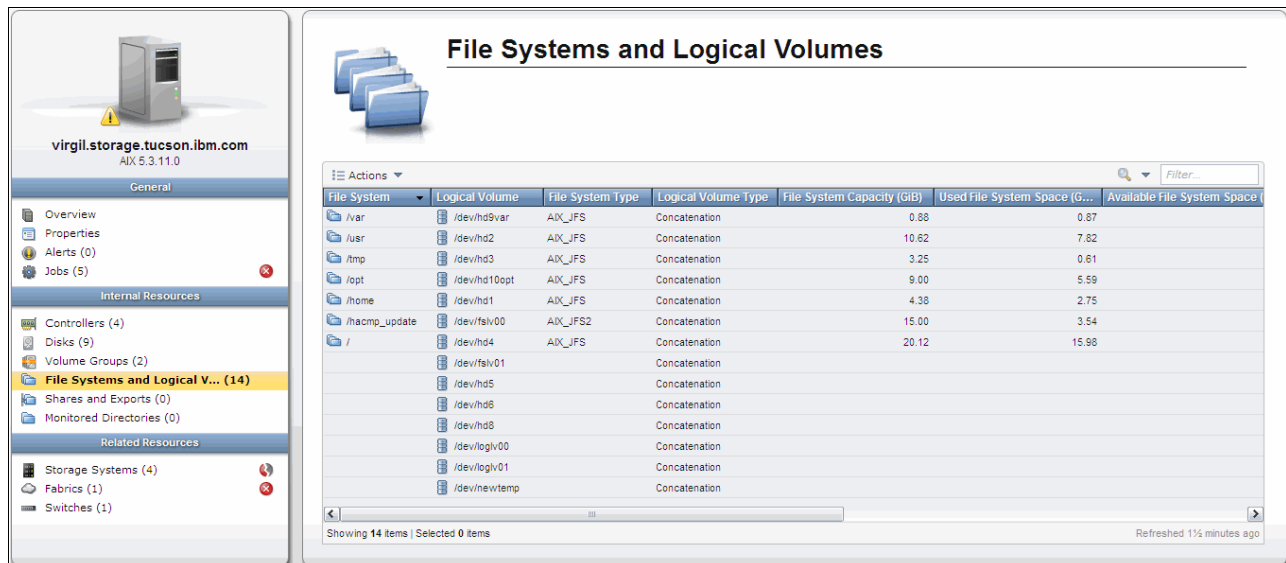


Figure 3-123 Example level 3 Server Internal Resources, File Systems, and Logical Volumes (AIX)

Below, the same example is used for a Windows server instead of a UNIX server. See example Figure 3-124.

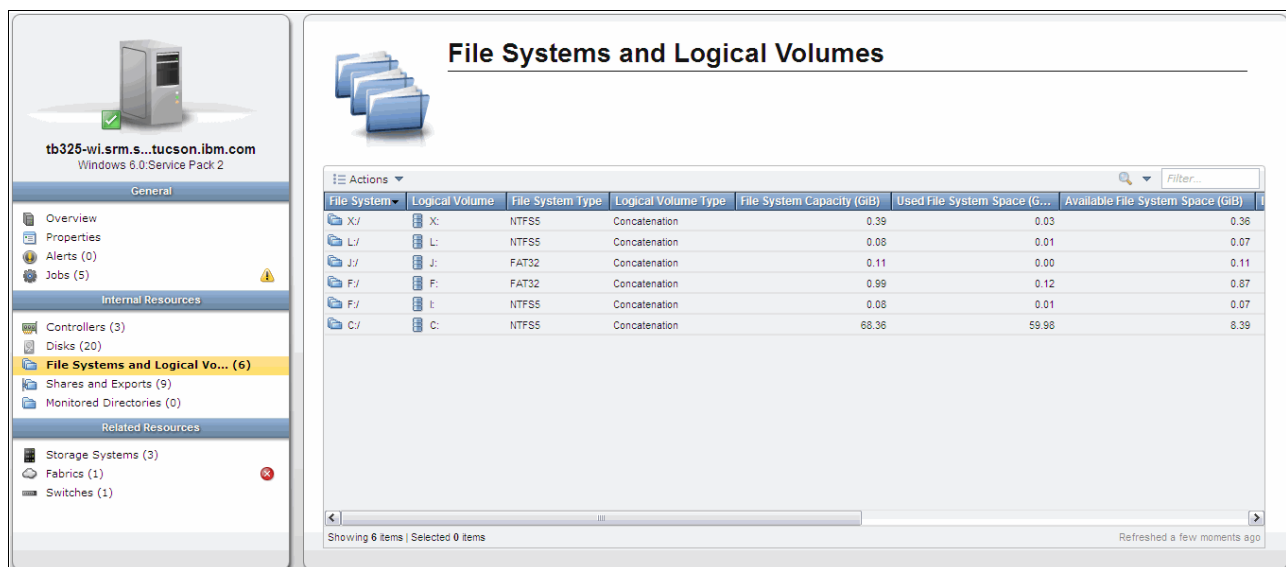


Figure 3-124 Example level 3 Server Internal Resources, File Systems, and Logical Volumes (Windows)

In the next example, we show all shares and exports from a server. To display that window, select the following entry in the index:

### Internal Resources → Shares and Exports

The Shares and Exports window (see the example for a Windows server in Figure 3-125 on page 198) of the server provides a table including all shares or exports of a server. Each row represents a share or export. Each column provides a property. The table shows properties such as: Name, path, and protocol.



Figure 3-125 Example level 3 Server Internal Resources, Shares and Exports (Windows)

The same example is used for a UNIX server. See Figure 3-126.



Figure 3-126 Example level 3 Server Internal Resources, Shares and Exports (AIX)

In the next example, we show all monitored directories of a server. To display that window, select the following entry in the index:

#### Internal Resources → Monitored Directories

To get data in the table monitored directories, you need to first set up a file system scan job with a directory group and profiles in the stand-alone GUI. After the scan, you also can see the monitored directories in the web-based GUI. In this example, we defined the directory group called **ITSO-Test**, which simply monitors all directories located in C:\Users\\*. Therefore, in this example we get the information for each user directory on this Windows host at the path C:\Users\<monitored\_directories>.



The Monitored Directories window (see Figure 3-127) of the server provides a table including all directories with that path. Each row represents a directory. Each column provides a property. The table shows properties such as: Name, owner, OS user group, total capacity, file count, directory count, access time, modification time, creation time, scan time, discovery time, directory attributes, and used directory groups.

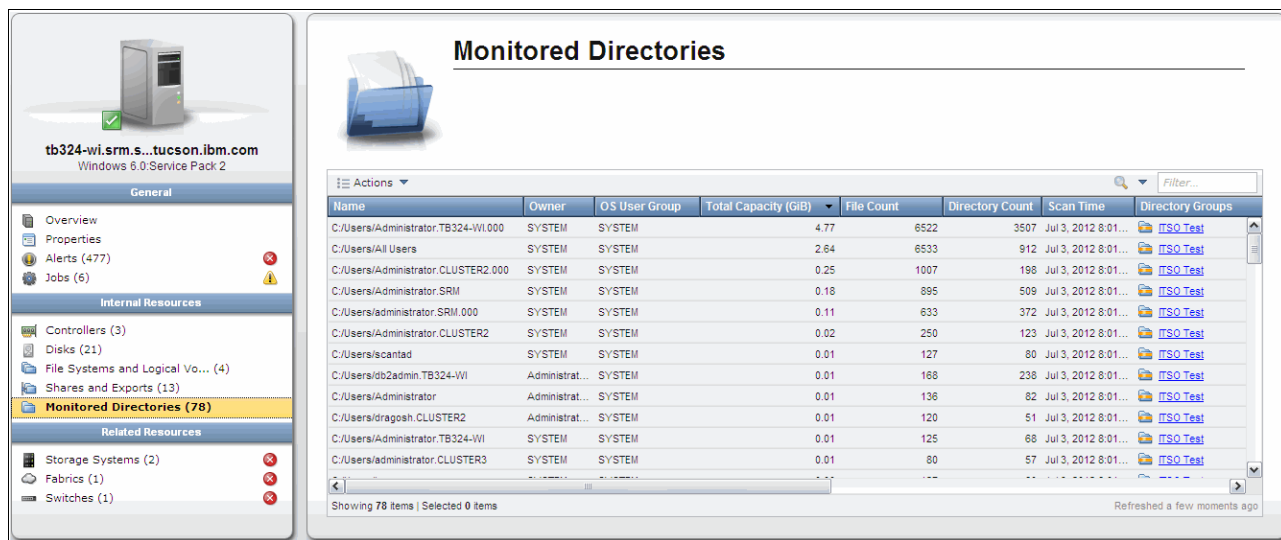


Figure 3-127 Example level 3 Server Internal Resources, Monitored Directories

## Example switch at level 3

In this section, we provide several level 3 examples with a switch.

In the first example, we provide the overview of a switch. To open the overview, click the Overview link in the index:

### General → Overview

The Overview window (see example Figure 3-128 on page 200) of the switch provides a quick overview of the switch. The overview window provides three sections.

The **Summary** chart, in this example at the section on the upper-left side in the window, shows information about the switch details such as WWN, Domain ID, and IP address. Furthermore, it provides information about the number of connected and online ports, and the not-connected (offline) ports. Furthermore, information about the related fabric is shown, such as name, health status of the fabric, and how many switches belong to that fabric.

The **Overall Activity** chart, in this example at the section on the upper-right side in the window, shows performance information over the last 24 hours of the entire switch. Use the carousel function to cycle the views such as: Overall bandwidth, total data rate, total frame rate.

The **Most Active Ports** chart, in this example at the section on the bottom in the window, shows top performance information for the switch ports over the last 24 hours. Through this information, you quickly can identify the most utilized ports. Use the carousel function to cycle the views such as: Overall bandwidth, total data rate, total frame rate.

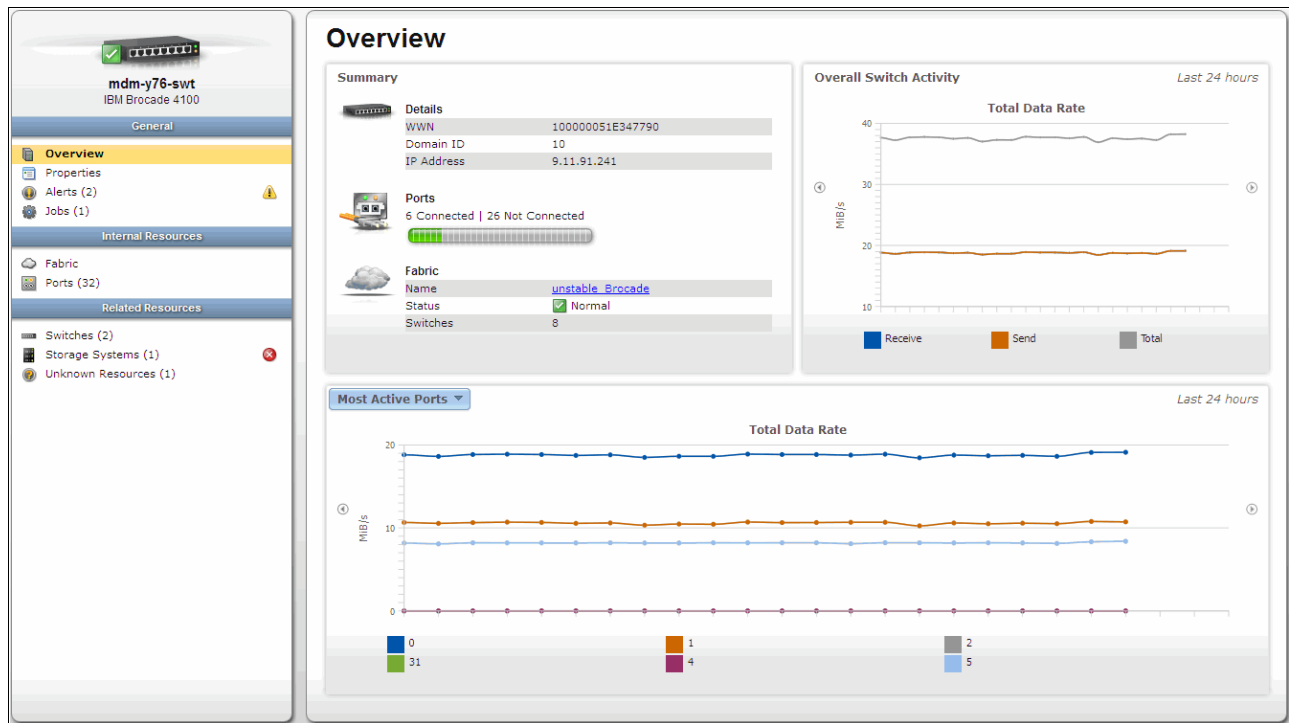


Figure 3-128 Example level 3 Switch General, Overview

In the next example, we provide the properties of a switch. To open the overview, click the Properties link in the index:

### General → Properties

The Properties window (see the example that is shown in Figure 3-129 on page 201) of the switch provides various information about the switch. On the upper-right in the window, it shows the data of the latest data collection of the current table tab. Check this to see how actual your displayed data is.

The **General** tab in the table provides information about the switch name, health status, IP address, element manager URL, serial number, firmware, and more.

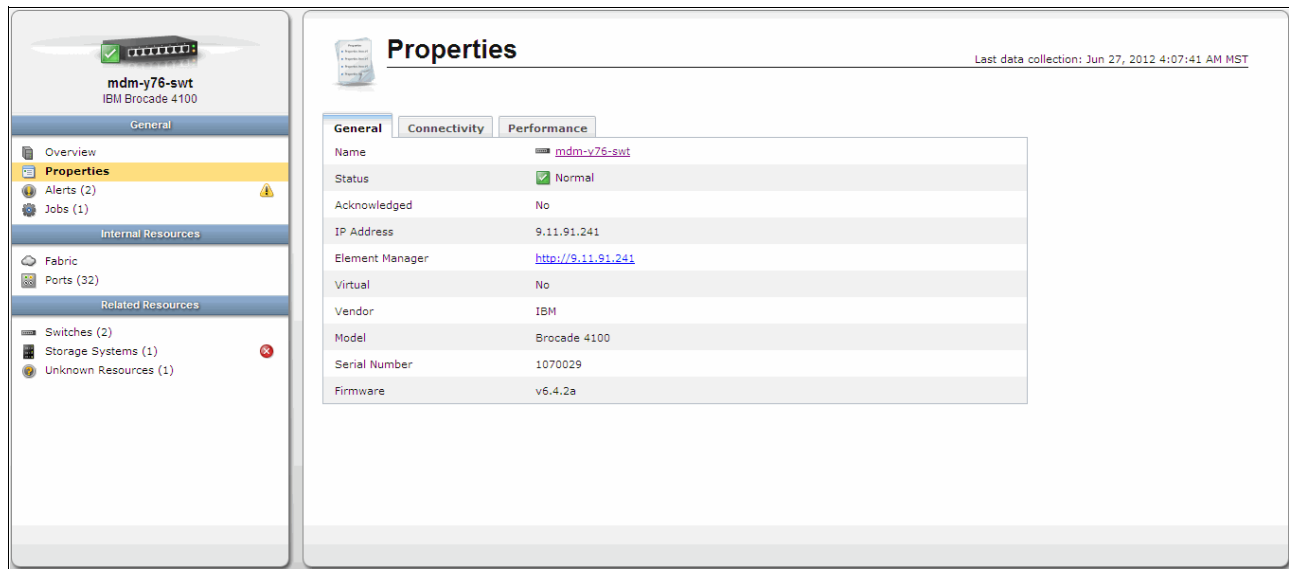


Figure 3-129 Example level 3 Switch General, Properties: General tab

Select the **Connectivity** tab (see example Figure 3-130) to get the information such as domain ID, WWN of the switch, number of ports, number of connected ports, fabric name to which the switch belongs, and the name of the principal switch within the fabric. Use the hyperlinks for the top-level resources **Fabric** or the **Principal Switch**, which forwards you to their Detail View.

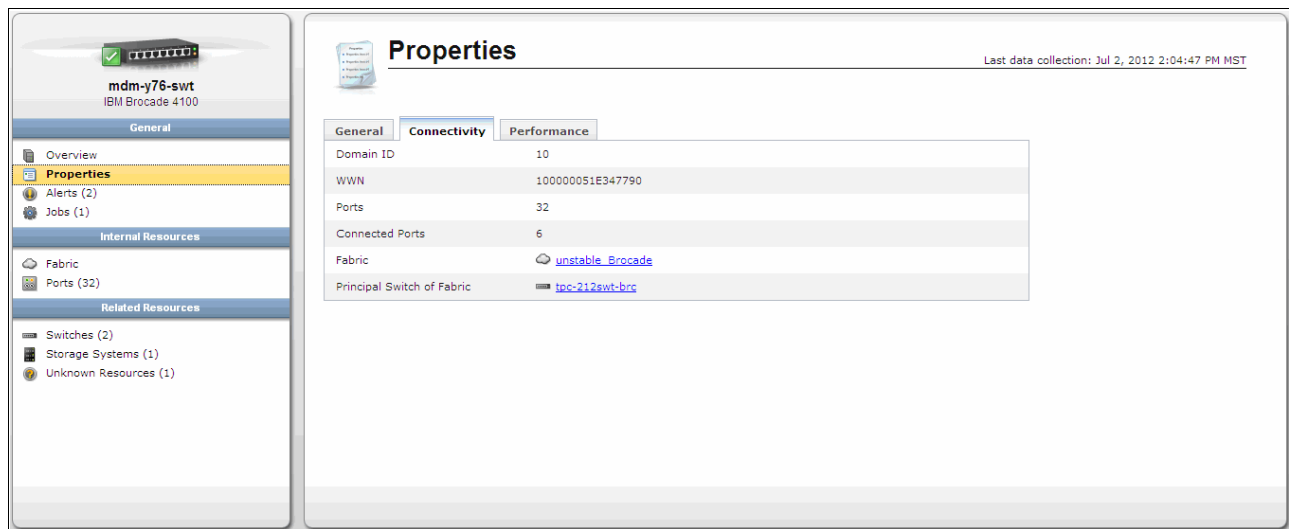


Figure 3-130 Example level 3 Switch General, Properties: Connectivity tab

Select the **Performance** tab to get information about the average performance data, such as: Total port frame rate, total port data rate, and overall port bandwidth percentage. See Figure 3-131 on page 202 for an example.

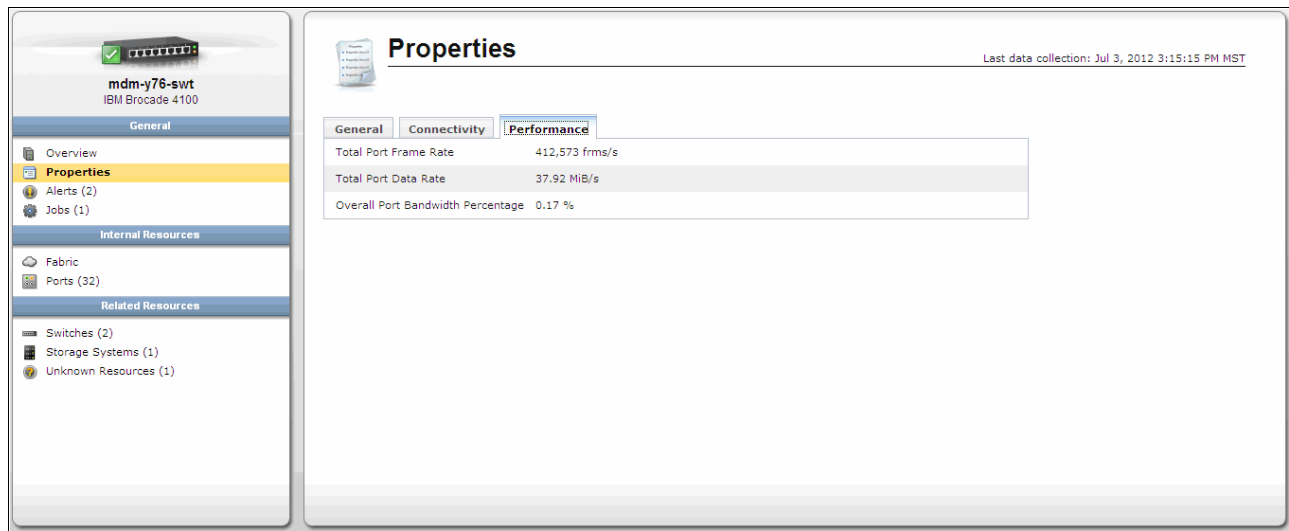


Figure 3-131 Example level 3 Switch General, Properties: Performance tab

In the next example, we provide the fabric information. To open the Fabric window, click the Fabric link in the index:

#### Internal Resources → Fabric

The Fabric window (see the example that is shown in Figure 3-132) of the switch provides a table with information about the fabric. It provides information such as: Fabric name, fabric status, if the fabric is virtual, the fabric type, and custom tags. Click the hyperlink at the Fabric name, which forwards you to the Fabric Detail View.



Figure 3-132 Example level 3 Switch Internal Resources, Fabric: General tab

Click the **Connectivity** tab to get information such as WWN of the fabric, principal switch name in the fabric, number of switches in the fabric, number of switch ports in the fabric, number of online and connected switch ports in the fabric, and the name of the active zone set. See Figure 3-133 on page 203 for an example. Use the **Principal Switch** hyperlink in the fabric, which forwards you to the Detail View of that switch, or click the **Active Zone Set** hyperlink, which provides you a properties window about the zone set.



Figure 3-133 Example level 3 Switch Internal Resources, Fabric: Connectivity

In the next example, we show all ports of a switch. To open the Ports table, click the Ports link in the index:

### Internal Resources → Ports

The Ports window (see the example for a Windows server in Figure 3-134) of the switch provides a table including all ports. It provides an overall view of all ports and connected resources to a switch. Each row represents a port. Each column provides a property. The table shows properties such as: Port number, port status, port type, state of the port, speed of the port, WWPN of the port, connected resource, connected port, and connected WWPN. The term *connected* is related to the resource, which is attached to the switch port. For example, a **Connected Resource** can be another switch, a server, a hypervisor, or a storage system. The **Connected Port** represents the port at the attached resource.

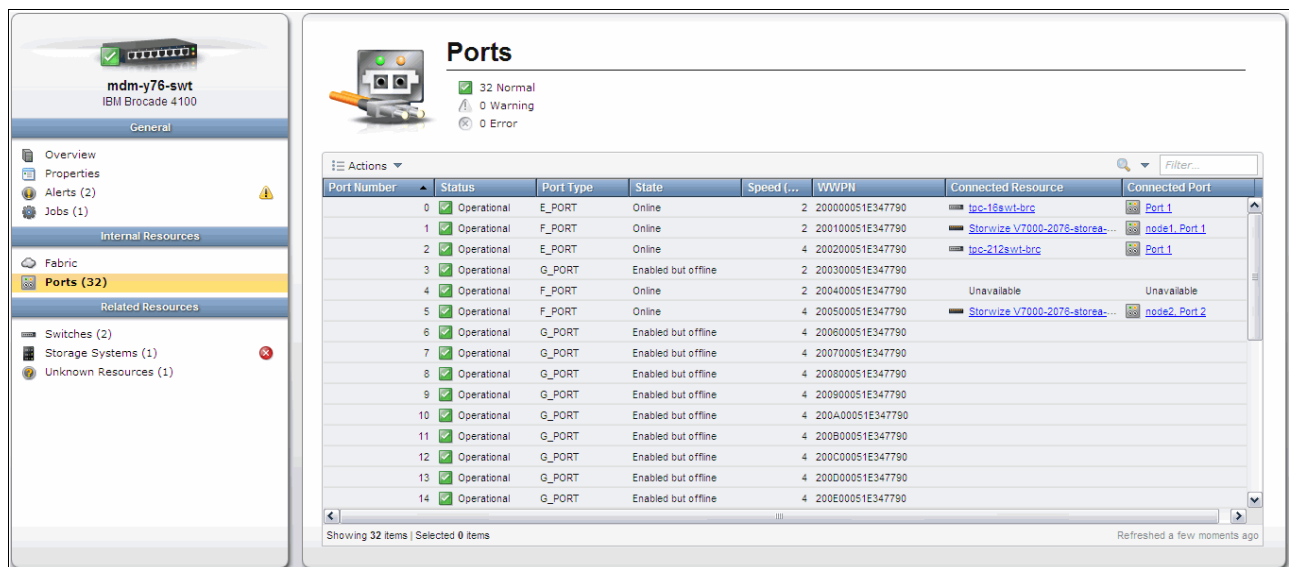


Figure 3-134 Example level 3 Switch Internal Resources, Ports

Click the hyperlink in the **Connected Resource** column to get to the third level (Detail View) of the connected resource, or click the hyperlink in the **Connected Port** column to get a new

Properties window for the port of the connected resource. For example, click the hyperlink in the **Connected Port** column for Port Number 1. A new properties window opens that contains the port information from the connected resource. See Figure 3-135, which shows the port properties for the V7000 node1, port1.

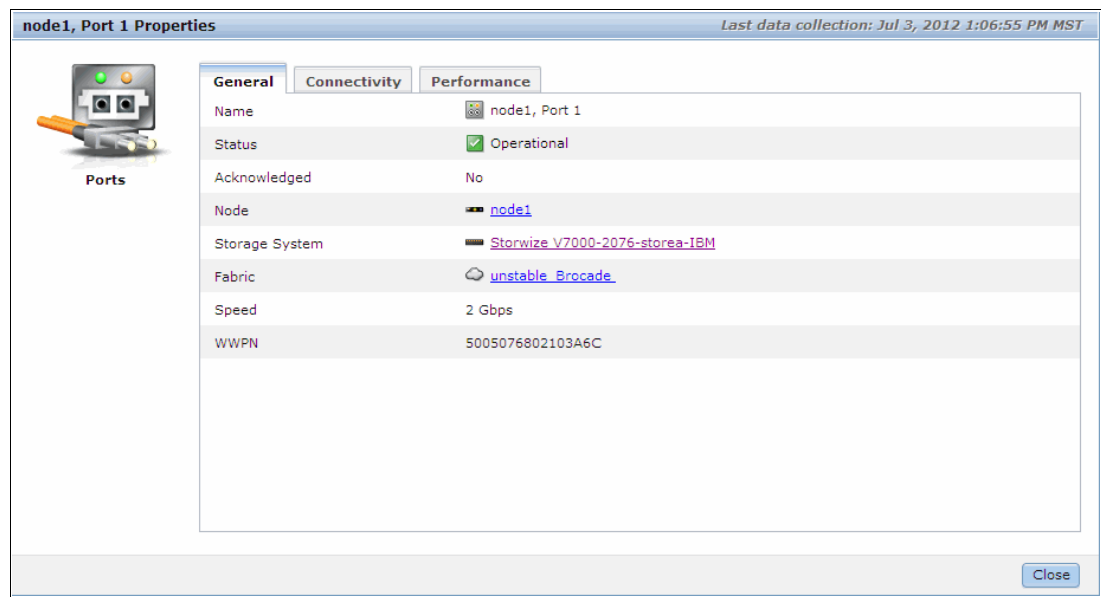


Figure 3-135 Example level 3 Storage System: Properties window Ports

In the next example, we provide the related unknown resources. To open the related unknown resources table, click the Ports link in the Index:

### Related Resources → Unknown Resources

The Unknown Resources window (see the example for a Windows server in Figure 3-136 on page 205) of the switch provides a table including all unknown resources.

Unknown resources are resources that are not monitored by Tivoli Storage Productivity Center but are connected to ports on the switch. Use this information to quickly determine the resources on a SAN that are not yet monitored by Tivoli Storage Productivity Center.

The Unknown Resources table provides information such as: Adapter WWN and unknown WWPN of the attached resource that is not monitored by Tivoli Storage Productivity Center, health status of the port, port type, port state, port speed, FC port ID, connected port, and connected WWPN of the switch. Click the hyperlink at the Connected Port column to get the Properties window of that port.

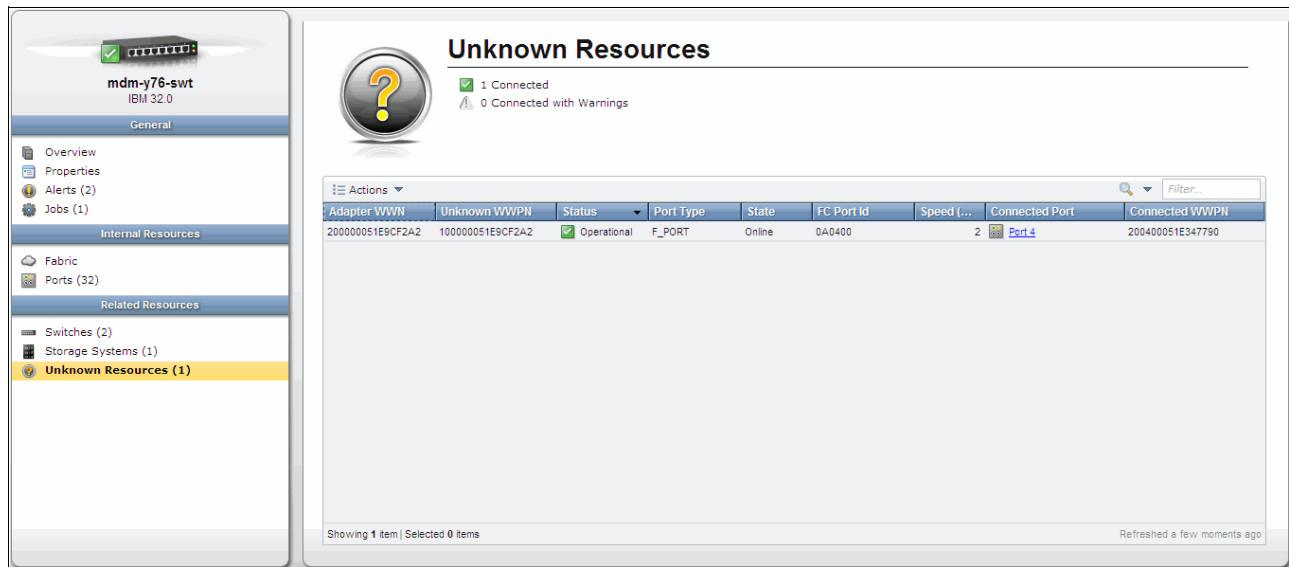


Figure 3-136 Example level 3 Switch Related Resources, Unknown Resources window

### Example fabric at level 3

In this section, we provide several level 3 examples with a fabric.

In the first example, we provide the overview of a fabric. To open the overview, click the Overview link in the Index:

#### General → Overview

The Overview window (see example Figure 3-137 on page 206) of the fabric provides a quick overview of the fabric. The Overview window provides three sections. You can use the drop-down menu in the charts to change the displayed chart. Hover the mouse of the line charts to get more information about the performance.

The **Summary** chart, in this example at the section on the upper-left side in the window, shows information about the fabric details such as WWN, principal switch, and the number of switches. Furthermore, it provides information about the number of connected and online ports, and the number of not-connected (offline) ports in the fabric.

The **Most Active Switches** chart, in this example at the section on the upper-right side in the window, shows top performance information over the last 24 hours of the most active switches. Through that you quickly can identify the most active switches in your fabric. Use the carousel function to cycle the views such as: Overall Bandwidth, Total Data Rate, and Total Frame Rate.

The **Most Active Ports** chart, in this example at the section on the bottom in the window, shows the top performance information per port over the last 24 hours in the fabric. Through that you quickly can identify the most utilized ports in your fabric. Use the carousel function to cycle the views such as: Overall Bandwidth, Total Data Rate, and Total Frame Rate.

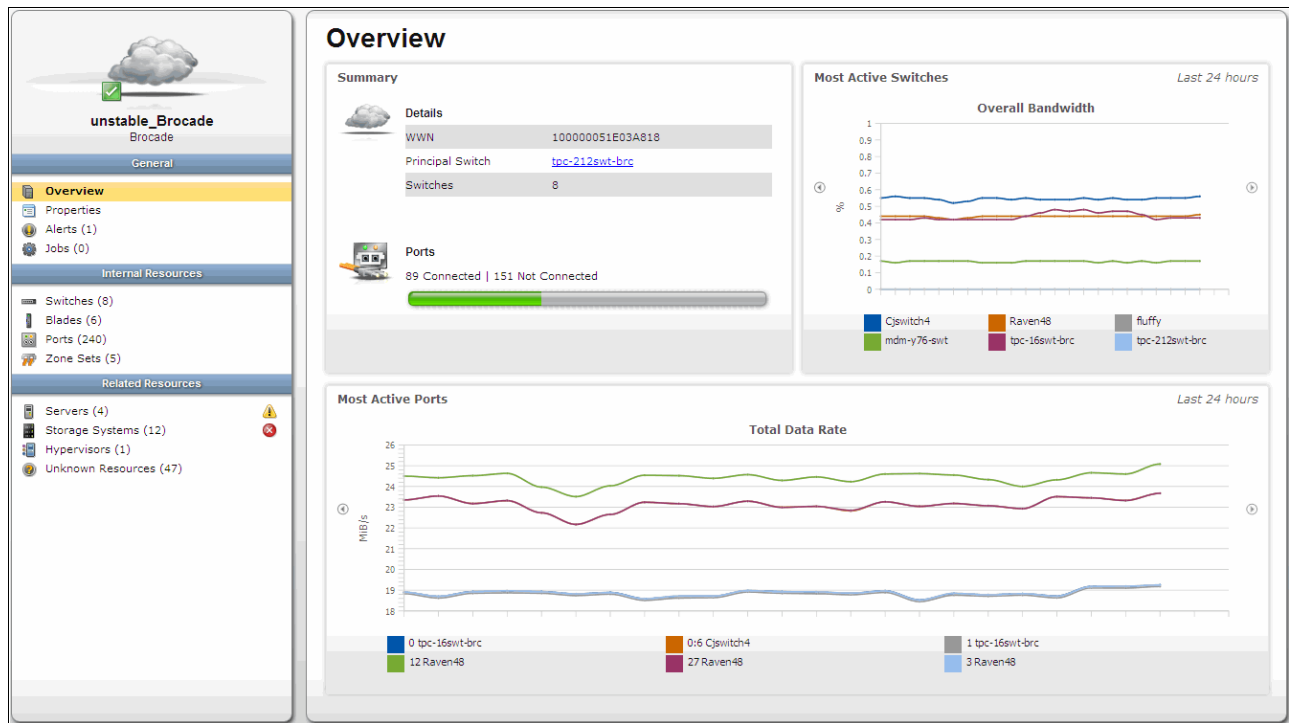


Figure 3-137 Example level 3 Fabric General, Overview

In the next example, we provide the information about the switches within a fabric. To open the switches table, click the Switches link in the Index:

#### Internal Resources → Switches

The Switches window (see the example for a Windows server in Figure 3-138 on page 207) of the fabric provides a table of all switches in the fabric. Each row represents a switch. Each column provides a property. The table shows properties such as: Switch name, health status, switch domain ID, number of ports, fabric name, principal switch name, vendor, model, serial number, firmware, if the switch is virtual, parent switch, WWN of the switch, element manager URL, and the time stamp of the last data collection. Click the hyperlink in the **Fabric** column, which forwards you to the fabric object Detail View at level 3. Click the hyperlink in the **Principal Switch** column, which forwards you to the switch Detail View at level 3. Click the hyperlink in the **Element Manager** column, which opens the Web interface on the switch.



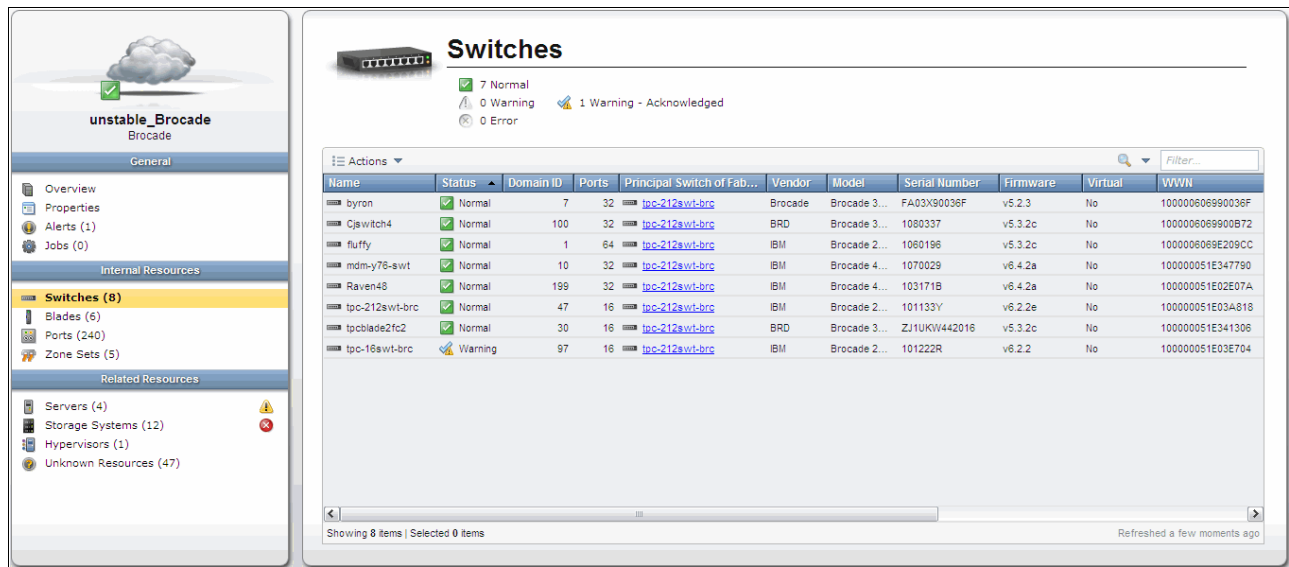


Figure 3-138 Example level 3 Fabric Internal Resources, Switches

In the next example, we provide the information about the ports within a fabric. To open the ports table, click the Ports link in the index:

### Internal Resources → Ports

The Ports table includes all ports from the fabric. See example Figure 3-139. Because this table is similar to the ports table within the switch, we do not explain it here in more detail. Refer to the example with the switch.

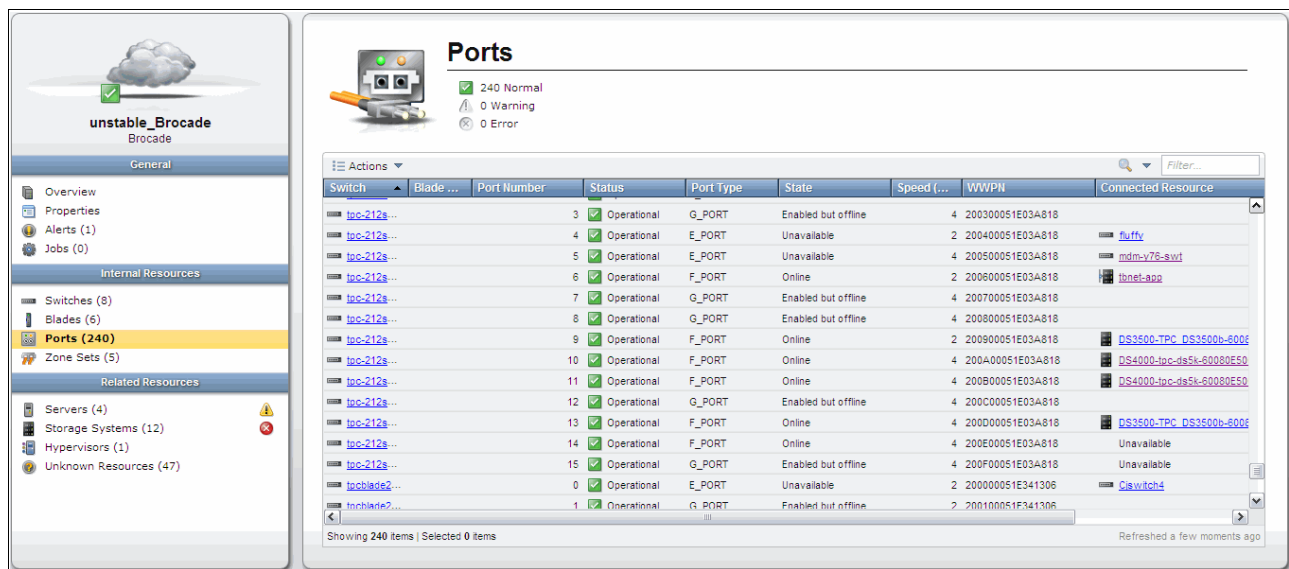


Figure 3-139 Example level 3 Fabric Internal Resources, Ports

In the next example, we provide the information about the zone sets for a fabric. To open the table, click the Zone Sets link in the index:

### Internal Resources → Zone Sets

The Zone Sets table shows all zone sets. Each row represents a zone set. See example Figure 3-140. The table provides information such as: Zone set name, if it is active, number of zones, and the description of the zone set.

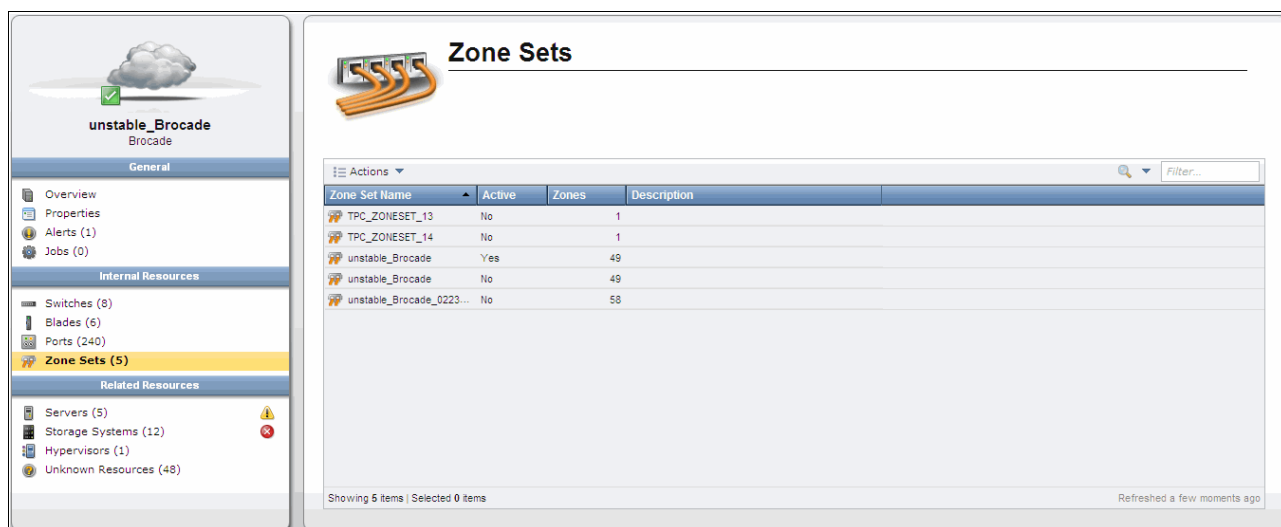


Figure 3-140 Example level 3 Fabric Internal Resources, Zone Sets

In the next examples, we provide the information about the related resources for a fabric. To open the table, click the links within the Related Resources section in the index.

The related resources to a fabric provide you information about how many and which resources such as servers, storage systems, and hypervisors are attached to the Fabric. It also provides information about how many attached resources are not monitored by Tivoli Storage Productivity Center yet. You can use the Unknown Resources link to find out which resources are not monitored by Tivoli Storage Productivity Center yet. See the following four examples for related resources for a fabric:

### Related Resources → Servers

Figure 3-141 shows the related servers.

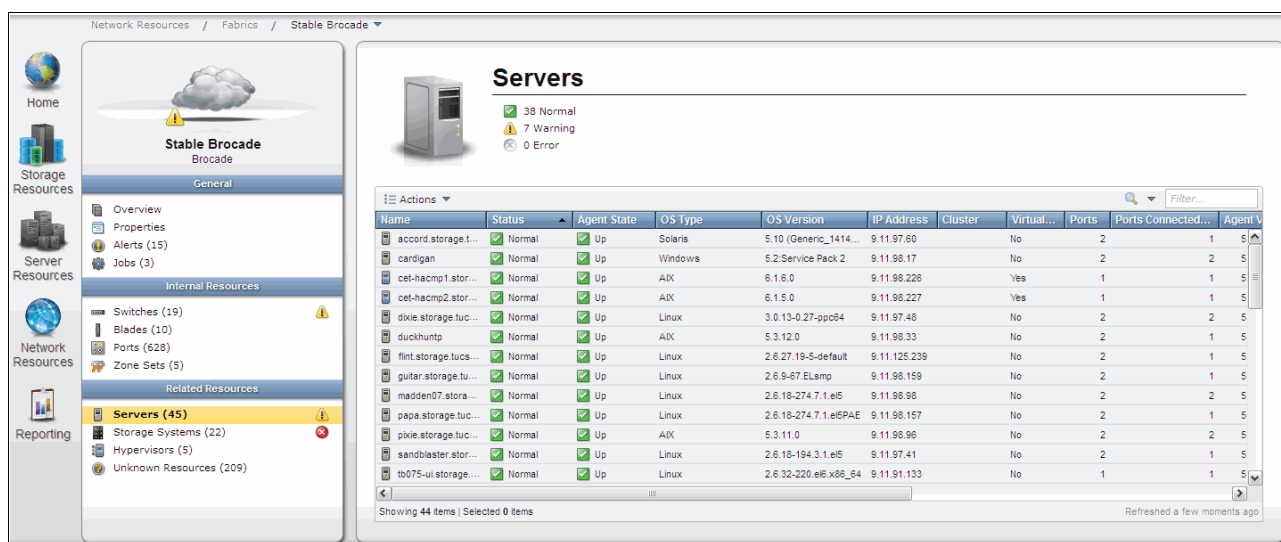


Figure 3-141 Example level 3 Fabric Related Resources, Servers

## Related Resources → Storage Systems

Figure 3-142 shows the related storage systems.

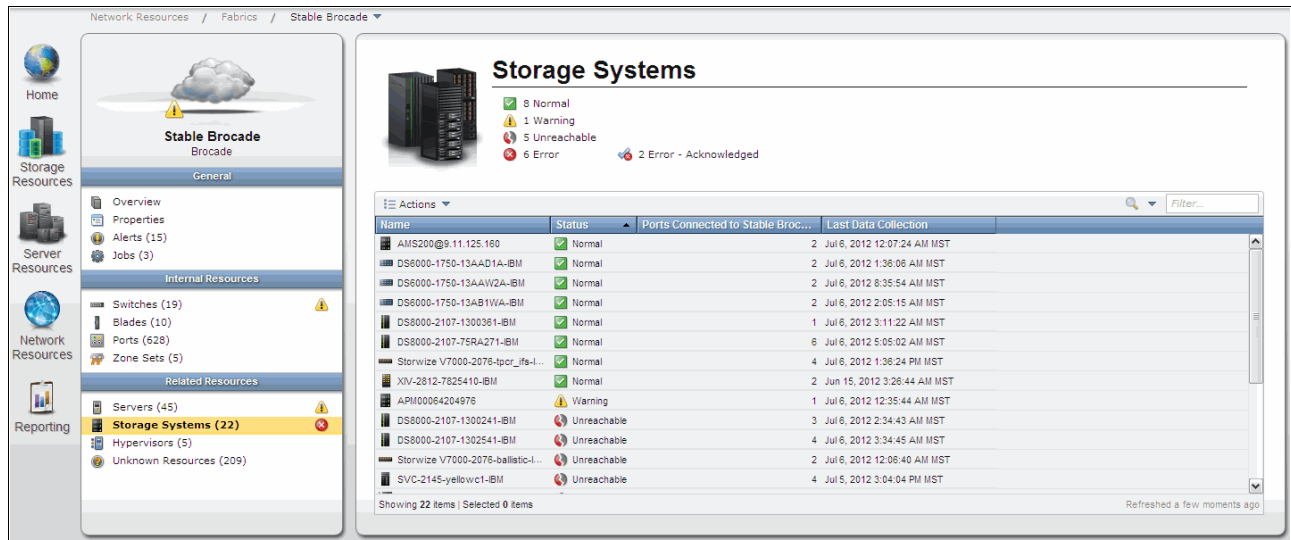


Figure 3-142 Example level 3 Fabric Related Resources, Storage Systems

**Note:** By default, the table at Figure 3-142 shows the key and related information. To unhide columns to increase the information content in the table, right-click a header of the columns and check the properties of interest. The complete table contains 30 columns.

## Related Resources → Hypervisors

Figure 3-143 shows the related hypervisors.

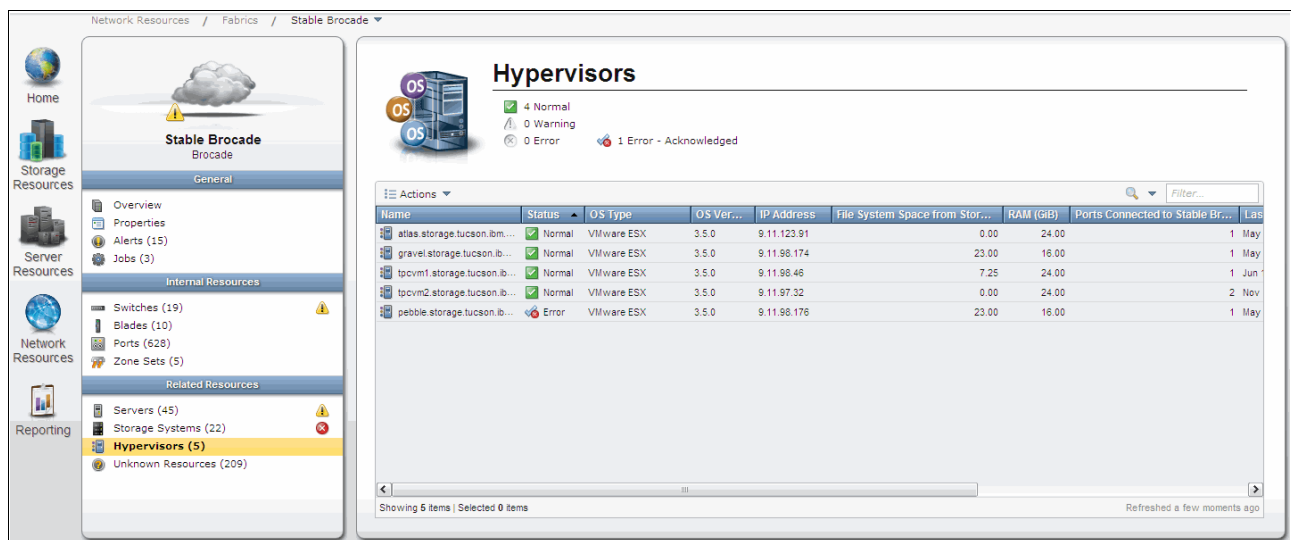


Figure 3-143 Example level 3 Fabric Related Resources, Hypervisors

## Related Resources → Unknown Resources

Figure 3-144 shows the related unknown resources.

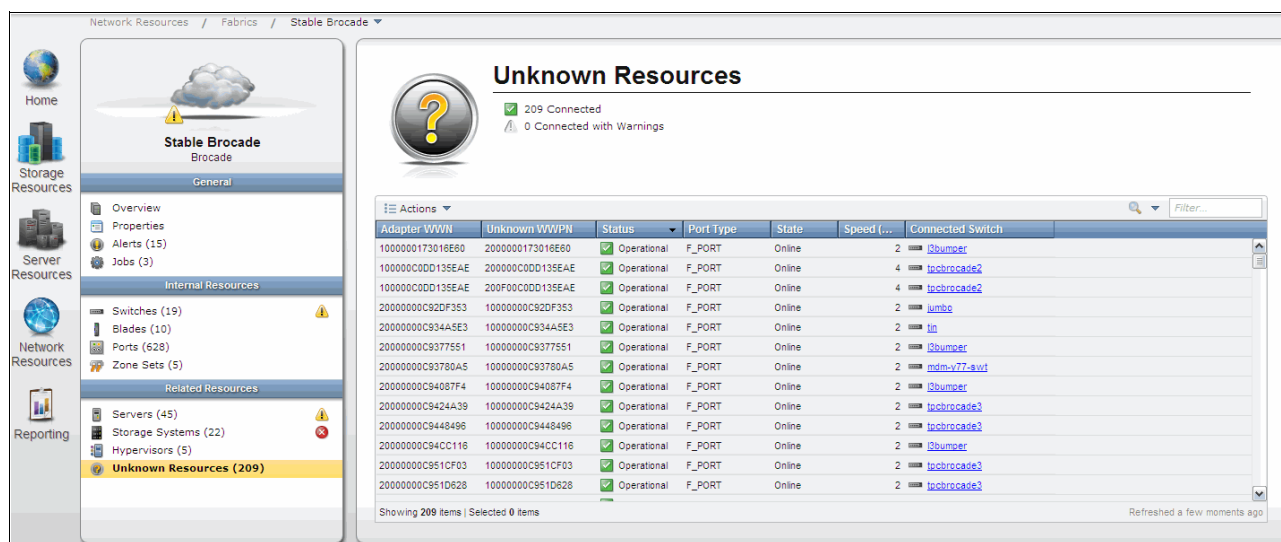


Figure 3-144 Example level 3 Fabric Related Resources, Unknown Resources

## 3.3 Display differences in the interfaces

Tivoli Storage Productivity Center stores information about monitored resources in a database repository. You can view this information in the stand-alone GUI or in the web-based GUI. Depending on the interface that you use, there might be some differences in how the information is presented.

### The web-based GUI does not show a fabric for a physical, Cisco SAN

The stand-alone GUI shows a “fabric” for a physical, Cisco SAN, whereas the web-based GUI does not show a “fabric” for a physical, Cisco SAN:

- ▶ In the stand-alone GUI, Tivoli Storage Productivity Center automatically generates a WWN to represent a physical, Cisco SAN as a fabric. This WWN typically starts with the numbers “3000”. The WWN for the fabric is shown on the **Topology → Fabrics** panel and in reports for fabrics.
- ▶ In the web-based GUI, a fabric is not shown for physical, Cisco SANs on the Fabrics page. Only the virtual fabrics, physical switches, and logical switches for Cisco Fibre Channel switches are shown in the web-based GUI.

### The number of unidentified endpoints on fabrics is different from the stand-alone GUI

The web-based GUI and stand-alone GUI might display a different number of unidentified endpoints on a fabric:

- ▶ In the web-based GUI, unidentified endpoints are labeled as *Unknown Resources* and each endpoint port is considered *one Unknown Resource*.
- ▶ In the stand-alone GUI, unidentified endpoints are labeled as *Other* and each endpoint node is considered *one Other*.

For example, an endpoint with two ports is shown as one Other resource in the stand-alone GUI, but in the web-based GUI it is shown as two Unknown Resources.

### Pool space for NetApp filers

For NetApp filers that are configured with block data, the values for pool space that are shown in the web-based GUI are different from the values shown in a storage management tool for NetApp filers, such as FilerView.

## 3.3.1 Health status

With the new web-based GUI, you can monitor the health status of your resources and identify potential problem areas in a storage environment. Monitored resources include top-level resources (storage systems, servers, hypervisors, fabrics, and switches) and their internal and related resources. By using the health status information, you can quickly determine the condition of your resource and if any actions must be taken. Tivoli Storage Productivity Center provides a number of different statuses to help you determine the condition of resources. Each status is represented by an icon in the web-based GUI.

### View health status in dashboard

When you log on to the web-based GUI the first look at the dashboard shows you the health status of your top-level resources. Figure 3-145 shows you the dashboard where you can see the status of your managed resources that are represented by an icon.

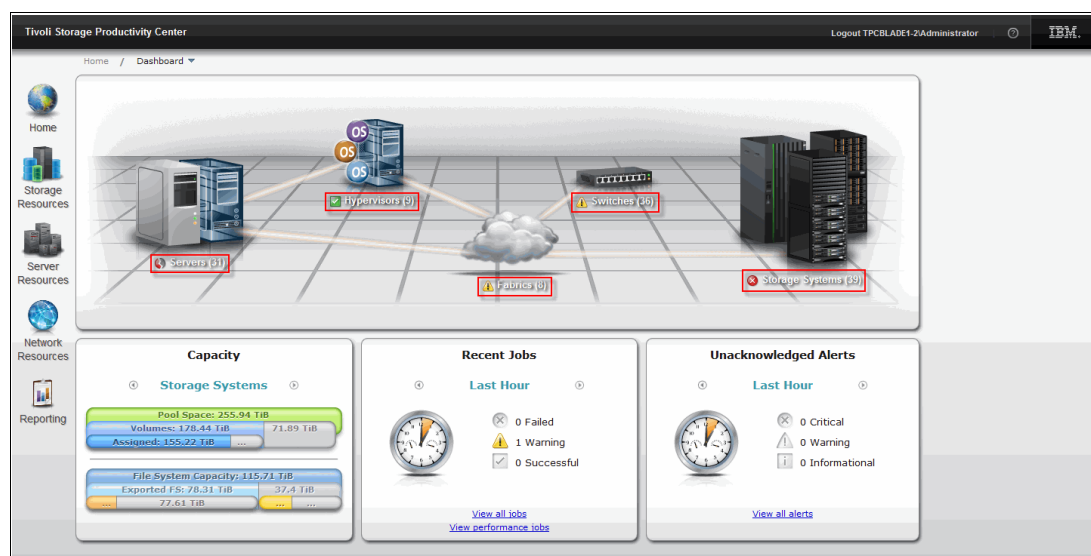


Figure 3-145 Health status of managed resources in the Dashboard view

If you move your mouse over the status icon of a monitored resource, it shows you the status summary. Figure 3-146 shows you the status summary for Fabrics resources.

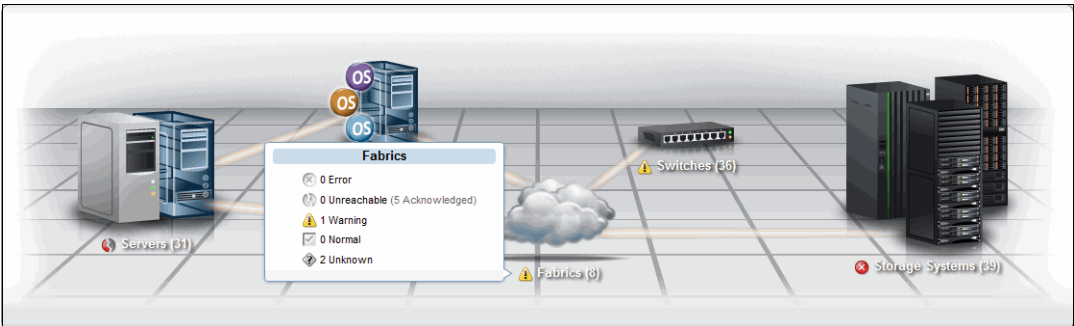










Figure 3-146 Status summary for Fabrics

The possible statuses of monitored resources in web-based GUI are shown and described in Table 3-19.

Table 3-19 Possible health statuses of monitored resources

Icon	Status	Description
	Error	<p>A serious problem was detected on a resource or on its internal resources.</p> <p>Resolve these problems as soon as possible.</p>
	Error - Acknowledged	<p>An Error status was detected and acknowledged. An Error - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.</p> <p>An acknowledged status is not used when determining the status of related, higher-level resources. For example, if the status of a volume is Error, the status of the related storage system is also Error. If the Error status of the volume is acknowledged, its status is not used to determine the overall status of the storage system.</p>
	Unreachable	<p>A resource is not responding to requests from the Tivoli Storage Productivity Center server. This status might be caused by a problem in the network or by a Storage Resource agent that is no longer running and did not communicate that it was shutting down.</p> <p>Unreachable status is used only for top-level entities.</p>

Icon	Status	Description
	Unreachable - Acknowledged	<p>An Unreachable status was detected and acknowledged. An Unreachable - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.</p> <p>An acknowledged status is not used when determining the status of related, higher-level resources. For example, if the status of a controller is Unreachable, the status of the related server is also unreachable. If the Unreachable status of the controller is acknowledged, its status is not used to determine the overall status of the server.</p>
	Warning	A Warning status represents potential problems on a resource or on its internal resources. This status is not critical.
	Warning - Acknowledged	<p>A Warning status was detected and acknowledged. A Warning - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.</p> <p>A Warning - Acknowledged status is not used when determining the status of related, higher-level resources. For example, if the status of a controller is Warning, the status of the related server is also Warning. If the Warning status of the controller is acknowledged, its status is not used to determine the overall status of the server.</p>
	Normal	No warnings or errors were detected on a monitored resource.
	Unknown	<p>A resource is known to Tivoli Storage Productivity Center but is not monitored and not being probed. To change an Unknown status, use a data collection job to collect status information about the resource.</p>

**Note:** “Missing” status has been removed in Tivoli Storage Productivity Center 5.1

As you can see from the table above, there is no more “Missing” status. It has been removed in Tivoli Storage Productivity Center 5.1 web-based GUI, but it is still displayed in stand-alone GUI. The web-based GUI will only display missing top-level entities but with Unreachable status where the cause is usually a data source problem.

The following example shows you a missing storage device in stand-alone GUI (Figure 3-147 on page 214), and the same device with unreachable status in web-based GUI (Figure 3-148 on page 214).

Action: Open Detail View									
Subsystem    Tape Library    Alert									
	Group	Label	Operational...	Vendor	Model	Type	Serial#	Consumed ...	Available S
Missing	Missing	DS3500-Glad-DS3512-6...	stressed, ok	IBM	2660	DS4000	60080E500...	3,076	2,222.35
Missing	Missing	DS4000-vcload5k1-6008...	stressed, ok	IBM	4988	DS4000	60080E500...	1,313.18	186.03
Missing	Missing	DS4800-TSM4K3-600A0...	ok	IBM	6091	DS4000	600A0B800...	94,010.78	0
Missing	Missing	DS8000-2107-1300241-I...	ok	IBM	921	DS8000	1300241	5,954	1,860
Missing	Missing	ESS-2105-18597-IBM	ok	IBM	800	ESS	18597	1,274.86	293.34
Missing	Missing	SVC-2145-yellowc1-IBM	stopped	IBM	8F4	SVC	000002006...	4.02	142

Figure 3-147 Missing storage device in stand-alone GUI

Name	Status	Firmware	Raw Disk Capacity (GiB)	Pool Capacity (GiB)	Available Pool Space (GiB)
AMS200@9.11.125.160	Normal	0783/A-S	1,607.25	1,071.48	
APM00064204976	Normal	3.26.40.5.031	8,884.13	5,130.31	
DS3500-Glad-DS3512-60080E5...	Unreachable	07.77.20.00	6,693.52	5,298.35	
DS3500-TPC_DS3500a-60080E...	Error	07.77.20.00	6,693.52	0.00	

Figure 3-148 Unreachable storage device in web-based GUI

### View health status in resource pane

You can use resource list pages to view only the status for a specific type of top-level resource. Each resource list page (Storage, Server, Network) shows you the health status summary, as shown in Figure 3-149.

Home

Storage Resources

Server Resources

Network Resources

Reporting

Tivoli Storage Productivity Center

Network Resources / Switches

Switches

19 Normal

3 Warning

0 Error

1 Unknown

13 Warning - Acknowledged

2 Error - Acknowledged

Switches

Alerts

Jobs

Actions

Name	Status	Domain ID	Ports	Connected Ports	Fabric	Principal
tpcmdata1	Unknown	111	32	6	100008008E37965	tp...
tpccisco01	Normal		40	0		
tpcbrocade1	Normal	4	32	20	Stable Brocade	st...
tpcblade6fc2	Normal	31	16	15	Stable Brocade	st...
tpcblade4fc2	Normal	3	16	13	100000051E025E70	tp...
tpcblade4fc	Normal	68	16	14	Stable Brocade	st...
tpcblade2fc2	Normal	30	16	5	unstable Brocade	tp...
tpc-66swt-csc	Normal	101	12	4	2001000530007CDF	di...
tpc-212swt-brc	Normal	47	16	12	unstable Brocade	tp...
tin	Normal	1	32	14	Stable Brocade	st...
Raven48	Normal	199	32	20	unstable Brocade	tp...
mdm-y76-swt	Normal	10	32	6	unstable Brocade	tp...
fluffy	Normal	1	64	2	unstable Brocade	tp...
director	Normal		80	13		

Figure 3-149 Health status in the resource page



In the resource page (Figure 3-149 on page 214), table rows are sorted by default on the status column with the worst status on top. There is no distinction for acknowledged versus unacknowledged items as far as sort order is concerned. The status column shows you the status icon and descriptive text next to it. You can do filtering on the status column by pulling-down of enumerated values, as shown in Figure 3-150.

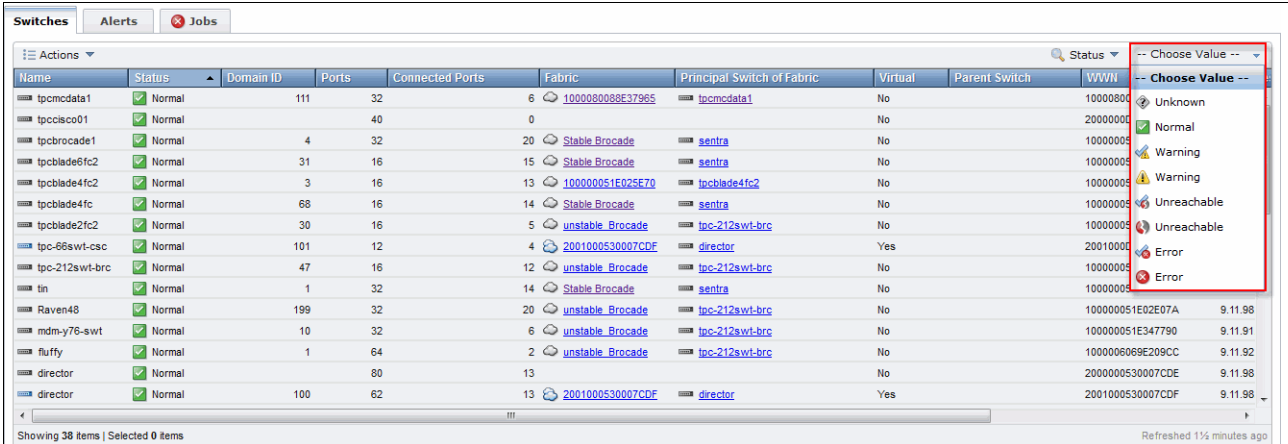


Figure 3-150 Filtering the status column

If you want to view the status of internal resources, you have to open the resource details page and select the internal resource for which you want to view the status. Figure 3-151 shows you an example for pools.

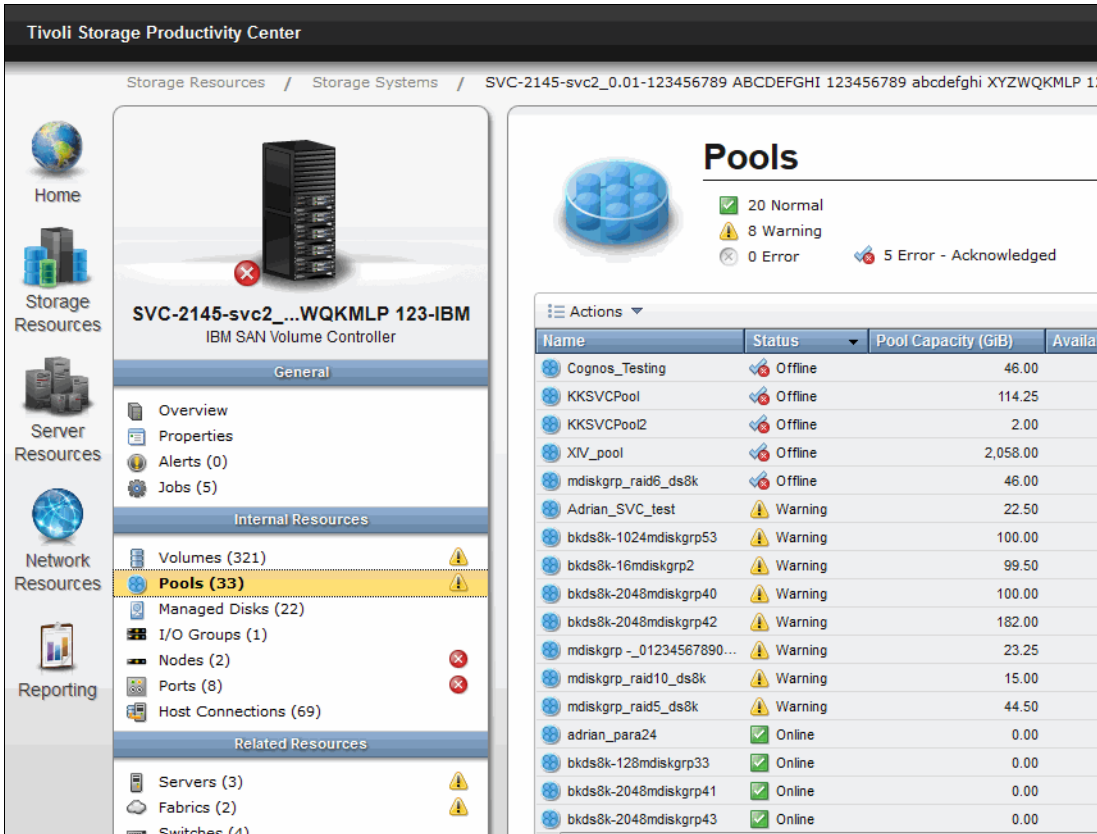


Figure 3-151 Internal resources health status

The health status indicator is displayed in the resource details page for each internal resource type if the status is error, warning, or unknown. Normal or acknowledged status indicators are not shown. Some types of internal resources are not associated with any health status (server disks, I/O Groups, and so on).

As you can see from the Figure 3-151 on page 215 for the internal resource types with health status, display is similar to resource panels as shown in Figure 3-149 on page 214. The health status summary is displayed above the table and counts of acknowledged and unacknowledged items are separated. The table rows are sorted by default on status column with the worst status on top. There is no distinction for acknowledged versus unacknowledged items as far as sort order is concerned. The status column shows you the status icon and descriptive text next to it. You can do filtering on the status column by pulling-down of enumerated values as shown in Figure 3-152.

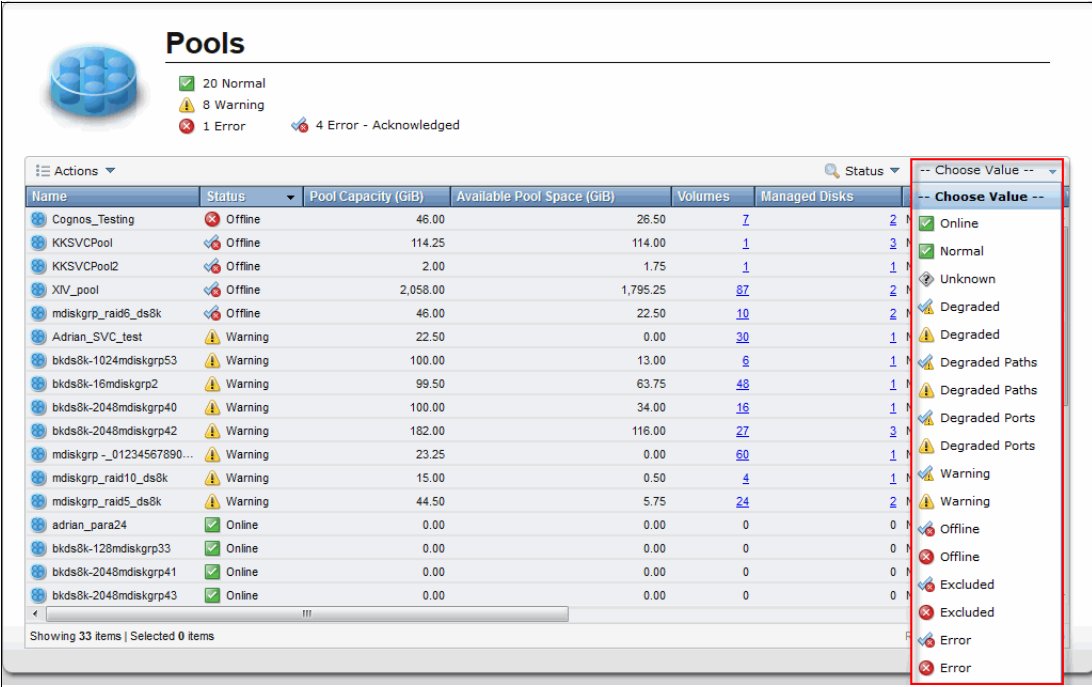













Figure 3-152 Internal resources health status filtering

As you can see from Figure 3-152, pools can have additional error and warning statuses. It is also applied for volumes, SAN Volume Controller managed disks, and ports. The statuses are shown in the summary as error and warning statuses. Table 3-20 on page 217 shows you additional possible error and warning statuses for pools, volumes, SAN Volume Controller managed disks, and ports.

Table 3-20 Additional Error and Warning status for Pools, Volumes, SVC Managed Disks, and Ports

Icon	Status	Description
	Offline	<p>SAN Volume Controller Managed Disk cannot be accessed by any of the online nodes.</p> <p>SAN Volume Controller Managed Disk group is offline and unavailable. No nodes in the cluster can access the Managed Disks.</p>
	Offline (acknowledged)	An Offline - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.
	Excluded	SAN Volume Controller Managed Disk has been excluded from use by the cluster after repeated access errors.
	Excluded (acknowledged)	An Excluded - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.
	Degraded	<p>SAN Volume Controller Managed Disk cannot be accessed by all the online nodes. That is, one or more (but not all) of the nodes that are currently working members of the cluster cannot access this Managed Disk.</p> <p>SAN Volume Controller Managed Disk group is available, however, one or more nodes cannot access all the Managed Disks in the group.</p>
	Degraded (acknowledged)	A Degraded - Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.
	Degraded Paths	Fibre Channel Paths can be degraded due to High Failure Rate.

Icon	Status	Description
	Degraded Paths (acknowledged)	A Degraded Paths-Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.
	Degraded Ports	Fibre Channel Ports can be degraded due to High Failure Rate.
	Degraded Ports (acknowledged)	A Degraded Ports-Acknowledged status indicates that a status was reviewed and is either resolved or can be ignored.
	Stopped	The status of a Fibre Channel port.

### ***Acknowledge the health status***

To avoid frequent “Error” statuses, Tivoli Storage Productivity Center 5.1 has the capability to acknowledge a bad health status. Error, unreachable, and warning health statuses can be acknowledged in web-based GUI and the status changes to *acknowledged* with a check mark on the status icon.

The acknowledged statuses are counted separately so if the health status of a lower-level resource is acknowledged, it will not be propagated to its top-level resource. Thus the top-level resource can have a green (Normal) status despite of its subentities with bad status (if acknowledged).

To acknowledge bad health status of a resource, you have to open the resource page and in the “Status” column right-click its status. Figure 3-153 on page 219 shows you an example for top-level resource (storage systems), and Figure 3-154 on page 220 shows you an example for internal resource (storage systems controller).

Tivoli Storage Productivity Center

Storage Resources / Storage Systems

## Storage Systems

17 Normal  
 3 Warning  
 8 Unreachable  
 5 Error  
 1 Unreachable - Acknowledged  
 5 Error - Acknowledged

Block Storage | File Storage | Alerts | Jobs

Actions

Name	Status	Firmware	Raw Disk Capacity (GiB)
Storwize V7000-2076-ballistic-I...	Normal	6.3.0.0 (build ...)	6,693.52
Storwize V7000-2076-tpcr_ifs-I...	Normal	6.3.0.0 (build ...)	22,350.20
SVC-2145-perfsvc1-IBM	Normal	5.1.0.6 (build ...)	128.00
XIV-2810-6000646-IBM	Normal	10.2.4.b	0.00
XIV-2812-7825410-IBM	Normal	11.1.0.b	330,228.46
APM00064204976	Warning	3.26.40.5.031	8,884.13
SVC-2145-svc2_0.01-1234567...	Warning		2,862.35
DS3500-Glad-DS3512-60080ES...	Unreach		6,693.52
DS4000-vcloud5k1-60080E5000...	Unreach		2,179.71
DS4800-TSM4K3-600A0B80004...	Unreachable	07.60.52.00	126,590.39
DS8000-2107-1300241-IBM	Unreachable	5.4.30.253	11,116.27
ESS-2105-18597-IBM	Unreachable	2.4.4.167	2,169.61
oxide	Unreachable	Data ONTAP ...	404.56

Showing 37 items | Selected 1 item

Figure 3-153 Acknowledge Status menu for top-level resource

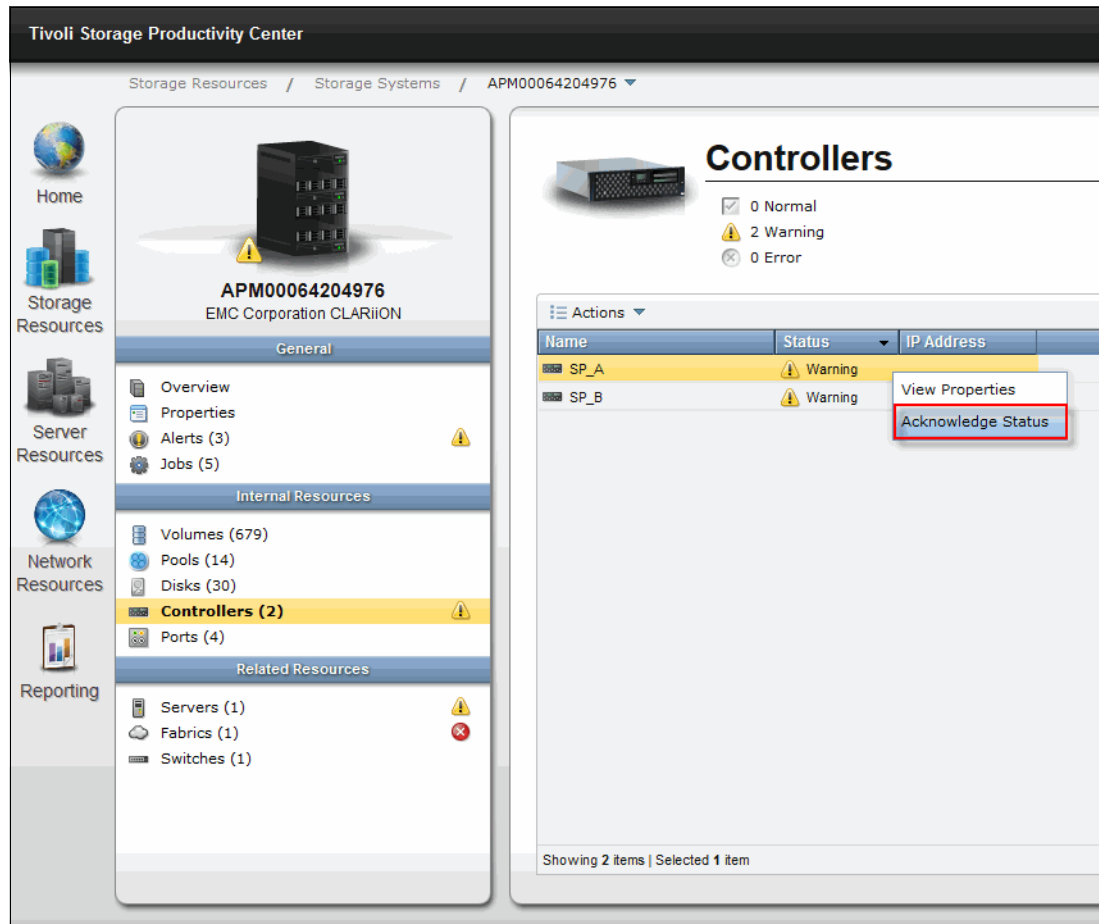


Figure 3-154 Acknowledge Status menu for internal resources

After you click **Acknowledge Status** the status will be “acknowledging” (Figure 3-155), and when it is finished you will get the information that the error is “acknowledged” (Figure 3-156).

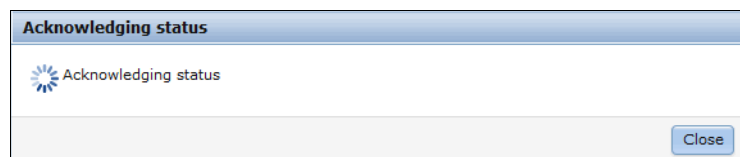


Figure 3-155 Acknowledging status

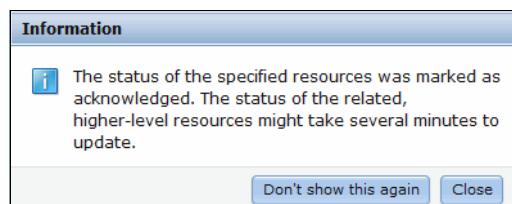


Figure 3-156 Information about acknowledged status

Click the **Close** button and you will see that the internal resource status is changed to acknowledged (Figure 3-157). The status summary on the top of the page also shows you acknowledged errors.

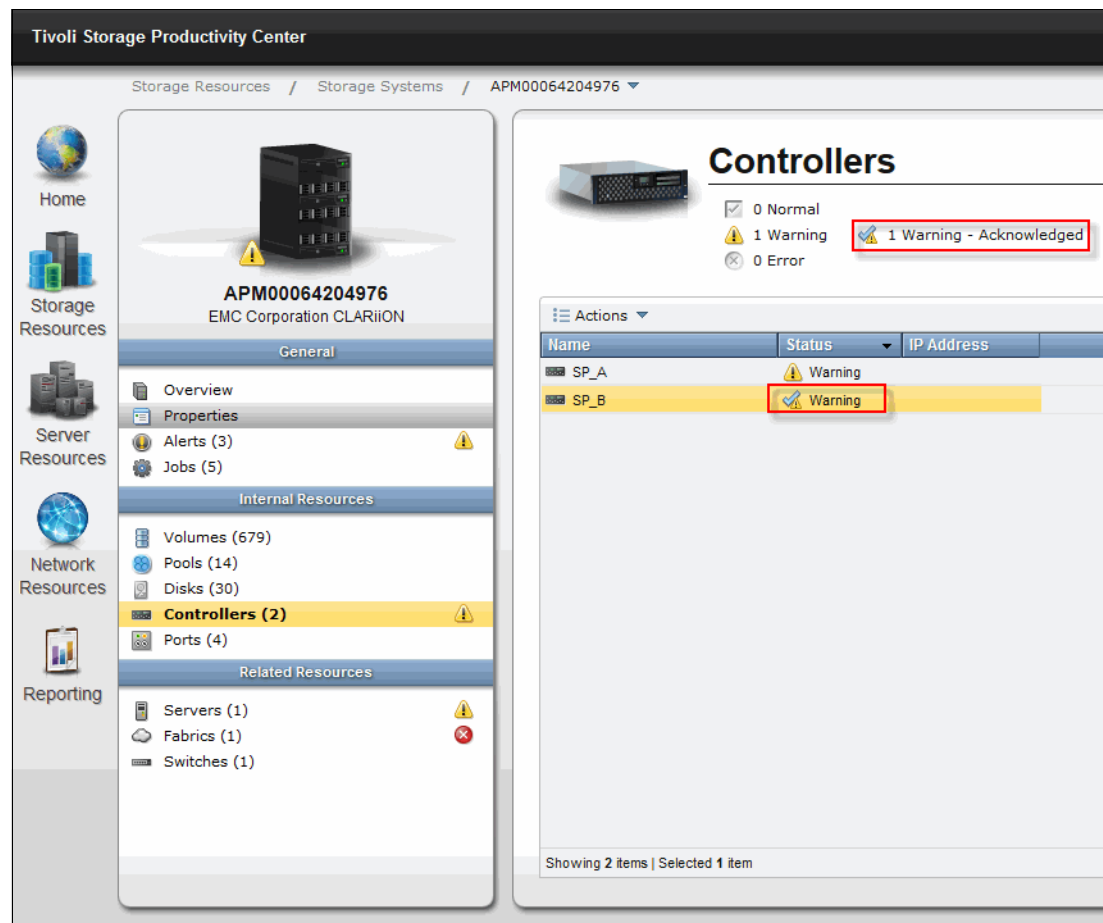


Figure 3-157 Acknowledged status

Health status can also be unacknowledged if for example the problem still exists and must be resolved. To unacknowledge the status, select the status of top-level resource or internal resource and right-click it (Figure 3-158 on page 222).



Figure 3-158 Unacknowledge status menu

After you click Unacknowledge Status the status will be “unacknowledging” (Figure 3-159), and when it is finished you will get the information that the error is “unacknowledged” (Figure 3-160).

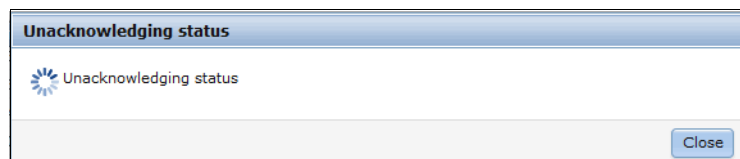


Figure 3-159 Unacknowledging status

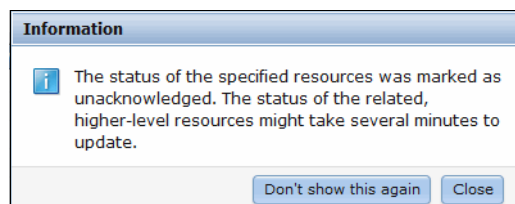


Figure 3-160 Information about unacknowledged status



Click the **Close** button and you will see that the resource status is changed to unacknowledged (Figure 3-161). The status summary is updated and it shows you the warning status again.



Figure 3-161 Unacknowledged status

### Health status propagation

Health status propagation in Tivoli Storage Productivity Center 5.1 is simplified and more intuitive than in the previous Tivoli Storage Productivity Center versions. The status of top-level resources (storage systems, servers, hypervisors, fabrics, and switches) is determined by the consolidated and propagated status of low-level internal resources. Previous Tivoli Storage Productivity Center versions had an intricate formula, most often resulting in “Warning” status at the top-level resources.

A *consolidated status* is the status that is reported by the top-level resource for its own hardware. For example, if the cooling fans in a storage system are stopped and the internal temperature is too high, that status is reported to Tivoli Storage Productivity Center.

A *propagated status* is the combined statuses of the monitored, internal resources for a top-level resource. For example, if a Warning status is detected on a volume in a storage system, that Warning status is used to determine the overall status of the storage system.

Tivoli Storage Productivity Center uses the values of consolidated status and propagated status to calculate the overall health status of a top-level resource. The most severe status is propagated making the overall health status easy to understand. But the propagation of the most severe status has the danger that error status is shown more frequently.

**Note:** Health status propagation avoids propagating status across different top-level resources. For example, the status of a fabric is no longer influenced by the status of servers and storage systems connected to that fabric.

Table 3-21 shows you the top-level resources and its internal resources that are used to calculate the health status.

*Table 3-21 Internal resources that are used to determine the status of top-level resources*

Top-level resource	Internal resources that are used to calculate the health status
Storage System	<ul style="list-style-type: none"> <li>▶ Clusters</li> <li>▶ Controllers</li> <li>▶ Disks</li> <li>▶ External disks</li> <li>▶ Modules</li> <li>▶ Network shared disks</li> <li>▶ Nodes</li> <li>▶ Pools, and the internal resources that are associated with pools: <ul style="list-style-type: none"> <li>– Volumes</li> <li>– RAID arrays</li> <li>– Managed disks</li> </ul> </li> <li>▶ Ports</li> </ul>
Server	<ul style="list-style-type: none"> <li>▶ Controllers, and ports on controllers</li> <li>▶ Volume groups</li> <li>▶ Monitored directories</li> </ul>
Hypervisor	<ul style="list-style-type: none"> <li>▶ Controllers</li> <li>▶ Ports on controllers</li> <li>▶ Virtual machines</li> </ul>
Fabric	<ul style="list-style-type: none"> <li>▶ Blades, and ports on blades</li> <li>▶ Ports that are not blades</li> <li>▶ Switches</li> </ul>
Switch	<ul style="list-style-type: none"> <li>▶ Blades</li> <li>▶ Logical switches</li> <li>▶ Ports</li> </ul>

Tivoli Storage Productivity Center uses the following statuses of internal resources to help calculate the status top-level resources:

- ▶ Unknown
- ▶ Normal
- ▶ Error
- ▶ Warning
- ▶ Unreachable

The statuses are propagated in the following way to determine the status of a top-level resource:

- ▶ If an internal resource has an Error status, the related top-level resource has an Error status
- ▶ If an internal resource has an Unreachable status, and no other internal resources have an Error status, the related top-level resource has an Unreachable status

- ▶ If an internal resource has a Warning status, and no other internal resources have an Error or Unreachable status, the related top-level resource has a Warning status
- ▶ If an internal resource has a Normal status, and no other internal resources have an Error, Unreachable, or Warning status, the related top-level resources have a Normal status
- ▶ If an internal resource has an Unknown status, and no other internal resources have an Error, Unreachable, Warning, or Normal status, the related top-level resource has an Unknown status

For example (Figure 3-162), in a storage system, a port might have an Error status, a pool might have a Warning status, and a number of disks might have an Unknown status. In this case, the overall status for the storage system is Error because it is the most severe status that was detected on the internal resources.

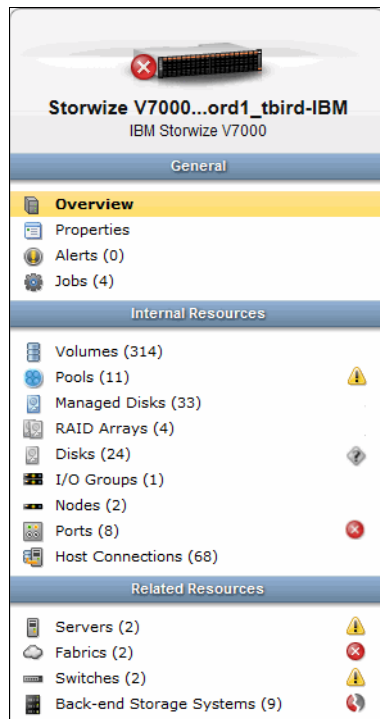


Figure 3-162 Health status propagation

Figure 3-163 on page 226 shows you some of the possible combinations of statuses and their resulting, propagated status.

Error 	Unreachable 	Warning 	Normal 	Unknown 	Resulting status for top-level resource
				X	Unknown
			X		Normal
			X	X	Normal
		X			Warning
		X		X	Warning
		X	X	X	Warning
	X				Unreachable
	X			X	Unreachable
	X		X	X	Unreachable
	X	X	X	X	Unreachable
X					Error
X				X	Error
X			X	X	Error
X		X	X	X	Error
X	X	X	X	X	Error

Figure 3-163 Propagation of the statuses for internal resources in the web-based GUI

## Health status propagation examples

In the following examples, we show you how the health status is propagated for the storage systems. Figure 3-164 shows you a web-based GUI dashboard where you can see the health status of Storage Systems.

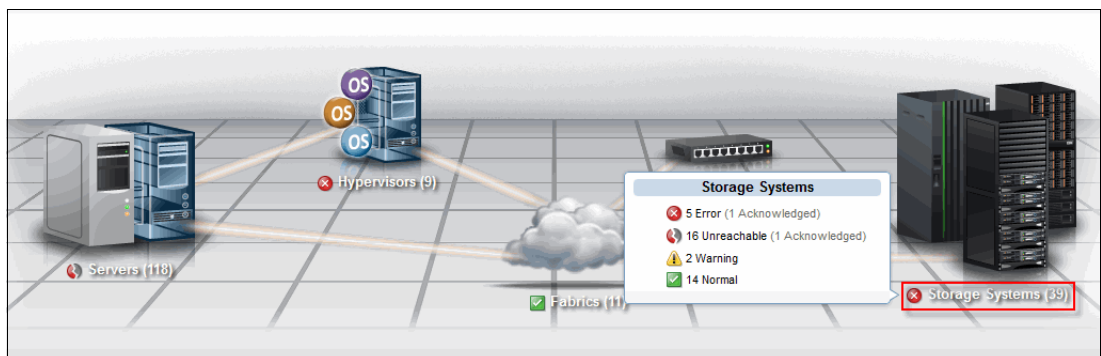


Figure 3-164 Storage Systems health status in Dashboard

The health status of Storage Systems shows you the “Error” status icon, as this is the worst status of the related resources. When you click the Storage Systems icon in the dashboard, it opens the Storage Systems pane where you see all statuses of managed storage resources (Figure 3-165). According to the statuses, health status is calculated.

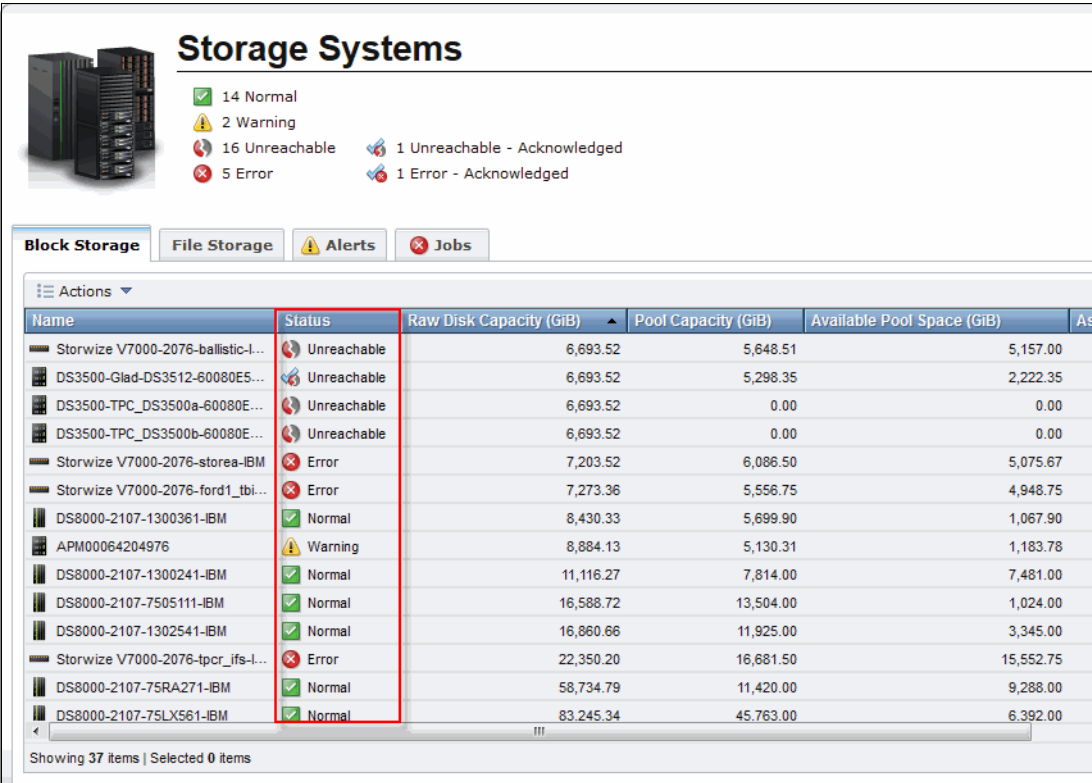


Figure 3-165 Storage Systems health status

If you select and acknowledge all error statuses (Figure 3-166 on page 228), the health status of Storage Systems will change to “Unreachable”, as this is the worst health status. Acknowledged statuses are not propagated.

**Note:** The health status of resource is not changed immediately after you change the status of related resource.

Block Storage					
File Storage					
Alerts					
Jobs					
Actions					
Name	Status	Raw Disk Capacity (GiB)	Pool Capacity (GiB)	Available Pool Space (GiB)	Ass
DS4800-DS4800-600A0B80001...	Error	467.62	367.35	19.78	
SVC-2145-svc2_0_01-1234567...	Error	2,930.37	2,926.00	2,223.75	
USP@9.11.123.88	Error	3,220.84	2,463.56	2,020.85	
Storwize V7000-2076-storea-IBM	Error	7,203.52	6,086.50	5,075.67	
Storwize V7000-2076-ford1_tbi...	Error	7,273.36	5,556.75	4,948.75	
Storwize V7000-2076-tpcr_ifs-I...	Error	22,350.20	16,681.50	15,552.75	
SVC-2145-yellowc1-IBM	Unreachable	147.00	147.00	142.00	
zinc	Unreachable	336.65	169.29	0.00	
oxide	Unreachable	404.56	169.41	82.67	
tbnet-app	Unreachable	669.46	386.03	286.99	
DS4800-mdm-z163-fast-600A0...	Unreachable	950.12	0.00	0.00	
DS4200-TPC4700-600A0B8000...	Unreachable	1,085.86	814.36	509.23	
DS5300-tpc5k-600A0B8000477...	Unreachable	1,089.86	817.35	1.91	
ESS-2105-18597-IBM	Unreachable	2,169.61	1,568.20	293.34	

Showing 37 items | Selected 5 items

Figure 3-166 Acknowledge "Error" statuses

Figure 3-167 shows you the changed Storage Systems health status in the dashboard.

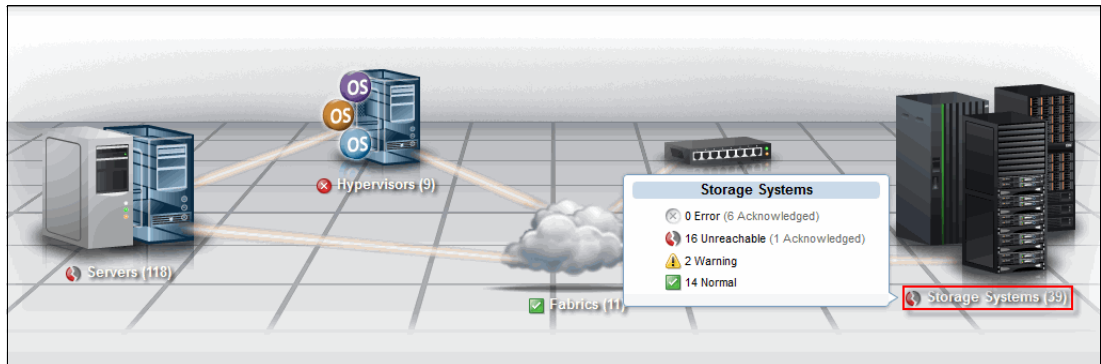


Figure 3-167 Changed Storage Systems health status

The health status of a storage resource is determined and propagated by the health status of its internal resources. Figure 3-168 on page 229 shows you an example of one storage system, which health status is "Error".

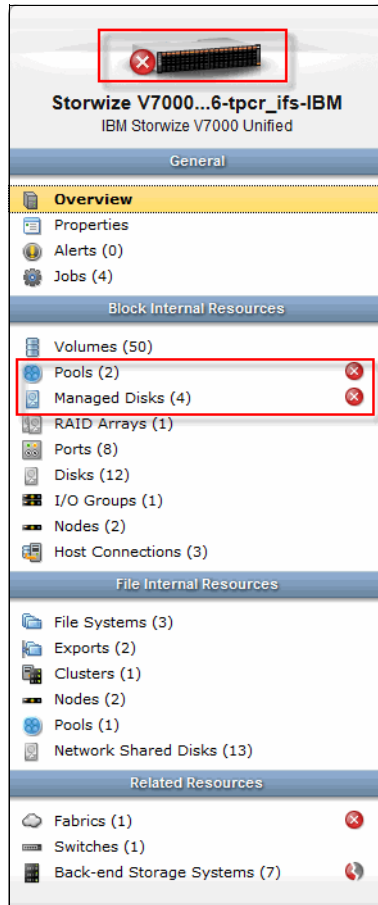


Figure 3-168 “Error” health status of a storage system

As you can see in Figure 3-168 internal resources, Pools and Managed Disks have an “Error” status. In this example, only the Pools health status is propagated as it is used to determine the status of a storage resource. The Managed Disks health status is used to determine the status of the Pools. If you acknowledge the “Error” status of the Pools, the storage resource will have a Normal status as shown in Figure 3-169 on page 230.

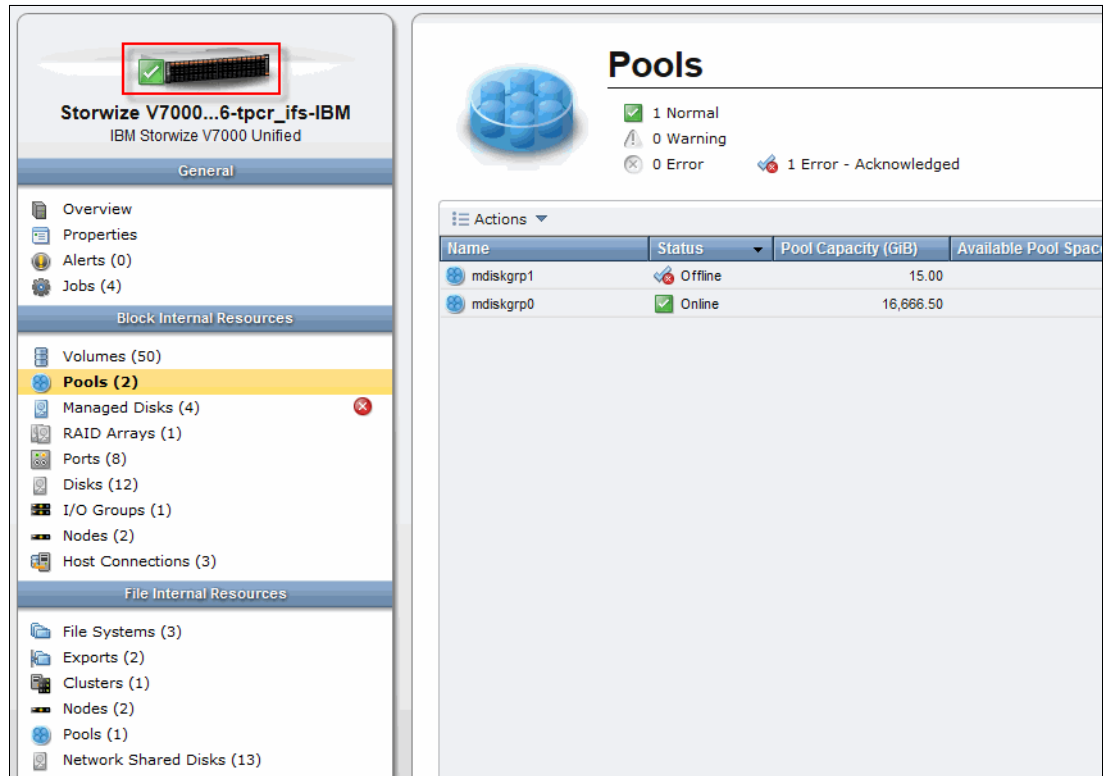


Figure 3-169 Storage resource normal status

### 3.3.2 Jobs

Jobs in Tivoli Storage Productivity Center are used to collect data and retrieve information about monitored resources and to complete other tasks that are related to monitoring an environment. In order to ensure that the latest information about monitored resources is available in the web-based GUI, you must define data collection jobs and run it regularly. All the jobs must be defined and run from stand-alone GUI because web-based GUI is currently not allowed to do job management actions. Also, you can configure in stand-alone GUI how the jobs are displayed in web-based GUI. The web-based GUI will then be used to view the following information about the jobs:

- ▶ The overall status of all jobs
- ▶ The status of performance monitor jobs
- ▶ The information about specific jobs, including status, related resource, type, and schedule
- ▶ The job logs

**Note:** All the jobs in Tivoli Storage Productivity Center 5.1 must be defined and run from stand-alone GUI. You can check Tivoli Storage Productivity Center 5.1 documentation in the following link about how to define and run the jobs:

<http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/index.jsp>

The web-based GUI in Tivoli Storage Productivity Center 5.1 supports the most common jobs for the high-level devices, which are the following:

- ▶ Probe
- ▶ Scan
- ▶ Performance monitors
- ▶ Deployment jobs



► Quota jobs

**Note:** Discovery, Ping, Aggregate, Tape, Provisioning, Planner, and Optimizer jobs are not supported in web-based GUI.

The web-based GUI shows you jobs on a device/schedule basis, as opposed to a schedule basis in stand-alone GUI. This makes it easier to find a job for a specific resource, and also it makes it easier to see the individual job status for the specific resource. Figure 3-170 shows you the stand-alone GUI jobs.


**Jobs for Selected Schedule**

View Log File(s) Only show jobs with status

Run	Computer	Device	Status	Start
<b>1 - Jun 20, 2012 3:44:00 AM MST</b>				
1 - Jun 20, 2012 3:44:00 AM MST	tpcblade1-2.storage.tucson.ibm.com	DS8000-2107-75LX561-IBM	Running with warning(s)	Jun 20, 2012 3:4
1 - Jun 20, 2012 3:44:00 AM MST	tpcblade1-2.storage.tucson.ibm.com	DS8000-2107-1300361-IBM	Running	Jun 20, 2012 3:4
1 - Jun 20, 2012 3:44:00 AM MST	tpcblade1-2.storage.tucson.ibm.com	DS8000-2107-75RA271-IBM	Running	Jun 20, 2012 3:4
1 - Jun 20, 2012 3:44:00 AM MST	tpcblade1-2.storage.tucson.ibm.com	DS8000-2107-7505111-IBM	Running	Jun 20, 2012 3:4
1 - Jun 20, 2012 3:44:00 AM MST	tpcblade1-2.storage.tucson.ibm.com	DS8000-2107-1300241-IBM	Running with warning(s)	Jun 20, 2012 3:4

Figure 3-170 Stand-alone GUI: Jobs for Selected Schedule

Figure 3-171 shows you the difference in new web-based GUI.

 **Jobs**

✖ 74 Failed  
⚠ 62 Warning  
✓ 195 Successful  
▶ 16 Running

**Jobs** | **Performance Monitors**

Actions ▼

Name	Monitor Status	Last Day Success Perc...	Last Successful Collection Attempt	Last S
DS8000-2107-1300241-IBM	Running with warnings	0	None	
DS8000-2107-75RA271-IBM	Running	100	Jun 26, 2012 4:45:00 PM MST	Jun 26, 2
DS8000-2107-1300361-IBM	Running	59	Jun 26, 2012 4:45:00 PM MST	Jun 26, 2
DS8000-2107-7505111-IBM	Running	29	Jun 26, 2012 4:45:00 PM MST	Jun 26, 2
DS8000-2107-75LX561-IBM	Running with warnings	0	None	

Figure 3-171 Web-based GUI: Jobs on a device/schedule basis

As you can see in the web-based GUI in Figure 3-171, only the resource name is displayed and not the job name.

The jobs and logs that are shown in the web-based GUI are determined by configuration settings in the stand-alone GUI. The default setting is to show the last five runs of a job. To change how many runs of a job are displayed in the web-based GUI, you have to use stand-alone GUI and do the following steps. Start the stand-alone GUI and in the navigation pane, go to **Administrative Services** → **Configuration** and click **Log File and Cached Batch Report Retention** (Figure 3-172 on page 232).

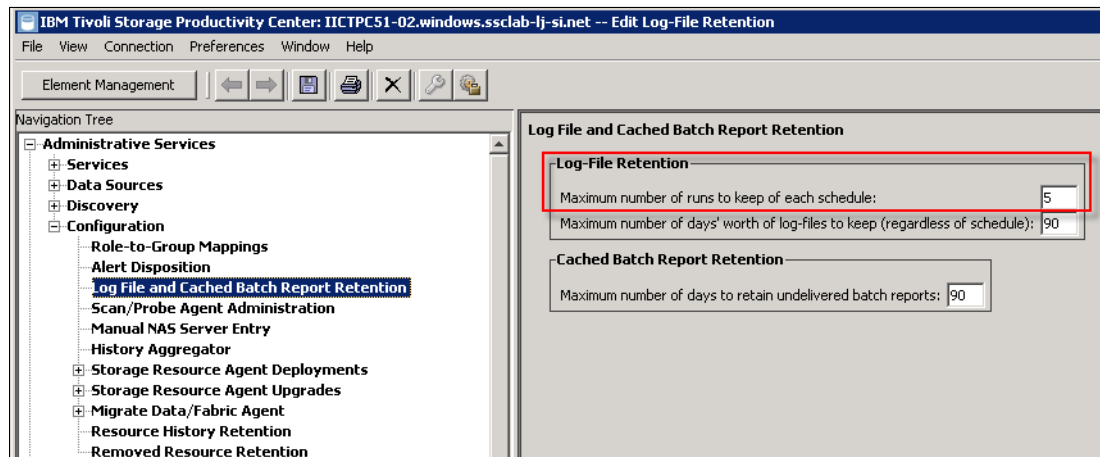


Figure 3-172 Stand-alone GUI: Jobs display setup

In the “Maximum number of runs to keep of each schedule” field, enter the maximum number of runs for a job (schedule) that you want to display in the web-based GUI and save the changes.

After you update the value for “Maximum number of runs to keep of each schedule” in the stand-alone GUI, the list of jobs on the Jobs page in the web-based GUI is automatically updated within a few minutes.

If you have some resources that are removed and that are no longer monitored by Tivoli Storage Productivity Center, their jobs will still be shown in the web-based GUI. By using the stand-alone GUI, you can set up for how long its related jobs are shown in the web-based GUI. The default setting for retaining job information about removed resources is two weeks. To change that value you have to do the following steps. Start the stand-alone GUI and in the navigation pane, go to **Administrative Services** → **Configuration** and click **Removed Resource Retention** (Figure 3-173).

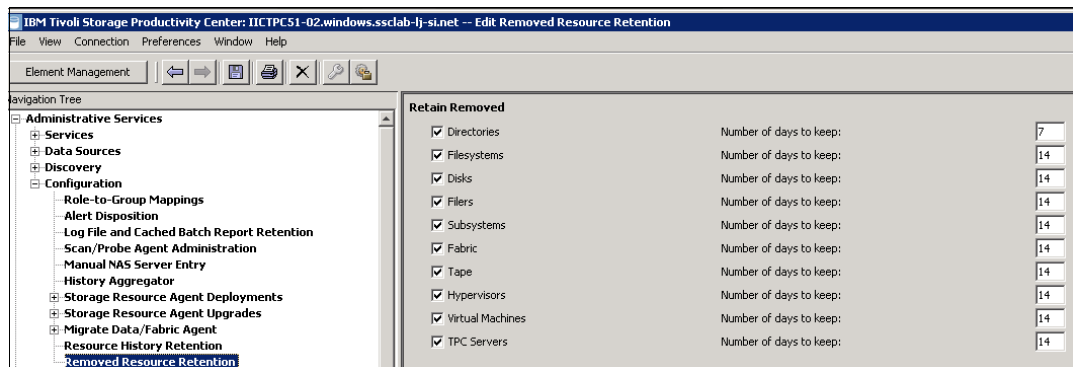


Figure 3-173 Stand-alone GUI: Jobs display setup

Select a resource and enter the number of days to retain information after it is no longer monitored by Tivoli Storage Productivity Center, and save the changes. After you change the retention settings in the stand-alone GUI, the list of jobs on the Jobs page in the web-based GUI is automatically updated within a few minutes.

Job information is available in the web-based GUI in different locations. You can view the job information in the following locations:

- Dashboard

- ▶ Jobs page (jobs and performance monitors)
- ▶ Resource pane (storage, servers, hypervisors, fabrics, switches)

### View Jobs in Dashboard

When you start your web-based GUI, the dashboard opens where in the main window you see the “Recent Jobs” carousel, which contains informations about the recent jobs (Figure 3-174). By clicking the ◀ or ▶, the “Recent Jobs” carousel cycles and it shows you job informations in the last hour, last day, and last week.

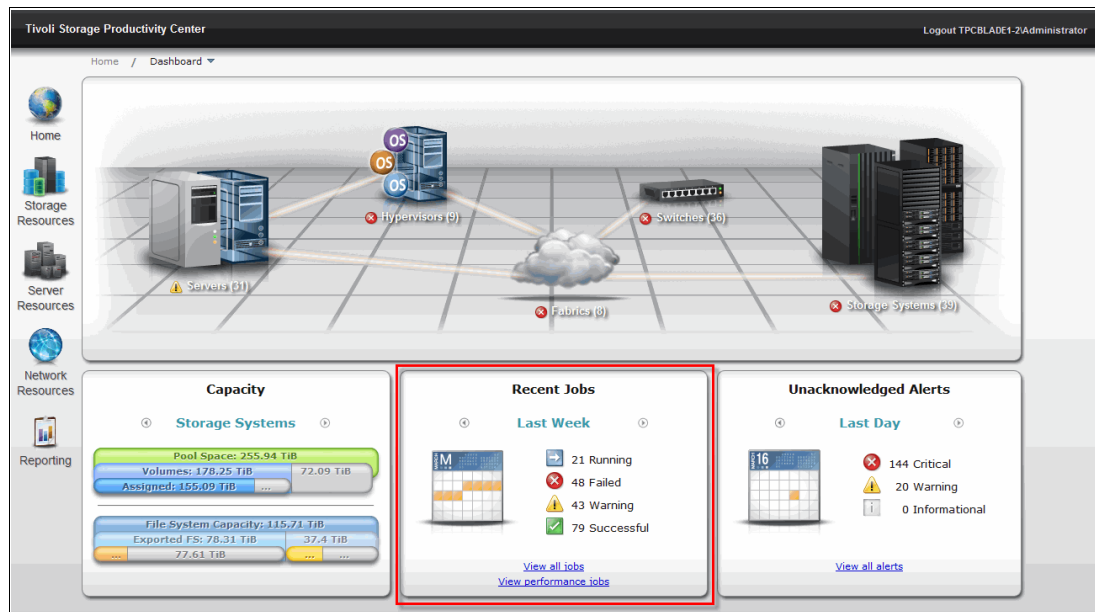


Figure 3-174 Recent Jobs status

The information that you see in the “Recent Jobs” carousel is summary, which includes the number of jobs that have the following statuses:

- ▶ Running: The number of jobs that are currently running
- ▶ Failed: The number of jobs that encountered error conditions during processing and did not complete monitoring actions
- ▶ Warning: The number of jobs that encountered warning conditions during processing, but still completed monitoring actions
- ▶ Successful: The number of jobs that completed monitoring actions and encountered no warning or error conditions

**Note:** The Recent Jobs carousel does not show Scheduled and Disabled jobs status.

If you click the links in the “Recent Jobs” carousel **View all jobs** or **View performance jobs**, it opens the Jobs page as shown in Figure 3-176 on page 234. The Jobs page can be also opened from the navigation pane, as shown in Figure 3-175 on page 234.

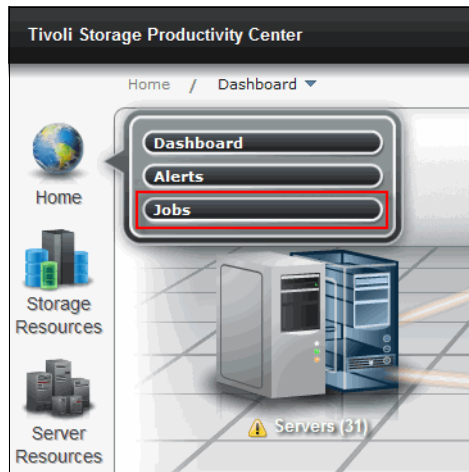


Figure 3-175 Web-based GUI: Jobs page open

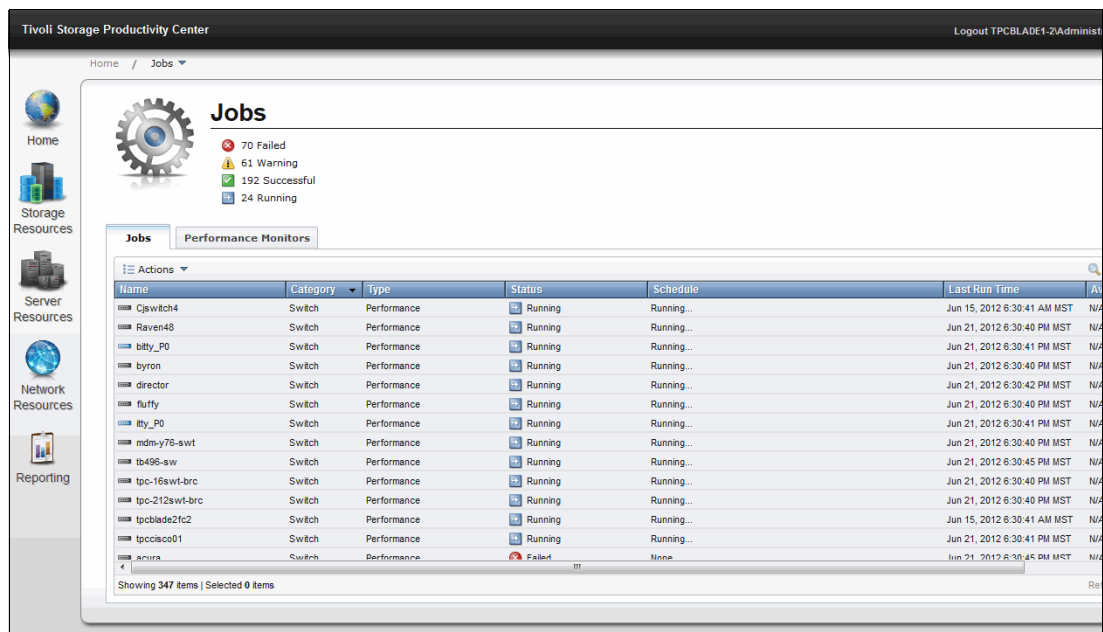


Figure 3-176 Web-based GUI: Jobs tab

### View Jobs page

The Jobs page as shown in Figure 3-176 is a central location to view and manage all the jobs that Tivoli Storage Productivity Center is using to monitor resources. You can view all data collection jobs for resources, including performance monitors in the Jobs tab. The Performance Monitors tab is a refinement and showing only performance monitors jobs.

The icons at the top of the page show you a summary of the statuses for all jobs (Figure 3-177). This summary includes the number of jobs that have a Failed, Warning, Successful, Running, Scheduled, and Disabled status. If you switch between the Jobs tab and Performance Monitors tab, you will always see the summary of all jobs.

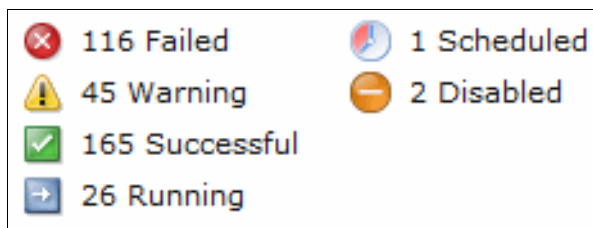


Figure 3-177 Jobs status

**Note:** Performance Monitor jobs can have the “Canceled” status and they are not shown in the Job status summary. The “Canceled” status means that the job is no longer being monitored.

The information in the Jobs tab is organized into columns. These columns include:

- ▶ Type of the jobs
- ▶ Information about the status of jobs
- ▶ The names of resources that are associated with jobs and category
- ▶ The schedule for jobs
- ▶ The last run time
- ▶ The average duration
- ▶ Links to job logs

The Performance Monitors tab in Figure 3-178 on page 236 shows you information about performance monitor jobs. The Performance Monitor jobs collect performance statistics about storage systems and switches. The information about performance monitors is organized into columns. These columns include:

- ▶ Information about the status of jobs
- ▶ The name of the storage systems or switches that are monitored
- ▶ The most recent success percentage and collection attempt
- ▶ The number of failed collections
- ▶ Links to job logs

T

The screenshot shows the Tivoli Storage Productivity Center Web-based GUI. The top navigation bar includes 'Home' and 'Jobs'. The left sidebar contains icons for 'Home', 'Storage Resources', 'Server Resources', 'Network Resources', and 'Reporting'. The main content area is titled 'Jobs' and displays a summary of job status: 70 Failed, 62 Warning, 192 Successful, and 23 Running. Below this, the 'Performance Monitors' tab is active, showing a table of performance monitors.

Name	Monitor Status	Last Day Success Perc...	Last Successful Collection Attempt
DS6000-1750-13AB1WA-IBM	Cancelled	100	Jun 15, 2012 6:15:00 AM MST
DS6000-1750-13AAD1A-IBM	Cancelled	100	Jun 15, 2012 6:15:00 AM MST
DS4000-tb616-60080E500017CC2...	Cancelled	100	Jun 15, 2012 6:15:00 AM MST
AMS200@9.11.125.160	Cancelled	33	None
tpccisco01	Running	100	Jun 25, 2012 5:00:00 PM MST
tpcblade2fc2	Running	100	Jun 25, 2012 5:00:00 PM MST
tpc-212swt-brc	Running	100	Jun 25, 2012 5:00:00 PM MST
tpc-16swt-brc	Running	100	Jun 25, 2012 5:00:00 PM MST
tb496-sw	Running	100	Jun 25, 2012 5:00:00 PM MST
mdm-y76-sw	Running	100	Jun 25, 2012 5:00:00 PM MST
ity_P0	Running	100	Jun 25, 2012 5:00:00 PM MST
fluffy	Running	100	Jun 25, 2012 5:00:00 PM MST
director	Running	100	Jun 25, 2012 5:00:00 PM MST
huron	Running	100	Jun 25, 2012 5:00:00 PM MST

Figure 3-178 Web-based GUI: Performance Monitors tab

Both the Jobs and Performance Monitors tables can be modified as described in 3.2.3, “Major web-based GUI elements” on page 126.

### View jobs in Resource pane

You can use resource list pages to view only the jobs for a specific type of top-level resource. Each resource list page (storage, server, network) has a Jobs tab that lists only the jobs for monitored resources (storage systems, servers, hypervisors, switches, or fabrics). For example, if you want to view only the jobs that are associated with storage systems, you have to use the list page for storage systems. In the navigation pane, select the path **Storage Resources** → **Storage Systems** (Figure 3-179 on page 237).

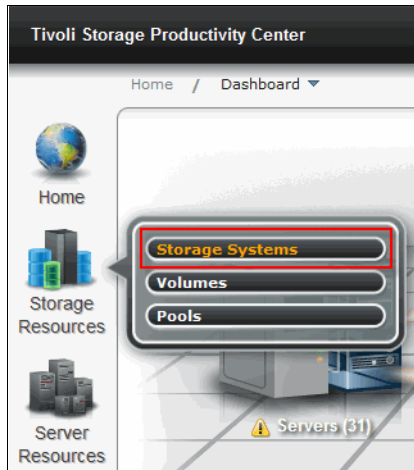


Figure 3-179 Storage Resources: Storage Systems

In the Storage Systems pane, click the **Jobs** tab (Figure 3-180) and you will see all jobs that are related to Storage Systems (Figure 3-181 on page 238).



Figure 3-180 Storage Systems: Jobs tab

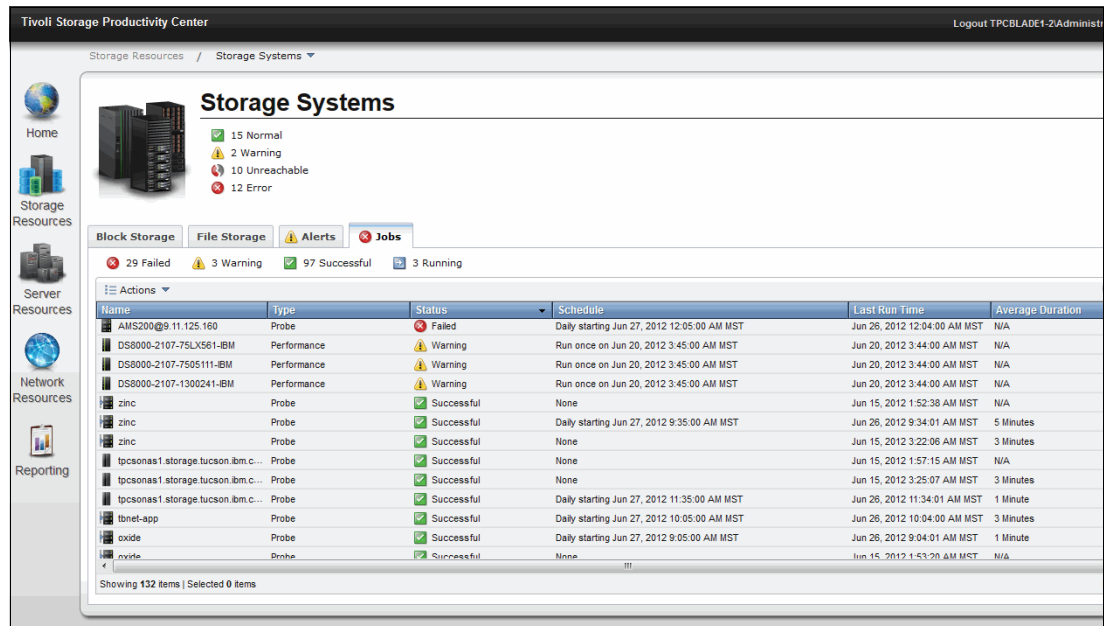


Figure 3-181 Storage Systems: Jobs pane

You can use the same steps if you want to see server or network resources jobs.

If you want to view the jobs for a specific resource within one resource type, you can open the resource details page, which has a Jobs tab. For example, if you want to view only the jobs for a specific switch in the navigation pane, select **Network Resources** → **Switches** (Figure 3-182).

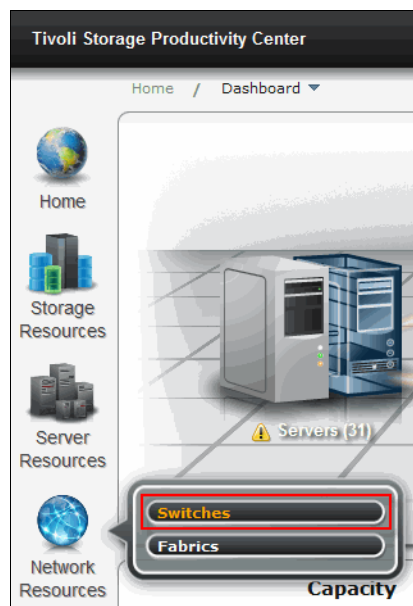


Figure 3-182 Network Resources: Switches

In the Switches pane, select the switch for which you want to view jobs and right-click it and select View Details (Figure 3-183 on page 239).



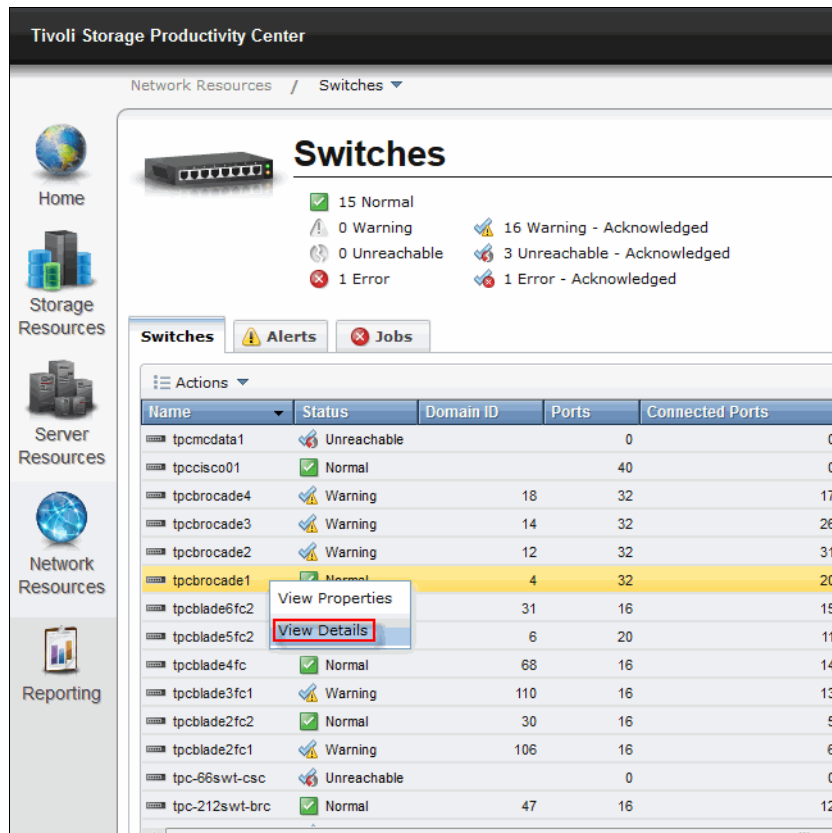


Figure 3-183 Switch: View Details

It will open the switch overview pane where you select Jobs in the General section (Figure 3-184).

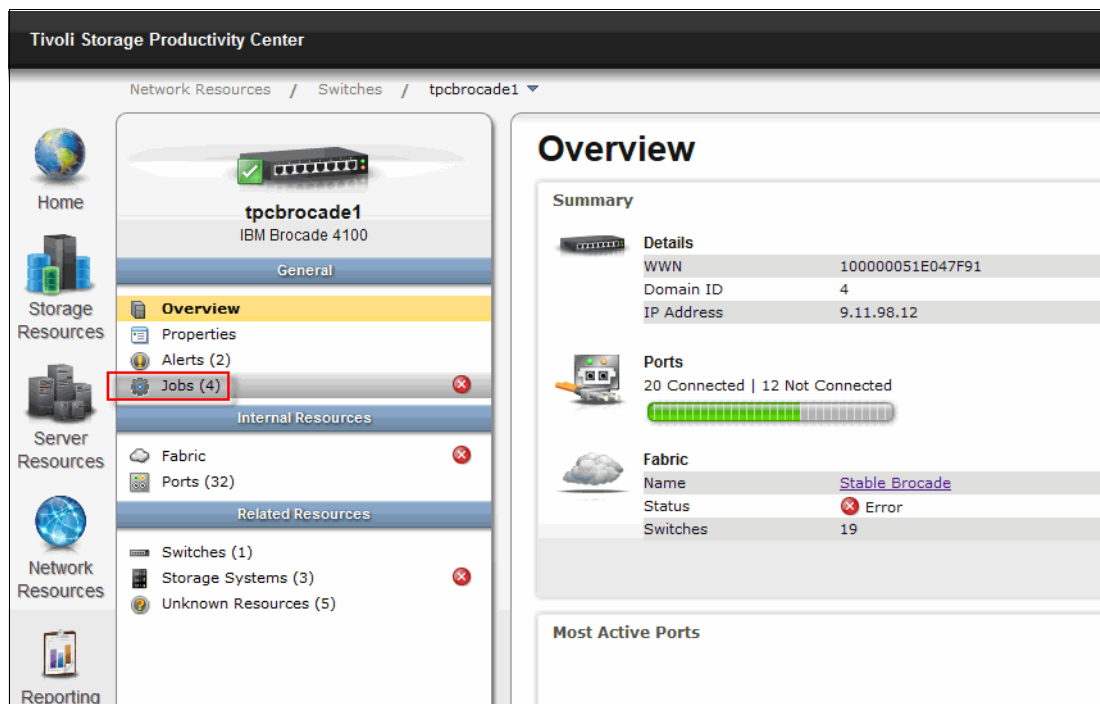


Figure 3-184 Jobs selection for a specific resource

After you click the Jobs link, you will see in the Jobs pane all the jobs that are related to a specific resource (Figure 3-185).

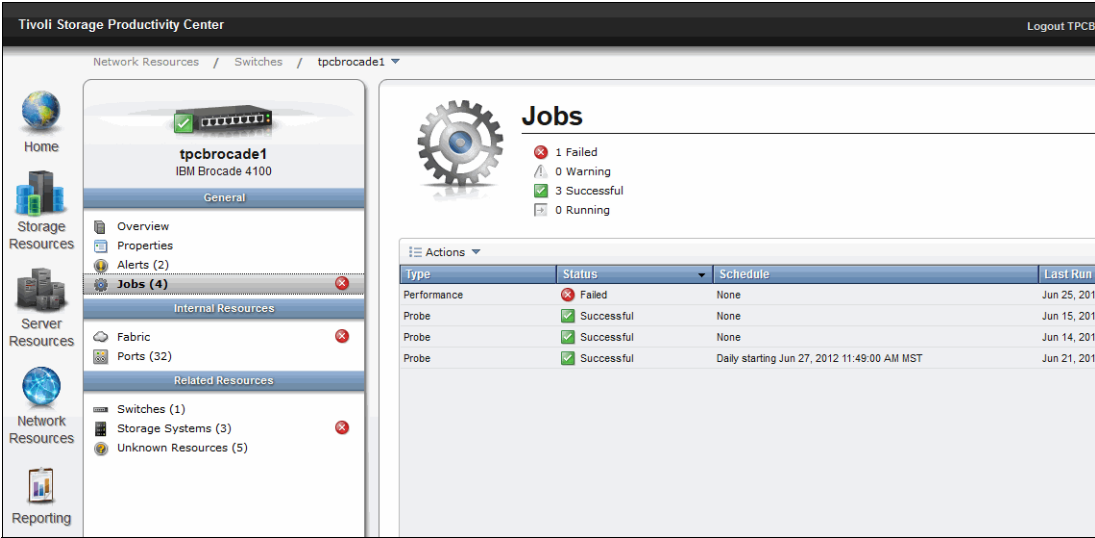


Figure 3-185 Jobs for a selected resource

The icons at the top of the page show you a summary of the statuses for jobs. This summary includes the number of jobs that have a Failed, Warning, Successful, or Running status.

**Viewing job logs**

If multiple resources are included in the same data collection job, a separate row for each resource is shown in the list of jobs in web-based GUI. For example, Figure 3-186 on page 241 shows you servers that are monitored by the same probe. A row for each server is shown in the list.

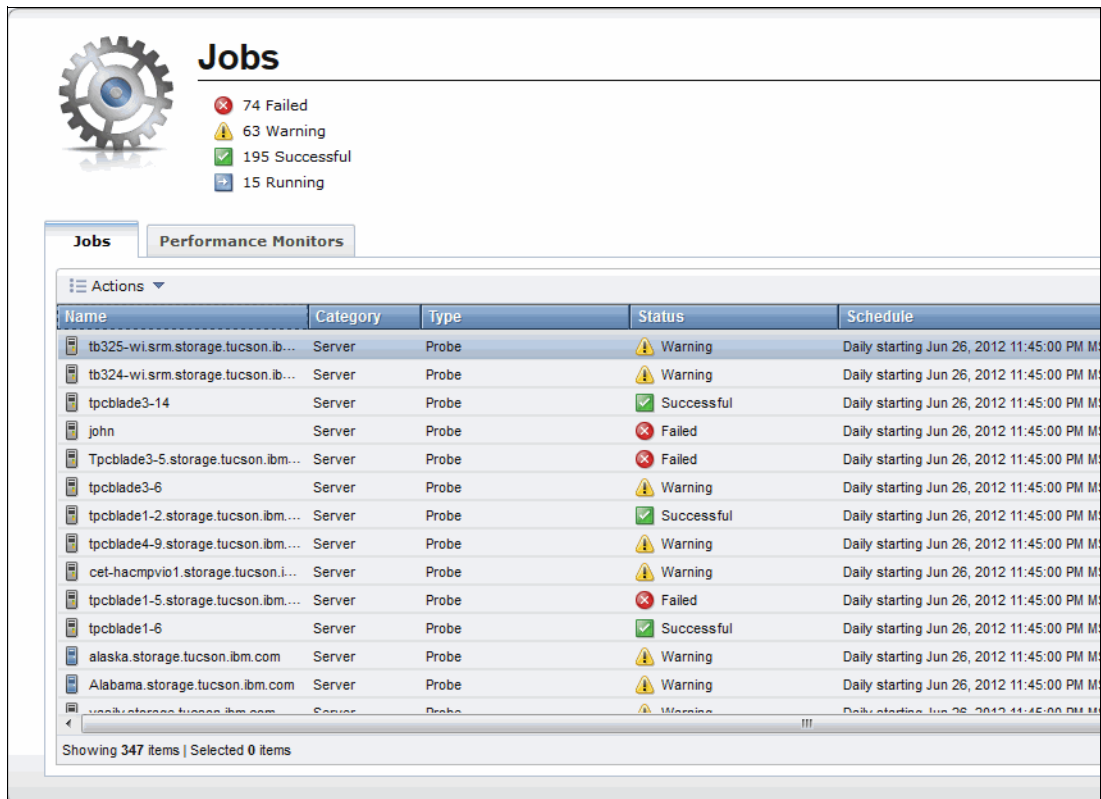


Figure 3-186 Probe job: One row per device in web-based GUI

To view the individual job runs you have to open the **View Logs** link from the Jobs pane. If the View Logs link is not visible, move the pane to the left and you will see the last column called “Logs” (Figure 3-187). Click the link and a new page with logs will open (Figure 3-188 on page 242).

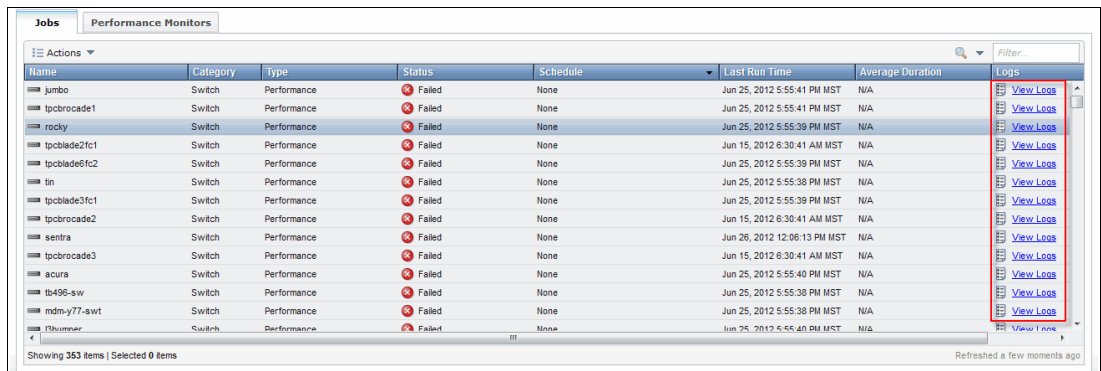


Figure 3-187 View Logs link in web-based GUI


















Logs			
Job Type: Probe Resource: cet-hacmpvio1.storage.tucson.ibm.com			
Select a log: ⚠ Run 45: Jun 25, 2012 11:37:04 PM MST - Jun 25, 2012 11:37:52 PM MST ▼			
Show all ▼			
Status	Date and Time	ID	Description
 Information	Jun 26, 2012 1:37:04.000 AM MST	<a href="#">STA0113I</a>	Probe started
 Information	Jun 26, 2012 1:37:10.000 AM MST	<a href="#">STA0200I</a>	Disk /dev/hdisk14 appears foreign.
 Information	Jun 26, 2012 1:37:10.000 AM MST	<a href="#">STA0200I</a>	Disk /dev/hdisk13 appears foreign.
 Information	Jun 26, 2012 1:37:10.000 AM MST	<a href="#">STA0200I</a>	Disk /dev/hdisk3 appears foreign.
 Information	Jun 26, 2012 1:37:19.000 AM MST	<a href="#">STA0395I</a>	HBAInfo Started
 Information	Jun 26, 2012 1:37:19.000 AM MST	<a href="#">STA0397I</a>	Number of HBA adapters found for this host: 1
 Information	Jun 26, 2012 1:37:19.000 AM MST	<a href="#">STA0396I</a>	HBAInfo Completed
 Information	Jun 26, 2012 1:37:19.000 AM MST	<a href="#">AGT0429I</a>	Process FabricDiscovery invoked with command line arguments /opt/IBM/SRA/ciprian_tpcblade1-2/agent/bin/FabricDiscovery -serverName tpcblade1-2.storage.tucson.ibm.com -logname /opt/SRA/ciprian_tpcblade1-2/agent/log/tpcblade1-2.storage.tucson.ibm.com/TPCUser.Probe.0045_probe.00034988.log -debug MID
 Information	Jun 26, 2012 1:37:19.000 AM MST	<a href="#">AGT0416I</a>	Number of HBA adapters on the system: 1
 Information	Jun 26, 2012 1:37:19.000 AM MST	<a href="#">AGT0417I</a>	Adapter 0 connected to switch fabric
 Information	Jun 26, 2012 1:37:49.000 AM MST	<a href="#">AGT0423I</a>	GIEL command on switch fabric failed, reason: 0, explanation: 0
 Information	Jun 26, 2012 1:37:49.000 AM MST	<a href="#">AGT0420I</a>	There are no adapters connected to switch fabric
 Information	Jun 26, 2012 1:37:49.000 AM MST	<a href="#">AGT0447I</a>	Fabric discovery did not find switch fabric
 Warning	Jun 26, 2012 1:37:52.000 AM MST	<a href="#">STA0115W</a>	Cannot connect to mountd to list exports: RPC: 1832-019 Program not registered
 Information	Jun 26, 2012 1:37:52.000 AM MST	<a href="#">STA0110I</a>	Probe completed with warnings
 Information	Jun 26, 2012 1:37:52.000 AM MST	<a href="#">STA0249I</a>	Sending results to server
 Information	Jun 26, 2012 1:38:00.000 AM MST	<a href="#">STA0250I</a>	Server saved results

Figure 3-188 Web-based GUI Logs page

The information about the Logs page is automatically updated every 30 seconds and new entries are added to the end of the log. As you can see in Figure 3-188, the Logs page shows you the following information:

- ▶ The overall status of a job (an icon that is shown in the “Select a log” list represents the most critical status that was generated by an action in the job)
- ▶ The status for each action in a job (an icon and type of status is shown in the Status column for each action)
- ▶ The date and time when an action was completed
- ▶ The ID of the message that is associated with an action
- ▶ A description of an action

By default, the most recent job is shown in the Logs page. If you want to view the previous job runs, click the pull-down menu in the “Select a log” list and select the log that you want. Figure 3-189 on page 243 shows you how to select a log.

Logs			
Job Type: Probe Resource: cet-hacmpvio1.storage.tucson.ibm.com			
Select a log: ⚠ Run 45: Jun 25, 2012 11:37:04 PM MST - Jun 25, 2012 11:37:52 PM MST			
Show all			
Status	Description		
⚠	Run 45: Jun 25, 2012 11:37:04 PM MST - Jun 25, 2012 11:37:52 PM MST		
⚠	Run 44: Jun 24, 2012 11:37:04 PM MST - Jun 24, 2012 11:37:52 PM MST		
⚠	Run 43: Jun 23, 2012 11:37:09 PM MST - Jun 23, 2012 11:37:53 PM MST	113I	Probe started
i	Run 42: Jun 22, 2012 11:37:08 PM MST - Jun 22, 2012 11:37:54 PM MST	200I	Disk /dev/hdisk14 ap
i	Run 41: Jun 21, 2012 11:37:08 PM MST - Jun 21, 2012 11:37:51 PM MST	200I	Disk /dev/hdisk13 ap
i		200I	Disk /dev/hdisk3 app
i	Information	Jun 26, 2012 1:37:19.000 AM MST	STA0395I HBAInfo Started
i	Information	Jun 26, 2012 1:37:19.000 AM MST	STA0397I Number of HBA adapt
i	Information	Jun 26, 2012 1:37:19.000 AM MST	STA0396I HBAInfo Completed
i	Information	Jun 26, 2012 1:37:19.000 AM MST	AGT0429I Process FabricDiscov
			arguments /opt/IBM/t
			/bin/FabricDiscovery
			tpcblade1-2.storage.t
			/SRA/ciprian_tpcblad
			/log/tpcblade1-2.stor
			Probe.0045_probe.00
i	Information	Jun 26, 2012 1:37:19.000 AM MST	AGT0416I Number of HBA adapt
i	Information	Jun 26, 2012 1:37:19.000 AM MST	AGT0417I Adapter 0 connected
i	Information	Jun 26, 2012 1:37:49.000 AM MST	AGT0423I GIEL command on sw
			explanation: 0
i	Information	Jun 26, 2012 1:37:49.000 AM MST	AGT0420I There are no adapter
i	Information	Jun 26, 2012 1:37:49.000 AM MST	AGT0447I Fabric discovery did r
⚠	Warning	Jun 26, 2012 1:37:52.000 AM MST	STA0115W Cannot connect to m
			RPC: 1832-019 Progr
i	Information	Jun 26, 2012 1:37:52.000 AM MST	STA0110I Probe completed with
i	Information	Jun 26, 2012 1:37:52.000 AM MST	STA0249I Sending results to ser
i	Information	Jun 26, 2012 1:38:00.000 AM MST	STA0250I Server saved results

Figure 3-189 Select a log

### Jobs details

The Jobs page shows you the status and details of the most recent run of a job. The following status might be displayed:

- ▶ **Running:** The job is currently running
- ▶ **Failed:** The job encountered error conditions during processing and did not complete the monitoring action
- ▶ **Warning:** The job encountered warning conditions during processing, but still completed the monitoring action
- ▶ **Successful:** The job completed the monitoring action and encountered no warning or error conditions
- ▶ **Scheduled:** The job is scheduled to run but has not started
- ▶ **Disabled:** The job is scheduled but will not run. You must enable the job before it can be run

If the status of the job is *scheduled*, that means that the job is scheduled to run but has not started. This is true only for the jobs that are started for the first time. If the job has already been started and if it has been finished, even if it is scheduled for the next run, its status will be the latest finished status. Figure 3-190 on page 244 shows you the scheduled jobs in stand-alone GUI. The job “Stable ESS” is started for the first time, and the job “Stable Brocade” was started before and is scheduled to run again.

Schedules						
View Detail		Run Now	Refresh	Select Action		
Creator	Name	Description	Job Type	Last Run Finished	Last Run St...	
administr...	Stable Brocade	Stable Brocade	Probe	Jun 27, 2012 2:41:50 P...	Success	Jun 27, 2012 4:00
administr...	Stable ESS	ESS	Probe			Jun 27, 2012 4:00

Figure 3-190 Scheduled jobs in stand-alone GUI

For those scheduled jobs you will see in the web-based GUI different statuses, as shown in Figure 3-191 and Figure 3-192.

Jobs					
Performance Monitors					
Actions					
Name	Category	Type	Status	Schedule	
ESS-2105-18596-IBM	Storage System	Probe	Scheduled	Run once on Jun 27, 2012 4:00:00 PM MST	
ESS-2105-18597-IBM	Storage System	Probe	Scheduled	Run once on Jun 27, 2012 4:00:00 PM MST	

Figure 3-191 Scheduled jobs for the first time

Jobs					
Performance Monitors					
Actions					
Name	Category	Type	Status	Schedule	
Stable Brocade	Fabric	Probe	Successful	None	
Stable Brocade	Fabric	Probe	Successful	None	
Stable Brocade	Fabric	Probe	Successful	Daily starting Jun 28, 2012 11:49:00 AM MST	
Stable Brocade	Fabric	Probe	Successful	Run once on Jun 27, 2012 4:00:00 PM MST	

Figure 3-192 Scheduled jobs that were run before

If multiple resources are included in the same job, a separate row for each resource is shown in the list of jobs. For example, if five storage systems are monitored by the same probe, a row for each storage system is shown in the list. There is an exception for fabric jobs. Probes that collect data about multiple fabrics are not shown in the list. Only probes that collect data about one fabric are shown. For example, if five fabrics are monitored by the same probe, there is no entry for the probe or fabrics in the list. If one fabric is monitored by a probe, a row for the fabric is shown. Fabric jobs with multiple fabrics in it will not show due to single log files being written for all fabrics in the job schedule.

Figure 3-193 shows you a fabric probe job for multiple fabrics, which is created in stand-alone GUI.

Schedules						
View Detail		Run Now	Refresh	Select Action		
Creator	Name	Description	Job Type	Last Run Finished	Last Run St...	
administr...	Fabric 1	Fabric all	Probe		Running	On Demand
Jobs for Selected Schedule						
View Log File(s)		Only show jobs with status Show All				
Run	Computer	Device	Status	Start Time	Finis	
1 - Jun 27, 2012 1:32:17 PM MST						
2 - Jun 27, 2012 1:43:39 PM MST						
3 - Jun 27, 2012 1:49:26 PM MST						
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	The job is running	Jun 27, 2012 1:49:26 PM MST		
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	The job is running	Jun 27, 2012 1:49:26 PM MST		

Figure 3-193 Multiple fabrics probe job

After the job finished, you will see its status in stand-alone GUI, as shown in Figure 3-194, but the web-based GUI will not show the fabric probe with multiple fabrics, as you can see in Figure 3-195.

Schedules

View Detail

Run Now

Refresh

Select Action

Creator	Name	Description	Job Type	Last Run Finished	Last Run St...	
administra...	Fabric 1	Fabric all	Probe	Jun 27, 2012 1:51:26 PM...	Warnings	On Dema...

Jobs for Selected Schedule

View Log File(s)

Only show jobs with status

Show

Run	Computer	Device	Status	Start Time
1 - Jun 27, 2012 1:32:17 PM MST				
2 - Jun 27, 2012 1:43:39 PM MST				
3 - Jun 27, 2012 1:49:26 PM MST				
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed successfully	Jun 27, 2012 1:51:00 PM MST
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed with warning...	Jun 27, 2012 1:49:26 PM MST
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed successfully	Jun 27, 2012 1:51:00 PM MST
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed successfully	Jun 27, 2012 1:50:55 PM MST
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed successfully	Jun 27, 2012 1:50:55 PM MST
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed with warning...	Jun 27, 2012 1:49:26 PM MST
3 - Jun 27, 2012 1:49:26 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	Completed with error(s)	Jun 27, 2012 1:51:03 PM MST

Figure 3-194 Multiple fabrics probe job finished

Jobs

Performance Monitors

Actions

Name	Category	Type	Status	Schedule
Stable Brocade	Fabric	Probe	Successful	None
Stable Brocade	Fabric	Probe	Successful	None
Stable Brocade	Fabric	Probe	Successful	Daily starting Jun 28, 2012 11:49:00 AM M...
Stable Brocade	Fabric	Probe	Successful	None

Figure 3-195 Web-based GUI showing finished fabrics probe jobs

If you create the probe that collects data about one fabric as shown in Figure 3-196, you will see it in the web-based GUI. Figure 3-197 on page 246 shows you web-based GUI with a fabric probe running job that includes only one fabric.

Schedules

View Detail

Run Now

Refresh

Select Action

Creator	Name	Description	Job Type	Last Run Finished	Last Run St...	
administra...	Stable Brocade	Stable Brocade	Probe		Running	On Dema...

Jobs for Selected Schedule

View Log File(s)

Only show jobs with status

Show

Run	Computer	Device	Status	Start Time
1 - Jun 27, 2012 1:30:02 PM MST				
2 - Jun 27, 2012 2:11:45 PM MST				
2 - Jun 27, 2012 2:11:45 PM MST	tpcblade1-2.storage.tucson.ibm.com	N/A	The job is running	Jun 27, 2012 2:11:45 PM MST
2 - Jun 27, 2012 2:11:45 PM MST	tpcblade1-2.storage.tucson.ibm.com	Stable Brocade	The job is running	Jun 27, 2012 2:11:45 PM MST

Figure 3-196 Stand-alone GUI: One fabric in a probe job

Jobs

Performance Monitors

Actions

Name	Category	Type	Status	Schedule	
stable_Brocade	Fabric	Probe	Running	Running...	J
stable_Brocade	Fabric	Probe	Successful	None	J
stable_Brocade	Fabric	Probe	Successful	None	J
stable_Brocade	Fabric	Probe	Successful	Daily starting Jun 28, 2012 11:49:00 AM M...	J

Figure 3-197 Web-based GUI: One fabric in a probe job

If you have a disabled job due to some reasons, it will be shown in web-based GUI as disabled. Figure 3-198 shows you a disabled job.

Jobs

Performance Monitors

Actions

Name

Category

Type

Status

Schedule

Stable Brocade

Fabric

Probe

Disabled

None

Figure 3-198 Disabled job in web-based GUI

### Performance monitors details

Performance monitors jobs are available under the Jobs tab and Performance Monitors tab. We would recommend using Performance Monitors tab for performance monitors jobs as the information shown on the Performance Monitors tab differs from the same jobs on the Jobs tab. This is due to obtaining the information in different places. The Jobs tab information is obtained from the Tivoli Storage Productivity Center database repository while the Performance Monitors tab obtains information from the Performance Monitors APIs.

**Note:** The icons at the top of the Jobs page show you the summary status of all jobs. This summary includes the number of jobs that have a Failed, Warning, Successful, or Running status. If you switch between the Jobs tab and Performance Monitors tab, the status will remain and show you the statuses for all jobs including performance jobs.

For example, if you check the status of your performance monitor job in the Jobs tab it will show you the status “Warning”, while the same job in the Performance Monitors tab will have the status “Running with warnings”. Figure 3-199 and Figure 3-200 on page 247 show you the same performance jobs in the Jobs tab and in Performance Monitors tab.

**Note:** Performance monitors jobs can run with warnings while for example probe jobs can have the “Warning” status, but it means that the job encountered warning conditions during processing, but still completed the monitoring action.

Jobs

Performance Monitors

Actions

Name	Category	Type	Status	Schedule
DS8000-2107-1300241-IBM	Storage System	Performance	Warning	None
DS8000-2107-1300361-IBM	Storage System	Performance	Warning	None
DS8000-2107-1302541-IBM	Storage System	Performance	Warning	None
DS8000-2107-7505111-IBM	Storage System	Performance	Warning	None
DS8000-2107-75LX561-IBM	Storage System	Performance	Warning	None

Figure 3-199 Performance monitors in the Jobs tab



Jobs

Performance Monitors

Actions











Name	Monitor Status	Last Day Success Perc...	Last Successful Collection Attempt	Last Statist
 DS8000-2107-1300241-IBM	 Running with warnings	0	None	
 DS8000-2107-1300361-IBM	 Running with warnings	0	None	
 DS8000-2107-1302541-IBM	 Running with warnings	0	None	
 DS8000-2107-7505111-IBM	 Running with warnings	0	None	
 DS8000-2107-75LX561-IBM	 Running with warnings	0	None	

Figure 3-200 Performance monitors in Performance Monitors tab

The following Monitor Status in the Performance Monitors tab might be displayed in this column:

- ▶ **Starting:** The job is starting
- ▶ **Running:** The job is running
- ▶ **Running with warnings:** The job is running, but encountered warning conditions during processing. Check the job log to view the warning messages
- ▶ **Stopping:** The job is stopping
- ▶ **Completed:** The job completed the monitoring action
- ▶ **Completed with warnings:** The job completed the monitoring action, but encountered warning conditions during processing
- ▶ **Failed:** The job encountered error conditions during processing and did not complete the monitoring action
- ▶ **Canceled:** The job is no longer being monitored
- ▶ **Not running:** The job is not running

### 3.3.3 Alerts

Alerts in Tivoli Storage Productivity Center are used to be notified when certain conditions or violations are detected on resources that are monitored. Many conditions can trigger alerts so before you can use the web-based GUI to view and manage the alerts, you need to set up Tivoli Storage Productivity Center that it examines the data about your resources for the conditions that you specified.

To set up Tivoli Storage Productivity Center, you must complete the following tasks in stand-alone GUI:

- ▶ Add resources for monitoring by Tivoli Storage Productivity Center
- ▶ Specify the conditions on the resources that trigger alert notifications
- ▶ Create schedules and collect data about the resources

**Note:** You can find the details about setting up Tivoli Storage Productivity Center alerts in *IBM Tivoli Storage Productivity Center Version 5.1 Installation and Configuration Guide*, SC27-4047, or in the Tivoli Storage Productivity Center information center at the following link:

<http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/index.jsp>

After you set up Tivoli Storage Productivity Center, it will examine the collected data and write an alert to a log when an event occurs. You also can specify that an action is initiated, such as sending an SNMP trap, sending an email, or running a script when the event occurs.

Alerts that are triggered based on the data collected by monitoring jobs (for example, pings, scans, and probes) must be defined before the monitoring jobs are run. Alerts that are triggered based on an external source, such as an SNMP trap, must be defined after the SNMP server is configured properly.

The conditions that trigger alert notifications depend on the type of resource that you are monitoring. Some triggering conditions, like thresholds, require you to enter values for triggering alerts. In general, the following types of conditions can trigger alerts:

- ▶ A data collection schedule did not complete
- ▶ A change occurred in the storage infrastructure
- ▶ A performance threshold was violated

When the alerts are defined, you can use web-based GUI to do the following:

- ▶ View alert conditions that are detected on monitored resources
- ▶ Acknowledge the status of alerts
- ▶ Remove alerts

**Note:** Tivoli Storage Productivity Center for Replication component still has its own database, and Tivoli Storage Productivity Center for Replication entities cannot reference from Tivoli Storage Productivity Center web-based GUI. There are a few exceptions, in which case the replication alert's resource hyperlinks directly to the Tivoli Storage Productivity Center for Replication GUI.

Alert informations are available in different locations in web-based GUI. You can view the alert informations in:

- ▶ Dashboard
- ▶ Alerts page
- ▶ Resource pane (storage, servers, hypervisors, fabrics, switches)

### ***View alerts in dashboard***

When you start your web-based GUI, the dashboard opens where in the main window you see the “Unacknowledged Alerts” carousel, which contains information about the unacknowledged alerts (Figure 3-201 on page 249). By clicking the ◀ or ▶, the carousel cycles and it shows you alerts information in the last hour, last day, and last week.

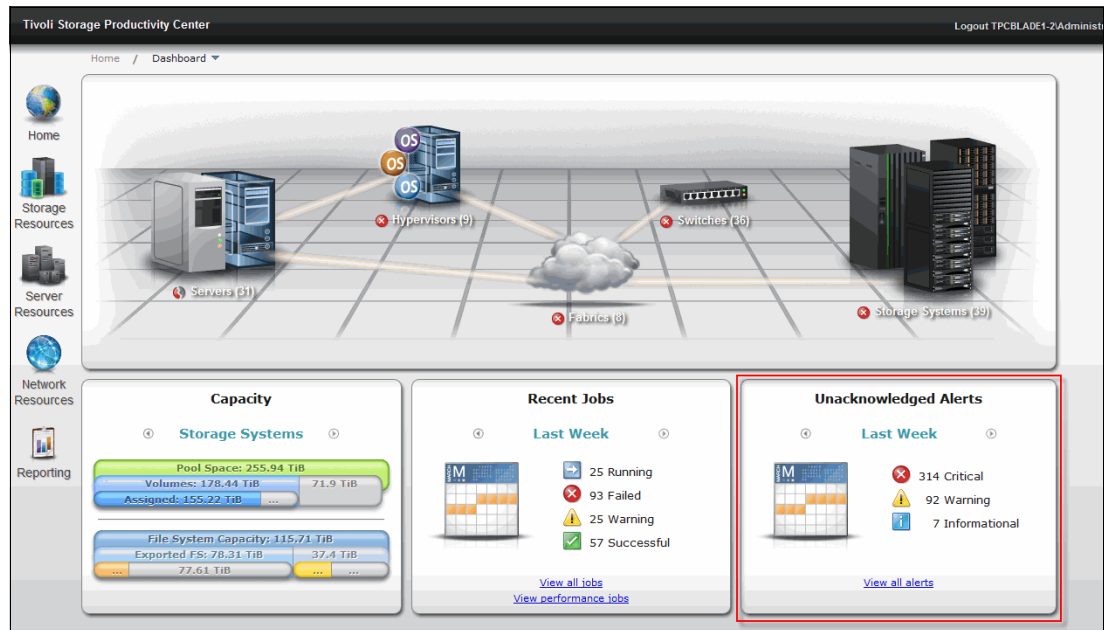


Figure 3-201 Web-based GUI: Alert in Dashboard

The information that you see in the Unacknowledged Alerts carousel is a summary of the unacknowledged alerts that were detected in your environment during a specified time period. The unacknowledged status means that the alert was not reviewed or resolved by a Tivoli Storage Productivity Center user.

**Note:** Acknowledged status indicates that an alert was reviewed and is either resolved or can be ignored. The user who acknowledged the status is being tracked. In the previous versions of Tivoli Storage Productivity Center, alerts could only be cleared.

The summary includes the number of alerts that have the following status or severity:

- ▶ **Critical:** An alert with a Critical severity represents a serious problem on a resource or on its internal resources. These problems should be resolved as soon as possible.
- ▶ **Warning:** An alert with a Warning severity represents potential problems on a resource or on its internal resources. The condition that generated the alert is not critical.
- ▶ **Informational** - An alert with an Informational severity does not represent a problem, but is intended to provide information about actions related to a resource.

### View Alerts page

The Alerts page is a central location to view and manage all alerts that were detected by Tivoli Storage Productivity Center. To open the Alerts page, you can click the **View all alerts** link in the “Unacknowledged Alerts” carousel (Figure 3-201) or go to the navigation pane and click **Home** → **Alerts** (Figure 3-202 on page 250).



Figure 3-202 Open Alerts page

The Alerts page opens as shown in Figure 3-203.

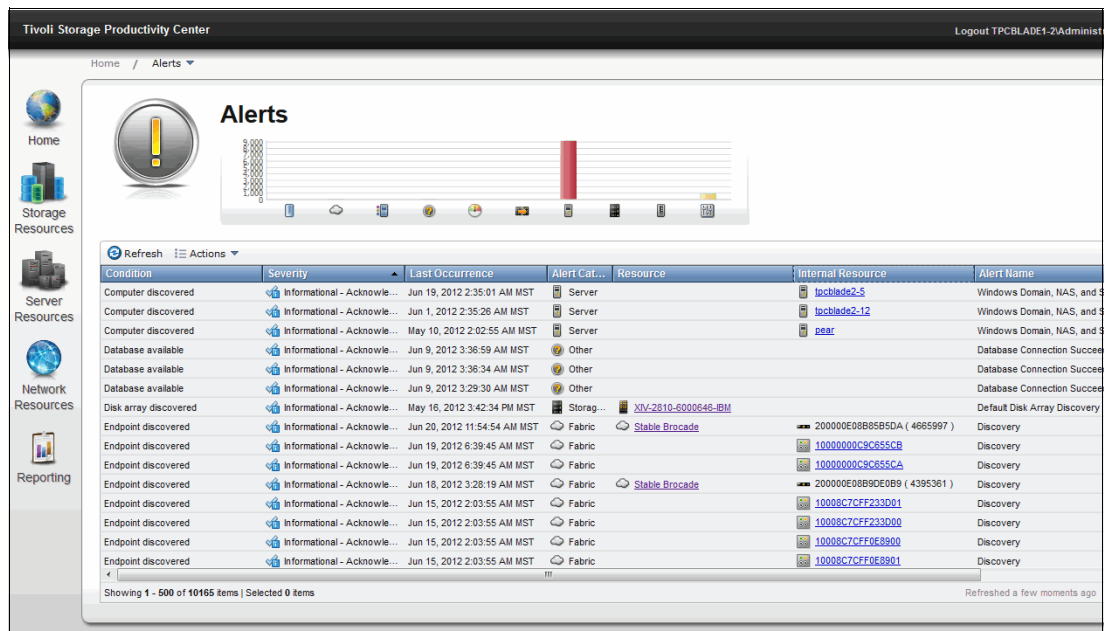


Figure 3-203 Alerts page

The Alerts page is organized in two sections where you can see all alerts for the managed resources. Alerts are displayed in the alerts summary chart (Figure 3-204) and in the alerts list (Figure 3-205 on page 251).

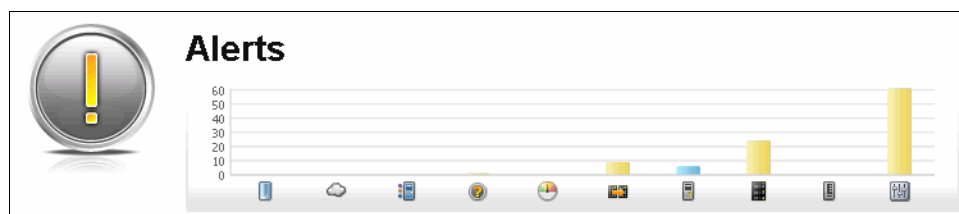


Figure 3-204 Alerts summary chart

Refresh Actions						
Condition	Severity	Last Occurrence	Alert Category	Resource	Internal Resource	
Probe failed	Warning	Jun 13, 2012 7:10:28 AM MST	TPC	XIV-2810-6000646-IBM		
Report failed	Warning	Jun 28, 2012 1:35:01 AM MST	TPC			
Report failed	Warning	Jun 28, 2012 1:34:00 AM MST	TPC			
Report failed	Warning	Jun 27, 2012 1:35:02 AM MST	TPC			
Report failed	Warning	Jun 27, 2012 1:34:03 AM MST	TPC			
Scan failed	Warning	Jun 28, 2012 2:19:12 AM MST	TPC			
Scan failed	Warning	Jun 27, 2012 2:19:08 AM MST	TPC			
Scan failed	Warning	Jun 26, 2012 2:21:24 AM MST	TPC			
Upgrade failed	Warning	Jun 28, 2012 2:44:44 AM MST	TPC			
Computer unreachable	Critical - Acknowledged	Jun 18, 2012 12:23:58 AM MST	Server	Cristina_CRG.tpc_clu...	Cristina_CRG.tpc_cluster2	
Computer unreachable	Critical - Acknowledged	Jun 18, 2012 12:23:58 AM MST	Server	Irina_crg.tpc_cluster2...	Irina_crg.tpc_cluster2.SRM	
Computer unreachable	Critical - Acknowledged	Jun 17, 2012 11:53:55 PM MST	Server	Cristina_CRG.tpc_clu...	Cristina_CRG.tpc_cluster2	
Computer unreachable	Critical - Acknowledged	Jun 17, 2012 11:53:55 PM MST	Server	Irina_crg.tpc_cluster2...	Irina_crg.tpc_cluster2.SRM	
Computer unreachable	Critical - Acknowledged	Jun 17, 2012 11:23:56 PM MST	Server	Cristina_CRG.tpc_clu...	Cristina_CRG.tpc_cluster2	
Computer unreachable	Critical - Acknowledged	Jun 17, 2012 11:23:56 PM MST	Server	Irina_crg.tpc_cluster2...	Irina_crg.tpc_cluster2.SRM	

Showing 1001 - 1500 of 10165 items | Selected 0 items

Figure 3-205 Alerts list

The alerts summary chart is a visual representation of the alerts that were detected on monitored resources. The chart consists of stacked bars with the number and severity of current alerts on the y-axis and the resource type on the x-axis. The y-axis labeling scales dynamically according to the highest number of alerts in any of the categories. If you click the icon in the summary chart that represents the alerts category, the alerts list populates with the information only for that category. If you place the mouse pointer over the icon, you get summary alerts information about that category. Figure 3-206 shows you an example with the Storage System icon.

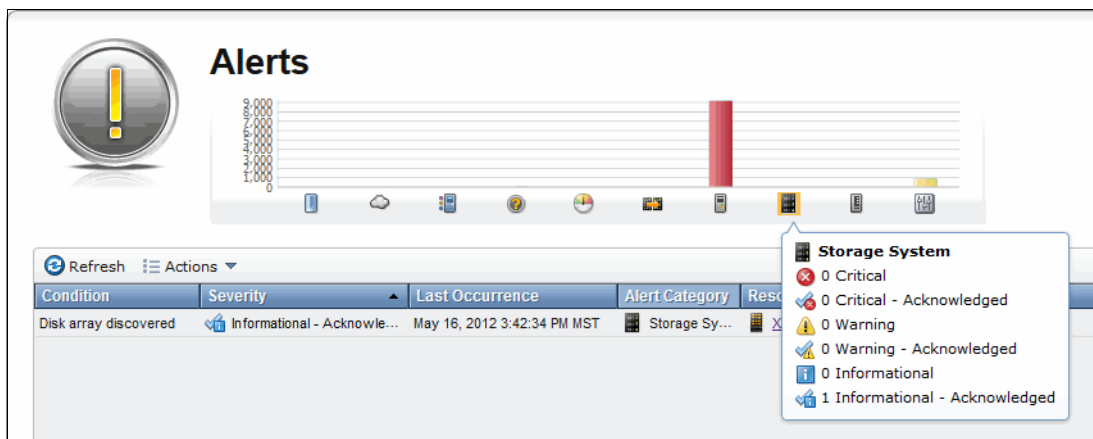


Figure 3-206 Alerts category in summary chart

The alerts list shows information about all the alerts that were detected on monitored resources. Information in the list is organized into columns. These columns include information about the condition that was detected, the severity of the alert, when the alert was detected, and the names of the resources where the alert condition was detected. With the alert list you have ability to filter, sort, and search the data. You will find more details about how to change the tables in the section “Tables” on page 128.

**Note:** The version of Tivoli Storage Productivity Center that detected an alert determines where information about the alert is displayed. Alerts that were generated in Tivoli Storage Productivity Center version 5.1 or later are displayed on the Alerts page and in the Alerts tab on the pages for the related resources. Alerts that were generated in Tivoli Storage Productivity Center versions before 5.1, also called *migrated alerts*, are only displayed on the Alerts page.

### ***View alerts in Resource pane***

You can use resource list pages to view only the alerts for a specific type of top-level resource. Each resource list page (storage, server, network) has an Alerts tab that lists only the alerts for monitored resources (storage systems, servers, hypervisors, switches, or fabrics). For example, if you want to view only the alerts that are associated with storage systems, you have to use the list page for storage systems. In the navigation pane, select **Storage Resources** → **Storage Systems** (Figure 3-207).

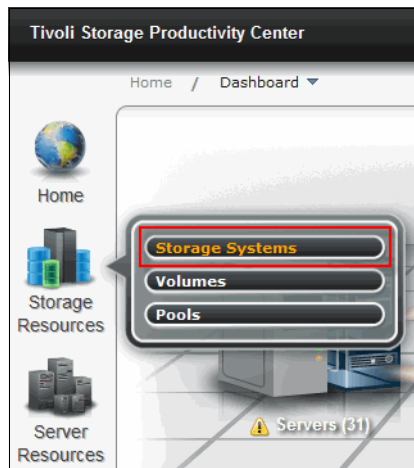


Figure 3-207 Storage Resources: Storage Systems

In the Storage Systems pane, click the **Alerts** tab (Figure 3-208 on page 253) and you will see all alerts that are related to storage systems (Figure 3-209 on page 254).



Figure 3-208 Storage Systems: Alerts tab



Figure 3-209 Storage Systems: Alerts pane

You can use the same steps if you want to see Server or Network Resources alerts.

If you want to view the alerts for a specific resource within one resource type, you can open the resource details page, which has an Alerts tab. For example, if you want to view only the jobs for a specific switch in the navigation pane, select **Network Resources** → **Switches** (Figure 3-210 on page 255).



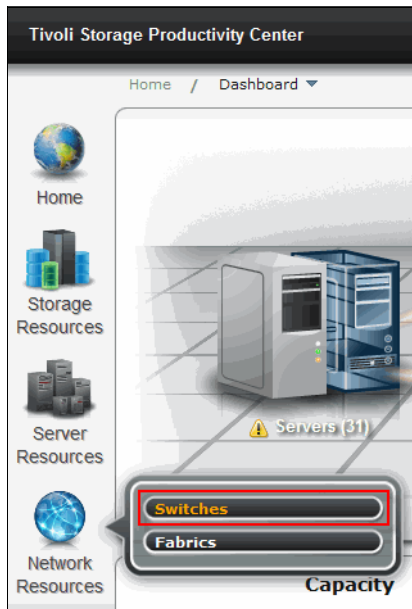


Figure 3-210 Network Resources

In the switches pane, select the switch for which you want to view alerts and right-click it and select **View Details** (Figure 3-211). It opens the switch overview pane where you select **Alerts** in the General section (Figure 3-212 on page 256).

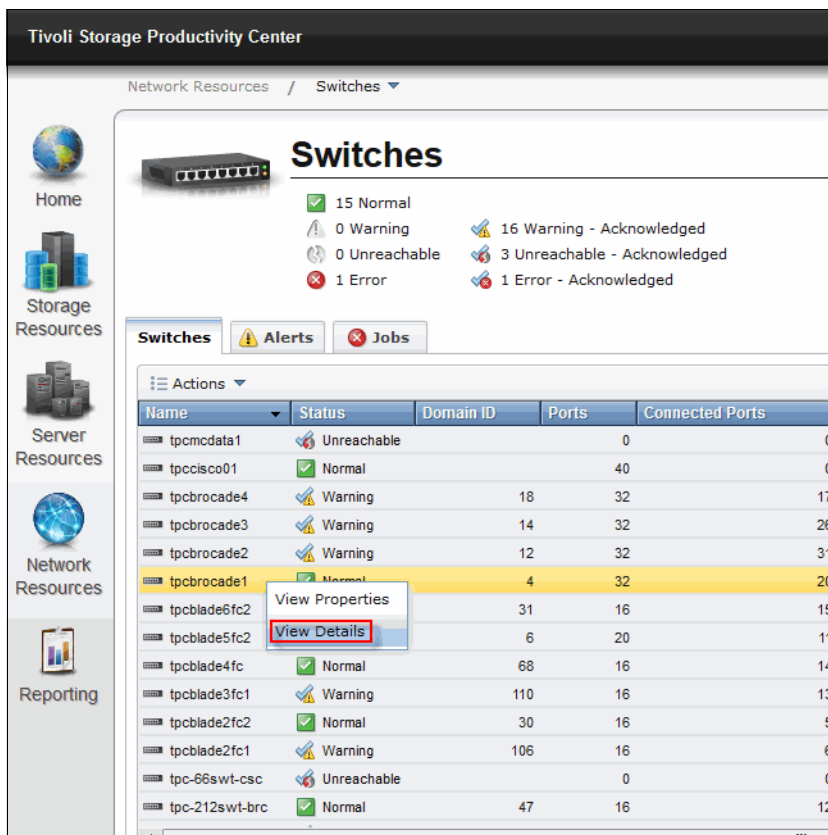


Figure 3-211 Switches details

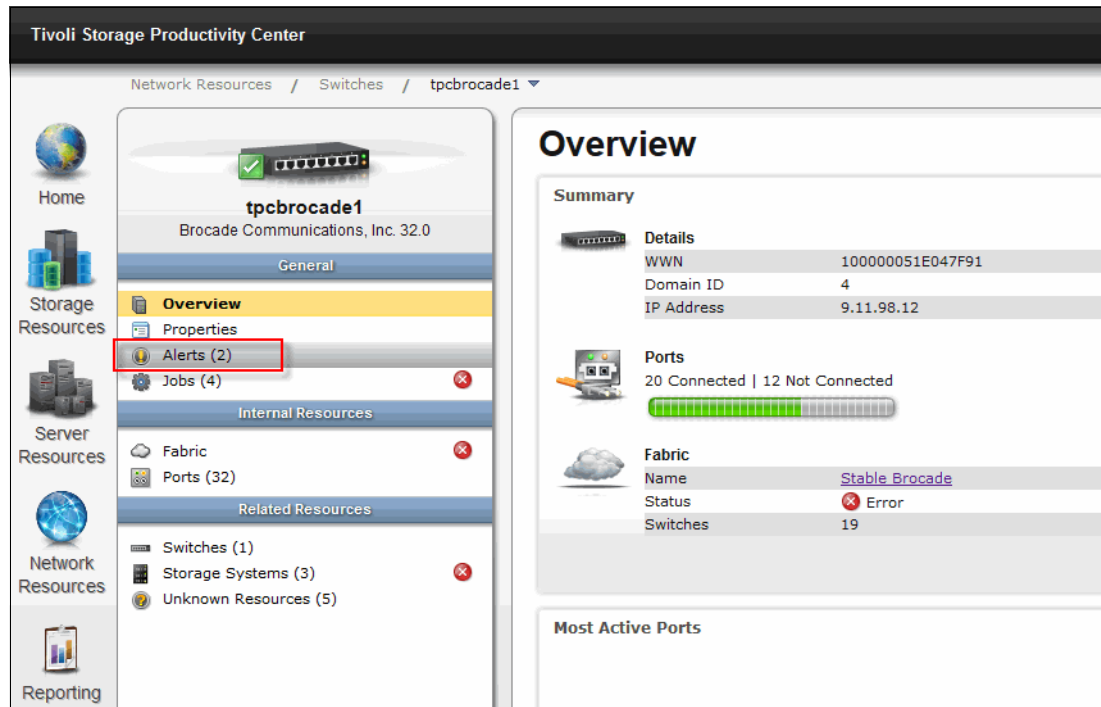


Figure 3-212 Switch: Alerts

After you click the Alerts link, you will see in the Alerts pane all the jobs that are related to a specific resource (Figure 3-213).

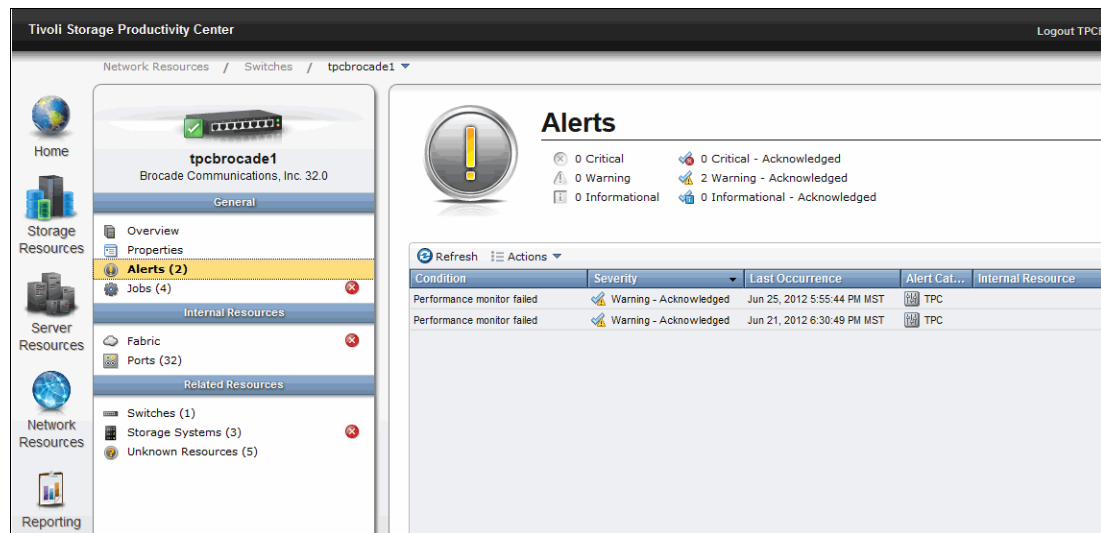


Figure 3-213 Alerts

The icons at the top of the page show you a summary of the statuses for alerts. This summary includes the number of alerts that have a Critical, Critical - Acknowledged, Warning, Warning - Acknowledged, Informational, or Informational - Acknowledged status.

To view detailed information about an alert, select the alert in the table and right-click it. Select **View Alert** as shown in Figure 3-214.

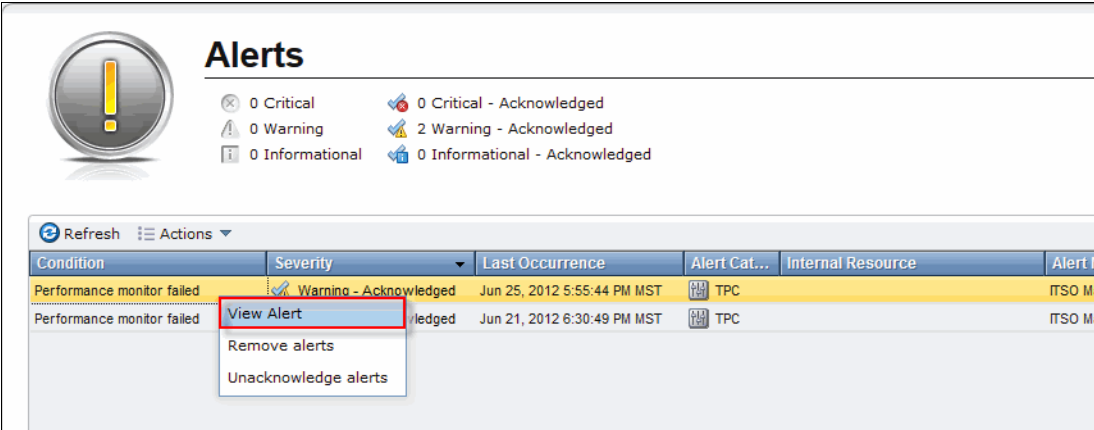


Figure 3-214 View Alert details

Selecting View Alert opens a window with alert details (Figure 3-215). You have the ability to cycle through previous/next alerts.

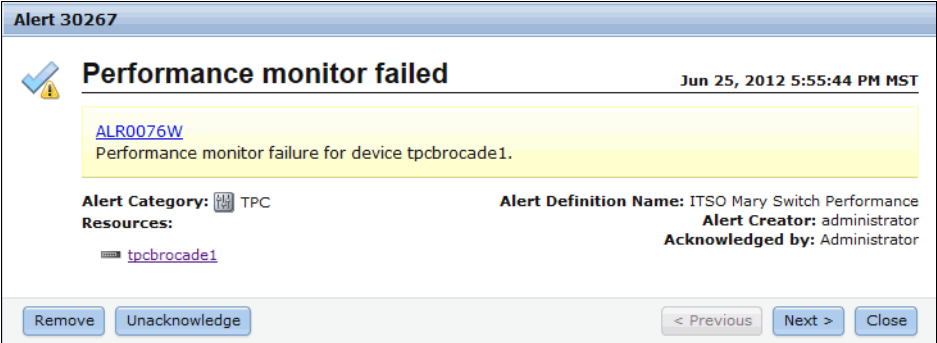


Figure 3-215 Alert details

To get an explanation about the error you can click the error number in the alert details window, or if you move the mouse pointer over the alert you will see an error number link, which you can also click (Figure 3-216). It will open the Tivoli Storage Productivity Center information center with the suggested action (Figure 3-217 on page 258).

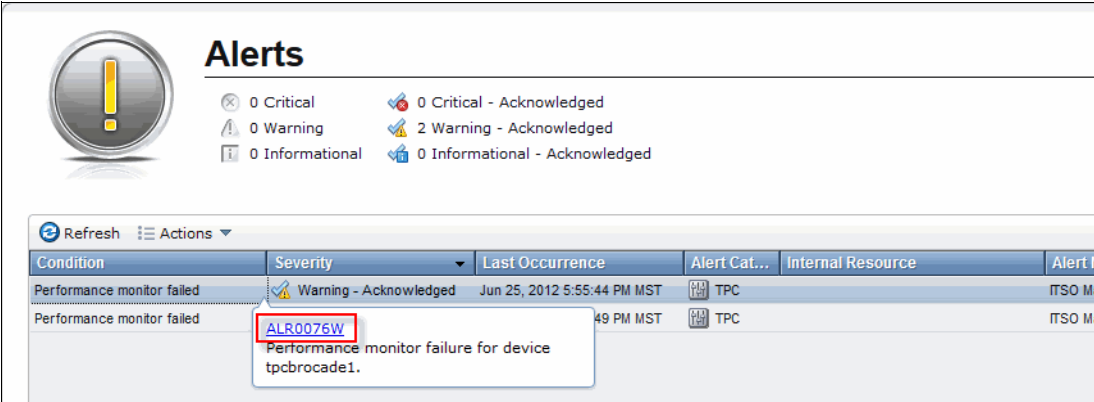


Figure 3-216 Alert error

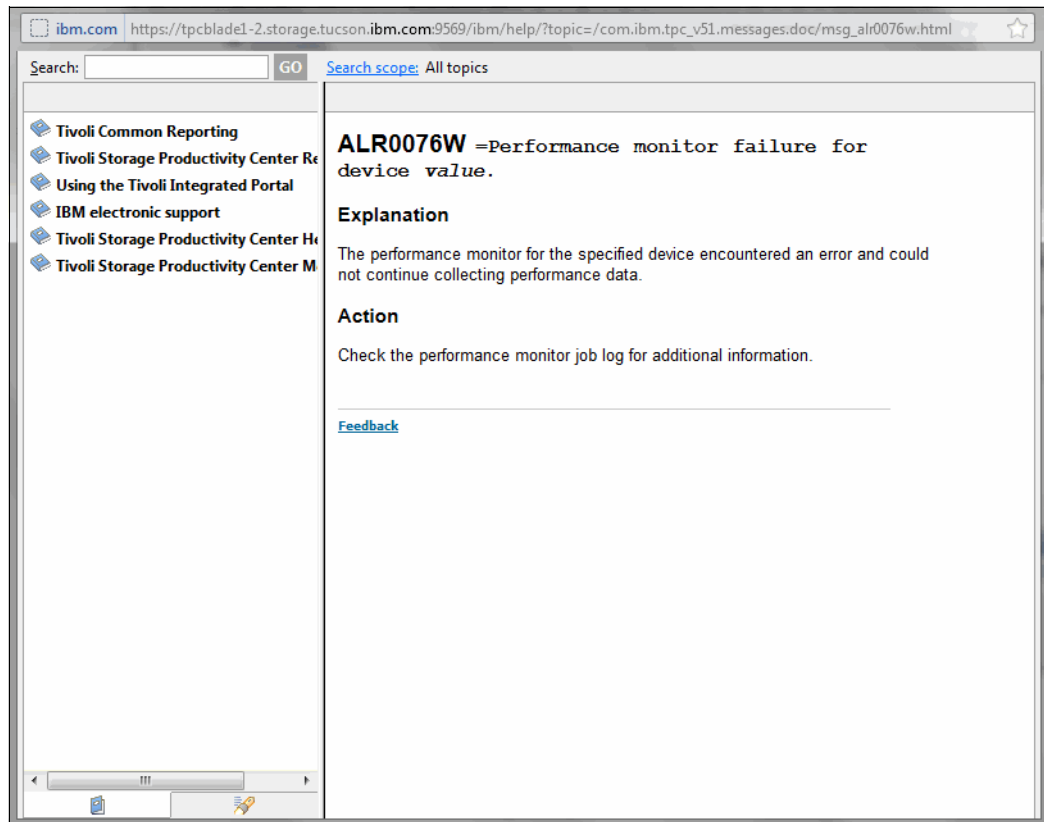


Figure 3-217 Error description in Tivoli Storage Productivity Center information center

### **Acknowledge and remove alerts**

Some alerts in Tivoli Storage Productivity Center are triggered by conditions that commonly occur and can be ignored. In such cases, you acknowledge these alerts to indicate that they were reviewed and do not require immediate resolution. By acknowledging alerts, you can more quickly identify the other alerts in lists that must still be reviewed and resolved.

To acknowledge an alert, go to the Alert page by clicking **Home** → **Alerts** from the navigation pane. The Alerts page opens as shown in Figure 3-218.

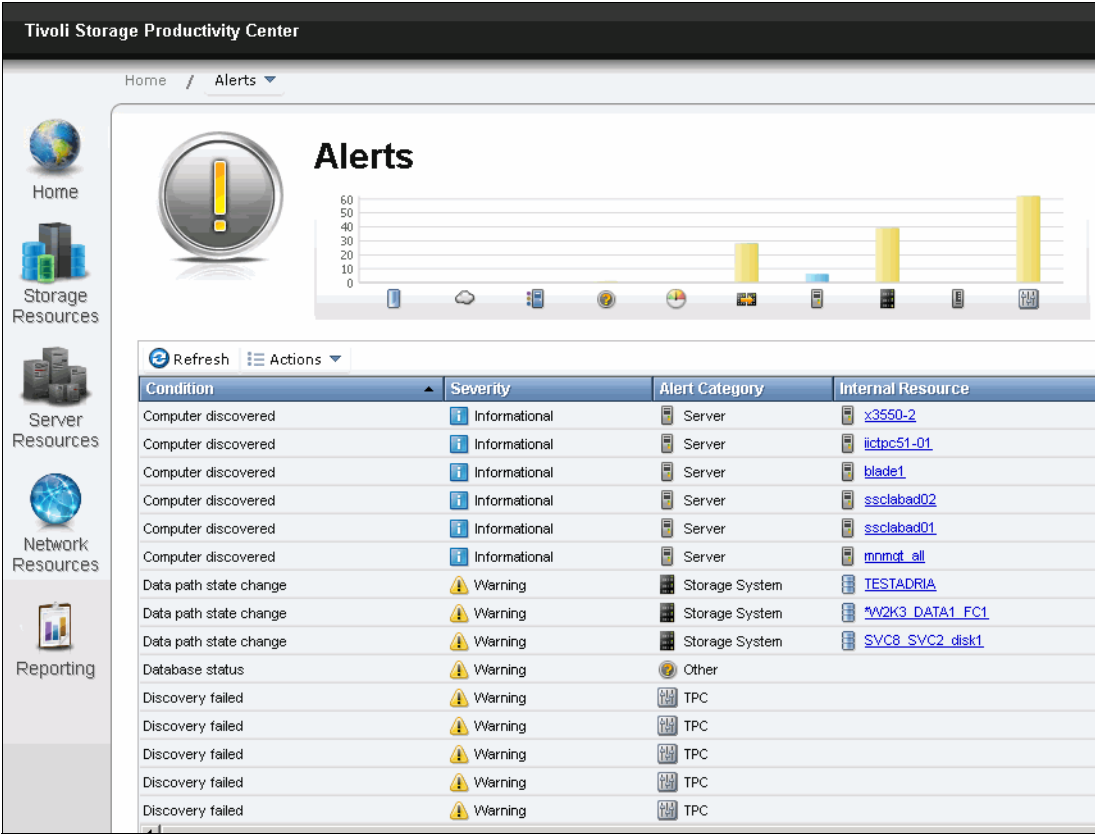


Figure 3-218 Alerts page

Find the alert that you want to acknowledge or filter the table to show the alert. Select the alert in the table and right-click it. In the menu, select **Acknowledge alerts** (Figure 3-219).

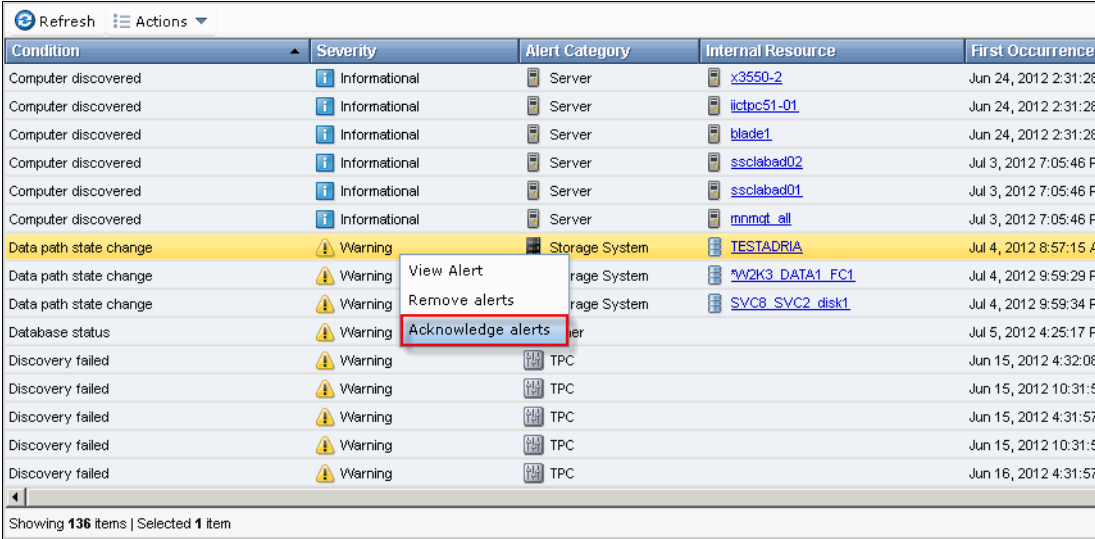


Figure 3-219 Acknowledge alerts

Figure 3-220 shows you the message that the alert has been acknowledged.

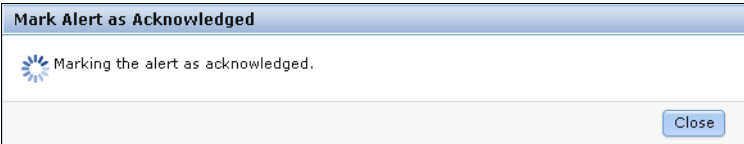


Figure 3-220 Marking the alert as acknowledged

The alert status is changed to *acknowledged* as shown in Figure 3-221.

Refresh Actions					
Condition	Severity	Alert Category	Internal Resource	First Occurrence	
Computer discovered	Informational	Server	<a href="#">x3550-2</a>	Jun 24, 2012 2:31:26	
Computer discovered	Informational	Server	<a href="#">ictpc51-01</a>	Jun 24, 2012 2:31:26	
Computer discovered	Informational	Server	<a href="#">blade1</a>	Jun 24, 2012 2:31:26	
Computer discovered	Informational	Server	<a href="#">ssclab02</a>	Jul 3, 2012 7:05:46 P	
Computer discovered	Informational	Server	<a href="#">ssclab01</a>	Jul 3, 2012 7:05:46 P	
Computer discovered	Informational	Server	<a href="#">mnmdt_all</a>	Jul 3, 2012 7:05:46 P	
Data path state change	Warning	Storage System	<a href="#">*W2K3_DATA1_FC1</a>	Jul 4, 2012 9:59:29 P	
Data path state change	Warning	Storage System	<a href="#">SVC8_SVC2_disk1</a>	Jul 4, 2012 9:59:34 P	
Data path state change	Warning - Acknowledged	Storage System	<a href="#">TESTADRIA</a>	Jul 4, 2012 8:57:15 A	
Database status	Warning	Other		Jul 5, 2012 4:25:17 P	
Discovery failed	Warning	TPC		Jun 15, 2012 4:32:06	
Discovery failed	Warning	TPC		Jun 15, 2012 10:31:5	
Discovery failed	Warning	TPC		Jun 15, 2012 4:31:57	
Discovery failed	Warning	TPC		Jun 15, 2012 10:31:5	
Discovery failed	Warning	TPC		Jun 16, 2012 4:31:57	
Showing 136 items   Selected 0 items					

Figure 3-221 Status of acknowledged alert

You can also acknowledge alerts in the resource page (storage systems, servers, hypervisors, switches, fabrics) alert tab or in the internal resource alert menu for a specific resource.

Figure 3-222 shows you an example for fabrics alerts. Figure 3-223 on page 262 shows you an example for specific fabric alerts.

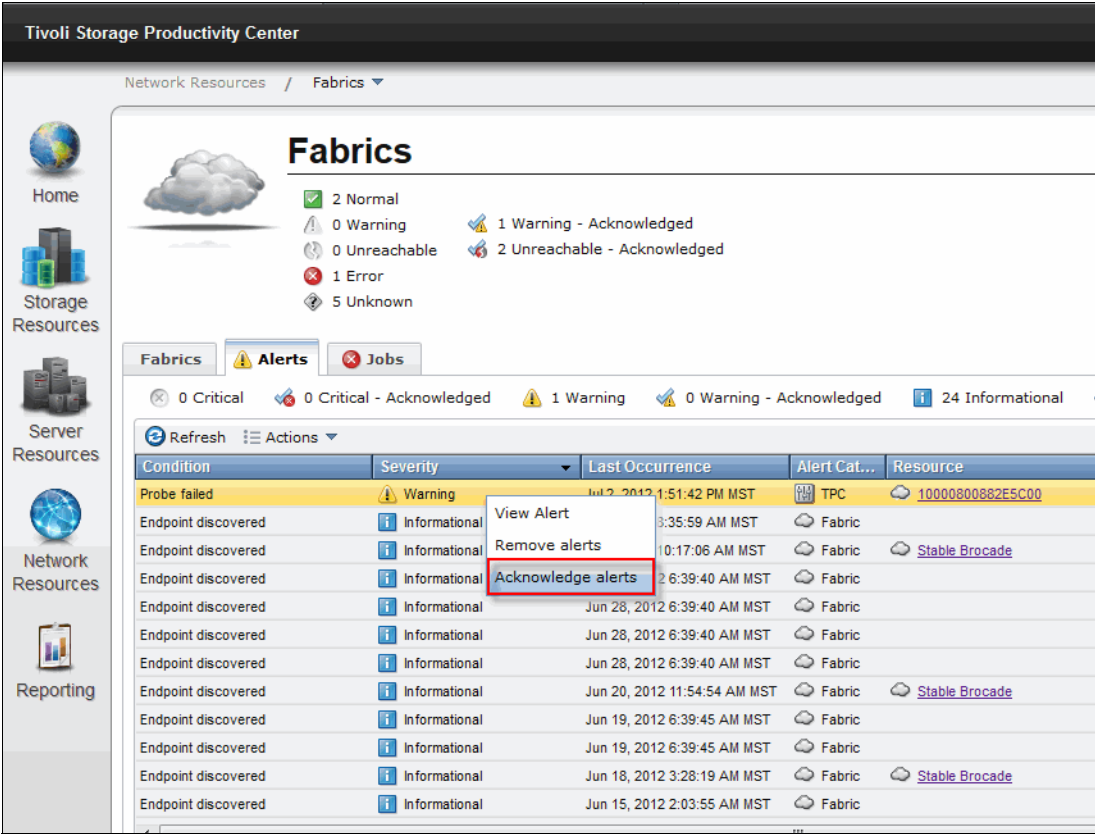


Figure 3-222 Acknowledge alerts in resource page

**Tivoli Storage Productivity Center**

Network Resources / Fabrics / Stable Brocade

**Alerts**

0 Critical  
0 Warning  
16 Informational

Condition	Severity	Last Occurrence
Endpoint discovered	Informational	Jul 2, 2012 10:17:0
Endpoint discovered	Informational	Jun 20, 2012 11:54
Endpoint discovered	Informational	Jun 18, 2012 3:28
Endpoint discovered	Informational	Jun 6, 2012 3:00:5
Endpoint discovered	Informational	Jun 6, 2012 2:57:2
Endpoint discovered	Informational	Jun 4, 2012 11:04:
Endpoint discovered	Informational	Jun 4, 2012 8:54:4
Endpoint discovered	Informational	May 31, 2012 12:3
Endpoint discovered	Informational	May 15, 2012 5:01
Endpoint discovered	Informational	May 12, 2012 3:32
Endpoint discovered	Informational	May 10, 2012 3:57
Endpoint discovered	Informational	May 10, 2012 3:52
Endpoint discovered	Informational	May 10, 2012 3:29
Endpoint discovered	Informational	May 10, 2012 3:28
Endpoint discovered	Informational	May 9, 2012 3:55:5
Endpoint discovered	Informational	May 8, 2012 8:36:4

Figure 3-223 Acknowledge alerts for specific fabric

Alerts can also be unacknowledged if for example the problem still exists and it must be resolved. To unacknowledge the alert, select the alert in the resource page (storage systems, servers, hypervisors, switches, fabrics) alert tab or in the internal resource alert menu for a specific resource.



Figure 3-224 shows you an example how to unacknowledge an alert for fabrics alerts in the Fabrics resource page. After you right-click the alert that you want to unacknowledge, the menu will open where you select the **Unacknowledge alerts** option.

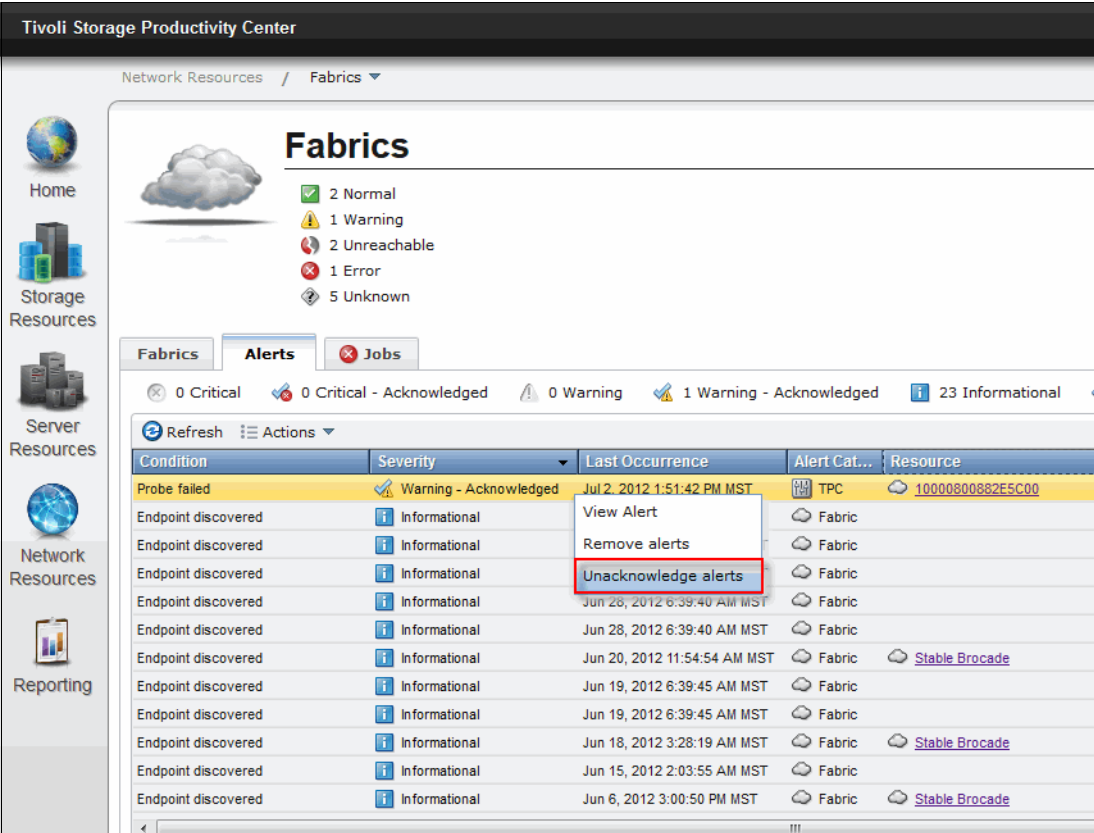


Figure 3-224 Unacknowledge alerts

Figure 3-225 shows you the message that the alert has been unacknowledged.

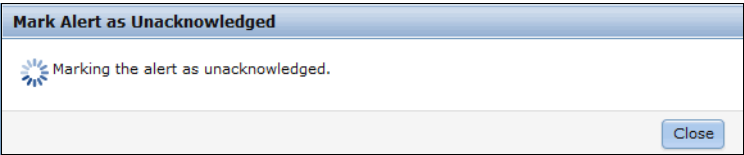


Figure 3-225 Marking the alert as unacknowledged

After the alert has been unacknowledged, the Alert tab will show you again the status icon (Figure 3-226).



Figure 3-226 Alerts tab showing warning icon

To remove an alert, you can select the **Remove alerts** option from the same menu where you acknowledge and unacknowledge alerts. Figure 3-227 shows you how to remove an alert for a fabric.

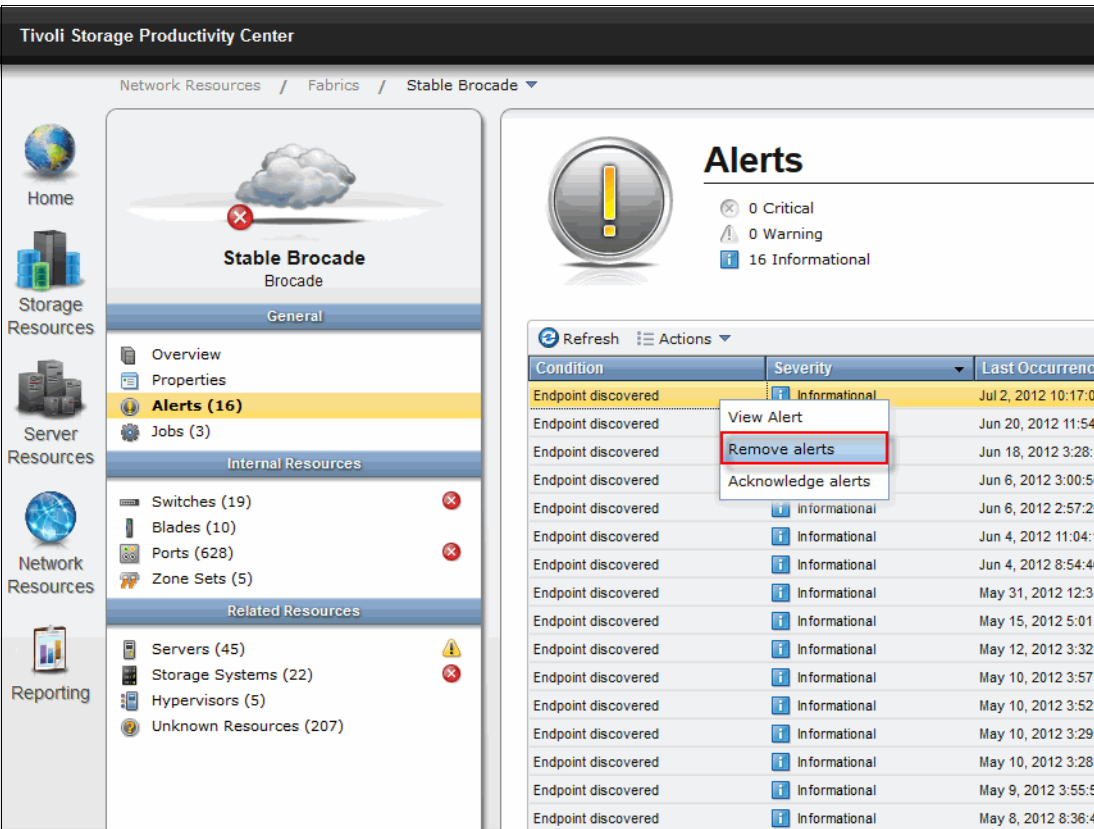


Figure 3-227 Remove alerts

After you click the Remove alerts option, you get a warning to confirm and remove the alert (Figure 3-228).

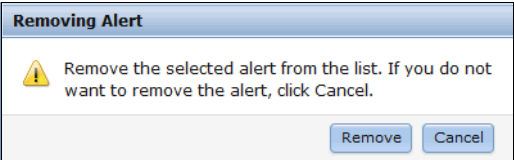


Figure 3-228 Removing Alert

Click the **Remove** button and the alert is removed (Figure 3-229).

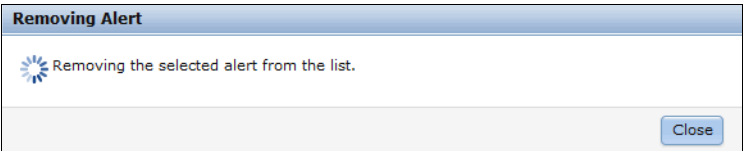


Figure 3-229 Removing Alert

**Tivoli Storage Productivity Center for Replication alerts**

Web-based GUI shows you also Tivoli Storage Productivity Center for Replication alerts in the alerts category in the summary chart, as shown in Figure 3-230. When you move your mouse over the Replication icon, you see the summary status of Tivoli Storage Productivity Center for Replication alerts.

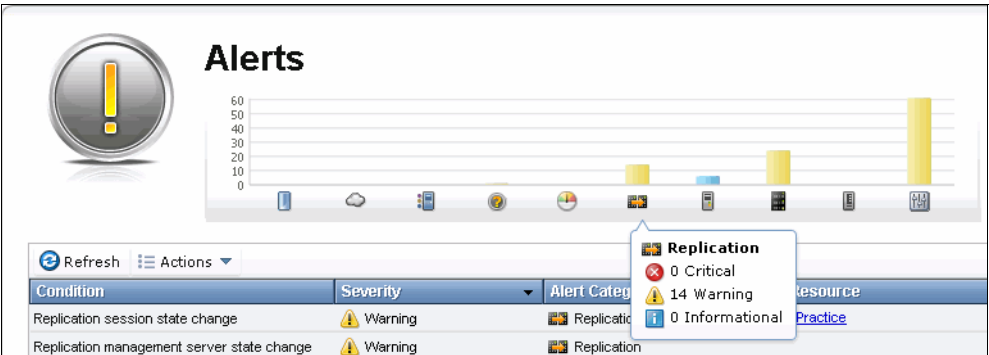


Figure 3-230 Tivoli Storage Productivity Center for Replication alerts in web-based GUI

If you filter the table with a Replication string, you will see all alerts that are related to Tivoli Storage Productivity Center for replication, as shown on Figure 3-231.

<div> <div>Refresh</div> <div>Actions</div> </div>				
Condition	Severity	Alert Category	Internal Resource	First Occurrence
Replication session state change	Warning	Replication	GM w Practice	Jul 5, 2012 10:27:46
Replication management server state change	Warning	Replication		Jul 5, 2012 9:29:24 P
Replication communication failure	Warning	Replication	SVC-CLUSTER-SVC2PROD	Jul 5, 2012 9:29:21 P
Replication communication failure	Warning	Replication	SVC-CLUSTER-SVC8	Jul 5, 2012 9:29:18 P
Replication session state change	Warning	Replication	GM w Practice	Jul 5, 2012 8:51:20 P
Replication session state change	Warning	Replication	GM w Practice	Jul 5, 2012 8:43:57 P
Replication configuration change	Warning	Replication	GM w Practice	Jul 5, 2012 8:41:57 P
Replication management server state change	Warning	Replication		Jul 5, 2012 8:34:15 P
Replication management server state change	Warning	Replication		Jul 5, 2012 8:34:14 P
Replication management server state change	Warning	Replication		Jun 23, 2012 12:53:0
Replication management server state change	Warning	Replication		Jun 23, 2012 12:52:5
Replication management server state change	Warning	Replication		Jun 19, 2012 1:57:58
Replication management server state change	Warning	Replication		Jun 15, 2012 1:26:23
Replication management server state change	Warning	Replication		Jun 15, 2012 1:26:21

Figure 3-231 Replication alerts

By clicking the link in the Internal Resource column, it opens Tivoli Storage Productivity Center for Replication GUI in the new web browser window, where you can see the status of your replication session to which the alert is related. Figure 3-232 shows you Tivoli Storage Productivity Center for Replication GUI with the status of the related resource.

Tivoli

Storage Productivity Center for Replication

Health Overview

Sessions

Storage Systems

Host Systems

Volumes

ESS/DS Paths

Management Servers

Administration

Advanced Tools

Console

About

Sign Out tpcadmin

Health Overview

Severe

Sessions

0 normal

0 warning

1 severe

Storage Systems

Host Systems

Management Servers

Remote Storage Systems

Remote Host Systems

Session Details

GM w Practice

Select Action:

Go

Status

Severe

State

Suspended

Active Host

H1

Recoverable

Yes

Description

(modify)

Copy Sets

2

Transitioning

No

Participating Role Pairs:

Role Pair	Error Count	Recoverable	Copying
H1-I2	0	2	0
H2-I2	0	0	0

Non-Participating Role Pairs:

Role Pair	Error Count	Recoverable	Copying
H1-H2	0	0	0

Figure 3-232 Tivoli Storage Productivity Center for Replication GUI

The Tivoli Storage Productivity Center for Replication alerts are defined in stand-alone GUI as shown in Figure 3-233. The alerts information about Tivoli Storage Productivity Center for Replication in web-based GUI is static and it is not a direct correlation to the actual status of the Tivoli Storage Productivity Center for Replication. This means that if for example your Tivoli Storage Productivity Center for Replication session status changed to normal, the web-based GUI still shows you the latest warning status about that session.

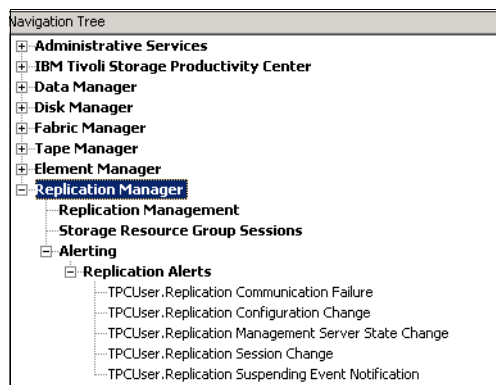


Figure 3-233 Tivoli Storage Productivity Center for Replication alerts in stand-alone GUI

### Alert notification emails

If you configured alerts to be sent via notification email, the email contains the following URLs:

- ▶ One URL for the alert record in the web-based GUI alert list
- ▶ Optionally, another URL for the resource's detail record in web-based GUI (for those resource types that are available in web-based GUI opens resource detail panel and properties)

Figure 3-234 shows you the alert notification email with the web-based GUI URLs.

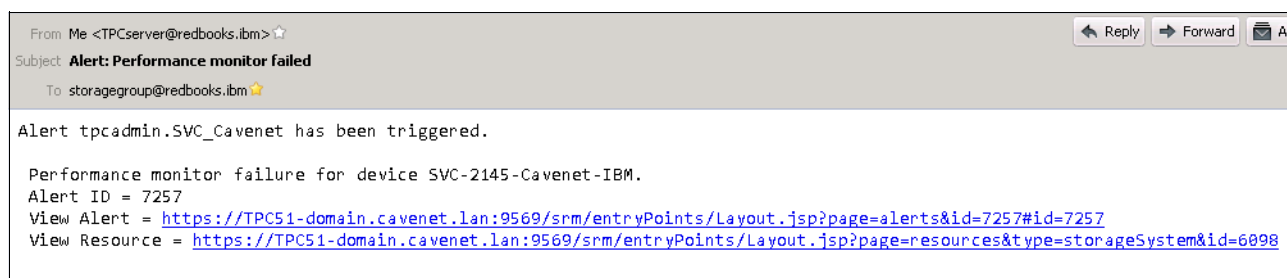


Figure 3-234 Alerts notification email

If you click the **View Alert** link in the email, the following web-based GUI page that is shown in Figure 3-235 opens.

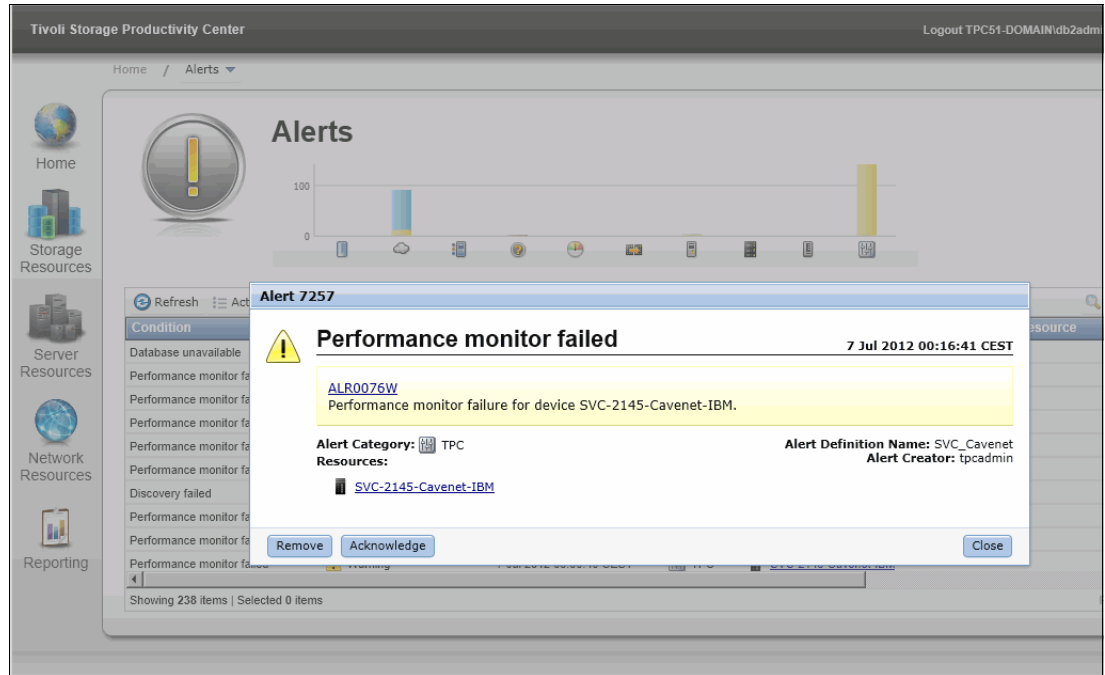


Figure 3-235 Alert record

If you click the **View Resource** link in the email, the following web-based GUI page that is shown in Figure 3-236 opens.

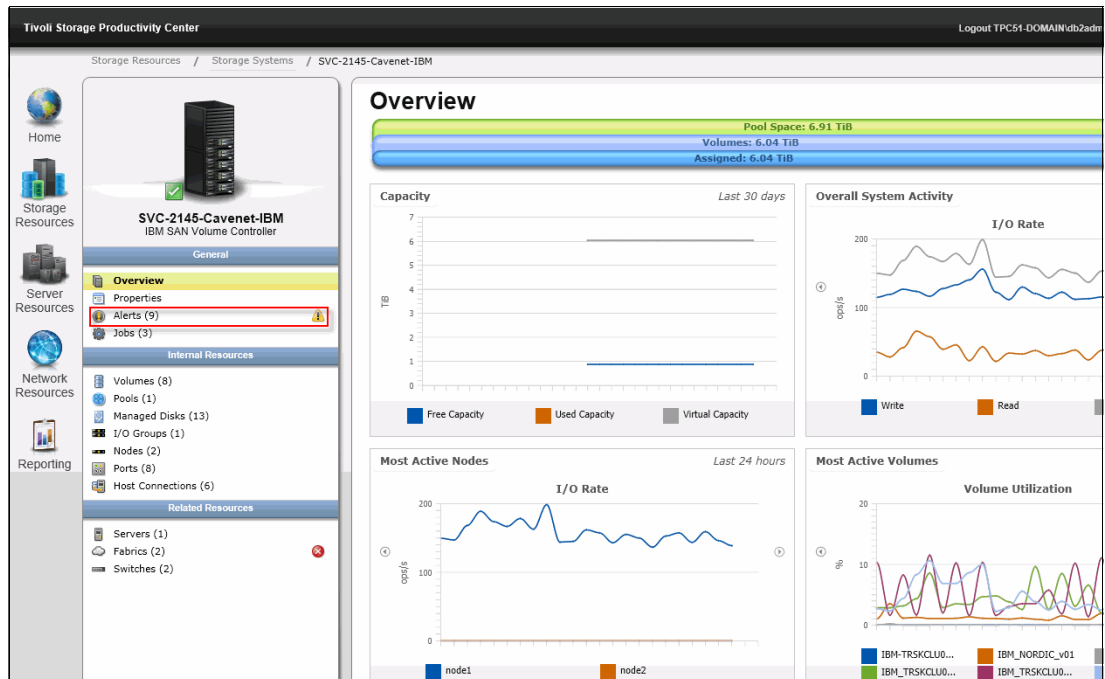


Figure 3-236 Resource overview



## Enhanced reporting with IBM Cognos

In this chapter, we describe the new Cognos reporting that is integrated in Tivoli Storage Productivity Center V5.1. The sample reports that are provided with the product are shown as well as how to create customized reports.

## 4.1 Quick Cognos introduction

Before Tivoli Storage Productivity Center 4.x, the Tivoli Storage Productivity Center graphical user interface (GUI) and TPCTOOL command-line interface (CLI) were the only supported means of accessing data from the Tivoli Storage Productivity Center repository. Tivoli Storage Productivity Center 4.x introduced a supported set of views to access the repository and installed Tivoli Common Reporting v1.2 as an application in the Tivoli Integrated Portal. Custom reports could be developed using the open source, Eclipse-based Business Intelligence and Reporting Tools (BIRT) report designer, which is imported into Tivoli Common Reporting 1.2, and administered and rendered through the Tivoli Common Reporting 1.2 portal.

### 4.1.1 Tivoli Storage Productivity Center 5.1 reporting components: Tivoli Common Reporting v2.1 and Cognos

With Tivoli Storage Productivity Center Version 5.1, the packaging of the internal components has been updated, and now includes Tivoli Integrated Portal Version 2.2. Tivoli Integrated Portal Version 2.2 contains besides other items Tivoli Common Reporting. Tivoli Common Reporting has been updated to Version 2.1.1.

With Version 4.2.2, Tivoli Storage Productivity Center had already introduced a new reporting GUI as an optional component, which you had to install manually. This reporting GUI was based on IBM Cognos. The only reports in Cognos then were the Storage Tiering Reports, and Cognos was not intended to be used for custom reporting then.

A Tivoli Storage Productivity Center 5.1 installation now includes Tivoli Common Reporting Version 2.1.1, the BIRT reporting engine, and the Cognos reporting engine. Everything gets installed together with Tivoli Storage Productivity Center. Even though the BIRT engine is still included, the preferred reporting engine is now IBM Cognos. The reason why there are now two reporting engines is simply compatibility: IBM wanted to ensure that you can still use old custom reports with Tivoli Storage Productivity Center.

Put into a hierarchical list, the packaging looks like what is shown below.

Tivoli Storage Productivity Center 5.1 includes:

- ▶ Tivoli Integrated Portal
  - Tivoli Common Reporting
    - IBM Cognos
    - BIRT runtime environment

**Note:** Because IBM Cognos comes packaged with Tivoli Common Reporting, just like the DB2 database that Tivoli Storage Productivity Center is using, there is not a license that you need to buy, but you are only entitled to use Cognos with Tivoli Data.

The BIRT runtime engine is integrated in such a way that for using your reports, you can also open Cognos and run or schedule your reports from here. However, technically, BIRT is not a part of Cognos, it is part of Tivoli Common Reporting.

A Cognos data package created from a Tivoli Storage Productivity Center data model will also be installed. This is important because the power of Cognos is unlocked by capturing the relationships of the data items when creating the data model. Tivoli Storage Productivity Center product development maintains the Tivoli Storage Productivity Center Cognos data



model and the data package installs by default with the product without any special intervention.

A user cannot only access canned Cognos reports supplied with Tivoli Storage Productivity Center, but can create ad hoc reports using the Cognos Query Studio and more elaborate reports using the Cognos Report Studio. Both of those components are installed with Tivoli Storage Productivity Center 5.1 and can be launched either directly from the Tivoli Storage Productivity Center web GUI or Tivoli Common Reporting 2.1.1 portal.

## Summary

Together with predefined reports and the simplified installation, this is a very good improvement of Tivoli Storage Productivity Center 5.1 over its earlier versions because it enables you to benefit from the custom reporting much quicker.

### 4.1.2 What IBM Cognos is

IBM Cognos is a family of products for business intelligence. The items included with Tivoli Storage Productivity Center are similar to the open source Business Intelligence Reporting Tools (BIRT). Cognos was acquired by IBM in 2008 and therefore Cognos is now the more strategic reporting engine for Tivoli.

Following are the most important advances of Cognos over BIRT:

- ▶ Ad hoc reporting capability with no SQL skill required with drag and drop support
- ▶ Scheduling of reports including emailing
- ▶ An included web-based report designer, so you do not need to download and install additional software

Additionally, Tivoli Storage Productivity Center provides predefined reports so that you can start using Cognos right away, whereas with BIRT, you had to download, install, create, and then import a report first before you could use it.

## Cognos Components

From a software point of view, Tivoli Storage Productivity Center includes two components from the family of Cognos products:

- ▶ Query Studio
- ▶ Report Studio

There is also a program installed for the configuration of Cognos called “IBM Cognos Configuration” in the “Tivoli Common Reporting 2.1.1” program group on Windows. However, this is regarded as an administrator’s tool, and not an end-users application, so that one is not available via the web, and you probably will not need to use this tool at the beginning.

## Cognos data models

In order to use the custom reporting capabilities of Cognos, the information of the existing custom views of the TPCREPORT schema need to be made available as a data model. A data model simply describes which views are related to other views and which keys need to be used to perform SQL join operations, in such a way that Cognos can read and understand the data model. Relationships that are not put into a data model cannot be used in the Cognos Query Studio. Cognos Report Studio will use the data model as well as customer SQL queries.

Data models help to organize and categorize the available columns/metrics that you can include into your reports.

Tivoli Storage Productivity Center will provide access to the information stored in its database through four different data models:

- ▶ IBM Tivoli Storage Productivity Center Historical Information
- ▶ IBM Tivoli Storage Productivity Center Performance
- ▶ IBM Tivoli Storage Productivity Center Resources
- ▶ IBM Tivoli Storage Productivity Center Storage Tiering

With this concept, you are freed from the requirement to have in-depth knowledge about how to write SQL queries.

**Note:** Currently, not all information that is available via the TPCREPORT views is already available in a Cognos data model. In chapter 4.10.3, “HBA details report” on page 376, we provided an example of how you can still use Cognos with a SQL query to display information that is not yet available in a data model.

## Cognos report packages

A report package is simply a bundle of reports. Tivoli Storage Productivity Center comes with predefined reports that are imported into Cognos at installation time. Those reports are organized in a similar structure like the data model:

- ▶ IBM Tivoli Storage Productivity Center Historical Information
- ▶ IBM Tivoli Storage Productivity Center Performance
- ▶ IBM Tivoli Storage Productivity Center Resources
- ▶ IBM Tivoli Storage Productivity Center Storage Tiering

Some of those folders might have subfolders as a mechanism to further group the reports. Unlike the stand-alone GUI in Tivoli Storage Productivity Center, this is not a disadvantage because you can

- ▶ Rearrange the reports and move/copy them into different folders
- ▶ Use the search field in the top of the Cognos window to find any report, no matter in which folder it is stored. For a short description of the search, see 4.2.1, “GUI elements” on page 274.

**Note:** If you move a report instead of copying the report, the drill-through functions will not work anymore, but it can be corrected.

For list of the predefined reports see 4.2.4, “Predefined reports” on page 283.

## Cognos advantages

Cognos reports are structured into folders and not in a hierarchical tree. This makes it easy to move and copy reports so that it works for each company. For example, you could structure the reports based on line of business, device type, or report type, whatever suits your needs. Additionally you can share or restrict the access to reports. With BIRT, some of this had to be done already in the report designer, and could not be changed later on.

Reports can be saved as bookmarks enabling quick access without the need to start the Tivoli Storage Productivity Center web GUI first.

The predefined reports can be copied and customized to be even more useful to you. Since Cognos includes everything that you need to do this, this is much easier than with BIRT where once installed reports cannot be changed from within the Tivoli Common Reporting environment. See 4.5.1, “Example modifying a predefined report” on page 316 for an example how to customize a predefined report.

## Other Cognos functions

As many other reporting tools, Cognos provides functions such as hyperlinks from one report to another (called *related links*) or common parameters, for example, data ranges, and storage system names.

Other types of functions are *email* and *export*.

## Running reports

There are different ways to launch Cognos, but it is most likely that you will use the Tivoli Storage Productivity Center web GUI and look at the predefined reports.

Reports can be run in different ways:


- ▶ Interactively, which is the most common way
- ▶ Schedule it
- ▶ Run it and save the output to look at it later
- ▶ Run via command line (`trcmd -run -report`)

Furthermore you have the option to use the following functions:

- ▶ Email it (not limited to scheduling)
- ▶ Save as different output formats
- ▶ Create a report view

A report view uses the same information as the underlying report, just you can change options like scheduling times, delivery methods, run options languages, and output formats. If you simply want a report to appear in more than one location, use Cognos shortcuts instead of report views.

Report views are mostly used for setting and saving parameters, so that the report can be generated without further panels to go through, and this is obviously important for scheduling.

You can have multiple views for the same report. Moving the report to a different location is not a problem, but if you delete it, the report views icon will change into .

## 4.2 Start using Cognos

To start using the Cognos functions in Tivoli Storage Productivity Center is easy because Tivoli Storage Productivity Center 5.1 comes with a set of predefined reports that you can simply launch and use as they are. In order to do this, there is an icon in the navigation bar on the left of the Tivoli Storage Productivity Center web GUI navigation pane that provides access to the following functions, as you can see in Figure 4-1 on page 274:

1. View predefined reports
2. Create a basic report
3. Design a report

Depending on your browser settings, Cognos will either be opened in a new tab or in a new browser window.



Figure 4-1 Launch Cognos reporting from the Tivoli Storage Productivity Center web GUI

The first option will start the initial Cognos panel (Figure 4-2 on page 275), where you have all available reports.

Option 2 will start the so-called Cognos Query Studio directly. See 4.4, “Create a basic report (Query Studio)” on page 294 for more information about Query Studio

Option 3 will start the Cognos Report Studio. See 4.5, “Design a report (Report Studio)” on page 314 for more information about Report Studio.

**Note:** There are also other ways of launching Cognos, like to open Tivoli Integrated Portal and navigate to Reporting, as you used to do with BIRT reporting. In order for this to work, the user needs to have assigned the Tivoli Integrated Portal role of `tcrPortalOperator`. We also found this way less useful because the amount of available screen space is less with the Tivoli Integrated Portal header and navigation frames around Cognos.

## 4.2.1 GUI elements

There are some things that we want to make you familiar with before we go to launch a report. The parts of the Cognos GUI are shown in Figure 4-2 on page 275.

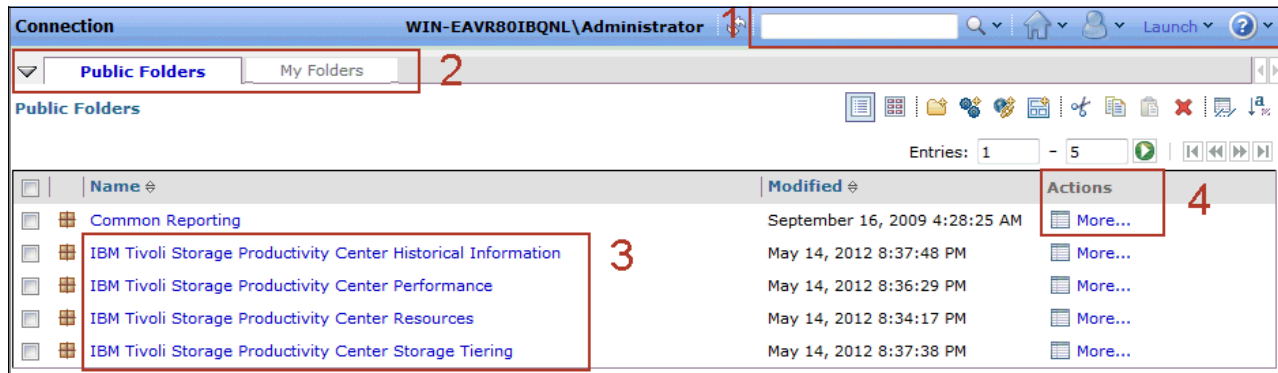





Figure 4-2 Most important items on the initial Cognos panel

The different parts in the Cognos GUI:


1. In the upper right area there are several helpful drop-down menus and functions. Some of the functions can also be clicked directly:
  - A search bar that lets you search for reports within the folder structure
  - The home menu icon , where you can define your home page and return to it from wherever you are
  - The My Area 
  - The Launch menu (see also Figure 4-15 on page 297), which not only can take you to the Query and Report Studio, but also lets you access the Administration, but this is usually only interesting for really advanced users
  - The last item is the help. When you click the  icon, a new window opens with the Cognos help content. Within the help menu, you can find the Quick Tour and the Getting Started links, which we found helpful for beginners of the new Tivoli Storage Productivity Center reporting. From the Quick Tour, only the first three items are interesting for you as a Tivoli Storage Productivity Center user because the Analysis Studio and Event Studio are not included in the Tivoli Common Reporting package for Tivoli Storage Productivity Center 5.1.

**Note:** In case your system is not connected to the Internet, you can copy a link to a download package for the Quick Tour if you follow the link “see the instructions” below the quick start icons.

The Getting Started option provides many good and interesting functions for every level of Cognos users, including these examples:

- How to run a report
- Schedule a report
- Create a query
- Create a report
- Create a portal page

Because this is all documented, we will not repeat all of this in this book, we just focus on what we believe are the most important items.

- The back button  (not visible in the screen capture) is only shown if you navigated somewhere and want to go back to the previous window.

## 2. Tabs

In Cognos, there are three elements that are easy to mix up, so we should explain them here:

- Tabs

Tabs are shown on the top of the Cognos windows like indicated with the number 2 in Figure 4-2 on page 275. Tabs can be created and can hold portals for quick access.

- Folders

A folder holds reports or other folders and provide a way to organize the reports in Cognos.

- Portal



There are two predefined portals in Cognos: the *Public Folders* and *My Folders*. These folders are not the same type of folders that we described above. They are more like special tabs that provide either access to all public folders and reports or your personal items.

3. On the top level of the Public Folders, you will find at first the imported reporting packages. As you use Cognos, you might store or group the items in a different way; therefore, you might also see folders or even reports here. Note, the icons next to the package names symbolize a package.
4. In the Actions section of the Public Folder or My Folder Tabs, you will see one or more icons, and the link “More...”. We explain the icons later on in more detail, but in general the icons provide actions for setting properties, running, editing, organizing, and scheduling reports. Actions for folders are focused around organizing, so you will find actions like copy, delete, rename, move, and so on.

## General icons







In Table 4-1, we included some general icons that you might see in Cognos. It seems very obvious what the icons mean, but when you open Cognos for the first time you can be overwhelmed.



Table 4-1 General Icons

Icon	Report Type
	Report Package
	Folder

In Table 4-2, you can see the report types and their icons that are supported in Cognos. The icons are displayed for saved reports so that you know in what format a report is saved.



Table 4-2 Report icons

Icon	Report Type
	HTML
	PDF
	Excel 2007
	Excel 2002
	Excel 2000 Single Sheet
	Excel 2000

Icon	Report Type
	Delimited Text (CSV)
	XML

When you first start using Cognos, you will probably only see the icon to open an HTML report. This is because the default report type is HTML. If you really want to, you could change the default report type in the properties of a report.












A more likely situation where you might see these icons is if you created and saved a report that is run with a different report format. The reason for this is that another default in Cognos is to show the most recently saved report instead of rendering a new one. This is helpful once you start scheduling reports because Cognos automatically shows you the most recently saved report.

So how can you determine if Cognos will show you a saved report or render a new report? Cognos will render a new report if there is this icon  just right of the report type icon, so for example .

## Action Icons

The list of action icons in Table 4-3 is shown to the right of the reports names (frame 4 in Figure 4-2 on page 275). Depending on the settings (properties) of a report, different icons might be shown. Those icons that are not shown are available by clicking the “More...” label.

Table 4-3 Action icons

Icon	Description
	Set report properties
	Run with options
	Open in Report Studio
	New schedule
	Move report to a different folder
	Delete report
	Copy report
	View output version: If there are saved reports, you can click this icon to get the different versions of that report
	Create a shortcut to this entry
	Create a report view of this report
	Add to browser bookmarks

## 4.2.2 Open your first report

Now that you have Cognos opened, we walk you through and show you how to open a report. From Figure 4-2 on page 275, we selected IBM Tivoli Storage Productivity Center Historical Information so that this folder was opened, as you can see in Figure 4-3 on page 278.

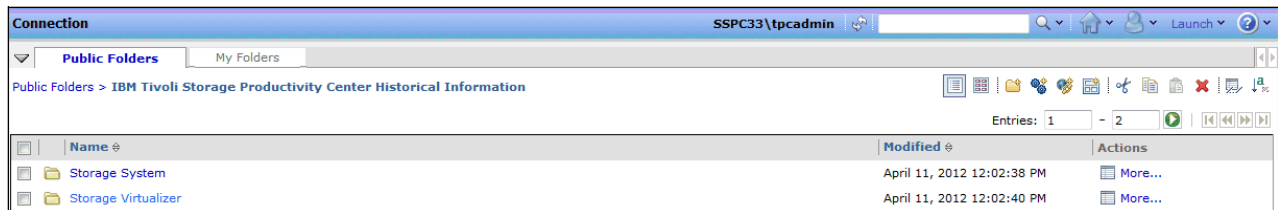


Figure 4-3 IBM Tivoli Storage Productivity Center Historical Information

At this level, Tivoli Storage Productivity Center comes with just two groups of reports, which are basically the same, but categorized into:

- ▶ Storage System
- ▶ Storage Virtualizer

We clicked Storage Virtualizer, and Cognos opened that folder to show us the available reports, as shown in Figure 4-4.



Figure 4-4 List of historical reports for a Storage Virtualizer

We simply clicked the label “Storage Virtualizer - Pools Historical Space Report” to run that report.

The next two steps depend on the actual report. For some reports, you can select the “scope” and parameters. For other reports, there are only parameters, and others have neither a scope or parameter selection.

When we discuss scope, we mean that a report will ask you to specify whether you want to select from a list of Storage Resource Groups or from a list of pools (in this example) when you select the parameters in the following step, see Figure 4-5 on page 279 for an example.



**View Historical Space Information**

\* ☐ Of Pools in a Storage Resource Group  
☒ Of a Pool in a Storage Virtualizer

Cancel < Back Next > Finish

Figure 4-5 Scope selection

We selected pools and clicked **Next** to come to the parameter selection screen, as shown in Figure 4-7 on page 280.

**Note:** When you compare Figure 4-5 and Figure 4-6, you see a red \* in front of the scope selection in Figure 4-5, but there is not a red \* or anything similar in Figure 4-6. This simply means that any parameter with a red mark (asterisk or underline) is a required parameter that you cannot omit. If you do not specify an optional parameter, the selected report will be created for any matching entity, so in this case, the report would list all storage pools of the selected storage virtualizer.

In Figure 4-6, we selected the parameters already, so you cannot see that the Storage Virtualizer is a required parameter. This is how the panel looks when it was just opened.

**Parameter Selection**

Select a Storage Virtualizer  
Storage Virtualizer Name (non optional)

Select a Pool  
Storage Virtualizer Pool Name (optional)

Figure 4-6 Non-optional parameter drop-down box

**Parameter Selection**

Select a Storage Virtualizer  
Storwize V7000-2076-ctr-22-IBM

Select a Pool  
Raid5 pool

Interval  
Daily

Date Range

Select desired date range for report: All

Start Date From:  
Jun 20, 2012 12 : 00 AM

End Date To:  
Jun 20, 2012 11 : 59 PM

Cancel < Back Next > Finish

Figure 4-7 Parameter selection

Select a storage virtualizer and a pool and click **Finish** to open the report.

**Tip:** For some reports, you might see a parameter selection field like shown in Figure 4-8 on page 281. In this case, Cognos lets you search for the parameter and lets you select a result from the list. For better performance, Cognos will not query all entities once you get to this parameter page, so you will have to enter a search string and hit search, before you can see any choices.

In case you really want to list all choices, you can simply use the SQL search character '%', and Cognos will find all entities. The percentage character is basically the same as asterisk in MS-DOS.

Figure 4-8 Search with % character

If Cognos needs some time to render the report, you might be presented with a pop-up window like what is shown in Figure 4-9.

It is recommended to specify a time frame and you have the following options:

- ▶ In “Select desired date range for report” select a type of time frame from the drop-down list, for example: all, last day, last 7 days, and so on.
- ▶ Or, in “Select desired date range for report” select “Date Range” (Figure 4-7 on page 280) and enter start and end data, and time.

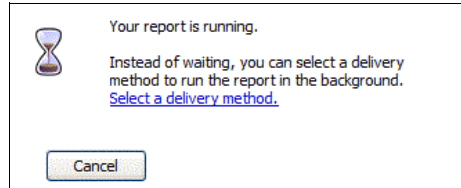


Figure 4-9 Long running report

Most of the time you will simply wait until it is finished, but if you click the link “Select a delivery method”, you will see a new pop-up window, as shown in Figure 4-10.

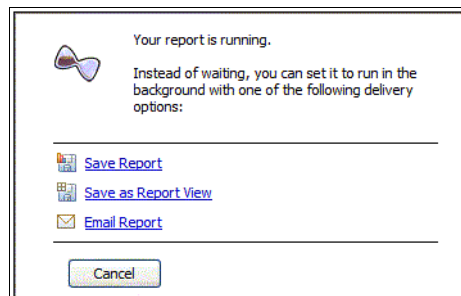


Figure 4-10 Select delivery option

What this also allows you to do is to select one of the following delivery options, and continue with your work immediately:

- ▶ Save Report
- ▶ Save as Report View
- ▶ Email Report

Let us assume that you have not selected a different delivery method, the next thing you will see is your rendered report, as shown in Figure 4-11.

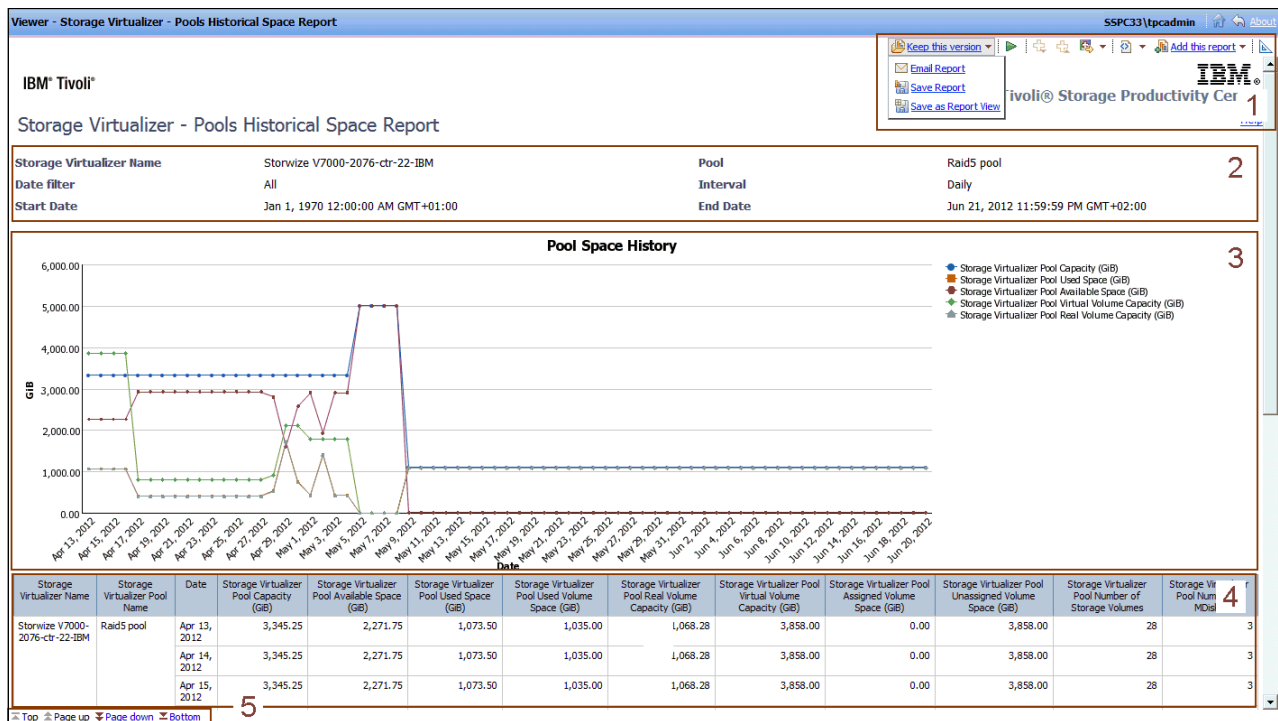


Figure 4-11 Storage Virtualizer Pool Space History report


We added frames to the report in order to explain the most important sections of a report:


#### ▶ Frame 1: Actions

In the upper right corner, you will find actions that you can perform on the displayed report. Actions include saving or emailing the report (as you can see in the drop-down menu). When you save a report by default, it is saved in the so called *Cognos content store*. If you want to save the output into the file system, you have to do some configuration first (see 4.7.4, “Content Store versus File System Archive” on page 338).

Saving as a report view is something different. Not the report output is saved, but a link/view. After saving the report view, you could change its properties and define the parameters so that when you run the report, it will not ask for the parameters (see 4.6.6, “Creating report views” on page 329 for more information).

You can click the run icon  to run the report again.

Right of the run icon are three icons to Drill Down, Drill Up, and Goto Related links . In the example shown, these functions are not available.

The next icon  lets you change the format that you view the report in.

The second action from the right lets you add the report to My Folders or create a bookmark in your browser.

The last icon  opens the report in the Cognos Report Studio.

- **Frame 2: Report parameters**

In this frame, you will see the parameters that you specified when you opened the report. For some reports (for example, the most active ... reports), there will be a function to change one of the parameters as you read the report, without needing to start over again.

**Note:** If you have selected “all” for the time range of a report, you will see a starting date of 1.1.1970, but that simply means that the underlying SQL query was using this to filter the time range. If you look at the report itself (frame 3 or frame 4), you can determine what was the earliest date and time returned for your selected parameters.

- **Frame 3: Diagram area**

This is the diagram area of a report. Depending on the report, you will see a single or up to four diagrams in this area.

- **Frame 4: Detailed table data**

This frame contains a table with the numbers and contains more details than the diagram could hold.


- **Frame 5: Navigation area**

For reports that contain a lot of data, the information is broken down into multiple pages (even for HTML reports that usually do not have pages). With the icons, you can navigate between the pages.

In “Changing web page size in Cognos GUI” on page 324, we show you how you can specify how many lines will be shown on one page.

### 4.2.3 Saving report results

If you want to save the results of your report, the default is to save the results to the so called *Cognos content store*, which is an internal database in Cognos.

To save a report to the file system, you need to do some preparations first and then use the Run with options  when you launch the report.

For more information about the setup and saving the report, see 4.7.4, “Content Store versus File System Archive” on page 338.

Another way is simply changing the report view from HTML to PDF, for example, and once the report is opened, use the viewers tools and menus to save the report to your computer’s hard disk drive.

### 4.2.4 Predefined reports

In this section, we provide some description of the report that is predefined in Tivoli Storage Productivity Center 5.1.

#### **What this is**

Tivoli Storage Productivity Center is shipping a number of predefined reports that you can use immediately. Some of the reports provide similar information than the reports in the stand-alone GUI, but the reports in Cognos were created from scratch.

## Report layout

In Figure 4-11 on page 282, you can see one example of how a report may look and what the general layout of a report is, but there are also reports that have a slightly different layout. The performance reports can especially look slightly different. These reports can contain more than just one diagram, so in general, there are the following types of reports:

1. Table only
2. Table and 1 - 4 Line charts, see Figure 4-12
3. Table and Horizontal bar chart, see Figure 4-13

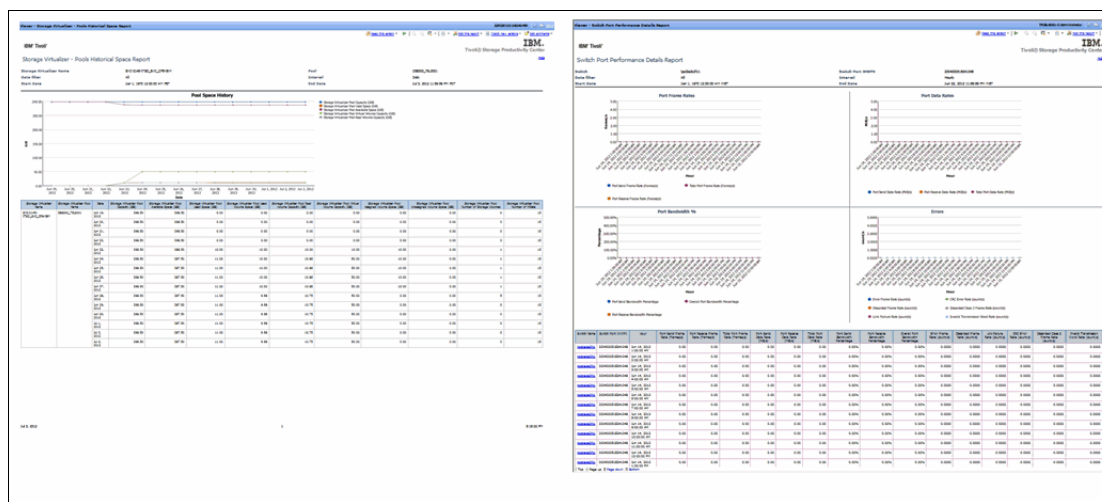


Figure 4-12 Line chart report examples

In the left diagram in Figure 4-13, there are two things that we want to point out:

- ▶ Left of the diagram, you can see a grouping of the listed entities.
- ▶ For the Most active ... reports, you will have the option to change the sort order even after you have opened the report. This defines what is considered as most active.

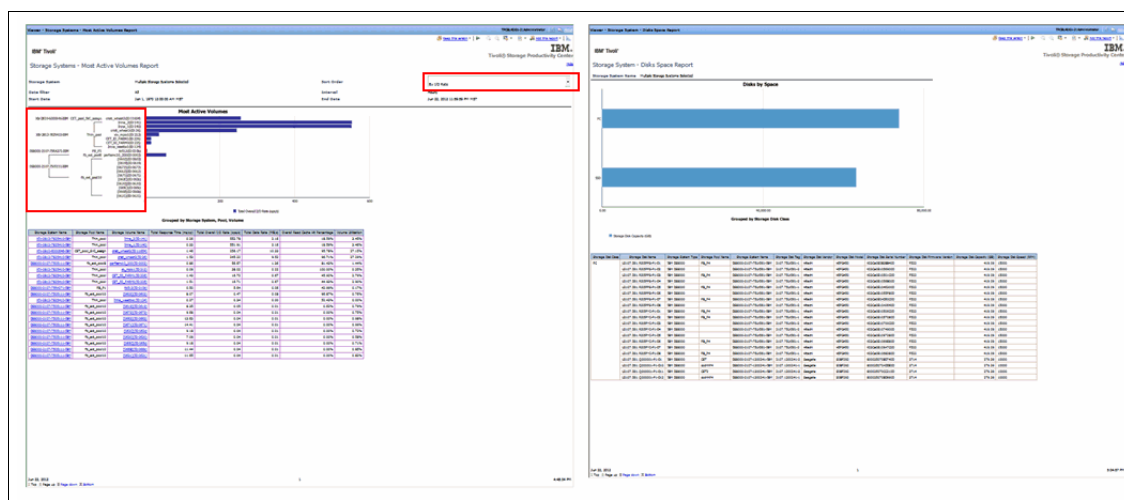


Figure 4-13 Bar chart report example

## Predefined report list

For each group of report, we also provide the link to the information center where you can find more information.

For reports that do include drill down/through for easier navigation from one report to the next report, the description in the information center provides a table with the names of the linked reports.

Note that each report has two pages in the information center:

- ▶ Running the <abc report> - where to find it and how to invoke it
- ▶ <abc report> - what is the content and which links are available

Following is the list of the reports that are predefined in Tivoli Storage Productivity Center Version 5.1:

▶ IBM Tivoli Storage Productivity Center Historical Information

[http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_c\\_12\\_histinfo\\_predefined\\_repts.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_c_12_histinfo_predefined_repts.html)

– Storage System

- Storage System - Pools Historical Space Report
- Storage System - Volumes Historical Space Report
- Storage Systems - Historical Space Report

– Storage Virtualizer

- Storage Virtualizer - Pools Historical Space Report
- Storage Virtualizer - Volumes Historical Space Report
- Storage Virtualizers - Historical Space Report

▶ IBM Tivoli Storage Productivity Center Performance

[http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_c\\_12\\_ov\\_predefined\\_performance\\_reports.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_c_12_ov_predefined_performance_reports.html)

– Fabric and Switch

- Most Active Switch Ports Report
- Switch Performance Details Report
- Switch Port Performance Details Report

– Storage System

- Storage System - Array Details Report
- Storage System - Controller or Module Details Report
- Storage System - Details Report
- Storage System - Port Details Report
- Storage System - Volume Details Report
- Storage Systems - Most Active Arrays Report
- Storage Systems - Most Active Controllers or Modules Report
- Storage Systems - Most Active Pools Report
- Storage Systems - Most Active Ports Report
- Storage Systems - Most Active Report
- Storage Systems - Most Active Volumes Report

– Storage Virtualizer

- Storage Virtualizer - Details Report
- Storage Virtualizer - IO Group Details Report
- Storage Virtualizer - MDisk Details Report
- Storage Virtualizer - Node Details Report
- Storage Virtualizer - Node Details Report
- Storage Virtualizer - Port Details Report
- Storage Virtualizer - Volume Details Report
- Storage Virtualizers - Most Active IO Groups Report

- Storage Virtualizers - Most Active MDisks Report
  - Storage Virtualizers - Most Active Nodes Report
  - Storage Virtualizers - Most Active Pools Report
  - Storage Virtualizers - Most Active Ports Report
  - Storage Virtualizers - Most Active Volumes Report
- IBM Tivoli Storage Productivity Center Resources
- [http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_c\\_12\\_ov\\_resources\\_predefined\\_rpts.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_c_12_ov_resources_predefined_rpts.html)
- Server
    - File System Details Report
    - Server Disk Details Report
    - Server Storage Summary Report
  - Storage System
    - Storage System - Disks Space Report
    - Storage System - Pools Space Report
    - Storage System - Volumes Space Report
    - Storage Systems - Space Report
  - Storage Virtualizer
    - Storage Virtualizer - Local Disks Space Report
    - Storage Virtualizer - Pools Space Report
    - Storage Virtualizer - Volumes Space Report
    - Storage Virtualizer MDisks Space Report
    - Storage Virtualizers - Space Report
  - Storage Resource Relationships Summary Report
  - Storage Resource Relationships Summary Report (Configurable)
- IBM Tivoli Storage Productivity Center Storage Tiering
- [http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_r\\_storage\\_tier\\_reports.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_r_storage_tier_reports.html)
- MDisk Group - VDisk Workload Activity Details Report
  - MDisk Group Details Report
  - MDisk Groups - Workload Activity Report
  - Storage Resource Group - VDisk Workload Activity Details Report
  - VDisk Details Report
  - VDisk Workload Activity Reports
  - Volume Migration Recommendation Report

When you look at the report names closely, you will recognize that they usually follow a certain naming convention:

<high level name> - < metric or low level name>

Some of the high-level names show the names as plural. When that is the case, a report consists not only of one entity being included, but multiple entities. For example:

Report name:	Storage Systems - Historical Space Report
High-level name:	Storage Systems

When you open this report, you will be prompted to select not only one but multiple storage systems, like you can see in Figure 4-14 on page 287.



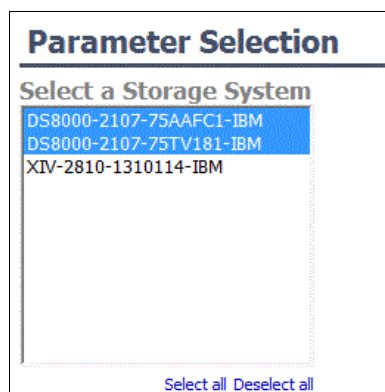


Figure 4-14 Parameter selection for some reports

### Historic reports

In Tivoli Storage Productivity Center 5.1, there are new reports that were not available before, not even in a similar way, because the data was not archived for these kinds of reports. These reports are for the storage systems, pools, and volumes. There is no equivalent in the stand-alone or web GUI.

Table 4-4 lists the new reports that show you capacity usage that is based on data collected via storage system probes.

Table 4-4 IBM Tivoli Storage Productivity Center historical information

Report	Description	Notes
<ul style="list-style-type: none"> <li>► Storage System <ul style="list-style-type: none"> <li>– Storage System - Pools Historical Space Report</li> <li>– Storage System - Volumes Historical Space Report</li> <li>– Storage Systems - Historical Space Report</li> </ul> </li> <li>► Storage Virtualizer <ul style="list-style-type: none"> <li>– Storage Virtualizer - Pools Historical Space Report</li> <li>– Storage Virtualizer - Volumes Historical Space Report</li> <li>– Storage Virtualizers - Historical Space Report</li> </ul> </li> </ul>	<p>With Tivoli Storage Productivity Center version 5.1, you can now report on the historical capacity/consumption of two more entities than before:</p> <ul style="list-style-type: none"> <li>► Storage pools</li> <li>► Storage volumes</li> </ul> <p>Even for storage subsystems and storage virtualizers, the Cognos capacity report has advantages because it provides more details.</p> <p>Note: In order for the storage pool or volume report to show any information, Tivoli Storage Productivity Center 5.1 had to be able to collect this data. Tivoli Storage Productivity Center 4.x did not collect that information.</p>	<p>You can select a single entity to be included in a report.</p> <p>or</p> <p>You can include an SRG that will act as a filter, and show all entities included from the selected report type, one after the other.</p> <p>There are no related links specified.</p>

The reports will be especially useful when you start using thin provisioning because then you might see much more changes, in particular for volumes.

### Performance reports

The performance reports are obvious to understand so at this point we will only explain the “most active” report idea. For those reports, Tivoli Storage Productivity Center is evaluating different metrics across the environment and sorts the entities accordingly. In the displayed report, you have a drop-down menu, where you can change which parameter is used for

sorting. This means that you can interactively change those reports while you are already looking at them. See Figure 4-13 on page 284 for an example.

## When to use predefined reports

For most of the reports, it is obvious what they are showing, but here we will point out some kind of use cases when you will want to use the predefined Cognos reports:

- ▶ Historical capacity reports

This group of reports is really new because in Tivoli Storage Productivity Center Version 4.2 and earlier, you could not easily get information about changes in the capacity of storage pool and storage volumes. Even for a storage subsystem, the reports include some additional details than Tivoli Storage Productivity Center used to provide.

- ▶ Storage Resource Relationships Summary Reports

The relationship reports are a simple way of displaying the storage that one or more server is using. You can restrict the report to only include some storage systems, but if you restrict the report too much you might get an empty result. However, you will also see some information about resources that you might not have selected. For example, if you selected a server and a storage system, but in the path between the two is a storage virtualizer, this one is automatically included.

It is very similar to a volume to host bus adapter (HBA) mapping report in the stand-alone GUI, only that here the mapping is not shown for HBAs but for servers, so reducing the number of lines. However, if in the case of an SAN Volume Controller a volume is striped across multiple MDisk in the resulting report, you will see a line for each MDisk that this volume is striped across.

There are two reports that show the relationship of resources:

- Storage Resource Relationships Summary Report
- Storage Resource Relationships Summary Report (Configurable)

Following are the differences between the two reports:

- The first report always included the storage virtualizer *and* back-end storage, whereas with the second report, you can specify to not include the storage systems, so that you get a report that is easier to read
- The second report also includes more host-level information like volume and file system

Both reports do not include capacity information but they include a number of drill through links to reports that do contain information like that.

## Considerations

There are no special considerations for using the predefined reports in general, and we cannot describe every report in detail in this book.

## Requirements

- ▶ Device has to be added to Tivoli Storage Productivity Center and should have a user-provided label (the default labels are sometimes very hard to remember)
- ▶ Data has to be probed or scanned for Tivoli Storage Productivity Center to be able to show any results
- ▶ Performance data has to be collected before information can be displayed

## 4.2.5 Report properties

Every report does have properties in Cognos. When you start using Cognos, these properties might be overwhelming, so we want to point out only a few things at this point. The properties are grouped into three different groups:

- ▶ General properties


Here you will find things like, for example: Select language, change the name, change retention options.

- ▶ Report properties

Select the default behavior when you open a report: Show last saved report or render a new version.

- ▶ Permission properties

Here you can specify which users are allowed to access that report.

To change properties, simply click this icon  next to the report name.

## 4.3 General thoughts

Before we continue with showing you how you can create your own reports, we point out some thoughts and the philosophy of some things in Cognos.

We pointed out specific topics of the user's guide at some places already, so here we provide a link to the complete chapter about Cognos reporting in the information center:

[http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_c\\_webbasedgui\\_rpting\\_ic\\_ov.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_c_webbasedgui_rpting_ic_ov.html)

### 4.3.1 Finding information in Cognos

Some items in Cognos have names that differ from what you might be used to. The reason is that Cognos requires names of two metrics (columns) that you add into one report that are not identical. For example, Cognos does not allow you to have a server volume (disk) and a storage system volume (LUN) in the same report if they both are just named "Volume". Therefore, in the data model the names may not be identical to the names in the GUI.

Furthermore, the naming convention required some more changes, such as:

- ▶ SAN Volume Controller and Storwize V7000 systems generally referred to as *Storage Virtualizers*
- ▶ User-Defined-Properties are called *Custom Tag* in the Cognos data model

If you start using Cognos, you might find this a bit irritating but it is not too hard to get used to it.

### 4.3.2 Support of the data models

In the Tivoli Storage Productivity Center manual, you will find the remark with the following restriction:

*You cannot create custom reports from the following packages:*

- ▶ *IBM Tivoli Storage Productivity Center Historical Information*
- ▶ *IBM Tivoli Storage Productivity Center Storage Tiering*

What this actually means is that the data models were created for providing the predefined reports in the corresponding folders, and there is a limited use when you try to create completely new reports from the data models.

Since models were not designed for creating new custom reports, you might find a lot of drawbacks because not all the information you would like is included in the models.

It certainly does not mean that if you discover incorrect information while you use the predefined reports, IBM will not accept and fix problems for those reports.

It also does not mean that you might want to change some attributes of those reports, but then like with any other custom report, IBM cannot support any error or deficiencies that might exist in your new or changed reports.

### 4.3.3 Data model for servers

As we explained earlier, the terms in Cognos for some entities are maybe not the same as in native terms of the systems. Here, we provide a very quick overview of the most important levels of a Windows or Linux/UNIX server in terms of storage information collected by Tivoli Storage Productivity Center, see Table 4-5 for details.

Table 4-5 Data model for Windows server

Native terms	Tivoli Storage Productivity Center web GUI	Tivoli Storage Productivity Center Cognos	Cognos example
Drive or File System	File System	Server Resources → Servers → File Systems → → <b>File System Mount Point</b>	Windows: C:/ Linux/UNIX: /home
Partition/Volume	Logical Volume	Server Resources → Servers → Logical Volumes → <b>Logical Volume Path</b>	Windows: C: \\?Volume.... Linux/UNIX: /dev/hd1
Disk	Disk name	Server Resources → Servers → Server Disks → <b>Server Disk Path</b>	Windows: Disk0 Linux/UNIX: /dev/hdisk0

Although Tivoli Storage Productivity Center has information about the controllers/HBAs of servers running a Storage Resource Agent (SRA), at this moment the Tivoli Storage Productivity Center data model does not yet include that information so this level is missing in the table above. Anyway you can create custom reports if you are willing to use SQL.

### 4.3.4 Data model for VMware hypervisor

As we explained earlier, the terms in Cognos for some entities are maybe not the same as in native terms of the systems. Here, we provide a very quick overview of the most important terms of a VMware Hypervisor in terms of storage information collected by Tivoli Storage Productivity Center. See Table 4-6 on page 291 for details.

**Note:** The information listed in Table 4-6 on page 291 is coming from a probe of a VMware data source. No SRA is required to collect this information.

Table 4-6 Data model for VMware hypervisor

Native terms	Tivoli Storage Productivity Center Web GUI	Tivoli Storage Productivity Center Cognos	Cognos Example
Data Store	Data Store or Logical Volume	Hypervisor Resources → Hypervisor Logical Volumes → <b>Hypervisor Logical Volume Path</b>	[LocalStorage] tpcvm01/tpcvm01-000001.vmdk
*.vmdk file	n/a	Hypervisor Resources → Managed Virtual Machines → Virtual Machine Files → <b>Virtual Machine File Path</b>	

**Note:** Actually, the Virtual Machine File Path does not only contain the virtual machine disk files, but also other important files of a virtual machine. Here is a list of files that can be listed:

- ▶ VM configuration file
- ▶ VM disk file
- ▶ VM NVRAM file
- ▶ VM snapshot file

The data model also contains the metric Hypervisor Resources → Managed Virtual Machines → Virtual Machine Files → Virtual Machine File Type that will contain the correct file type, so it is helpful for filtering.

The VM configuration file is also available as a separate metric: Hypervisor Resources → Managed Virtual Machines → Virtual Machine → Virtual Machine Configuration File.

Tivoli Storage Productivity Center also has information about the size of the files in Hypervisor Resources → Managed Virtual Machines → Virtual Machine Files → Virtual Machine File Logical Size GiB.

### 4.3.5 Grouping

When somebody talks about a group, there could be actually two meanings for people that work on reporting. Because it can be a major point for misunderstandings, we explain this here.

#### Planning for grouping

- ▶ You need to set up groups in Tivoli Storage Productivity Center first before you can use them for the reporting.

- ▶ Groups are still defined in the stand-alone Tivoli Storage Productivity Center GUI.
- ▶ Tivoli Storage Productivity Center always had groups that only allow you to add entities of certain types into the groups for reporting purposes:
  - Data Manager → Reporting → Groups → Computer
  - Data Manager → Reporting → Groups → File System
  - Disk Manager → Reporting → Groups → Storage Subsystem

The advantage of using these groups is that they not only support to add individual entities to the group, but also use simple filter rules to include entities.

In addition, Tivoli Storage Productivity Center has the concept of Monitoring Groups, but these types of groups have nothing to do with reporting.

In version 4.1, Storage Resource Groups (SRGs) have been added to Tivoli Storage Productivity Center. The advantage of SRGs is that you can add any kind of entity to an SRG (for example, volumes, servers, storage pool, and so on). SRGs can also contain other SRGs, so they are very flexible, but this obviously adds complexity. The panel to add, change, and delete SRGs in the stand-alone GUI can be found here:

IBM Tivoli Storage Productivity Center → Monitoring → Storage Resource Group Management

Although the SRGs are located in the Monitoring subtree of the stand-alone GUI, they are used for more purposes than just showing you a consolidated health status of the group.

Storage Resource Groups are tightly integrated with the SAN Planner function to help with storage provisioning, by using different kinds of profiles. Beginning with Tivoli Storage Productivity Center 4.2.2, there are predefined storage tiering reports that can report on an SRG level.

SRGs are also built into the TPCREPORT view schema, and so they can be accessed from SQL queries, if you want to.

- ▶ One entity can be included in multiple groups, no matter if it is a reporting group or an SRG.
- ▶ In version 4.2, the SRGs have been almost silently enhanced: SRGs can now be created, modified, and deleted from the tpctool command-line interface. With a little customization work, groups can now be created from input of other sources. So for example if you want to create a group based on applications running on server, you could write a script that would parse a file and group the servers into SRGs, which reflect the different applications.
- ▶ In the Cognos data model, both the older reporting groups and the Storage Resource Groups are available.
- ▶ Not all of the data models include groups for reporting so you should use table Table 4-7 to understand when you actually can use groups with Cognos.

*Table 4-7 Grouping available in the Cognos data models*

Data Model	Reporting Groups	Storage Resource Group
IBM Tivoli Storage Productivity Center Historical Information	n/a	✓
IBM Tivoli Storage Productivity Center Performance	n/a	n/a

Data Model	Reporting Groups	Storage Resource Group
IBM Tivoli Storage Productivity Center Resources	Server, Storage Subsystem, Storage Virtualizer	✓
IBM Tivoli Storage Productivity Center Storage Tiering	n/a	✓

#### Notes:

- ▶ The reporting groups Storage Subsystem and Storage Virtualizer are actually the same group type in the stand-alone GUI, it is just that in Cognos the subsystem group for a storage virtualizer is labeled differently.
- ▶ In IBM Tivoli Storage Productivity Center Resources → Tivoli Storage Productivity Center → Servers to Storage Systems → Server Resources, you will also find a folder in the navigation tree that is called *Logical Volume Group*. This is not a group created or managed by Tivoli Storage Productivity Center, it is a grouping of volumes on a logical volume manager level on the servers.

- ▶ In some situations, it might be more appropriate to use naming conventions for entities and based on that information group or filter data within your reports.

## When to use grouping

There are different concepts of groups:

- ▶ A group can mean that out of the complete list of entities, only a subset of entities should be included. Grouping can be compared to filtering. Typically when you think about filtering the items share one property, for example, a starting character. In a group, it is not required to have the same starting character.
- ▶ When you are more familiar with SQL, grouping will mean something different for you. In SQL, grouping means that entities are aggregated into one entry. Therefore, for example, if you have a group of servers, the free capacity that they are using could be added up to build a summary. Other simple examples of aggregate functions would be minimum, maximum, average, or count.
- ▶ Cognos has a function in that will group data. This can be used to aggregate numerical data and makes reports easier to read. See Figure 4-25 on page 307 for an example.

Grouping can be used to organize the data in reports in multiple ways, for example:

- ▶ Location information
- ▶ Tier information
- ▶ Application or project group
- ▶ Customer (if you are a storage provider with multiple customers)

Since SRGs currently do not provide a way of using predefined tags to describe their purpose, you might want to define your own convention for the SRG names or use the User-Defined-Properties that go with the name of Storage Resource Group Custom Tag in the Cognos data model.

## Considerations

- ▶ The Tivoli Storage Productivity Center 5.1 web GUI does not yet provide a way to manage groups, so you need to use the stand-alone GUI for any management of groups. The only exception is that SRGs can be managed by the CLI.
- ▶ At this point, the use of any kind of grouping will provide a similar result, but based on where Tivoli Storage Productivity Center is coming from and the direction it is heading to, the Storage Resource Groups are the more strategic approach.
- ▶ Although the Cognos data model allows you to use Storage Resource Groups, their use is currently being restricted to only list SRGs that include entities with at least one volume, storage pool, or storage subsystem.

## Requirements

- ▶ You need to have set up groups before you can report on them in Cognos.
- ▶ If you use Storage Resource Groups, they must include at least one volume, storage pool, or storage subsystem, to be available in Cognos. All other SRGs are simply filtered and not displayed in Cognos.
- ▶ License: No special requirement. Any Tivoli Storage Productivity Center license does include the required functions for using monitoring groups or Storage Resource Groups.

### 4.3.6 Storage subsystems versus storage virtualizer

In Cognos, you will find that the way the information is organized in the data model differentiates between a storage subsystem and a storage virtualizer. Most of the information in the data model is very similar, but when it comes to the performance metrics there is a huge number of metrics that are only available for the SAN Volume Controller and V7000, so this breakup helps to find the information more quickly.

Although this is a helpful way of organizing the metrics, there are two consequences from this organization:

- ▶ A V7000 used as a back-end device for an SAN Volume Controller will only show up under storage virtualizer reports, although in this case it could be regarded as a storage subsystem. This is not related to the “layer” attribute of the system.

The layer attribute defines the purpose of a Storwize V7000 that is in a relationship with another V7000 or SAN Volume Controller. A V7000 that is configured to provide storage to an SAN Volume Controller or another V7000 is defined with the layer attribute set to storage instead of replication.

- ▶ Supported non IBM storage virtualization devices (for example, Hitachi USP-V) do not have the same level of detailed information collected that Tivoli Storage Productivity Center will collect for SAN Volume Controller or V7000 devices. As a result, those non IBM devices will not be included in the Storage Virtualizer category.

So the Storage Virtualizer category could at this point really be called *SAN Volume Controller*, but it would not be completely correct because the V7000 is also listed in here. Furthermore, it would limit the future use of this category.

## 4.4 Create a basic report (Query Studio)

After looking through some of the predefined reports, you might want to create a report on your own. This is when you will start Query Studio, the second way to use Cognos.



## What Query Studio is

*Query Studio*, a web-based tool that enables you to create custom reports that show exactly the data that you are interested in. In order to create such a custom report, you do not need any skills in writing SQL and you certainly do not need knowledge about the database tables or views.

If you want to read more about the capability of Query Studio, you can open the online help of Query Studio. You can save the help into a PDF document for offline reading and maybe better search capabilities.

## When to create ad hoc reports

These are some situations when you use the Cognos Query Studio:

- ▶ When you do not find the data you are looking for or it is distributed across more than one panel in the web GUI, you can create what is called an *ad hoc report*. Often, you will not save this type of report because typically you add filters and columns in a way that is unique to your question.
- ▶ When you need a report that is not available in Tivoli Storage Productivity Center, but it does not require much customization so that you do not need to use Report Studio.
- ▶ When there is a report that you need to adjust.

## Considerations

- ▶ Not all reports can be edited in Query Studio. Typically, if reports have been created with the more advanced Report Studio you can only edit them in Report Studio.
- ▶ Report location
  - If you save a report (or anything else) into the My Folder tab, it will not be available for any other user logged in to Cognos. So if you want others to use the report, you should create a folder to store the reports that you want to share.
  - If you want to be able to copy the report definitions to another Tivoli Storage Productivity Center server, you should create a folder outside of the Tivoli Storage Productivity Center predefined folders and reports.
- ▶ Security: If you are running in a multi-user environment, you may need to restrict the access to this report for other users and groups
- ▶ Query Studio does not support multiple languages in a single report, if you do need to have one report in multiple languages you have two options:
  - Copy and translate the report so that you have multiple reports, one per language  
This approach might be not usable if you have links/drill-down capabilities from other reports to this report, unless you want to copy the whole reporting structure for each language.
  - Use Report Studio
- ▶ If you created a report in Query Studio, when you use it at a later time it will start in Query Studio. This means that you can quickly adjust the report if required, but it also means that the report actions are not available that we explained in Figure 4-11 on page 282. For example, you cannot save a version of the report that you are currently looking at, instead you would have to do that from the Cognos list of reports.
- ▶ The Query Studio only supports the following type of reports:
  - List reports
  - Grouped list reports
  - Crosstab (pivot) reports

- Charts (pie, column, bar, line, area, column-line, and radar charts)

Note: Bar and column charts are very similar, just the direction of bars (left to right) and columns (bottom to top) are different.


- Query Studio gives you the ability to perform simple calculations. Once you added them to a report, you cannot edit or change them. You need to delete and add the changed calculation to the report again.

## Requirements

There is actually nothing that you need to install like it used to be with the BIRT-based custom reports, so the only requirements are to use a supported browser, which at this time can be found on this page:

<http://www-01.ibm.com/support/docview.wss?uid=swg27024859#browser>

**Note:** Tivoli Storage Productivity Center has been tested and runs with different browsers, but when you are starting to get into creating your own reports, we have better experience using MS Internet Explorer than with Firefox for the following reasons:

- Firefox does not support drag/drop in Query Studio or Report Studio. You will either have to use the  button or right-click a metric and select insert from the pop-up menu.
- Report Studio did not work for us.

This is a temporary restriction, that will be lifted with the next fix pack (fix pack 1).

So even if you do not use Internet Explorer, usually you might want to use it for creating custom reports with Tivoli Storage Productivity Center.

If you are just using predefined reports or one of your existing reports and you are not going to make modifications, you can also use Firefox.

If you cannot wait for the fix pack 1, you can install the special Tivoli Common Reporting interim fix 6 to be able to work with Firefox. This interim fix is available here:

<http://www-933.ibm.com/support/fixcentral/swg/selectFixes?parent=ibm~Tivoli&product=ibm/Tivoli/IBM+Tivoli+Common+Reporting&release=2.1.1.0&platform=All&function=all>

**Important:** Internet Explorer often requires some configuration to be performed:

- Add IBM Cognos URLs to the Trusted Sites zone
- Enable automatic prompting for file downloads. At first, we could not open Excel-based reports from Cognos. Enabling this setting solved this issue:
  - In Internet Explorer, go to the Tools → Internet Options → Security tab.
  - Select the Trusted Sites zone (the one that you added your IBM Cognos URLs to)
  - Click Custom Level
  - In the Downloads section enable
    - “Automatic prompting for file downloads”
    - “File download”

**Note:** By default, any user that was able to open/log in to Cognos is allowed to create reports.

## Query Studio GUI

In the Tivoli Storage Productivity Center Web GUI, simply click Reporting → Create a basic report. If you are already in Cognos, you can easily switch to the Cognos Query Studio by using the “Launch” menu on the upper right side, like shown in Figure 4-15, so there is no need to go back to the Tivoli Storage Productivity Center web GUI.

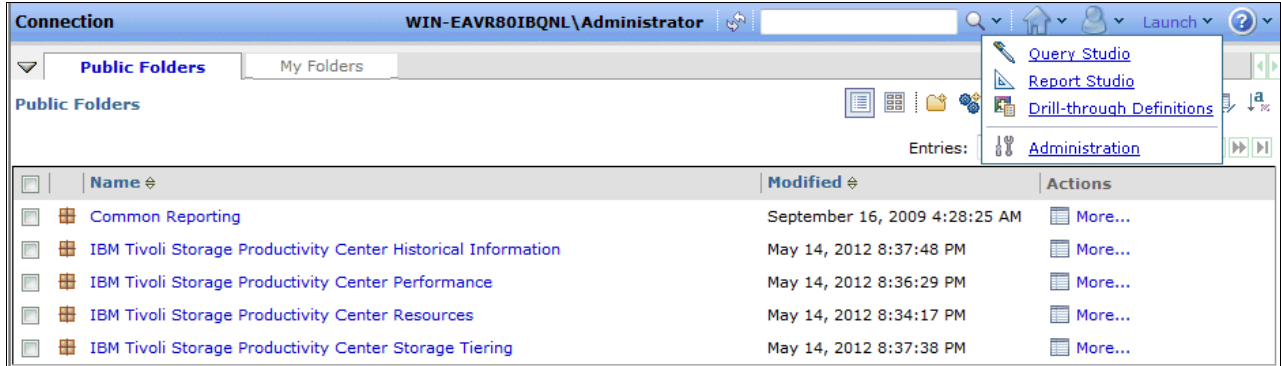


Figure 4-15 Launch Cognos from Tivoli Common Reporting

Next, you have to select a report package/data model that you will base your report on from the list of packages that are shown in Figure 4-16. Remember that only two of the shipped packages are actually meant to use in our own reports (for more information, see 4.3.2, “Support of the data models” on page 289).

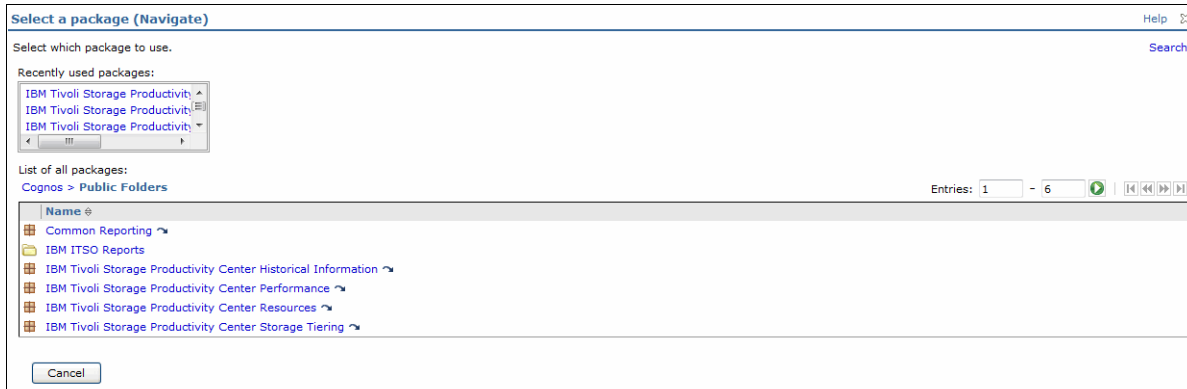


Figure 4-16 Select reporting package to use

In the example that will follow “Create a report” we selected IBM Tivoli Storage Productivity Center Resources. When you click this link, the Query Studio opens and presents you an empty report like what is shown in Figure 4-17 on page 298.

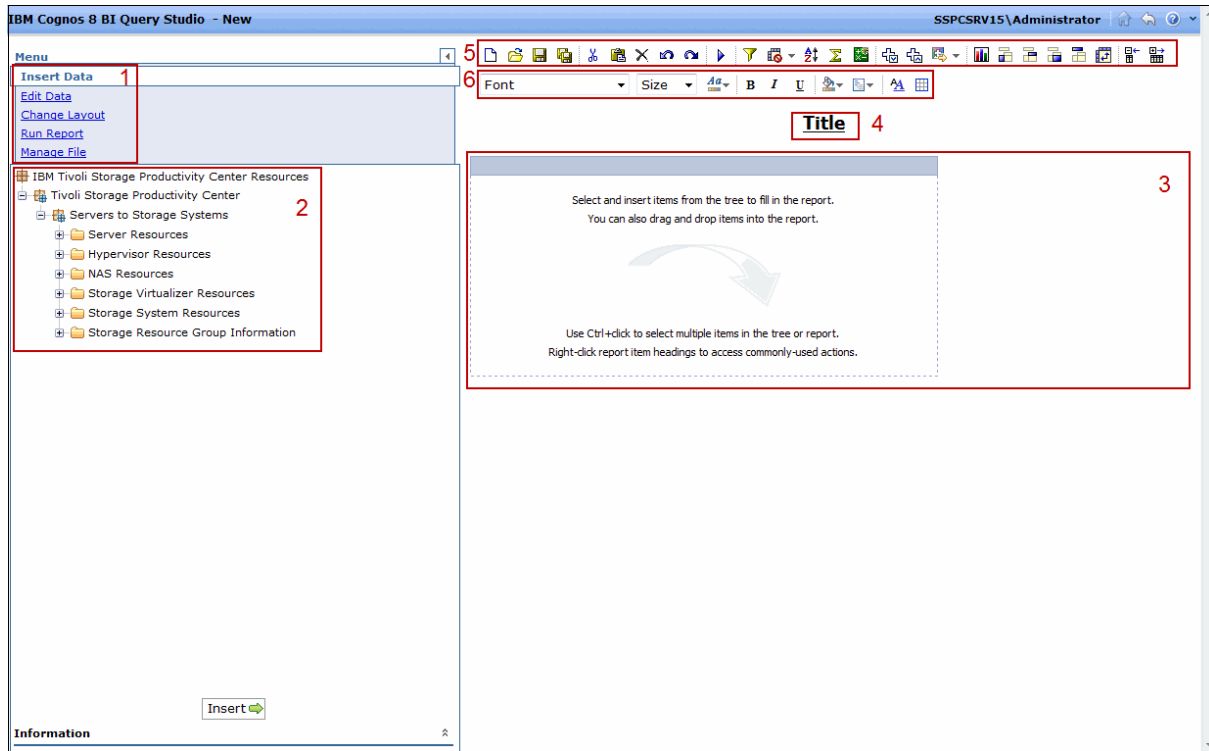


Figure 4-17 Query Studio editor

In the Query Studio editor that is shown in Figure 4-17, we highlighted several details with a frame:

1. This is the aspect of the navigation area (frame 2). You can choose from the following options:
  - Insert Data: Insert data into the report
  - Edit Data
  - Change Layout
  - Run Report
  - Manage File
2. When Insert Data is selected in frame 1, you will have a hierarchical tree of available information (metrics, and some filters). Usually this is collapsed, but to give you a better overview we have expanded this before we created the screen capture).
3. The report area
4. Report title
5. Shortcuts to edit and layout function otherwise available in frame 1
6. Changing the appearance of the report

Query Studio supports a lot of functions, which we cannot explain all in this book, but we found the following functions so helpful, that we believe you do not need to export data into other tools like Excel. Table 4-8 on page 299 lists the most frequently used functions in Query Studio.

Table 4-8 Most frequently used functions in Query Studio

Function	Examples
Grouping of data	“Step 3” on page 304
Creating sections	“Step 2” on page 302
Creating crosstabs (pivot tables)	“Step 5” on page 307
Conditional styles	Figure 4-104 on page 375
Filters	“Considerations for this report” on page 313

We will use these functions in the example that we describe later in this chapter.

## Create a report

Now we create a report example using the Cognos Query Studio. In order to make it a useful report, we choose to create a report that shows SAN Volume Controller VDisk mirror information in a way that the SAN Volume Controller GUI does not provide.

Figure 4-18 shows you that SAN Volume Controller displays information about VDisk mirror in a tree table fashion. From this table, you can see that the volume has VDisk mirror set up, and you know the name of one of the pools that contains a VDisk copy. You need to go to the properties to find out where the other VDisk copy is stored.

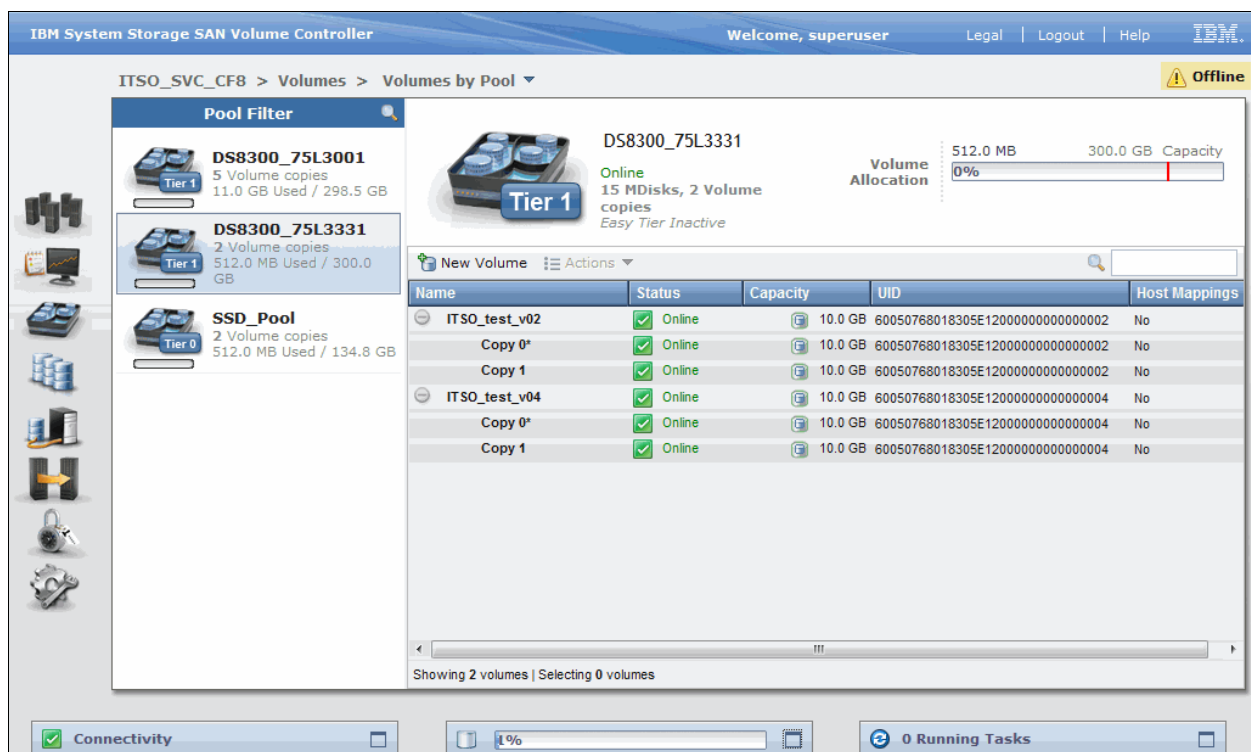


Figure 4-18 SAN Volume Controller GUI VDisk mirror information

## Step 1

Our report should display the information differently and hopefully more intuitively. The first thing we did after opening the Query Studio is to add all the columns that we need to the report area. In Table 4-9 on page 300 we provide you a reference which columns we used.

The report is based on the Tivoli Storage Productivity Center Resources data model, and since everything in the model has a common start in the hierarchical tree of Tivoli Storage Productivity Center Resources → Tivoli Storage Productivity Center → Servers to Storage Systems, we leave out this part. Figure 4-19 shows our report.

Table 4-9 Finding the columns in the data model IBM Tivoli Storage Productivity Center resources

Column label	Data model hierarchy
Storage Virtualizer Name	Storage Virtualizer Resources → Storage Virtualizers → Storage Virtualizer Name
Storage Virtualizer Volume Name	Storage Virtualizer Resources → Storage Virtualizer Volumes → Storage Virtualizer Volume Name
Storage Virtualizer Volume Real Space (GiB)	Storage Virtualizer Resources → Storage Virtualizer Volumes → Capacity and Usage Metrics → Storage Virtualizer Volume Real Space (GiB)
Storage System Custom Tag 1	Storage SystemResources → Storage Systems → Component Properties → Storage System Custom Tag 1
Storage Virtualizer Pool Name	Storage Virtualizer Resources → Storage Virtualizer Pools → Storage Virtualizer Pool Name

The screenshot displays the IBM Cognos 8 BI Query Studio interface. On the left, the 'Menu' pane shows the 'Insert Data' section with a tree view of the data model hierarchy. The 'Storage System Custom Tag 1' column is highlighted in the tree. The main workspace shows a report titled 'Title' with five columns: 'Storage Virtualizer Name', 'Storage Virtualizer Volume Name', 'Storage Virtualizer Volume Real Space (GiB)', 'Storage System Custom Tag 1', and 'Storage Virtualizer Pool Name'. The data is organized into rows, with a 'Summary' row at the bottom showing a total of 21.69 for the 'Storage Virtualizer Volume Real Space (GiB)' column. The status bar at the bottom indicates 'Information - Storage System Custom Tag 1' and the date 'Jun 26, 2012'.

Figure 4-19 Columns added to the report

The more complex the report, the more you need to plan how you arrange your columns and the sequence of steps how you create the report.

Here, for example, we choose the last two columns carefully, because we want to show a hierarchy of the two columns later on.

The column labeled Storage System Custom Tag 1 is automatically derived from the storage systems that are used as a back-end to the SAN Volume Controller. This is what makes the Cognos data models so powerful because with pure SQL this would have been more complex.

For this report, we filled this Storage System Custom Tag 1 in the stand-alone GUI of Tivoli Storage Productivity Center before we started creating the report, but this is a one time customization task.

### ***Step 1 (optional)***

**Note:** Since we have taken the information from the Storage Virtualizer Resources folder, the report will actually also include any IBM Storwize V7000 device. When the IBM Storwize V7000 is included, the report might not be as useful. This is because VDisk mirroring is often used in SAN Volume Controller stretch cluster installations.

If you want to filter out all Storwize V7000 systems, that is easy to do:

1. Insert the information: **Storage Virtualizer Resources** → **Storage Virtualizers** → **Vendor, Model, and Device Information** → **Storage Virtualizer Type**
2. Right-click that column and select **Filter** from the menu (see Figure 4-20)
3. Select **IBM SAN Volume Controller Cluster**, and leave the other settings
4. Click **OK**

If you want to you can now delete the column so that it is not displayed anymore, but you need to ensure (clear) to delete the filter at the same time.

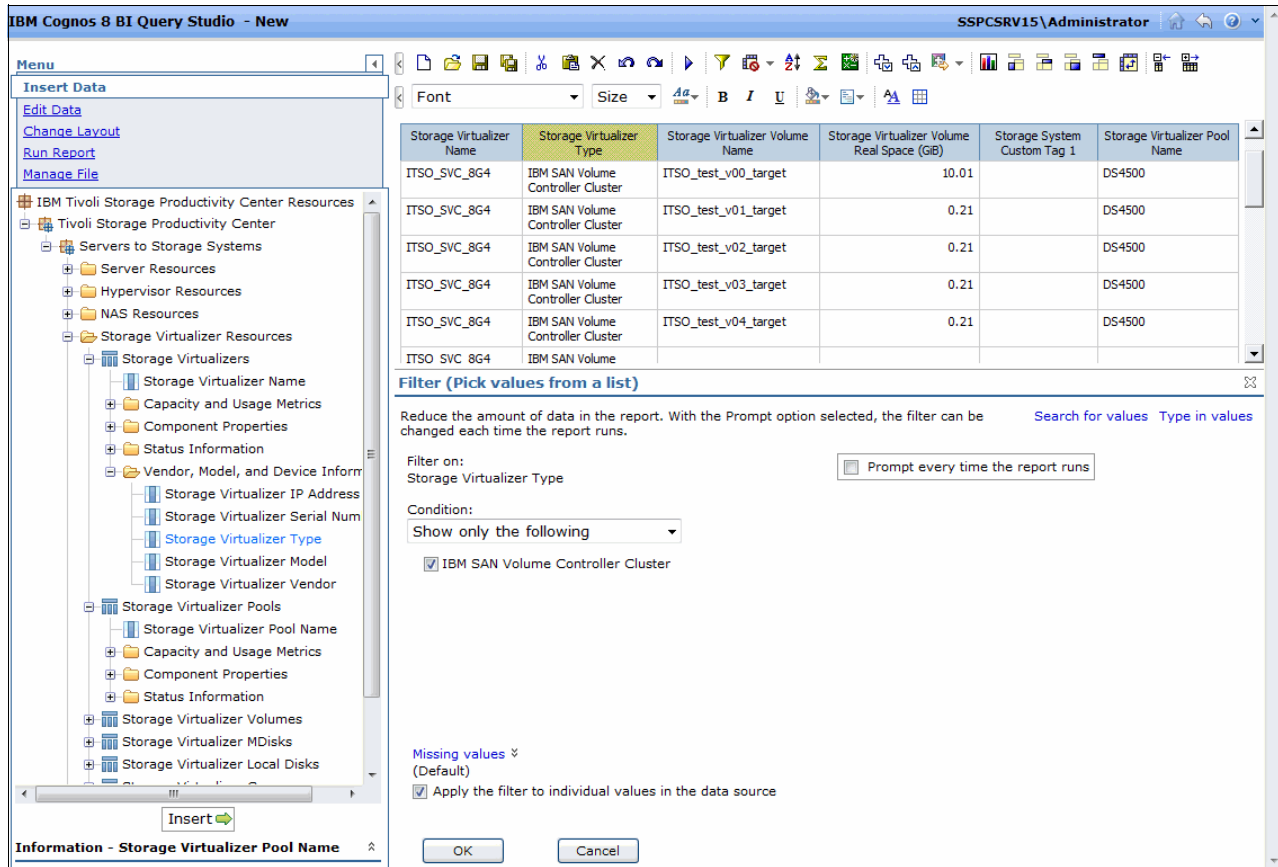



Figure 4-20 Use the filter

## Step 2

The next step is to add a section, so that each SAN Volume Controller will be displayed with its own little table of volumes. In Figure 4-21 on page 303 we selected the first column and clicked  to create sections.



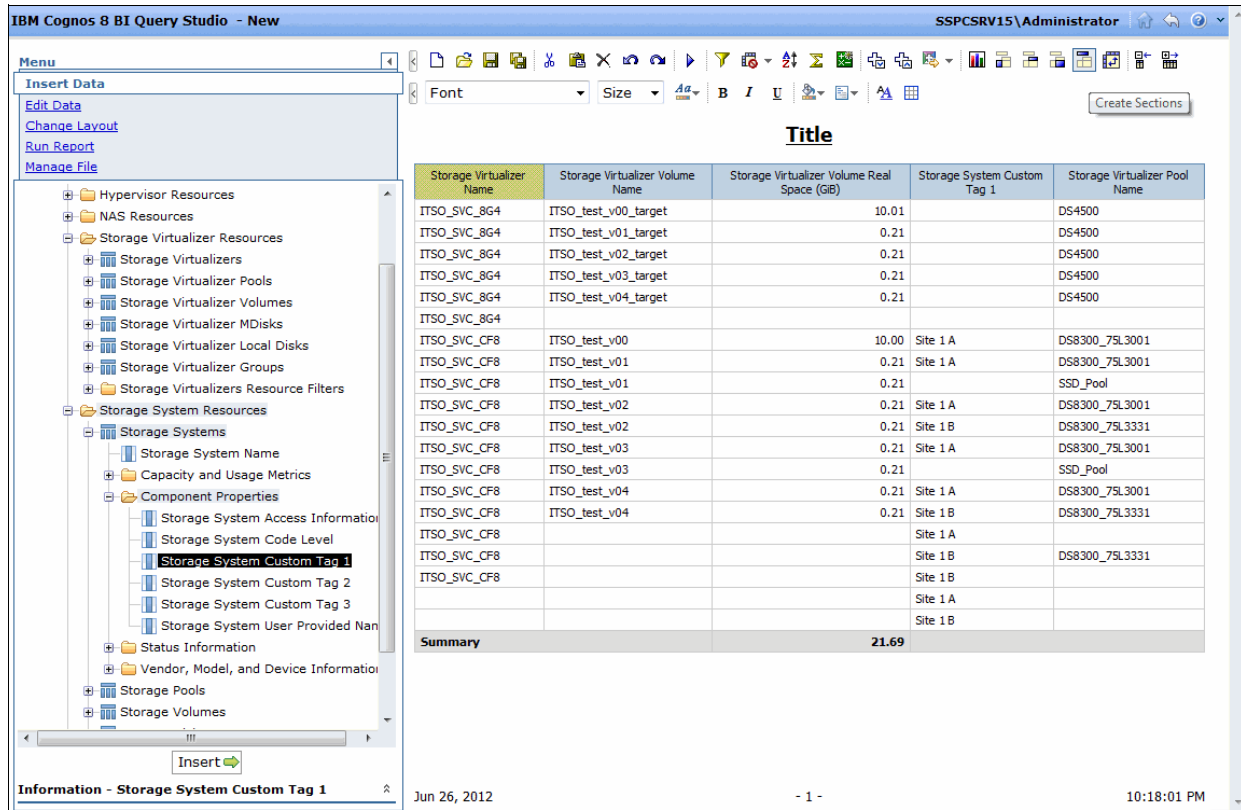

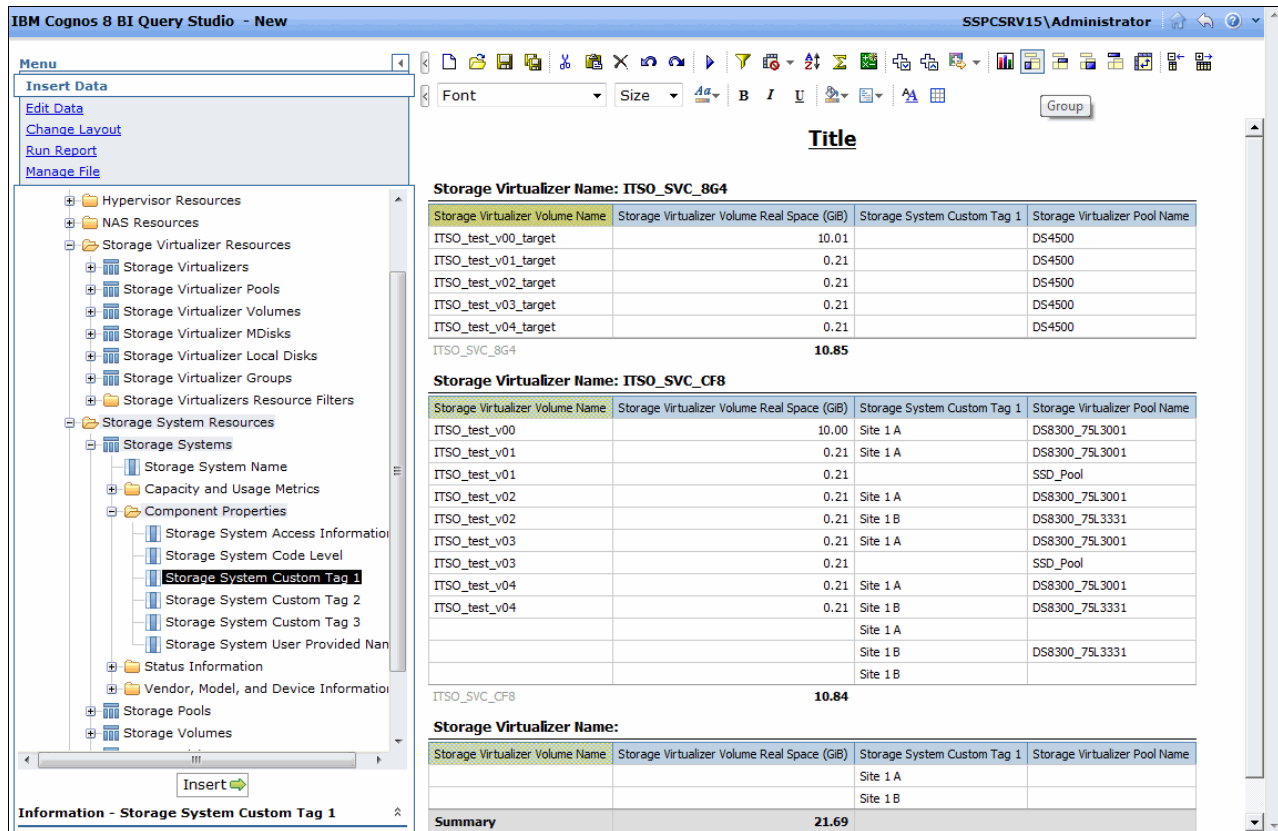


Figure 4-21 Creating sections for the SVCs

Once we have the sections we create a group of volumes. This is only really required because we want to turn off the automatic summation, which would later be confusing.

### Step 3

As shown in Figure 4-22, we select the column with the volume names, and click the group icon .



**Menu**  
[Insert Data](#)  
[Edit Data](#)  
[Change Layout](#)  
[Run Report](#)  
[Manage File](#)

**Font**    **Size**    **B**    **I**    **U**    **Group**

**Title**

**Storage Virtualizer Name: ITSO\_SVC\_8G4**

Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Storage System Custom Tag 1	Storage Virtualizer Pool Name
ITSO_test_v00_target	10.01		DS4500
ITSO_test_v01_target	0.21		DS4500
ITSO_test_v02_target	0.21		DS4500
ITSO_test_v03_target	0.21		DS4500
ITSO_test_v04_target	0.21		DS4500
<b>ITSO_SVC_8G4</b>	<b>10.85</b>		

**Storage Virtualizer Name: ITSO\_SVC\_CF8**

Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Storage System Custom Tag 1	Storage Virtualizer Pool Name
ITSO_test_v00	10.00	Site 1 A	DS8300_75L3001
ITSO_test_v01	0.21	Site 1 A	DS8300_75L3001
ITSO_test_v01	0.21		SSD_Pool
ITSO_test_v02	0.21	Site 1 A	DS8300_75L3001
ITSO_test_v02	0.21	Site 1 B	DS8300_75L3331
ITSO_test_v03	0.21	Site 1 A	DS8300_75L3001
ITSO_test_v03	0.21		SSD_Pool
ITSO_test_v04	0.21	Site 1 A	DS8300_75L3001
ITSO_test_v04	0.21	Site 1 B	DS8300_75L3331
		Site 1 A	
		Site 1 B	DS8300_75L3331
		Site 1 B	
<b>ITSO_SVC_CF8</b>	<b>10.84</b>		

**Storage Virtualizer Name:**


Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Storage System Custom Tag 1	Storage Virtualizer Pool Name
		Site 1 A	
		Site 1 B	
<b>Summary</b>	<b>21.69</b>		

**Information - Storage System Custom Tag 1**

Figure 4-22 Grouping volumes

The result of the grouping is shown in Figure 4-23, but since each volume had only one row anyway it is not so obvious.

**Step 4**

As we said earlier, we want to turn off the automatic summation so we right-click the summation line, and select  .

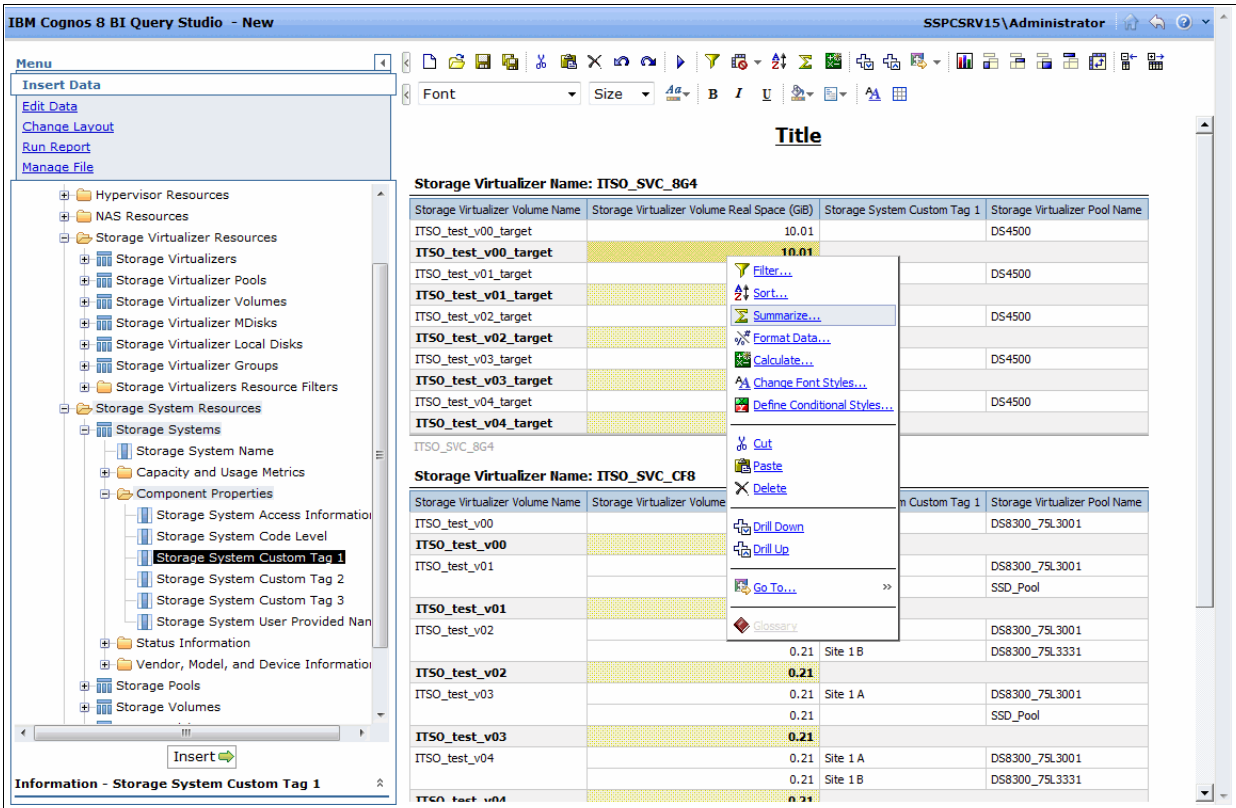


Figure 4-23 Context menu

A panel will open in the bottom part of the page, where you switch the summation by selecting **None** from the list, as shown in Figure 4-24.

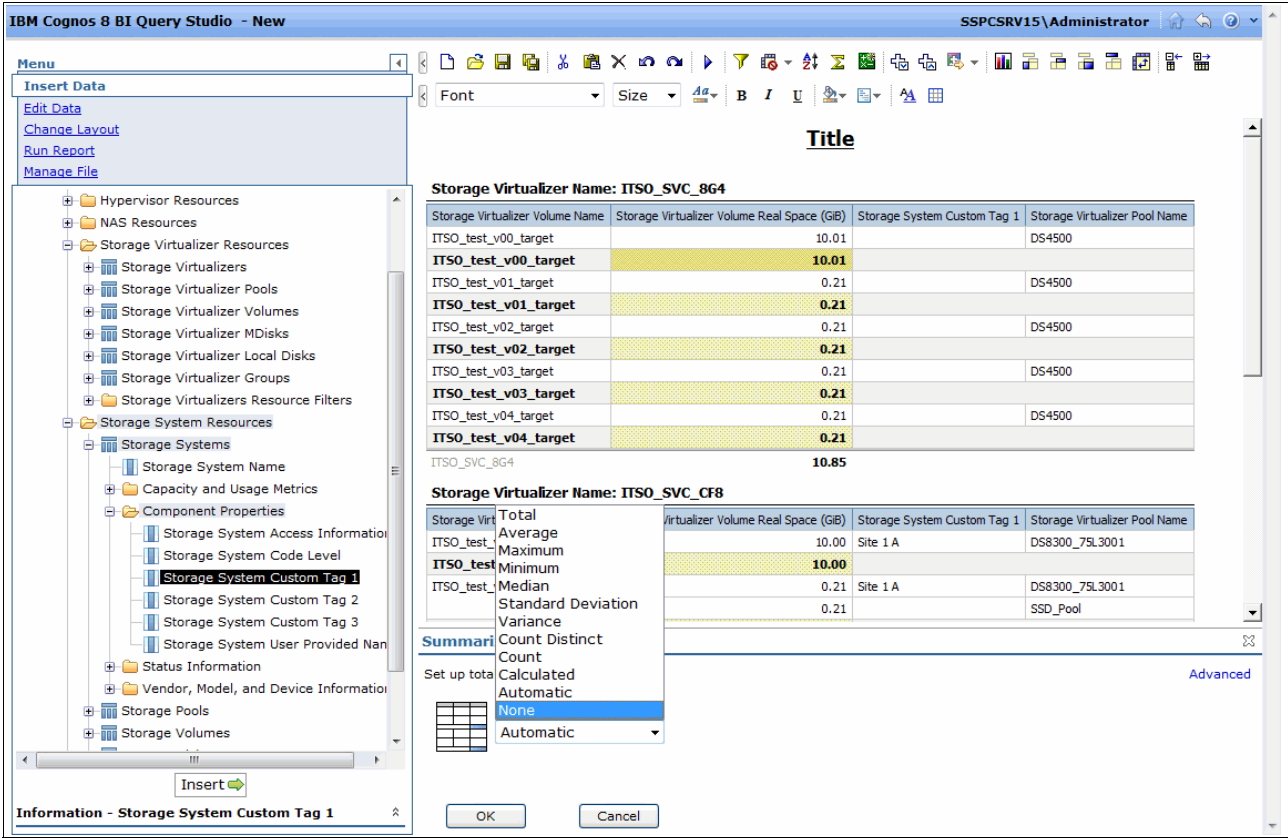

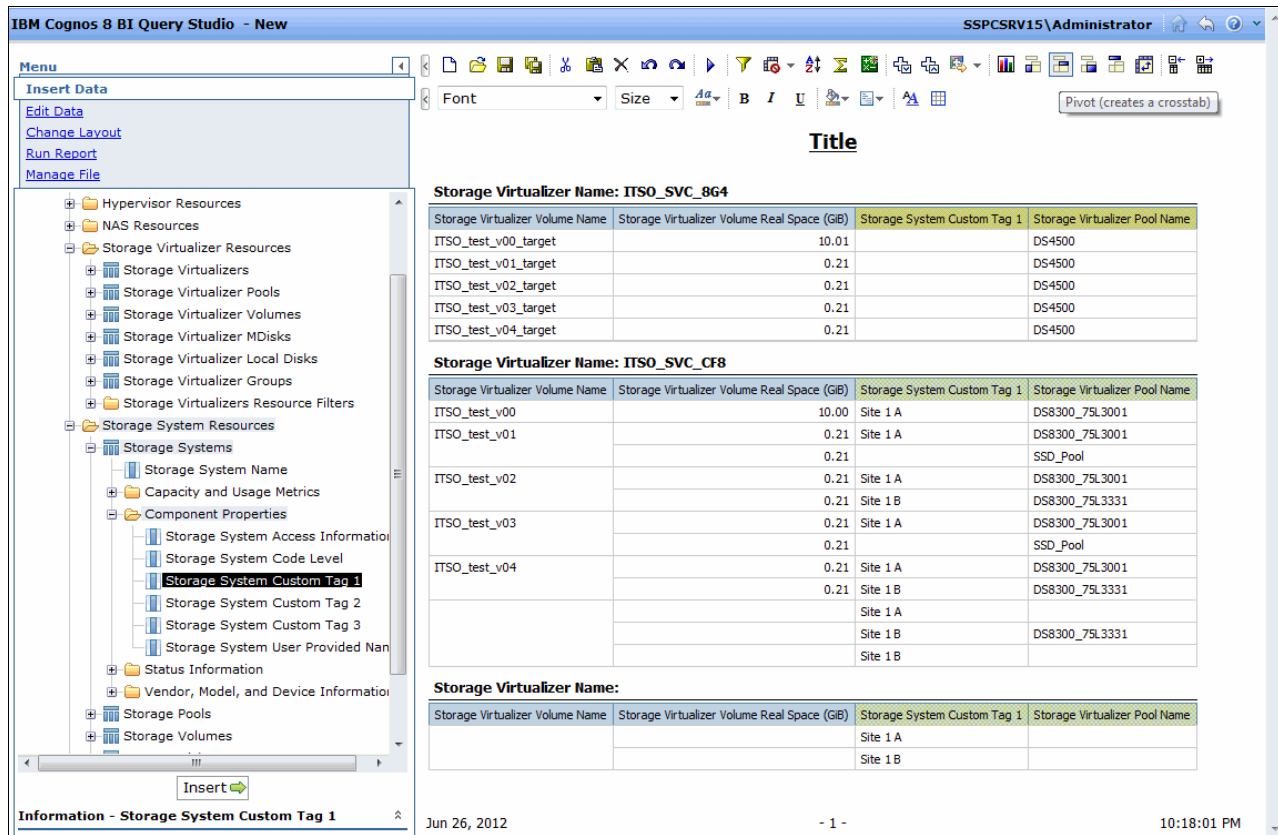


Figure 4-24 Change summation

When you are finished click **OK** to apply the changes.

## Step 5

The last major step before we do some cosmetic corrections is to create a crosstab. To do this, simply select the two rightmost columns, and click the crosstab icon  , as shown in Figure 4-25.



**Menu**  
Insert Data  
Edit Data  
Change Layout  
Run Report  
Manage File

**Font**    **Size**    **AA**    **B**    **I**    **U**    **Color**    **Align**    **Grid**    **Pivot (creates a crosstab)**

**Title**

**Storage Virtualizer Name: ITS0\_SVC\_864**

Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Storage System Custom Tag 1	Storage Virtualizer Pool Name
ITS0_test_v00_target	10.01		DS4500
ITS0_test_v01_target	0.21		DS4500
ITS0_test_v02_target	0.21		DS4500
ITS0_test_v03_target	0.21		DS4500
ITS0_test_v04_target	0.21		DS4500

**Storage Virtualizer Name: ITS0\_SVC\_CF8**

Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Storage System Custom Tag 1	Storage Virtualizer Pool Name
ITS0_test_v00	10.00	Site 1 A	DS8300_75L3001
ITS0_test_v01	0.21	Site 1 A	DS8300_75L3001
	0.21		SSD_Pool
ITS0_test_v02	0.21	Site 1 A	DS8300_75L3001
	0.21	Site 1 B	DS8300_75L3331
ITS0_test_v03	0.21	Site 1 A	DS8300_75L3001
	0.21		SSD_Pool
ITS0_test_v04	0.21	Site 1 A	DS8300_75L3001
	0.21	Site 1 B	DS8300_75L3331
		Site 1 A	
		Site 1 B	DS8300_75L3331

**Storage Virtualizer Name:**

Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Storage System Custom Tag 1	Storage Virtualizer Pool Name
		Site 1 A	
		Site 1 B	

**Information - Storage System Custom Tag 1**

Jun 26, 2012    - 1 -    10:18:01 PM

Figure 4-25 Grouped table

The order of the two columns is important because we want to have the “site” information on top of the storage pool name, and if the columns would be swapped they would also show as storage pool on top of the “site”.

Figure 4-26 on page 308 shows you the resulting crosstab.

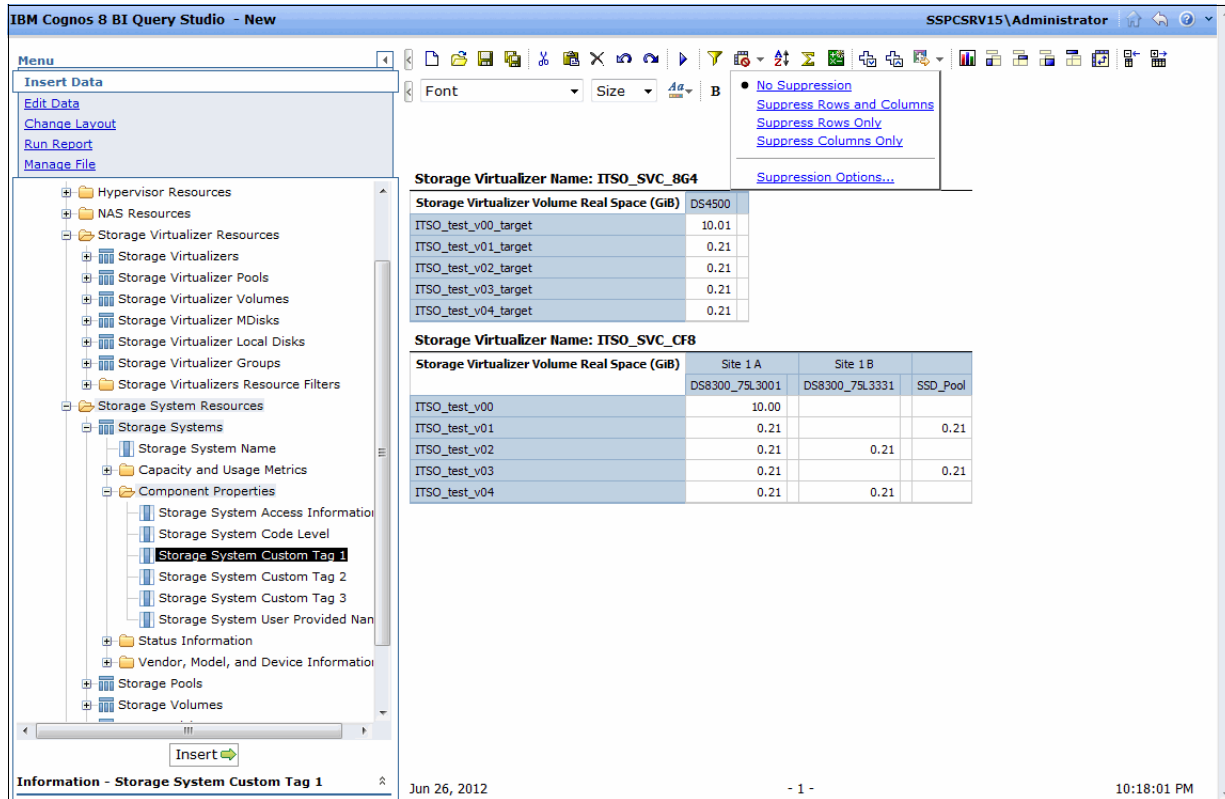



Figure 4-26 Crosstab of VDisk information

### Step 6

Since there are some empty columns that we do not want to be shown in the final report, we click  and select **Suppress Rows and Columns**, which then results in a report as shown in Figure 4-27 on page 309.

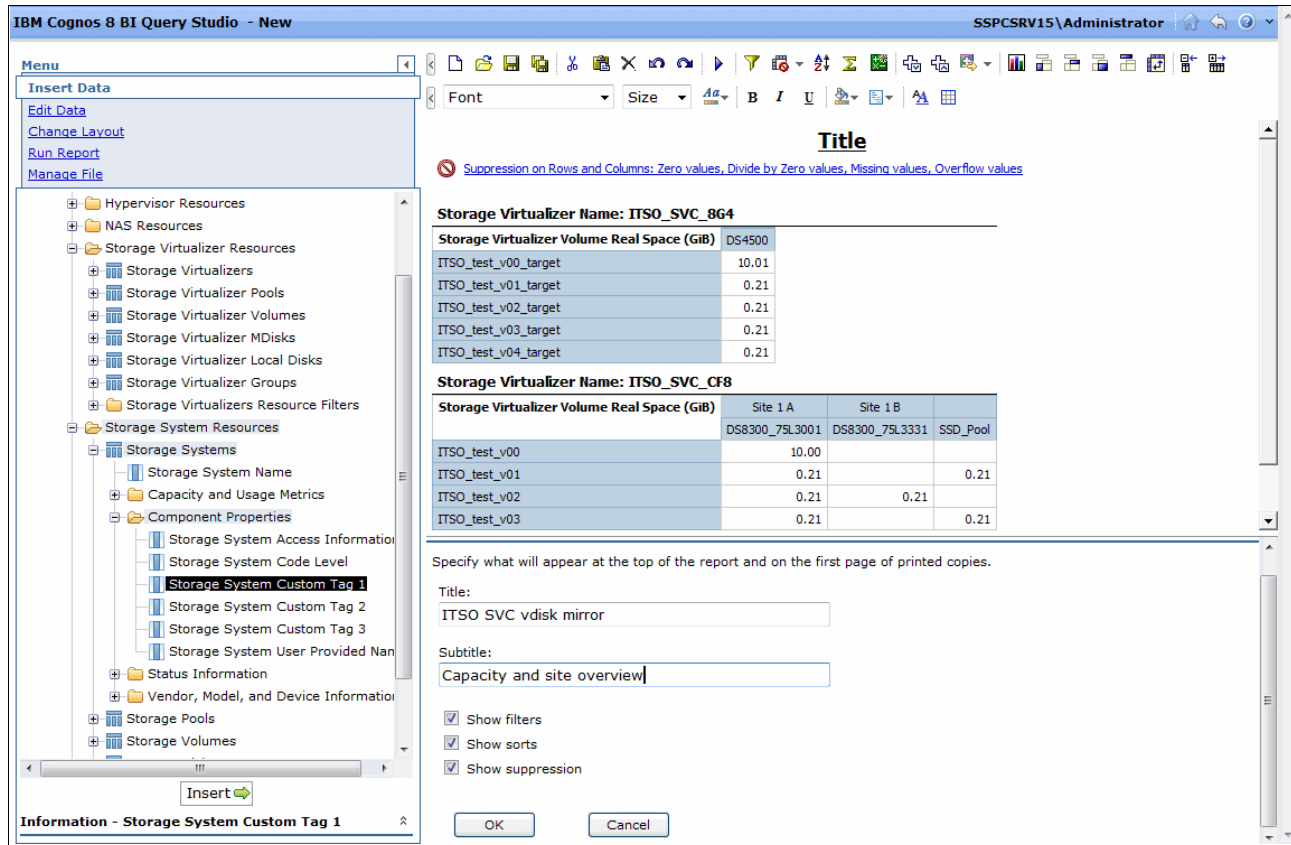


Figure 4-27 Edit title

### Step 7

The next step is just cosmetic corrections because we still like to use the term SAN Volume Controller.

The first one is to change the label of Storage Virtualizer Volume Real Size (GiB) into a shorter label. To do this, simply double-click the label to open the edit panel on the bottom part of the window, as shown in Figure 4-28 on page 310.

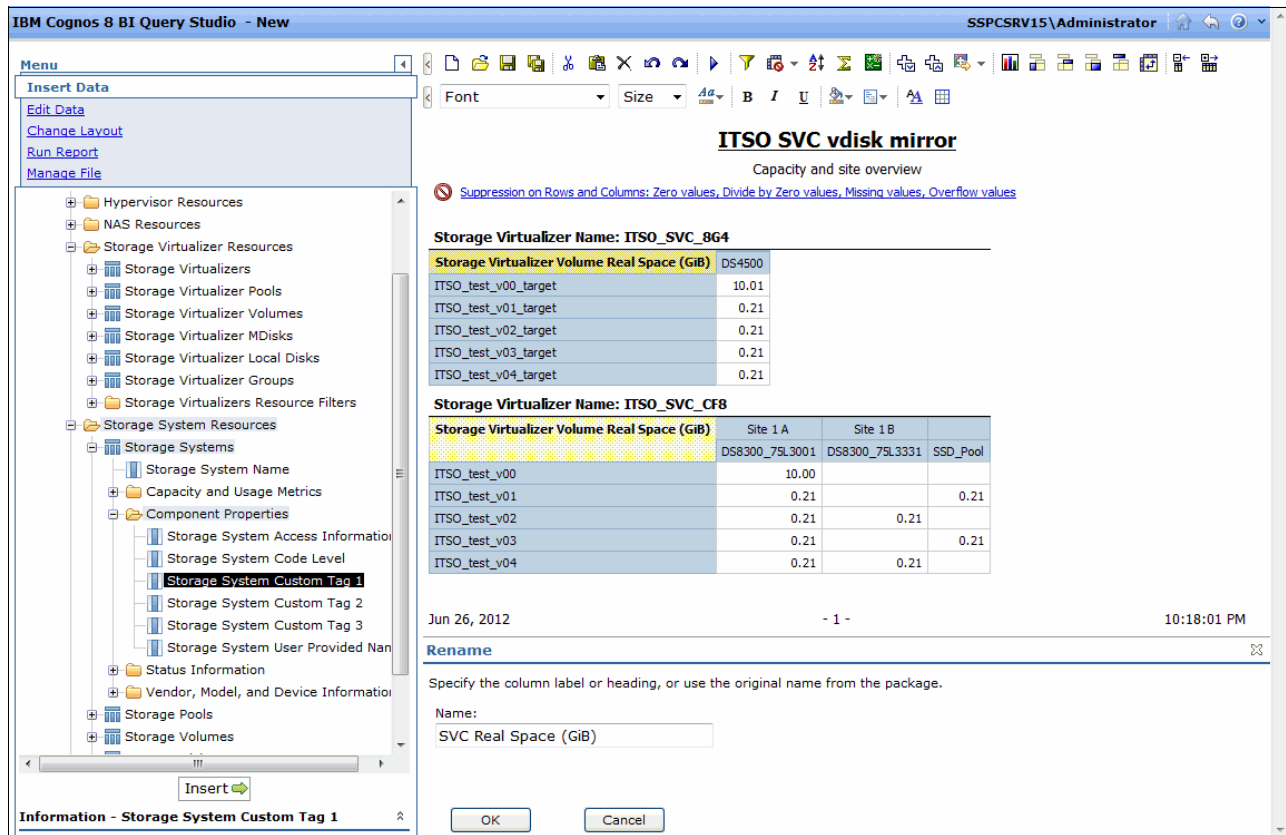



Figure 4-28 Change column label

Simply type in the name you would like to use and click **OK**.



Now the only thing that is left is to save your new report. Click  and use the panel to provide a name, description, and other information, as shown in Figure 4-29.

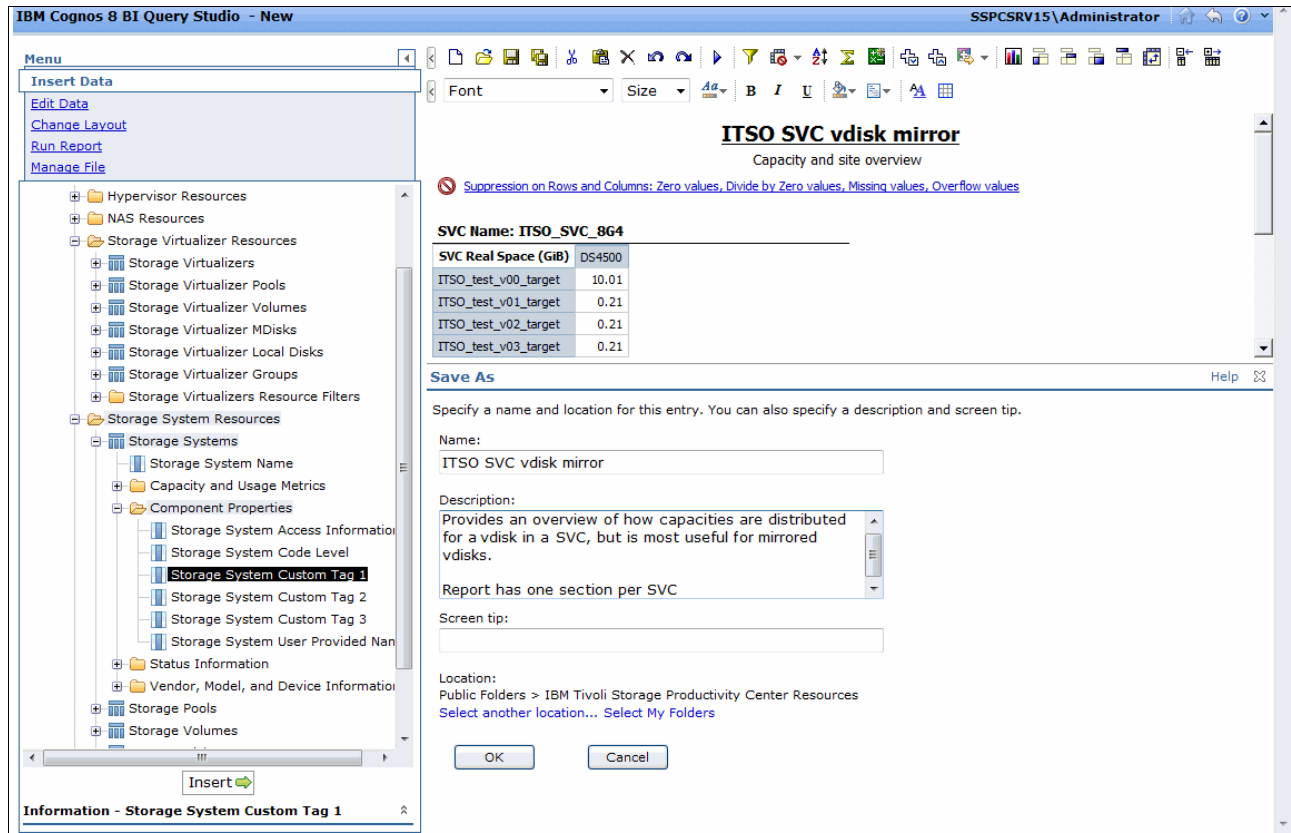


Figure 4-29 Save the report

As we discussed previously, we want to keep our custom reports separate from the preinstalled ones. We also want to make them available to multiple users. To do this we specify the IBM ITSO Reports folder that we created previously.

From the panel, simply click **Select another location**. Navigate and select the folder of your choice and click **OK**, as demonstrated in Figure 4-30 on page 312.

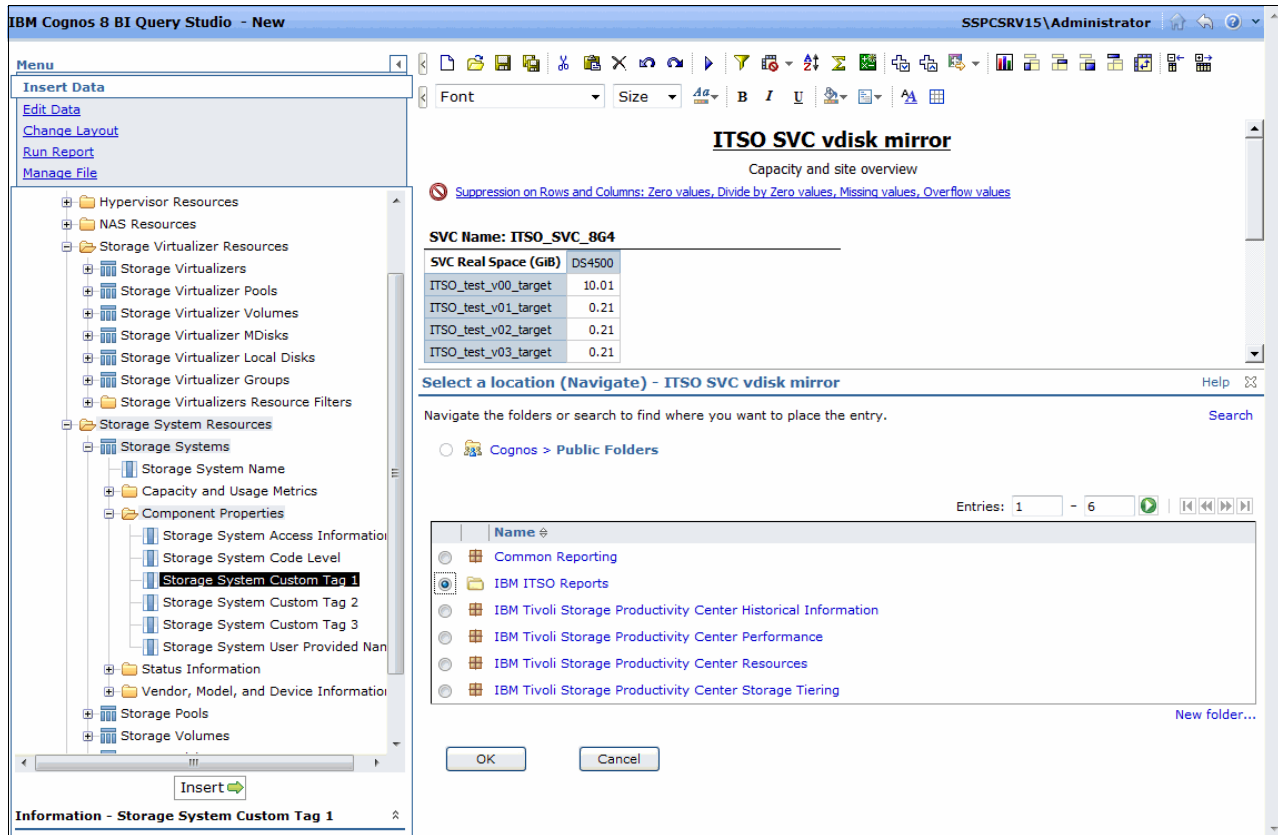



Figure 4-30 Select another location

Once you click **OK** you are done. You can now close the window/tap and click .

## Open your new report

Whenever you now want to use this report, you simply navigate from the **TPC Web GUI** → **Reporting** → **View predefined report** → **<your folder name>**. See Figure 4-31 to see how your report is listed in the folder.

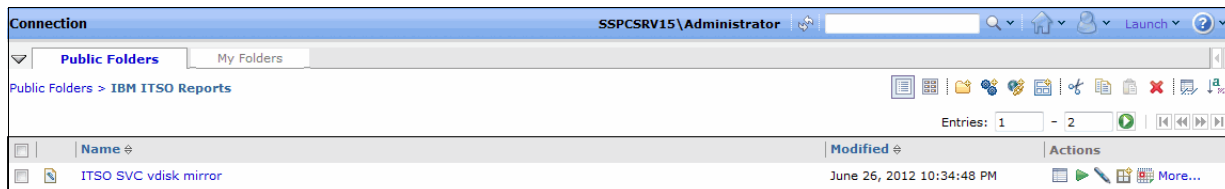


Figure 4-31 Our example report

From here, you can simply click the label to open the report or use any other action.

**Note:** Since this is a report created in Query Studio, it has a different icon that the ones that come preinstalled with Tivoli Storage Productivity Center. This simply means that when you open the report you will get back into the Query Studio editor to view or change your report.

If the space in the panel is too small, you can click the little icon (indicated in Figure 4-32) to minimize the navigation area on the left.

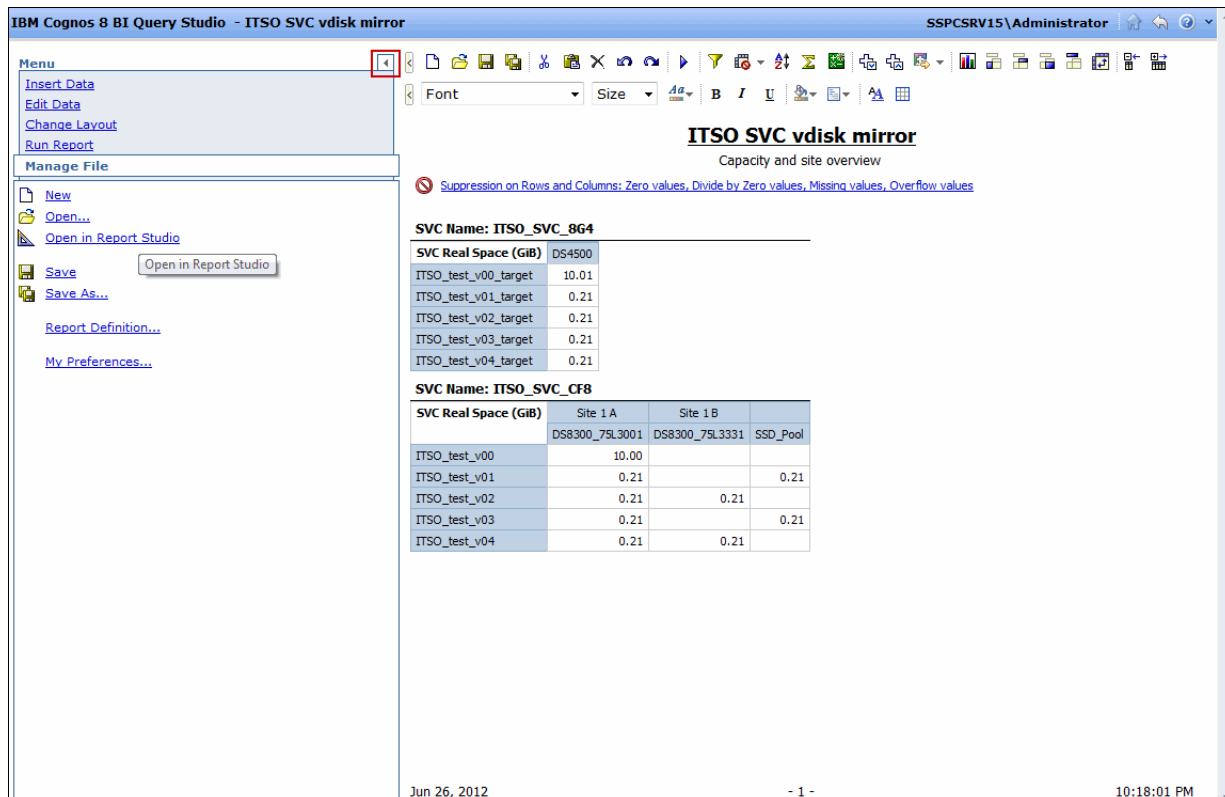


Figure 4-32 Open this report in Query Studio

## Considerations for this report

- ▶ In order to show the site information, you need to configure the User Provided Property 1 in the stand-alone Tivoli Storage Productivity Center GUI.
- ▶ User Defined Properties cannot be configured for storage pools, so that information was derived from the back-end storage system.
- ▶ The SSD\_Pool is actually using based on internal SSD drives, and since an SAN Volume Controller stretched cluster is installed in two locations we did not customize the User Defined Property 1 for this SAN Volume Controller. Note, these customizations would not require to change the report; the site information is picked up dynamically.
- ▶ Since we have taken the information from the Storage Virtualizer Resources folder, the report will actually also include any IBM Storwize V7000 device. When the IBM Storwize V7000 is included, the report might not be as useful. This is because VDisk mirroring is often used in SAN Volume Controller stretch cluster installations.

If you want to filter out all Storwize V7000 systems, that is easy to do:

- a. Open the report

- b. Insert the information: **Storage Virtualizer Resources** → **Storage Virtualizers** → **Vendor, Model, and Device Information** → **Storage Virtualizer Type**
- c. Right-click that column and select **Filter** from the menu

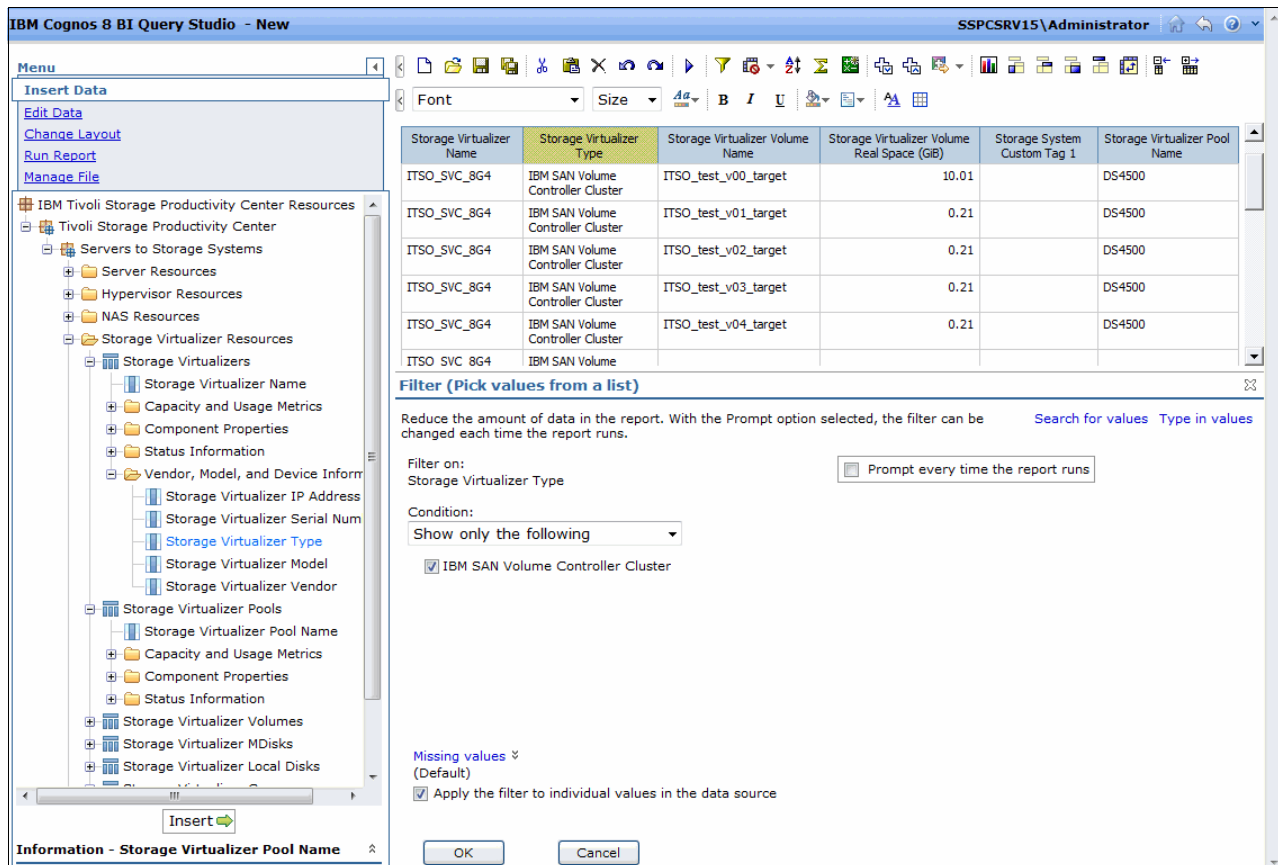


Figure 4-33 Use the filter

- d. Select **IBM SAN Volume Controller**, and leave the other settings
- e. Click **OK**

## 4.5 Design a report (Report Studio)

In this section, we give you a quick introduction to the Report Studio tool in Cognos. Explaining the Cognos Report Studio in great detail is beyond the scope of this IBM Redbooks publication. To get you started, we give you some examples of what you can do with it.

### What Report Studio is

*Report Studio* is a tool that offers more flexibility in creating reports than Query Studio. The functions and features in Report Studio are so many that we cannot explain everything within this book. Instead, we focus on how you can use Report Studio to enhance some reports.

### When to design reports

The Query Studio is regarded as the ad hoc interface to the information collected by Tivoli Storage Productivity Center. For many questions, Tivoli Storage Productivity Center has

provided predefined reports. When you do not see what you are looking for, you will likely start using the Query Studio and maybe save your report for future use.

Once your reporting idea is getting more and more complex, you see the limitations of an easy to use ad hoc query utility like Query Studio. This is where you will start to use the Report Studio. One simply example would be if you want to create multiple different diagrams into one report, you will need to use the Report Studio.

## Considerations

- ▶ You should always create a copy of one of the predefined reports before you edit the reports:

If you copy a predefined report, the links for other reports will not change. Therefore, you will be directed to the version of the report that was shipped with Tivoli Storage Productivity Center until you also change the links.

- ▶ You should create your own folder for your reports because this makes it much easier to export the reports you created and copy them to another server.
- ▶ In Report Studio you cannot only use the Tivoli Storage Productivity Center data models, you can also use any SQL statements to query the Tivoli Storage Productivity Center database views.
- ▶ When you talk with somebody about a report you have something in mind that is often different from what the other person understands from your description. This is true for any kind of situation, but most often you will be in some kind of customer and service provider relationship. Before you start using the Report Studio to design a new report, you should therefore spend some time on the following questions.
  - These questions should help you to get a clear understanding of the content of the report:
    - Why is this report needed (purpose)?
    - What is the current way of getting/viewing the data? What are the deficiencies?
    - What is the report used for?
    - What information needs to be included?
    - Who will use the report?
    - How will the report be used (batch or interactive usage)?
  - Considerations
    - Language and regional options
    - Parameters
    - Links
  - Create a prototype on a sheet of paper to illustrate what you design should look like

## Requirements

- ▶ There are no requirements to run Report Studio, but we typically used Microsoft Internet Explorer because it seems to work better when designing reports. If you are just looking at reports, you can also use Firefox.
- ▶ When you open the Report Studio, you will be prompted to allow it to access your clipboard, see Figure 4-34 on page 316.

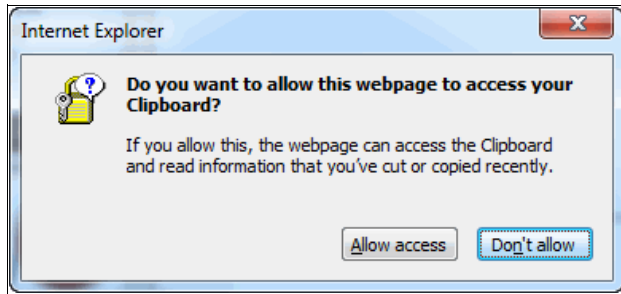



Figure 4-34 Allow access to the clipboard

### 4.5.1 Example modifying a predefined report

The new historical reports are a great enhancement of the reporting capabilities of Tivoli Storage Productivity Center. Even though they prove to be a helpful tool, we found that they still could be enhanced and here we show you how we have done that:

1. First, create a copy of the report so that you have the original one as a backup copy.
2. Open the report in Report Studio by clicking .
3. Within this report, we first want to change the amount of total physical capacity as a solid area instead of a simple line. In Figure 4-35, we marked the two actions you need to perform:
  - Click to select the data series (1)
  - On the properties panel change the chart type from Line to Area

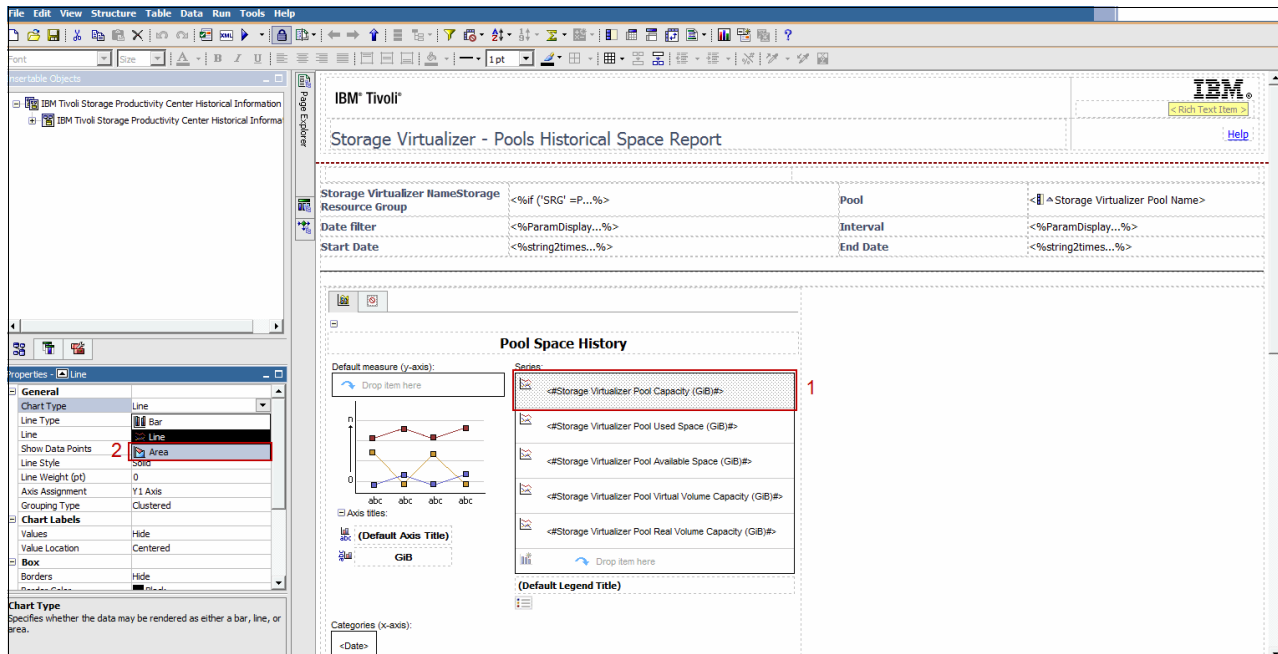


Figure 4-35 Change data series chart type

4. In order to still see the other lines in the diagram we changed the color of the area. See Figure 4-36 on page 317:
  - Select the complete diagram area (1)
  - In the properties panel on the lower left side, search for the Palette entry and click ...
  - A dialog box (3) will appear where we clicked the first color entry

- A new box opens where we specified the custom color that we wanted to use

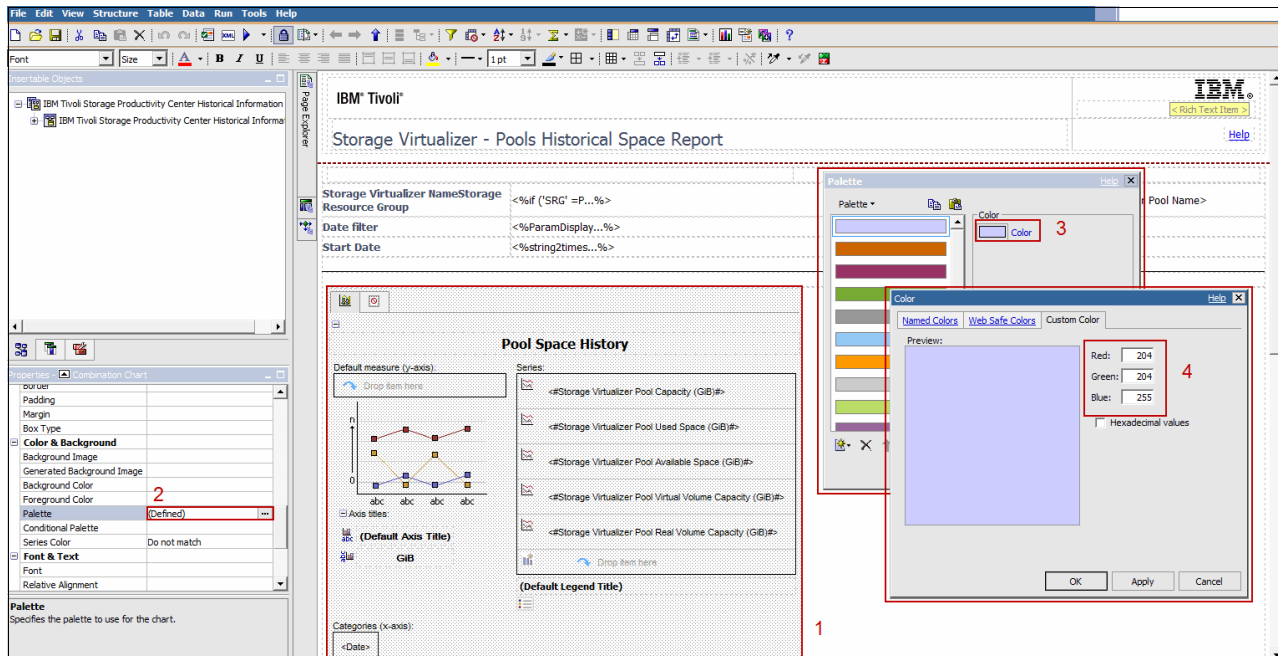


Figure 4-36 Change the color palette

5. We like the columns in the table to be color coded like the diagram colors. See Figure 4-37:
  - Select the column (1).
  - In the properties panel (2), click ... for the Background Color property.
  - A new dialog box appears. In Custom Color, we entered the color information (4) that we also used in the chart area.

Repeat this step if you want to color code other columns as well, like we did.

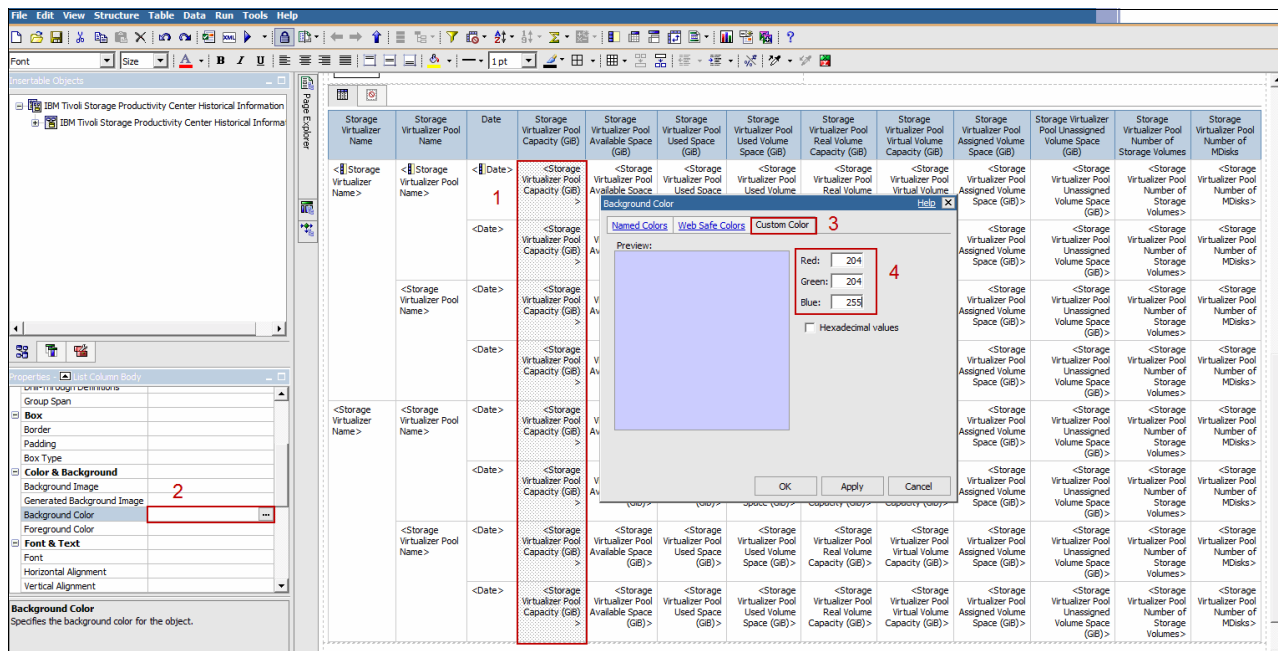


Figure 4-37 Color coding the table



6. Next, we deleted some of the data series from the chart because we wanted to have a chart that is more intuitive to the user.  
If you delete the lines, some information might change its color because the color is defined by the position in the color palette, so you might need to change the column backgrounds.
  - Deleting a data series is simply done by selecting it, and then hitting the delete button on your keyboard.
7. We also felt that the columns should set arranged in the same order that they are listed in the legend.
  - For this, simply drag and drop the columns in the order of your preference
8. The last major change to the report is to add a column with a calculated value for the Thin Provisioning Factor, so a relative number that shows how much more capacity has been defined in the volumes than is actually physically available:

#### Pool Virtual Volume Capacity / Pool Capacity

Any value below 1 indicates no overprovisioning, and any number greater than one shows that more capacity has been defined in volumes that are available:

- The first step is to switch to open Query Explorer (1).
- Select the query that you want to modify (2) and add the calculation, as shown in Figure 4-38.

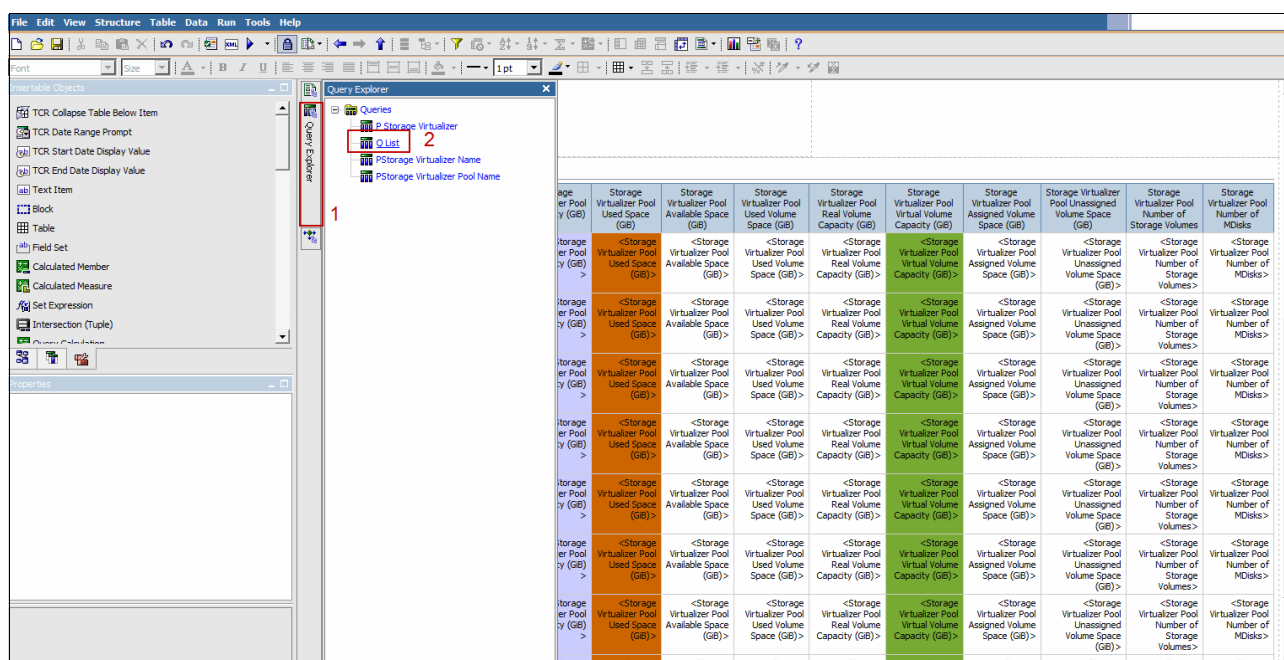


Figure 4-38 Open the Query Explorer

- The main panel will change to show the data items in the selected query, as shown in Figure 4-39 on page 319.
- From the list of Insertable Objects on the left, drag and drop the Data Item object to the center of the panel.



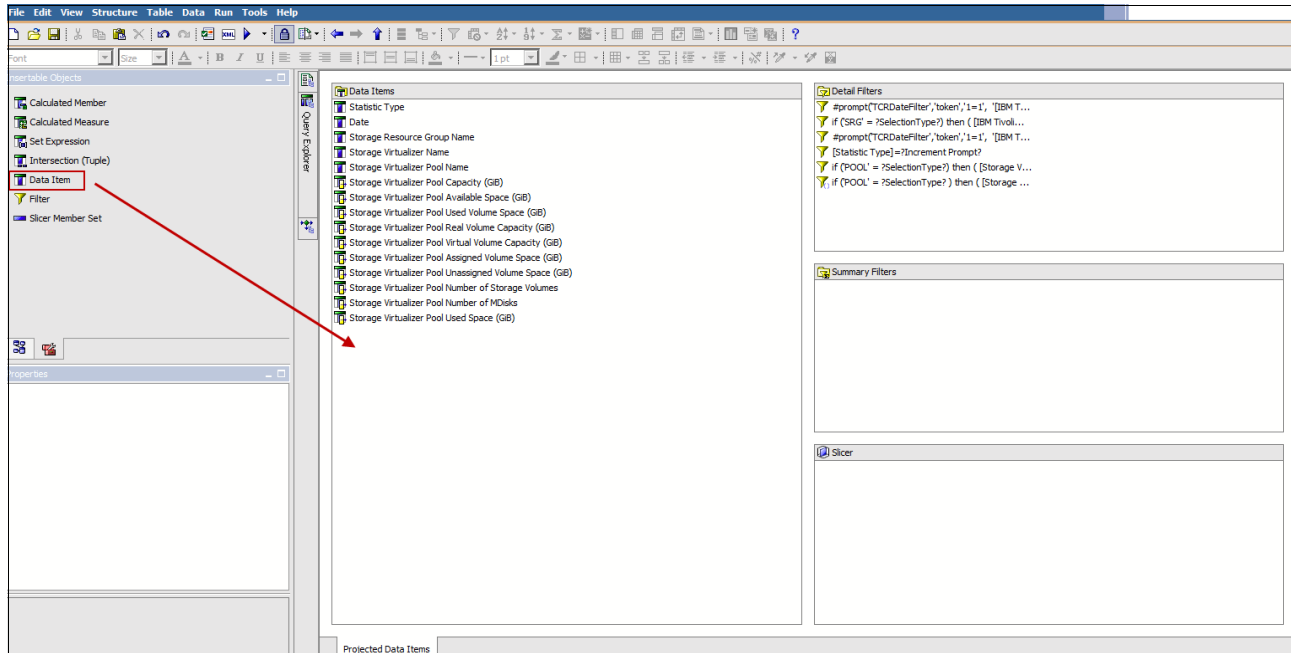


Figure 4-39 Query Explorer

- A dialog box opens where you can define the expression, as shown in Figure 4-40.
- In this case we used the following expression:

**[IBM Tivoli Storage Productivity Center Historical Information].[Storage Virtualizers Pool Historical Space Information].[Storage Virtualizer Pool Virtual Volume Capacity (GiB)]/[IBM Tivoli Storage Productivity Center Historical Information].[Storage Virtualizers Pool Historical Space Information].[Storage Virtualizer Pool Capacity (GiB)]**

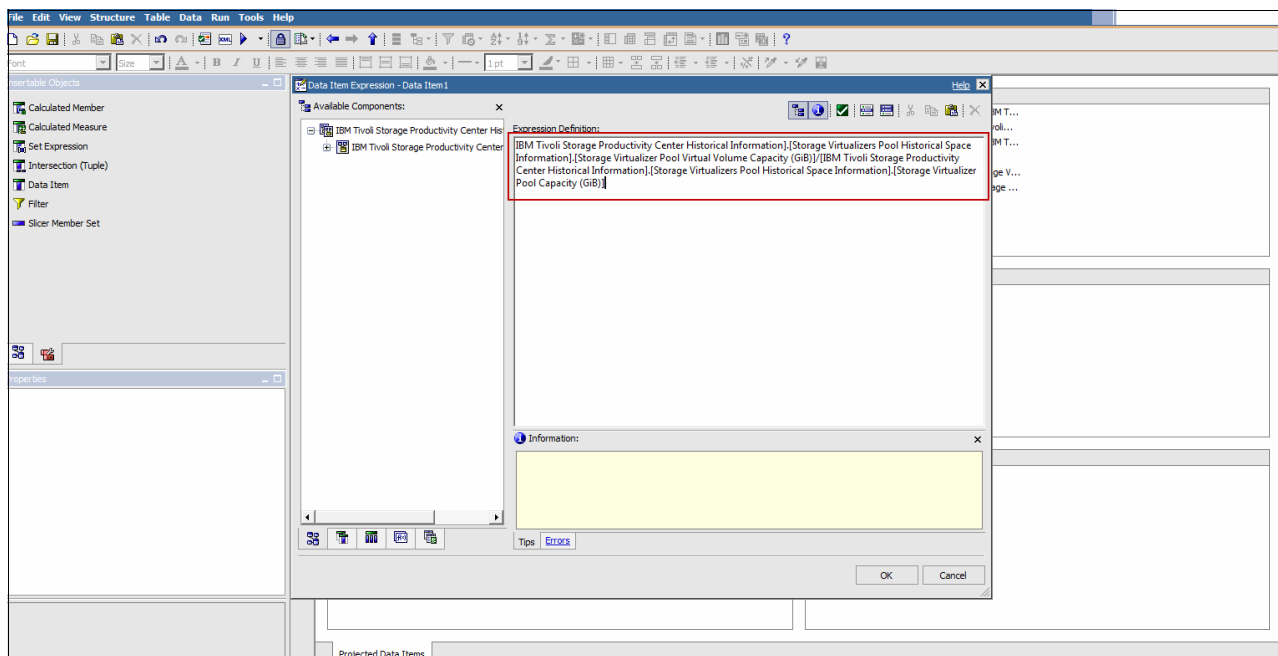


Figure 4-40 Enter the expression

- Click **OK** to close the dialog box.
- In the properties of the newly added data item, we changed the name to Thin Provisioning Factor as shown in Figure 4-41.

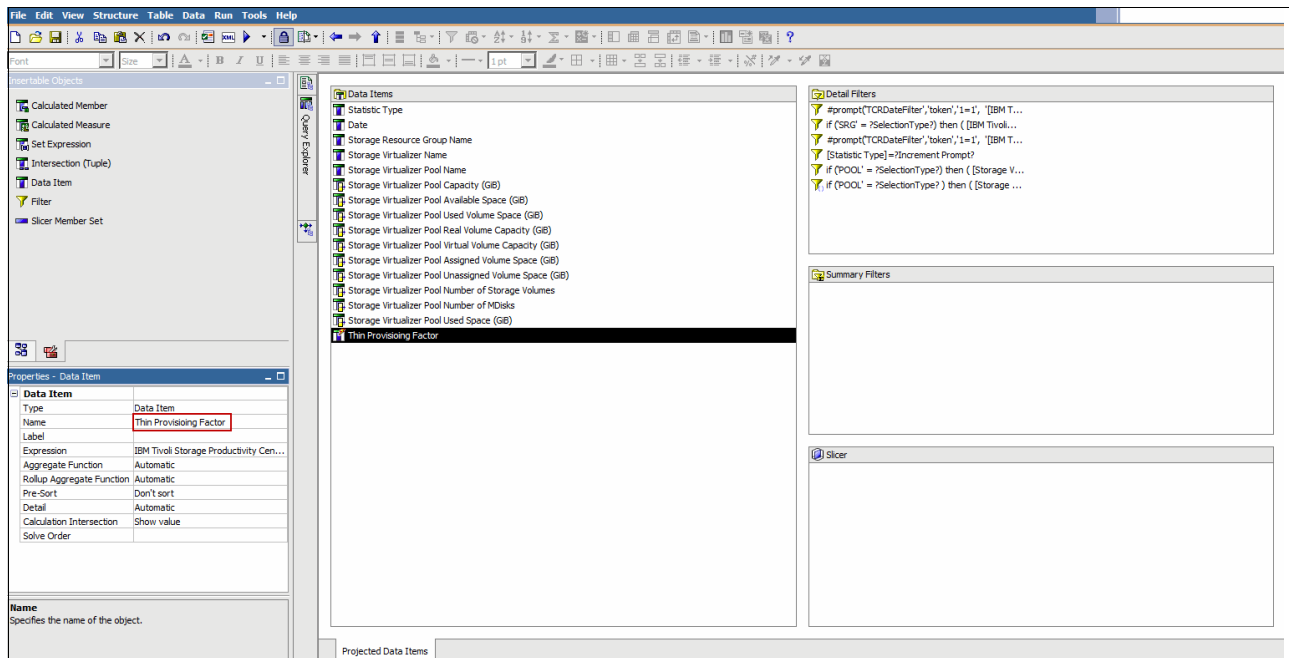


Figure 4-41 Label the new data item

The last step is to add the new data item Thin Provisioning Factor to your report. To do this, use the following steps:

- Open the Page Explorer (1)
- Select the report page
- Drag and drop the new data item to the report

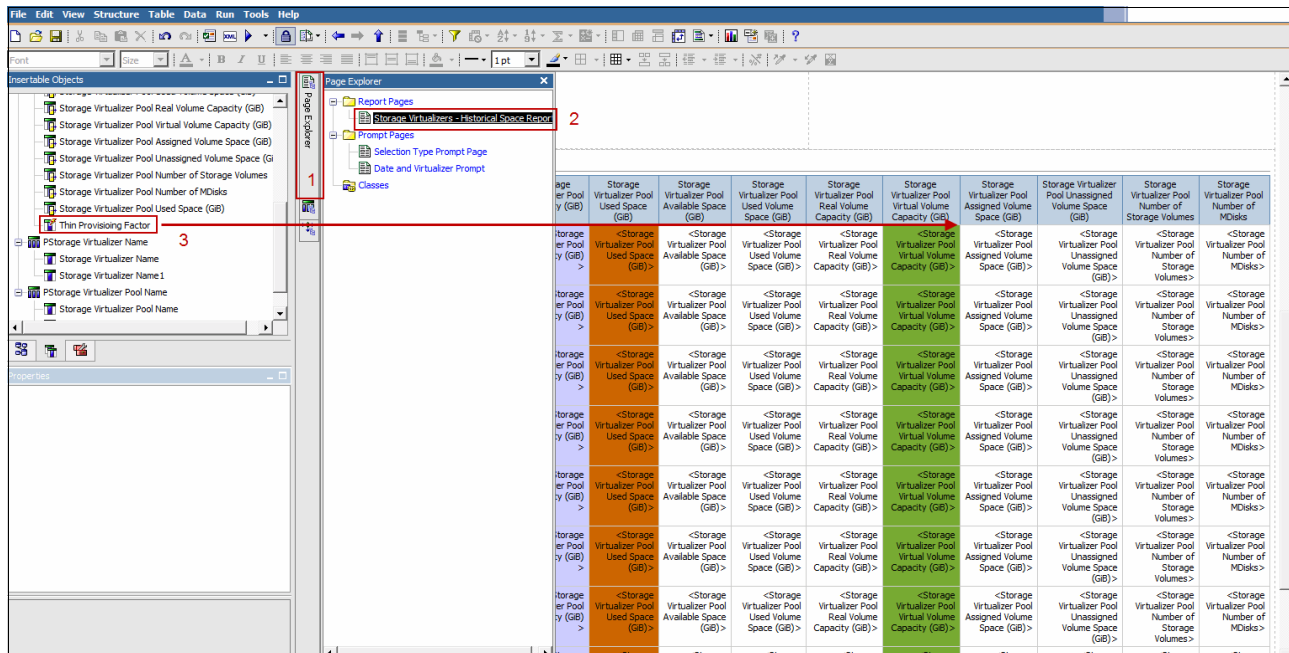


Figure 4-42 Add the column to the report

- Now you can save the report by clicking the diskette symbol, or Select **File** → **Save**.
9. If you now run the report, it will look similar to the one that is shown in Figure 4-43.

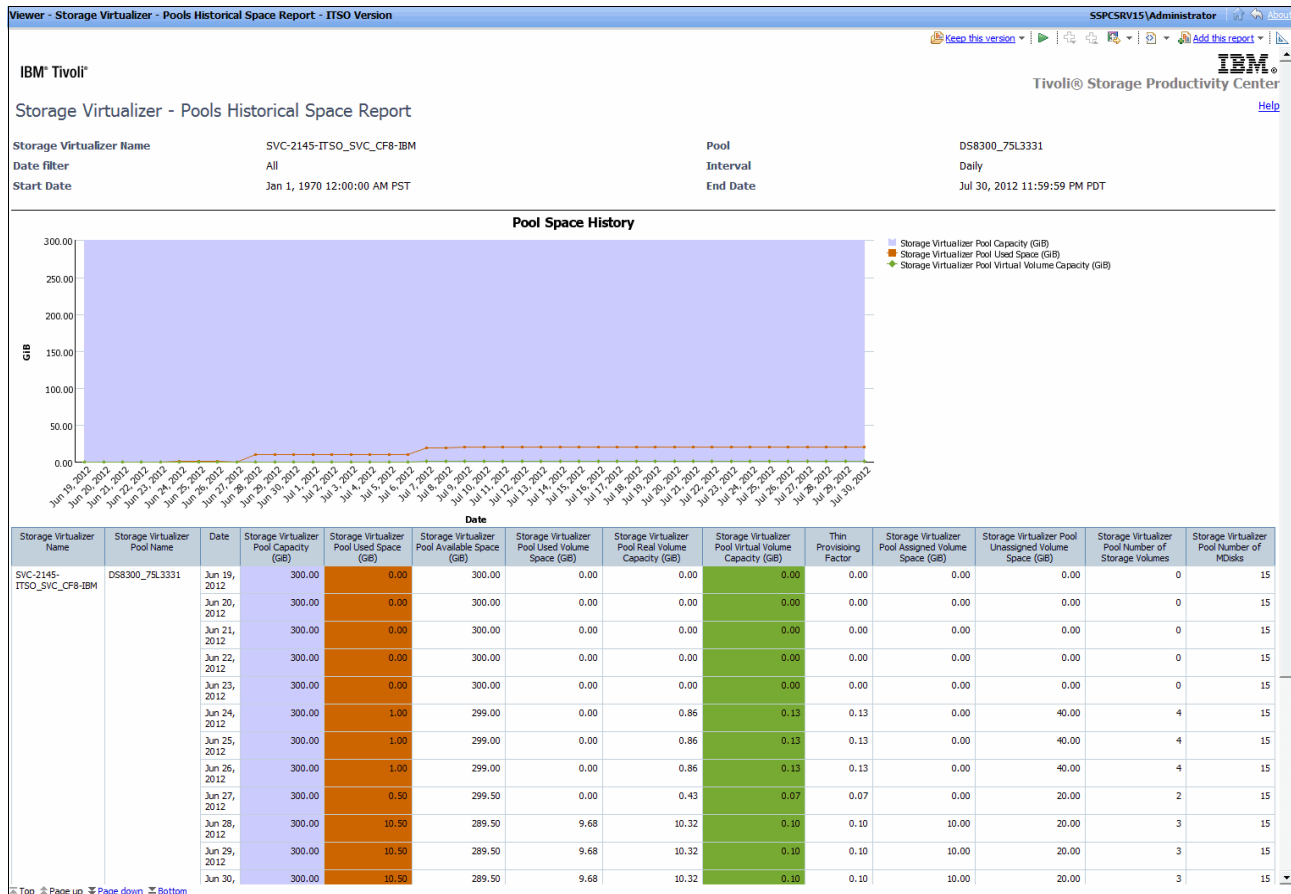


Figure 4-43 Modified Pools Historical Space Report

## 4.5.2 Example: Build a report using your own SQL statement

You can build a report by using your own SQL in Report Studio, which is sometimes helpful, because not all data that Tivoli Storage Productivity Center is collecting is available in the data models yet.

This process is also working if you want to query other data sources, but you would have to consult the online help on how to create a data source object in Cognos.

**Note:** For Tivoli Storage Productivity Center Version 5.1, a new documentation about the TPCREPORT schema is necessary because there has been some changes in the views. This new version is available at the following site:

[https://www-304.ibm.com/support/docview.wss?rs=40&uid=swg27020299&context=SSBSE&cs=utf-8&lang=en&loc=en\\_US](https://www-304.ibm.com/support/docview.wss?rs=40&uid=swg27020299&context=SSBSE&cs=utf-8&lang=en&loc=en_US)

We used this process to build an HBA details report. The steps to build the report are described here:

1. From the File menu, click **New**.

2. Select the report type that you like, for example, “blank” as shown in Figure 4-44 on page 322.

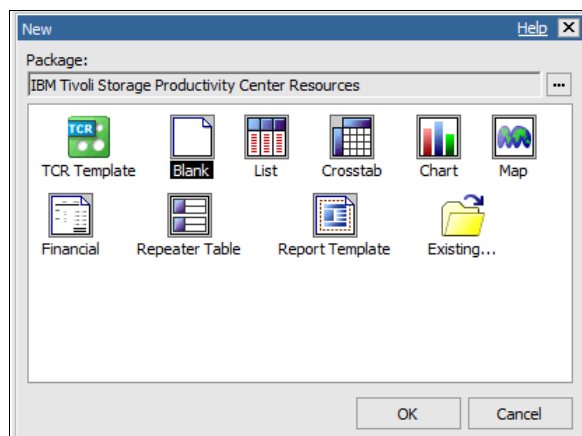


Figure 4-44 Select template

You can also use the Tivoli Common Reporting template to make your report look similar to the predefined reports.

3. Pause the pointer over the query explorer button and click **Queries**.
4. In the Insertable Objects pane, drag Query to the work area.
5. In the Insertable Objects pane, to build an SQL query, drag SQL to the right of the query. You can drag SQL anywhere in the work area, and Report Studio will automatically create a query.
6. In the Properties pane, double-click the Data Source property and click a data source.
7. If required, set the Catalog property to the name of the catalog.
8. Double-click the SQL property and type the SQL.
9. Click **Validate** to check for errors.
10. In the Properties pane, set the Processing property to **Limited Local**. If you do not set this correctly, you will get an error when running your report.
11. Double-click the query.

If the SQL is valid, the data items defined in the SQL appear in the Data Items pane.
12. Pause the pointer over the page explorer button and click a report page.
13. In the Insertable Objects pane, on the Toolbox tab, drag an object to the work area.

For example, drag a list, crosstab, chart, or repeater.
14. Click the data container.
15. In the Properties pane, click the select ancestor button and click the container that you just created.

For example, if you created a list, click List.
16. Set the Query property to the query for the report type.
17. In the Insertable Objects pane, on the Data Items tab, drag the items from the query that you chose in the previous step to the data container.

## 4.6 Proven practices

In this section, we provide you some tips and background information that will help you to use Cognos more efficiently.

### 4.6.1 Probing before reporting

Cognos enables you to create reports with data from different sources in a way that the Tivoli Storage Productivity Center GUI does not provide. This is extremely helpful in many situations. The structure of the data models is designed to show you which type of data source is required to collect the information. The data itself is often collected in individual jobs per data source or grouped by similar data sources.

The reason why we point this out is that in many reports you might combine data from different sources. When you do this you need to make sure that you have collected the data from all sources before you use the report.

For example, we looked at a VMware report where we had the Server Name (Data Source: SRA) and the VMDK files (Data Source: VMware hypervisor) among other things in the report. When we added a VMDK file to a VMware guest system that had an SRA running, we just probed the VMware hypervisor, and opened our report again. We cropped the report in Figure 4-45 to show the important part.

ITSO-BNA-138	DCFM.cavenet.lan	VM Datastore	[VM Datastore] DCFM-138/DCFM.vmdk	15,48
	DCFM.cavenet.lan	VM Datastore	[VM Datastore] DCFM-138/ITSO-BNA-138_1.vmdk	8
	DCFM.cavenet.lan	VM Datastore	[VM Datastore] DCFM-138/ITSO-BNA-138.vmdk	0
		VM Datastore	[VM Datastore] DCFM-138/ITSO-BNA-138_2.vmdk	7
ITSO-BNA-138				30,48

Figure 4-45 Missing information

Column 1 contains the VMware guest name and column 2 contains the SRA reported server name. Tivoli Storage Productivity Center obviously knows that the virtual machine ITSO-BNA-138 is related to DCFM.cavenet.lan, so when we added the DCFM-138/ITSO-BAN-138\_2.vmdk disk file we would have expected that all cells in column 2 would contain the SRA server name.

Yet at first we thought that this result was strange and maybe a defect, but once you think about this further it makes sense.

The SRA probe job is the one that is collecting disk information from a server and tries to find matching disk serial numbers in the environment. Since the SRA probe did not yet run, the new VMDK file was not yet correlated to the server.

To put this the other way around: Tivoli Storage Productivity Center is not directly showing a relationship of virtual machine names to servers with an SRA. Tivoli Storage Productivity Center needs to find a disk in both data sources to do the correlation.

**Note:** There is another thing to understand. By default, Cognos will cache content, so that when you close a report and report it, Cognos will be much quicker to display the information.

In addition, Cognos is using multiple server processes (by default this is set to two processes) and each of the processes uses its own cache, which means that you might not always see that the second run is fast because if you use a different browser or a new session, you might be connected to the other Cognos server process.

There is a not so nice side effect of this performance tuning procedure:

While you create a report you sometimes change something in your environment like adding a volume to a server. Even though you performed the required probes, the changes do not show up in your report. In this case the reason is most likely the cache: if you had opened your report before you added the volume to the server, this information is still cached, and so it will take approximately 15 minutes to expire before you can see the change in the Cognos report.

## 4.6.2 Number of rows in pages

In Cognos the length of a page is by default limited to 20 rows, which forces you to flip through the pages of a long report to find the information you are looking for. This especially applies to reports that do not use a diagram to sum up the information in the tables.

The first reports that you create are most likely ad hoc reports that only contain a table; therefore, you will hit this 20-row limit very soon.

You can change the amount of information that Cognos displays per page for a report easily, but we have not found a way to simply change the default, so you have to change this for every report.

### Changing web page size in Cognos GUI

Follow these steps to change the web page size from the Cognos GUI:

1. Navigate to the folder containing the report and open the report properties. See Figure 4-46.

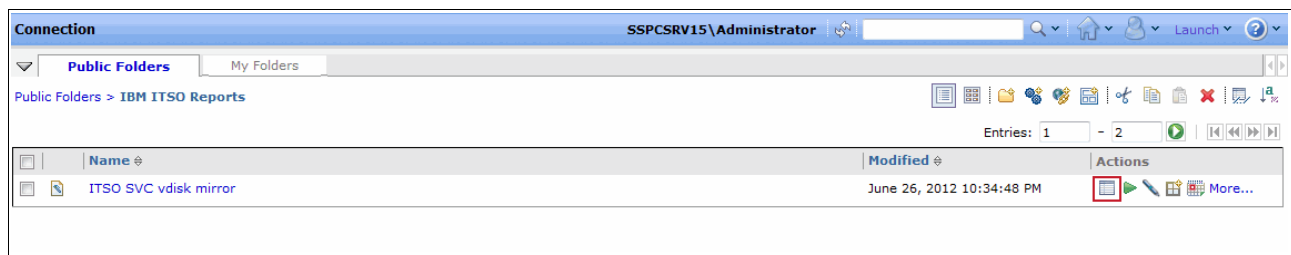


Figure 4-46 Open report properties

- Depending if you opened the properties of a report created in Query Studio or Report Studio, the tab that you need to open is labeled Query or Report. See an example in Figure 4-47.

The screenshot shows a Windows-style dialog box titled "Set properties - ITSO SVC vdisk mirror" with a "Help" icon in the top right corner. The dialog has three tabs: "General", "Query" (which is selected and highlighted with a red rectangle), and "Permissions". Below the tabs, it says "Specify the properties for this entry." The "Query" tab contains the following fields and options:

- Type:** Query
- Owner:** SSPCSRV15 \Administrator
- Contact:** None, with a link "Set the contact" and a dropdown arrow.
- Location:** Public Folders > IBM ITSO Reports, with a link "View the search path, ID and URL".
- Created:** June 26, 2012 10:34:48 PM
- Modified:** June 27, 2012 4:58:33 PM
- Icon:** Standard, with a link "Edit..."
- ☐ Disable this entry
- ☐ Hide this entry
- Language:** English (United States) (dropdown menu)
- Name:** ITSO SVC vdisk mirror (text field)
- Screen tip:** (empty text field)
- Description:** Provides a overview of how capacities are distributed for and vdisk in SVC, but is most usefull of mirrored vdisks. Report has one section per SVC (text area with a scrollbar).
- Run history:** Setting the number of occurrences to zero (0) saves an unlimited number of occurrences. Number of occurrences: 5 (radio button selected, text field). Duration: (empty text field) Day(s) (dropdown menu).
- Report output versions:** Setting the number of occurrences to zero (0) saves an unlimited number of occurrences. Number of occurrences: 1 (radio button selected, text field). Duration: (empty text field) Day(s) (dropdown menu).
- Package:** IBM Tivoli Storage Productivity Center Resources, with a link "Link to a package..."
- Buttons:** OK, Cancel

Figure 4-47 General properties page

- Expand the Advanced options to see the web page size option. See Figure 4-48 on page 326.

**Set properties - ITSO SVC vdisk mirror** Help ⓘ

**General** **Query** **Permissions**

Select the default options to use for this entry.

Default action:  
View most recent report ▼

Report options:  
☒ Override the default values  
 Format:  
HTML ▼  
 Language:  
English (United States) ▼

PDF options:  
No options saved  
[Set...](#)

Prompt values:  
No values saved  
[Set...](#)

☒ Prompt for values

Run as the owner:  
☐ SSPCSRV15\Administrator

**Advanced options ⓘ**

Number of rows per Web page in HTML reports:  
20 ▼

☒ Enable selection-based interactivity in HTML reports  
☒ Enable alerts about new versions  
☐ Enable enhanced user features in saved output versions  
☐ Enable comments in saved output versions

Report cache:  
☐ Refresh the report cache:  
 A report cache is used to optimize the performance of prompt pages. The cache is refreshed automatically when a report runs interactively and the cache is expired. You can also clear the cache at any time.  
 Cache duration:  
 Day(s) ▼

OK Cancel

Figure 4-48 Advanced Query options

4. Change the “Number of rows per Web page in HTML reports”.
5. Click **OK**.



## Changing web page size in Query Studio

From within Query Studio, use the following steps:

1. Select **Change Layout** from the menu in the upper left corner.
2. Select **Set Web Page Size**. Select the size that you want.
3. Click **OK** (see Figure 4-49).

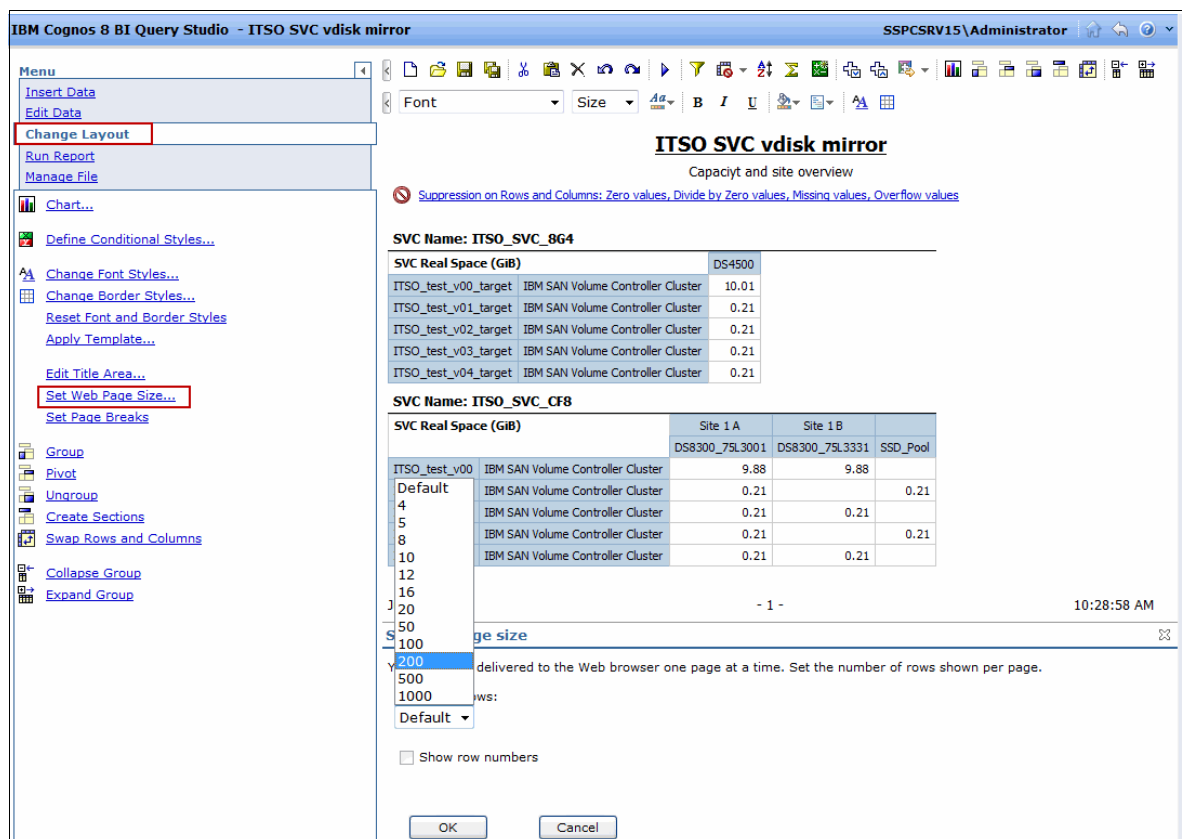


Figure 4-49 Web page size

## 4.6.3 Blank cells

When you work with ad hoc reports, you will sometimes see blank cells in reports. Some of those cells are simply because no data is available in the database and that can have multiple reasons, like no probe or scan has been running; there is nothing configured.

There is also another reason for such empty cells. If you look at the example in Figure 4-50, you will see that the server SSPCSR15 has two entries for Disk 0 but one of the File System Mount Point cells is empty. Therefore, why does Cognos show you this line at all.

Server Name	File System Mount Point	Server Disk Path ^
SSPCSRV15	C:/	Disk 0
SSPCSRV15		Disk 0
SSPCSRV15	S:/	Disk 1
SSPCSRV15	E:/	Disk 2
SSPCSRV15	F:/	Disk 3
SSPCSRV15		

Figure 4-50 Empty cell example

The answer is that there is more data to be displayed. So when we added the Logical Volume Path, this empty cell does make more sense. See Figure 4-51.

Server Name	File System Mount Point	Server Disk Path ▲	Logical Volume Path
SSPCSRV15	C:/	Disk 0	C:
SSPCSRV15		Disk 0	\\?\Volume{21558500-989b-11e0-8379-806e6f6e6963}
SSPCSRV15	S:/	Disk 1	S:
SSPCSRV15	E:/	Disk 2	E:
SSPCSRV15	F:/	Disk 3	F:
SSPCSRV15			

Figure 4-51 Example with added Logical Volume Path

The report now shows that the server SSPCSR15 has a Disk 0 with two partitions, but only one of them has a file system on it and is mounted.

If you understand this concept, you will also understand why the last line in the report shows only the Server Name: there must be some other data that would be shown when you add more columns to this report.

In summary, Cognos is not running simple inner joins on the data because that would not show the empty cells.

### 4.6.4 No data in reports

If Cognos is showing a message similar to “No data is available for the selected criteria. For more information, see the troubleshooting section in the online help.”, the most typical reasons for this would be:

- ▶ Information was filtered out, for example, by specifying data range.
- ▶ This data is not available in Tivoli Storage Productivity Center because the resource has not been probed, scanned, or performance data has not been collected.

**Note:** Currently no data gathered by scans is required, but this could change without this IBM Redbooks publication being updated. Therefore, to be complete, we listed all data collection jobs.

- ▶ What we said about the blank cells in a report only apply to the relationship of information within a resource. If you tried to create a report where you show the volumes of a storage system that are not assigned to a server and at the same time add the server name to the report, your report would be empty.

### 4.6.5 Create and use your own folders in Cognos GUI

If you want to share your reports with other users, you should create and use your own folder structure in the Cognos navigation. There are two reasons for this recommendation:

1. The My Folder is personalized per user ID, so if you only use one user ID to work with Tivoli Storage Productivity Center, you could use this folder. However, if multiple different users need to access those reports, you should create your own folder.
2. During a Tivoli Storage Productivity Center update, it can happen that the folders with the predefined reports need to be updated as well and your reports could be deleted.

## 4.6.6 Creating report views

For scheduling reports where you need to specify parameters, create a so called *report view*. In Cognos, a report view is a link to a report where you have once specified the required parameters and those are stored together with the link.

In a multi-customer and multi-user environment, report views might also be a way to restrict some users from seeing data about other users environments, so that could be another use case for report views.

In order to do this, you need to do two steps.

### Step 1: Create report view

To create a report view, simply follow these steps:

- Click the **More** link next to the report
- Select **Create a report view of this report...**

You will see a new panel like what is shown in Figure 4-52.

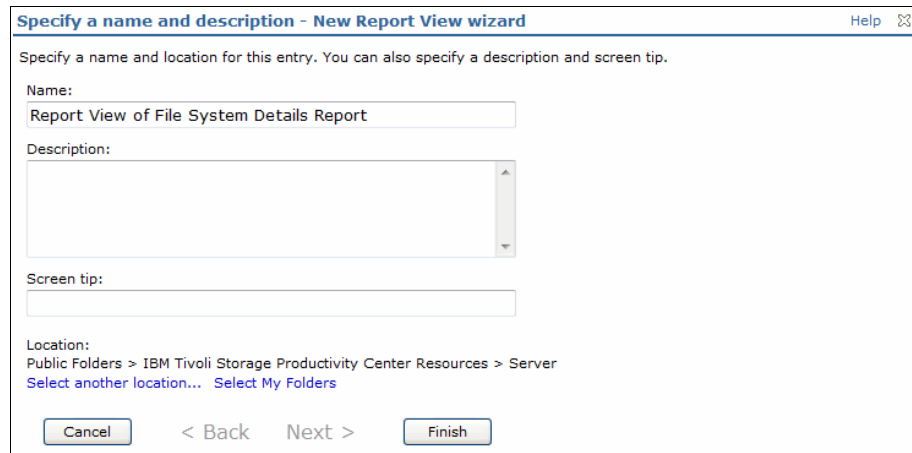


Figure 4-52 Enter report view specifications

- Change the name and enter a description and screen tip
- Choose the location where the report should be stored (remember, it should be stored in a different folder than the predefined reports). See 4.6.5, “Create and use your own folders in Cognos GUI” on page 328
- Click **Finish**

### Step 2: Define parameters for the view

Now you have to set the parameters for this view, so you go to the list of reports and open the report views properties by clicking this icon  .

On the properties panel in Figure 4-53 on page 330, click the **Report view** tab to get the panels where you can specify parameters.

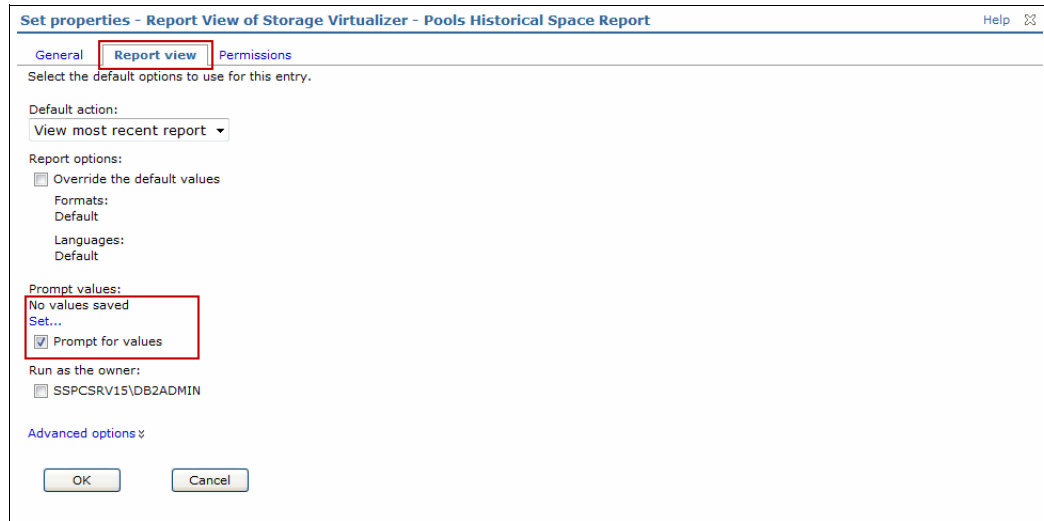


Figure 4-53 Set report view parameters

- ▶ First, click **Set** and the parameter dialog opens so that you can select the parameters for this view.
- ▶ Finally, you need to disable the parameter prompt, especially if you want to use the report view for scheduling.
- ▶ Click **OK** to save your changes.

## 4.6.7 Connection issues

Cognos sometimes prompts you to enter a user ID and password, although you specified your credentials already. In some cases you can just click OK without entering any credentials.

The reason for this strange behavior is that Cognos does not really seem to have a prompt to let you know that it had some connection problems, so it simply prompts for credentials instead.

Another point is that Tivoli Storage Productivity Center and Cognos are using a token-based authentication mechanism and that token is stored within cookies. The tokens have a timeout (default 480 minutes), but that can be changed (see “Web-based GUI session timeout” on page 109 for how to change the default).

If you work with multiple Tivoli Storage Productivity Center servers and you do not log off from them you might in some cases see errors when starting Cognos. Be aware that Cognos is launched from within Tivoli Storage Productivity Center, so Cognos does not have a logoff function itself.

If you work with multiple user IDs on one Tivoli Storage Productivity Center and Cognos server, the fact that cookies are used might also cause trouble, so we recommend in this case to use different browsers for the different user IDs, for example MS Internet Explorer for user1 and Firefox for user2.

## 4.7 Advanced Cognos configuration

In this section, we focus on what we believe are one-time configuration tasks. Tasks that you might perform more than once are documented in 4.8, “Advanced Cognos administration” on page 352.

In order to differentiate between these two types of tasks, we try to use the term *configuration* versus administration in this chapter of the book.

### 4.7.1 Architecture

Before we start explaining what kind of configuration tasks you want or need to perform, we show you in Figure 4-54 a simplified diagram of the Cognos architecture and how it is integrated into the overall Tivoli Storage Productivity Center application.

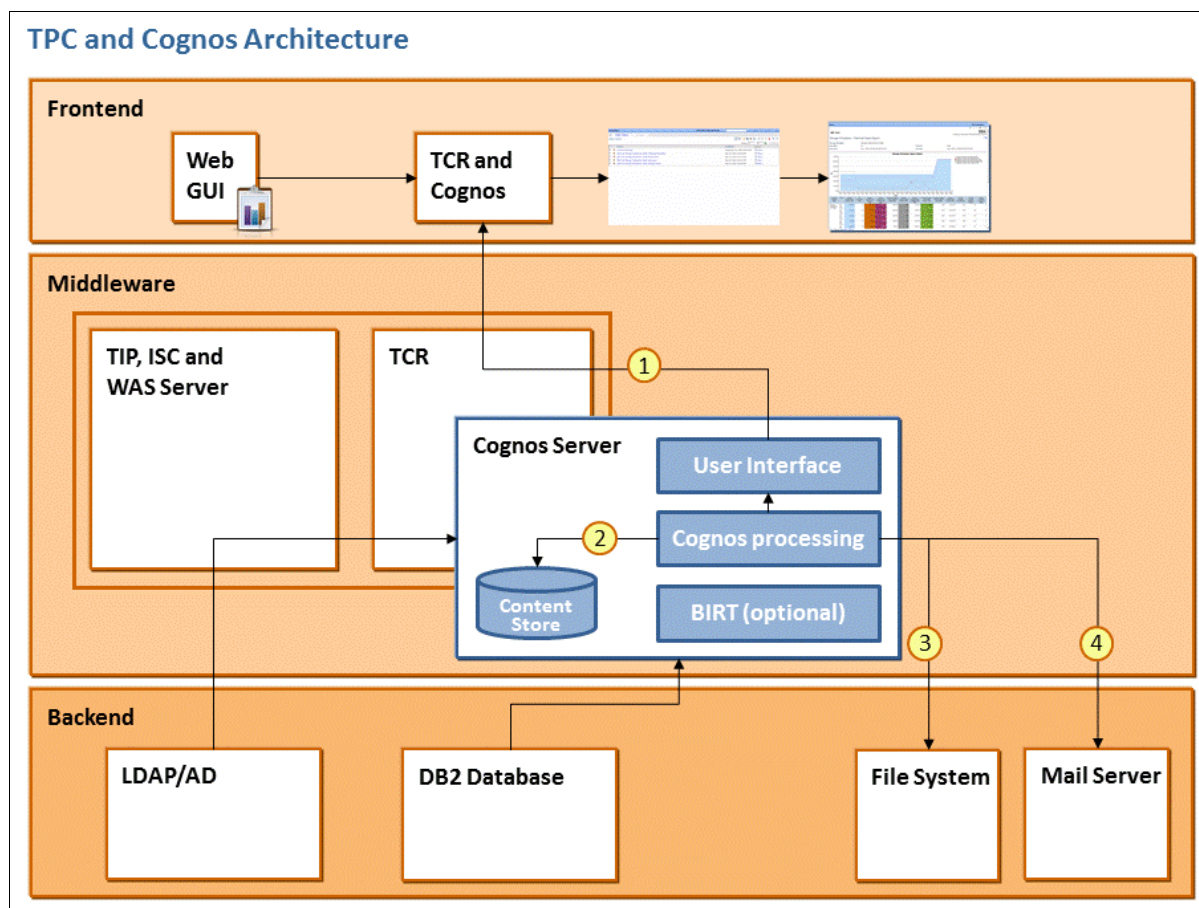


Figure 4-54 Cognos architecture

You can see that Cognos can be regarded as a kind of middleware that is related to Tivoli Common Reporting. Through Tivoli Integrated Portal, Cognos can make use of LDAP/AD so that you can limit the access to reports to certain users or groups if you need.

Cognos does not use the Tivoli Storage Productivity Center processes (which are not shown) to access the DB2 database where the Tivoli Storage Productivity Center repository is stored. For this reason, you need to go into the Cognos administration to update the stored DB2 password in case it has been changed.

You will also notice that BIRT practically runs within Cognos so that from the Cognos GUI you do not really see a difference between how to run a BIRT report versus how to run a Cognos report.

The numbers in the picture show you the direction where the information processed by Cognos can be directed to:

1. A rendered report is passed along through the Cognos User Interface to your browser to be displayed.
2. A report can be stored into the content store (see 4.7.4, “Content Store versus File System Archive” on page 338), which is by default where scheduled reports are stored.
3. Instead of the content store, reports can also be stored in the file system.
4. New to Cognos is the function to send reports via email.

**Note:** With the integration of BIRT into Cognos for running reports, BIRT reports behave almost the same as Cognos reports. You can perform all of the following actions:

- ▶ Create a report view
- ▶ Schedule
- ▶ Save
- ▶ Email
- ▶ Set access permission

## 4.7.2 IBM Cognos configuration and administration

There are two interfaces for working with Cognos as an administrator. We briefly describe how you access those tools here before we describe, later on in this section, what you do in each.

### IBM Cognos Configuration utility

During the Tivoli Storage Productivity Center installation, a program folder for IBM Tivoli Common Reporting 2.1.1 will be created in the Windows start menu. In that folder you will find the tool called *Cognos Configuration*.

**Note:** It is a bit irritating that even though you might have installed Tivoli Storage Productivity Center with the db2admin as the common user, this tool is only available as a start menu shortcut for the user that was running the Tivoli Storage Productivity Center installer. The tool is available as:

“C:\Program Files\IBM\tipv2Components\TCRComponent\cognos\bin\tcr\_cogconfig.bat”

The Cognos Configuration utility looks like a Java stand-alone program that looks like what is shown in Figure 4-55.

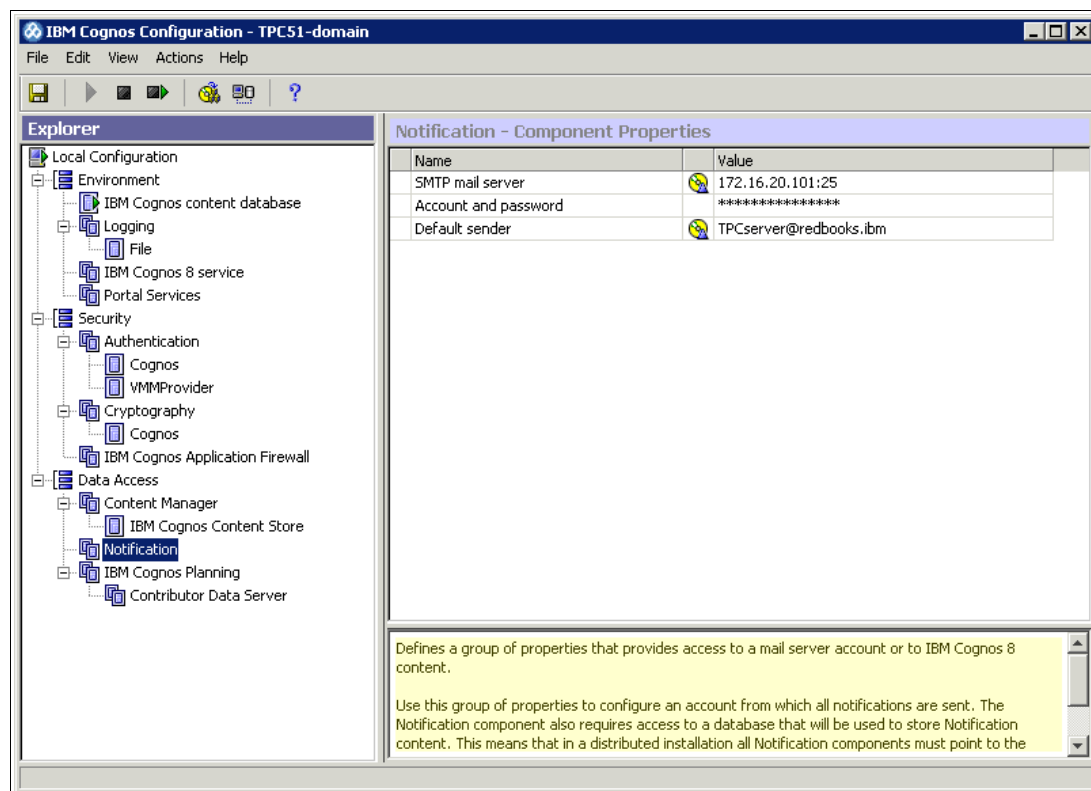


Figure 4-55 Cognos Configuration utility

Generally spoken, you will use this tool for tasks that are postinstallation configuration tasks, so you will probably use it only once. These are the tasks for which we used the utility:

- ▶ Setting up the email server: 4.7.3, “Email server configuration” on page 334.
- ▶ Setting up the export/import directory: 4.9.2, “Importing a BIRT report package” on page 360.

## Cognos administration panel

Depending on what you do with Cognos, the Cognos administration will be used more often so it is not regarded as a postinstallation one-time setup utility.

The Cognos administration panel is started from the Cognos Launch menu as shown in Figure 4-56.

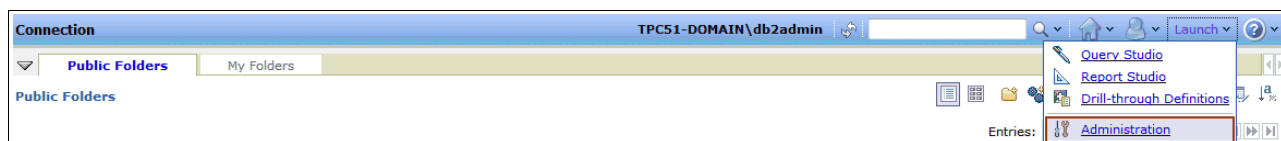


Figure 4-56 Launching the Cognos administration panel

Figure 4-57 shows what the Cognos administration panel will look like.

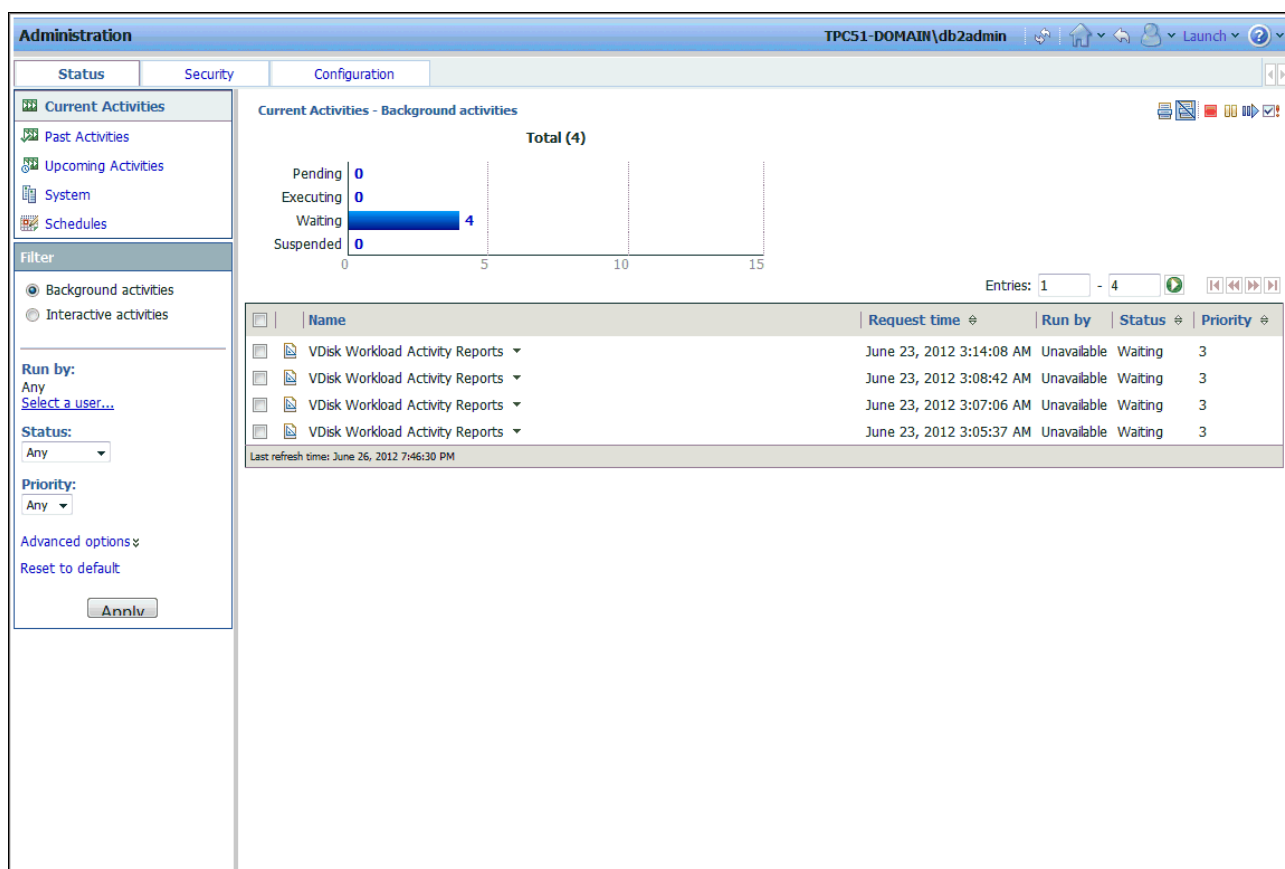


Figure 4-57 Cognos administration panel

### 4.7.3 Email server configuration

Before you can start using the email function in Cognos, you have to go through some configuration steps:

1. Open the Cognos Configuration program. On Windows, follow the path **Start → All Programs → Tivoli Common Reporting 2.1.1 → IBM Cognos Configuration**
2. From the navigation tree on the left select: **Data Access → Notification**



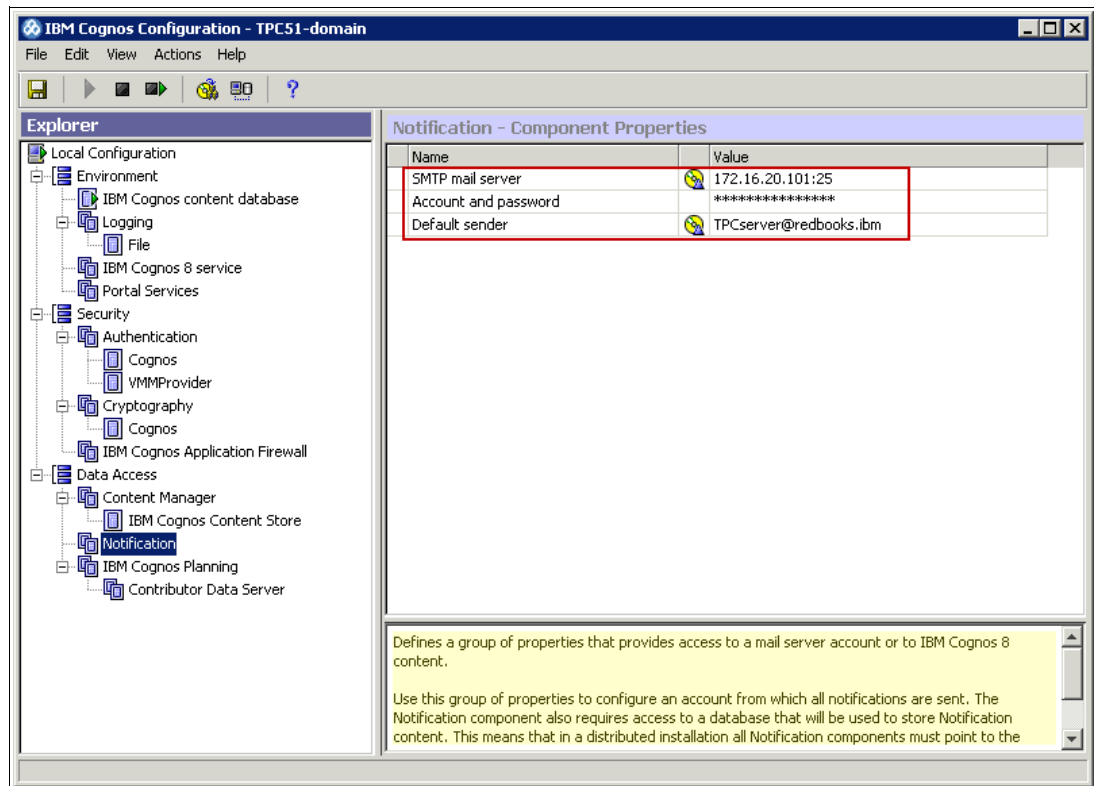


Figure 4-58 IBM Cognos Configuration utility

3. In the "Notification – Component Properties" panel, make the following changes:
  - Set the value for "SMTP" mail server
  - Edit the "Account and password" information
  - Optionally edit the "Default sender"
4. Restart Cognos by selecting the restart button or by exiting the utility (it will ask you to restart Cognos to apply the changes).

### Example: Sending an email

Here is an example of how you would send an email of a report that you have opened. In this example, we use the Storage Virtualizer - Pool Historical Space Report, as shown in Figure 4-59 on page 336.

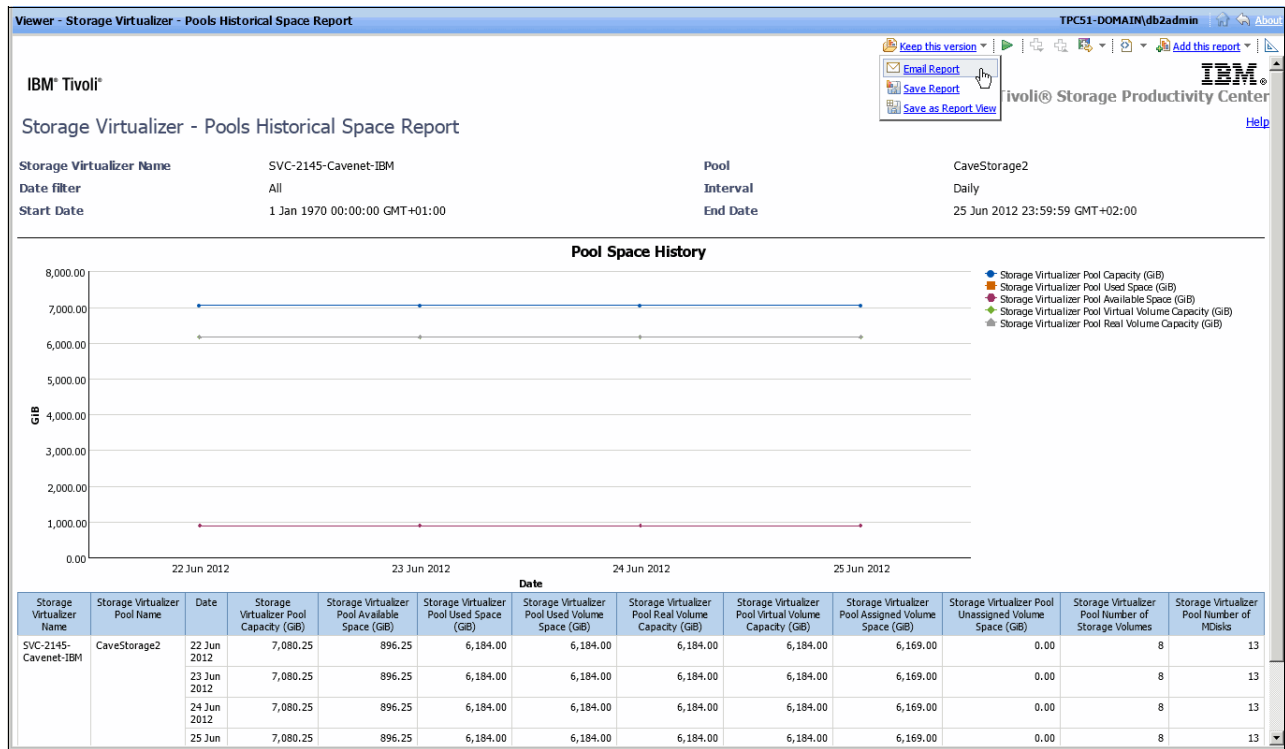


Figure 4-59 Storage Virtualizer - Pools Historical Space Report

- ▶ From the menu, select **Keep this version**
- ▶ Select **Email Report**

You will see the window that is shown in Figure 4-60 on page 337 as an overlay to your report, but we cropped the screen capture for better readability.

In this simple email editor, you need to:

- ▶ Enter the recipient's email address

Set the email options - Storage Virtualizer - Pools Historical Space Report

Help

Specify the recipients and contents of the email. To add recipients, click [Select the recipients or type the email addresses separated by semi-colons](#). To include an HTML report as the message body, leave the Body box empty and select the report as the only attachment.

To:

StorageGroup@rebooks.ibm

Cc:

Select the recipients...

Show Bcc

Subject:

Report: Storage Virtualizer - Pools Historical Space Report


Body:


Change to plain text >>


**B**


*I*


U



































































































































































































































































Optionally, you can do the following functions:

Once you click OK the email is sent. In Figure 4-61 on page 338 we show an example of what the actual email will look like.

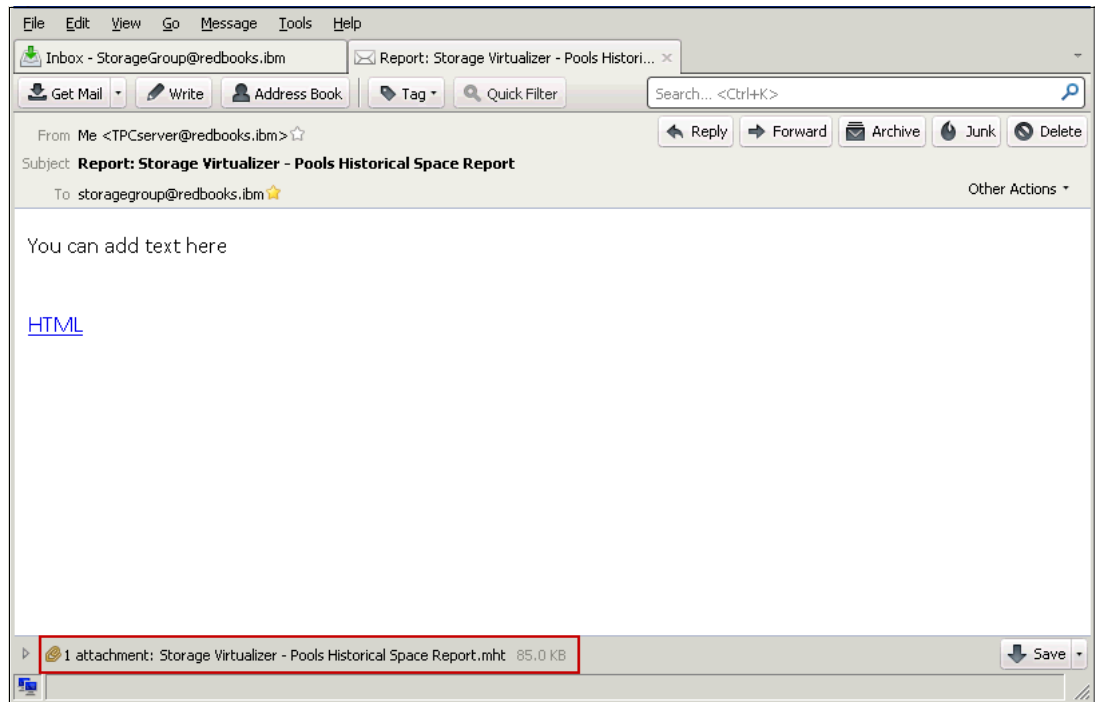


Figure 4-61 Email example

### Considerations

- ▶ If you send an email of a report that you are looking at, it will be attached as the report type that you are looking at.
  - Note: If you view an HTML report, the attached file will be in html format
- ▶ If you do not add any content to the body of the email, your email client application will probably show you the attachment inline, so you do not need to detach/open it
- ▶ If you sent a link to a report that you are currently looking at, the report is not stored in Cognos, so when the recipient opens the report it will need to be rendered again. It is possible that the new report will be different than the original since the data used to create the report may have changed.

## 4.7.4 Content Store versus File System Archive

In Cognos, you can select where you want to store reports that you manually save or that are saved by a scheduled run. There are two locations that Cognos can use to store reports:

- ▶ Cognos Content Store (default)
- ▶ File System Archive

The default location for storing saved reports is the Cognos Content Store, which is a small Derby database.

### Considerations

- ▶ Storing report outputs in the Content Store has the advantage that you can use the purging capabilities of Cognos. When you store report outputs in the file system of your server, you will need to handle the purging of reports by some other means.

- ▶ For information stored in the Cognos Content Store, the same security mechanisms apply as for reports. If you store the report output in the file system, you may need to once again consider security settings.
- ▶ There is no default location in the file system to save reports, so you need to set this up first.

## Configuring File System Archive

In Cognos, you cannot simply enter a directory to save a report to. Instead, you will have to select a target directory from a predefined list, so this requires up-front configuration, because no default locations are defined when Cognos is installed:

- ▶ Step 1: The first part is to define a root directory for all further content directories.
- ▶ Step 2: The second part is to configure the content directories.

At a later date:

- ▶ Step 3: Save a report to the file system location.

Usually, we should have documented the second step in the administration section because this can be a recurring task, but it is better to have everything in one place. Therefore, it is documented here.

### **Step 1**

To configure the root directory for all your reports, you need to use the IBM Cognos Configuration utility.

When you open the utility, you will see a window as shown in Figure 4-58 on page 335. From the menu of the utility:

- ▶ Select **Actions** → **Edit Global Configuration**.
- ▶ Then, select the **General** tab to open the dialog that is shown in Figure 4-62 on page 340.

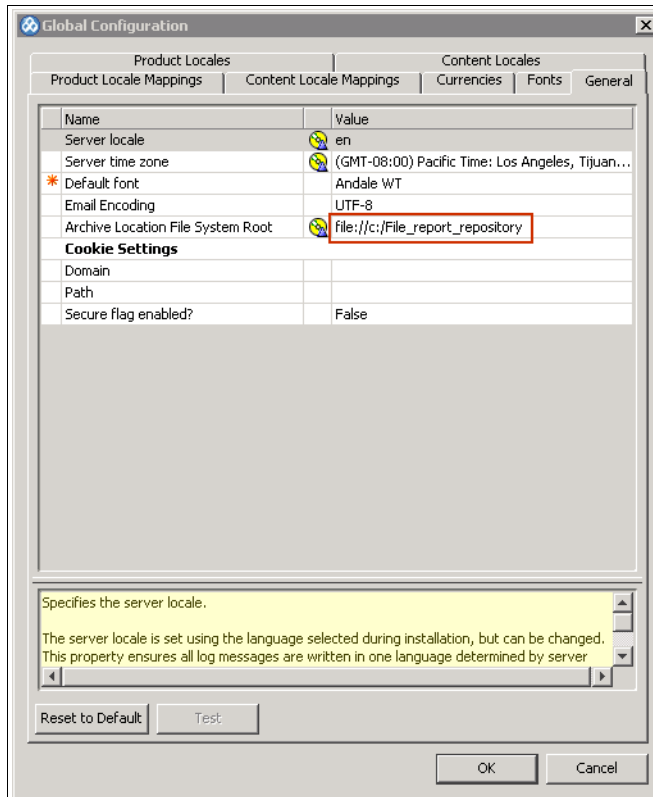


Figure 4-62 Configure archive file directory

Simply enter the directory that you want to use onto the Archive Location File System Root field, according to the syntax that is explained in the yellow box on the lower part of the dialog box.

When you have made changes in the utility, you will be asked to restart Cognos when you exit the utility. Until you do so, the changes are not applied.

## Step 2

Now that you have configured a root directory, and need to specify at least one subfolder in the Cognos web administration panel. Open the Cognos administration as shown in Figure 4-56 on page 333:

- ▶ From the initial window, click the Configuration tab (indicated with 1 in Figure 4-63 on page 341)
- ▶ Click Dispatchers and Services (indicated with 2)
- ▶ Click the Define File System Locations icon (indicated with 3)

**Note:** You need to be logged in as the common user or have sufficient authority to see the icon.



Figure 4-63 Administration of file system folders in which to save reports

If this is the first time that you define a file system folder, the list will be empty, but we had configured folders before, so you can already see two entries in Figure 4-64.

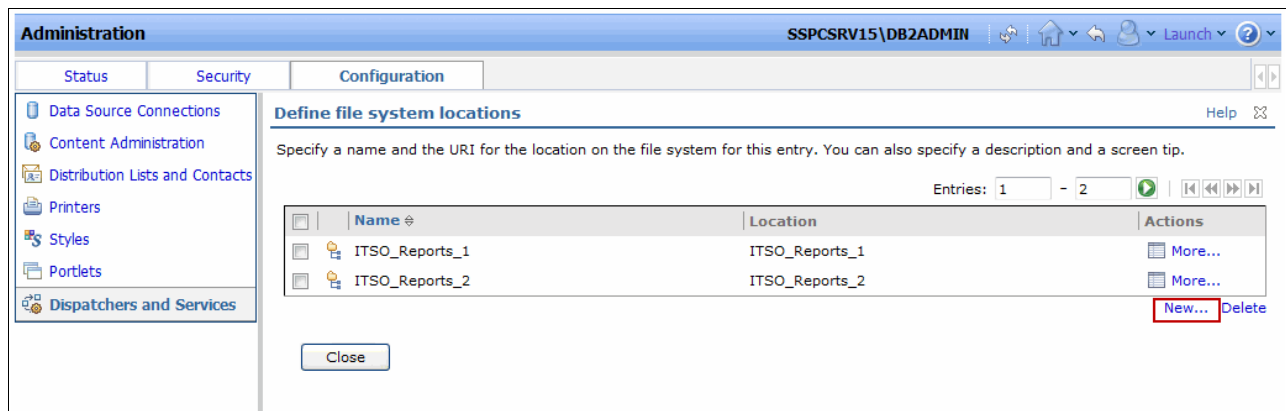


Figure 4-64 Click Add to define a new file system folder

The information that you need to provide is a name that Cognos will use to refer to the folder, and the name of the folder within the file system. To be consistent we used the same names, as you can see in Figure 4-65 on page 342.

**Administration** SSPCSRV15\DB2ADMIN Launch ?

Status Security **Configuration**

Data Source Connections  
Content Administration  
Distribution Lists and Contacts  
Printers  
Styles  
Portlets  
Dispatchers and Services

**Specify a name and description - New File System Location** Help

Specify a name and the URI for the location on the file system for this entry. You can also specify a description and screen tip.

Name:  
ITSO\_Reports\_3

Description:

Screen tip:

File system root location:  
The file system root location is set in IBM Cognos Configuration.  
file:///c:/File\_report\_repository

File system location:  
Type a URI address that refers to a location contained within the File System Root location.  
ITSO\_Reports\_3

Location:  
Configuration

Cancel < Back Next > Finish

Figure 4-65 Enter folder details

Click **Finish**.

At this point, no directory is created yet until the first report is saved into this location. From a file system perspective, it looks like Example 4-1 at this point.

#### Example 4-1 File system folders

```
C:\File_report_repository>dir
Volume in drive C is IBM_PRELOAD
Volume Serial Number is 14B5-1D32

Directory of C:\File_report_repository

07/02/2012  03:07 PM    <DIR>          .
07/02/2012  03:07 PM    <DIR>          ..
07/02/2012  01:31 PM    <DIR>          ITSO_Reports_1
07/02/2012  03:07 PM    <DIR>          ITSO_Reports_2
               0 File(s)                0 bytes
               4 Dir(s) 253,293,502,464 bytes free
```



### Step 3


In order to actually save a report to the file system you will have to run that report and specify options for that run using . You will see the panel with the run options as shown in Figure 4-66.

Figure 4-66 Run report with options

- First choose the delivery method. Select **Save the report**.
- Then you need to click the advanced options link in the upper right corner. That will reload the panel and show more options (see Figure 4-67 on page 344).

**Run with advanced options - Storage Virtualizer - Pools Historical Space Report** Help ⓘ

Select how you want to run and receive your report. If you produce a single report output, you can view it. If you produce multiple report outputs, you can save them, print them, or send an email notification.


**Time and mode:**


☐ View the report now

☒ Run in the background:

☒ Now

☐ Later:


Jul 5, 2012 

11 : 56 AM 


---

**Options**

**Formats:**

☐ HTML 

Number of rows per Web page:

20 

☒ Enable selection-based interactivity


☐ PDF

No options saved

[Set...](#)

☒ Excel 2007

☐ Excel 2002

☐ Excel 2000 Single Sheet 

☐ Delimited text (CSV)

☐ XML

**Delivery:**

Select at least one delivery method. For burst reports, the email recipients are determined by the burst specification.

☐ Save:

☒ Save the report

☐ Save the report as a report view [Edit the options...](#)

[Report View of Storage Virtualizer - Pools Historical Space Report](#)

☒ Save to the file system [Edit the options...](#)

Name: Use the report name. Location: ITSO\_Reports\_1. Replace existing files

☐ Print the report

Printer location:  [Select a printer...](#)

☐ Send the report by email [Edit the options...](#)

0 recipients

**Languages:**

English (United States) [Select the languages...](#)

**Prompt values**

No values saved

☒ Prompt for values

Figure 4-67 Advanced run options

You can now specify a lot more options, like multiple output formats or a simply run the schedule. For saving the report to the file system you now need to:

- ▶ Check **Save to the file system**.
- ▶ Click the **Edit the options** link.

In the following panel (Figure 4-68), you can change the file name and most importantly, select one of the folders defined in Step 2 (“Step 2” on page 340).

**Set the options when saving to a file system - Storage Virtualizer - Pools Historical Space Report** Help ⓘ

Specify the name and location of the report on the file system and the action to take when saving a file that already exists.

**Name:**

☒ Use the report name

☐ Specify a file name:

**Location:**

ITSO\_Reports\_1 

**Conflict resolution:**

☐ Keep existing files

☒ Replace existing files

☐ Make the file names unique and append a timestamp

☐ Make the file names unique and append a sequence number

Figure 4-68 Options for saving reports to the file system

- From the drop-down list, select the output folder that you want your report to be saved to.

## 4.7.5 Sharing your work: Import/export reports

In order to share the reports that you created or customized, the report definitions need to be exported out of Cognos. This export is also called a *deployment package*, which is the same type of package that has been shipped with Tivoli Storage Productivity Center.

### Create a deployment package (export)

To create a deployment package, follow the steps outlined below:

1. Go to the Cognos administration panel as described in “Cognos administration panel” on page 333.
2. Click the **Configuration** tab on the top of the administration panel.
3. Next select **Content Administration** on the left side. See Figure 4-69.

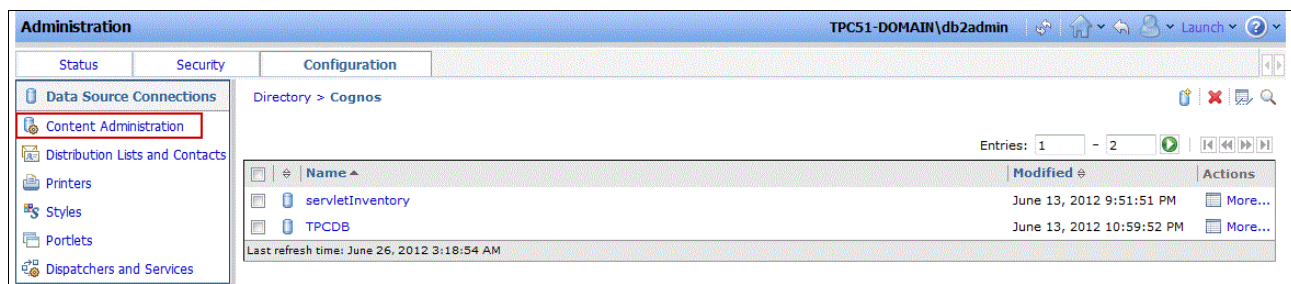


Figure 4-69 Select Content Administration

4. Create new export by clicking the export icon, as shown in Figure 4-70.

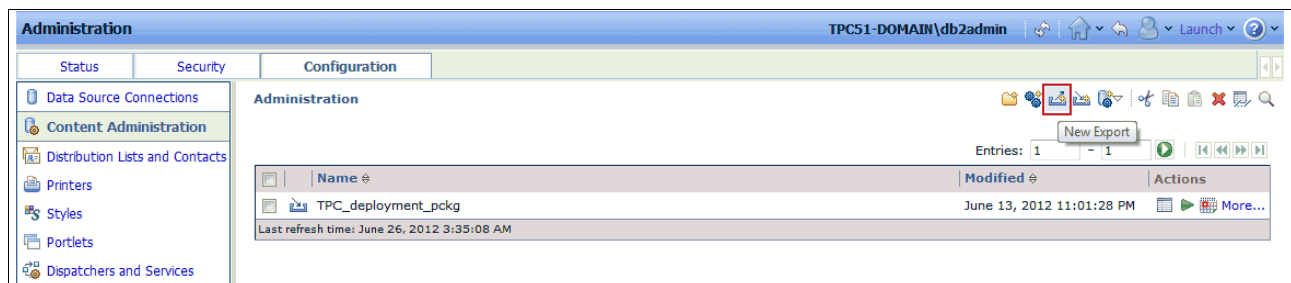


Figure 4-70 Click New Export

5. Specify a name for the export job, as shown in Figure 4-71 on page 346.

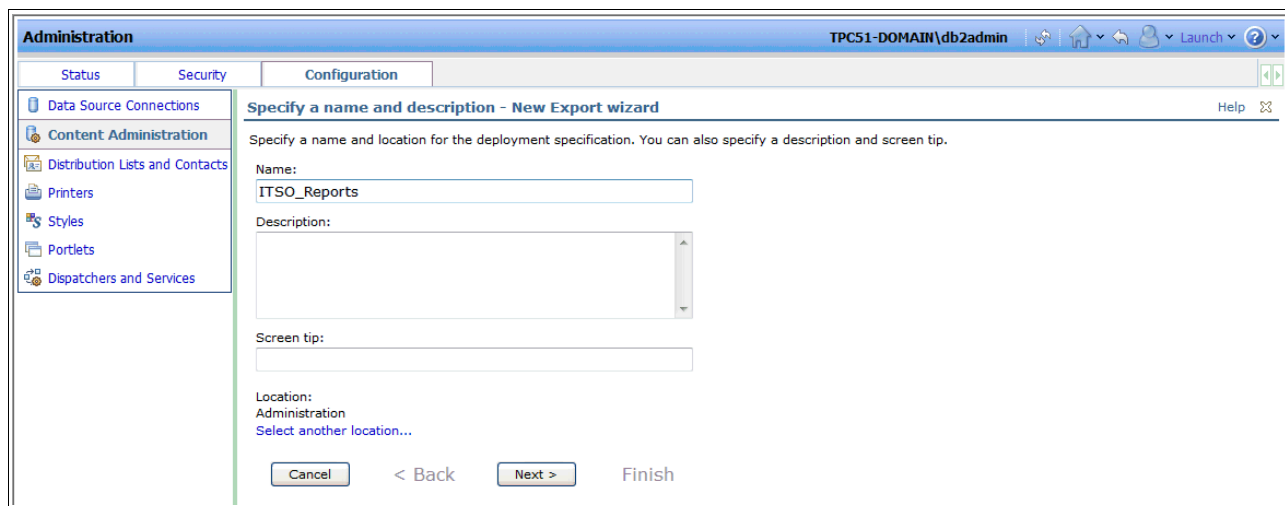


Figure 4-71 Enter export name

- Click **Next** to go to the first selection panel, where you specify what you want to export, as shown in Figure 4-72.

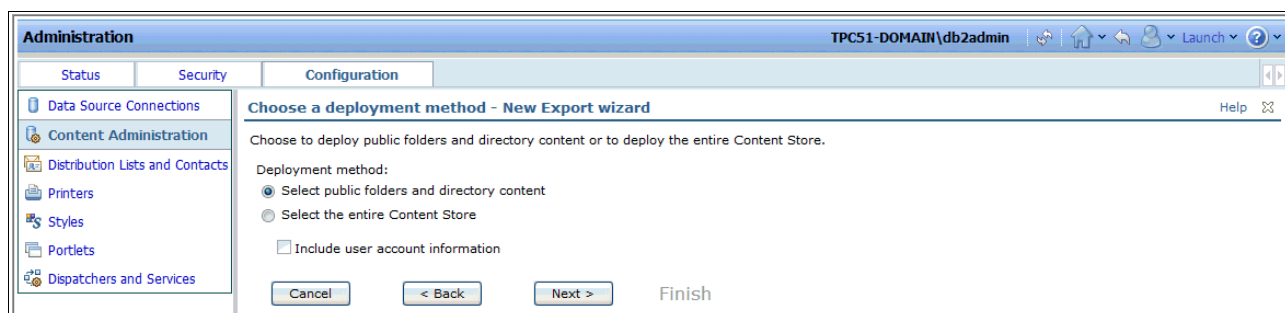


Figure 4-72 First selection panel

- Leave the default to “Select public folders and directory content”, and click **Next** to go to Figure 4-73.

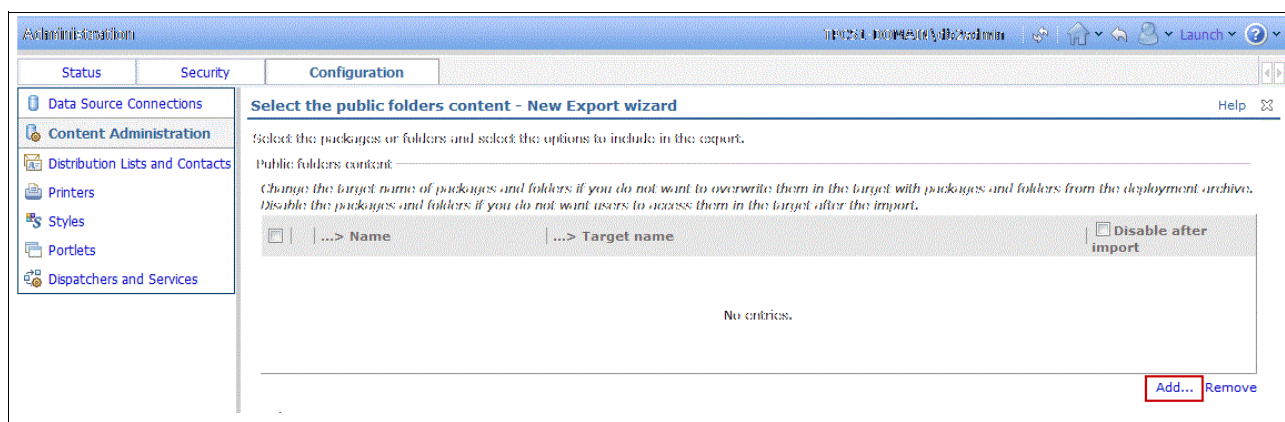


Figure 4-73 Second selection panel

- Click **Add**.

A new panel opens where you see a list of folders on the left and an empty list on the right. See Figure 4-74.

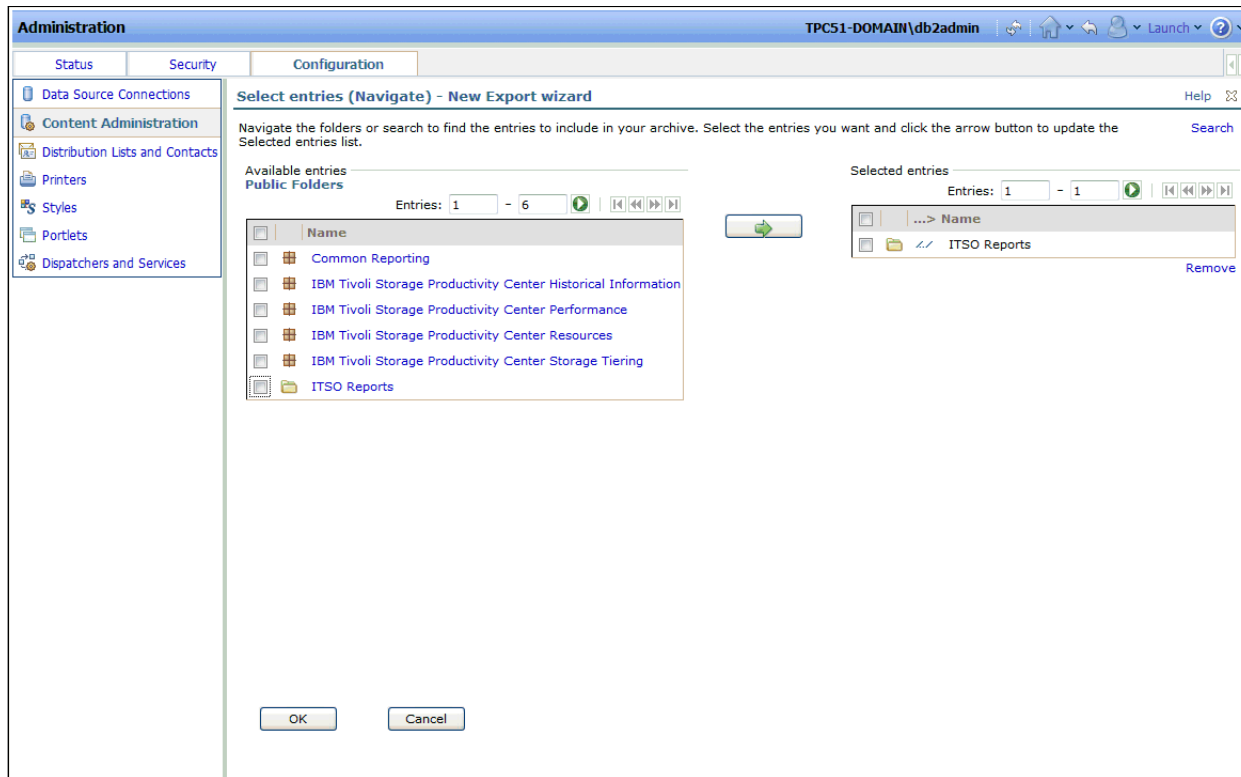


Figure 4-74 Select folder and reports and add them to the list on the right

9. Browse and select the folders or other deployment packages that you want to export, and click the green arrow to add your selection to the list on the right. Once you are done, click **OK** to go back to Figure 4-75 on page 348.

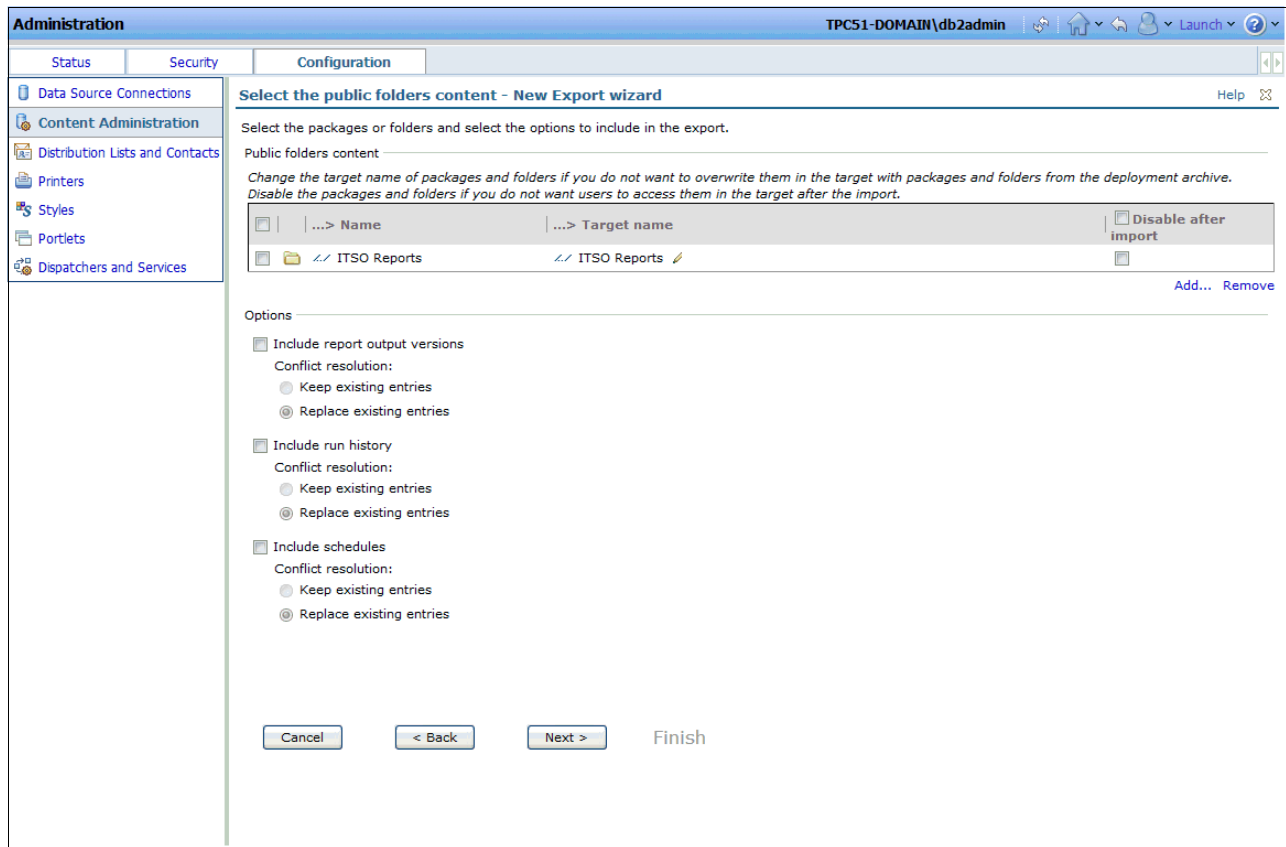


Figure 4-75 Options for the deployment package

10. We have not changed anything else from this point on in the wizard, but Cognos does not let you finish creating the export package from here. Therefore, you have to click **Next**, **Next**, **Next**, ... until you have the option to click **Finish**, as shown in Figure 4-76.

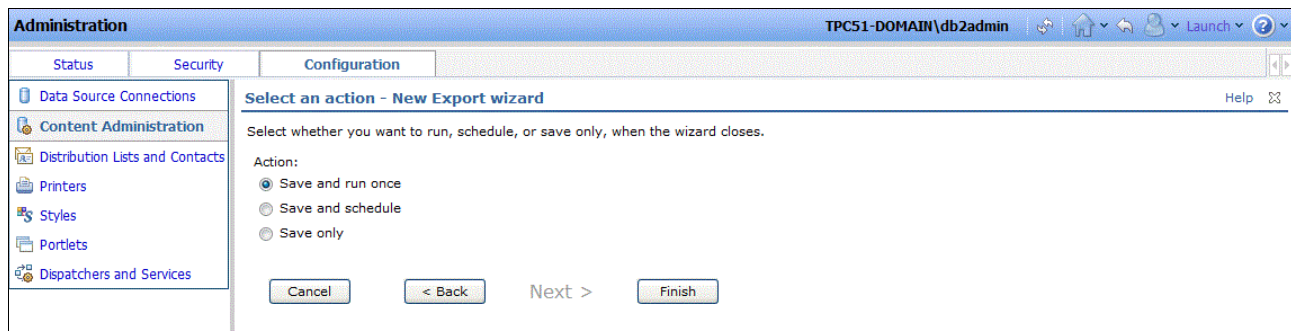


Figure 4-76 Select Save and run once

11. Select **Save and run once**, unless you plan to use this function as a backup procedure while you are creating new reports. Now click **Finish**.  
On the next panel you will be able to specify when to run, even if it should only run once. See Figure 4-77 on page 349.

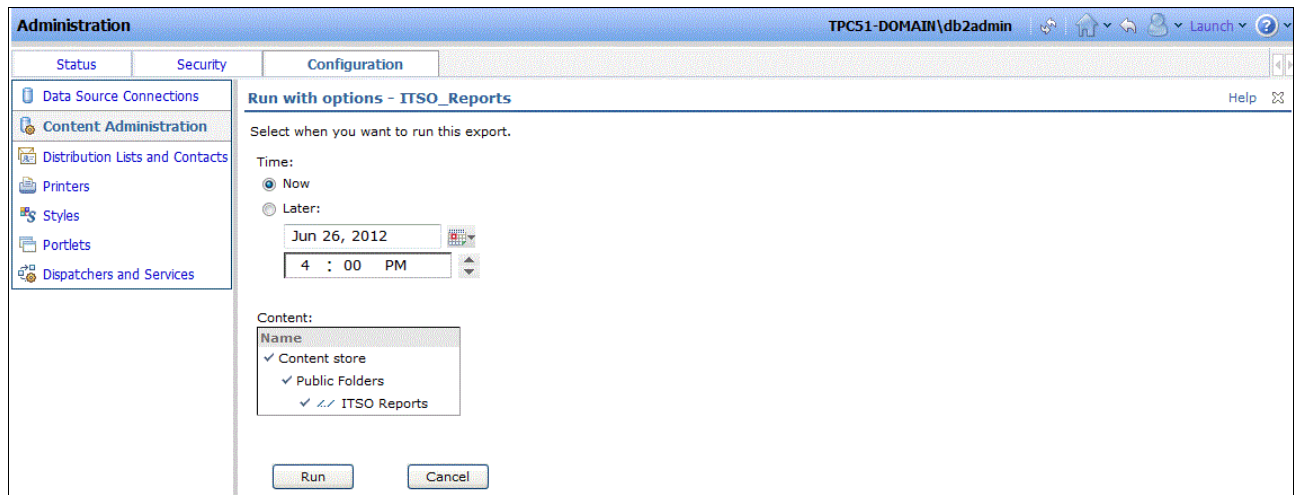


Figure 4-77 Select time to run the export

12. At the end of the process you should now see a panel similar to Figure 4-78.

If you have run this before and cleared “Show this dialog in the future”, you might get the panel that is shown in Figure 4-81 on page 351.

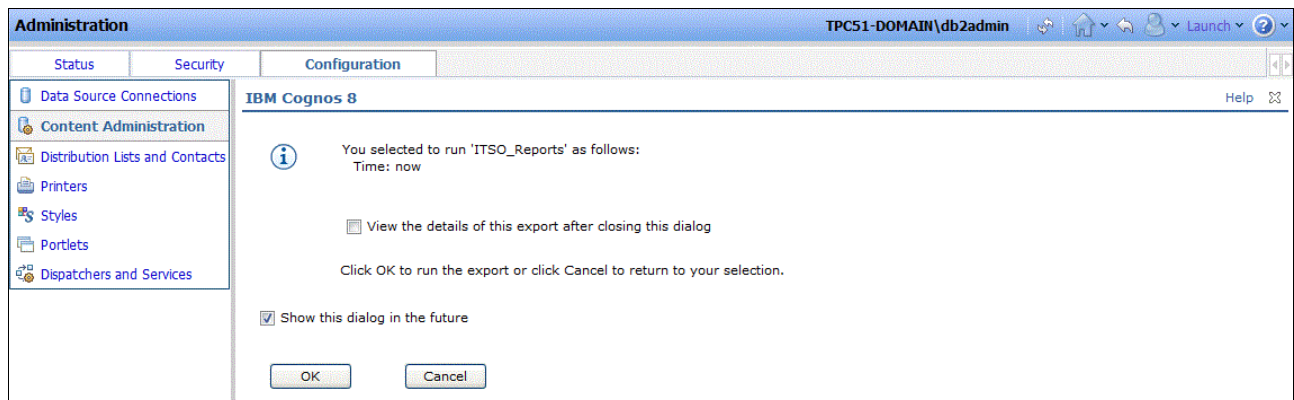


Figure 4-78 Notice panel

13. If you want you can select “View the details of this export after closing this dialog”.

14. Depending on how quickly you click OK or how long your job might run, you might see Figure 4-79 on page 350.

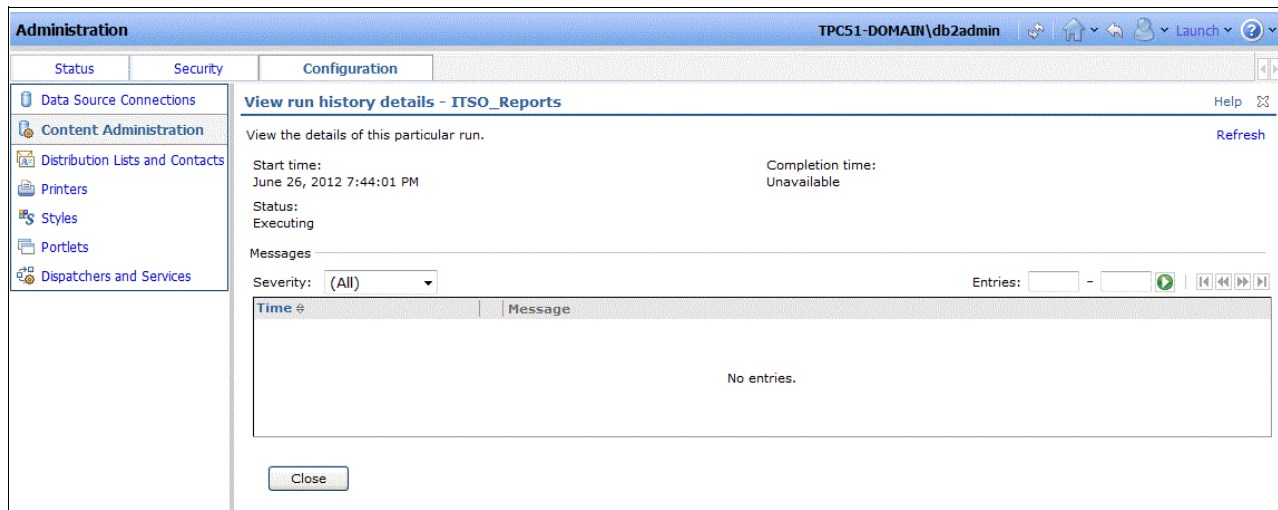


Figure 4-79 Details panel while the job is still running

15. Wait a few moments and click the refresh icon in the upper right corner. Once the job is finished, you will see what is shown in Figure 4-80.

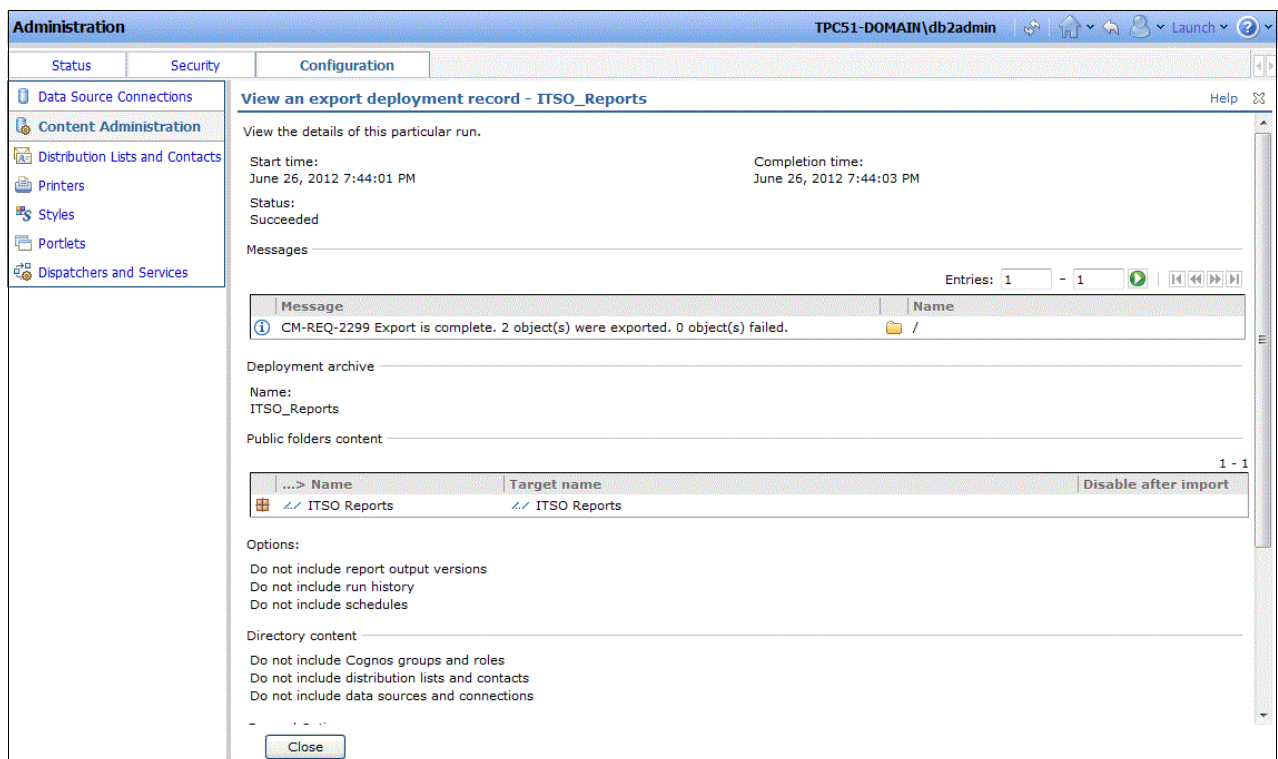


Figure 4-80 Job result details

16. When you close that panel, you will go back to the list of deployment package jobs where your export is listed. See Figure 4-81 on page 351.



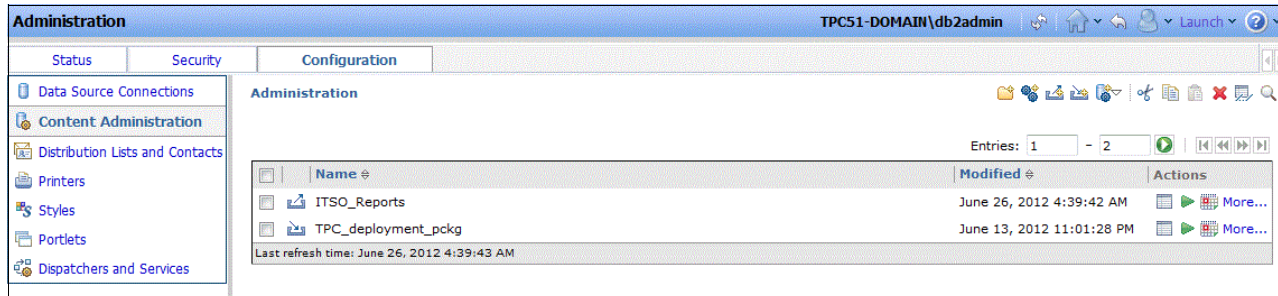


Figure 4-81 Overview of deployment packages

The deployment package will be saved as a compressed file with the name you provided in step 5, and it is stored in:

...\tipv2Components\TCRComponent\cognos\deployment>\<your package name>.zip

**Note:** If you included graphic images in your report like a logo, it will not be part of the exported package. In case you are using this as a method to copy reports from one server to another, you will have to copy the images manually.

### Load a deployment package (import)

Importing a deployment package is done basically the same way as an export, just the other way around.

There is one thing that we want to point out for a first-time user. It is likely that when you create the export, your compressed file will contain only one folder, and since this file is named the same as the folder, you will probably skip through the import dialog and not change anything. However, when you get the panel that is shown in Figure 4-82 on page 352, you need to make a check mark in front of the folder name because the default in Cognos is to not import anything from the compressed file unless you checked the entry on this panel.

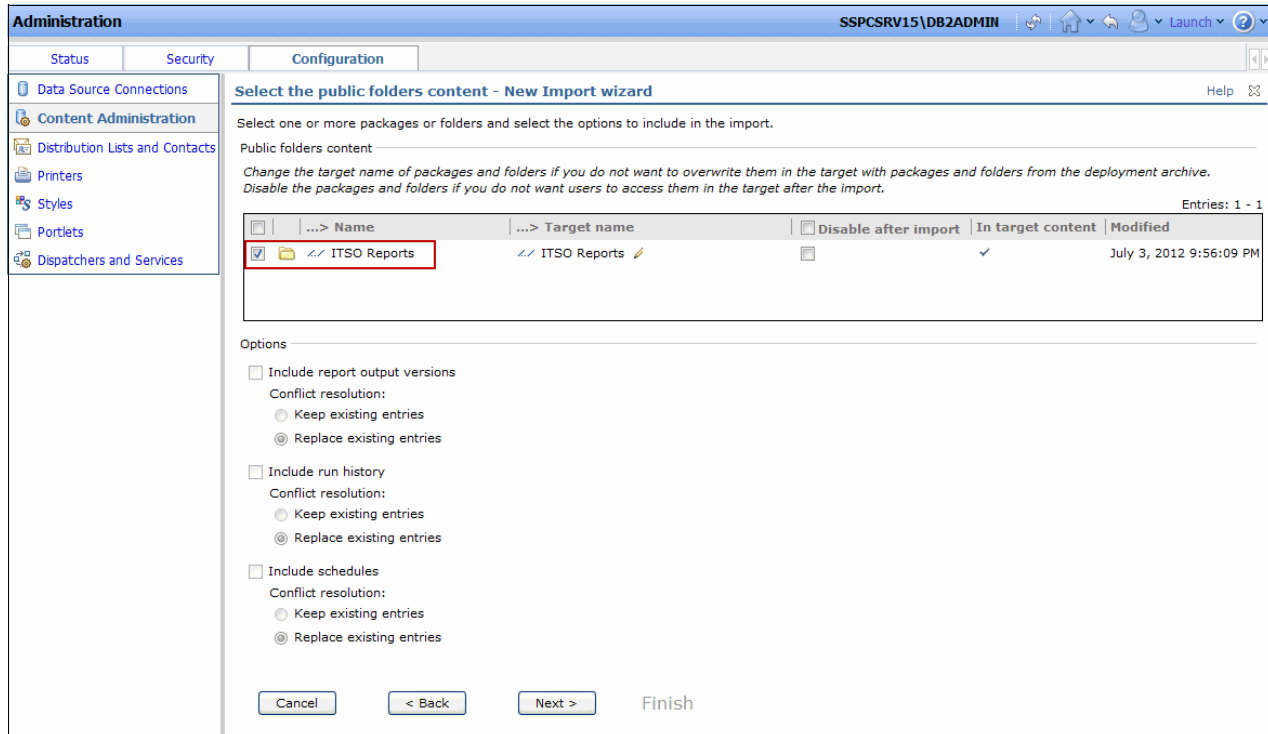


Figure 4-82 Select which folders to import

## Considerations

- ▶ There are a lot of options that you can choose from during the import, but when you start using Cognos you might want to use the defaults.
- ▶ If you import reports, you might need to change the access rights of the reports because the user directory might be a different one than the one where the reports were exported from.
- ▶ If you want to schedule the export as a kind of backup procedure for the work you invested into creating and modifying reports, note that Cognos will simply overwrite an existing package without warning, so there is no version history.

## 4.8 Advanced Cognos administration

In this section, we describe those types of tasks that you will probably run more often than the tasks in 4.7, “Advanced Cognos configuration” on page 331. We therefore try to use the term “administration” here and use “configuration” for one-time configuration tasks.

### 4.8.1 Open Cognos Administration

To perform administrative tasks in Cognos you need to switch to the administrative interface by opening the launch menu on the upper right corner and select **Administration**. See Figure 4-83 on page 353.

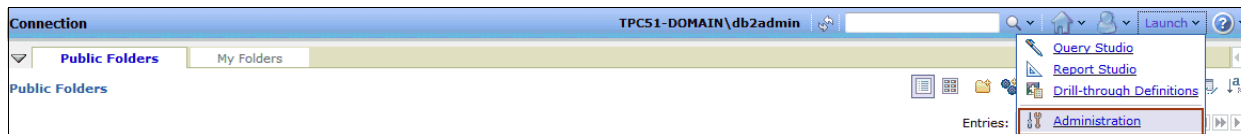


Figure 4-83 Switch to Cognos Administration

## 4.8.2 Backup reports

One easy way to back up your report definitions is to export your report definitions as a report package into the file system and let this report package file be backed up by your favorite backup application.

For instructions about how to create such a report package, see 4.7.5, “Sharing your work: Import/export reports” on page 345.

This process can also be scheduled so that even if somebody else has created a new report, it will be backed up regularly.

## 4.8.3 Change DB2 password

We documented this procedure in 7.3.3, “Change the DB2 password that is stored in IBM Tivoli Common Reporting and Cognos” on page 478.

Here is a quick outline of the steps:

1. In the Public Folders tab, click **Launch > Administration**.
2. Click the **Configuration** tab.
3. Click **TPCDB**, and then click **TPCDB** again.
4. In the Actions column, click the Set properties icon, and then click the **Signon** tab.
5. Click **Edit the signon**.
6. Make your changes, and then click **OK**.

## 4.8.4 Scheduling a report

Scheduling a report can also be performed by non-administrative users, but we included this topic in this section because it is more likely that one person will be in charge of doing this type of administrative work.

The first step is to open the scheduling panel by clicking the little calendar icon for a report. See Figure 4-84 for an example.

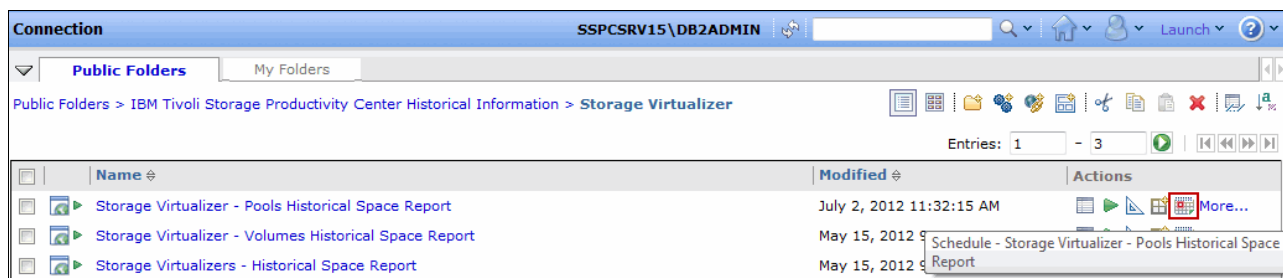


Figure 4-84 Launch the scheduling GUI

The scheduling panel has three sections that can or need to be modified. See Figure 4-85 for an example.

**Schedule - Storage Virtualizer - Pools Historical Space Report** Help

Schedule this entry to run at a recurring date and time. You can run using the default values or specify the options. You can disable the schedule without losing any of its details.

☐ Disable the schedule      Priority: 3      Start: Jul 2, 2012 3 : 54 PM

Frequency:  
Select the frequency by clicking on a link.

By Day    **By Week**    By Month    By Year    By Trigger

Every 1 week(s) on:

☒ Monday    ☐ Tuesday    ☐ Wednesday    ☐ Thursday  
☐ Friday    ☐ Saturday    ☐ Sunday

End:  
☒ No end date  
☐ End by: Jul 2, 2012 3 : 54 PM

**Options**

☐ Override the default values

Formats:  
Default

Languages:  
Default

Delivery:  
Save the report

**Prompt values**

☒ Override the default values

No values saved  
[Set...](#)

OK    Cancel

Figure 4-85 Scheduling panel

- In frame 1 you can set up the scheduling time and frequency:
  - You can select By Day, By Week, By Month, or By Year
  - You can also schedule entries based on an occurrence, such as a database refresh or an email. The occurrence acts as a trigger, causing the entry to run. For example, you might want to run a report every time a database is refreshed. Triggers are not used very often, so for more information click the Help link on the upper right corner that is shown in Figure 4-85. If the help panel does not have the navigation tree on the left, simply click the little blue triangle to show the area.
- In frame 2, you can change some options like output type:
  - To change the default output from HTML to something else, select **Overwrite the default values**
  - If you want to set the number of lines in the web report, you also need to select **Overwrite the default values**
- In case the report requires parameters you have to set them in frame 3 for the report. If you forget to do this, your schedule cannot run successfully:
  - Check the box.
  - Click **Set...**
  - Now step through the parameter selection dialog just as though you would launch a report.
  - Once you have done this, the Set... changes into links to view, edit, or clear the information you entered.
  - If you get prompted, simply enter your password again.

## Considerations

- ▶ If you schedule a report you can only define one set of parameters.
- ▶ If you need to schedule the same report to run with different parameters, you should create report views for the set of parameters first and then schedule those views.
- ▶ You can select more than one output file to be created within one schedule run if you select “Overwrite the default values” in Figure 4-85 on page 354. Therefore, you do not need to create one view per output type.
- ▶ If one of the report parameters contains a date, you should select relative date ranges, otherwise you will always create the same report.
- ▶ Cognos takes care of deleting old reports if they are saved to the Content Store (which is default), but you might want to change the number of versions and age setting. This is done in the properties of a report (see Figure 4-86).

**Set properties - Storage Virtualizer - Pools Historical Space Report** Help

General Report Permissions

Specify the properties for this entry.

Type: Report Location: Public Folders > IBM Tivoli Storage Productivity Center Historical Information > Storage Virtualizer [View the search path, ID and URL](#)

Owner: SSPCSR15 \DB2ADMIN Created: May 15, 2012 9:38:40 PM

Contact: None [Set the contact](#) Modified: July 2, 2012 4:45:11 PM

Icon: Standard [Edit...](#)

☐ Disable this entry

☐ Hide this entry

The name, screen tip and description are shown for the selected language.

Language: English [Remove values for this language](#)

Name: Storage Virtualizer - Pools Historical Space Report

Screen tip:

Description:

**Run history:**  
Setting the number of occurrences to zero (0) saves an unlimited number of occurrences.

☒ Number of occurrences: 5

☐ Duration:  Day(s)

**Report output versions:**  
Setting the number of occurrences to zero (0) saves an unlimited number of occurrences.

☒ Number of occurrences: 1

☐ Duration:  Day(s)

Package:  
IBM Tivoli Storage Productivity Center Historical Information [Link to a package...](#)

OK Cancel

Figure 4-86 Change history settings of a report

- The run history is simply the log entries.
- What you need to change is the Report output versions.
- You can set the number of runs or the number of days to keep saved reports.
- ▶ As long as you save the scheduled reports in the Cognos Content Store, it is protected with the same authorization settings as the original report, but if you save it to the file system or print it, it might not be secured anymore.
- ▶ Whenever there is a saved version of the report, the most recent version will be launched. This is indicated in the report icon:
  - runs the report, which means it is newly rendered
  - opens a saved report
  - You can change this behavior in the settings of a report. See Figure 4-87 on page 356

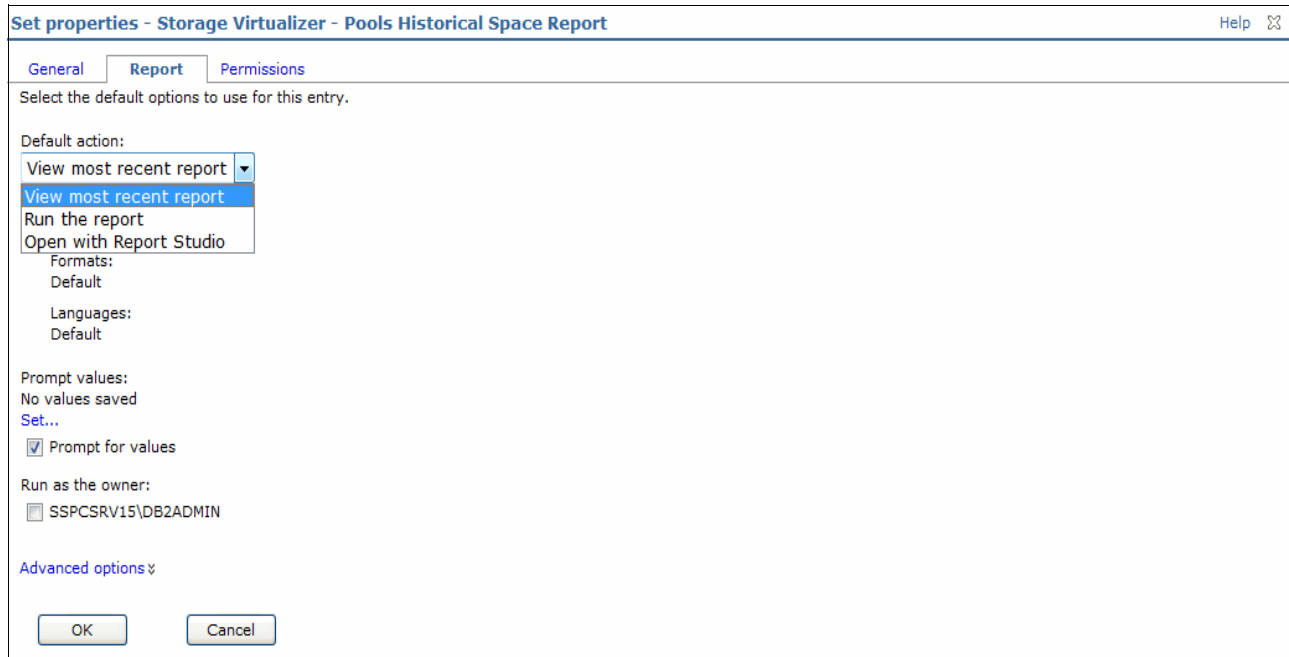



Figure 4-87 Setting default for viewing or running reports

## Viewing saved reports (View report output versions)

To open a saved version of a report, you simply click the  icon next to the report. When you click this icon, you will see a history of the previously run reports.

At first you might think that there is only one saved report when you look at Figure 4-88, but actually the list of reports is not in the middle of the panel it is the drop-down box on the upper left side.

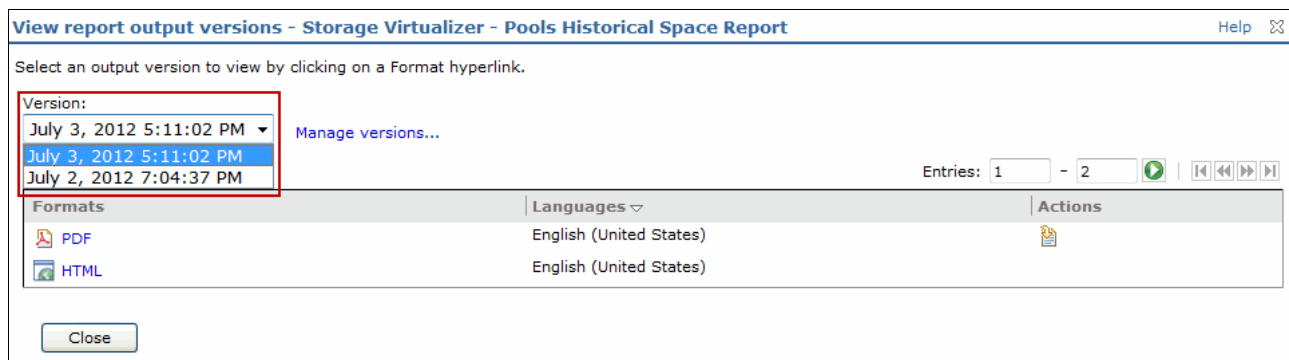


Figure 4-88 Viewing saved reports

In the middle of the panel, you will see what file types of this report were saved, because when you schedule a report you can select one or more output types.

## View the run history

If you need to find out if your schedule has or has not run, you can view the run history in Cognos by clicking the More link next to the report.

- From the list of available options, select **View run history** like indicated in Figure 4-89 on page 357.

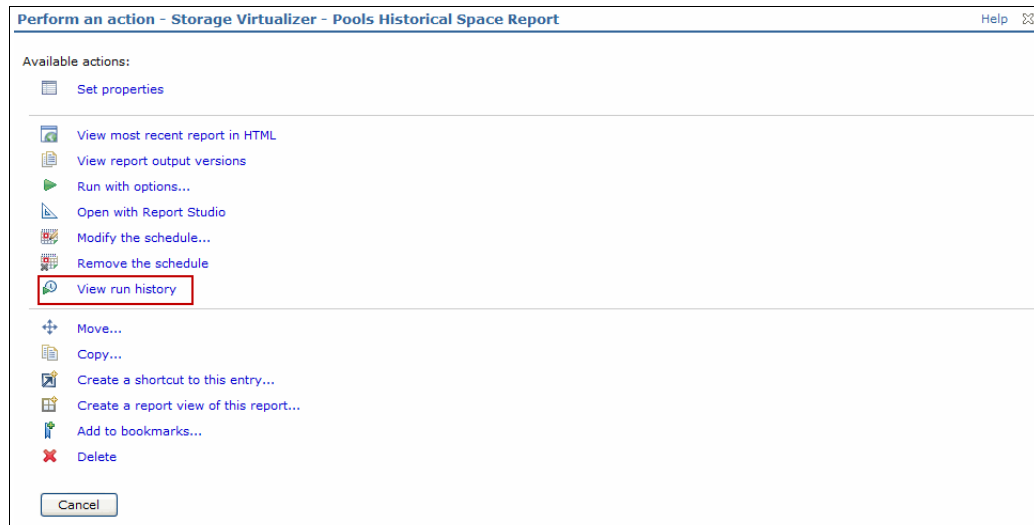


Figure 4-89 View run history

On the run history panel, you can see two different icons on the right, as shown in the red frame in Figure 4-90, “Run history” on page 357.

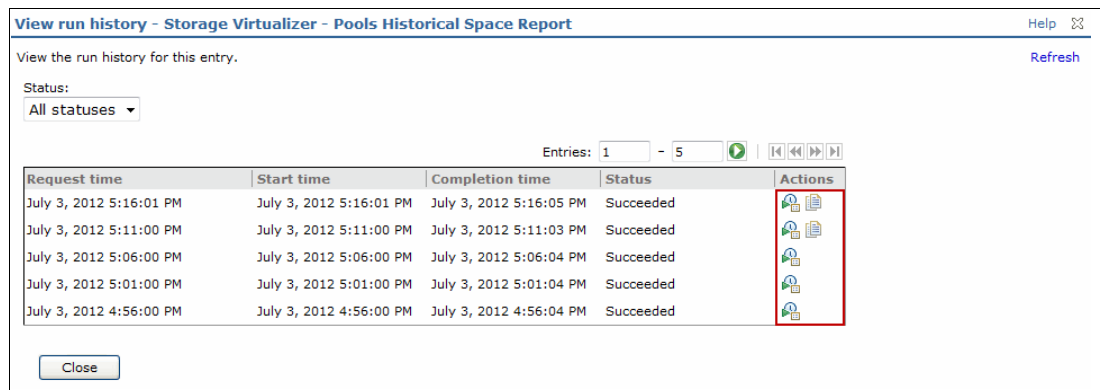


Figure 4-90 Run history

- ▶ The first icon indicates that there is more information available for this run
- ▶ The second icon will take you to the report output files panel that we showed in Figure 4-88 on page 356.

## 4.8.5 Using external data sources

On the one hand, Cognos can use more than one data source for reporting. Alternatively, the Tivoli Storage Productivity Center license does not allow you to use Cognos for anything else than Tivoli reporting.

### When to use external data sources

This situation might sound like it cannot be of any value but actually this can be used in some situations quite well:

- ▶ Multi-tenancy: Currently, Tivoli Storage Productivity Center is not prepared to be used in an environment with multiple tenants. If you have such an environment where no resource

(SAN or storage systems) is shared, you could install one Tivoli Storage Productivity Center per environment, but use only one Cognos website to look at reports from both environments.

- ▶ A simple use case could be if you want to have a dedicated Tivoli Storage Productivity Center server for your test environment, but you want the reports to be visible in the same website as your production data.

Actually most of the scenarios are the same: You have two or more Tivoli Storage Productivity Center servers and want one single point where you can access all the reports.

## Considerations

- ▶ Since Cognos needs to access the data of the remote Tivoli Storage Productivity Center database, you need to test if the connection is sufficient to access the remote database (latency/bandwidth). There is no easy way to figure this out, so testing is your best option.
- ▶ Since by default the reports are not restricted to certain users in Cognos, you might need to think about adding report security, even though Cognos only allows read access to the reports.
- ▶ The users that need to access the reports might not need access to Tivoli Storage Productivity Center so you could provide the following short cuts to them for direct access to Cognos.
- ▶ New Tivoli Storage Productivity Center 5.1 installation:  
`https://<hostname>:9569/tarf/servlet/dispatch`
- ▶ Upgrade from Tivoli Storage Productivity Center 4.x:  
`https://<hostname>:16311/tarf/servlet/dispatch`
- ▶ If you are really concerned about security, the Tivoli Storage Productivity Center server with the Cognos that is enabled to access multiple other Tivoli Storage Productivity Center databases should not be used for any other purpose.
- ▶ Having more than one Tivoli Storage Productivity Center server does not break your license agreements as long as the managed capacity is licensed, so you could have any number of Tivoli Storage Productivity Center servers for the same environment from a license point of view.
- ▶ Using Cognos with a Tivoli Storage Productivity Center version 4.x server is not supported and will not work.
- ▶ If you create your own reports based on the published SQL schema, you could create reports that theoretically can be used across different Tivoli Storage Productivity Center versions.

## Requirements

There is only one requirement for this setup:

- ▶ You must catalog the remote TPCDB on the Tivoli Common Reporting server before Cognos will be able to connect to it. This is because Cognos uses a native interface to connect to DB2.

## Implementation

The base implementation of multiple data sources in Cognos is described in the Tivoli Storage Productivity Center users guide, so we will not repeat those steps: Here is a link to the section in the information center:

[http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_t\\_multiple\\_connections\\_to\\_TPCDB.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_t_multiple_connections_to_TPCDB.html)



## 4.8.6 Launch through Tivoli Integrated Portal

This is not really a administration topic, but you could actually also launch Cognos through Tivoli Integrated Portal using this url:

`http://<machine where Tivoli Integrated Portal is installed>:9568/ibm/console`

or

`http://<machine where Tivoli Integrated Portal is installed>:9569/ibm/console`

The disadvantage is that you will always see a Tivoli Integrated Portal frame around the reporting panel. Because your screen space is reduced, we do not recommend using this way to access Cognos. It is also not much more direct that going through the Tivoli Storage Productivity Center web GUI and then launching Cognos.

**Note:** If Tivoli Storage Productivity Center was upgraded from version 4.x to version 5, it is likely that the port is different:

`http://<machine where Tivoli Integrated Portal is installed>:16310/ibm/console`

or

`https://<machine where Tivoli Integrated Portal is installed>:16311/ibm/console`

## 4.9 BIRT and Cognos

Given the fact that the Cognos approach to creating reports is so dramatically different from BIRT, the notion of a conversion utility that would create Cognos reports from BIRT reports is not possible. The BIRT engine, however, is still installed with Tivoli Common Reporting v2.1. Since the primary engine in Tivoli Common Reporting 2.1.1 is Cognos, administering BIRT reports in Tivoli Common Reporting v2.1 is not as straightforward as it was in Tivoli Common Reporting v1.2.

In Tivoli Common Reporting version 2.1, there is no ability to create BIRT reports. It is only a portal through which reports may be administered and rendered. There is also no longer a graphical interface to import BIRT report packages, so if you have BIRT reports that you still need, and do not want to re-create in Cognos, you will have to use the Tivoli Common Reporting command-line utility.

During the upgrade of a Tivoli Storage Productivity Center server to version 5.1, BIRT reports that had been installed will not be added to the new Tivoli Common Reporting. In this case, or when you install a new Tivoli Storage Productivity Center 5.1 server, you will have to import your BIRT reports. In the rest of this section, we explain how to import, update, configure, and run BIRT reports in Tivoli Storage Productivity Center 5.1 and Cognos.

**Note:** Make sure that you have a copy of your BIRT reports before running the upgrade to Tivoli Storage Productivity Center 5.1 because they will not be available afterward.

We just provided the commands that we are using. For more information about available `trcmd` commands and options, see the Tivoli Common Reporting documentation, which can be found here:

[http://pic.dhe.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=%2Fcom.ibm.tivoli.tcr.doc\\_21%2Fic-home.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v3r1/index.jsp?topic=%2Fcom.ibm.tivoli.tcr.doc_21%2Fic-home.html)

One interesting topic of the manual that we do not cover in this book is how you can convert BIRT reports into Cognos report specifications.

**Note:** The key difference between BIRT and Cognos reports, however, is that the BIRT reports cannot be modified using the Cognos Report Studio. Modifications to the reports will need to be done using the BIRT report designer, then imported into Tivoli Common Reporting, as was the case in Tivoli Common Reporting 1.2.

Besides this, you can do all other actions with BIRT reports, for example create report views, scheduling, emailing, and restrict access.

### 4.9.1 Prerequisite configuration: Set up BIRT to use DB2

This configuration is required because BIRT is not packaged with the files that are required for a JDBC connection to a DB2 database:

- ▶ Search for the two JAR files on your Tivoli Storage Productivity Center server (on Windows the files are located in C:\Program Files\IBM\SQLLIB\java):
  - db2jcc.jar
  - db2jcc\_license\_cu.jar
- ▶ Copy the files to:  
C:\Program Files\IBM\tpv2Components\TCRComponent\lib\birt-runtime-2\_2\_2\ReportEngine\plugins\org.eclipse.birt.report.data.oda.jdbc\_2.2.2.r22x\_v20071206\drivers

### 4.9.2 Importing a BIRT report package

In the GUI, a report package is shown as a folder. To use a meaningful name for the folder with your reports, the easiest way is to give the compressed file that contains your reports the name that the folder should be called, before you continue with this step. You can also use the optional **reportSetBase** parameter.

Use a command like the following and in Example 4-2 on page 361 to import BIRT report packages into Tivoli Common Reporting 2.1:

```
trcmd -user <tipuser> -password <tippasswd> -import -bulk <zip filename>
[-reportSetBase <report set name>]
```

Where:

<tipuser>	User ID capable of administering reports in Tivoli Common Reporting 2.
<tippassword>	Password for that user ID.
<zip filename>	The name of the zip file containing the report package exported from the BIRT report designer or from Tivoli Common Reporting 1.2.
<report set name>	Optional: If importing a report package from the BIRT report designer, supply the report set base name. Unlike Tivoli Common Reporting 1.2, Tivoli Common Reporting 2.1 will not assume that the directory name in the report package will be the report set base name. Instead, it will create a report set base name that matches the name of the compressed file.

#### Example 4-2 Importing a BIRT report package

```
C:\Program Files\IBM\tipv2Components\TCRComponent\bin>trcmd.bat -user db2admin  
-password Passw0rd -import -bulk c:\temp\ITSO_HBA_Report.zip  
CTGTRQ092I Import operation successfully performed.
```

The imported BIRT package is shown in Figure 4-91.

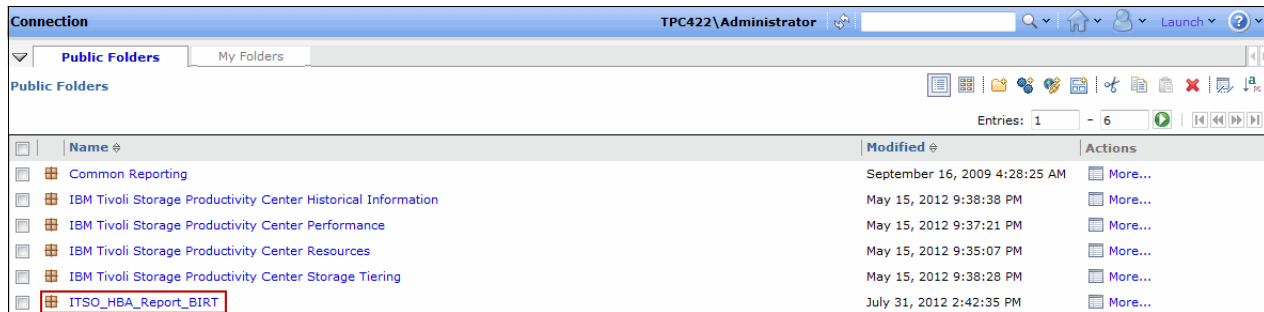


Figure 4-91 Imported BIRT package does not look any different than a Cognos package

For more information about this command, see the Tivoli Common Reporting information center:

[http://pic.dhe.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc\\_21/rtcr\\_cli\\_import.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_21/rtcr_cli_import.html)

### 4.9.3 Updating a BIRT data source

The following command updates a BIRT data source in Tivoli Common Reporting 2.1. The commands have three parts so we split it into three lines for better readability. When you enter them do not press <ENTER> between the lines.

You can change the data source for all BIRT reports that use the same data source name with the following command:

```
trcmd -user <tipuser> -password <tippasswd> -modify -dataSources -reports  
-datasource "name=<data source name>"  
-setDataSource "odaURL=jdbc:db2://tpcserver.ibm.com:50000/TPCDB"  
"odaUser=administrator" "odaPassword=<password2>"
```

You could also change the data source for an individual report with this command:

```
trcmd -user <tipuser> -password <tippasswd> -modify -dataSources -reports  
-reportname "/content/package[@name='<reportsetname>']/report[@name='<report  
name>']"  
-setDataSource "odaURL=jdbc:db2://tpcserver.ibm.com:50000/TPCDB"  
"odaUser=administrator" "odaPassword=<password2>"
```

Where:

<tipuser>	User ID capable of administering reports in Tivoli Common Reporting 2.1
<tippassword>	Password for that user ID

<reportsetname>	Name of the report set base
<report name>	Name of a report in the report set
<data source name>	Name of the data source in the BIRT report
<dbuser>	User ID to be used in the data source to connect to the database
<dbpasswd>	Password for database user
<JDBC URL>	URL in the form jdbc:db2://<hostname>:<port>/<database>. For a default Tivoli Storage Productivity Center installation, it is acceptable to use jdbc:db2://localhost:50000/TPCDB

For more information about this command, see the Tivoli Common Reporting information center:

[http://pic.dhe.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc\\_21/rtcr\\_cli\\_modify.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v3r1/topic/com.ibm.tivoli.tcr.doc_21/rtcr_cli_modify.html)

*Example 4-3 Updating the data source*

```
C:\Program Files\IBM\tpv2Components\TCRComponent\bin>trcmd -user db2admin
-password PasswOrd -modify -dataSources -reports -reportname
"/content/package[@name='ITSO_HBA_Report']/report[@name='Server_HBA_Report']"
-setDataSource "odaURL=jdbc:db2://9.12.5.113:50000/TPCDB" "odaUser=db2admin"
"odaPassword=PasswOrd"
CTGTRQ098I Datasources successfully modified.
```

## 4.9.4 Running BIRT reports in Tivoli Common Reporting 2.1

Once the reports are imported into Tivoli Common Reporting 2.1, they are accessed no differently than the Cognos reports. First, you will have to open the imported report package folder (shown in Figure 4-92) to see all the imported reports, like shown in Figure 4-92.

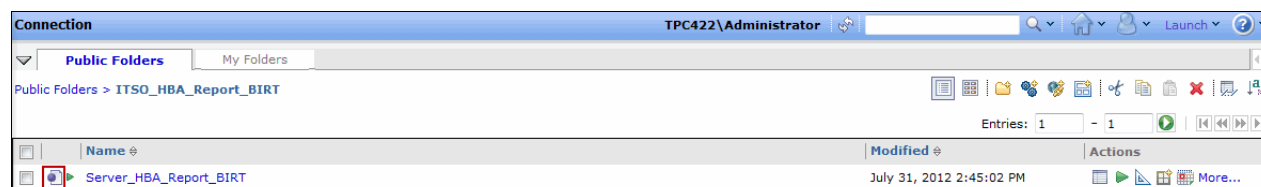



Figure 4-92 Imported BIRT reports

Note that BIRT reports have a different icon: .

When you click the report, you will almost not see any difference to a BIRT report, but in our example the layout of the report is fairly typical, see Figure 4-93 on page 363.

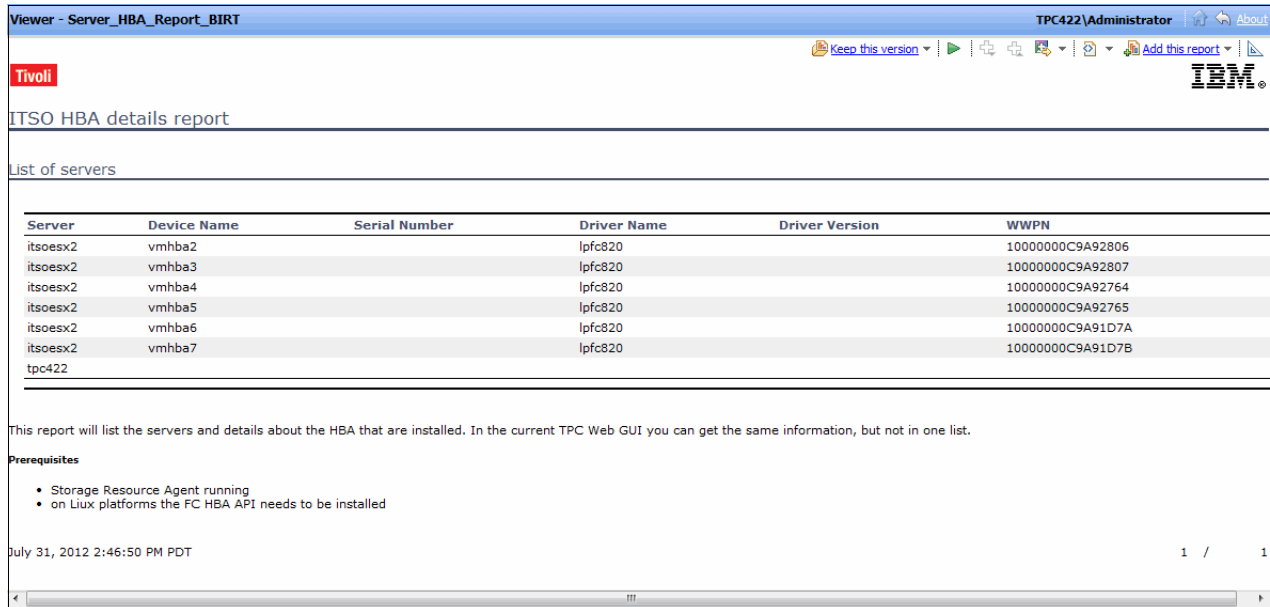


Figure 4-93 View of a BIRT report in Cognos

In case you see your report but also the error message that is shown in Example 4-4, something went wrong with the configuration in section 4.9.1, “Prerequisite configuration: Set up BIRT to use DB2” on page 360 and the BIRT process cannot find the DB2 drivers.

#### Example 4-4 Error message when missing DB2 drivers

The following items have errors:

ReportDesign (id = 1):

+ Cannot open the connection for the driver: org.eclipse.birt.report.data.oda.jdbc  
Cannot load JDBC Driver class: com.ibm.db2.jcc.DB2Driver

## 4.10 Usage scenarios and example reports

In previous sections of this chapter, we provided examples of reports that you can create or customize. In those sections, the focus was more on how to actually use Cognos to create those reports.

In this section, we show you some more scenarios for custom reports but we do not provide a full step-by-step walk through. We want to focus on the thought process of how to create reports.

Table 4-10 shows you a list of all the example reports that we provided in this chapter.

Table 4-10 Custom reports provided in this chapter

Report	Reference	Cognos application
SVC VDisk mirror	4.4, “Create a basic report (Query Studio)” on page 294	Query Studio
Storage Virtualizer - Pools Historical Space Report	4.5.1, “Example modifying a predefined report” on page 316	Report Studio

Report	Reference	Cognos application
Orphaned Volumes	4.10.1, "Orphaned volumes" on page 364	Query Studio and Report Studio
Wasted Space report	4.10.2, "Wasted space report" on page 369	Query Studio
HBA details report	4.10.3, "HBA details report" on page 376	Report Studio
VMware end-to-end mapping report	4.10.4, "VMware end-to-end mapping report" on page 378	Query Studio

### 4.10.1 Orphaned volumes

When you start to think about this scenario, you realize that there is more than one reason why a volume can be orphaned or unused.

In Figure 4-94, we tried to provide a diagram with the most likely scenarios.

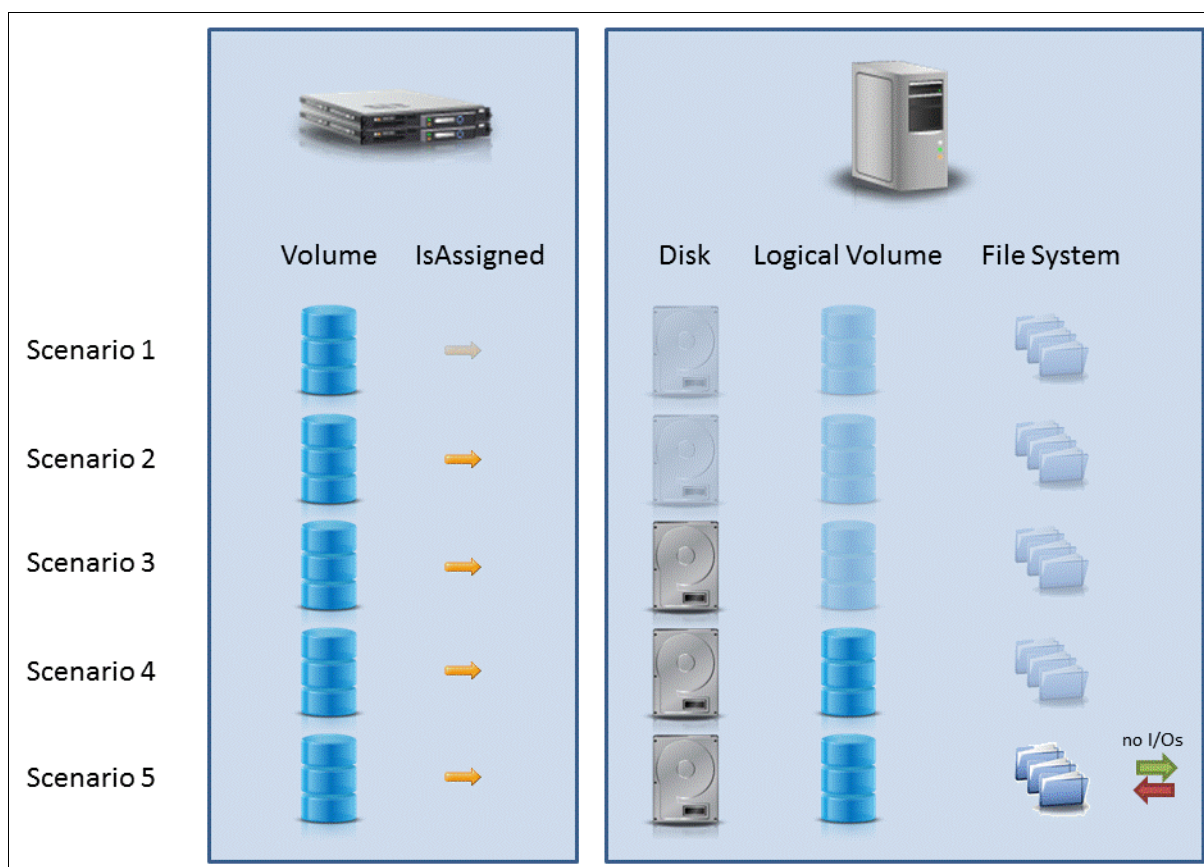


Figure 4-94 Diagram with the orphaned volumes scenarios

The reports that we created for this scenario are based on storage virtualizers in the Cognos data model. Therefore, the reports are not applicable to the storage system, but you can

easily apply the same concept here, although maybe not everything is possible in the same way.

Table 4-11 gives you a description of each of the scenarios.

Table 4-11 Scenario description

Scenario	Description
Scenario 1	<ul style="list-style-type: none"> <li>▶ Volume is created in the storage system, but it is not mapped or assigned to a server.</li> <li>▶ For this scenario, no SRAs need to be deployed.</li> <li>▶ Note: FlashCopy or remote copy target volumes will typically also not be assigned. Today, the Cognos data model only includes information about if a volume is configured in a Metro Mirror relationship but metric actually contains GlobalMirror information, so the label is a bit misleading.</li> </ul>
Scenario 2	<ul style="list-style-type: none"> <li>▶ The volume is assigned, but there is no disk visible at the server (most likely due to a missing zoning).</li> <li>▶ For this scenario, SRAs need to be deployed.</li> </ul>
Scenario 3	<ul style="list-style-type: none"> <li>▶ The server does see the disk, but there is no logical volume defined.</li> <li>▶ For this scenario, SRAs need to be deployed.</li> </ul>
Scenario 4	<ul style="list-style-type: none"> <li>▶ The server does see the disk, and a logical volume is defined, but no file system.</li> <li>▶ For this scenario, SRAs need to be deployed.</li> </ul>
Scenario 5	<ul style="list-style-type: none"> <li>▶ Everything is defined and mounted, but no I/Os are issued.</li> <li>▶ For this scenario, no SRAs need to be deployed.</li> </ul>

Due to the nature of the Query Studio, there is no way to create a single report for all the above scenarios, so we created a subfolder in IBM ITSO Reports with one report per scenario.

All scenarios are very simple to create. Basically, just combine a few logical filters to just show those results that are valid for the corresponding scenario.


## Scenario 1

In this scenario, we are looking for volumes that are not connected to a server so the only thing we actually need to do is to look for volumes that have set the IsAssigned property to No.

Since there could be volumes in a Metro Mirror or Global Mirror relationship acting as target volumes, those volumes would also not be assigned to a server, so we have added a second filter to the report.

## Scenario 2, 3, and 4

This is very interesting because the way that we explained the different scenarios one might actually start and create three reports. But, if you think this through from the server end, this is actually only one report: all volumes that are not listed as a file system in Tivoli Storage Productivity Center are not available to store data, so these volumes need to be looked at and may be available for reuse.

In order to set up a filter in this way, simply select the column (File System Mount Point in this case), and click  to show the filter properties panel, as shown Figure 4-95 on page 366.

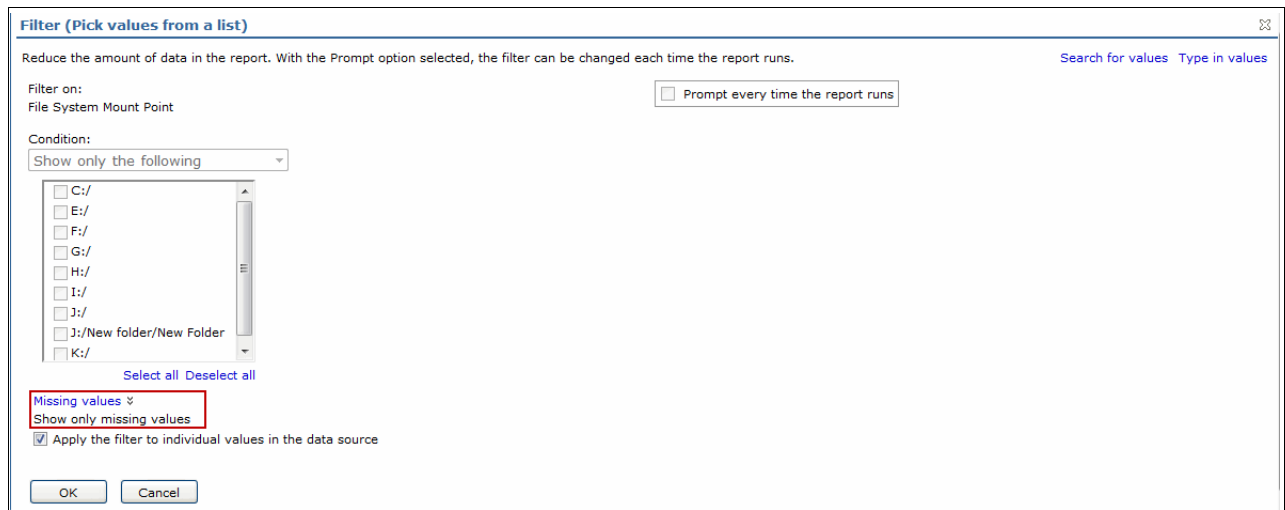


Figure 4-95 Applying a filter

The trick for this report is to not select anything in the upper list box, but expand “Missing values” and select “**Show only missing values**” and click **OK**.

## Scenario 5

This one uses the performance package of Cognos to determine if I/O is running on a volume so it is similar to the Tiered Storage Optimizer analysis.

Basically this is a simple report. You just add the Storage Virtualizer Name, the Storage Virtualizer Volume Name, and the Total Overall I/O Rate (ops/s) to a report. Since you did not specify a time range, Cognos creates an average of all I/Os for each volume, and defines a filter to only show I/O rates between 0 and 0, as shown in Figure 4-96 on page 367.



### Orphaned Volumes - Scenario 5

Total Overall I/O Rate (ops/s): 0

**Storage Virtualizer Name: ITSO\_SVC\_8G4**

Storage Virtualizer Volume Name	Total Overall I/O Rate (ops/s)
ITSO_test_v01_target	0.00
ITSO_test_v02_target	0.00
ITSO_test_v03_target	0.00
ITSO_test_v04_target	0.00
ITSO_SVC_8G4	0.00

**Storage Virtualizer Name: ITSO\_SVC\_CF8**

Storage Virtualizer Volume Name	Total Overall I/O Rate (ops/s)
ITSO_test_v03	0.00

**Filter**

Reduce the amount of data in the report. With the Prompt option selected, the filter can be changed each time the report runs.

Filter on:  
Total Overall I/O Rate (ops/s)

Condition:  
Show only the following

From: ☐   
☐ Lowest value

To: ☒   
☐ Highest value

Missing values   
(Default)

☐ Prompt every time the report runs

Apply the filter to:  
☒ Values in the report  
☐ Group summaries in the report:  
  
☐ Individual values in the data source

This package contains both OLAP and relational data. This setting applies to the relational data only. OLAP data will use summary filters.

Figure 4-96 Orphaned Volumes Scenario 5: Define filter

The challenge with this report is that we do not want an average but the total number of I/Os in this will better identify the volumes with no I/Os without rounding errors. We did not find a way to change the default aggregate function from average to total in Query Studio, but it was easy to create the report in Query Studio and then change the aggregate function to sum/total in Report Studio.

We saved the report as it was. From Query Studio, we changed the navigation area to Manage File and clicked Open in Report Studio. For more information about Report Studio, see section 4.5, “Design a report (Report Studio)” on page 314.

In Report Studio, we selected the cells that contain the number of I/Os and changed the property Aggregation Function from Average to Total, as shown in Figure 4-97 on page 368.

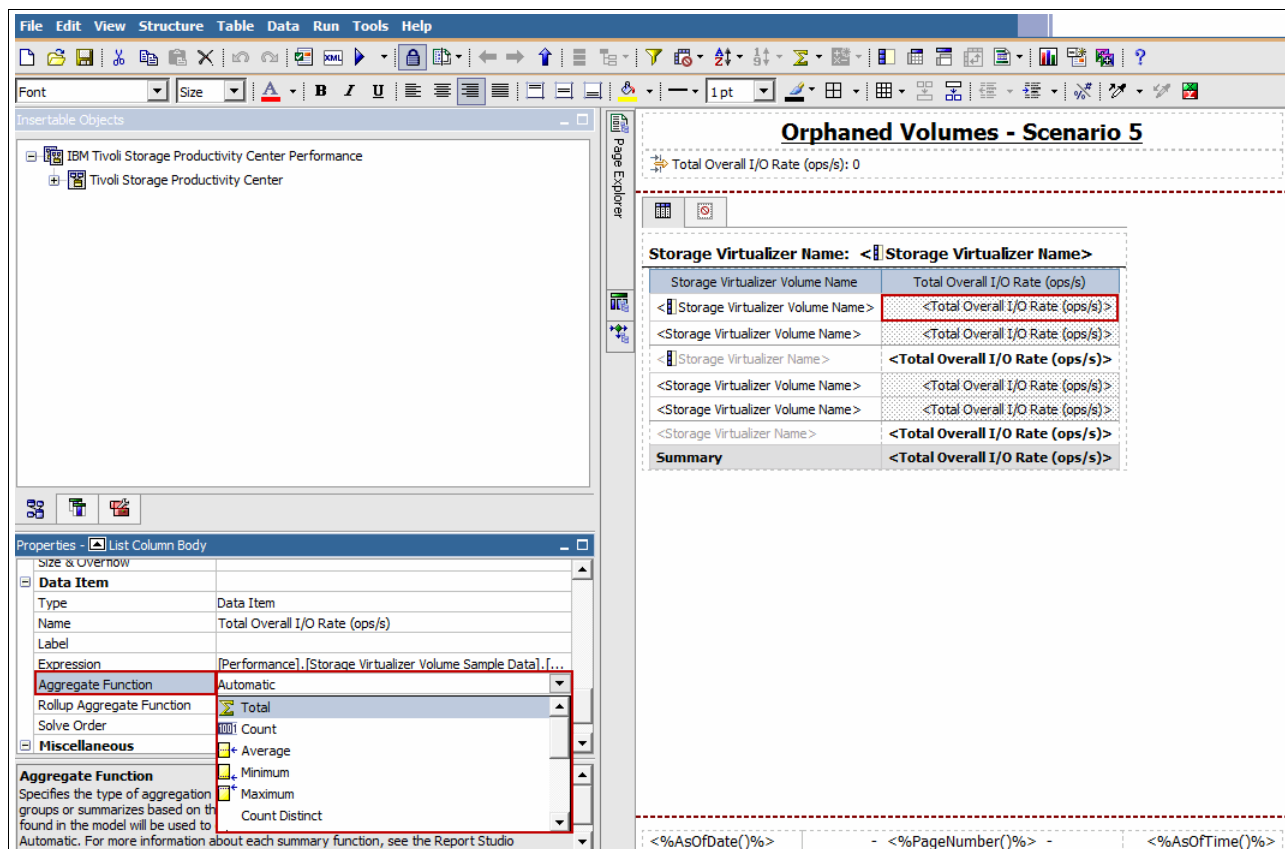


Figure 4-97 Change aggregate function in Report Studio

Now we saved the report by clicking the diskette symbol, and closed Report Studio. Saving this query changes its icon, which also means it will not open in the Query Studio editor when you run it.

## Considerations about the Cognos data model for this scenario

The SRA collects a lot of information and tries to “normalize” the information into a structure that can be applied to Windows and UNIX-based servers. This makes reporting easy, but the drawback is that not everything that you can configure in those operating systems will be read and stored in Tivoli Storage Productivity Center by the SRA.

For example, the following configurations are not visible to the SRA on Windows:

- ▶ Windows does not really use the concept of a logical volume and file systems the way a UNIX-based operating system would do. As long as you do not partition a disk, the two metrics Logical Volume Path and File System Mount Point will contain almost the same information. The File System Mount Point information will usually add a forward slash “/” to the drive letter in Windows.
- ▶ Volumes with file systems that are mounted as a folder in Windows will be displayed with the Logical Volume Path and File System Mount Point containing the same information, except that the Logical Volume Path will contain back slashes “\” not forward slashes “/”.
- ▶ When a volume is offline, it is displayed as though there is no logical volume or file system that is configured.
- ▶ If a Windows disk initialized or not, it is displayed just as a disk without a logical volume or file system on it. You cannot see in Tivoli Storage Productivity Center that the disk has not been initialized.

- ▶ There is no distinction between basic and dynamic disks.
- ▶ The Windows volume types: simple, striped, spanned and RAID 5 are displayed in Tivoli Storage Productivity Center as concatenated disks as Server Resources → Logical Volumes → Logical Volume Type.

A Windows volume type of “mirrored” is displayed as “Collection mirroring”, but the Server Resources → Logical Volumes → Logical Volume Mirror Count will always be 0.

## 4.10.2 Wasted space report

When using thin provisioning, you currently have the problem that only a few file systems and storage systems will cooperate in order to deallocate capacity that is no longer used.

We created a report that you can use to show the difference between what the file system regards as used space and what the SAN Volume Controller or V7000 regards as used (real) space.

### Considerations

- ▶ Today the Cognos data model does not allow to include historical information into this type of report. The IBM Tivoli Storage Productivity Center Historical Information data model does not include file system historical data, and it is not supported for creating your own reports.
- ▶ The TPCREPORT schema does include a view called FILESYSTEM\_HISTORY, but it does not offer the same information for SAN Volume Controller or V7000 volumes.

### Creating the wasted space report

Table 4-12 shows you the information that was added to the report. To make it easier to read we left out the common part, which is:

IBM Tivoli Storage Productivity Center Resources → Tivoli Storage Productivity Center → Servers to Storage Systems.

*Table 4-12 Finding the columns in the data model IBM Tivoli Storage Productivity Center resources*

Column label	Data model hierarchy
Server Name	Server Resources → Servers → Server Name
File System Mount Point	Server Resources → File Systems → File System Mount Point
File System Is Detected	Server Resources → File Systems → Status Information → File System Is Detected
File System Used Space (GiB)	Server Resources → File Systems → Capacity and Usages Metrics → File System Used Space (GiB)
File System Capacity (GiB)	Server Resources → File Systems → Capacity and Usages Metrics → File System Capacity (GiB)
Storage Virtualizer Name	Storage Virtualizer Resources → Storage Virtualizers → Storage Virtualizer Name
Storage Virtualizer Volume Name	Storage Virtualizer Resources → Storage Virtualizer Volumes → Storage Virtualizer Volume Name
Storage Virtualizer Volume Real Space (GiB)	Storage Virtualizer Resources → Storage Virtualizer Volumes → Capacity and Usage Metrics → Storage Virtualizer Volume Real Space (GiB)

Column label	Data model hierarchy
Storage Virtualizer Volume Capacity (GiB)	Storage Virtualizer Resources → Storage Virtualizer Volumes → Storage Virtualizer Volume Capacity (GiB)

Once all those columns are added to the report, it will look like Figure 4-98.

**Wasted Space Report**  
Filesystems that have less used space reported than real space in SVC/V7000

Server Name	File System Mount Point	File System Is Detected	File System Used Space (GiB)	File System Capacity (GiB)	Storage Virtualizer Name	Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)
SSPCSRV15	C:/	Yes	43.35	278.16			
SSPCSRV15	E:/	Yes	6.15	9.99	ITSO_SVC_CF8	ITSO_test_v00	9.88
SSPCSRV15	F:/	Yes	0.07	9.76	ITSO_SVC_CF8	Partitioned	4.38
SSPCSRV15	G:/	Yes	0.03	1.99	ITSO_SVC_CF8	Spanned0	0.03
SSPCSRV15	G:/	Yes	0.03	1.99	ITSO_SVC_CF8	Spanned1	0.03
SSPCSRV15	H:/	Yes	0.04	3.99	ITSO_SVC_CF8	stripped1	0.05
SSPCSRV15	H:/	Yes	0.04	3.99	ITSO_SVC_CF8	stripped2	0.05
SSPCSRV15	I:/	Yes	0.04	2.99	ITSO_SVC_CF8	Mirrored1	0.09
SSPCSRV15	I:/	Yes	0.04	2.99	ITSO_SVC_CF8	Mirrored2	0.09
SSPCSRV15	J:/	Yes	9.22	15.98	ITSO_SVC_CF8	Partitioned	4.38
SSPCSRV15	J:/	Yes	9.22	15.98	ITSO_SVC_CF8	RAID5_1	2.39
SSPCSRV15	J:/	Yes	9.22	15.98	ITSO_SVC_CF8	RAID5_2	2.39
SSPCSRV15	J:/	Yes	9.22	15.98	ITSO_SVC_CF8	RAID5_3	2.39
SSPCSRV15	J:/	Yes	9.22	15.98	ITSO_SVC_CF8	RAID5_4	2.38
SSPCSRV15	J:\New folder\New Folder	No	0.05	4.99			
SSPCSRV15	K:/	No	0.09	99.99			
SSPCSRV15					ITSO_SVC_CF8	Dynamic	0.13
SSPCSRV15					ITSO_SVC_CF8	Mapped_Initialized	2.07
SSPCSRV15					ITSO_SVC_CF8	Mapped_Only	2.01

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Figure 4-98 Adding filters to the Wasted Space Report

Tivoli Storage Productivity Center retains information about entities that have been deleted for a grace period based on the remove resource retention setting. When you create reports this is often not wanted, so you need to filter out that information, simply by adding a filter to only include lines that have a “yes” in the “File System Is Detected” column.

Because we do not need to see the information later on that a file system is detected, you can delete the column from the report. When you do that, you will be asked if you want to delete the filter as well. In this case, you do not want to delete the filter so you need to clear the filter like shown in Figure 4-99 on page 371.

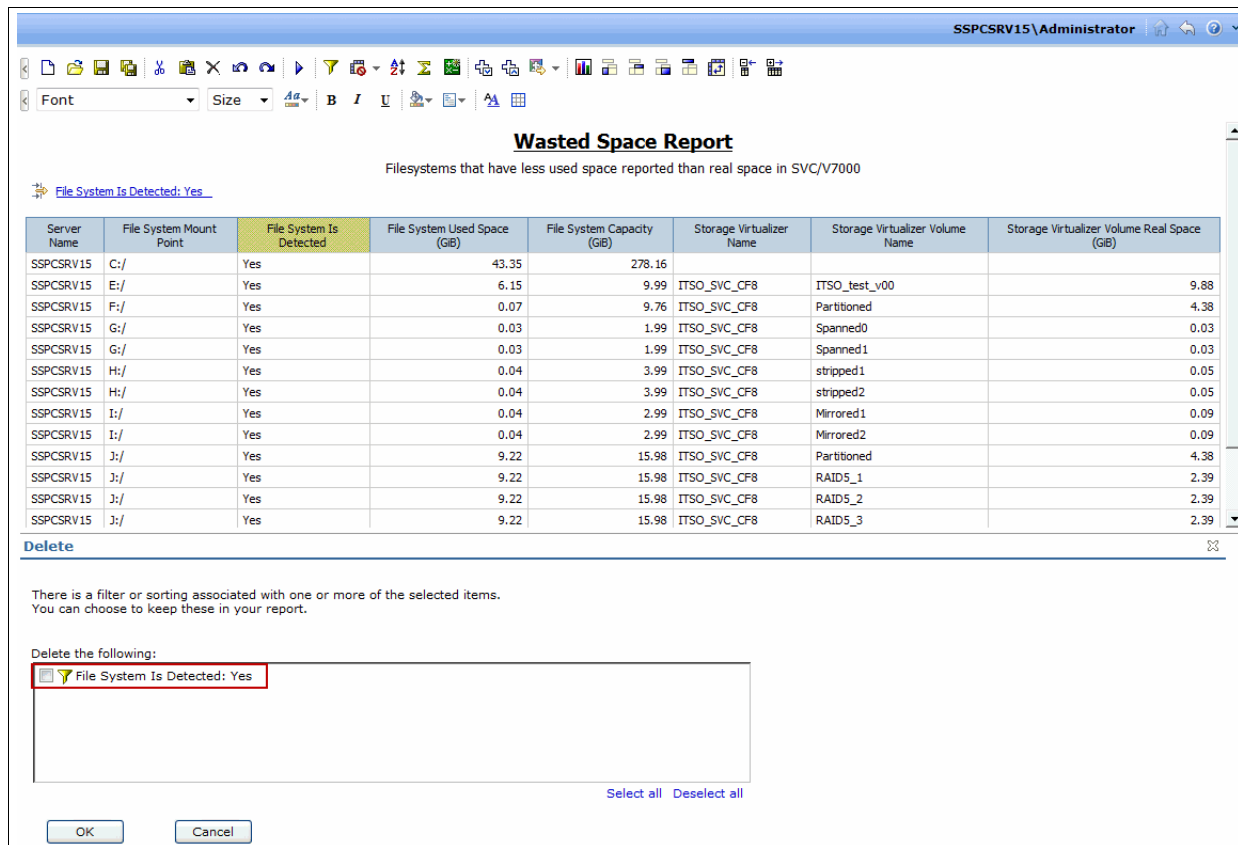


Figure 4-99 Delete a column that has a filter defined

We also added a filter that the “Storage Virtualizer Name” column should not be empty because this report will only work for volumes that are provisioned by an SAN Volume Controller or V7000 storage unit. Since you never know how the units are called, we simply specified that lines with missing values should be left out, as shown in Figure 4-100.

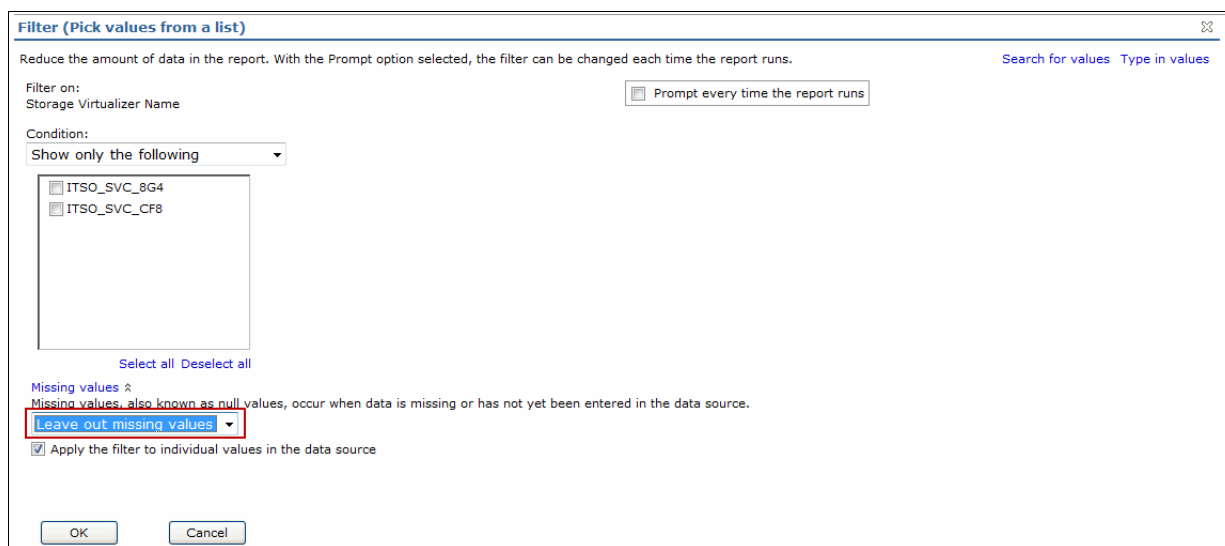


Figure 4-100 Filter on missing values

When you click **OK** at this point, you will be asked how to combine the two filters. The default is to apply both using an AND method, but you could also change to OR, as shown in Figure 4-101.

In general, Cognos does also allow a grouping of filters where some are combined with OR and others with AND.

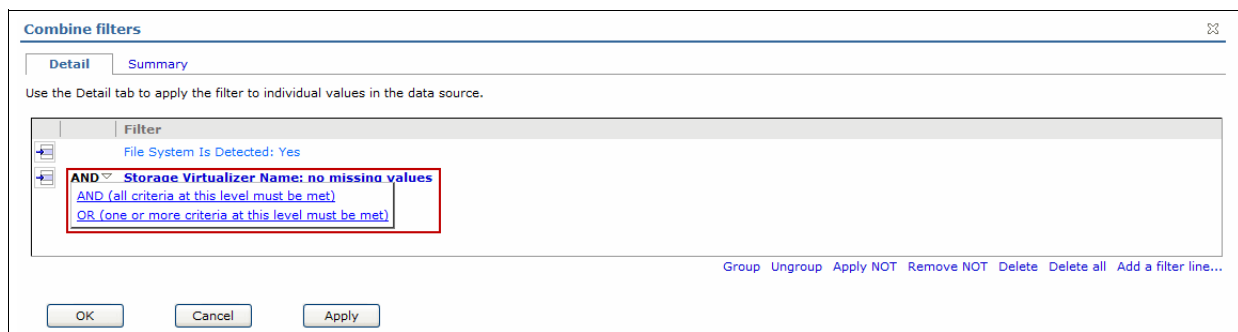


Figure 4-101 Combining the filters

The next step is to add the analysis to the report by adding two calculations:

- ▶ The difference between the space used in the file system and the (real) space used on the VDisk
- ▶ A percentage value of how much space is wasted

Adding a calculation is simple. We illustrated the required steps in Figure 4-102 on page 373.

**Note:** There are many volume and file system types, for example: Spanned volumes, mirrored volumes, or partitioned disks. When adding the file system and the VDisk into a tabular report, this will be shown as 1:1, 1:N, N:1, or N:M relationships. With Query Studio, you are limited in filtering out those combinations so some of the calculated results in this report might be misleading.

Because of this fact, we added a grouping by server and by file system to make it easier to identify which file system and volumes belong together.

**Wasted Space Report**  
Filesystems that have less used space reported than real space in SVC/V7000

File System Is Detected: Yes AND Storage Virtualizer Name: no missing values

Server Name	File System Mount Point	File System Used Space (GiB)	File System Capacity (GiB)	Storage Virtualizer Name	Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)
SSPCSRV15	E:/	6.15	9.99	ITSO_SVC_CF8	ITSO_test_v00	9.88
	E:/	6.15	9.99			9.88
	F:/	0.07	9.76	ITSO_SVC_CF8	Partitioned	4.38
	F:/	0.07	9.76			4.38
	G:/	0.03	1.99	ITSO_SVC_CF8	Spanned0	0.03
	G:/	0.03	1.99	ITSO_SVC_CF8	Spanned1	0.03
	G:/	0.03	1.99			0.06
H:/	0.04	3.99	ITSO_SVC_CF8	stripped1	0.05	

**Calculate**

New calculated report items appear after the last selected item. You can safely delete report items that were used to create calculations.

Operation type: **Arithmetic**

Operation: **- (difference)**

Order:

- ☒ Storage Virtualizer Volume Real Space (GiB) - File System Used Space (GiB)
- ☐ File System Used Space (GiB) - Storage Virtualizer Volume Real Space (GiB)

Expression:  
Storage Virtualizer Volume Real Space (GiB) - File System Used Space (GiB)

New item name:  
☒ Use the default name  
☒ **Wasted Space (GiB)**

Buttons: Insert, Cancel

Figure 4-102 Adding a calculation

Adding the first calculation:

1. Select the columns that should be included in the calculation
2. Click the calculation action icon in the toolbar on the top
3. Select Operation Type: For the first calculation, we need to choose "Arithmetic"
4. Select the "Operation" and choose the order of how the columns will be used in the formula
5. Provide a descriptive name

The second calculation is added in the same way, except that the Operation Type Percentage was chosen.

Since the report now includes negative values, we added another filter to remove those entries. Since Cognos always performs a greater or equal comparison, we entered 0.01 as the value as you can see in Figure 4-103.

The screenshot displays the SSPCSRV15 Administrator window. The top section shows a report with columns: Server Name, File System Mount Point, File System Used Space (GiB), File System Capacity (GiB), Storage Virtualizer Name, Storage Virtualizer Volume Name, Storage Virtualizer Volume Real Space (GiB), Wasted Space (GiB), and Wasted Space %. The report lists data for server SSPCSRV15 across various file systems (E:/, F:/, G:/, H:/, I:/, J:/) and storage virtualizers (ITSO\_SVC\_CF8). The bottom section shows the 'Filter' configuration panel. It includes a 'Filter on:' dropdown set to 'Wasted Space (GiB)', a 'Condition:' dropdown set to 'Show only the following', and a 'From:' input field with the value '0.01' highlighted by a red box. The 'To:' input field is empty. The 'Apply the filter to individual values in the data source' checkbox is checked.

Server Name	File System Mount Point	File System Used Space (GiB)	File System Capacity (GiB)	Storage Virtualizer Name	Storage Virtualizer Volume Name	Storage Virtualizer Volume Real Space (GiB)	Wasted Space (GiB)	Wasted Space %
SSPCSRV15	E:/	6.15	9.99	ITSO_SVC_CF8	ITSO_test_v00	9.88	3.73	37.34%
	E:/	6.15	9.99			9.88	3.73	37.34%
	F:/	0.07	9.76	ITSO_SVC_CF8	Partitioned	4.38	4.31	44.16%
	F:/	0.07	9.76			4.38	4.31	44.16%
	G:/	0.03	1.99	ITSO_SVC_CF8	Spanned0	0.03	0.00	0.00%
	G:/	0.03	1.99	ITSO_SVC_CF8	Spanned1	0.03	0.00	0.00%
	G:/	0.03	1.99			0.06	0.03	1.51%
	H:/	0.04	3.99	ITSO_SVC_CF8	stripped1	0.05	0.01	0.25%
	H:/	0.04	3.99	ITSO_SVC_CF8	stripped2	0.05	0.01	0.25%
	H:/	0.04	3.99			0.10	0.06	1.50%
	I:/	0.04	2.99	ITSO_SVC_CF8	Mirrored1	0.09	0.05	1.67%
	I:/	0.04	2.99	ITSO_SVC_CF8	Mirrored2	0.09	0.05	1.67%
J:/	9.22	15.98	ITSO_SVC_CF8	Partitioned	4.38	-4.84	-30.29%	
J:/	9.22	15.98	ITSO_SVC_CF8	RAIDS_1	2.39	-6.83	-42.74%	
J:/	9.22	15.98	ITSO_SVC_CF8	RAIDS_2	2.39	-6.83	-42.74%	

**Filter**

Reduce the amount of data in the report. With the Prompt option selected, the filter can be changed each time the report runs.

Filter on:  
Wasted Space (GiB) ☐ Prompt every time the report runs

Condition:  
Show only the following

From: ☐ 0.01

☐ Lowest value

To: ☐

☒ Highest value

Missing values ☐  
(Default)

☒ Apply the filter to individual values in the data source

Figure 4-103 Include only values greater than zero

As previously mentioned, Query Studio asks you how to combine all the filters and here again we choose the AND operator.

Next, we add a conditional color coding of the calculated values to the report. Select the Wasted Space % column and open the context menu and select "Define Conditional Styles". A new panel opens, as shown in Figure 4-104 on page 375.



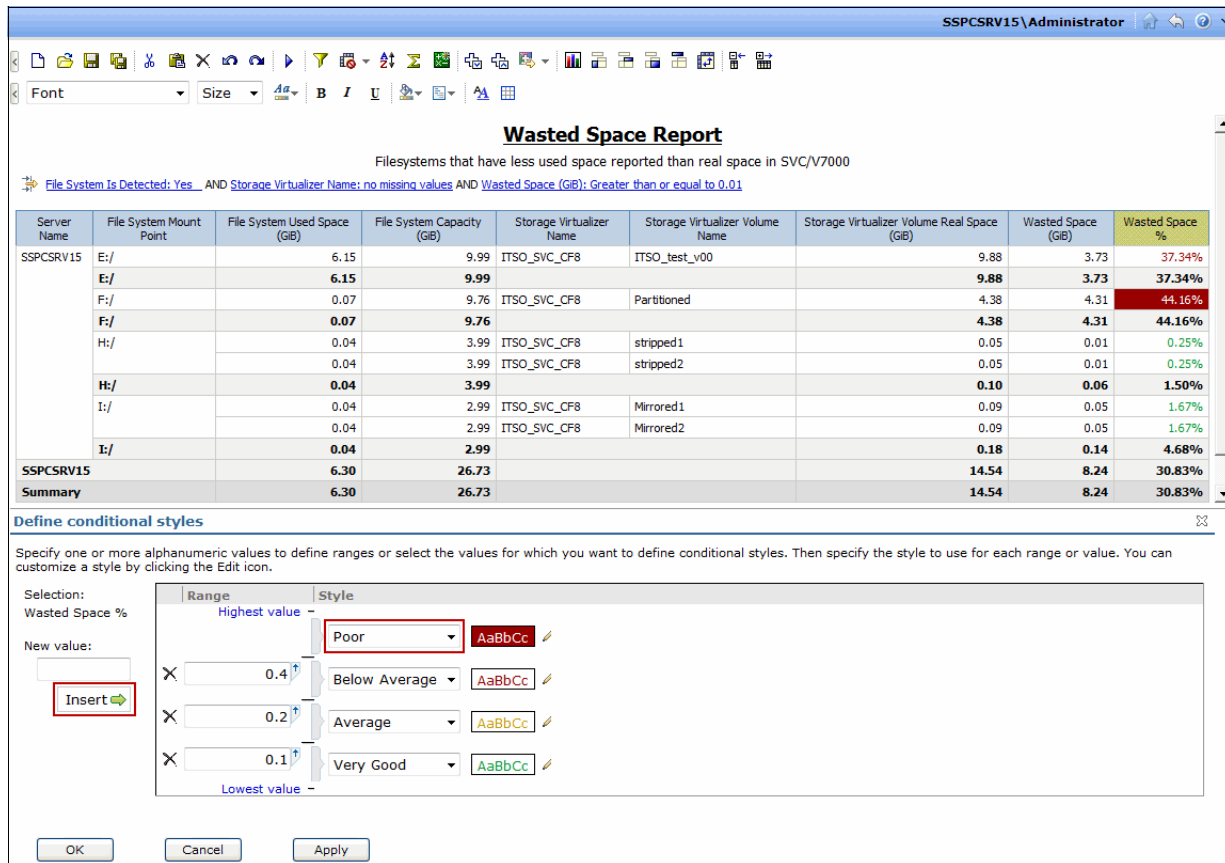


Figure 4-104 Define conditional styles

Percentage numbers have to be entered as 0.nn values in the left entry field. Click **Insert** and continue with the rest of the values. Afterward, you should either select a color preset from the drop-down list, or edit it manually.

Note, we just chose the values to give you an example of how conditional styles are used. You should change those values to your needs.

The very last step is optional: We have added another filter to the report for the Wasted Space % column. The difference here is that we check the box "Prompt every time the report runs", like on Figure 4-105.

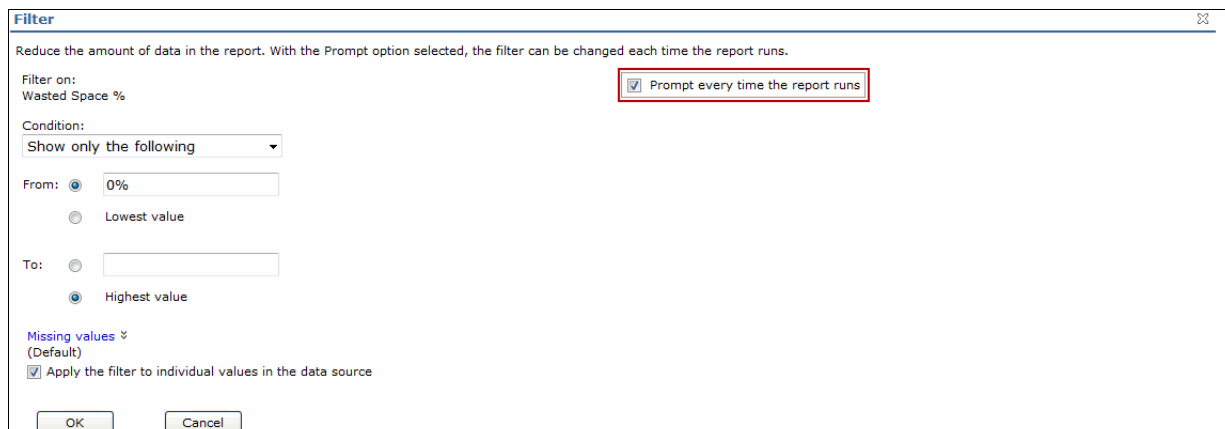


Figure 4-105 Prompt me every time the report runs

When you now save and reopen the report, you will see this panel (see Figure 4-106) where you can specify a threshold so that you limit the number of file systems and volumes that will be shown. If the report is empty, it is a good sign because it means that you do not have any file systems with so much wasted space.

Figure 4-106 Prompt for a value when you run the report

### 4.10.3 HBA details report

The ITSO HBA details report is meant to provide you with a list of all servers and the details of their HBAs, because in both the new web GUI and the old Java GUI, you can only see the details of a single server at a time.

We used the procedure in Example 4-5 to create the ITSO HBA details report. For your reference, we include at this point only the SQL query because the rest of the procedure is already described in 4.5.2, “Example: Build a report using your own SQL statement” on page 321.

#### Example 4-5 SQL statement

---

```
select
  CS.DISPLAY_NAME as Server,
  CS.TYPE as Platform,
  CS.OS_VERSION as Version,
  HBA.MODEL,
  HBA.VENDOR,
  HBA.NAME as Device_Name,
  HBA.SERIAL_NUMBER,
  HBA.DRIVER_NAME,
  HBA.DRIVER_VERSION,
  HBA.WWPN
from TPCREPORT.COMPUTERSYSTEM CS left join TPCREPORT.HOSTBUSADAPTER HBA on
CS.COMPUTER_ID = HBA.COMPUTER_ID and HBA.DETECTABLE = 'True' and CS.DETECTABLE =
'True'
with ur for read only;
```

---

Later on, we added Cognos grouping for the Server column to make the report more readable, as shown in Figure 4-107.

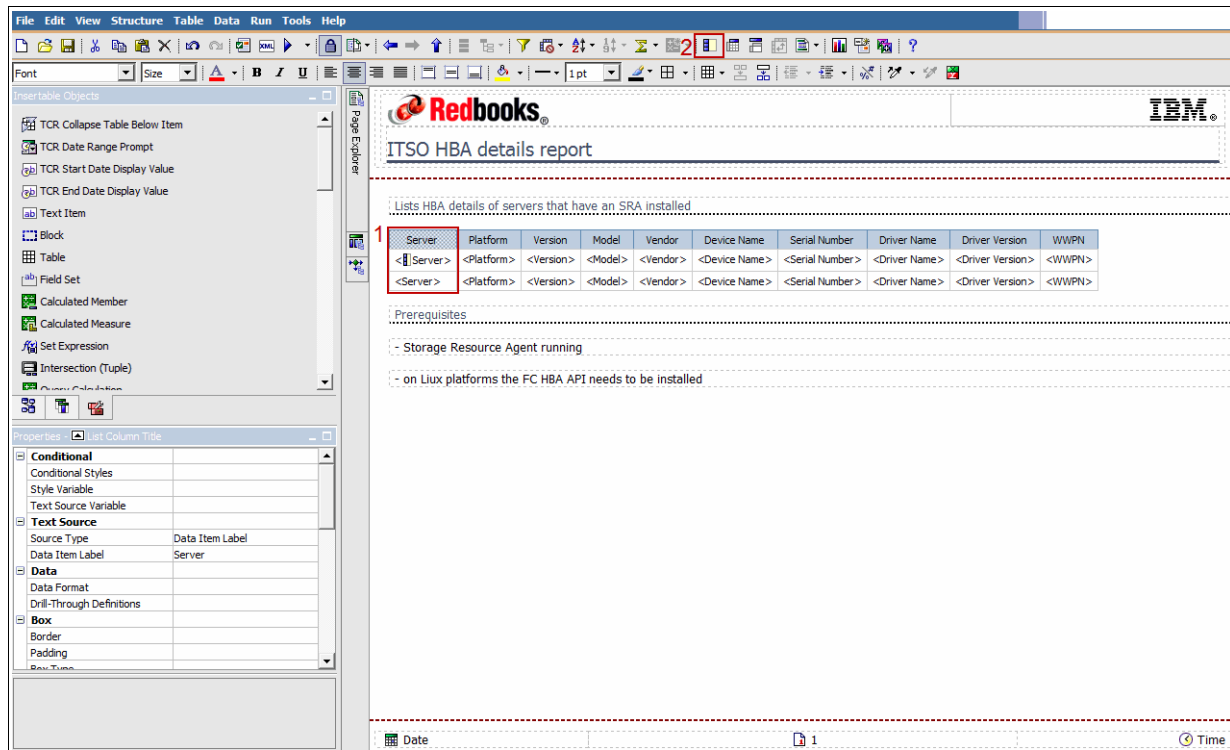


Figure 4-107 Adding grouping to a SQL report

Figure 4-108 shows how the final report looks.

Viewer SSPCSRV15\Administrator

**Redbooks** **IBM**

### ITSO HBA details report

Lists HBA details of servers that have an SRA installed

Server	Platform	Version	Model	Vendor	Device Name	Serial Number	Driver Name	Driver Version	WWPN
itsoesx2.itso.ibm.com	VMWare ESX	5.0.0	LPe12000 8Gb Fibre Channel Host Adapter	Unknown	vmhba2		lpfc820		10000000C9A92806
	VMWare ESX	5.0.0	LPe12000 8Gb Fibre Channel Host Adapter	Unknown	vmhba3		lpfc820		10000000C9A92807
	VMWare ESX	5.0.0	LPe12000 8Gb Fibre Channel Host Adapter	Unknown	vmhba4		lpfc820		10000000C9A92764
	VMWare ESX	5.0.0	LPe12000 8Gb Fibre Channel Host Adapter	Unknown	vmhba5		lpfc820		10000000C9A92765
	VMWare ESX	5.0.0	LPe12000 8Gb Fibre Channel Host Adapter	Unknown	vmhba6		lpfc820		10000000C9A91D7A
	VMWare ESX	5.0.0	LPe12000 8Gb Fibre Channel Host Adapter	Unknown	vmhba7		lpfc820		10000000C9A91D7B
SSPCSRV15	Windows	6.1	QLE2562	QLogic Corporation	com.qlogic-QLE2562-0	H47083	ql2300.sys	9.1.8.6	21000024FF2B4B66
	Windows	6.1	QLE2562	QLogic Corporation	com.qlogic-QLE2562-1	H47339	ql2300.sys	9.1.8.6	21000024FF2B4B67

**Prerequisites**

- Storage Resource Agent running
- on Linux platforms the FC HBA API needs to be installed

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Figure 4-108 ITSO HBA details report example output

Since we used an ITSO logo in the report, we put that image also into the compressed file that you can download. It has to be copied manually into the images folder, since the export of report definitions does not include graphic images.

#### 4.10.4 VMware end-to-end mapping report

One of the strengths of Cognos is that it is easy to create a report with exactly the information that you are interested in and lined up in the way that you want it.

We have used this capability to create a report where you can see the mapping of VMware systems. Specifically, we wanted to show which virtual machine is located in which data store and how much capacity it has defined.

But we did not stop there. We added the information that we had from those servers that also had SRAs deployed as well as the information from the storage systems that provided the storage to the ESX server.

In 4.3.4, “Data model for VMware hypervisor” on page 290, we provided a short documentation about the most important metrics that we use for this report. To create the report simply insert the information listed in Table 4-13 on page 379 into a new Query Studio report.

Table 4-13 Information for the VMware end-to-end mapping report

Column label	Data model hierarchy
Virtual Machine Name	Hypervisor Resources → Managed Virtual Machines → Virtual Machine → Virtual Machine Name
Server Name	Server Resources → Servers → Server Name
File System Mount Point	Server Resources → File Systems → File System Mount Point
Logical Volume Path	Server Resources → Logical Volumes → Logical Volume Path
Virtual Machine File Path	Hypervisor Resources → Managed Virtual Machines → Virtual Machine Files → Virtual Machine File Path
Virtual Machine File Logical Size (GiB)	Hypervisor Resources → Managed Virtual Machines → Virtual Machine Files → Virtual Machine File Logical Size (GiB)
Hypervisor Name	Hypervisor Resources → Hypervisor → Hypervisor Name
Datastore (Hypervisor_Logical_Volume_Path) <sup>a</sup>	Hypervisor Resources → Hypervisor Logical Volumes → Hypervisor Logical Volume Path
Storage Virtualizer Name	Storage Virtualizer Resources → Storage Virtualizers → Storage Virtualizer Name
Storage Virtualizer Volume Name	Storage Virtualizer Resources → Storage Virtualizer Volumes → Storage Virtualizer Volume Name
Virtual Machine File Type	Hypervisor Resources → Managed Virtual Machines → Virtual Machine Files → Virtual Machine File Type

a. We added the term “Datastore” to the default column “Hypervisor Logical Volume Path”. We also reformatted the title so that the term Datastore would be on one line and the original column name in a second line by replacing the blank characters between the word with “\_” characters. Usually we would just have renamed the column, but to show you where the information is coming from we used this way.

When all the metrics are added, we formatted the report in just two ways:

- ▶ Sorting for the virtual machine name
- ▶ Grouping for the virtual machine name

**Note:** We would have liked to add grouping also to the hypervisor and data store but Cognos would have then moved those columns to the left. However, we did not do this since we wanted to create an end-to-end mapping report.

Next, we added these filters to the report as a logical AND condition:

- ▶ Hypervisor name is not allowed to be empty to remove all physical servers.
- ▶ Data store (Hypervisor\_Logical\_Volume\_Path) is not allowed to be empty, to prevent from showing storage volumes that are mapped to the hypervisor but not added to a data store.
- ▶ The Virtual Machine File Type has to be “VM disk file” or “VM snapshot file” because those are the ones consuming the most space. Once you have added this filter, you can delete the column, if you make sure that the filter is still applied. See Figure 4-109 on page 380.

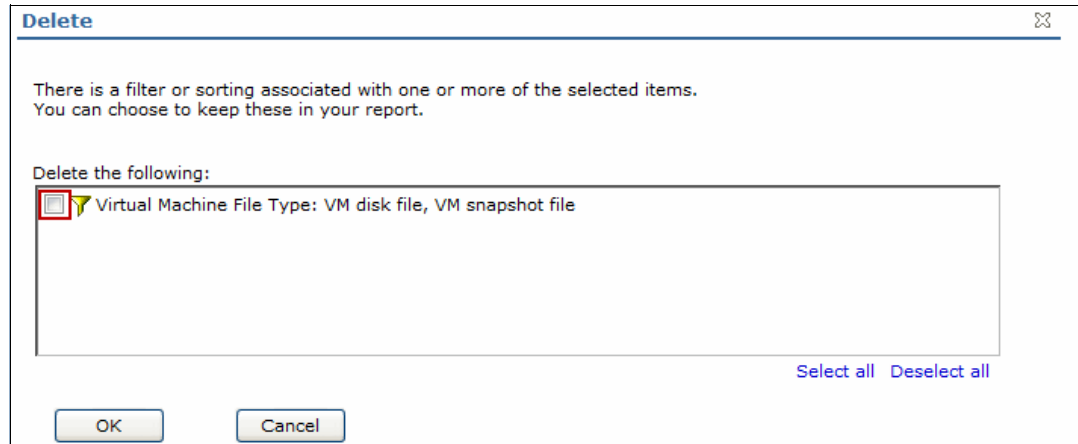


Figure 4-109 Delete a column that is used for a filter

Take a look at how the report looks like at this point. Figure 4-110 is a example where we have pointed out some things that we want to make you aware of.

ITSO VMware end-to-end mapping report									
<small>           Hypervisor Name: no missing values AND Datastore (Hypervisor Logical Volume Path): no missing values AND Virtual Machine File Type: VM disk file, VM snapshot file            Virtual Machine Name: Ascending order         </small>									
Virtual Machine Name	Server Name	File System Mount Point	Logical Volume Path	Virtual Machine File Path	Virtual Machine File Logical Size (GB)	Hypervisor Name	Datastore (Hypervisor Logical Volume Path)	Storage Virtualizer Name	Storage Virtualizer Volume Name
Lin01Client	1			[LocalStorage] Lin01Client\Lin01Client.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage	2	
Lin01Client					8				
Lin01DNS				[LocalStorage] Lin01DNS\Lin01DNS.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage		
Lin01DNS					8				
tpcvm01	tpcvm01.democentral.ibm.com	C:/	C:	[LocalStorage] tpcvm01\tpcvm01-000001.vmdk	2.84	tpcesx01.democentral.ibm.com	LocalStorage		
	tpcvm01.democentral.ibm.com	E:/	E:	[LocalStorage] tpcvm01\tpcvm01_1-000001.vmdk	0.21	tpcesx01.democentral.ibm.com	LocalStorage		
	tpcvm01.democentral.ibm.com	F:/	F:	[SVC20G_TP] tpcvm01\tpcvm01_2.vmdk	5	tpcesx01.democentral.ibm.com	SVC20G_TP	SVC-2145-tpcSVC02-IBM	AVMdisk_03
tpcvm01					8.05				
tpcvm02				[LocalStorage] tpcvm02\tpcvm02.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage		
				[SVC20G_TP] tpcvm02\tpcvm02_1.vmdk	10	tpcesx01.democentral.ibm.com	SVC20G_TP	SVC-2145-tpcSVC02-IBM	AVMdisk_03
tpcvm02					18				
tpcvm03	tpcvm03.democentral.ibm.com	C:/	C:	[LocalStorage] tpcvm03\tpcvm03-000001.vmdk	4.18	tpcesx01.democentral.ibm.com	LocalStorage		
	tpcvm03.democentral.ibm.com	E:/	E:	[LocalStorage] tpcvm03\tpcvm03_1.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage		
tpcvm03					12.18				
tpcvm04				[LocalStorage] tpcvm04\tpcvm04_1.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage		
				[LocalStorage] tpcvm04\tpcvm04.vmdk	15	tpcesx01.democentral.ibm.com	LocalStorage		
tpcvm04					23				
tpcvm05				[LocalStorage] tpcvm05\tpcvm05.vmdk	15	tpcesx01.democentral.ibm.com	LocalStorage		
tpcvm05					15				
tpcvm06				[LocalStorage] tpcvm06\tpcvm06.vmdk	15	tpcesx01.democentral.ibm.com	LocalStorage		
tpcvm06					15				
3				[LocalStorage] tpcvm01\tpcvm01_1.vmdk	4	tpcesx01.democentral.ibm.com	LocalStorage		
				[LocalStorage] tpcvm01\tpcvm01-Snapshot3.vmsn	2	tpcesx01.democentral.ibm.com	LocalStorage		
				[LocalStorage] tpcvm01\tpcvm01.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage		
				[LocalStorage] tpcvm03\tpcvm03-Snapshot1.vmsn	0	tpcesx01.democentral.ibm.com	LocalStorage		
				[LocalStorage] tpcvm03\tpcvm03.vmdk	8	tpcesx01.democentral.ibm.com	LocalStorage		
				[My_Display_Name].snapshot\hourly.0\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\hourly.1\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\hourly.2\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\hourly.3\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\hourly.4\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\hourly.5\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\highly.0\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].snapshot\highly.1\vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[My_Display_Name].vmprachi\vmprachi.vmdk	0	tpcesx01.democentral.ibm.com	My_Display_Name		
				[NetApp_3700].snapshot\hourly.0\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\hourly.1\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\hourly.2\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\hourly.3\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\hourly.4\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\hourly.5\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\highly.0\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].snapshot\highly.1\tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
				[NetApp_3700].tpcvm07\tpcvm07.vmdk	8.01	tpcesx01.democentral.ibm.com	NetApp_3700		
Summary					94.09				
					201.32				

Figure 4-110 ITSO VMware end-to-end mapping report

There are some things that we want to point out with this report, because to some it might seem like it would have errors:

1. In our environment, not every server had an SRA installed, so some information is not available to Tivoli Storage Productivity Center like:

- Server Name
- File System Mount Point
- Logical Volume Path

If you do not have SRAs deployed, you can delete these columns from the report, but here the idea was to demonstrate the end-to-end mapping. Since we also wanted to make you aware of where the data comes from, we did not configure the report to simply leave out these lines.

2. From the name, you can already guess that this ESX server is using local storage for many VMs so not all fields are filled with information about storage virtualizers. Also, you need to understand that if you would have no storage virtualizers, but you have storage systems, you need to change the report to reflect this.

You might have both types of SAN storage so that you need to have both in the report. In this case, we recommend using the Report Studio and consolidate the columns of storage virtualizers and storage systems.

3. All those files in this part of the report seem to be no longer referenced by a VM so actually this is another form of wasted space.

## Further enhancements

This report could be further enhanced in several ways:

- ▶ Create a section per hypervisor, so fewer columns are used, and you get more space to add more information.
- ▶ Add the current file system used space (Server Resources → File Systems → Capacity and Usage Metrics → File System Used Space (GiB)) to see how much of the VM disk file is actually used.
- ▶ Add columns for a storage system name and a storage system volume name.
- ▶ Add a column for storage pools. This might be interesting for SAN Volume Controller split clusters.

We can only provide the starting point but as you see there are many enhancements possible that might be helpful to manage your environment.







# Tiered Storage Optimization

This chapter provides information about Tiered Storage Optimization in IBM Tivoli Storage Productivity Center.

## 5.1 Tiered Storage Optimization overview

Tiered Storage Optimization (TSO) is an information lifecycle management tool that seeks to identify storage volumes that are in an undesirable storage tier and recommend a more appropriate location. By migrating these volumes, a storage administrator can ensure that each tier's storage is used only by volumes that actually need the tier's feature versus price tradeoff. In the remainder of this chapter, we provide an overview about Tiered Storage Optimization.

### 5.1.1 Terminology review

In this section, we review terminology that will be used throughout this chapter.

#### Storage Resource Groups

Tivoli Storage Productivity Center provides the ability to create a logical grouping of storage entities called a “Storage Resource Group” or SRG. In Tivoli Storage Productivity Center 5.1, TSO uses SRGs to identify the volumes that should be analyzed as well as the potential new destinations for volumes that need to be migrated. Each TSO policy utilizes two different SRGs: a “source” and a “target”. The “source” SRG should represent the set of volumes that the policy will evaluate. For any subsystem or storage pool in this “source” SRG, TSO will determine the corresponding storage volumes at the start of each analysis job. The “target” SRG should represent the set of potential storage pools to be considered as the location for volumes which match the TSO policy's condition.

#### TSO policies and conditions

TSO is a policy-driven analysis engine. Each user-defined TSO policy has the following elements:

- ▶ A source SRG
- ▶ A target SRG
- ▶ At least one condition
- ▶ A priority

When created, a policy is automatically added as the lowest priority policy. During analysis, policies are evaluated in priority order.

In order to be used in analysis, a policy must have at least one condition. In Tivoli Storage Productivity Center 5.1, the following conditions are available:

- ▶ Ignore: Instructs all subsequent policies to ignore the volumes in this policy's source SRG.
- ▶ Force: All volumes in the policy's source SRG automatically meet the policy's migration criteria.
- ▶ Age: For each volume in the policy's source SRG for which Tivoli Storage Productivity Center has file system scan data for the file systems on the volume, TSO will compare the percentage of files older or newer than the specified age against the specified threshold. A single policy can have both an Age and an IODensity condition, in which case a volume must match both conditions before a recommendation is generated.
- ▶ IODensity: For each volume in the policy's “source” SRG, TSO will calculate the IODensity (IO Rate/total capacity in GB) and compare this value with the specified threshold. A single policy can have both an IODensity and an Age condition, in which case a volume must match both conditions before a recommendation is generated.

## TSO analysis

TSO analysis is initiated via the Tivoli Storage Productivity Center CLI and will go through all valid policies in priority order. For each volume, in the policy's source SRG, which matches the policy's conditions, TSO will attempt to generate a recommendation to migrate the volume to one of the storage pools in the policy's target SRG. Once a recommendation has been generated for a particular volume, subsequent TSO policies will ignore the volume.

The recommendations from the most recent TSO analysis can be viewed at any point via the Tivoli Storage Productivity Center CLI or a Cognos report.

## 5.2 TSO setup

In this section, we go through considerations for setting up TSO.

### 5.2.1 Data retrieval

Before any TSO analysis can be performed, Tivoli Storage Productivity Center must retrieve the data which will be analyzed. There are three aspects to this:

1. Add (and probe) the wanted storage subsystems to Tivoli Storage Productivity Center. If the back-end subsystems are IBM hardware and supported by the Tivoli Storage Productivity Center Storage Optimizer (SO), adding (and probing) these subsystems is recommended. If this is not the case, each storage pool in the subsystems that will be used (even if the pool will not be directly used for optimization) needs to have its "maximum theoretical IO" value set by the Tivoli Storage Productivity Center user. See the Tivoli Storage Productivity Center STAR configuration instructions for details as to how to perform this step. Without this information, TSO will still be able to make migration recommendations based on the available space in and current relative utilization of the candidate storage pools, but will be unable to take the candidate pools' maximum load into consideration.
2. Run Performance Monitoring jobs for each subsystem that will be used with TSO. A minimum of one day's worth of PM data is required for each subsystem, but 10 days worth is recommended as a time span more likely to represent the typical use of the storage. The number of days worth of data used by TSO can be configured via the Tivoli Storage Productivity Center CLI command `setdscfg` (see the Tivoli Storage Productivity Center CLI TSO Commands appendix item).
3. If the TSO Age condition will be used, add SRAs to hosts to which volumes have been assigned and which have placed file systems on these volumes. Ensure that each file system has been recently scanned by the SRA.

It is recommended that the Performance Management (PM) jobs be set to run indefinitely and that SRA file system scans are scheduled to run as regularly and as frequently as necessary, given each file system's usage, to ensure that TSO analysis is always being done on up-to-date information.

### 5.2.2 TSO policies

Since TSO analysis is policy-driven, the policies, and their respective conditions, must be defined before running analysis. Each user-defined TSO policy has the following elements:

- ▶ A "source" SRG
- ▶ A "target" SRG
- ▶ At least one condition

- A priority

The source and target SRGs used must be different (from each other) and must already exist when creating the TSO policy. However, the actual contents of these SRGs will not be evaluated until an analysis is initiated. The source SRG will be evaluated at a VDisk level, thus any storage pools or subsystems in the SRG will be taken to mean the inclusion of all of the pool's or subsystem's storage volumes. The target SRG will be evaluated at a storage pool level; any storage volumes directly included in the SRG will be ignored. For both SRGs, any SRG member of a type not used by TSO in Tivoli Storage Productivity Center 5.1 (host computers, for example) will be ignored.

In Tivoli Storage Productivity Center 5.1, the recommended approach is to create one SRG per storage tier and to include only storage pools in these SRGs. For example, in a lab environment with two Storwize subsystems which have tier 1, tier 1.5 (EasyTier pool merging tier 1 and tier 2 storage), tier 2, and tier 3 storage, there should be four SRGs. By adding storage pools to the SRGs (as opposed to storage volumes), the SRGs can be used as both source and target parameter values for the appropriate TSO policies and TSO will be able to determine the volumes currently residing in a particular storage tier at analysis time without needing any input from the storage administrator to manually update the SRGs when new volumes are created within these storage pools.

TSO policies are created via the **mktp** CLI command and modified via **modifyp**. (See the Tivoli Storage Productivity Center STAR configuration CLI TSO Commands appendix item for details about all TSO Commands.)

When created, a TSO policy is automatically added as the lowest-priority policy. The policy's priority can be modified using the **modifyp** command. During analysis, TSO goes through each policy individually, starting with the highest-priority policy. All recommendations generated are “aware” of previous recommendations and are generated based on the assumption that those previous recommendations will be acted upon. This has two key ramifications:

1. A volume will never have multiple recommendations (note: the “ignore” condition's lack of a recommendation is included in this and thus will properly ensure no lower-priority policy considers the ignored volume)
2. TSO's model of each storage pool's available physical capacity and performance capabilities is adjusted with each recommendation

Due to these ramifications, it is recommended that policies which seek to move volume from lower-capacity storage pools into higher-capacity storage pools (typically the “down-tiering” policies) should be given higher priority than corresponding policies to move volumes in the opposite directions. Doing this will help ensure that TSO is to factor in the space (and performance ability) freed up by migrations of volumes out of the smaller storage pools.

Regardless of its priority value, the policy will not actually be used during analysis until at least one condition has been added to it. These conditions are added via the **addtpcondition** command. During analysis, each storage volume in the policy's “source” SRG will be evaluated and a recommendation will be generated only if the following holds true:

- The volume must meet the criteria of all policy conditions
- The volume must be in a non-error state storage pool

There must be at least one storage pool on the same subsystem in the target SRG with sufficient available capacity that is not in an error state. Note that TSO analysis takes into account the impact of any recommendations it has already generated as though they had been taken.

### 5.2.3 Tivoli Storage Productivity Center 5.1 available conditions

The following available conditions apply to Tivoli Storage Productivity Center 5.1.

- ▶ **Ignore:** Instructs all subsequent policies to ignore the volumes in this policy's "source" SRG. Although the Tivoli Storage Productivity Center CLI command will require that a "target" SRG be specified (and that it be different from the "source" SRG) when the TSO policy is created, the "ignore" condition type will not actually use the "target" SRG. This condition is primarily of use when certain volumes must stay in their current location regardless of actual usage.
- ▶ **Force:** All volumes in the policy's "source" SRG automatically meet the policy's migration criteria. This condition is primarily of use when TSO recommendations need to accommodate an external requirement. For example, if certain volumes need to be up-tiered in advance of anticipated demand, a high-priority policy with a "force" condition will help ensure optimal placement of these volumes in the selected higher-tier storage pools.
- ▶ **Age:** For each volume in the policy's "source" SRG for which Tivoli Storage Productivity Center has file system scan data for the file systems on the volume, TSO will compare the percentage of files older and newer than the specified age against the specified threshold. A single policy can have both an Age and an IODensity condition, in which case a volume must match both conditions before a recommendation is generated. This condition can only be evaluated when Tivoli Storage Productivity Center has file system scan information (from an SRA install on a host computer) for the file systems on the storage volume. If there are multiple file systems, TSO merges the file age information across all file systems into a single percentage rather than evaluating the file systems individually. Volumes for which Tivoli Storage Productivity Center does not have this information are treated as not having met the condition (no migration recommendation will be generated). This condition is primarily of use in three scenarios:
  - When determining an appropriate IO Density value (for use with the IO Density condition type) is not yet possible. For example, if expected IO Density values are not yet clear but optimization needs to be performed, an age-based condition provides a simple and intuitive approach.
  - When seeking to identify volumes that are good (or bad) candidates for EasyTier pools. For example, a storage volume with high IO Density and high average file age (meaning that the volume's IO rate is driven by access to a small percentage of files in the subsystem) is a particularly good EasyTier candidate since its performance can be improved by moving only a subset of its capacity to SSD.
  - When seeking to further prioritize the type of volume that is migrated in situations where the destination or input storage pools have limited capacity. For example, if the tier 1 storage pools have limited available capacity but some volumes still need to be up-tiered into these storage pools, it may be desirable to prioritize "up-tiering" volumes that meet both a particular IO Density setting *and* a given average Age. Thus, having two "up-tier" policies, a higher-priority policy with "IODensity > X" and "at least Y% of files newer than Z" conditions and a lower-priority policy with just "IODensity > X" would ensure that (relatively) newly created volumes with high IODensity values are given priority when considering whether to move them into the limited tier 1 storage pools.
- ▶ **IODensity:** For each volume in the policy's "source" SRG, TSO will calculate the IODensity (IO Rate/total capacity in GB) and compare this value with the specified threshold. A single policy can have both an IODensity and an Age condition, in which case a volume must match both conditions before a recommendation is generated. Since this condition is able to make use of the same performance information that is required as a prerequisite of TSO, it is always available. The recommendation for 10 days worth of PM data for more accurate analysis by TSO applies to the IODensity metric as well. However, note that TSO

uses the highest daily IO Rate value across all X days worth of PM data when calculating IODensity – in the event that this peak value is an abnormality, the number of days worth of PM data for TSO must be adjusted. Note also that IO Density is greatly influenced by the volume capacity. Two storage volumes with the same IO Rate can nonetheless have drastically different IO Densities if their capacity values differ significantly. Thus, although this condition's availability is significantly greater than that of the Age condition, proper usage of the condition requires a relatively detailed knowledge of the expected usage of storage volumes within the various storage tiers.

When creating policy conditions, be careful to avoid creating logical loops. In Tivoli Storage Productivity Center 5.1, TSO does not do any validation of policies to help avoid such scenarios. Since a particular analysis job will never generate multiple recommendations for a single volume, these loops may not be immediately obvious from the analysis results. As an example, consider the following two policies as shown in Table 5-1.

*Table 5-1 Sample TSO policy conditions*

Name	Candidates	Destinations	Priority	Conditions
Down-tier	root.tier1	root.tier2	1	IODENSITY <= 5
Up-tier	root.tier2	root.tier1	2	IODENSITY >= 5

If a storage volume has an IODensity of 5, it will bounce between the tier 1 and tier 2 storage with each new analysis run.

## 5.3 TSO analysis

TSO uses the Tivoli Storage Productivity Center Storage Optimizer to select the optimal storage pool from the set of candidate pools. The Storage Optimizer models are generated using the daily PM data roll-up records over a user-configurable number of days (default value of 10. See the **getdscfg** and **setdscfg** commands in the xref Appendix for more details).

These Storage Optimizer models are generated for each subsystem represented by the SRGs in the TSO policies being analyzed. Over the course of the analysis, the models are updated by each recommendation, as though the recommendation had been acted upon immediately, so that the impact of previous recommendations (generated from higher-priority policies) influences subsequent recommendations.

TSO will loop through the policies in priority order and, for each policy, will evaluate the storage volumes included (directly or implicitly via the inclusion of a storage pool) in the “from” SRG. Although TSO does not support cross-subsystem recommendations in Tivoli Storage Productivity Center 5.1, there is no guarantee that an analysis job will group or sort the recommendations by subsystem when outputting the results.

The TSO recommendations can be viewed via the Tivoli Storage Productivity Center CLI or the appropriate Cognos report. These listings will not provide any detail as to recommendations that could not be generated. To view this information as well as all other information relevant to a particular TSO analysis job, the specific job log must be referenced. The TSO job logs are listed in the Tivoli Storage Productivity Center GUI in the Jobs panel, under the “CLI and Event Driven Jobs” section. This log is of particular use if certain recommendations were expected but not generated.

The TSO Cognos report, “Volume Migration Recommendation Report”, provides additional details beyond the basic recommendation. In particular, for each recommendation, it lists the current volume response time (as estimated by Tivoli Storage Productivity Center) and the

predicted volume response time if the recommendations are all taken. This prediction has several limitations:

- ▶ The prediction is at a pool level, and is based on Tivoli Storage Productivity Center knowledge of the pool's theoretical max IO rate
- ▶ The prediction assumes that the current workloads of the pool's volumes (including those volumes recommended to be migrated into the pool and not including those recommended to be moved out from the pool) provide consistent current performance data
- ▶ The prediction can only take into account back-end subsystem performance limitations if the back-end subsystem information (including performance data) is known to Tivoli Storage Productivity Center and the back-end subsystem is supported by Tivoli Storage Productivity Centers Storage Optimizer

In Tivoli Storage Productivity Center 5.1, TSO only remembers the recommendations generated by the most recent TSO analysis job. Thus, if historic information about TSO recommendations is wanted, the recommendations must be saved after each analysis run by either piping the output of the **gettprec** Tivoli Storage Productivity Center CLI command to a file or by saving the Cognos report. Historic recommendation data is also available in the TSO analysis job logs, but is not in a table format.

### 5.3.1 Cognos report

After an analysis has been run, the recommendations can also be viewed via a Tivoli Storage Productivity Center-provided Cognos report. The “Volume Migration Recommendation Report”, in the “IBM Tivoli Storage Productivity Center Storage Tiering” category report displays on recommendations on a per-policy basis. The Cognos report provides an estimate as to each volume's current response time (based on the Tivoli Storage Productivity Center PM data used during analysis) and Tivoli Storage Productivity Center's estimated new response time for the volume. It is important to note that the new response time is impacted by numerous criteria, in particular, the estimate is made based on the assumption that all recommendations are taken. It is also heavily dependent on Tivoli Storage Productivity Center's understanding as to the maximum theoretical output of the relevant storage pool.

### 5.3.2 Advanced considerations

In Tivoli Storage Productivity Center 5.1, TSO is not aware of mirrored VDisk copies. It will make recommendations for mirrored VDIs without regard to their secondary copies. This has several key ramifications:

- ▶ If the secondary copy is in a storage pool that was in the “target” SRG for the relevant policy, it is possible that TSO may generate a recommendation to move the primary copy to the same storage pool.
- ▶ If the primary and secondary copies are backed by different back-end subsystems, this distinction will not necessarily be maintained.

In all such cases, it is possible to ensure that Tivoli Storage Productivity Center only considers valid locations by creating “source” and “target” SRGs that group based on tier level and the appropriate additional characteristics (such as location).

In Tivoli Storage Productivity Center 5.1, TSO will allow the generation of migration recommendations across multiple tiers (that is, down-tiering from tier 0 to tier 3 or up-tiering from tier 3 to tier 0). In practice, however, this is discouraged, particularly for down-tiering, due to the potential for edge cases (such as volumes that are lightly used except for a few small

but critical files that are used constantly) where such a significant migration could cause large-scale disruptions.

### 5.3.3 Performing the migrations

In Tivoli Storage Productivity Center 5.1, TSO does not provide a way to execute the recommendations from within Tivoli Storage Productivity Center. The CLI output has been designed in such a way that it should be possible to write a script to act upon the recommendations given that the script can access the appropriate storage subsystems. Whether executed by a script or manually, the recommended means of performing these migrations is via the SAN Volume Controller and Storwize commands to add a VDisk mirror. The sequence of operations should be the following (each subsequent step only to be taken after the previous step has been completed):

1. Create a VDisk mirror copy in the recommended location
2. Delete the original VDisk copy (thereby making the copy created in step 1 the primary, and only, copy)

If the volume already has a VDisk copy, there are several possible approaches depending on the purpose and capabilities of the secondary copy. If the secondary copy has significantly worse performance than the primary, the following steps are recommended:

1. Delete the current secondary copy (thereby making the primary copy the only copy)
2. Create a new secondary copy in the recommended location
3. Delete the original VDisk copy (thereby making the new secondary copy the primary, and only, copy)
4. Create a new secondary copy in the location of the original secondary copy

If the secondary copy has similar performance to the primary, the primary can be deleted immediately and a new copy created (from the remaining copy, now the primary copy) in the recommended location.

In either case, these steps would need to be modified if it is desirable to also migrate the secondary copy.





## Additional functions

Besides the two major new features, IBM Tivoli Common Reporting integration and web GUI, IBM Tivoli Storage Productivity Center V5.1 has additional new features and enhancements. A new feature is support for IBM SONAS as a NAS device. You can discover, scan, and make reports, either from the stand-alone GUI, web GUI, or Tivoli Common Reporting. Together with support for SONAS, we have a single command-line interface (CLI) for managing both the SONAS and StorWize V7000 Unified from within Tivoli Storage Productivity Center.

Storage Optimizer has been enhanced. Tivoli Storage Productivity Center can now assist in Tiered Storage Optimization (TSO). This enhancement provides the capability for moving volumes not just within a storage system, but between different storage systems, behind a storage virtualizer like SAN Volume Controller or StorWize V7000.

Tivoli Storage Productivity Center for Replication has been enhanced with threshold for recovery point objective (RPO) alerts, the possibility to export RPO for analysis trends, and support for Space Efficient volumes on IBM DS8300.

No enhancements have been made for ESX VMware. We will, by example, show how to connect Tivoli Storage Productivity Center to an ESX Cluster, for gathering information about the virtual machines (VMs).

## 6.1 SONAS support

Tivoli Storage Productivity Center V5.1 provides the following:

- ▶ Added support for SONAS, including configuration, discovery, probe, file system scan, and CLI
- ▶ Extended existing NAS file system scan, monitor, alerting and reporting support to include support for file modules
- ▶ Control and configure IBM SONAS devices from a single CLI environment
- ▶ Topology enhancements

Tivoli Storage Productivity Center V5.1 offers several possibilities to manage the IBM SONAS, either from the GUIs or CLI. SONAS CLI is through *tpctool*, which has many possibilities for creating, exporting, setting security, and exporting shares.

### Planning

The IBM SONAS currently supports file access, meaning Tivoli Storage Productivity Center can access the SONAS and get hardware and configuration information, but Tivoli Storage Productivity Center cannot scan the SONAS. It needs a server mounting the exports, and running the scans. This server is referred to as a *proxy Storage Resource Agent* (SRA). It is a standard SRA, but it is called a proxy because the server allows Tivoli Storage Productivity Center getting file level access to the SONAS.

To connect Tivoli Storage Productivity Center to the SONAS, we need to obtain the following items:

- ▶ Name or IP of the SONAS management interface
- ▶ Name or IP of the proxy SRA, with access to all file systems to be scanned
- ▶ User name and password for admin access to the management interface on the SONAS, or
- ▶ SSH key for allowing admin access to management interface, and pass phrase for SSH key, if used

### 6.1.1 Connecting Tivoli Storage Productivity Center to SONAS

To add a SONAS to Tivoli Storage Productivity Center, follow the normal procedure for adding a new storage subsystem. Go to Tivoli Storage Productivity Center stand-alone GUI, and select the path Administrative Services → Storage Subsystems and select “Add”. This will start the wizard shown in Figure 6-1 on page 393.

In “Device Type”, select “IBM SONAS” from the drop-down menu. We need now the connection information we obtained earlier. Enter the IP address into the “IP Address” field (2), and select connection method (3).

For connectivity from Tivoli Storage Productivity Center there are three options:

1. “Upload new key”, which will upload the default Tivoli Storage Productivity Center SSH key<sup>1</sup> to the SONAS, and then the default Tivoli Storage Productivity Center SSH key will be used for access. For this operation, we need to provide administrative access to the SONAS, and will proceed to (4a)

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<sup>1</sup> The default Tivoli Storage Productivity Center SSH key is C:\Program Files\IBM\TPC\device\conf\tpc\_svc.pem

2. “Use existing uploaded key”, if we already have an SSH key for access to the SONAS and want to reuse this key, we select this option and later provide the location for it (4b)
3. “Use user password”, is used if we do not want to use an SSH key, but access with a username and password (4a)

Based on the connection method, we proceed to (4a) in Figure 6-1 if using option one or three or proceed to (4b) if using option two.

Figure 6-1 Configure SONAS device in Tivoli Storage Productivity Center

If using an SSH key we will either use the default Tivoli Storage Productivity Center SSH key, or specify the location of our existing key by selecting the browse button next to (4b). If our key has a pass phrase, we enter the pass phrase. The default Tivoli Storage Productivity Center SSH key does not have a pass phrase.

Last is selecting which SONAS user to run as, recommended username is admin. Either type in the name (5) or click the button, which will launch a connection to the SONAS, and collect the possibilities. The possibilities will be shown in a window, from which we can select the SONAS user name.

Figure 6-2 on page 394 shows an example for configuring a SONAS device.

Storage Subsystem : tpcsonas1.storage.tucson.ibm.com

**IP Address:** 9.11.92.144

**Select Key:** Use existing uploaded key

Administrator User Name: (Optional)

Administrator Password: (Optional)

**User Name:** admin Select User ...

**Private SSH Key:** C:\Program Files\IBM\TPC\device' Browse ...

Passphrase: \*\*\*\*\* (Optional)

**User Password:**

Figure 6-2 Example for configuring a SONAS device

Figure 6-2 shows a device configuration where we already uploaded the SSH key to the SONAS, and therefore have chosen “Use existing key”. The SONAS user name for the device is “admin”, and we pointed at the location of the key using the browse button. Last we added the pass phrase for the key.

Whether a username and password or SSH key with or without a pass phrase is used will be based on individual environment policies.

An SSH key without a pass phrase enables anyone who gets the key to connect to the storage device, without providing the password. The advantage is that there is no password to remember or change, disadvantage is everybody with the key can connect.

The difference between user name and password and SSH key with pass phrase is that with the SSH key with pass phrase we have an extra security layer. Both methods require a password or pass phrase, which basically is the same. The SSH key option requires that we also have a key, and therefore this option is the most secure option available.

When we finish the device configuration by adding the new SONAS to either an existing or new monitoring group, a probe will automatically be launched, which will gather the following information about the SONAS:

- ▶ Cluster information
- ▶ Nodes
- ▶ File systems
- ▶ Network Share Disks (NSD)
- ▶ Pools
- ▶ File sets
- ▶ Exports (shares)
- ▶ Quotas

This information will be stored into the Tivoli Storage Productivity Center database repository, like any other storage subsystem.

When the initial probe has finished, we can start collecting file system information from the SONAS.

Statistics about capacity, usage, and trending of storage consumption on the IBM SONAS is collected by running scans. Data is collected through a server, which has an SRA running. The server needs to have access to the exports, file systems, and shares from the IBM SONAS that you would like to collect information about.

By running scans and using the results of those scans in reports, we can perform the following tasks:

- ▶ View all of the statistical information collected like when files were created, accessed, and modified and by what group or user.
- ▶ Generate historical views of storage consumption and utilization that show usage trends over time. System administrators can use these views to project and plan for future storage consumption.

Creating and installing this SRA is no difference than any normal SRA, either deploy it from Tivoli Storage Productivity Center stand-alone GUI:

Administrative Services → Configuration → Storage Resource Agent Deployment

or, install it directly on the server using CLI.

When installed, we need to probe the new SRA to get file system information, and afterward we need to set up the scan; both tasks are done from stand-alone GUI:

Probe: IBM Tivoli Productivity Center → Monitoring → Probes

Scan: Data Manager → Monitoring → Scans

When completed, we have obtained file level information in Tivoli Storage Productivity Center about the SONAS.

## 6.1.2 Stand-alone GUI management

To get an overview of the SONAS, go to stand-alone GUI, and navigate to Disk Manager → Storage Subsystems.

Find the new SONAS and double-click it. This provides the high-level information about status, version, and capacity, as shown in Figure 6-3 on page 396.

Storage Subsystems		tpcsonas1.storage.tucson.ibm.com Details	
<b>Storage Subsystem</b>	tpcsonas1.storage.tucson.ibm.com		
<b>Label</b>	<input type="text"/>		
<b>Status</b>	<input checked="" type="checkbox"/> Normal		
<b>Vendor</b>	IBM		
<b>Type</b>	SONAS		
<b>Model</b>	2851		
<b>Available FileSystem Space</b>	85.41 TB		
<b>Consumed FileSystem Space</b>	43.27 GB		
<b>Version</b>	1.3.1.1-2		
<b>User-defined property 1 (UDP1)</b>	<input type="text"/>		
<b>User-defined property 2 (UDP2)</b>	<input type="text"/>		
<b>User-defined property 3 (UDP3)</b>	<input type="text"/>		
<b>IP Address</b>	9.11.92.144		
<b>Element Manager</b>	https://9.11.92.144		
<input type="button" value="Element Management"/>			
<b>Replication Information</b>			
The device is not supported.			

Figure 6-3 GUI display of SONAS details

There are many options available for managing the SONAS from the same location. If we click using the right mouse button on the device from the Storage Subsystems tab in Figure 6-3, we see Figure 6-4 on page 397.

Storage Subsystems								
<div> Add Storage Subsystem MDisk Groups Volumes Create Volume Virtual Disks Create Virtual Disk Remove </div> <div> Launch Element Manager </div>								
Storage Subsystems								
Subsystem	Label	Type ▲	Model	Status	Available Space (GB)	Consumed Space (GB)	Configured	
DS4000-vcloud5k1-60080E500017C55000000004AE9D265-LSI		DS4000	4988	Unreachable	186.03	1,313.18	NA	
DS4200-TPC4700-600A0B8000299C8C00000000461E7168-LSI		DS4000	3992	Critical	509.23	305.14	NA	
DS4800-DS4800-600A0B8000111554000000004293ACDA-LSI		DS4000	6091	Critical	19.78	347.57	NA	
DS4800-mdm-z163-fast-600A0B80001167B4000000004CD7CE4B-LSI		DS4000	6091	Unreachable	0	0	NA	
DS4800-TSM4K3-600A0B800047423E0000000048638940-LSI		DS4000	6091	Unreachable	0	94,010.78	NA	
D55300-tpc5k-600A0B8000477B56000000004A7C211A-LSI		D55000	7091	Critical	1.91	815.44	NA	
DS6000-1750-13AAD1A-IBM		DS6000	511	Normal	1,173	2,931	NA	
DS6000-1750-13AAW2A-IBM		DS6000	511	Normal	2,838	1,266	NA	
DS6000-1750-13AB1WA-IBM		DS6000	511	Normal	2,048	516	NA	
DS8000-2107-1300241-IBM		DS8000	921	Unreachable	1,860	5,954	NA	
DS8000-2107-1300361-IBM		DS8000	921	Normal	1,147.9	4,552	NA	
DS8000-2107-1302541-IBM		DS8000	941	Normal	3,359	8,566	NA	
DS8000-2107-7505111-IBM		DS8000	921	Normal	1,024	12,480	NA	
DS8000-2107-75LX561-IBM		DS8000	941	Normal	6,392	39,371	NA	
DS8000-2107-75RA271-IBM		DS8000	951	Normal	8,698	1,136	NA	
APM00064204976		EMC	CLARIION	Critical	1,183.78	3,946.53	NA	
ESS-2105-18596-IBM		ESS	800	Normal	321.78	1,246.42	NA	
ESS-2105-18597-IBM		ESS	800	Unreachable	293.34	1,274.86	NA	
AMS200@9.11.125.160		Hitachi	AMS200	Normal	273.34	798.13	NA	
USP@9.11.123.88		Hitachi	USP	Critical	2,020.85	442.71	NA	
oxide		NetApp	N3700	Critical	82.67	86.75	NA	
tbnet-app		NetApp	N3700	Critical	286.99	99.04	NA	
zinc		NetApp	N3700	Warning	0	169.28	NA	
sonas1a.storage.tucson.ibm.com		SONAS	2851	Warning	NA	NA	NA	
tpcsonas1.storage.tucson.ibm.com		SONAS	2851	Normal	NA	NA	NA	
Storwize V7000-2076-ford1_tbird-IBM		Storwize	2851	Normal	5,565.68	152.07	NA	
Storwize V7000-2076-storea-IBM		Storwize	2851	Normal	5,095.09	991.41	NA	
Storwize V7000-2076-ballistic-IBM		Storwize	2851	Normal	5,166.8	481.71	NA	
Storwize V7000-2076-tpcr_ifs-IBM		Storwize	2851	Normal	15,553	1,128.5	NA	
SVC-2145-perfsvc1-IBM		SVC	8G4	Normal	85.86	42.14	NA	
SVC-2145-svc2_0.01-123456789 ABCDEFGHI 123456789 abcdefghi		SVC	8G4	Critical	2,272.02	585.98	NA	
SVC-2145-yellowc1-IBM		SVC	8F4	Unreachable	295.98	4.02	NA	
XIV-2810-6000646-IBM		XIV	A14	Normal	0	0	NA	
XIV-2812-7825410-IBM		XIV	114	Normal	1,794.95	96.16	NA	

Figure 6-4 Tivoli Storage Productivity Center GUI SONAS options

Here it is possible to get:

- Details, which are the same as Figure 6-3 on page 396
- Select Management GUI, which gives more options about what SONAS component to manage
- Get directly to Tivoli Storage Productivity Center-R for setting up replication for the SONAS
- Launch the web based Element Manager for SONAS

The second possibility for managing the SONAS is through Topology viewer. In the stand-alone GUI, go to:

IBM Tivoli Storage Productivity Center → Topology → Storage

In the window to the right we see Figure 6-5 on page 398, where our storage subsystems are divided into separate boxes, based on their status.

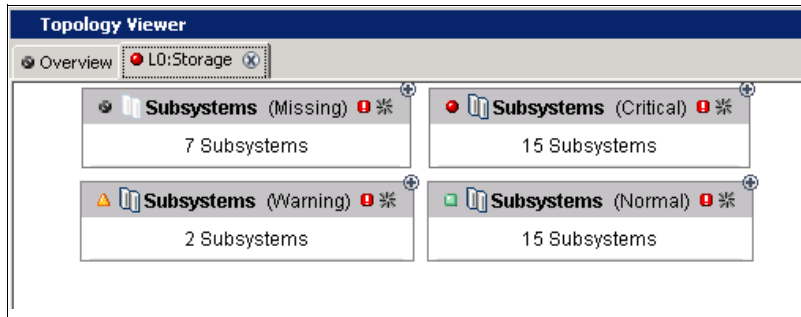


Figure 6-5 Topology viewer for storage

We look for our new SONAS, or select it from the list in the bottom of the window. In our example, we expand the storage group “Normal” because from Figure 6-3 on page 396 we noticed the status was green (Normal). We will get all storage subsystems with status normal in a window as shown in Figure 6-6. We find the SONAS and right-click it.

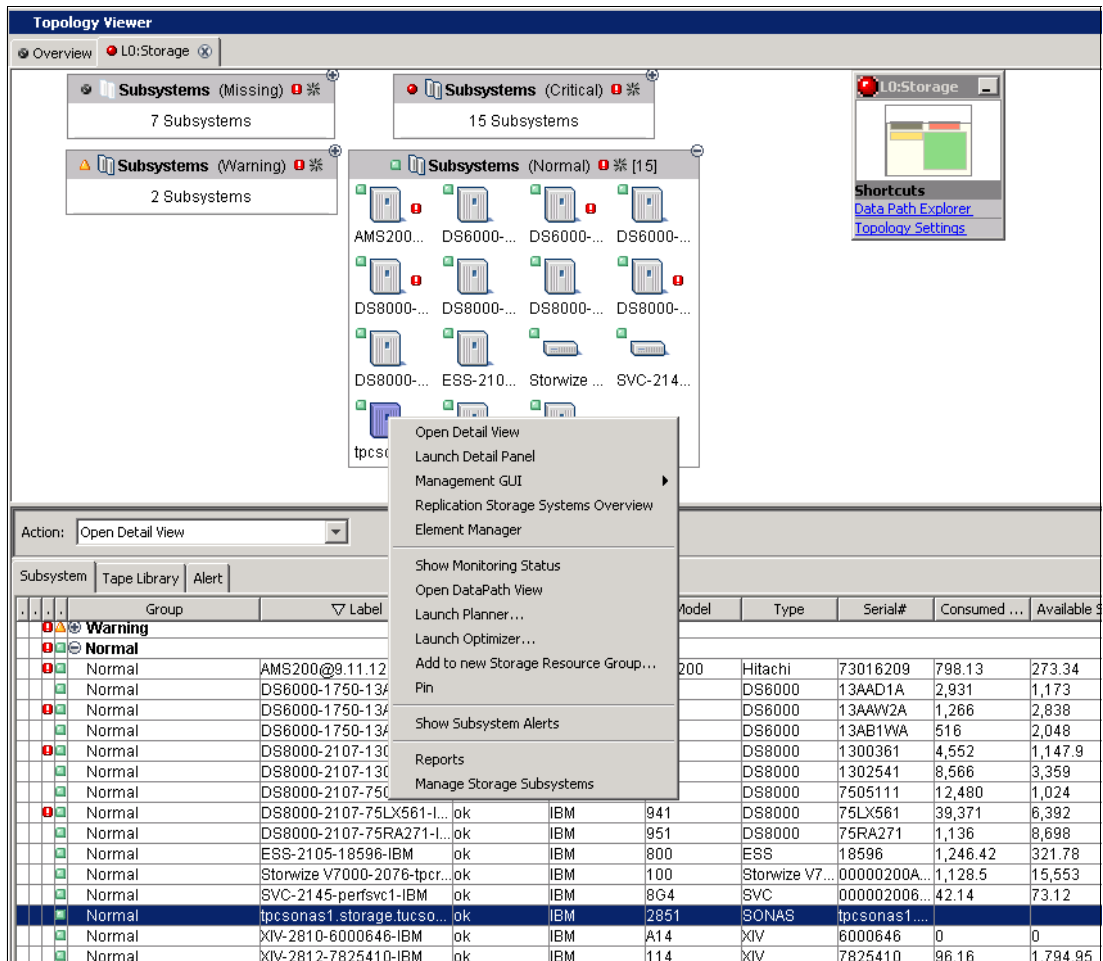


Figure 6-6 Topology viewer for SONAS

We notice there are more options available when compared to the Storage Subsystems view in Figure 6-4 on page 397. New options include possibility to launch Planner, Optimizer, or Datapath view.



In the Topology Viewer for the SONAS in Figure 6-6 on page 398, we see the SONAS is a file asset. While clicking the right mouse button to see options for managing the SONAS, click the left mouse button, which will take us to an asset view of the SONAS.

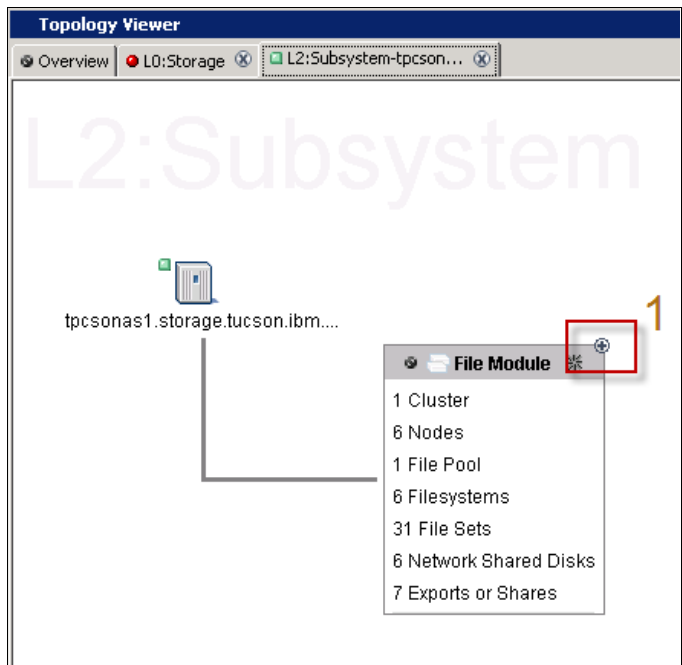


Figure 6-7 Tivoli Storage Productivity Center topology view of SONAS

The File Module window will show a high-level view of what is configured on the SONAS. If you click the expand button (1) in Figure 6-7, you will start drilling down through the various components in the SONAS, getting more and more detailed information. It is also possible to see the relationship between the components. For example, selecting a file system we can see what file set it is located on. We can also see which NSDs and shared that it has, as shown in Figure 6-8.

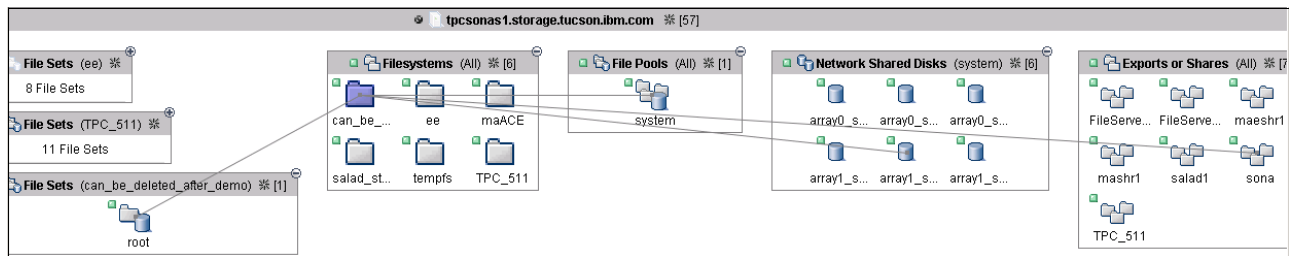


Figure 6-8 Tivoli Storage Productivity Center topology view, relationship inside the SONAS

Instead of drilling through the topology GUI, which can be difficult to navigate through due to size, it is possible to jump directly to the resource component of interest, using the tabs in the bottom of the panel. See Figure 6-9 on page 400. Select one of the different tabs (1), and expand it (2).

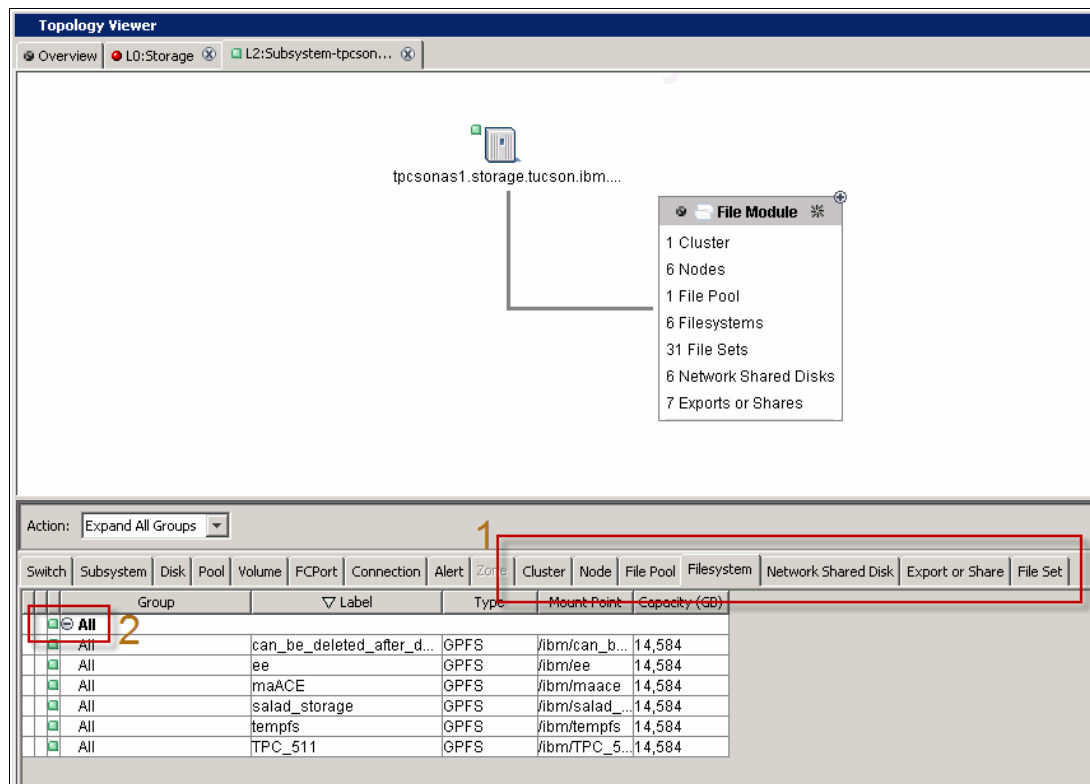


Figure 6-9 Topology Viewer showing SONAS details

In table format, this shows the details of the resource selected.

Instead of drilling through the SONAS components, it is also possible to get detailed information about the SONAS by using miscellaneous reports, which are available in the stand-alone GUI. Go to the following path:

Data Manager → Reporting → Asset → By IBM Storwize V7000 Unified/IBM SONAS

**Note:** Tivoli Storage Productivity Center uses the same reports for IBM SONAS and IBM Storwize V7000 Unified.

Select SONAS and you will see different reports that are available as shown in Figure 6-10 on page 401.

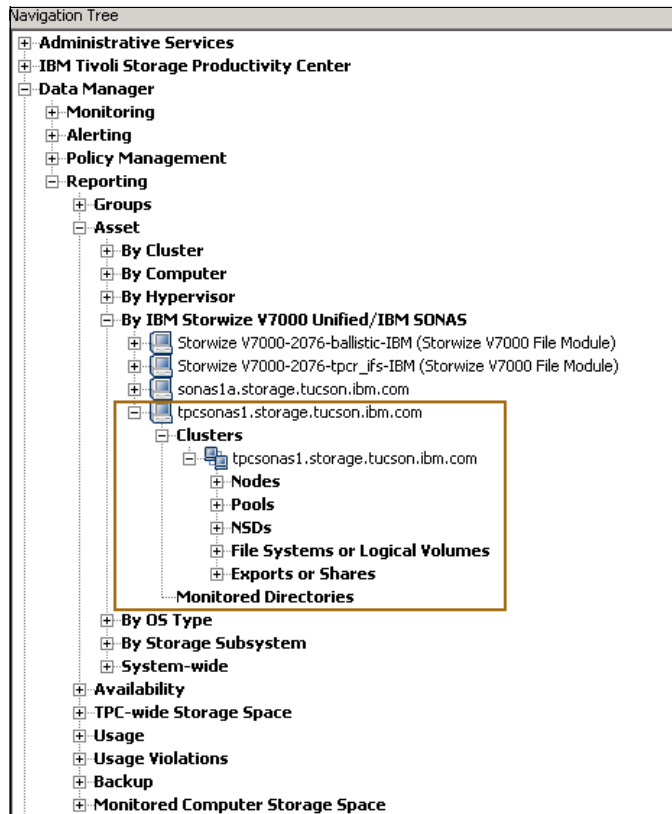


Figure 6-10 Reports for SONAS in Data Manager

Each of the bullets can be expanded to yield further information:

- ▶ Nodes
- ▶ Pools
- ▶ NSDs
- ▶ File systems or logical volumes
- ▶ Exports and shares

The reports available will depend on having an SRA on the servers using the SONAS storage. We provide a couple of examples of the detailed information possible using Tivoli Storage Productivity Center to monitor the SONAS. The first report is the detailed information about the nodes as shown in Figure 6-11 on page 402.

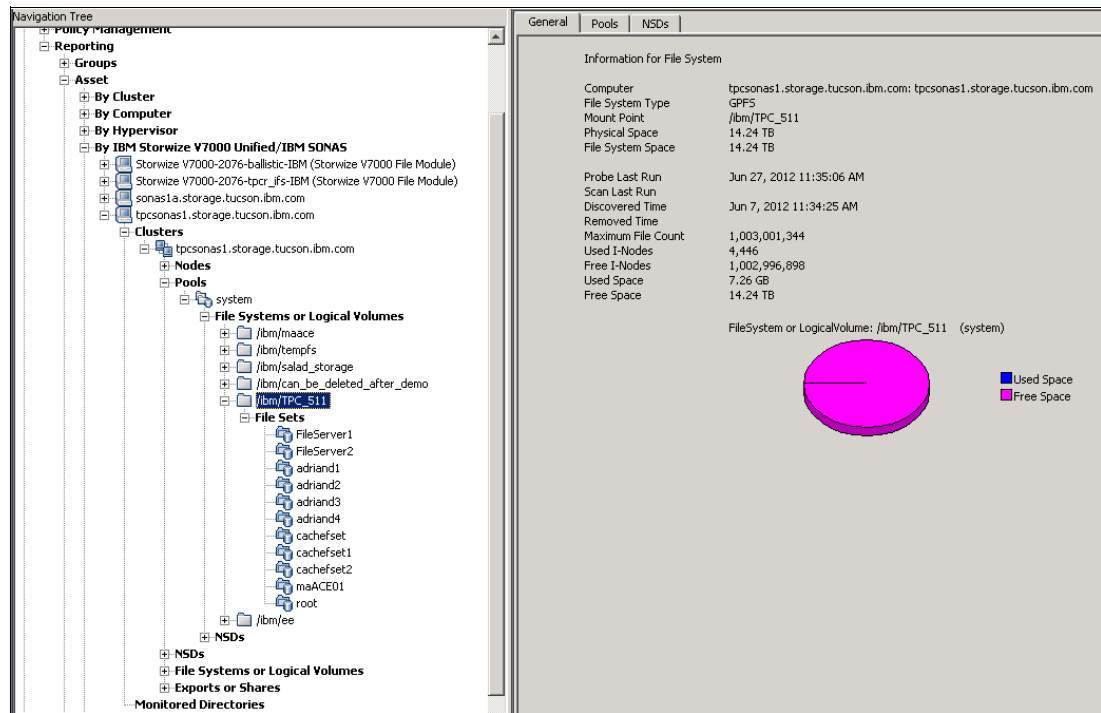


Figure 6-11 Tivoli Storage Productivity Center reports for SONAS file systems

When expanded fully and selecting a file system “/ibm/TPC\_511”, the window at the right shows different information, such as the size of the file system, the type of file system, and when it was last scanned. There will also be a graphic representation showing used capacity.

Another possibility to see the same information, but in a different report format, is shown in Figure 6-12 on page 403. The path to create this report is:

Data Manager → Reporting → Asset → System-wide → File Systems of Logical Volumes → By Available File System Space

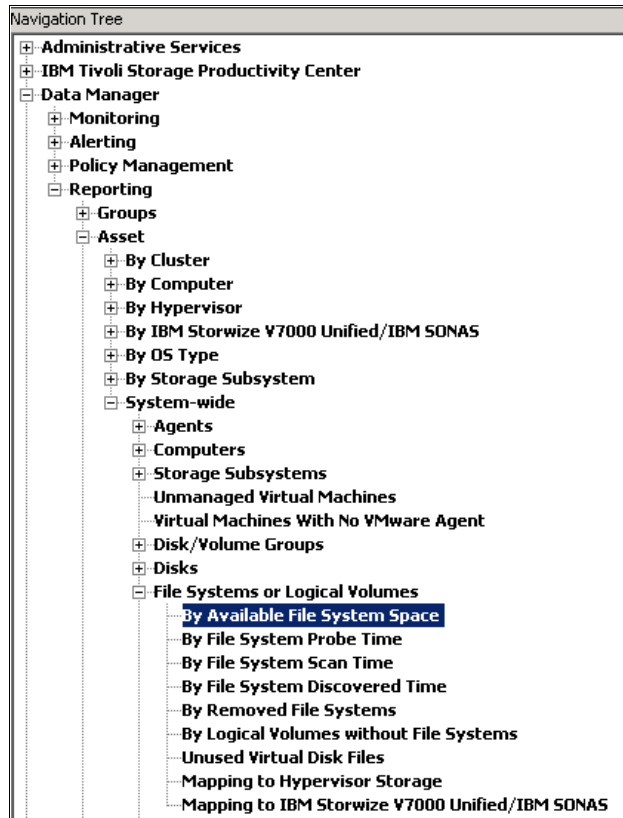


Figure 6-12 Tivoli Storage Productivity Center SONAS report, system wide

In the window that is shown in Figure 6-13, click “Generate Report” (1). If we have many subsystems, it might be beneficial to limit the search by selecting “Filter” (2) and input the host name of the SONAS, or part of the host name.

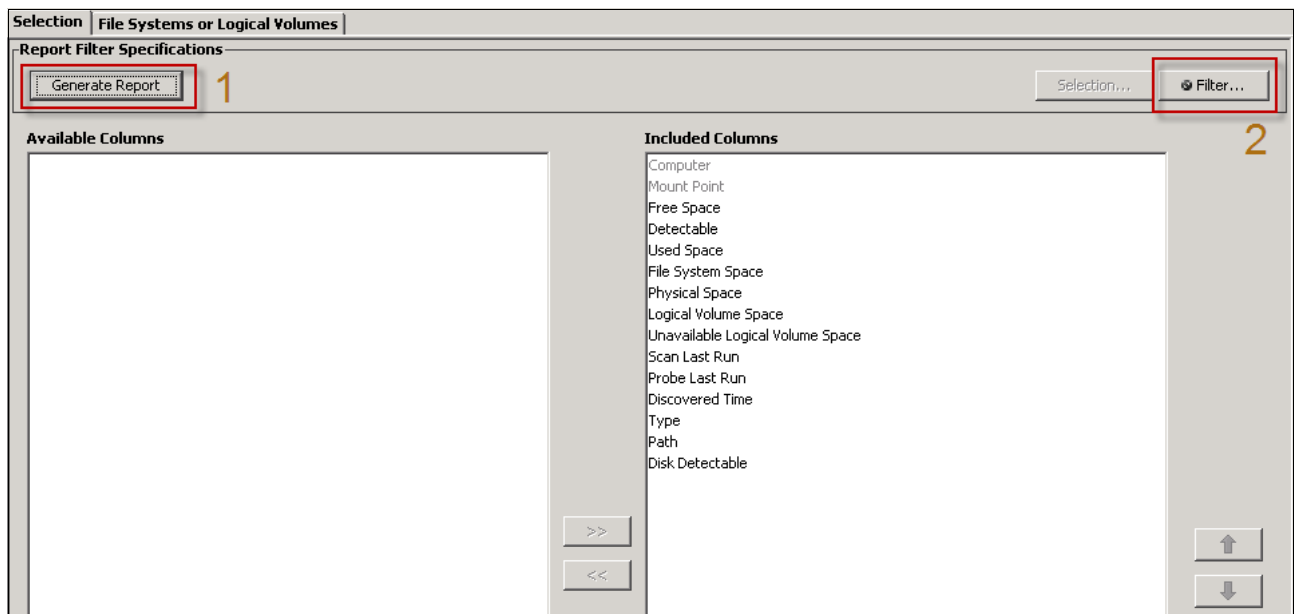


Figure 6-13 Tivoli Storage Productivity Center SONAS report, generate report

The resulting report is shown in table format (see Figure 6-14). It is possible to export the data in the report using **File → Export Data** at the top of the panel:

File → Export Data

Computer	Mount Point	Free Space	Detectable	Used Space	File System Space	Physical Space	Logical Volume Space	Unavailable Logical Volume Space
<b>TOTAL</b>		28.63 TB		644.33 GB	29.26 TB	29.26 TB	29.26 TB	0
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/dtest	3.56 TB	Yes	630.16 GB	4.18 TB	4.18 TB	4.18 TB	0
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/test3	4.18 TB	Yes	2.32 GB	4.18 TB	4.18 TB	4.18 TB	0
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/mumfss2	4.18 TB	Yes	2.31 GB	4.18 TB	4.18 TB	4.18 TB	0
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/GabiRegF5	4.18 TB	Yes	2.31 GB	4.18 TB	4.18 TB	4.18 TB	0
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/TPC_511	4.18 TB	Yes	2.31 GB	4.18 TB	4.18 TB	4.18 TB	0
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/gpfs0	8.35 TB	Yes	4.92 GB	8.36 TB	8.36 TB	8.36 TB	0

Figure 6-14 Tivoli Storage Productivity Center SONAS, system-wide report 1

We notice in the bottom we have a scroll bar, meaning there are columns not shown. The first part of the report shows information about utilization of the SONAS, when scrolling to the right we will see that last half of the report (Figure 6-15).

Computer	Mount Point	Logical Volume Space	Scan Last Run	Probe Last Run	Discovered Time	Type	Path	Disk Detectable
<b>TOTAL</b>		0	N/A	N/A	N/A			
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/dtest	0	Jun 26, 2012 2:17:44 AM	Jun 13, 2012 11:08:01 AM	May 17, 2012 11:08:45 AM	GPFS		Yes
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/test3	0	N/A	Jun 13, 2012 11:08:01 AM	May 17, 2012 11:08:45 AM	GPFS		Yes
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/mumfss2	0	N/A	Jun 13, 2012 11:08:01 AM	May 17, 2012 11:08:45 AM	GPFS		Yes
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/GabiRegF5	0	N/A	Jun 3, 2012 11:06:19 AM	May 17, 2012 11:08:45 AM	GPFS		No
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/TPC_511	0	N/A	Jun 13, 2012 11:08:01 AM	Jun 5, 2012 11:07:07 AM	GPFS		Yes
sonas1a.storage.tucson.ibm.com: tpcsonas2.storage.tucson.ibm.com	/ibm/gpfs0	0	N/A	Jun 13, 2012 11:08:01 AM	May 17, 2012 11:08:45 AM	GPFS		Yes

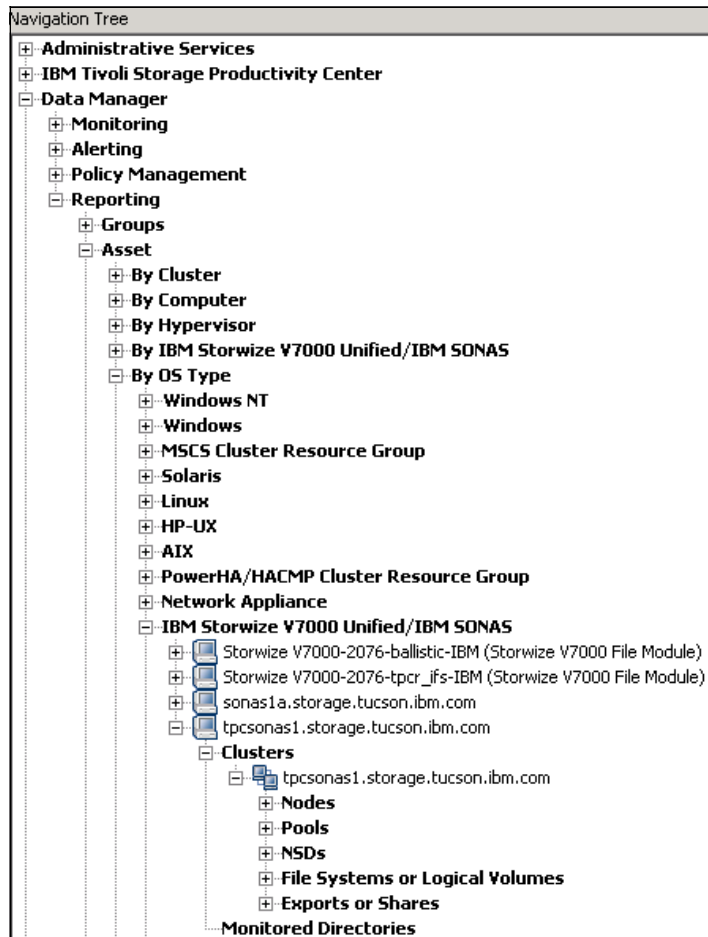
Figure 6-15 Tivoli Storage Productivity Center SONAS, system-wide report 2

Last part of the report shows when the system was last scanned.

Another possibility for reports about the SONAS is in the stand-alone GUI. Go to:

Data Manager → Reporting → Asset → IBM Storwize V7000 Unified/IBM SONAS

This is where it will be possible to generate reports with options as shown in Figure 6-16 on page 405.



**Note:** IBM SONAS file systems show up as belonging to the interface node instead of the cluster. This can happen if the IBM SONAS file systems are mounted on a Storage Resource Agent which has been probed, but the IBM SONAS is not yet configured or probed. After the IBM SONAS has been configured and probed, the file systems will show up as belonging to the cluster.

### 6.1.3 Web GUI management

The new web GUI provides new and different views on storage devices and relationships between different components. Because it is a web-based GUI it also provides the possibility for linking between objects.

When logged in to the web GUI, either from the start menu or at the URL:

<https://localhost:9569/srm>

We navigate to Storage Systems. See Figure 6-17.

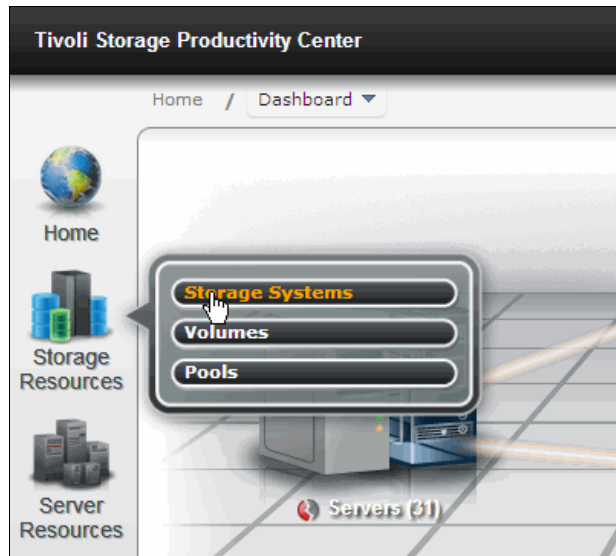


Figure 6-17 Web GUI Storage Systems



In the “Storage Systems” view, we click “File Storage” tab (1), as shown in Figure 6-18. Then, we search for “sonas” (2) to find our IBM SONAS devices. This is a good reason to give your SONAS and all servers and subsystems meaningful names.

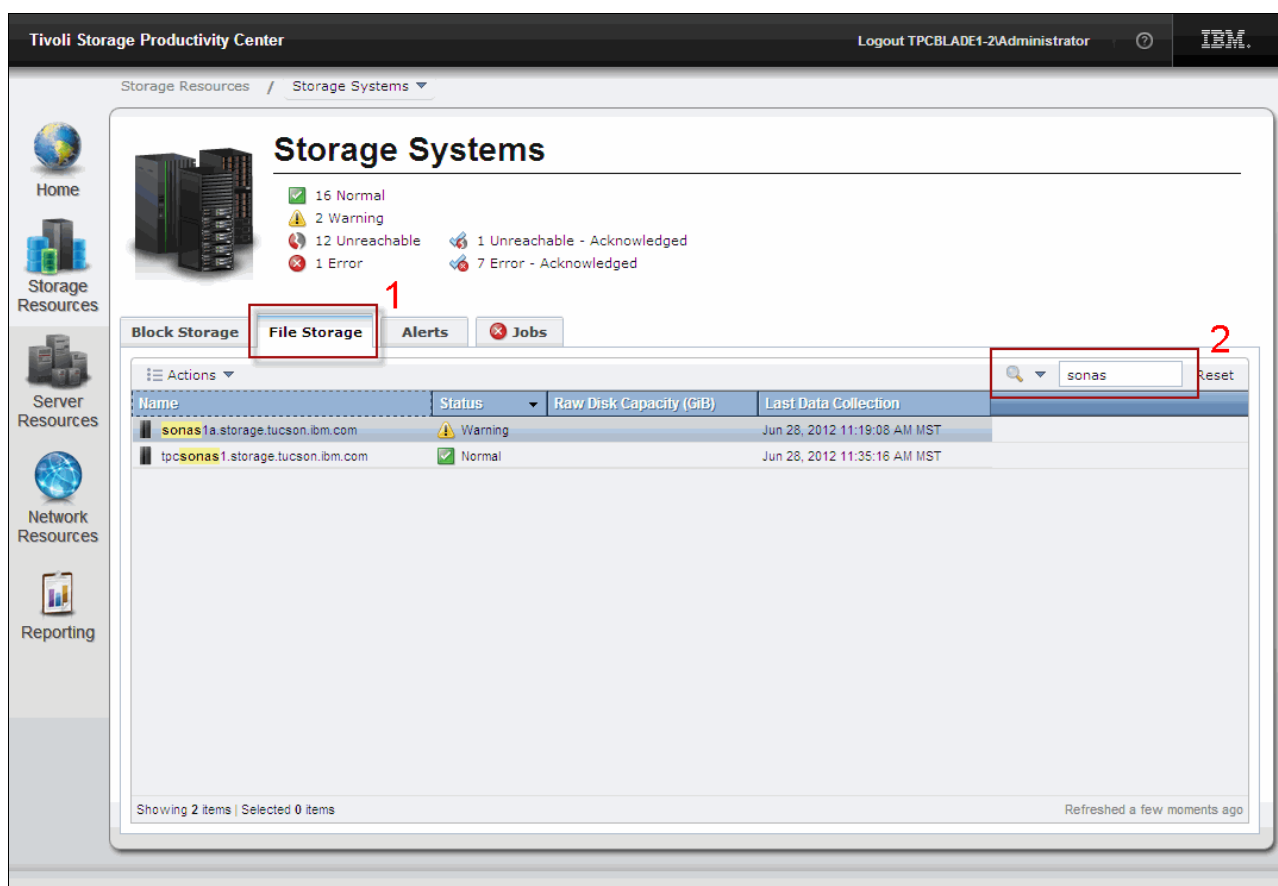


Figure 6-18 Web GUI, storage systems, File Storage

**Note:** In Tivoli Storage Productivity Center V5.1, a SONAS is managed as a File Storage device. You will not find a SONAS under Block Storage. Therefore, we have to select File Storage.

We select our IBM SONAS to view the details. See Figure 6-19 on page 408. There are some important panels to be aware of. In the top of the windows (1), there are the bread crumbs showing where we currently are, and allowing for jumping back to previous menus. At the end, after “Store Resources / Storage Systems /”, there is a drop-down box, allowing for change to a different storage system, not just SONAS.

The side panel at (2) gives information about how many of different things there are, for example, we can see that we have seven alerts, three jobs, six file systems, and six NSDs. They are all hyperlinks that allow us to jump directly to the item of interest.

At the top of the panel (3), we see a Storage Overview of the SONAS, showing the total, exported, and available capacity in TiB.

Below the Storage Overview there are two windows with historic information, showing the available and used space for the past 30 days. At the bottom, there are the largest file

systems created on the SONAS. It is possible to change what the two windows are showing by toggling the content by clicking the arrow in the side (4).

Figure 6-19 shows a web GUI detailed view of SONAS.

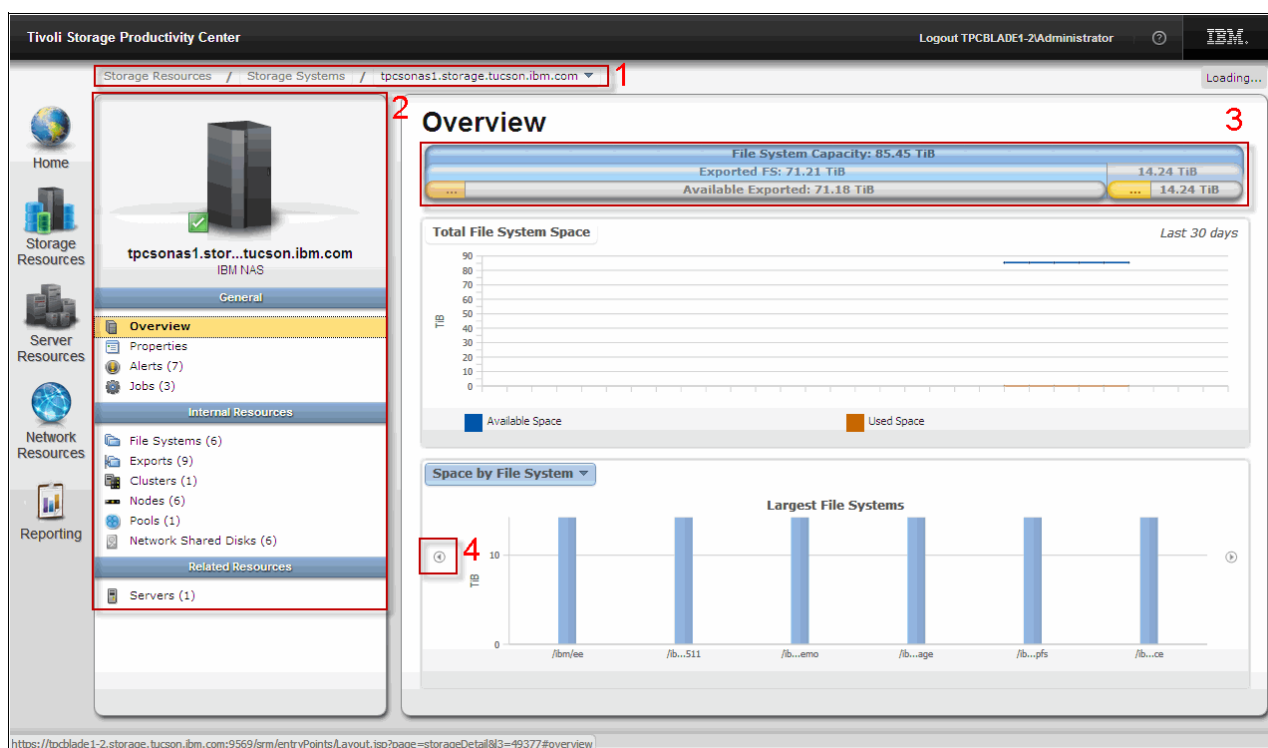


Figure 6-19 Web GUI detailed view of SONAS

From the overview that is shown in Figure 6-20 on page 409 we can select properties (1) to get details about the configuration of the SONAS, which will be shown in the right-side frame. There are different tabs (2) available. For the SONAS, they are empty because we in Tivoli Storage Productivity Center V5.1 manage SONAS as a File Storage device. When Tivoli Storage Productivity Center is enhanced to support SONAS as a block device, the tabs will contain information, like any storage system managed as a Block Storage device.

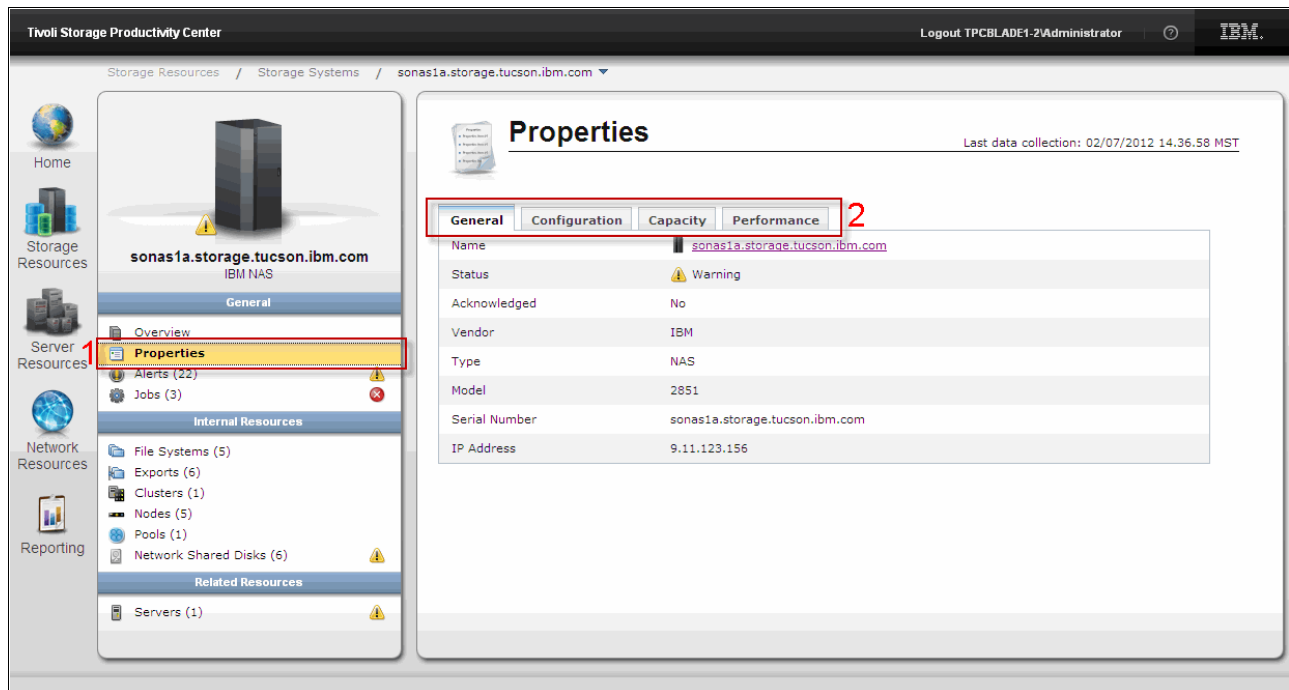


Figure 6-20 SONAS properties

From the overview, we can also see the status of the last job run, and the most severe alert on the SONAS, as shown in Figure 6-21. For details about handling and viewing jobs and alerts, see 6.1.5, “Health check and alerting” on page 419.

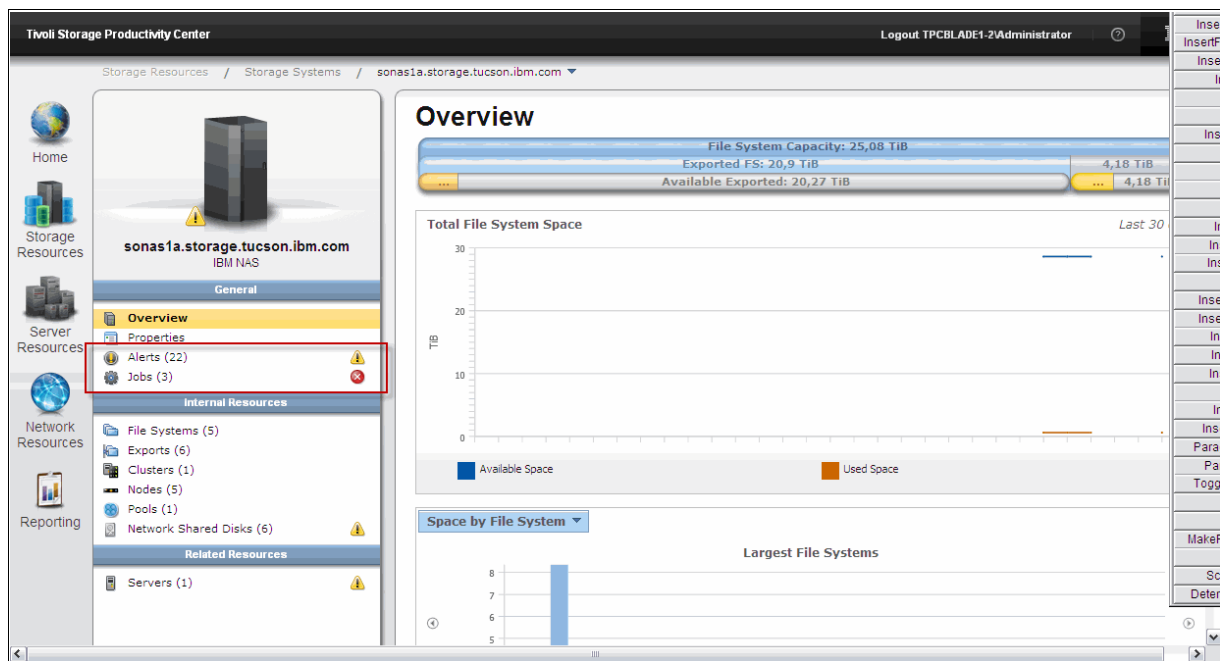


Figure 6-21 SONAS alerts and jobs

In the overview, there is an entire whole section about “Internal Resources”, which contains details about different components within the SONAS.

File systems contain details about capacity, file counts, and usage (Figure 6-22).

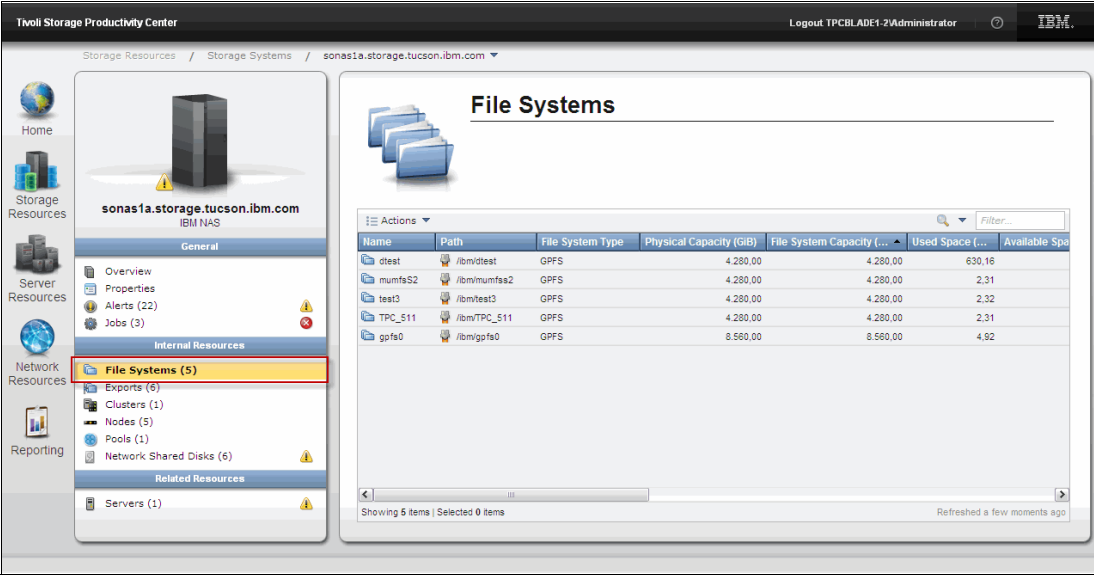


Figure 6-22 SONAS file systems

Scrolling to the right in the right-sided window, we find some interesting links, as shown in Figure 6-23.

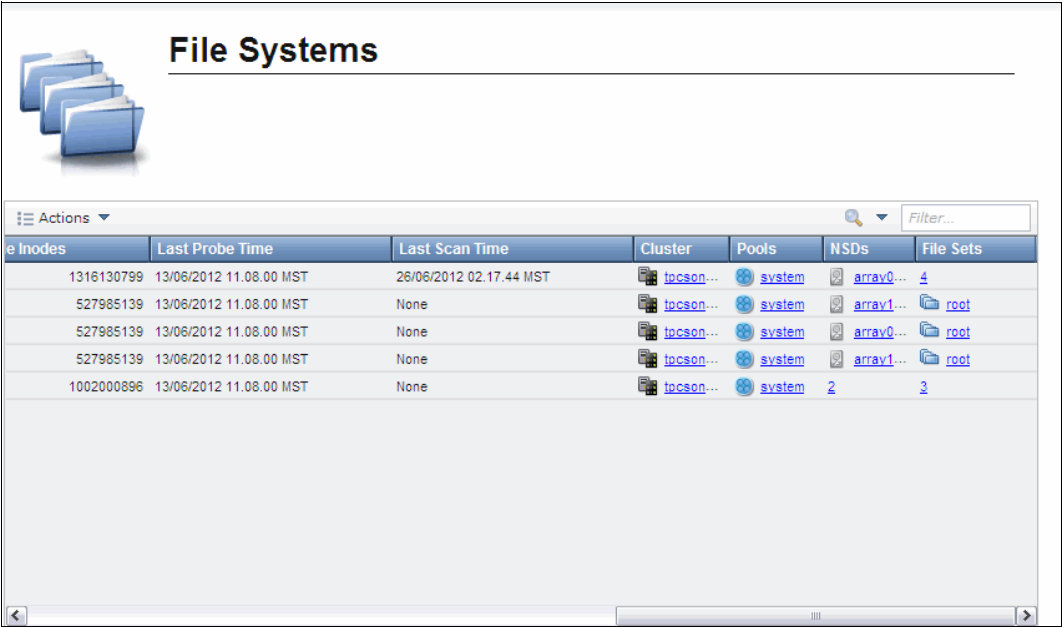


Figure 6-23 SONAS file system links

For example, clicking Array1 in the NSD column gives us details about the status, capacity, and when it was last probed. See Figure 6-24 on page 411.

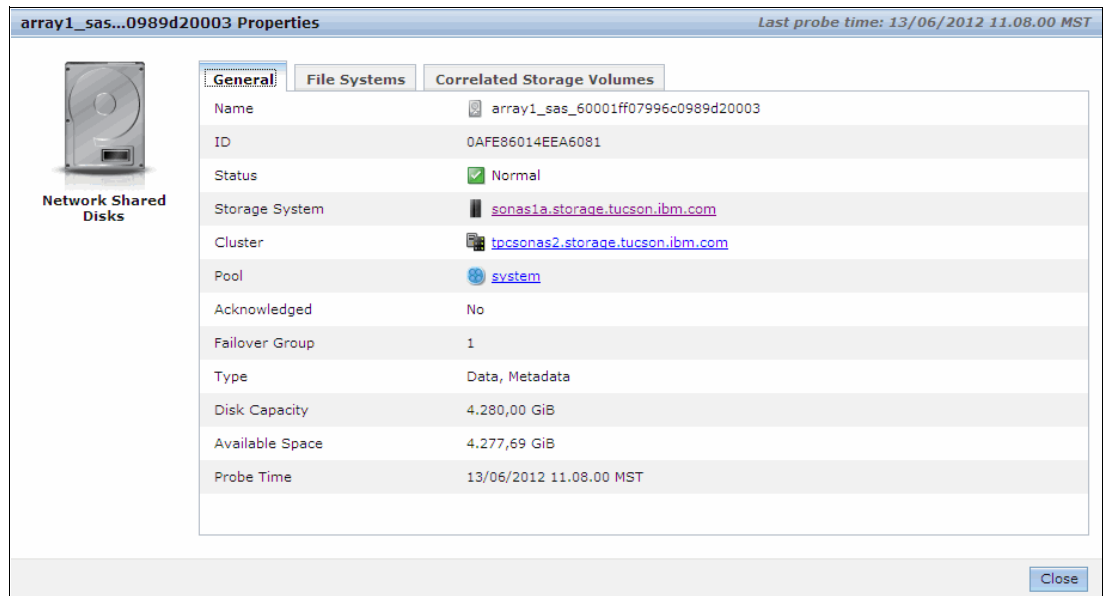


Figure 6-24 Array information from the file systems tab

Clicking the “File Systems” tab gives us name, mount point, and information about capacity. We just need to use the scroll bar. See Figure 6-25.

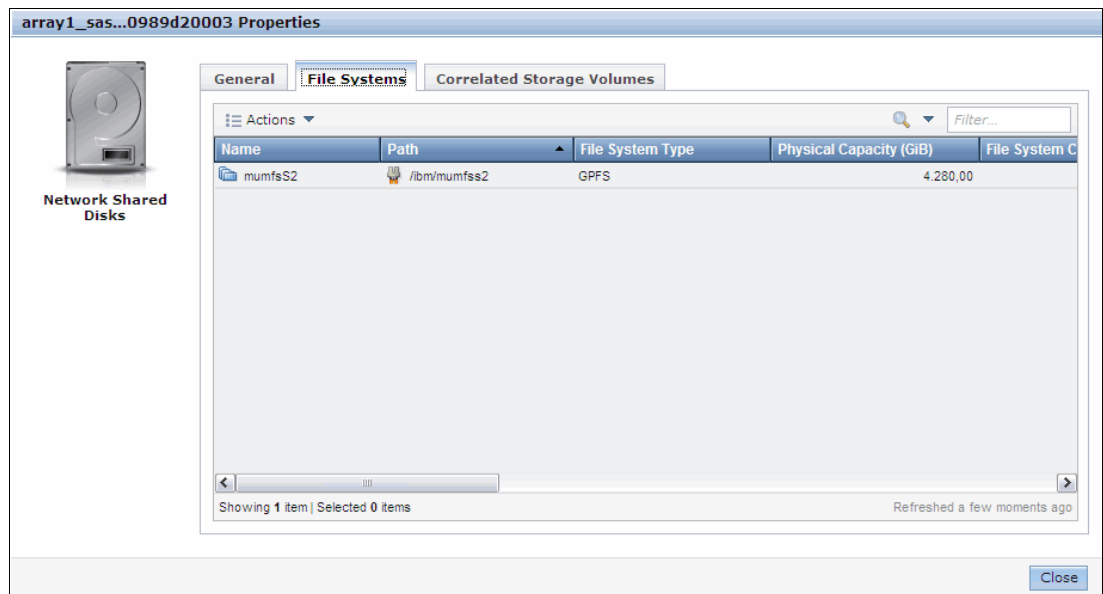


Figure 6-25 File systems information from NSD tab

The above example shows the integration and how easy it is to jump between different components, due to the correlation. There is no need to navigate to a new panel for finding related jobs or alerts, as in stand-alone GUI.

From the storage system overview, we can view the exports for the SONAS. See Figure 6-26. In the window to the right, we can see the name of exports, the path, and protocol that the exports have.

The marked entry shows the possibility when an SRA is installed, that Tivoli Storage Productivity Center V5.1 can correlate information, and present the user with the possibility to jump directly over and watch properties for the server.

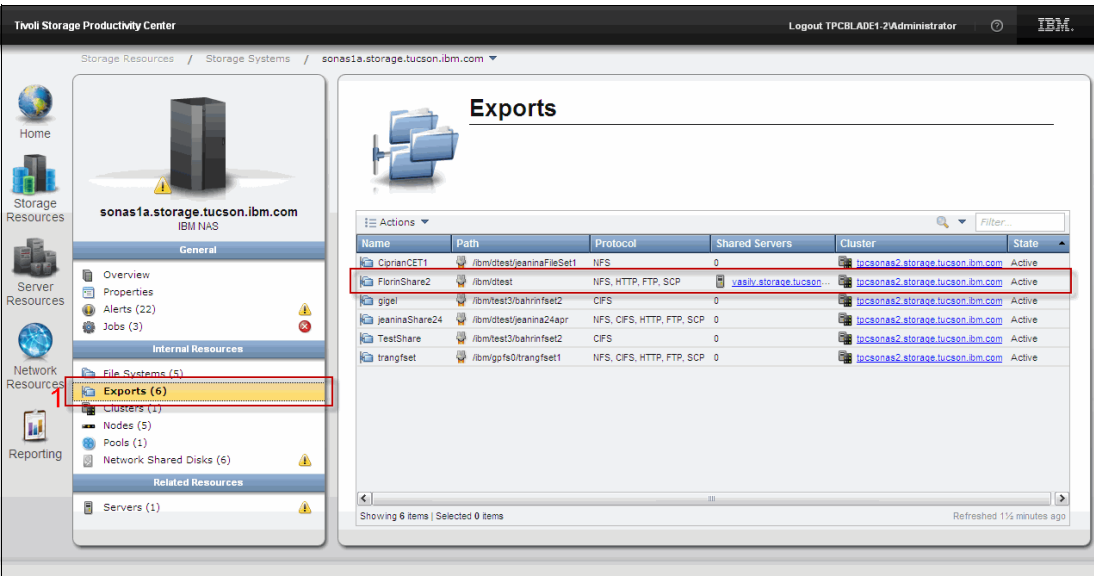


Figure 6-26 SONAS exports view

The “Clusters” option in the overview shows basic information about the SONAS, name, and ID, as shown in Figure 6-27.

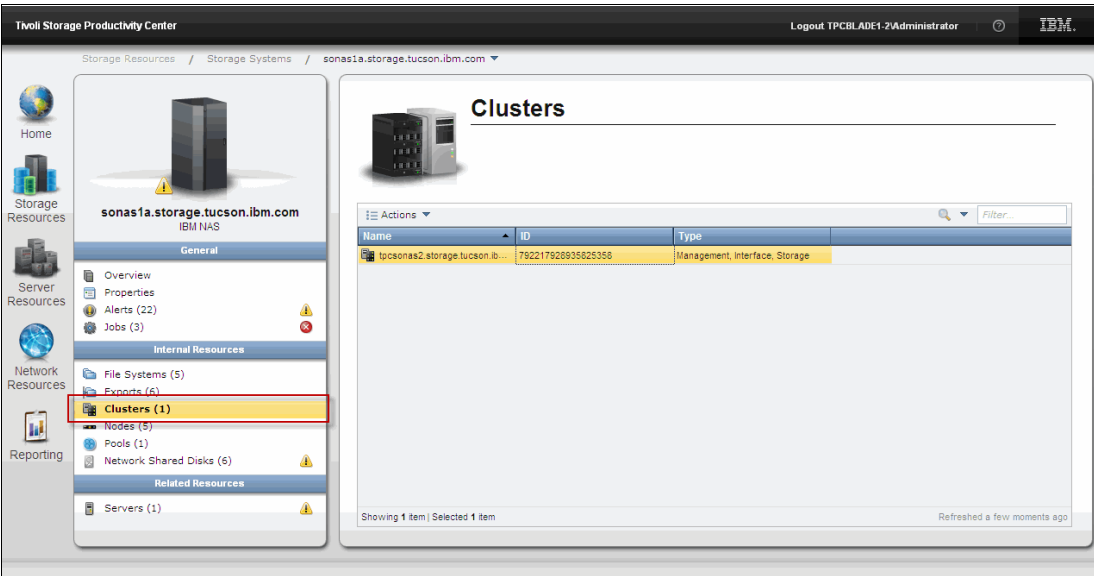


Figure 6-27 SONAS overview, clusters

From the overview, we can select nodes to get details about the different hardware components within the SONAS. See Figure 6-28. We see the different types, interfaces, management, and storage. We also see the status of each individual component.

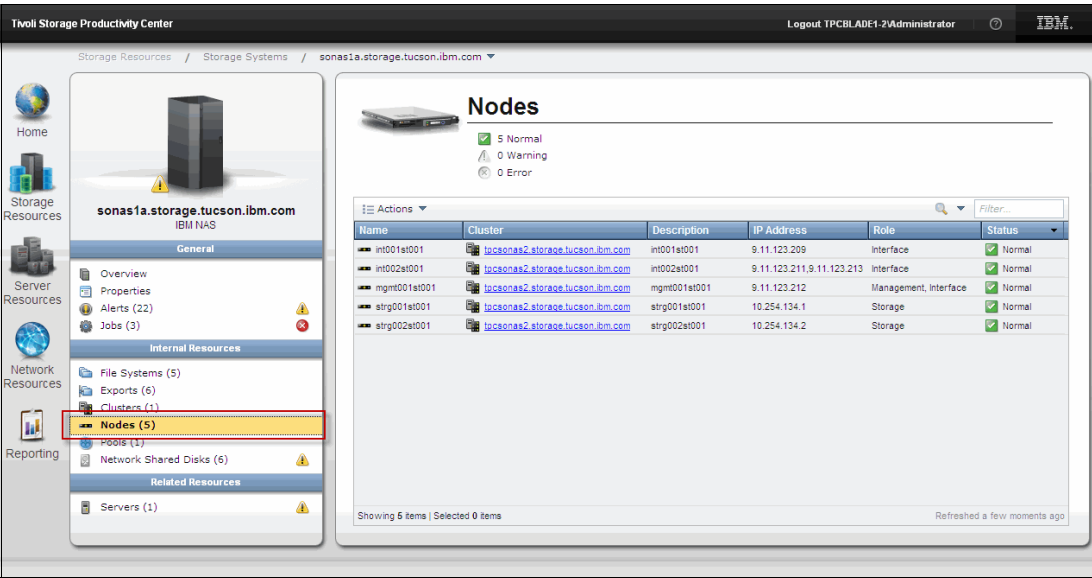


Figure 6-28 SONAS nodes

The “Pools” option shows details about the pools that are created on the SONAS. See Figure 6-29. We see capacity and this SONAS has 5 file systems and 6 NSDs. The numbers for file systems and NSDs are hyperlinks for jumping to detailed information for each component.

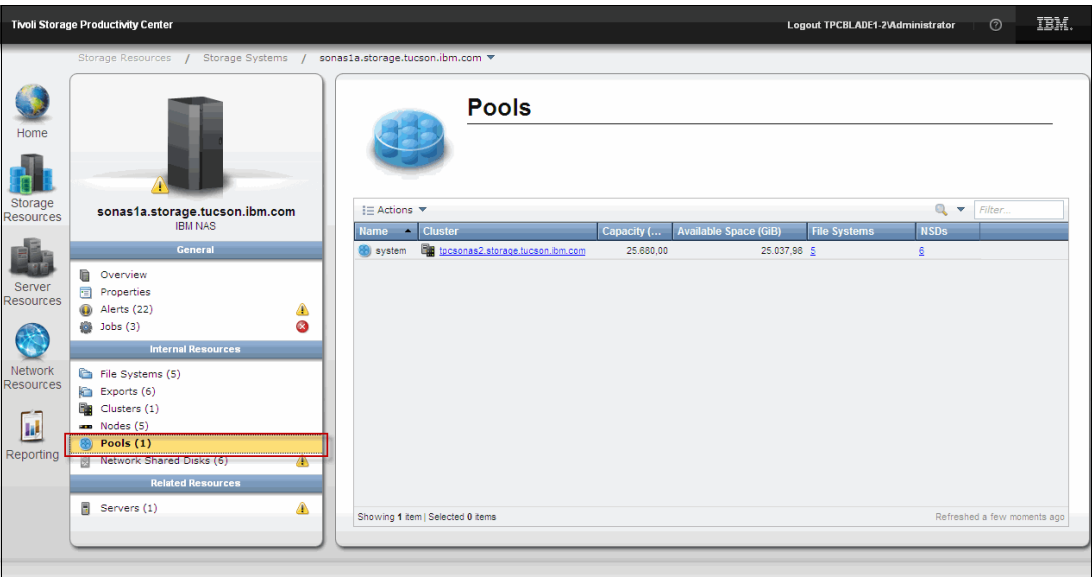


Figure 6-29 SONAS pools

From the overview, we can select NSD. See Figure 6-30. This shows details like which array does the NSD reside on, which pool is used, what is the capacity, and what file system has been built on it. It will also show the status of each NSD. In our example, we can see that the first NSD has an alert with status “Warning”.

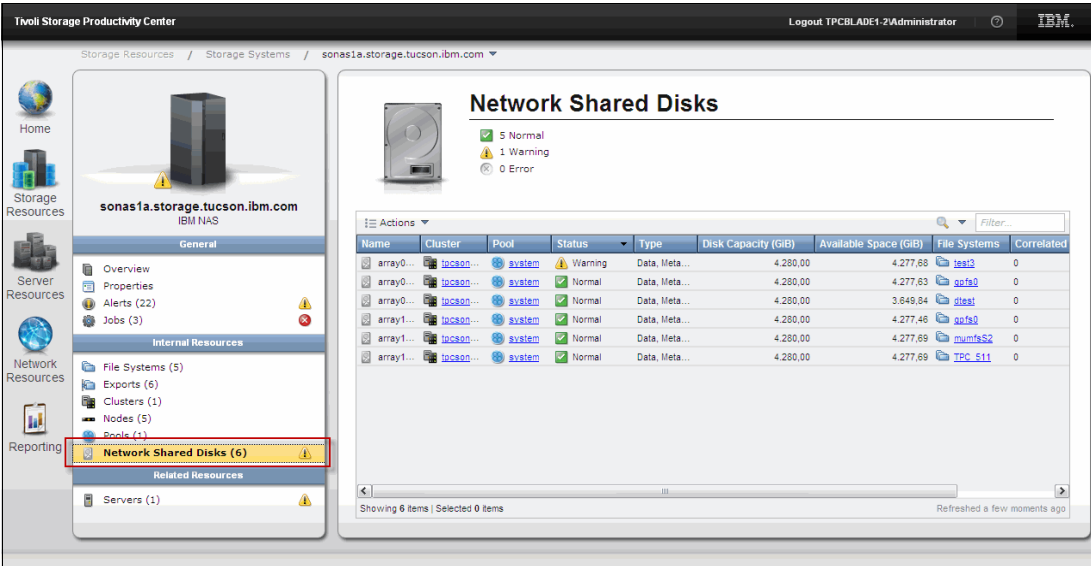


Figure 6-30 SONAS NSDs

The bottom of the Overview frame in Figure 6-31 is “Servers”. Clicking this link takes us to a list of servers that have storage on the selected SONAS array, pending that we have an SRA installed on them. We provided an example in Figure 6-31, where one of the connected servers to the SONAS has an SRA installed.

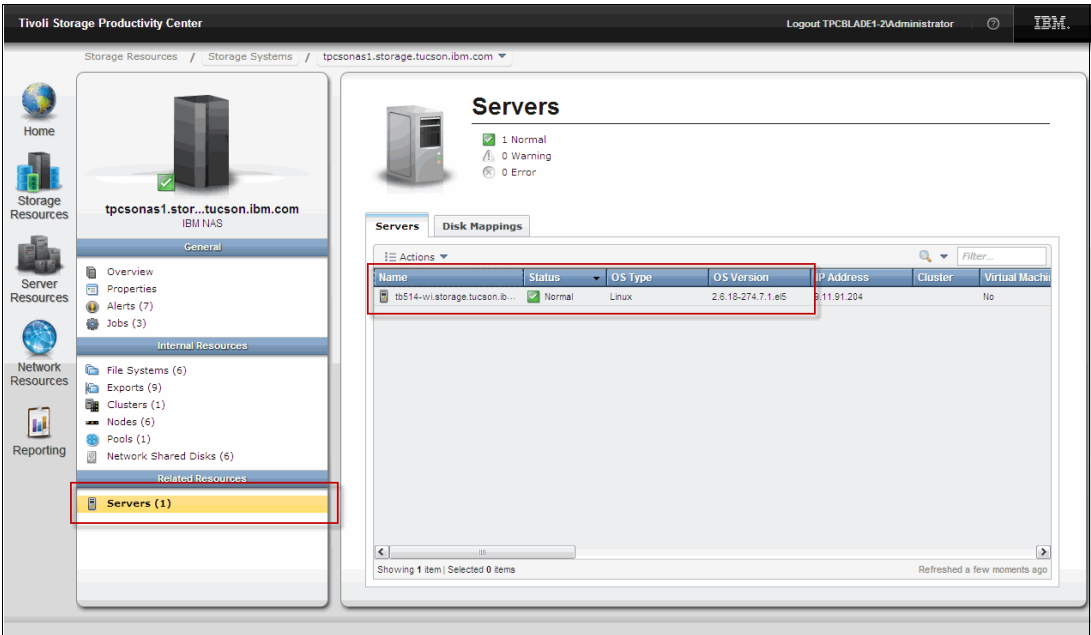


Figure 6-31 SONAS with connected SRAs



Clicking the server in the right-side frame takes us from the storage overview to the overview for the server. See Figure 6-32.

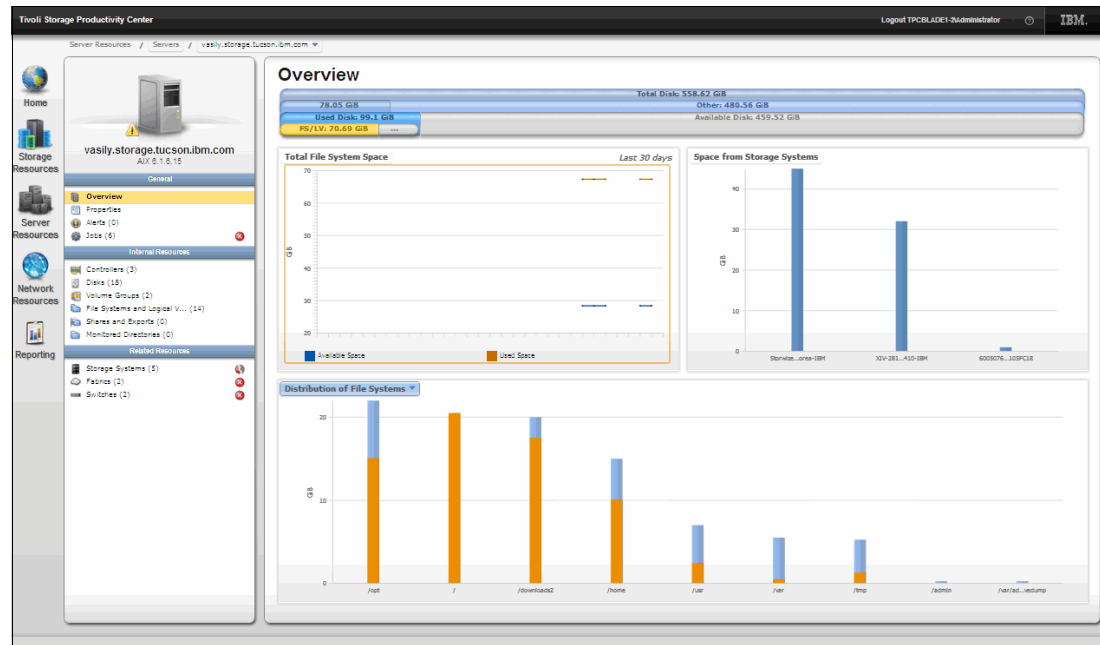


Figure 6-32 Server overview

This example shows the flexibility of the new web GUI that we are able to jump from one view, directly to related information.

From all windows in the web GUI, it is possible to export the presented data to a file. See Figure 6-33 on page 416.

To export data, select from the actions menu. Follow the path:

Actions → Export → Fileformat

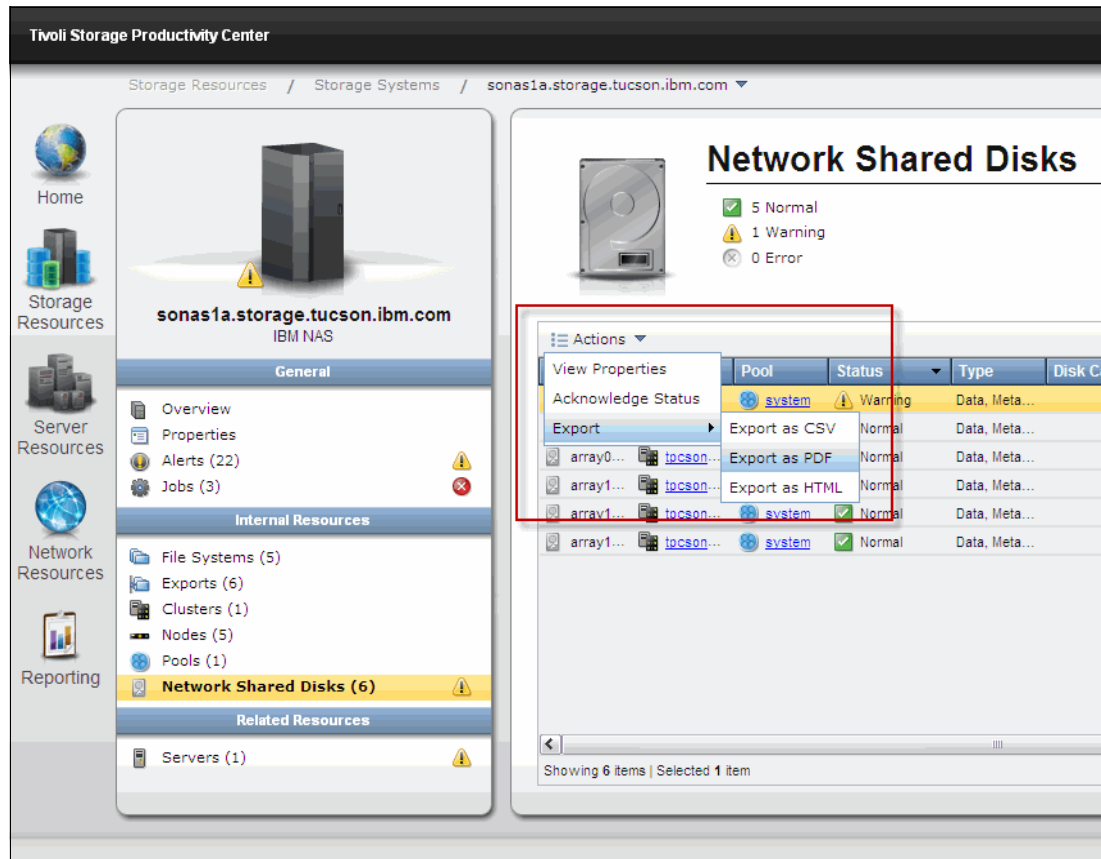


Figure 6-33 Web GUI export data to file

Currently there are three formats available to export data:

- CSV format, data included in “” and delimiter comma (,).

#### Example 6-1 CSV formatted export

```
"Name","Cluster","Pool","Status","Type","Disk Capacity (GiB)","Available Space (GiB)","File Systems","Correlated Storage Volumes"
"array0_sas_60001ff07996c0889d10002","tpcsonas2.storage.tucson.ibm.com","system","Warning","Data, Metadata","4.280,00","4.277,68","test3","0"
"array0_sas_60001ff07996c0689cf0000","tpcsonas2.storage.tucson.ibm.com","system","Normal","Data, Metadata","4.280,00","4.277,63","gpfs0","0"
"array0_sas_60001ff07996c0a89d30004","tpcsonas2.storage.tucson.ibm.com","system","Normal","Data, Metadata","4.280,00","3.649,84","dtest","0"
"array1_sas_60001ff07996c0789d00001","tpcsonas2.storage.tucson.ibm.com","system","Normal","Data, Metadata","4.280,00","4.277,46","gpfs0","0"
"array1_sas_60001ff07996c0989d20003","tpcsonas2.storage.tucson.ibm.com","system","Normal","Data, Metadata","4.280,00","4.277,69","mumfsS2","0"
"array1_sas_60001ff07996c0b89d40005","tpcsonas2.storage.tucson.ibm.com","system","Normal","Data, Metadata","4.280,00","4.277,69","TPC_511","0"
```

- PDF format, example for sending with email. See Figure 6-34 on page 417.

## IBM Tivoli Storage Productivity Center NASNSDs

Created By: Administrator

Created On: 2. juli 2012 17:12:01 MST

Name	Cluster	Pool	Status	Type	Disk Capacity (GiB)	Available Space (GiB)	File Systems	Correlated Storage Volumes
array0_sas_60001ff07996c0889d10002	tpcsonas2.storage.tucson.ibm.com	system	Warning	Data, Metadata	4.280,00	4.277,68	test3	0
array0_sas_60001ff07996c0689cf0000	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,63	gpfs0	0
array0_sas_60001ff07996c0a89d30004	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	3.649,84	dtest	0
array1_sas_60001ff07996c0789d0001	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,46	gpfs0	0
array1_sas_60001ff07996c0989d20003	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,69	mumfsS2	0
array1_sas_60001ff07996c0b89d40005	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,69	TPC_511	0

Figure 6-34 PDF file format export

- HTML format, example for use on web server. See Figure 6-35.

<b>IBM Tivoli Storage Productivity Center</b> <b>NASNSDs</b> Created By: Administrator Created On: 2. juli 2012 17:12:13 MST								
Name	Cluster	Pool	Status	Type	Disk Capacity (GiB)	Available Space (GiB)	File Systems	Correlated Storage Volumes
array0_sas_60001ff07996c0889d10002	tpcsonas2.storage.tucson.ibm.com	system	Warning	Data, Metadata	4.280,00	4.277,68	test3	0
array0_sas_60001ff07996c0689cf0000	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,63	gpfs0	0
array0_sas_60001ff07996c0a89d30004	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	3.649,84	dtest	0
array1_sas_60001ff07996c0789d00001	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,46	gpfs0	0
array1_sas_60001ff07996c0989d20003	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,69	mumfsS2	0
array1_sas_60001ff07996c0b89d40005	tpcsonas2.storage.tucson.ibm.com	system	Normal	Data, Metadata	4.280,00	4.277,69	TPC_511	0

Figure 6-35 Export as HTML file

## 6.1.4 CLI management

For managing the IBM SONAS, there is a comprehensive CLI available. This makes it possible for centralized storage management, without starting each individual SONAS web management console. The CLI is incorporated into the tpctool, which on Windows gets started with the following command:

```
C:\Program Files\IBM\TPC\cli\tpctool.bat
```

From within the tpctool, some of the possible tasks for SONAS include:

- ▶ Reporting, using commands like lscluster, lsnode, lsnsd, lsfs, lsfsset, lsexport, lsquota
- ▶ Provisioning for file systems, file sets, exports, and quotas
  - Commands for file systems
    - Creating, removing, and changing file systems with mkfs, rmfs, chfs
    - Mount and unmount file systems with mountfs, unmountfs
  - Commands for file sets
    - Creating, removing, and changing file sets with mkfset, rmfset, chfset
    - Link and unlink file set on the file system to the junction path with linkfset, unlinkfset
  - Commands for export
    - Creating, removing, and changing exports with mkexport, rmexport, chexport
  - Commands for Quota
    - To set or check quotas with setquota, chkquota

For details about each command and usage, see the IBM Redbooks publication, *IBM SONAS Implementation*, SG24-7962.

**Note:** tpctool provisioning commands map one-to-one to storage system CLI commands, except for chfs, mkexport, and chexport. Some options for these commands may require more than one storage system CLI command.

Commands are implemented by the device server that uses the same native external process API to connect and issue the commands on both the Storwize V7000U or IBM SONAS system. This means the same commands and options are available for both Storwize V7000U and SONAS. Storage administrators familiar with the Storwize V7000 CLI can easily manage the SONAS.

## Log files

When commands are used, their result is stored in the following log file:

C:\Program Files\IBM\TPC\Device\log\auditTPCDeviceServer.log

It is possible to see who and what have been performed; see Example 6-2. In our example, we can see that the user administrator, on 8 May, mounted a file system named testfs on storage system tpcsonas1.storage.tucson.ibm.com.

### Example 6-2 Audit log example

---

```
2012-05-08 16:06:52.511-0700 BTACS0047I DiskManagerService.mountFilesystems
performed by Administrator at 127.0.0.1. Input parameters:
[[FilesystemData@cd844f3f( Operation=MOUNT,
FilesystemId=testfs+tpcsonas1.storage.tucson.ibm.com+tpcsonas1.storage.tucson.ibm.
com+0, Nodes=NULL)]], output parameters: JobID=1032 com.ibm.tpc.ServiceUtils
recordInAuditLog
```

---

In a problem or failure, it is possible to do troubleshooting by examining the log files in:

device/log/epm

Some errors also show up directly in tpctool. For example, see Figure 6-36 on page 419.

```

tpctool>
tpctool> chexport -export ma_exprt8+tpcsonas3.storage.tucson.ibm.com+tpcsonas3a.storage.tucson.ibm.com+0 -l
HWNEP0193E The change export command failed because the following command executed on the NRS device failed
cli chexport ma_exprt8 -c tpcsonas3.storage.tucson.ibm.com --http
returned:
EFSSG0029C Protocol HTTP is already configured for export ma_exprt8.

```

ExportId	Status
ma_exprt8+tpcsonas3.storage.tucson.ibm.com+tpcsonas3a.storage.tucson.ibm.com+0	FAILED

```

tpctool>

```

Figure 6-36 Error message from tpctool

The error indicates we attempted to change the export protocol for a file to HTTP, but the HTTP protocol was already enabled.

## 6.1.5 Health check and alerting

Tivoli Storage Productivity Center monitors and checks the SONAS like any other subsystem. Tivoli Storage Productivity Center will query the SONAS on a one-minute interval for any new alerts. New alerts are collected, stored in the database, and presented in the web GUI and the stand-alone GUI.

Alerts for SONAS can be found in the stand-alone GUI under Alerting, as shown in Figure 6-37.

IBM Tivoli Storage Productivity Center → Alerting → Alert Log → All

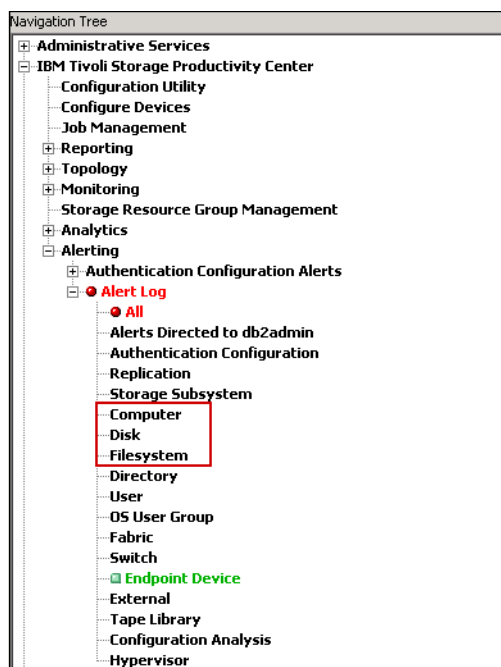


Figure 6-37 Tivoli Storage Productivity Center alert log

In Tivoli Storage Productivity Center V5.1, both SONAS and V7000U alerts are moved from the OS Alerts View to Storage Subsystem Alerts View, so in the upper right window you need to change the view. See Figure 6-38 on page 420.

The screenshot shows a web interface for viewing alerts. At the top, there is a 'View:' label followed by a dropdown menu currently set to 'OS Alerts'. Below the dropdown, there are two buttons: 'Clear' and 'Delete All'. To the right of these buttons are three more buttons: 'Page Up', 'Page Down', and 'Refresh'. The 'Storage Subsystem Alerts' option is highlighted in the dropdown menu.

Figure 6-38 All log, storage subsystem

From the “All” log it might not be possible easily to find the alerts we are looking for; the SONAS alerts can be divided into three other log files, namely:

- Computers, for alerts regarding clusters and nodes (Figure 6-39).

Computer	Obj. Type	Object	Alert Type	First Triggered	Last Triggered ▲	# Times	Alert Creator	Alert Name
tpcsonas1.storage.tucson.ibm.com	Cluster	tpcsonas1.storage.tucson.ibm.com	Cluster Was Rediscovered	Apr 2, 2012 3:59:23 PM	Apr 2, 2012 3:59:23 PM	1	TPCUser	NAS Cluster Was Rediscovered (Advanced)

Figure 6-39 Computer alert

- Disk for NSD alerts (Figure 6-40).

Enclosure Type	Enclosure	Disk	Alert Type	First Triggered	Last Triggered	# Times	Alert Creator	Alert Name
Computer	(N/A)	array0_sas_60001f074ba807894c0001	NSD State Changed	Apr 2, 2012 3:59:23 PM	Apr 2, 2012 3:59:23 PM	1	TPCUser	NAS NSD State Changed (Advanced)

Figure 6-40 NSD alert

- File system for alerts about file systems, file sets, exports, and quotas (Figure 6-41).

Computer	Obj. Type	Object	Alert Type	First Triggered	Last Triggered	# Times	Alert Creator	Alert Name
tpcsonas1.storage.tucson.ibm.com	Filesystem	/bm/JM_TEST	File system reconfigured	Apr 2, 2012 4:09:38 PM	Apr 2, 2012 4:09:38 PM	1	TPCUser	NAS File System Reconfigured (Advanced)
tpcsonas1.storage.tucson.ibm.com	Exports or Shares	jeanina24	Export Is Missing	Mar 28, 2012 10:01:43 PM	Mar 28, 2012 10:01:43 PM	1	TPCUser	NAS Export Is Missing (Advanced)

Figure 6-41 File system alert

If looking for alerts from a particular SONAS, it is possible to go to the Topology Viewer using the path:

IBM Tivoli Storage Productivity Center → Topology → Storage

Select the SONAS and get the high-level details as shown in Figure 6-42 on page 421.

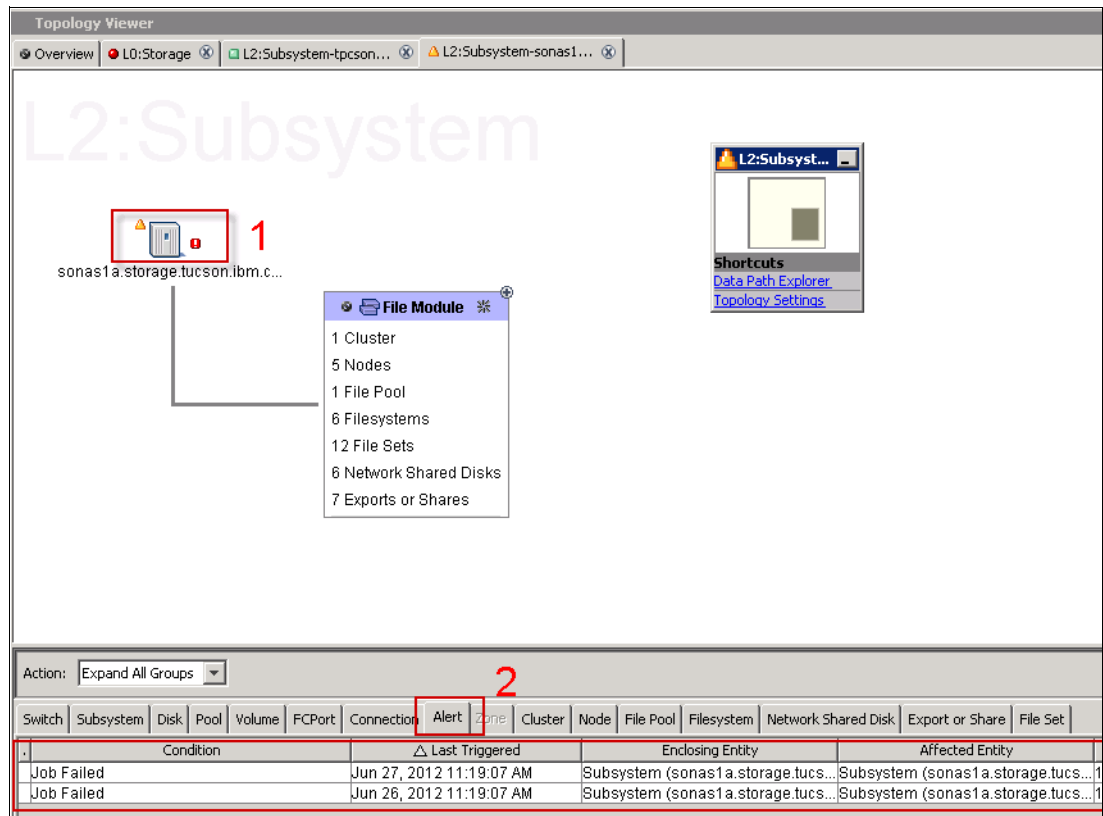


Figure 6-42 Topology view

Next to the SONAS (1) at the right side, we see a red “!”, meaning that SONAS has one or more alerts. To the left of the SONAS we see a yellow triangle, this is the most severe alert on the SONAS. Select the alert tab (2). We can see all the alerts for this SONAS. If several components have an alert, the same procedure can be used while drilling down through the SONAS. Select the component, then click the Alert tab to see the alerts. When an alert is acknowledged the status changes to green.

From the Web GUI, it is also possible to check the status and see the alert logs. Go to Storage Systems. See Figure 6-43.



Figure 6-43 Web GUI SONAS status

Like in the stand-alone GUI, we can see the overall status of the SONAS in Figure 6-43 on page 421. In our example, the most critical alert is Warning.

After selecting the SONAS storage system, you are presented an overview of the SONAS. Under the General tab we clicked Alerts (1). The Alerts pane for the selected SONAS opens on the right side of the window.

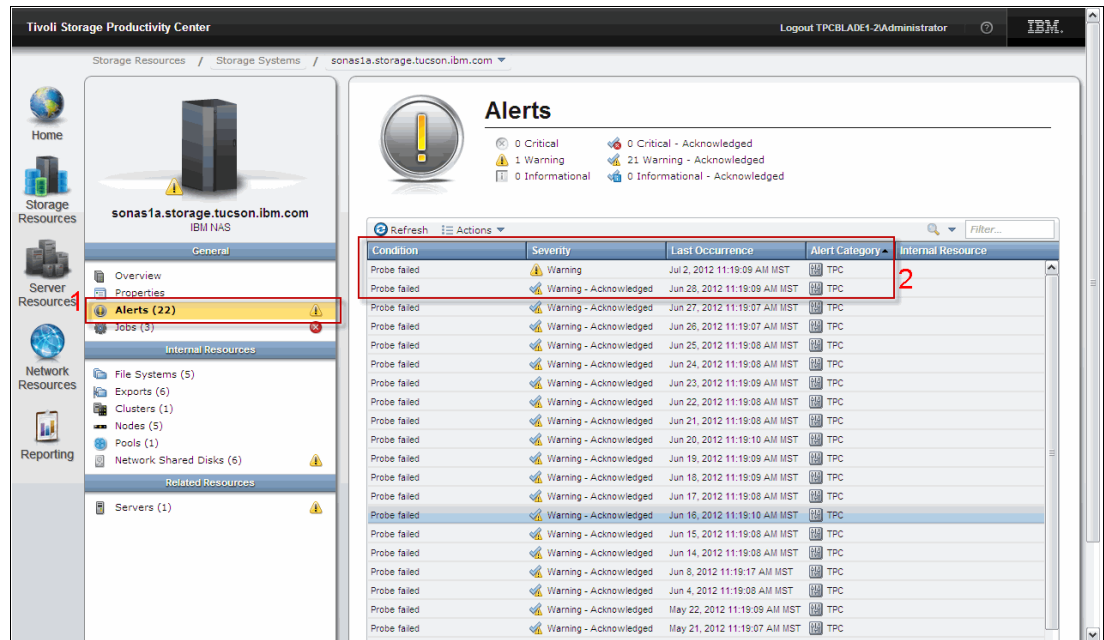


Figure 6-44 Web GUI SONAS alerts

In the alerts (Figure 6-44 (2)), we see a new icon. In the first line we have a Warning alert, which has not yet been acknowledged. In the second line, we see the triangle with a little check mark on. This means that this alert has been acknowledged, meaning someone has seen it, and acknowledged it. When viewing alerts in the stand-alone GUI, after an alert has been acknowledged it turns green. In the web-based GUI, it is easier to spot the status of alerts, whether they have been acknowledged and corrected or not.

Another new feature is when you click an error, for example the first line in Figure 6-44, you see the panel that is shown in Figure 6-45.

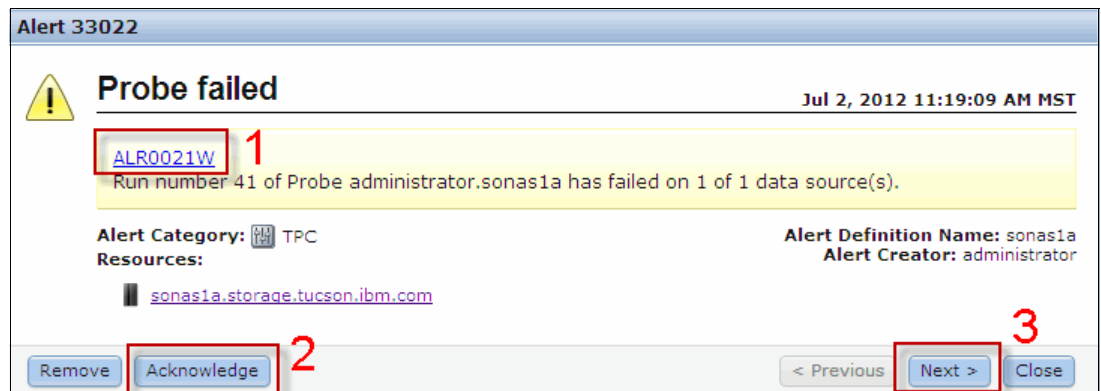


Figure 6-45 Alert in Web GUI



From the alert pop-up windows we can Acknowledge the alert (2), which will change the icon to the triangle square with the check mark. When all alerts are acknowledged, the overall status of the SONAS changes to green.

In our example, clicking the “ALR0021W” alert (1) opens a window with a description about the alert. See Figure 6-46.

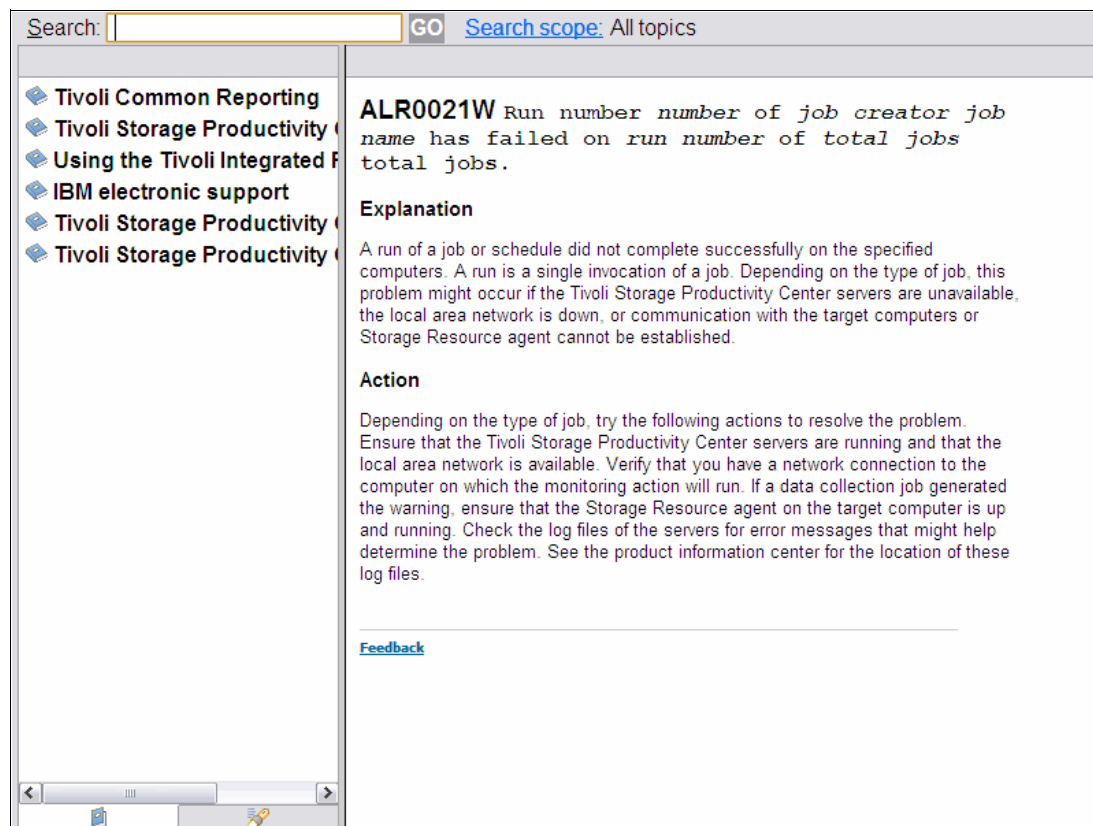


Figure 6-46 Alert description

The alert description in Figure 6-46 does not require Internet access. It is a web service hosted on the Tivoli Storage Productivity Center server.

Getting details for jobs is similar to getting alert details. In the overview window for the storage system (Figure 6-47 on page 424), click jobs (1). In the right side window, you see information about the jobs (2).

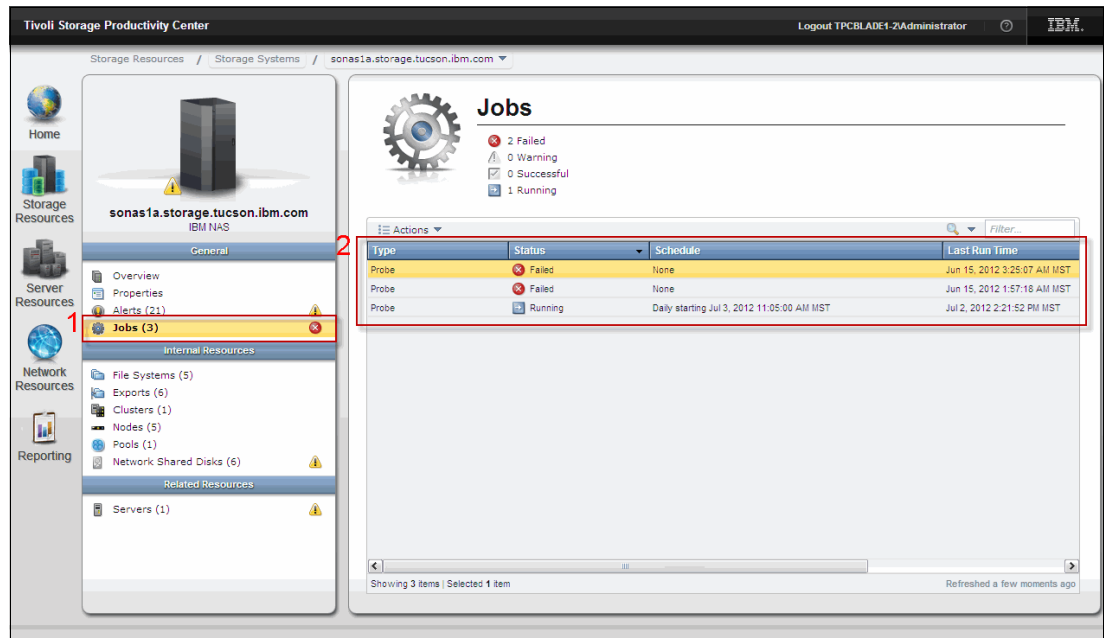


Figure 6-47 Storage system jobs

You can see the status of the bottom job is running, and it is scheduled for running daily at 11:05 a.m. Scrolling all the way to the right, and clicking “View Logs” gives the possibility for accessing the logs. See Figure 6-48.

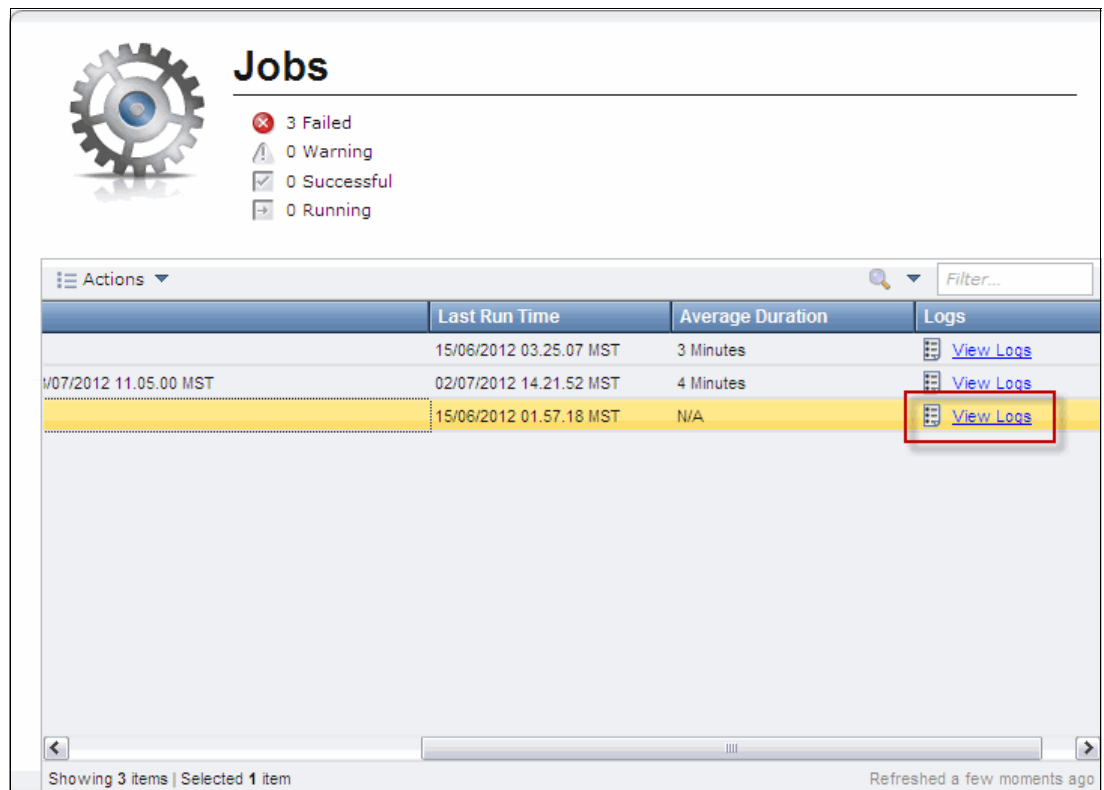


Figure 6-48 Jobs view logs

From the logs window (Figure 6-49), you can choose which job run to watch (1), you can filter using the status message ID by selecting from the drop-down menu in (2). Similar to alerts, you can click an ID (3) to get further details.

Logs

Job Type: Probe    Resource: sonas1a.storage.tucson.ibm.com

Select a log: 

⊗ Run 42: 02/07/2012 14.21.52 MST - 02/07/2012 14.36.58 MST

Show all

Status	Date and Time	ID	Description
Information	02/07/2012 14.21.52 MST	<a href="#">BTADS0000I</a>	Starting Discover NAPI_PROBE_PO RUN ID 6253 , ar
Information	02/07/2012 14.21.53 MST	<a href="#">HWNEP0147I</a>	Collecting asset sonas1a.storage.
Information	02/07/2012 14.21.54 MST	<a href="#">HWNEP0148I</a>	Collecting cluster sonas1a.storage.
Information	02/07/2012 14.21.55 MST	<a href="#">HWNEP0150I</a>	Collecting nodes system.
Information	02/07/2012 14.21.57 MST	<a href="#">HWNEP0153I</a>	Collecting file sys sonas1a.storage.
Information	02/07/2012 14.21.58 MST	<a href="#">HWNEP0154I</a>	Collecting file set system.
Error	02/07/2012 14.36.58 MST	<a href="#">HWNEP0135E</a>	External process
Information	02/07/2012 14.36.58 MST	<a href="#">HWN021709I</a>	Collection for sto completed.
Information	02/07/2012 14.36.58 MST	<a href="#">BTADS0001I</a>	Discover Process 40343 is complet

Figure 6-49 Jobs view logs

In our example, we clicked the error to get further help. See Figure 6-50.

Søg:  Gå [Søgeomfangt](#) Alle emner

Tivoli Common Reporting

Tivoli Storage Productivity Center Reporting

Brug af Tivoli Integrated Portal

Elektronisk IBM-understøttelse

Tivoli Storage Productivity Center Help

Tivoli Storage Productivity Center Messages

**HWNEP0135E External process failed with error code .**

**Explanation**

The external process failed.

**Action**

Check the logs for errors and retry the operation.

[Feedback](#)

Figure 6-50 Jobs, detailed help

## 6.2 Enhanced management for virtual environments

Tivoli Storage Productivity Center continues to enhance its support of virtualized environments. In this section, we describe the enhancements in Tivoli Storage Productivity Center V5.1.

### 6.2.1 VMware and Tivoli Storage Productivity Center

*VMware* is a virtualization platform that gets increasingly popular, due to the possibility to consolidate, and easily deploy new machines. By introducing this virtualization layer between the servers, called virtual machines (VMs) and the underlaying hardware, like storage and host bus adapters (HBAs), it is no longer enough to have SRAs on the servers, and access to the storage systems, for Tivoli Storage Productivity Center to create reports end to end. The solution is getting access to the virtualization layer (VMware) to be able to correlate information from SRAs on VMs, to the storage system that they use.

VMware has many components and levels for accessing the resources. See Figure 6-51.

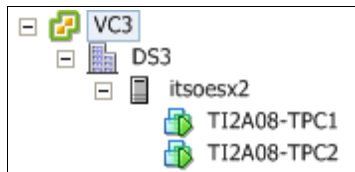


Figure 6-51 VMware inventory example

In our test environment, at the top we have the vCenter server (VC3), which is the main management console. Beneath that, we have one or more data centers (DS3), then we have clusters or hosts, which means multiple or single hypervisors; on the clusters or hosts we have the virtual machines. Resources like network or storage are added to the hypervisors, which then can be used for provisioning to new or existing servers.

#### Planning for Tivoli Storage Productivity Center connection to VMware

There is no specific planning activity required; adding a VMware data source to Tivoli Storage Productivity Center is very simple and straight forward. The only action that you need to perform is to get the certificates. As a storage administrator, you may or may not have access to the VMware environment so this step should be performed first.

In addition, you also need to ensure that Tivoli Storage Productivity Center can talk to the VMware data source via HTTPS. Ensure that any firewalls allow HTTPS access.

#### When to use Tivoli Storage Productivity Center connection to VMware

There are two use cases when you should think about adding a VMware data source to Tivoli Storage Productivity Center:

- ▶ You want more information where a server actually stores its data. An SRA cannot look into the hypervisor; therefore, unless you are using raw device mapping there is no link between the server and the storage.
- ▶ You do not need detailed information about the servers, but you want detailed information about how the storage is being consumed.

## Considerations when connecting Tivoli Storage Productivity Center to VMware

There are two scenarios of adding a VMware data source to Tivoli Storage Productivity Center:

1. Add each hypervisor directly to Tivoli Storage Productivity Center.
2. Add the VMware vCenter server to Tivoli Storage Productivity Center. It knows all the hypervisors.

We recommend getting access to the vCenter, for ease of management, because we do not need to add individual resources, or update when new resources are added or removed. For example, we could add the hypervisor “itsoesx2” instead of the vCenter. Currently that would be the same effort, one certificate to obtain and one device to add. Imagine that we tomorrow add a new hypervisor, “itsoesx3” where we deploy new VMs. We then need to add the new hypervisor to our Tivoli Storage Productivity Center, obtaining the new certificate and add it. When accessing at a higher level, for example data center or vCenter, this new hypervisor “itsoesx3” will be discovered with a probe, identically to when new VMs are deployed. If one vCenter is used for several customers or data centers, each with their own Tivoli Storage Productivity Center server, it can be necessary to access at a lower level than the vCenter, to ensure data integrity within the individual Tivoli Storage Productivity Center servers.

Tivoli Storage Productivity Center provides alerts so that you can get informed if a new VM was created or a new hypervisor was added to the environment.

Further considerations:

- ▶ If you only add the VMware data source to Tivoli Storage Productivity Center, but do not have the SAN storage also configured in Tivoli Storage Productivity Center, the use of the information is limited
- ▶ Tivoli Storage Productivity Center understands the different mapping type in VMware like, the use of data stores and raw device mapping
- ▶ With Cognos reporting you can see some information that is not yet available in the web GUI or well hidden in the stand-alone GUI like the vmdk filename of a virtual machine
- ▶ Usually to use the Data Path Explorer, a Storage Resource Agent is required. For the VMware hypervisors are an exception to this rule: Once you have added the VMware data source and probed everything (ESX, SAN, and storage), you can use the Path Explorer to see the data paths between the ESX server and the storage through your SAN

## Prerequisites for when connecting Tivoli Storage Productivity Center to VMware

There are no prerequisites for adding a VMware data source to Tivoli Storage Productivity Center 5.1. In case you use Tivoli Storage Productivity Center with an earlier version, you will need Tivoli Storage Productivity Center Standard Edition; the other licenses did not include this feature. With Tivoli Storage Productivity Center 5.1, every license does allow adding a VMware data source.

## Getting the certificates

For Tivoli Storage Productivity Center to get access to VMware, we need to obtain from the VMware administrator:

- ▶ Certificate for vCenter, or certificates for each hypervisor
- ▶ IP address for the vCenter or hypervisors

- User granted the VMware role “VM Power User”, and the “VM Power User” being granted access to the resources we require, for example the vCenter

The VirtualCenter server uses a self-generated SSL certificate located in the following directory:

C:\Documents and Settings\All Users\Application  
Data\VMware\VMware\VirtualCenter\SSL\rui.crt

We need a copy of that file before adding the VMware to Tivoli Storage Productivity Center. When the IP address of the vCenter is obtained, it is possible to download the vSphere Client, so we can browse and validate our user. Simply point a browser at the IP address:

http://<IP of vCenter>

Then, download the vSphere client. See Figure 6-52.



Figure 6-52 Download vSphere Client

When downloaded and installed, we can run the “VMware vSphere Client” from the desktop.

When started, we can browse the VMware environment (Figure 6-53). We can select the resource (1), then we click “Permission” (2) to verify that our VMware user has been added to the resource. In this example, our user is only granted access to a specific hypervisor, namely “itsoesx2”. Therefore, even though we access through the vCenter (VC3), we will not be allowed access to other resources than what is beneath the hypervisor “itsoesx2”.

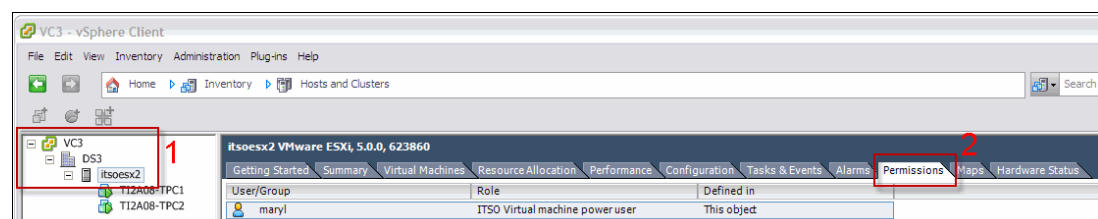


Figure 6-53 VMware user

## Adding VMware to Tivoli Storage Productivity Center

Adding a “VMware VI Data Source” to Tivoli Storage Productivity Center is almost like adding any storage system or CIMON agent, except we need to import the obtained certificate first.

In our example, we import the vCenter certificate. If adding multiple hypervisors, repeat the following steps for each hypervisor:

1. First, we copy the vCenter certificate to the Tivoli Storage Productivity Center server.
2. In a command prompt (CMD.exe), navigate to the Java (JRE) bin directory:

```
C:\Program Files\IBM\TPC\jre\bin
```

3. Using the keytool program, we import the vCenter SSL certificate into the keystore, which we then copy to the Tivoli Storage Productivity Center device conf directory, allowing Tivoli Storage Productivity Center to access the vCenter. Keytool takes the following arguments:

```
keytool -import -file certificate-filename -alias server-name -keystore vmware.jks
```

For example, see Example 6-3. When asked, we provide a password. This password is not used for adding the VMware resource to Tivoli Storage Productivity Center, only for management of this keystore. When asked “Trust this certificate” we answer yes.

---

### Example 6-3 Import vCenter SSL certificate into keystore

---

```
C:\Program Files\IBM\TPC\jre\bin>keytool -import -file c:\temp\rui.crt -keystore  
vmware.jks -alias VC
```

**Enter keystore password:**

Re-enter new password:

Owner: EMAILADDRESS=support@vmware.com, CN=vc3.itso.ibm.com, OU="VMware, Inc.",  
O="VMware, Inc."

Issuer: EMAILADDRESS=support@vmware.com, CN=vc3.itso.ibm.com, OU="VMware, Inc.",  
O="VMware, Inc."

Serial number: 28719bc4

Valid from: 3/26/12 8:23 PM until: 3/24/22 8:23 PM

Certificate fingerprints:

MD5: 06:F1:39:2B:0D:F7:54:98:4C:FE:8A:6F:36:C4:42:16

SHA1: A6:1D:CC:52:E7:6A:DC:CC:C0:DA:D5:43:07:3C:0C:12:12:F4:9B:F3

**Trust this certificate? [no]: yes**

Certificate was added to keystore

---

4. Finally, we copy the newly created keystore to the <TPC base>\device\conf directory:

```
copy vmware.jks C:\Program Files\IBM\TPC\device\conf
```

**Note:** Tivoli Storage Productivity Center only allows one keystore, and it must be named vmware.jks. The certificate that we import to the keystore grants the Tivoli Storage Productivity Center server access to retrieving encrypted information from the vCenter. Our user determines what or which resources we are getting access to.

When the keystore is copied, we are ready to add the VMware as a data source. In the stand-alone GUI, we navigate to **Administrative Services** → **VMware VI Data Source** (1). See Figure 6-54 on page 430.

Administrative Services → VMware VI Data Source (1)

Then, we select from the window to the right, “Add VMware VI Data Source” (2).

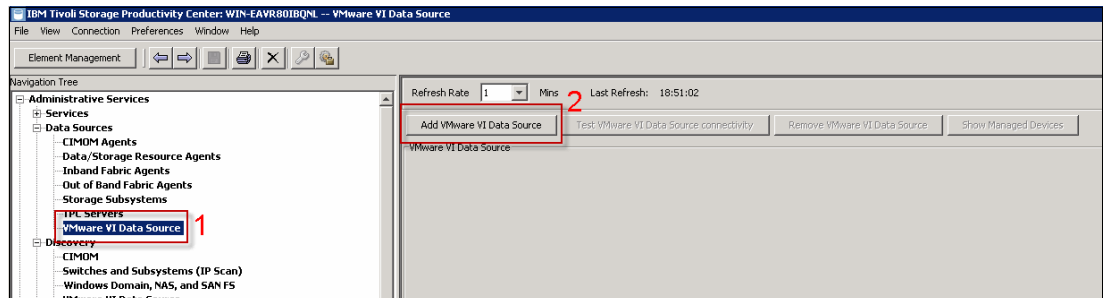


Figure 6-54 Add VMware data source

In the next window, see Figure 6-55. We enter the IP address of the vCenter (1), our username and password for access to the vCenter (2), and an optional description (3), then click **Save**. Description is optional, but we recommend entering some meaningful text so that we easily can see which VMware resource we are looking at.

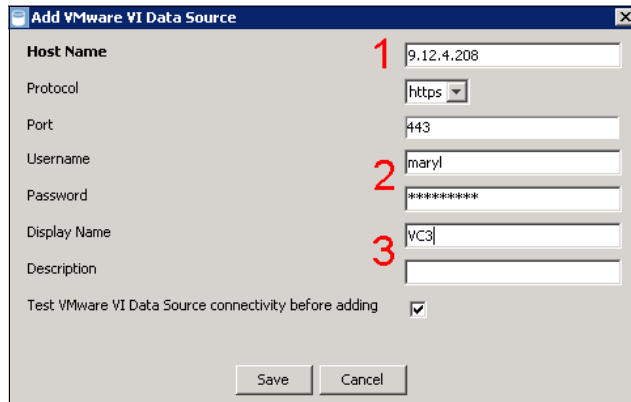


Figure 6-55 Add VMware data source

Tivoli Storage Productivity Center will now query the vCenter and validate our credentials, and Tivoli Storage Productivity Center will validate the VMware data source against the certificate we have trusted, using the keytool. When the query is completed, we see the new VMware source. See Figure 6-56.

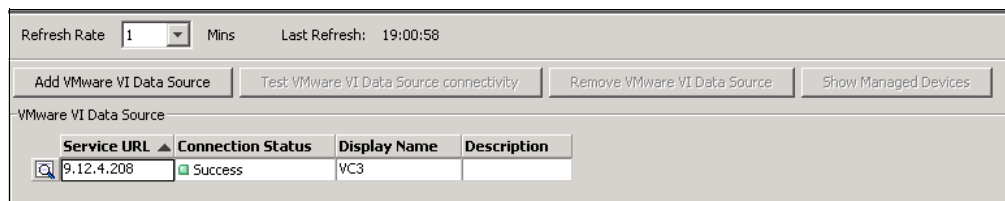


Figure 6-56 Added VMware source

## Troubleshooting

Two common scenarios when a connection fails, include:

- Username or password error (Figure 6-57 on page 431).  
The solution is to verify that you entered the correct user name and password. If so, we need to verify that our user name has been granted access to the VMware resource.



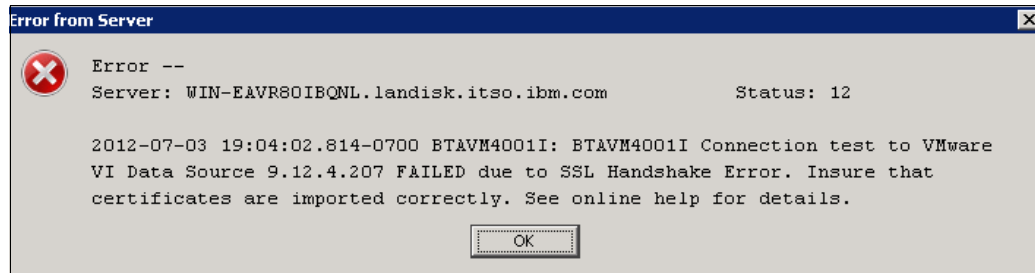


Figure 6-57 Username or password error

- ▶ SSL error when trying to add the VMware data source (Figure 6-58). The solution is to verify that we are using the right certificate for the right IP address. Second, verify that the certificate has been imported into the keystore, and the keystore is copied to the <TPC base>\device\conf directory.

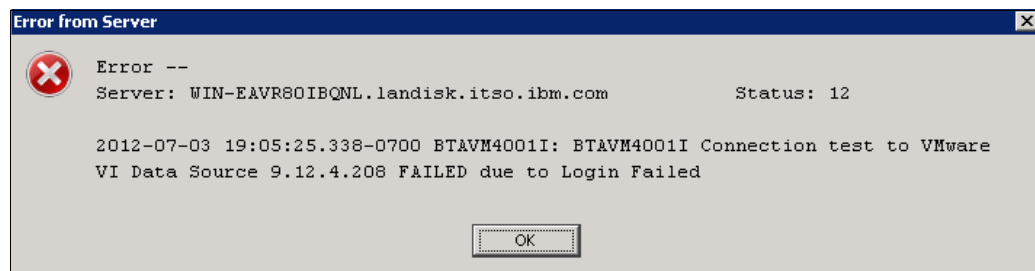


Figure 6-58 SSL certificate error

Other possible scenarios might be missing firewall access between the Tivoli Storage Productivity Center server and the vCenter, or a wrong IP address obtained or entered.

After VMware data source has been added, we need to discover it before being able to probe it. In the stand-alone GUI, navigate to:

Administrative Services → Discovery → VMware VI Data Source

Then, right-click and select “run now” (Figure 6-59). There is no configuration of this discovery or no IP address to be added. It will simply run a discovery on the VMware VI Data Source.

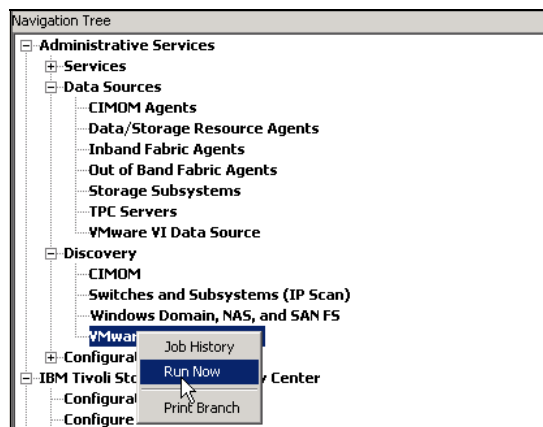


Figure 6-59 VMware discovery

When “discovery” is successfully completed, we see this in the job history (Figure 6-60).

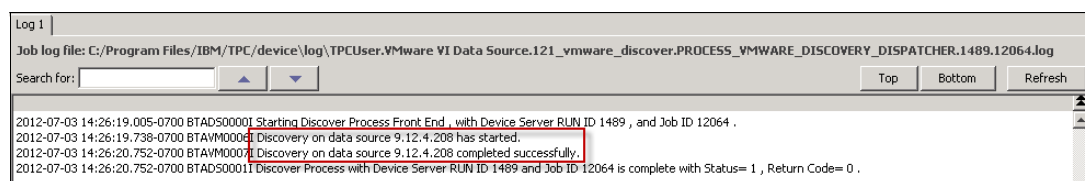


Figure 6-60 VMware discovery job log

The next step is creating a probe for the vCenter to obtain information from the VMware about the following:

- ▶ Virtual machines (VMs)
- ▶ Storage allocations
- ▶ Hardware and software

In the stand-alone GUI, we navigate to Figure 6-61:

IBM Tivoli Storage Productivity Center → Job Management → Monitoring

By using the right mouse button, select “Create Probe”. It is possible to add the hypervisor to an existing probe, but we recommend creating a new probe.

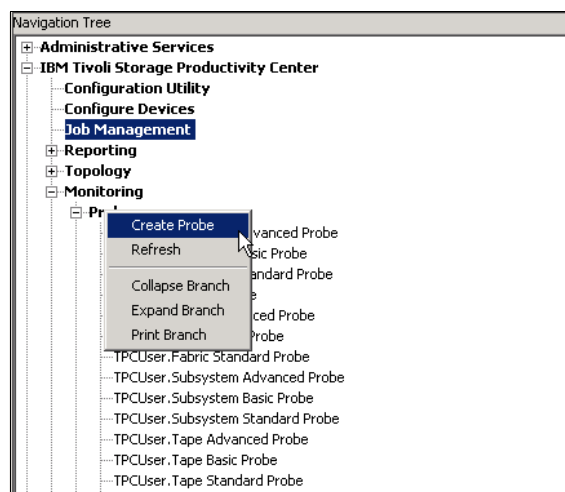


Figure 6-61 Create probe

In the Create Probe window that is shown in Figure 6-62, we enter Hypervisor as the name for the new probe (1). Then, we expand the hypervisors in the left window (2), and select either the single hypervisor “itsoesx2” or “All Hypervisors”, depending on your requirements. You may want to probe all hypervisors at the same time for ease of management, or individually for more flexibility. In our example, we chose “All Hypervisors”, which we see in the window to the right (4). Expanding “All Hypervisors”, we see that it includes the “itsoesx2” hypervisor. Next is to schedule it on the “When to Run” tab, and optionally create an Alert in case the probe fails.

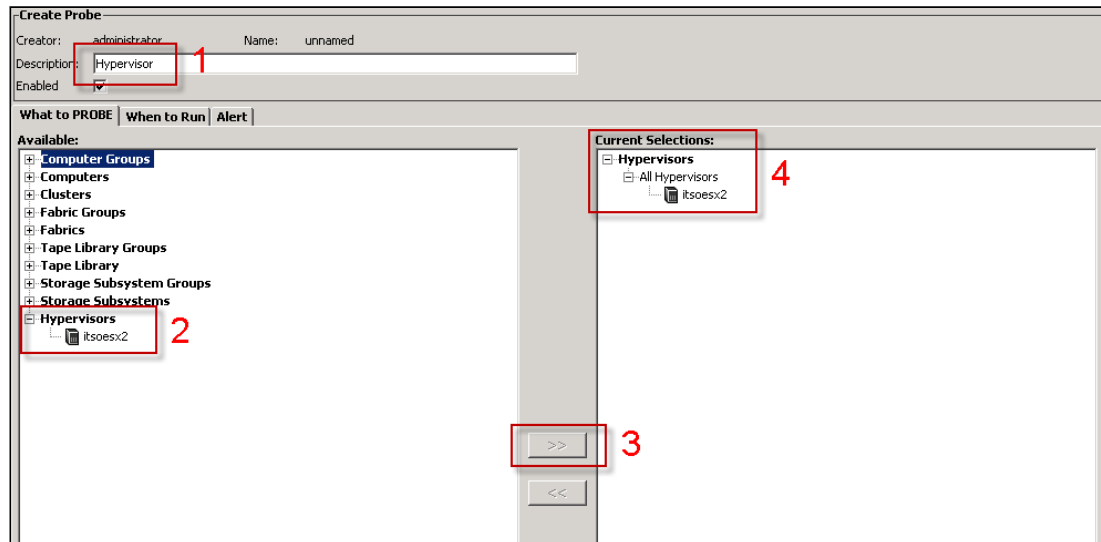


Figure 6-62 Add probe, details

We save our new probe by clicking the disk symbol. See Figure 6-63.

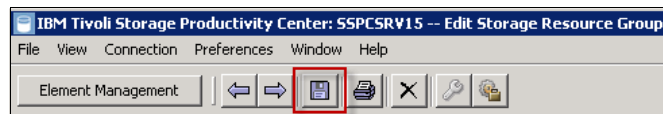


Figure 6-63 Save probe

When asked, we provide a name for the probe (Figure 6-64). We suggest the same name as entered in Figure 6-62.

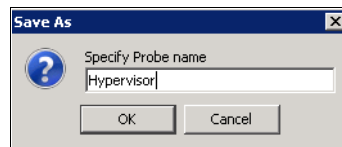


Figure 6-64 Probe, save as

When saved, we right-click the hypervisor probe and select “Run Now”. In the job history for the probe, we see Figure 6-65. By expanding the log in the bottom window, we notice the last line, where the column “Device” has the name of our hypervisor “itsoesx2”

administr...	Hypervisor	Hypervisor	Probe	Jul 3, 2012 7:47:40 PM ...	Success	Jul 4, 2012 7:32:00 PM PDT
Jobs for Selected Schedule						
View Log File(s)				Only show jobs with status: Show All		
Run	Computer	Device	Status	Start Time	Finish Time	
1 - Jul 3, 2012 7:46:49 PM PDT						
1 - Jul 3, 2012 7:46:49 PM PDT	N/A	N/A	Completed succe...	Jul 3, 2012 7:46:50 PM PDT	Jul 3, 201...	administrator.Hypervis
1 - Jul 3, 2012 7:46:49 PM PDT	WIN-EAVR80IBQN.Landisk.itso.ibm	N/A	Completed succe...	Jul 3, 2012 7:46:50 PM PDT	Jul 3, 201...	administrator.Hypervis
1 - Jul 3, 2012 7:46:49 PM PDT	WIN-EAVR80IBQN.Landisk.itso.ibm	itsoesx2	Completed succe...	Jul 3, 2012 7:46:50 PM PDT	Jul 3, 201...	administrator.Hypervis

Figure 6-65 Probe Job History

Examine the job log. See Example 6-4 on page 434. We found:

- Nine physical volumes, meaning disks assigned to “itsoesx2”

- Eight logical volumes, meaning disks assigned to virtual machines
- Two virtual machines

#### Example 6-4 Hypervisor probe job

---

```

2012-07-03 19:46:50.625-0700 BTADS0000I Starting Discover Process Front End , with
Device Server RUN ID 1493 , and Job ID 12079 .
2012-07-03 19:46:50.625-0700 BTAVM0008I Probe of hypervisor itsoesx2 has started.
2012-07-03 19:46:55.430-0700 BTAVM0015I Collection of the physical storage
configuration for hypervisor itsoesx2 has started.
2012-07-03 19:47:04.463-0700 BTAVM0021I The probe of itsoesx2 found 9 physical
disks.
2012-07-03 19:47:04.931-0700 BTAVM0016I Collection of the physical storage
configuration for hypervisor itsoesx2 completed successfully.
2012-07-03 19:47:04.931-0700 BTAVM0017I Collection of the logical storage
configuration for hypervisor itsoesx2 has started.
2012-07-03 19:47:04.946-0700 BTAVM0022I The probe of itsoesx2 found 8 logical
volumes.
2012-07-03 19:47:29.126-0700 BTAVM0018I Collection of the logical storage
configuration for hypervisor itsoesx2 completed successfully.
2012-07-03 19:47:29.126-0700 BTAVM0019I Collection of the virtual machines
configuration for hypervisor itsoesx2 has started.
2012-07-03 19:47:29.126-0700 BTAVM0023I The probe of itsoesx2 found 2 virtual
machines.
2012-07-03 19:47:29.235-0700 BTAVM0020I Collection of the virtual machines
configuration for hypervisor itsoesx2 completed successfully.
2012-07-03 19:47:29.485-0700 BTAVM0009I Probe of hypervisor itsoesx2 completed
successfully.
2012-07-03 19:47:29.485-0700 BTADS0001I Discover Process with Device Server RUN ID
1493 and Job ID 12079 is complete with Status= 1 , Return Code= 0 .

```

---

To get the complete picture, we need SRAs deployed to the virtual machines.

In the Tivoli Storage Productivity Center web GUI, we can view our hypervisor, log in using the icon in the start menu, or on the URL:

<https://localhost:9569/srm>

From the dashboard, we select “Hypervisors”. See Figure 6-66.

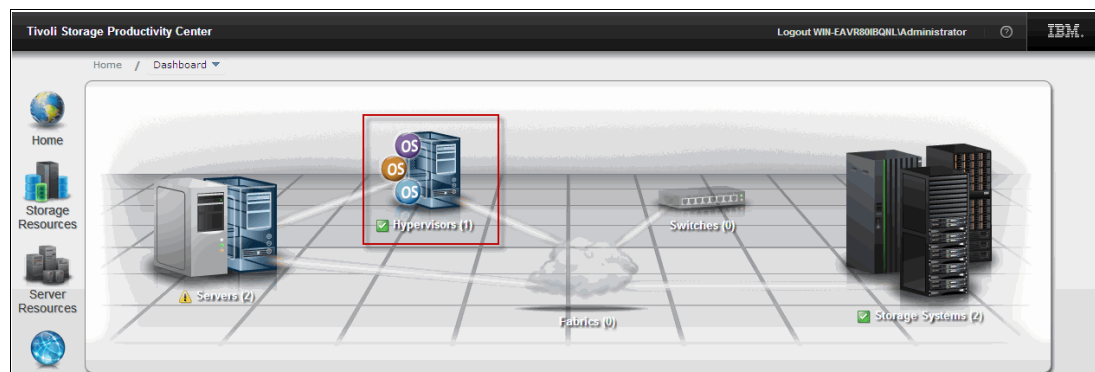


Figure 6-66 Web GUI dashboard

This brings us to the overview of the hypervisor, “itsoesx2”. See Figure 6-67. You can see that the status is Normal (green), the hypervisor is running VMware ESX V5.0, and the IP address and capacity.

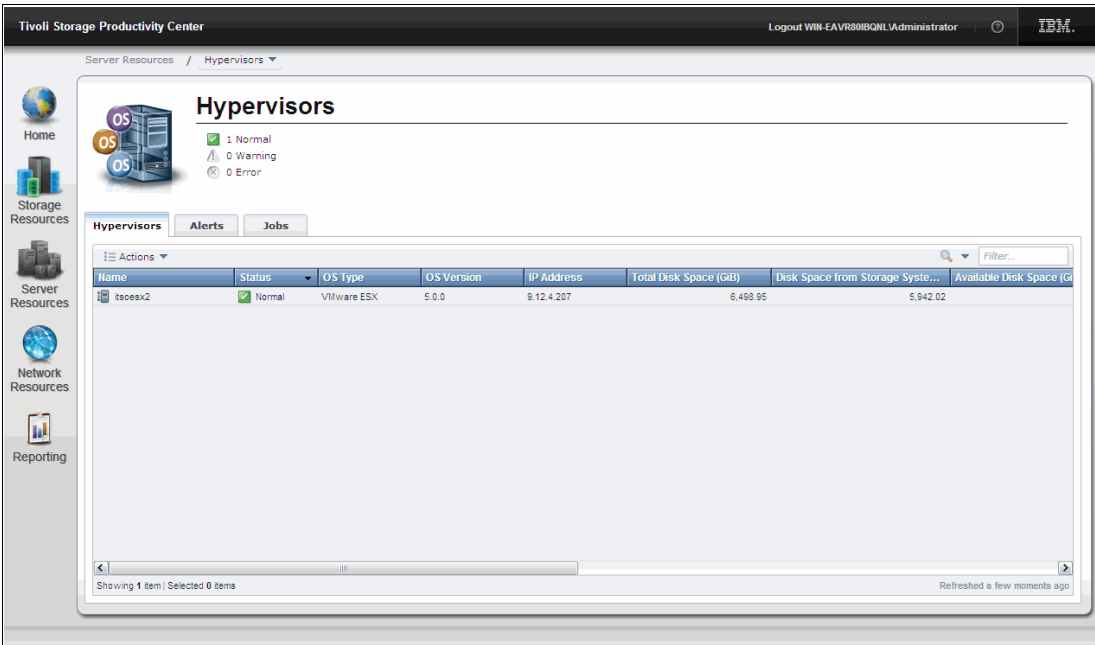


Figure 6-67 Hypervisor overview

Clicking the line “itsoesx2” brings us to the details for our hypervisor. From that page we select “Virtual Machines”. See Figure 6-68.

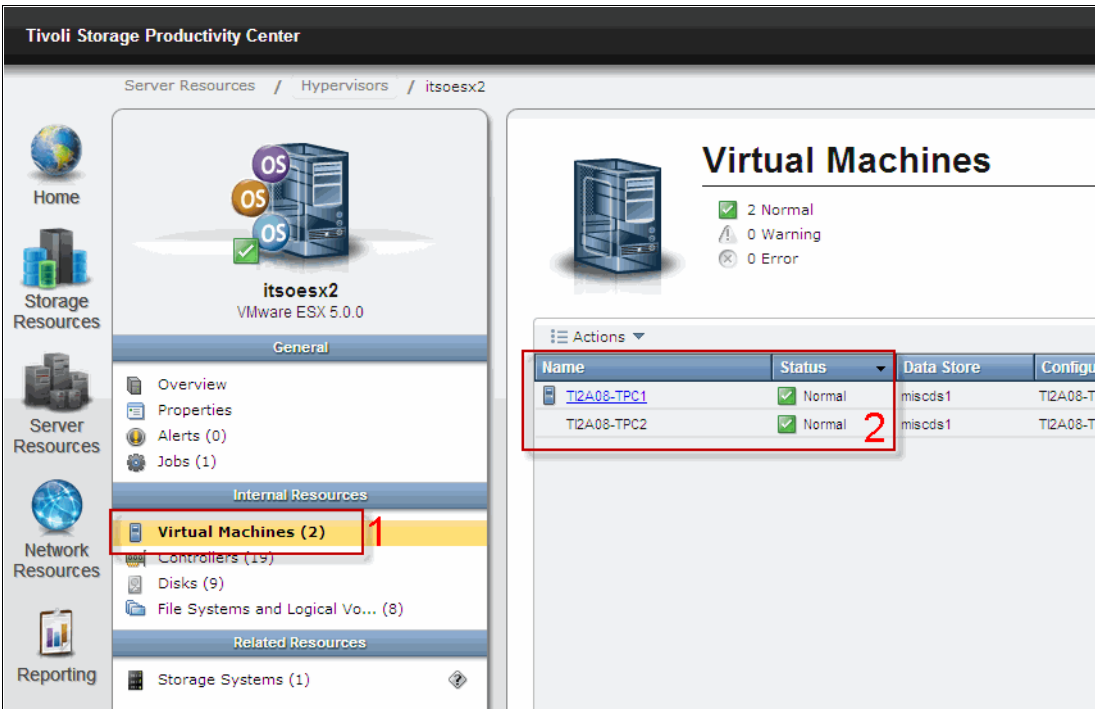


Figure 6-68 Web GUI SRA view

We selected “Virtual Machines” (1) at Figure 6-68 on page 435. In the right side window (2), you can see the virtual machines on the ESX hypervisor. We notice the difference between the two lines. The top is blue and has a computer icon next to the name. The icon shows that there is an SRA deployed on this server, which in fact is our Tivoli Storage Productivity Center server. If you scroll all the way to the left, you also see the column named “Agent”. For the first, the value is “Yes” and for the second line, it is “No”. The difference between having a VM with or without an SRA is that with an SRA we can get details about the file system, distribution, and usage. See Figure 6-69.

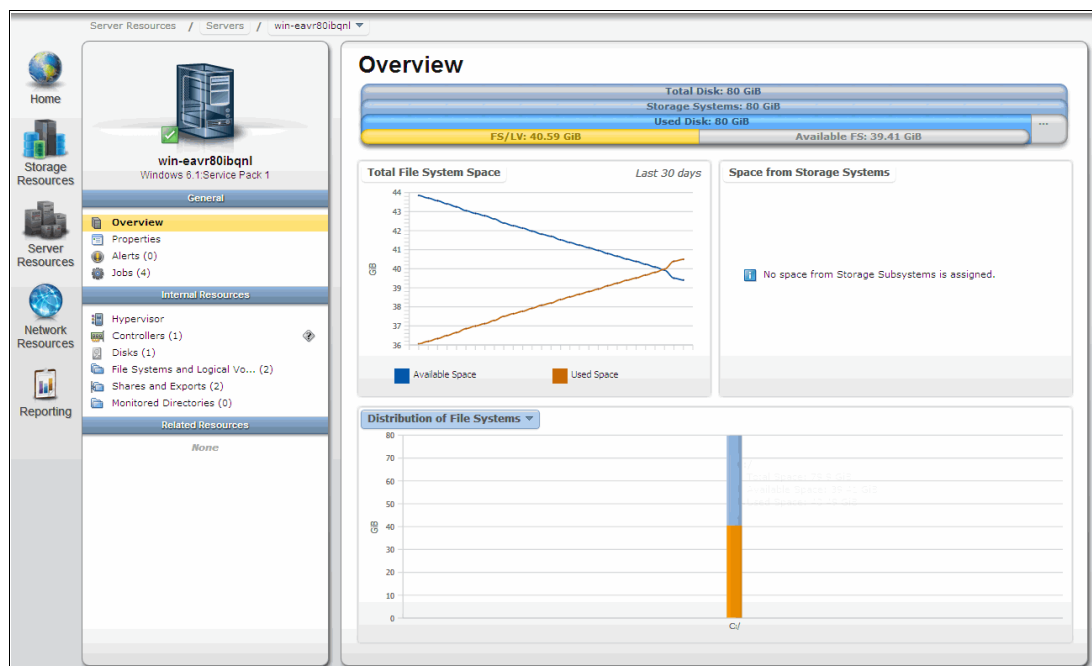


Figure 6-69 Web GUI SRA details

## 6.3 Tiered Storage Optimization

Tiered Storage Optimization (TSO) is a new feature introduced with Tivoli Storage Productivity Center V5.1 and available under VSC license:

- ▶ TSO is an Information Lifecycle Management (ILM) tool that is focused on ensuring that storage volumes are located in the appropriate storage tier
- ▶ TSO evaluates recent performance and file system scans against user-defined policy conditions in order to find volumes in an incorrect tier
- ▶ TSO leverages the Tivoli Storage Productivity Center Planner and Storage Optimizer to recommend an appropriate new storage pool to which the volume should be migrated
- ▶ Because Tivoli Storage Productivity Center V5.1 has only limited support for storage tier modeling, TSO uses user-defined SRGs to model tiers

*ILM* is defined as “a process for managing information through its lifecycle, from conception until disposal, in a manner that optimizes storage and access”. See Figure 6-70 on page 437 for illustration.

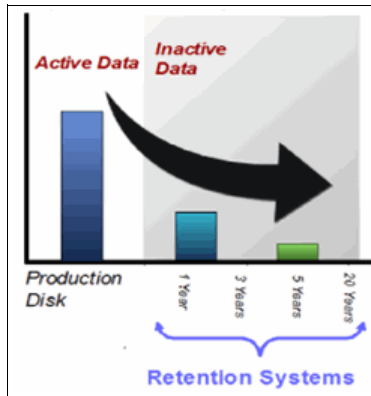


Figure 6-70 Information Lifecycle Management

Over time, data gets less and less accessed. When data is not used, it should be moved from a production disk to a storage type that is cheaper. The process of moving between different storage types is also referred to as *tiering*. See Figure 6-71.

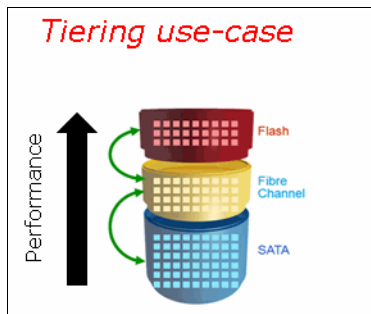


Figure 6-71 Tiering

In Figure 6-71 you see three different tiers: Tier 0 is Flash or SSD; Tier 1 is Fibre Channel disk, for example IBM DS8000 with 15 K RPM disks; and Tier 2 is SATA, could be IBM DS4000®. Moving storage from Tier 1 (Fibre Channel) to Tier 0 (Flash) is called *up-tiering*. Identically, moving from Tier 1 (Fibre Channel) to Tier 2 (SATA) is called *down-tiering*.

The reason for talking about ILM, TSO, and tiering is when we look at the current allocation of storage (see Figure 6-72) the distribution of storage is not cost effective. Too much storage is allocated on Tier 1, and should be moved to cheaper alternatives. The distribution should end up looking like the “Target Storage Pyramid”.

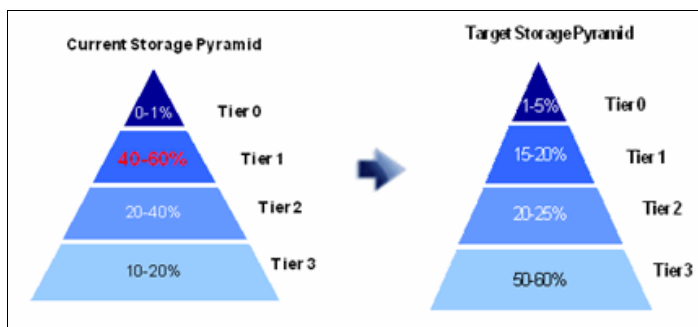


Figure 6-72 Storage pyramid

TSO is developed to help administrators find the volumes to be moved based upon criteria they specify, which is determined by business objectives. TSO operates with two criteria, which we describe later in details, which is *IODensity* and *Age*. Either one of the criteria can be used to determine storage that is not used, either by low *IODensity*, or not being used for a long time. When combined they can be used to identify volumes that neither are used and is old, which are ideal candidates for being down-tiered.

TSO has several limitations that need to be understood to avoid confusion and unrealistic expectations:

- ▶ TSO does not have a GUI component. There is a Cognos report to display the most recent analysis results and analysis job logs can be viewed via the stand-alone GUI, but actual setup and analysis must be done via the Tivoli Storage Productivity Center CLI.
- ▶ TSO does not provide the ability to have Tivoli Storage Productivity Center execute the recommended migration.
- ▶ TSO will only analyze VDisks in SAN Volume Controller and Storwize subsystems.
- ▶ TSO needs user-defined policies and cannot evaluate storage configuration without.

Prerequisites for TSO being able to evaluate is Performance Management (PM) data collected from subsystems and file scans from servers:

- ▶ For each SAN Volume Controller or Storwize to be analyzed, there must be a minimum of one day's worth of PM data available. We recommend a minimum of 10 days worth of data to help ensure that periodic fluctuations are noticed.
- ▶ For the same time period, a file system (SRA) scan data should be available, in order for the age condition to be able to evaluate the VDisk as precise as possible. Otherwise, the latest file system scan will be used.
- ▶ TSO policies with the wanted conditions.

PM data is used both during policy evaluation and when selecting the recommended new storage pool from the candidate list.

## Policy

TSO policy conditions are either:

- ▶ *IODensity*, number of IOPS/GB evaluated against a metric value
- ▶ *Age*, % files in a file system older or newer than a metric value

*IODensity* is a difficult term to understand, we will try to explain it with an example.

Every physical hard drive has a maximum theoretical capability in how many IOPS it can perform. Rule of thumb says around 200 IOPS. The number of IOPS per disk drive does not increase with capacity. This means a 1TiB hard drive and a 100GiB hard disk drive with the same physical characteristics (interface, speed and type) should be able to deliver the same IOPS.

To be able to compare the workload on the two drives, we need to divide by the capacity to determine the *IODensity*. The formula for *IODensity* is  $IODensity = IOPS / Capacity$ .

*Age %* is simply: How many files are there in the file system, how many match the criteria that are specified, and the relative number between how many files and how many match the criteria is the *Age %*.

Creating and running policies is handled using command-line interface (CLI). In the following scenario, we describe some of the commands that are available during an example where we evaluate if some VDisk on Tier 1 is eligible for moving to Tier 0.



TSO is a CLI-driven tool, operated from within tpctool. To start tpctool, see Example 6-5.

#### Example 6-5 tpctool command

tpctool is installed together with TPC and can be started with the command  
<TPC base>\cli\tpctool.bat

For details about how to use tpctool, see the following ITSO Redbooks publication:

<http://www.redbooks.ibm.com/abstracts/redp4230.html?Open>

**Tip:** Type the following command at a system prompt, using the Tivoli Storage Productivity Center user name and password:

```
tpctool -user <user_name> -pwd <user_password> -url <Device_server_URL>
```

Example: tpctool -user administrator -pwd password -url localhost:9550

You are then no longer required to enter user, pwd, and url for each command.

## Creating a policy and Storage Resource Group

First, a policy needs to be created using the mktp command:

```
mktp -name <name> -to <SRG> -from <SRG>
```

Where the options are:

- ▶ Name: Is the name of the policy
- ▶ SRG: Is the list of SRGs to be evaluated by this policy

Only volumes on the same SAN Volume Controller, Storwize V7000, or Storwize V7000 Unified storage systems are considered for tiering policies; other storage types are ignored.

SRGs are created using the stand-alone GUI. See Figure 6-73.

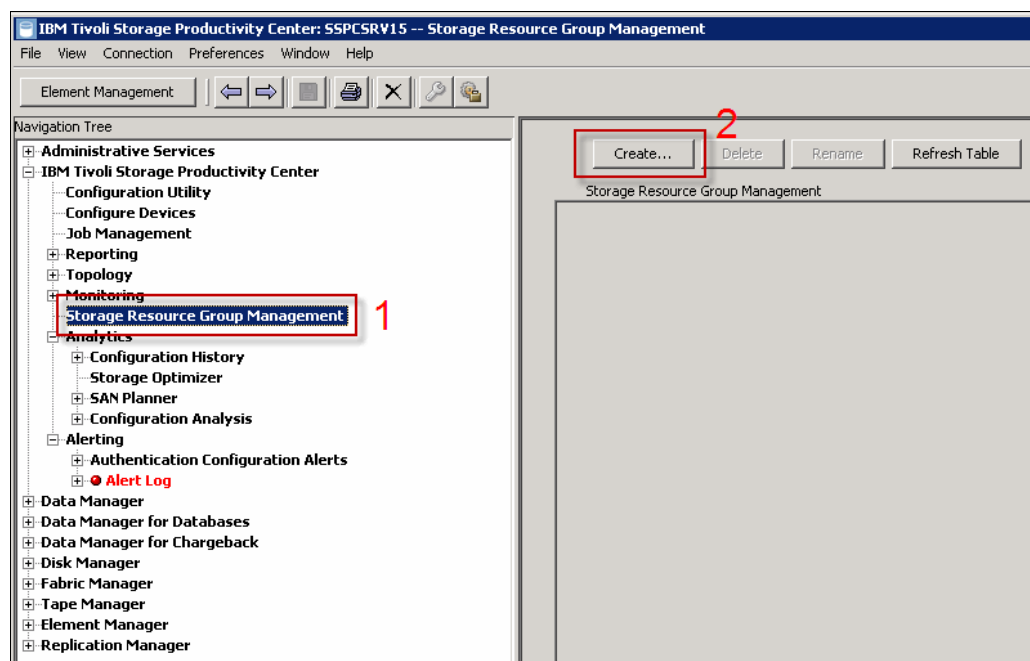


Figure 6-73 Creating SRGs in stand-alone GUI

Navigate to **IBM Tivoli Storage Productivity Center → Storage Resource Group Management (1)**, then click **Create (2)** for starting to define the SRG. The SRG must contain one or more volumes (VDisks), pools (MDisk groups), or storage devices (MDisks).

In the topology viewer, navigate to the SAN Volume Controller or Storwize, and select the resources to go into the SRG. See Figure 6-74.

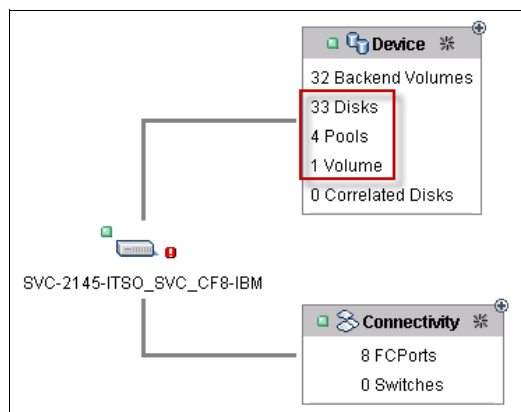


Figure 6-74 Topology viewer with the resources possible for an SRG for TSO

Two Storage Resource Groups need to be created, a source and a target, that cannot consist of the same resources.

First, we create the source with our VDisks. See Figure 6-75.

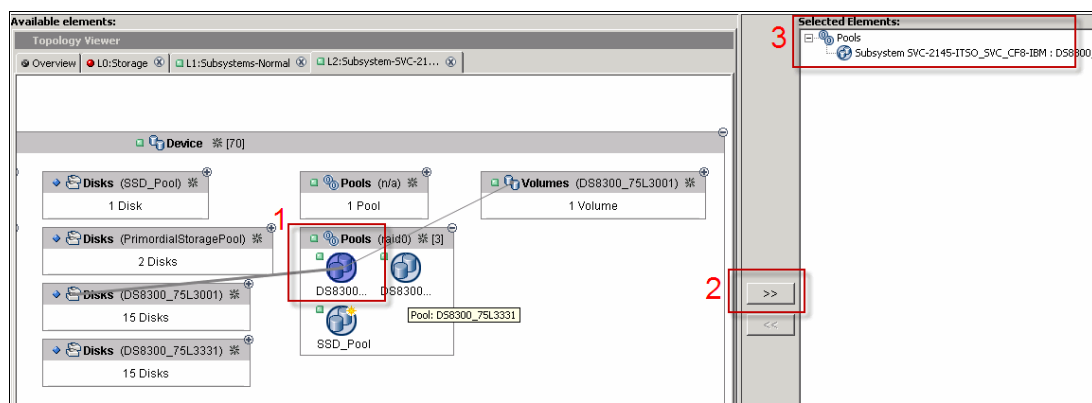


Figure 6-75 Source SRG

When selecting the pool (MDisk group) (1) in the topology viewer, it shows the relationship, from what back-end subsystem, and which MDisks does the pool reside on, to which VDisks it contains.

We add this resource by clicking the arrow (2), and in the right side window(3) we can see all the resources added.

Save the SRG by clicking the **OK** button and assign a proper name, like SVC\_vdisks\_tier1. See Figure 6-76 on page 441.

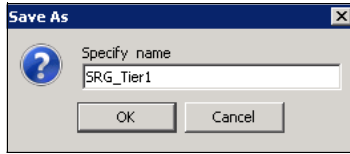


Figure 6-76 Name the SRG

Then, save the new SRG by clicking the save button. See Figure 6-77.

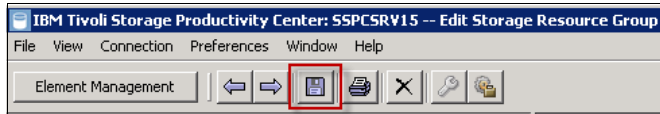


Figure 6-77 Save the SRG resource

Create the target SRG by following the same procedure as the source SRG, by going to topology viewer (shown in Figure 6-74 on page 440) and selecting the SSD Pool, as shown in Figure 6-78.

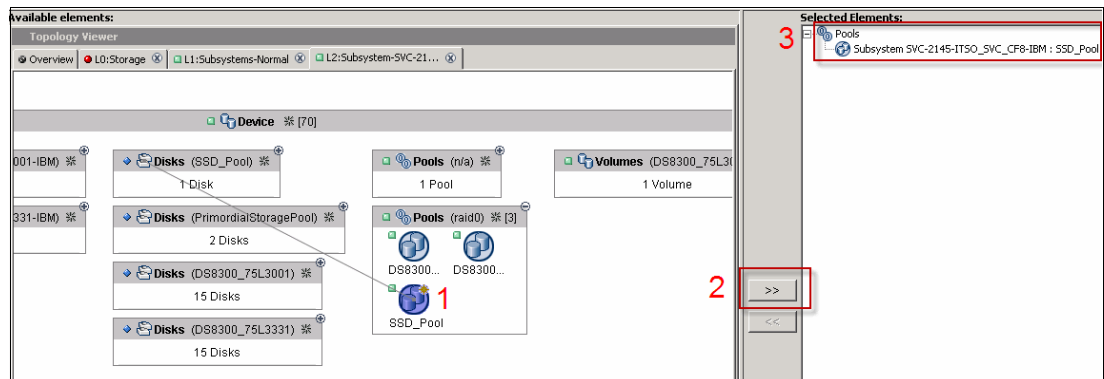


Figure 6-78 Creating SRG with SSD disks

Click the **OK** button, and assign a name to it, for example “SVC\_SSD\_Tier0” (Figure 6-76), and save it like shown in Figure 6-77.

The “Storage Resource Group Management” should now look like what is shown in Figure 6-79.

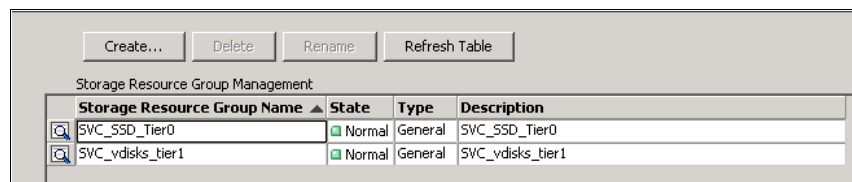


Figure 6-79 List SRGs

**Note:** TSO does not support cross-subsystem (from one SAN Volume Controller or StorWize to another SAN Volume Controller or StorWize) migration and thus will never recommend moving a VDisk from one subsystem to another, even if one or both of the policy's SRGs contain entities in multiple subsystems.

We will in a simple example demonstrate the steps that need to be performed when using TSO. We use the following terms:

- ▶ Tiering policy, which is from source to target
- ▶ Condition policy, which is the condition type and metric to evaluate again
- ▶ TSO policy, which is the combination of Tiering policy and Condition policy

We start by logging in to tpctool, with the command:

```
"C:\Program Files\IBM\TPC\cli\tpctool.bat" -url localhoquitst:9550 -user db2admin -pwd Passw0rd
```

**Tip:** Type the following command at a system prompt, using the Tivoli Storage Productivity Center user name and password:

```
tpctool -user <user_name> -pwd <user_password> -url <Device_server_URL>
```

Example: `tpctool -user administrator -pwd password -url localhost:9550`

You are then no longer required to enter user, pwd, and url for each command.

We start by creating the Tiering policy between our source and target SRG, that we previously defined. See Example 6-6.

*Example 6-6 Create Tiering policy*

---

```
tpctool> mktp -name tier_1_to_0 -from SVC_vdisks_tier1 -to SVC_SSD_Tier0
Name          Status
=====
tier_1_to_0    SUCCESSFUL
```

---

It is important to notice that the command is case-sensitive, even on Windows.

Then, we create the Condition policy using the **addtpcondition** command (Example 6-7), which uses the following arguments:

```
addtpcondition -name <Tiering policy> -type <type> -value <value> -age <age> -operator <operator>
```

In our example, we create a condition that targets VDisks with an IODensity that is more or equal to five, and we have our Condition policy evaluate our Tiering Policy named tier\_1\_to\_0.

*Example 6-7 Create Condition policy*

---

```
tpctool> addtpcondition -name tier_1_to_0 -type iodensity -value 5 -operator >=
Name          Status
=====
tier_1_to_0    SUCCESSFUL
```

---

- ▶ Tiering policy is the name of the policy that is created in Example 6-6
- ▶ The type is either:
  - IODensity: Number of IOPS/GiB evaluated against a metric value
  - Age: % files in a file system older or newer than a metric value
  - Ignore: Means that the resources in the source SRG are not evaluated by the policy
- ▶ Value is the metric value to evaluate against for the type

- The operator is one or “>”, “<” and “=” alone or combined, for example “>=”, which means greater to or equal

**Note:** A single policy can have both an Age and an IODensity condition.

To check the current settings of our TSO policy, issue the **lstp** command as shown in Example 6-8.

*Example 6-8 Show TSO policy*

---

```
tpctool> lstp
Name Candidates Destinations Prior Condition(s)
=====
tier_1_to_0 administrator.SVC_vdisks_tier1 administrator.SVC_SSD_Tier0
"IODENSITY >= 5"
```

---

The output of the **lstp** command is shown in Example 6-8. It shows for the TSO policy named `tier_1_to_0`, a list of suggested VDisks to be moved from the SRG named `SVC_vdisks_tier1`, to the SRG named `SVC_SSD_Tier0`, if VDisks IODensity is greater than or equal to five.

If needed, we can modify our policy with the **modifytp** command, which has the following arguments:

**modifytp** -name <name> -to <SRG> -from <SRG> -priority <priority>

- “name” is the name of the policy to modify
- “SRG” is the name of the Storage Resource Group
- Policy “priority” determines the order in which a TSO analysis job evaluates the defined policies

At least “name” and one of the three other parameters must be specified.

To run the TSO policy, use the **analyztp** command, which has the following options:

**analyztp** -name <name> -async -force

All parameters are optional.

TSO analysis iterates through all subsystems included in at least one policy's SRGs and applies each policy, in priority order.

**Note:** Starting an analysis job immediately deletes all recommendations from the previous analysis job.

Only one analysis job can be running at a time.

The **-force** parameter is an undocumented addition that attempts to kill the currently running analysis job to be able to run a new analysis. Due to Java thread control limitations, it might not always succeed.

A result of running a TSO policy job is shown in Example 6-9.

*Example 6-9 Result of an analyztp job*

---

```
tpctool> analyztp
AAJ000101I The most recent tiering policy analysis job completed successfully.
Volume          From          To          Policy          Subsystem
```

```

=====
vdisk37          CET_DS6K_pool1  mdiskgrp0      iodowntier "Storwize
V7000-2076-storea-IBM"
v0              L3_DS6K_pool1    mdiskgrp0      iodowntier "Storwize
V7000-2076-storea-IBM"
vdisk2          CET_DS6K_pool1  mdiskgrp0      iodowntier "Storwize
V7000-2076-storea-IBM"
vo15            L3_DS6K_pool1    mdiskgrp0      iodowntier "Storwize
V7000-2076-storea-IBM"
=====

```

In addition to listing the actual migration recommendation, each line lists the VDisk's current storage pool, the TSO policy that generated the recommendation, and the subsystem containing the VDisk. This information should be sufficient not only to distinguish between similarly named VDisks, but also to enable scripting of the output to perform the recommendations.

Another possibility to see the result of an analyzetzp job is going to the job history in the Tivoli Storage Productivity Center stand-alone GUI, as shown in Figure 6-80.

**Filters**

Entity Type:  Entity Name:

Entity Name Filter:

**Schedules**

Creator	Name	Description	Job Type	Last Run Finished	▼ Last Run...
TPCUser	CIMOM	CIMOM Discovery Schedule	CIMOM Discovery Job	Jun 22, 2012 10:29:06 ...	Failed
administr...	DS8000_PM		Subsystem Performance M...	Jun 21, 2012 2:03:16 P...	Failed
administr...	ITSO_SVC_CG8_PM		Subsystem Performance M...	Jun 21, 2012 2:03:33 P...	Failed
TPCUser	Aggregator	History Aggregator Schedule	Aggregator Job	Jun 22, 2012 3:29:29 A...	Success
TPCUser	CLI and Event Driven Jobs	CLI and Event Driven Jobs schedule	Device Server Jobs	Jun 22, 2012 11:09:14 ...	Success
TPCUser	Computer Advanced Ping	Ping the Advanced computer group	Ping	Jun 22, 2012 10:59:01 ...	Success
TPCUser	Computer Basic Ping	Ping the Basic computer group	Ping	Jun 22, 2012 8:19:01 A...	Success
TPCUser	Computer Standard Ping	Ping the Standard computer group	Ping	Jun 22, 2012 11:09:01 ...	Success
TPCUser	Default Ping	Ping the Default Computer Group	Ping	Jun 22, 2012 10:53:01 ...	Success
TPCUser	Default Probe	Probe the Default Computer Group	Probe	Jun 22, 2012 1:44:08 A...	Success
TPCUser	Default Scan	Scan the Default Ellacustom Group	Scan	Jun 22, 2012 2:15:15 A...	Success

**Jobs for Selected Schedule**

Only show jobs with status:

Run	Computer	Device	Status	Start Time	Finish Time
Jun 19, 2012 4:41:58 PM PDT					
Jun 19, 2012 4:43:03 PM PDT					
Jun 19, 2012 5:05:37 PM PDT					
Jun 19, 2012 5:06:01 PM PDT					
Jun 19, 2012 5:06:42 PM PDT					
Jun 21, 2012 7:29:14 PM PDT					
Jun 21, 2012 7:29:38 PM PDT					
Jun 21, 2012 10:51:02 PM PDT					
Jun 22, 2012 11:09:06 AM PDT					
Jun 22, 2012 11:09:06 AM PDT	SSPCSRV15...	N/A	Completed successfully	Jun 22, 2012 11:09:06 AM PDT	Jun 22, 2012 11:09:14 A...

Figure 6-80 Job history in Tivoli Storage Productivity Center stand-alone GUI

Sort the "Job Type" column for the latest job, by clicking the column "Job Run". It is named "CLI and Event Driven Jobs schedule", select it, and in the bottom of the window select the last run, and expand it. Double-click to open the log file. See Figure 6-81 on page 445.

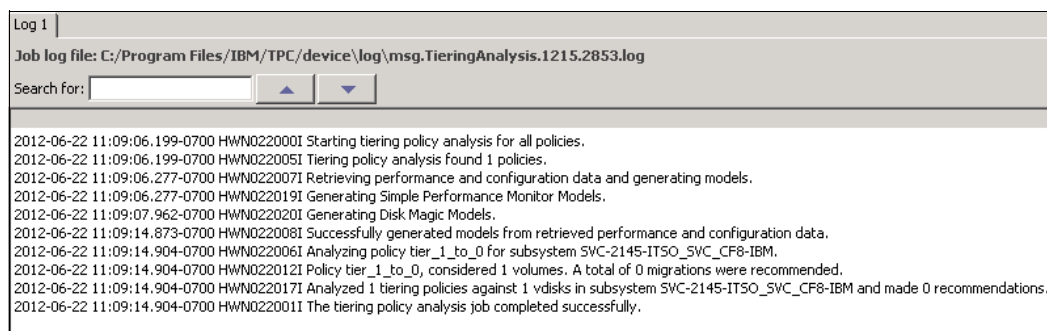


Figure 6-81 Log details for a job in stand-alone GUI

This shows the same result as shown in the CLI. See Example 6-9 on page 443.

From Cognos it is possible to see even more details. Go to Cognos through a web based GUI, selecting Reporting, and find “Volume Migration Recommendation Report”. It will look similar to Figure 6-82.

Volume Migration Recommendation Report											<a href="#">Help</a>
Policy Name	Storage Virtualizer Current Name	Storage Pool Current Name	Storage Volume Name	Storage Volume WWN	Storage Volume Capacity (GB)	Storage Virtualizer Recommended Name	Storage Pool Recommended Name	Storage Volume Current Response Time (ms/op)	Storage Volume Predicted Response Time (ms/op)	Storage Volume Response Time Change (ms/op)	
iodowntier	Storwize V7000-2076-storea-IBM	CET_DS6K_pool	bcd_CET_odenESX	6005076802808131E000000000000001	200.000	Storwize V7000-2076-storea-IBM	mdiskgrp0	0.121	0.365	(0.244)	
		CET_DS6K_pool	CET_IO_FARM	6005076802808131E000000000000347	5.000	Storwize V7000-2076-storea-IBM	mdiskgrp0	0.121	0.365	(0.244)	

Figure 6-82 Cognos report

The current and predicted response time numbers in the far right of Figure 6-82 are based on the Storage Optimizer analysis results and are heavily dependent upon the accuracy of each pool's theoretical IO capability information and, in particular, the PM data collected.

Use these troubleshooting tips in case of no recommendations or unexpected recommendations:

- Validate policy conditions are correctly defined
- There is very little logging for the Age condition analysis; volumes considered but rejected due to lack of data are logged in job log. In the stand-alone GUI, check “Data Manager → Reporting → Usage → Access Load → Access Time” reports to see the file system age data Tivoli Storage Productivity Center has (same data is used for Age analysis)
- Check Tivoli Storage Productivity Center PM data report for VDisks: In the stand-alone GUI, see “Disk Manager → Reporting → Storage Subsystem Performance → By Volume” to view the IO information (be sure to select the “daily” sample summation level)
- Job log may contain reason

## Difference between Storage Optimizer in Tivoli Storage Productivity Center V4 and TSO in Tivoli Storage Productivity Center V5

Storage Optimizer (SO) in Tivoli Storage Productivity Center V4 was limited to a single storage array, in which SO would try to balance the workload equally between all pools.

When analyzing a storage system, SO would target the hotspots based on a %-loaded value specified by the operator. Then, SO would suggest moving one or more VDisks to another pool (mdiskgrp) for equaling the load across the storage system.

TSO in Tivoli Storage Productivity Center V5 has the ability for using SRGs and is not limited to a single storage system, however, it is limited to a single SAN Volume Controller or StorWize. Within the SAN Volume Controller or StorWize, it is possible to define multiple SRGs, each with their own Tiering profile, for example grouping the SSD disks together to form one SRG or the 15 K Fibre Channel disks to form another SRG. Based on two conditions, IODensity and Age, or a combination of the two, TSO is then used to evaluate the optimal placement for VDisks, and thereby maximize efficiency, by suggesting up-tiering loaded volumes, or down-tiering less used volumes. By down-tiering volumes, we free up valuable capacity, which can be used for loaded volumes.

Within the SRG, TSO will try to balance the workload evenly between all devices. When used, TSO can bring us closer to a better storage distribution (Figure 6-72 on page 437), and thereby lower the Total Cost of Ownership (TCO).

## 6.4 Tivoli Storage Productivity Center for Replication enhancements

In Tivoli Storage Productivity Center 5.1, the following features and enhancements are new for Tivoli Storage Productivity Center for Replication:

- ▶ Support for external failover by external products
- ▶ Defining Warning and Severe thresholds for RPO alerts
- ▶ Providing the ability to export replication history to a table for analysis
- ▶ Support for DS8000 6.3 Extent Space Efficient Volumes in All Remote Copy Services relationships

In the following sections, the new features and enhancements are described.

### 6.4.1 Support for external failover by external products

Applications such as the IBM Series i Toolkit, VMware Site Recovery Manager, and Veritas Cluster Server manage failover operations for certain replication session types and storage systems. The failover commands take place outside of Tivoli Storage Productivity Center for Replication control and it enables IO access to target volume in the copy service pair.

The following session types are supported:

- ▶ Metro Mirror Single Direction
- ▶ Metro Mirror Failover/Failback
- ▶ Metro Mirror Failover/Failback with Practice
- ▶ Global Mirror Single Direction
- ▶ Global Mirror Either Direction with Two-Site Practice
- ▶ Global Mirror Failover/Failback
- ▶ Global Mirror Failover/Failback with Practice



**Notes:**

- ▶ HyperSwap, Openswap, and 3-site solutions are not supported.
- ▶ The external applications do not support external direction changes of remote copy pairs. It also does not perform automatic flash to host volume in practice sessions. For GM sessions, the session will be marked as not recoverable.

The following storage systems are supported:

- ▶ IBM DS8000
- ▶ IBM SAN Volume Controller
- ▶ IBM Storwize V7000
- ▶ IBM Storwize V7000 Unified
- ▶ XiV

If an application completes a failover operation for a session, the Severe status is displayed for the session on the Session Details page in Tivoli Storage Productivity Center for Replication and an error message is generated for the role pairs for which the failover occurred.

To change the session status to Normal, use the application to confirm that the role pairs that are in the session are consistent and then restart the session.

## 6.4.2 Warning and severe thresholds for recovery point objective alerts

You can use the recovery point objective (RPO) Alerts option with IBM DS8000 and XiV to specify the length of time that you want to set for the RPO thresholds. The values determine whether a Warning or Severe alert is generated when the RPO threshold is exceeded for a role pair. The RPO represents the length of time in seconds of data exposure that is acceptable in the event of a disaster.

For the DS8000, the thresholds can be set 0 - 65535 seconds. The default value is 0 and it specifies that no alerts are generated. The warning level threshold must be lower than the severe level threshold. Figure 6-83 on page 448 shows you how to set up RPO thresholds for DS8000.

**Create Session**

✓ Choose Session Type  
 Properties  
 Location 1 Site  
 Location 2 Site  
 Results

**Properties**  
 Name and describe the session.

\*Session name  
 GMFOFB

Description  
 GM

**ESS / DS Global Mirror Options:**  
 (These options only affect ESS/DS Storage Systems.)

**H1-J2:**  
 \*Consistency group interval time (seconds)  
 30 (0-65535)

Recovery Point Objective Alerts

\*Warning level threshold (seconds)  
 60 (0-65535)

\*Severe level threshold (seconds)  
 120 (0-65535)

☐ Fail MM/GC if target is online (CKD only)

< Back Next > Finish Cancel

Figure 6-83 Setting RPO alerts for DS8000 Global Mirror session

For the XiV, the thresholds can be set 30 - 86400 seconds. The default value is 30 seconds. If the XiV system determines that the RPO is greater than this value, the session state becomes severe. Figure 6-84 shows you how to set up RPO thresholds for XiV.

**Create Session**

✓ Choose Session Type  
 Properties  
 Location 1 Site  
 Location 2 Site  
 Results

**Properties**  
 Name and describe the session.

\*Session name  
 GM\_XiV

Description

**XiV Global Mirror Options:**  
 (These options only affect XiV Storage Systems.)

**H1-H2:**  
 \*Recovery point objective threshold (seconds)  
 60 (30-86400)

Synchronization schedule (HH:MM:SS)  
 Minimum Interval

< Back Next > Finish Cancel

Figure 6-84 Setting RPO alerts for XiV Global Mirror

### 6.4.3 Exporting replication history to a table

You can export data for a Global Mirror role pair that is in a session to a comma-separated value (CSV) file. The data in the CSV file can be used to analyze trends in your storage environment that affect your RPO. Export can create two types of CSV Files:

- A file that contains data about the RPO
- A file that contains data about the logical subsystem (LSS) out-of-sync tracks

**Note:** The default maximum export data range for RPO data is 31 days and the default maximum export data range for LSS out-of-sync tracks data is 7 days.

To export data to a CSV file, you must complete these steps:

1. In the Tivoli Storage Productivity Center for Replication navigation tree, click **Sessions**.
2. Click the Global Mirror session for which you want to export data.
3. Click **Export Global Mirror Data** from the Select Action menu, and click **Go** (Figure 6-85).

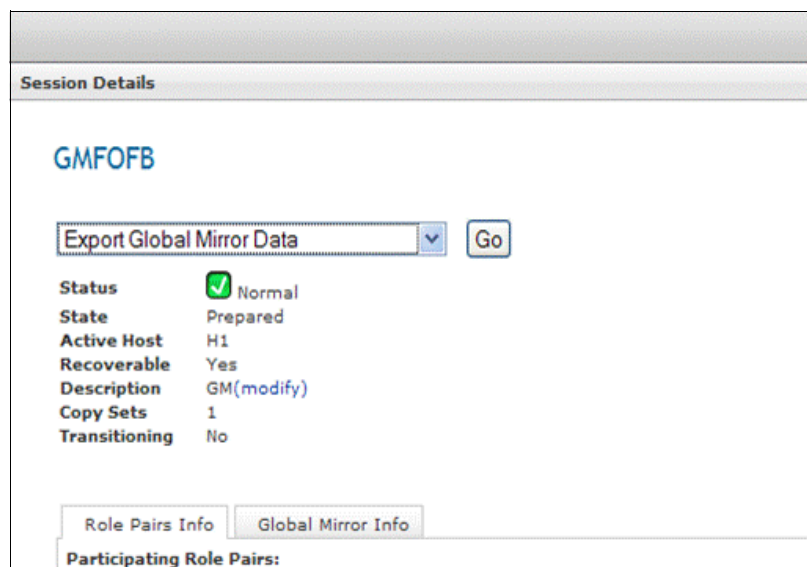


Figure 6-85 Export Global Mirror Data

The Export Historical Data for Global Mirror wizard is displayed as shown in Figure 6-86 on page 450.

Figure 6-86 Export Historical Data wizard

4. Complete the following information, and then click **Next**:

- Select the role pair for the data that you want to show in the CSV file
- Select the type of data that you want to export to a CSV file. Depending on the data type that you select, the CSV file contains data about the RPO or data about LSS out-of-sync tracks. To better analyze trends, you can create a CSV file with one data type and then create a file with the other data type. For example, the file that contains data for the RPO might show that the RPO threshold is often exceeded on a particular day and time. You can then view the file that contains data for LSS out-of-sync tracks to see whether a particular LSS or set of LSSs have high out-of-sync track values for that day and time
- RPO: The data that is shown in the export file includes the average RPO for the dates that you select and information that is related to the formation of consistency groups
- LSS Out-of-Sync Tracks: The out-of-sync tracks that are in the LSSs
- Select the start date for the data that you want to show in the export file

**Note:** By default, the date range maximum for RPO files is 31 days of data and the maximum for LSS out-of-sync track files is 7 days of data.

- Select the end date for the data that you want to show in the export file.

If the export was successful, a link to the CSV file is provided on the Results page, as shown in Figure 6-87 on page 451. You can save the CSV file to your local system.

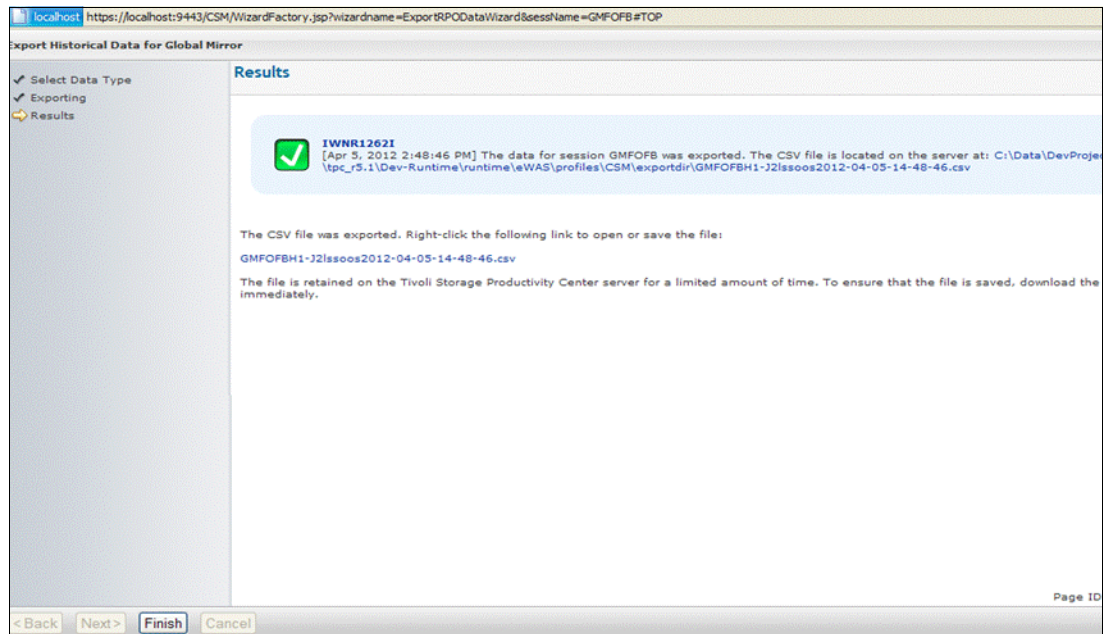


Figure 6-87 Export Historical Data results

#### 6.4.4 Support for DS8000 6.3 Extent Space Efficient Volumes

The Tivoli Storage Productivity Center for Replication 5.1 now supports Extent Space Efficient Volumes in all roles of replication sessions with DS8000 version 6.3 microcode. You can use Extent Space Efficient Volumes as copy set volumes for the following DS8000 session types:

- FlashCopy (DS8000 6.2 or later)
- Metro Mirror (DS8000 6.3 or later)
- Global Mirror or Metro Global Mirror (DS8000 6.3 or later)

### 6.5 Installing Tivoli Storage Productivity Center for Replication with Tivoli Storage Productivity Center 5.1

Tivoli Storage Productivity Center 5.1 uses a completely new installer that provides a more unified installer experience across Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication. The entire Tivoli Storage Productivity Center installer is rearchitected and rewritten from scratch to simplify installation and postinstallation configuration tasks. It is based on Install Anywhere Software and all unnecessary steps are masked. With the new Tivoli Storage Productivity Center installer, Tivoli Storage Productivity Center for Replication is installed without starting Tivoli Storage Productivity Center for Replication installer as it was in the previous Tivoli Storage Productivity Center 4.x versions.

By installing Tivoli Storage Productivity Center 5.1, Tivoli Storage Productivity Center for Replication will be installed with the same user ID that has run the installer. If upgrading from the previous versions, all Tivoli Storage Productivity Center for Replication configurations will remain unchanged.

Because all Tivoli Storage Productivity Center for Replication functions and features convergence into Tivoli Storage Productivity Center 5.1 license, the installer will install Tivoli

Storage Productivity Center for Replication with all the features and functions that were available in Tivoli Storage Productivity Center for Replication Two Site and Tivoli Storage Productivity Center for Replication Three Site Business Continuity. It means that you do not need to have separate Tivoli Storage Productivity Center for Replication products to run two or three site solutions (Metro Mirror, Global Mirror, Metro/Global Mirror). Those features and functions are integrated and installed with Tivoli Storage Productivity Center 5.1.

### **Tivoli Storage Productivity Center for Replication licensing**

With the introduction of Tivoli Storage Productivity Center 5.1, all of the Tivoli Storage Productivity Center for Replication functions, including the functions that were previously in the Tivoli Storage Productivity Center for Replication Two Site and Tivoli Storage Productivity Center for Replication Three Site Business Continuity are now part of Tivoli Storage Productivity Center 5.1. There is no additional license for Tivoli Storage Productivity Center for Replication with Tivoli Storage Productivity Center 5.1. All Tivoli Storage Productivity Center for Replication functions are merged into the Tivoli Storage Productivity Center 5.1 license. 1.2, “Tivoli Storage Productivity Center V5.1 licensing” on page 6 provides details about Tivoli Storage Productivity Center licensing and how existing Tivoli Storage Productivity Center for Replication licenses are migrated into new Tivoli Storage Productivity Center licenses.

### **Starting Tivoli Storage Productivity Center for Replication in Tivoli Storage Productivity Center 5.1**

With the new Tivoli Storage Productivity Center 5.1, there are several ways to start the Tivoli Storage Productivity Center for Replication. You can do the following:

- ▶ Use your browser to access the Tivoli Storage Productivity Center for Replication
- ▶ Use your browser to log on to the Tivoli Integrated Portal, and then choose Tivoli Storage Productivity Center for Replication
- ▶ Use Remote Desktop Manager to log on to Tivoli Storage Productivity Center server, or if you are logged on directly to Tivoli Storage Productivity Center server, you can go to Start → All Programs → IBM Tivoli Productivity Center and then choose Tivoli Storage Productivity Center for Replication
- ▶ Use Tivoli Storage Productivity Center web-based GUI to start Tivoli Storage Productivity Center for Replication

To use your browser to access the Tivoli Storage Productivity Center for Replication, open your browser and use the following URL:

**`https://hostname:9559/CSM/`**

Because this is a normal web URL access process, you do not need to put in the Fully-Qualified Host Name (FQHN), and you are permitted to use the Tivoli Storage Productivity Center server's TCP/IP address. You can see from Figure 6-88 on page 453 that we used the host name in the following address to get to the Tivoli Storage Productivity Center for Replication GUI login panel:

`https://iictpc51-02.windows.ssc1ab-lj-si.net:9559/CSM/`

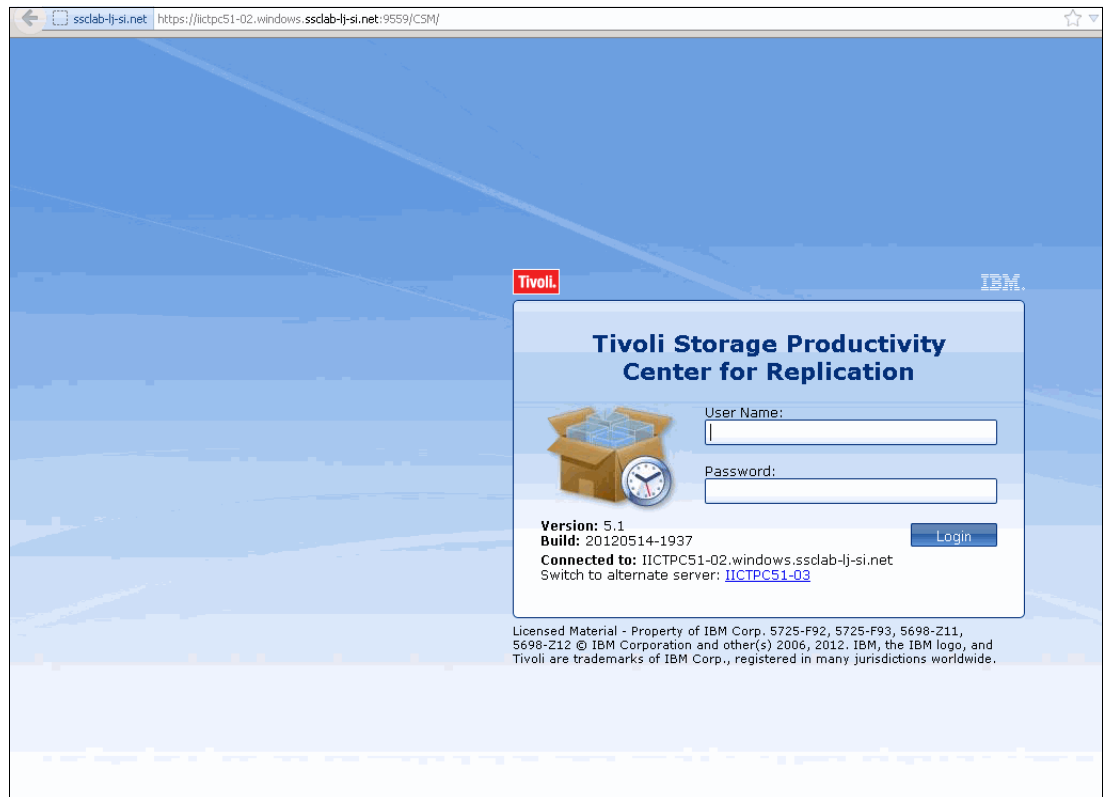


Figure 6-88 Tivoli Storage Productivity Center for Replication login

To use the Tivoli Integrated Portal to access the Tivoli Storage Productivity Center for Replication, open your browser and use the following URL to log on to Tivoli Integrated Portal:

**`https://hostname:9569/ibm/console`**

Figure 6-89 on page 454 shows you the Tivoli Integrated Portal logon window.



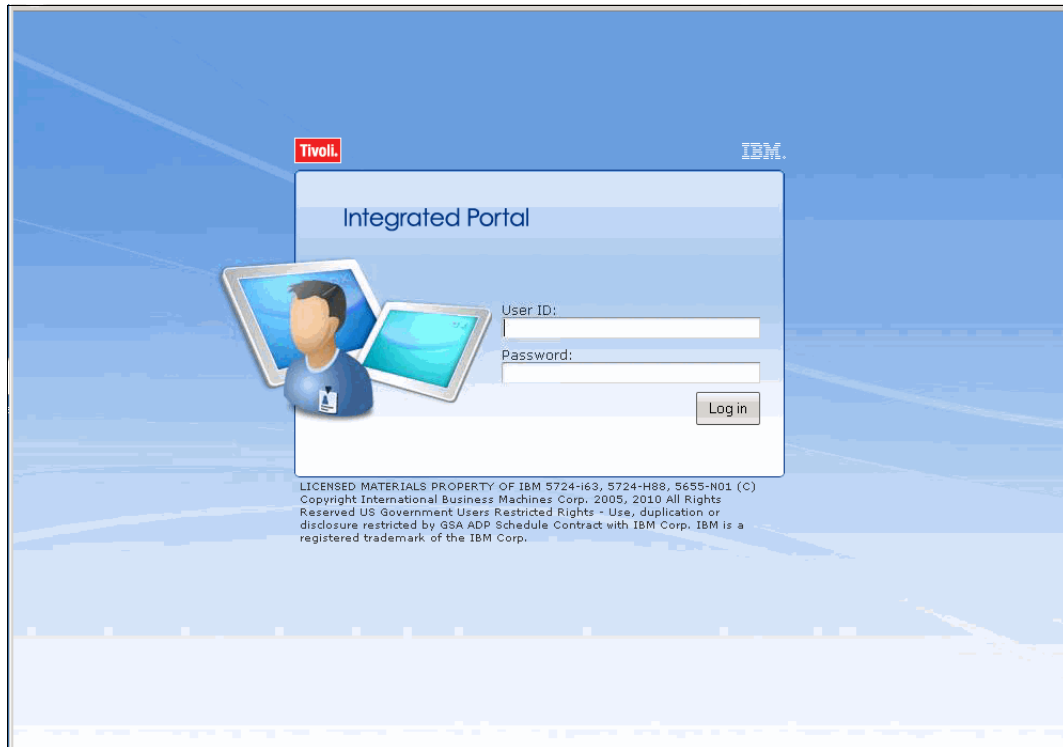


Figure 6-89 Tivoli Integrated Portal login window

After you log on to Tivoli Integrated Portal, the panel in Figure 6-90 opens.

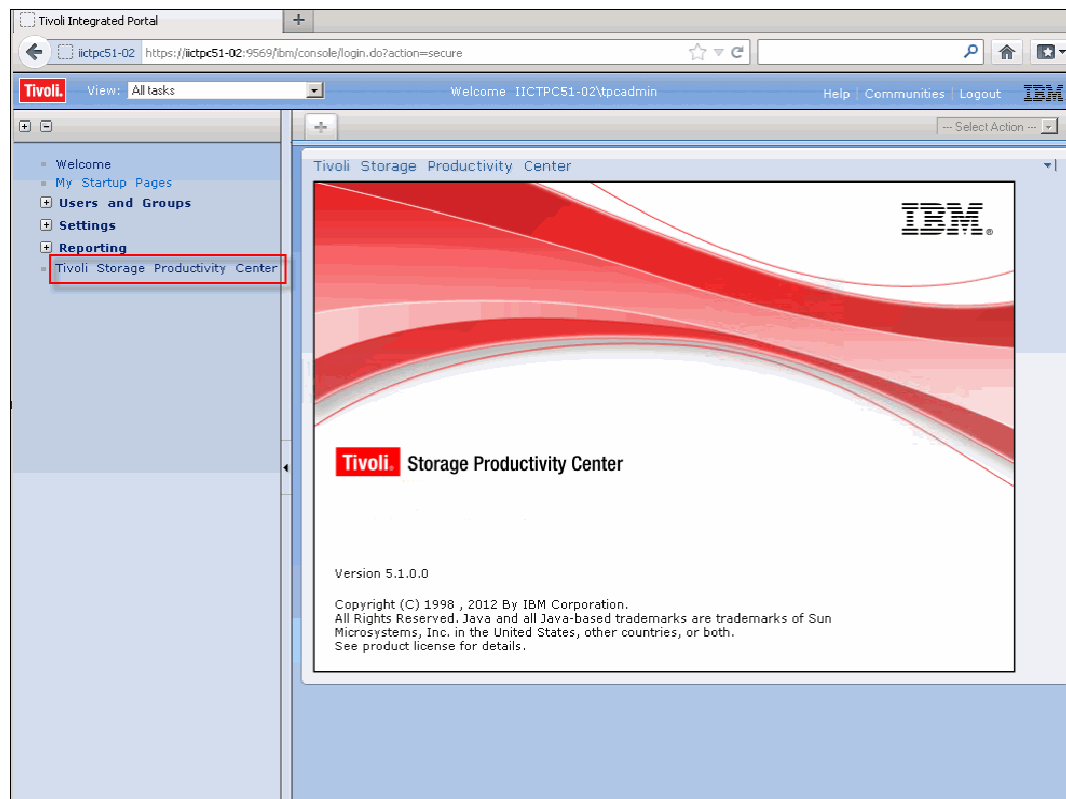


Figure 6-90 Tivoli Storage Productivity Center link in Tivoli Integrated Portal



Click the **Tivoli Storage Productivity Center** link, which is shown in the red box in Figure 6-90 on page 454, and the panel with Tivoli Storage Productivity Center GUI links opens. See Figure 6-91.

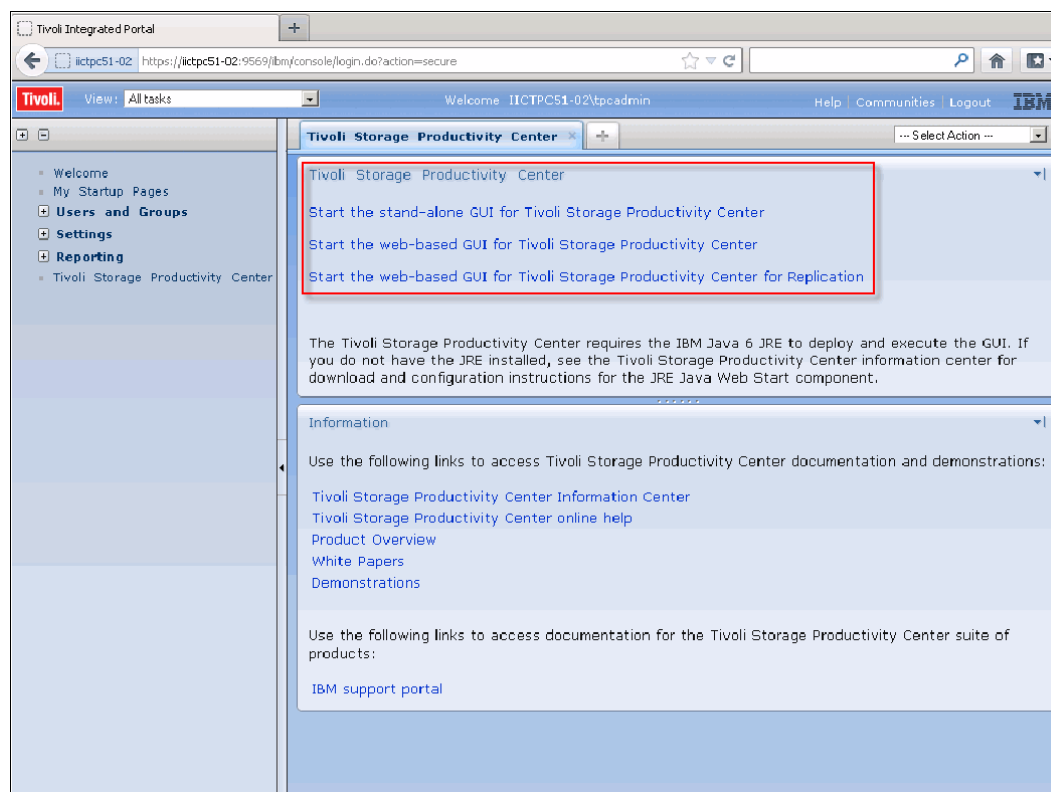


Figure 6-91 Tivoli Storage Productivity Center for Replication link in Tivoli Integrated Portal

Click the **Start the web-based GUI for Tivoli Storage Productivity Center for Replication** link and the Tivoli Storage Productivity Center for Replication GUI opens in a new window.

You can also use Remote Desktop Manager to connect to Tivoli Storage Productivity Center server, or if you are logged on directly to the Tivoli Storage Productivity Center server, you can go to Start → All Programs → IBM Tivoli Productivity Center and then choose Tivoli Storage Productivity Center Replication Manager GUI. If you are on the Tivoli Storage Productivity Center server, using this method is the quickest. Figure 6-92 on page 456 shows you the Start menu from the Tivoli Storage Productivity Center server.

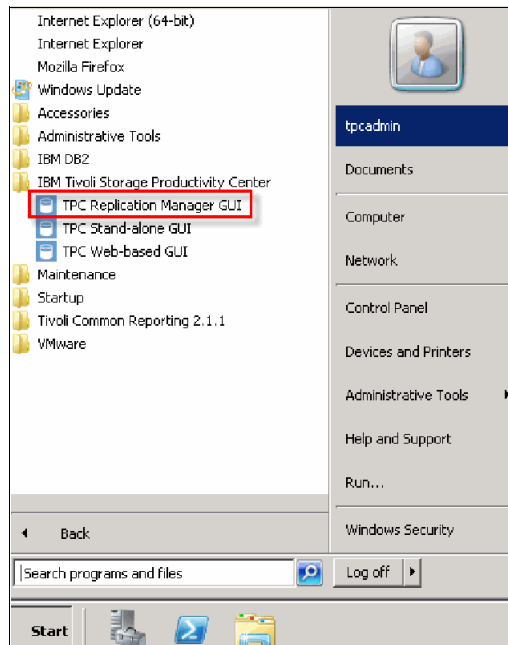


Figure 6-92 Tivoli Storage Productivity Center Replication Manager GUI from the server start menu

If you are using web-based GUI to check the status of replication sessions on the alerts pane, you can directly start Tivoli Storage Productivity Center for Replication from here by clicking the link in the Internal Resource column, which represents the specific session in Tivoli Storage Productivity Center for Replication (Figure 6-93).

Condition	Severity	Alert Category	Internal Resource	First Occurrence
Replication session state change	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 12, 2012 9:23:38 PM CEST
Replication session state change	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 12, 2012 9:03:35 PM CEST
Replication communication failure	Warning	Replication	<a href="#">STORMZEE-V7000.CLUSTER.V70...</a>	Aug 12, 2012 4:54:48 PM CEST
Replication suspending event notify	Warning	Replication	<a href="#">Storwize GM</a>	Aug 12, 2012 4:54:48 PM CEST
Replication session state change	Warning	Replication	<a href="#">GM w Practice</a>	Aug 10, 2012 9:23:38 PM CEST
Replication session state change	Warning	Replication	<a href="#">GM w Practice</a>	Aug 10, 2012 9:13:39 PM CEST
Replication session state change	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 10, 2012 6:49:55 PM CEST
Replication suspending event notify	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 10, 2012 6:49:55 PM CEST
Replication session state change	Warning	Replication	<a href="#">FC for GM</a>	Aug 10, 2012 6:18:45 PM CEST
Replication suspending event notify	Warning	Replication	<a href="#">GM w Practice</a>	Aug 10, 2012 6:17:26 PM CEST
Replication session state change	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 10, 2012 6:17:25 PM CEST
Replication session state change	Warning	Replication	<a href="#">GM w Practice</a>	Aug 10, 2012 6:17:25 PM CEST
Replication session state change	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 10, 2012 6:03:50 PM CEST
Replication session state change	Warning	Replication	<a href="#">GM w Practice</a>	Aug 10, 2012 6:03:39 PM CEST
Replication session state change	Warning	Replication	<a href="#">SVC8_GM w Practice</a>	Aug 10, 2012 6:00:26 PM CEST

Figure 6-93 Tivoli Storage Productivity Center for Replication session alerts

After you click the specific link in the Internal Resource column, the Tivoli Storage Productivity Center for Replication new window opens and you see details for the specific replication session, as shown in Figure 6-94.

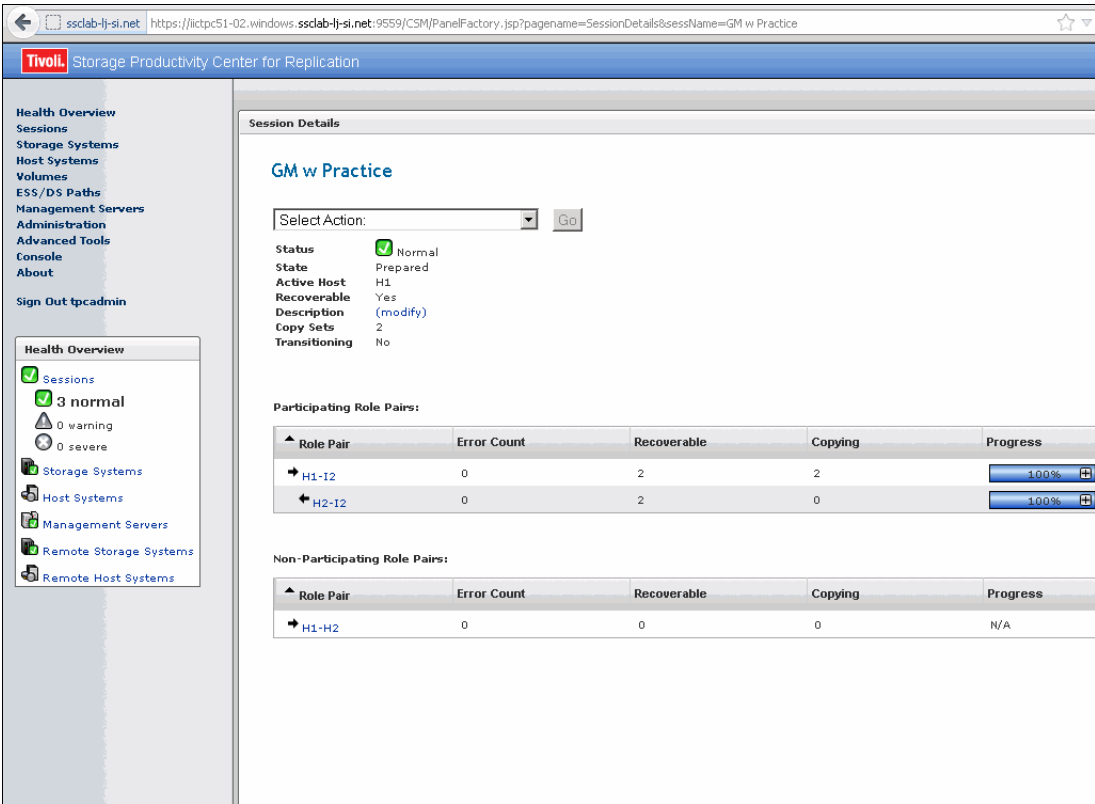


Figure 6-94 Tivoli Storage Productivity Center for Replication session details





## Advanced administration

When we talk about IBM Tivoli Storage Productivity Center, we are actually talking about several components that are installed at the same time. Tivoli Storage Productivity Center allows from the simplest installation where all components are owned and managed by the same shared user ID, to the extreme case, where each component is managed by different users, who can even be external users, for example in a Microsoft Active Directory.

In most cases, we have someone responsible for the Tivoli Storage Productivity Center applications, which is granted the highest level of access, and users, who do not need the same access level. It is even possible that we have some users who only need access to some Tivoli Storage Productivity Center components, for example, for reporting.

Another reason for user management is security, evidence, and compliance. We might need to be able to provide evidence for which person logged in at any given time, and carried out which tasks. This cannot easily be accomplished when using shared user IDs.

Security comes in many forms, starting from simply who has access to the Tivoli Storage Productivity Center server, over which functions and tasks can that person perform. Tivoli Storage Productivity Center is equipped with many roles, to whom either users or groups of users can be mapped. The users might be Local OS, internal in the Tivoli Storage Productivity Center component, or even outside the server, for example in an Active Directory.

Internal between the Tivoli Storage Productivity Center components, various users are used for letting the different Tivoli Storage Productivity Center components access each other. Those users have passwords, and for security and compliance reasons, we need to change those passwords from time to time. Therefore, Tivoli Storage Productivity Center has a tool for doing so, which we show by example.

To understand the complex nature of Tivoli Storage Productivity Center components, users, and process, we have included a short section, describing the various components and their functions.

We describe in detail the following tasks and more advanced settings in Tivoli Storage Productivity Center V5.1:

- ▶ User management
- ▶ Tivoli Storage Productivity Center architecture overview

- ▶ How to change passwords
- ▶ Configuring IBM Tivoli Integrated Portal for Lightweight Directory Access Protocol (LDAP) support
- ▶ Tivoli Storage Productivity Center users and authentication
- ▶ Tivoli Storage Productivity Center certificates

Tivoli Storage Productivity Center uses self-signed certificates, which result in an error in their user's web browser because the new web GUI is the preferred method of accessing Tivoli Storage Productivity Center. We have described how to solve this error.

## 7.1 User management

The basics for user management are to understand that Tivoli Storage Productivity Center consists of multiple components. This section gives an overview of the different components, their responsibilities, interaction, and functions. We also explain what functions that each of the users that we saw from installation have.

We point out which components are granting access to what other components. This nested user management is the foundation for centralized user management through the Tivoli Integrated Portal.

### 7.1.1 User management enhancements

The new Tivoli Storage Productivity Center V5.1 has been improved in several places, which makes user management even better. Following are the enhancements:

- ▶ New Tivoli Integrated Portal.
- ▶ Tivoli Storage Productivity Center for Replication user authorization through Tivoli Integrated Portal, and thereby gain LDAP support.
- ▶ Mix and match local, file, domain, and external users.
- ▶ Direct support for domain users in Tivoli Integrated Portal (Windows only).
- ▶ Special user created (named tpcFileRegistryUser) to allow access if Local OS and external user repository is unavailable.

Changes have been made in the Tivoli Storage Productivity Center V5.1 authentication. If Tivoli Integrated Portal IBM WebSphere Application Server is unavailable, Device Server and Replication Server WebSphere Application Server are used for user authentication, which are both configured with local OS repository.

If Tivoli Integrated Portal WebSphere Application Server is configured with LDAP/Active Directory (AD) repository and even if all Tivoli Storage Productivity Center roles were mapped to AD groups, upon its unavailability, the Device Server and Replication Server will allow users in the local operating system administrative group<sup>1</sup> to log in to stand-alone GUI.

During installation, the following users are automatically granted administrative rights, and can be used for accessing Tivoli Integrated Portal, Tivoli Storage Productivity Center, and WebSphere Application Server:

- ▶ User used to install Tivoli Storage Productivity Center, also known as *Common User Name*.
- ▶ Local administrator group<sup>1</sup>.

---

<sup>1</sup> Administrators on Microsoft Windows, root on Linux, and system on IBM AIX

- The backup user, `tpcFileRegistryUser`, who is created in the Tivoli Integrated Portal file repository.

We recommend that the same user ID is used for all the roles, unless specific needs exist, for example, a split server installation.

The following WebSphere Application Server roles are granted to the above users:

- Admin security manager, Administrator, Integrated Solutions Console (ISC) Admin, and monitor

The following Tivoli Integrated Portal roles are granted to the above users:

- Administrator, `iscadmins`, monitor, `chartAdministrator`, and `tcrPortalOperator`

The roles make it possible for users who they are granted to do administrative tasks in all the Tivoli Storage Productivity Center components. Examples of administrative tasks are to create new users, grant roles to existing users, change the configuration, and to allow LDAP/AD authentication.

To let the Tivoli Storage Productivity Center components Tivoli Storage Productivity Center Device Server, Data Server and Tivoli Storage Productivity Center for Replication, and Tivoli Common Reporting extract data from the Tivoli Storage Productivity Center Repository Database, each of the components retains the Database Administrative user ID name and password. This password can later be changed used the password tool.

For access between the above mentioned Tivoli Storage Productivity Center components and the Tivoli Integrated Portal, a Common User ID is created, this allows access from each Tivoli Storage Productivity Center component to the Tivoli Integrated Portal. The access makes it possible for authentication of users against external file repositories, which goes through the Tivoli Integrated Portal.

## 7.2 Tivoli Storage Productivity Center overview

Tivoli Storage Productivity Center consists of many different components as shown in Figure 7-1 on page 462. We explain the data flow from user front-end, through the Tivoli Storage Productivity Center components to the back-end services. We also describe the different user roles within Tivoli Storage Productivity Center that allow for flow of data, where they exist, and finally how users get authenticated and against what user repository.

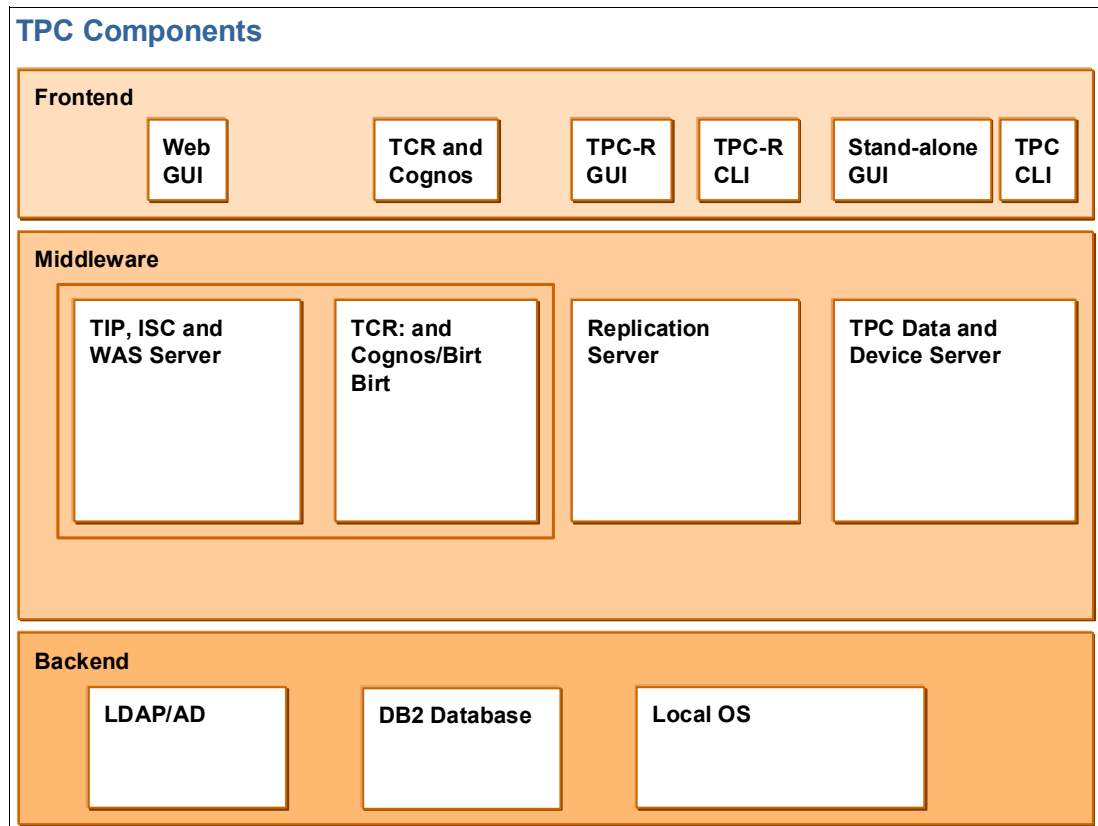


Figure 7-1 Tivoli Storage Productivity Center components

Here we describe the function of each of the components.

## 7.2.1 Front-ends

Front-ends are all the many different ways to access information with the Tivoli Storage Productivity Center. From the new web GUI, stand-alone GUI, to various web-based services, like Tivoli Storage Productivity Center for Replication, to command line (CLI) tools, like tpctool, which are used for TSO.

## 7.2.2 IBM Tivoli Integrated Portal and ISC

Like in Tivoli Storage Productivity Center V4, Tivoli Integrated Portal and Tivoli Storage Productivity Center integration provides functionalities such as single sign-on and authentication against external user repositories. The single sign-on feature for web browser is provided using Lightweight Third-Party Authentication (LTPA), which comes with WebSphere. The browser receives a cookie containing the LTPA token and the time frame it is valid. The time frame for LTPA is controlled in ISC.

Tivoli Integrated Portal is responsible for filtering data or allowing operations based on Tivoli Storage Productivity Center license as well as based on the capabilities of the devices managed by Tivoli Storage Productivity Center.



Tivoli Integrated Portal is the core component for controlling user access. Access to Tivoli Integrated Portal used to be controlled either by internal File Repository, Local OS groups, or Federated Repository<sup>2</sup>. New in Tivoli Storage Productivity Center V5.1 is the possibility for mix and match of File, Local OS, and External Repository users. For details, see 7.4, “LDAP configuration” on page 483.

ISC handles the Federated Repository, therefore configuration and access to external repositories, like Active Directory (AD) is handled through the ISC. Access to ISC is handled by the Tivoli Integrated Portal, using role to group or role to user mapping.

### **7.2.3 Tivoli Storage Productivity Center data and device server**

Data server is the component responsible for product scheduling functions, configuration, event information, reporting, and graphical user interface (GUI) support. It coordinates communication with data collection from agents that scan file systems and databases to gather storage demographics and populate the database with results.

Automated actions can be defined to perform file system extension, data deletion, and Tivoli Storage Manager backup or archiving, or event reporting when defined thresholds are encountered. The data server is the primary contact point for GUI user interface functions. It also includes functions that schedule data collection and discovery for the device server.

Device service is the component that discovers, gathers information, analyzes performance, and controls storage subsystems and SAN fabrics. It coordinates communication with and data collection from agents that scan SAN fabrics and storage devices.

### **7.2.4 Replication server**

Starting with Tivoli Storage Productivity Center V4.1, the IBM Tivoli Storage Productivity Center for Replication product is integrated into Tivoli Storage Productivity Center. Replication server allows for easy handling of advanced copy functions between storage arrays. For new features and details see 6.4, “Tivoli Storage Productivity Center for Replication enhancements” on page 446.

### **7.2.5 Tivoli Storage Productivity Center database repository (TPCDB)**

A single database instance serves as the repository for all Tivoli Storage Productivity Center components. This 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 that are 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.

Access to the TPCDB for Tivoli Storage Productivity Center components is controlled by the eWAS; direct access to TPCDB is controlled by DB2 management.

### **7.2.6 Tivoli Common Reporting reports**

Tivoli Common Reporting includes two engines for doing the reporting, namely Business Intelligence and Reporting Tools (BIRT) and Cognos. BIRT is the old engine, kept for compatibility reasons, and Cognos is the new engine to be used.

---

<sup>2</sup> Federated Repository like Lightweight Directory Access Protocol (LDAP) and Active Directory (AD)

Starting with Tivoli Storage Productivity Center V4.1, Tivoli Common Reporting was a plug-in that could be installed with Tivoli Storage Productivity Center. From Tivoli Storage Productivity Center V5.1, Tivoli Common Reporting is now fully integrated. Tivoli Common Reporting provides the capability for users to either use a long list of predefined reports, or create custom designed reports. The reports are different and more specialized than provided by the stand-alone GUI.

Tivoli Common Reporting is installed as a part of the Tivoli Integrated Portal. For details about Tivoli Common Reporting, see Chapter 4, “Enhanced reporting with IBM Cognos” on page 269.

## 7.2.7 Local operating system

Local operating system (OS) stands for the local user repository, including both users and groups. If the server is a member of a domain, those users are also available for the different Tivoli Storage Productivity Center components with user management, like a user in the local operating system.

## 7.2.8 CLI programs

There are two CLI programs that still can be used instead of the GUI. They remain for easy user access and scripting against Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication.

The first program that we mention is *tpctool*. It is command-line interface (CLI) interaction with the Device Server, where various metrics can be obtained, like performance or capacity. This is an alternative way of extracting data from TPCDB instead of using the Tivoli Storage Productivity Center GUI, as shown in Example 7-1.

### Example 7-1 *tpctool* command

---

*tpctool* is installed together with TPC and can be started with the command  
<TPC base>\cli\tpctool.bat

---

For details about how to use *tpctool*, see the IBM Redpaper™ publication:

<http://www.redbooks.ibm.com/abstracts/redp4230.html?Open>

**Tip:** Type the following command at a system prompt, using the Tivoli Storage Productivity Center user name and password:

```
tpctool -user <user_name> -pwd <user_password> -url <Device_server_URL>
```

Example: `tpctool -user administrator -pwd password -url localhost:9550`

You are then no longer required to enter user, pwd, and url for each command.

*Tpctool* is also used for Tiered Storage Optimization (TSO). See 6.3, “Tiered Storage Optimization” on page 436.

The second CLI tool, is *csmttool*. It is the CLI interface for access to Tivoli Storage Productivity Center Replication Server, used for similar tasks as Tivoli Storage Productivity Center for Replication GUI, for example, to set up replication for storage devices as shown in Example 7-2 on page 465.

#### Example 7-2 csmcli command

csmcli is installed together with TPC and can be started with the command  
<TPC base>\cli\csmcli.bat

For details about how to use csmcli, refer to the following IBM Redbooks publication:

<http://www-304.ibm.com/support/docview.wss?uid=swg21292738>

### 7.2.9 Tivoli Storage Productivity Center data flow

All of the information with the Tivoli Storage Productivity Center components is stored in databases, most in the DB2 database named TPCDB, but Tivoli Storage Productivity Center for Replication has its own small Durby database, used for storing Tivoli Storage Productivity Center for Replication configuration. For the front-ends to access the information into TPCDB, we describe the data flow in Figure 7-2.

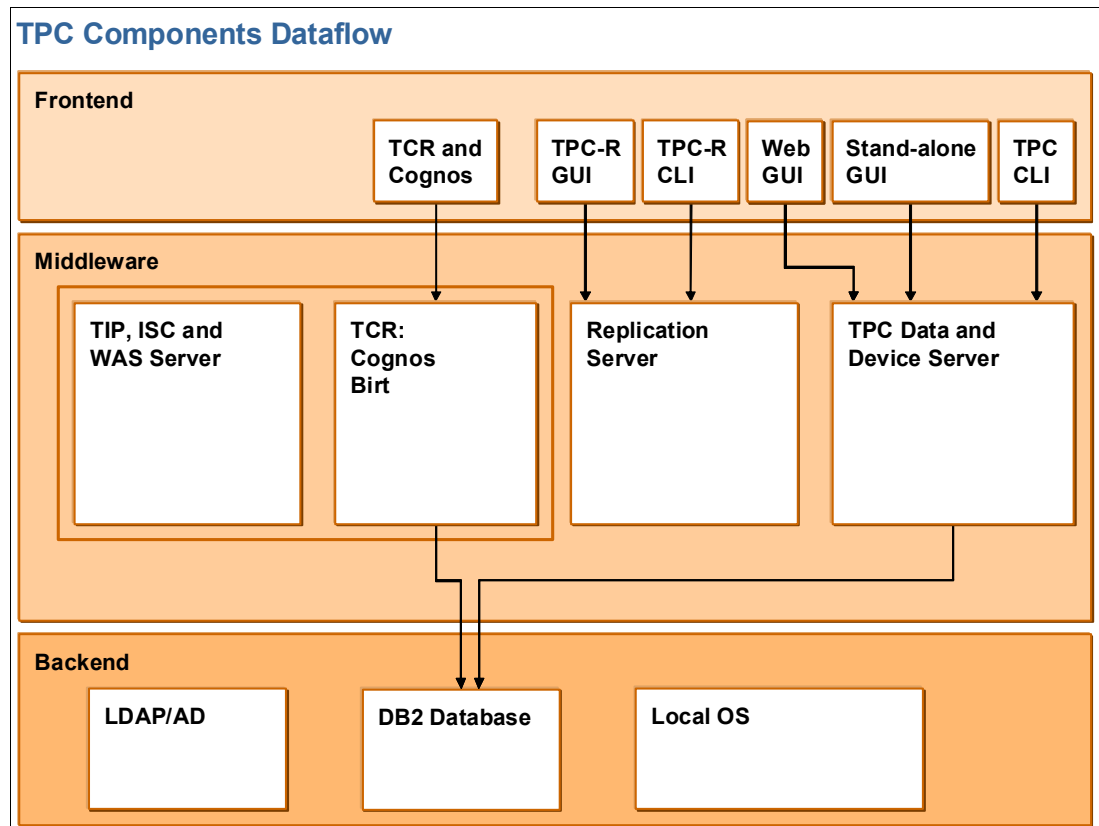


Figure 7-2 Tivoli Storage Productivity Center data flow

Tivoli Common Reporting goes through the Tivoli Common Reporting module that is installed with Tivoli Storage Productivity Center. The report engine requests information and retrieves it from TPCDB, and presents the user with the requested information. Custom reports are stored into the file system.

Tivoli Storage Productivity Center for Replication GUI and Tivoli Storage Productivity Center for Replication CLI goes to replication server, which retrieves or stores the information into the internal Tivoli Storage Productivity Center for Replication Durby database.

Tivoli Storage Productivity Center web GUI, stand-alone GUI, and Tivoli Storage Productivity Center CLI goes to the Tivoli Storage Productivity Center Data and Device Server, who either retrieves or stores the information into TPCDB.

## 7.2.10 Tivoli Storage Productivity Center user repositories

To verify and authenticate user access, Tivoli Storage Productivity Center uses three different repositories. See Figure 7-3.

- ▶ Local OS: The users and groups in the OS.
- ▶ Tivoli Integrated Portal File Repository: The users and groups that are created in the Tivoli Integrated Portal.
- ▶ LDAP Repository: An external repository, for example Active Directory.

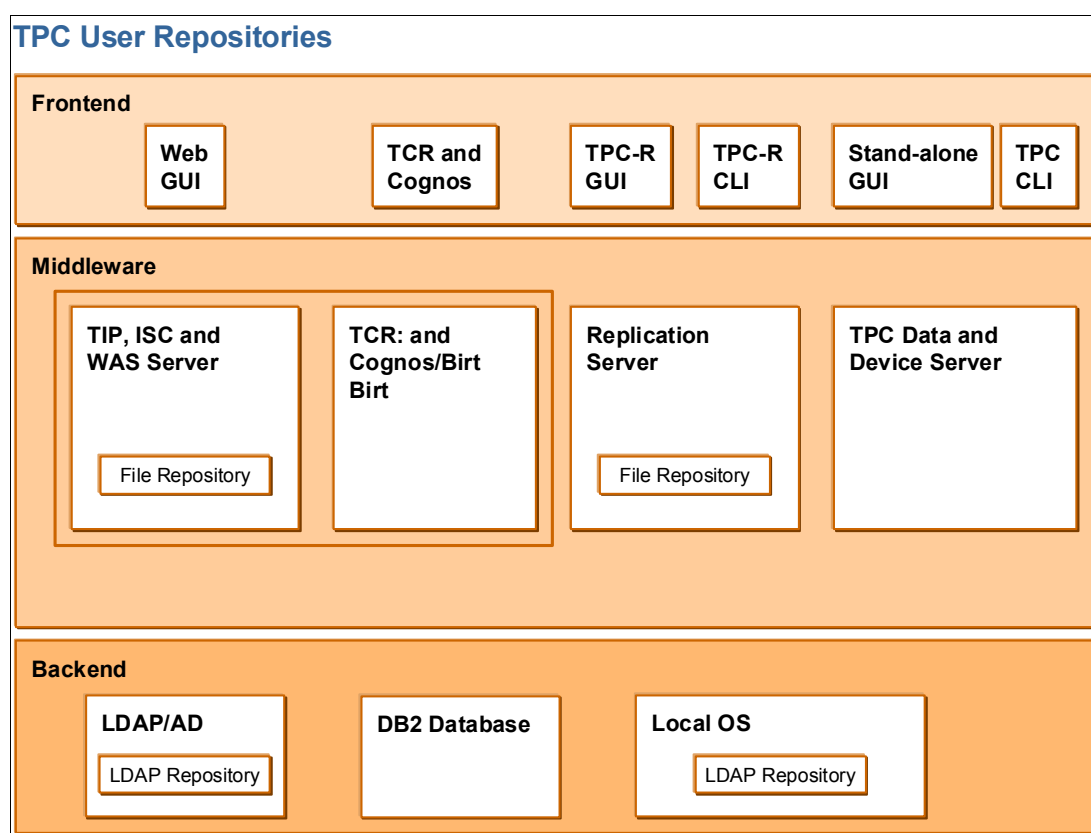


Figure 7-3 Tivoli Storage Productivity Center user repositories

## 7.2.11 Tivoli Storage Productivity Center user authentication

When a user request from either front-end applications comes to a Tivoli Storage Productivity Center component, it needs to be authenticated. Depending on the component, the flow is a little different. In general, users are authenticated in the following order:

1. File repository (if available)
2. Local OS
3. External user repository

We describe the authentication process in two pictures: Figure 7-4 on page 467 and Figure 7-5 on page 468.

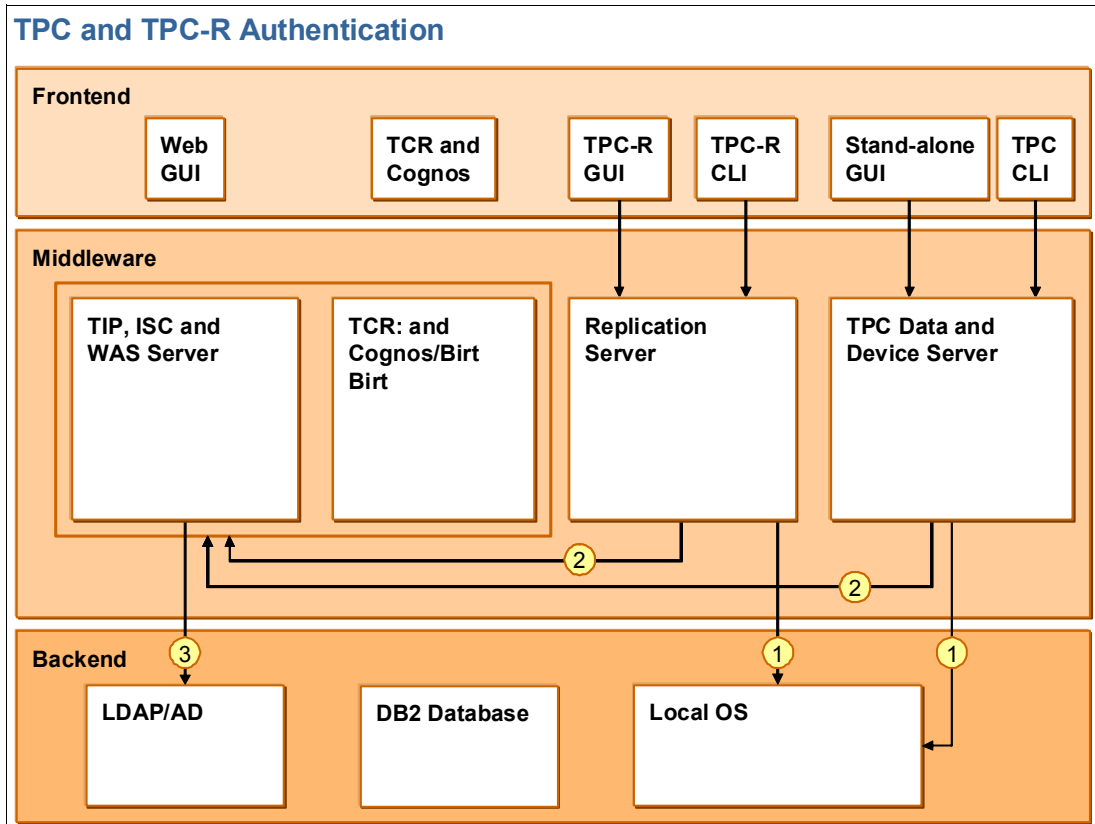


Figure 7-4 Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication authentication

A user request from Tivoli Storage Productivity Center web GUI or Tivoli Storage Productivity Center CLI goes to the Tivoli Storage Productivity Center Data and Device Server.

The Tivoli Storage Productivity Center Data and Device Server uses role to group mappings:

- ▶ First, the local OS gets asked if the user responsible for the request is a member of any local OS groups.
- ▶ Second, Tivoli Integrated Portal gets asked to provide the groups from the external repository (if available).
- ▶ Finally, the user gets authenticated with the repository that he is a member of. This is the reason for failure if the user is a member of multiple repositories.

When authentication is obtained, the user gets granted the role that matches his group. The role to group mapping is done in the stand-alone GUI. The default is that all members of Local OS Administrators<sup>3</sup> are granted Superuser access.

User's requests from Tivoli Storage Productivity Center for Replication GUI or Tivoli Storage Productivity Center CLI goes to the replication server, like Tivoli Storage Productivity Center Data and Device Server. Tivoli Storage Productivity Center for Replication uses role-to-group mappings but also role-to-user mappings:

- ▶ First, the internal file repository gets asked if the user exists there
- ▶ Then, local OS gets asked if the user requesting is a member, or a member of any group

<sup>3</sup> On Linux it is the root group, on AIX it is the system group

- Then, the Tivoli Integrated Portal gets asked to check if the user is a member, or a member of a local Tivoli Integrated Portal group, or if the user is a member of a group from an external repository (if available)

Based on the result, the user gets authenticated. The user is then granted the access level according to either:

- The group-to-role mapping, for the group he is a member of
- The user-to-role mapping

Because both replication server and Tivoli Storage Productivity Center Data and Device Server use multiple repositories and the Tivoli Integrated Portal is the last one asked, access to either Tivoli Storage Productivity Center component can be processed if the Tivoli Integrated Portal service is down. If the Tivoli Integrated Portal service is down, users will then only be able to be authenticated against Local OS, or the Tivoli Storage Productivity Center for Replication File Repository for Tivoli Storage Productivity Center for Replication process, as shown in Figure 7-5.

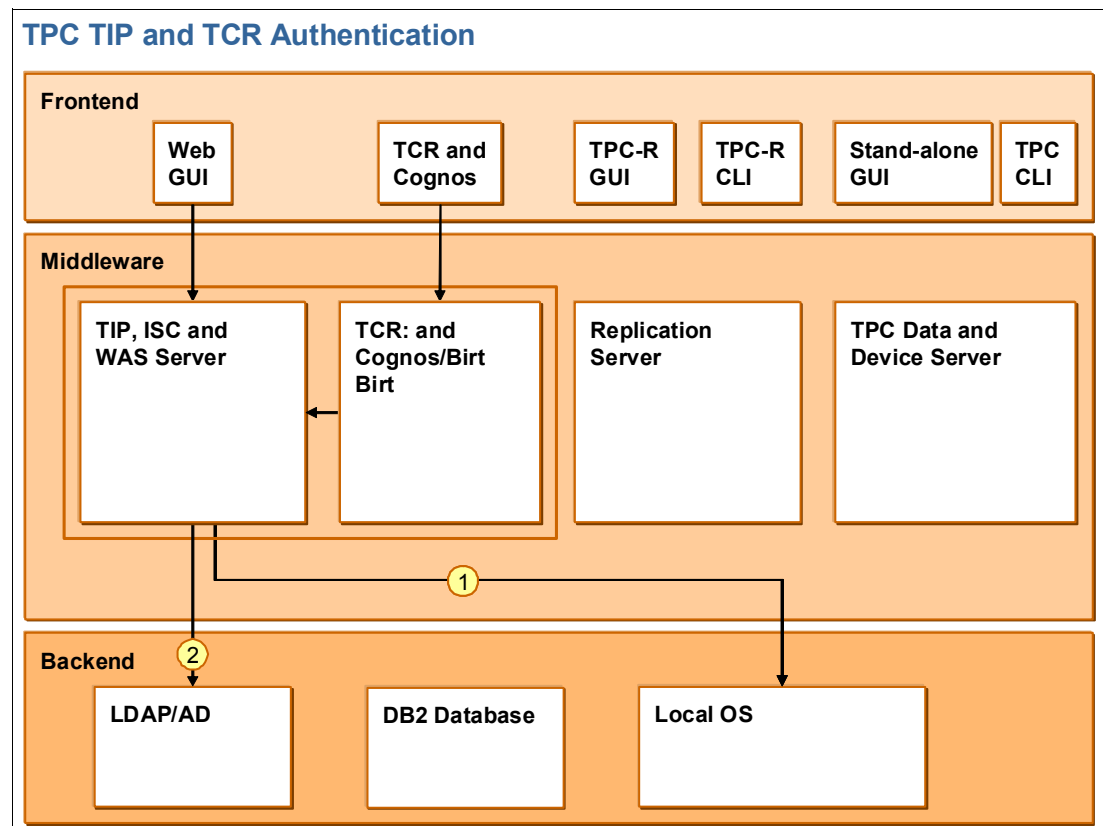


Figure 7-5 Tivoli Storage Productivity Center Tivoli Integrated Portal and Tivoli Common Reporting authentication

The Tivoli Storage Productivity Center web GUI has no role mapping, therefore all authenticated users are granted access. The process requests authentication from Tivoli Integrated Portal. Tivoli Integrated Portal will check if the user is member of:

- Internal file repository
- Second, if the user is a member of the Local OS
- Last, if the user is a member of groups from external repository (if available)

Based on the result, the user is authenticated against the repository that he is a member of, and granted access to Tivoli Storage Productivity Center web GUI.

User request regarding Tivoli Common Reporting goes to the Tivoli Common Reporting component because Tivoli Common Reporting is an integrated part of Tivoli Integrated Portal. User request goes to:

- ▶ Internal file repository
- ▶ Second, if the user is a member of the Local OS
- ▶ Last, if the user is a member of groups from external repository (if available)

Based on the result, the user is authenticated against the repository that he is a member of, and granted access to based on either:

- ▶ The group to role mapping for the group that he is a member of
- ▶ The user to role mapping

The default is that everyone is granted access, but it is possible to change this. See 7.5.4, “Configuring user in Tivoli Common Reporting” on page 506.

## 7.2.12 Tivoli Storage Productivity Center components users

Tivoli Storage Productivity Center operates internal with security, so information is only available for the granted process. If Tivoli Storage Productivity Center is installed in a split server configuration, this also enables Tivoli Storage Productivity Center to access information located on another server.

During installation, Tivoli Storage Productivity Center creates one user in “Tivoli Integrated Portal, ISC, and WebSphere Application Server” namely tpcFileRegistryUser, intended for initial and backup administrator access to the components. This user is not a member of Local OS.

Group to role mapping is also done during installation. This is for initial administrator access to Tivoli Storage Productivity Center components. These role-to-group mappings, are referred to as “mapped to”, as shown in Figure 7-6 on page 470.

Finally, there are tokens created. The tokens are for the user name and password that is needed for getting access to the DB2 database and Tivoli Integrated Portal. The tokens do not allow for users to access the component, it is only used for communication between Tivoli Storage Productivity Center components. Tokens are marked with a username in “( )”, in the example “(DBAdmUser token)” that is shown in Figure 7-6 on page 470.

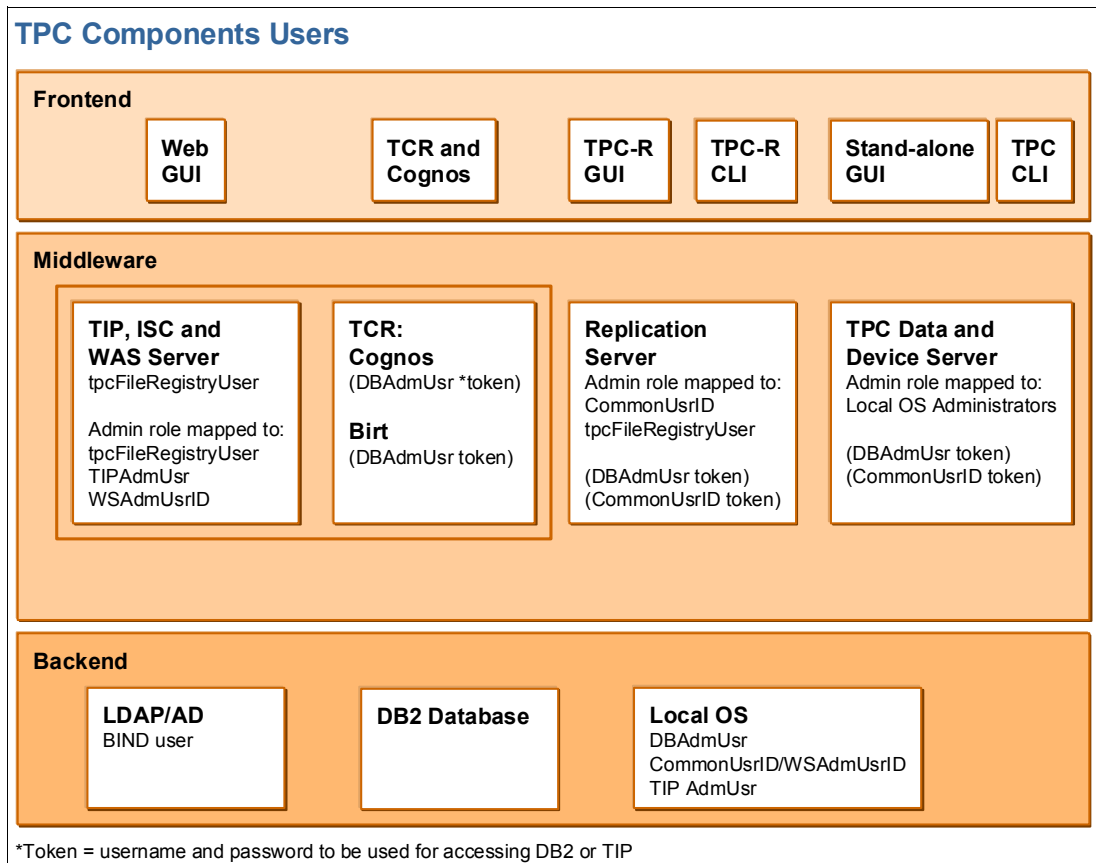


Figure 7-6 Tivoli Storage Productivity Center Components Users panel

The strange looking user names in the Local OS are actually a role-to-user name mapping done during installation:

- ▶ DBAdmUser is DB2 administrator, username default “db2admin”.
- ▶ CommonUsrID and WSAdmUsrID are the same user, referred to as the Common User ID, used for internal Tivoli Storage Productivity Center component communication; username is default “db2admin”. Common user ID is granted:
  - Administrative access to Tivoli Storage Productivity Center for Replication
  - Administrative access to ISC, for configuring access to external repository
- ▶ TIPAdmUsr is a user being granted administrative access to Tivoli Integrated Portal, username is default “db2admin”.

The four usernames can be found in the `InstallVariable.properties` file located in:

`C:\Program Files\IBM\TPC\config`

An example from a Tivoli Storage Productivity Center V5.1 installation is shown in Example 7-3.

Example 7-3 `InstallVariable.properties` example

```
varTIPAdmUsr=tpcreporting
varCommonUsrID=tpcadmin
varWSAdmUsrPW=U2A7jn7H9REAXc2gDuskdQ\=\=
varTIP1.1AdmUsr=
```



```
varDBAdmUsr=db2admin  
varWSAdmUsrID=tpcadmin  
varCommonUsrPW=U2A7jn7H9REExc2gDuskdQ\=\=
```

---

We see there has been different user names for different functions used. A reason for the different user names could be separation of duties or other security-related reasons. All users need to be created in Local OS.

An example for multiple user names is separation of duties where different departments are responsible for various components and you need to track who did what at any given time. A scenario could be:

- ▶ One group is responsible for the DB2 database, using the db2admin login. Normally, this would be the DBA department.
- ▶ Another group responsible for the OS, using System user, which is Administrator on Windows, therefore, the Wintel or OS department.
- ▶ Another group responsible for the Tivoli Integrated Portal, using the TIPadmUsr, could be the Security department, since we are talking user management.
- ▶ Lastly, a group responsible for Tivoli Storage Productivity Center and ISC, which could be the Application Department.

The last user on Figure 7-6 on page 470 is the “BIND user”. This is the user created in the external user repository, for example Active Directory. This user grants Tivoli Integrated Portal access for accessing and querying the AD about users and groups, and obtain authentication.

## 7.3 Change password tool

As shown previously in 7.2.12, “Tivoli Storage Productivity Center components users” on page 469, Tivoli Storage Productivity Center has many different users. To make password changes easier, Tivoli Storage Productivity Center has a tool for changing some of the many passwords used throughout the product.

The password tool is located in C:\Program Files\IBM\TPC\service, and can be started using:

```
C:\Program Files\IBM\TPC\service\changepasswords.bat
```

For further reference “C:\Program Files\IBM\TPC” will be referred to as <TPC Base>.

The password tool is not able to change a password for:

- ▶ DB2 access for Tivoli Common Reporting
- ▶ BIND users password

To change DB2 access for Tivoli Common Reporting, see 7.3.3, “Change the DB2 password that is stored in IBM Tivoli Common Reporting and Cognos” on page 478.

The BIND user is the link between Tivoli Integrated Portal and LDAP/AD, which we discuss in 7.4, “LDAP configuration” on page 483.

## Password tool enhancements made in Tivoli Storage Productivity Center V5.1

The password tool has been enhanced in Tivoli Storage Productivity Center V5.1 to make it more robust and compatible with other Tivoli Storage Productivity Center V5.1 enhancements:

- ▶ Support single-server and split-server configurations
- ▶ Support password change for Tivoli Integrated Portal
- ▶ Support different user IDs for Tivoli Storage Productivity Center, Tivoli Integrated Portal, and DB2
- ▶ Password change for Tivoli Storage Productivity Center for Replication (due to device server and Tivoli Storage Productivity Center for Replication sharing the same WebSphere Application Server instance)
- ▶ Changes password for corresponding Windows service

### Options presented for password change

New in Tivoli Storage Productivity Center V5.1, is the option “Change Tivoli Storage Productivity Center server passwords”. This replaces the Tivoli Storage Productivity Center V4 options “Change DB2 user password for Device and Data Server” and “Tivoli Storage Productivity Center for Replication” (Figure 7-7). Also new is the additional option to the change the password for Tivoli Integrated Portal.

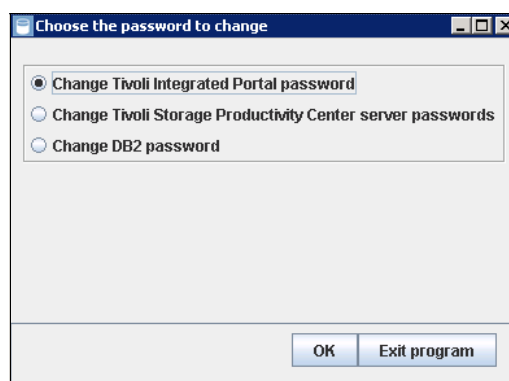


Figure 7-7 Tivoli Storage Productivity Center components options

The password tool options that are presented are dynamic based on the type of configuration, whether it is single-server or multiple-server configurations:

- ▶ If a server does not have a Tivoli Integrated Portal component installed, the option for changing a password for Tivoli Integrated Portal will not be presented when the tool runs on that server
- ▶ If a server has only a DB2 repository, the options to change passwords for Tivoli Storage Productivity Center and Tivoli Integrated Portal will not be presented when the tool runs on that server
- ▶ If a server is in a split-server configuration, and does not have a DB2 repository, the option for changing the DB2 password will still be presented. This is because the configuration files associated with accessing the DB2 repository need to be updated when the DB2 password changes.

Figure 7-8 on page 473 shows the options if the Common User ID is used for Tivoli Storage Productivity Center and DB2 repository, which is the recommended installation.

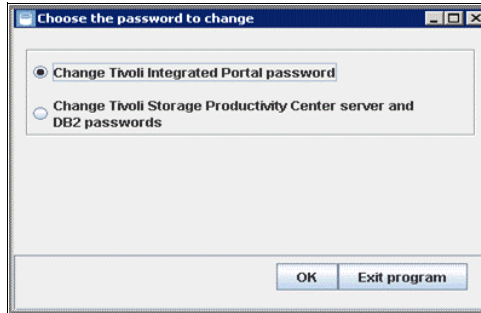


Figure 7-8 User options

During the Tivoli Storage Productivity Center installation, it is possible to use the same user ID or separate IDs for Tivoli Storage Productivity Center, Tivoli Integrated Portal, and DB2 access (see 7.2.12, “Tivoli Storage Productivity Center components users” on page 469 for details). Rather than presenting two redundant choices, options and labels get modified accordingly. For example, only the option “Change Tivoli Storage Productivity Center server and DB2 user passwords” will be presented, when the same user ID has been used for Tivoli Integrated Portal and DB2.

The change passwords tool logging and tracing is found in the `PWTool.log` file in the `<TPC base>/service` directory.

### 7.3.1 Best practices for password change

It is a good practice to make backups of the Tivoli Storage Productivity Center configuration files before changing passwords. This is shown in Example 7-4.

Tivoli Integrated Portal backup is started using `backupconfig.bat` (`backupconfig.sh` on UNIX). On Windows, it is located in `<TIP base>\bin`.

Example 7-4 Tivoli Integrated Portal backup

---

```
C:\Program Files\IBM\tipv2\bin>backupConfig.bat
ADMU0116I: Tool information is being logged in file C:\Program
          Files\IBM\tipv2\profiles\TIPProfile\logs\backupConfig.log
ADMU0128I: Starting tool with the TIPProfile profile
ADMU5001I: Backing up config directory C:\Program
          Files\IBM\tipv2\profiles\TIPProfile\config to file C:\Program
          Files\IBM\tipv2\bin\WebSphereConfig_2012-06-14.zip
ADMU0505I: Servers found in configuration:
ADMU0506I: Server name: server1
ADMU2010I: Stopping all server processes for node TIPNode
ADMU7702I: Because server1 is registered to run as a Windows Service, the
          request to stop this server will be completed by stopping the
          associated Windows Service.
.....
ADMU5002I: 1.039 files successfully backed up
```

---

The Tivoli Integrated Portal backup will be collected and placed into a compressed file. The backup can be restored using `restroreconfig.bat` (`restoreconfig.sh` on UNIX). On Windows, it is located in the `<TIP base>\bin` directory.

The following Tivoli Storage Productivity Center components will have some files updated during the password update. We recommend that you make a copy of files for safe keeping.

## Device server

For Device server, create a backup of the files, which keeps it in sync with the Tivoli Storage Productivity Center administrator's password:

- ▶ <TPC base>/config/InstallVariable.properties file
- ▶ <TPC base>/ewas/profiles/DeviceServerProfile/properties/soap.client.props
- ▶ <TPC base>/device/conf/tsnmdbparms.properties

## Data server

For Data server create a backup of the file:

- ▶ <TPC base>/data/config/repository.config

## Replication server

The Replication server is updated with Tivoli Storage Productivity Center administrator password in:

- ▶ <TPC base>/ewas/profiles/ReplicationServerProfile/properties/soap.client.props

## Installer properties

Tivoli Storage Productivity Center installer properties for Common User Name, Tivoli Integrated Portal, and DB2 passwords are updated:

- ▶ <TPC base>/config/installVariables.properties

Passwords are encrypted in the file, but with a backup it is possible to see if the password actually was updated.

## 7.3.2 Suggested order for changing passwords

The order for changing Tivoli Storage Productivity Center components passwords is:

1. Tivoli Integrated Portal password
2. Tivoli Storage Productivity Center server password
3. DB2 password
4. Tivoli Common Reporting password

Note: The option for changing Tivoli Storage Productivity Center and DB2 user passwords will be combined if the same user ID is used for Tivoli Storage Productivity Center and the DB2 repository.

In a split-server configuration, this order should be followed by running the change password tool on the appropriate machines.

The Tivoli Common Reporting password cannot be changed from the change password tool, but we provide the procedure for changing the password for connecting to the DB2 database.

We do not provide figures for every panel, for example, certain panels are simply confirmation panels that open only in certain circumstances. We do provide figures of panels that require you to actively do an action.

Change password for a user running a Tivoli Storage Productivity Center component starts with changing that user's password in the Local OS. The Tivoli Storage Productivity Center change password tool is not capable of doing that. On Windows however, the change password tool can for the Tivoli Storage Productivity Center component service, change the user's password.

When the password is changed in the Local OS, start the password tool program located at:

C:\Program Files\IBM\TPC\service\changepasswords.bat

Select what password to change from the panel (Figure 7-9). Keep in mind the order specified above. Depending on if this is a split-server configuration or the same user IDs have been used for multiple Tivoli Storage Productivity Center components, this is the panel that will appear.

In this scenario, we first change the Tivoli Integrated Portal password then the DB2 users password.

First, we select “Change Tivoli Integrated Portal Password”, as shown in Figure 7-9.

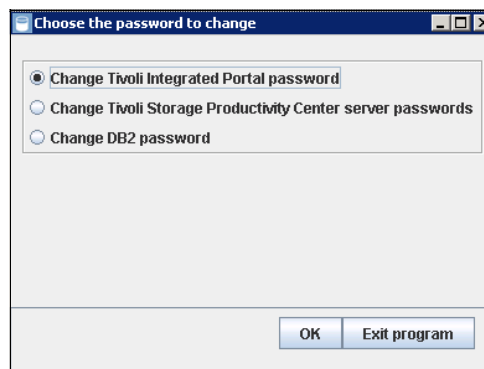


Figure 7-9 Select Tivoli Storage Productivity Center component to change

We then get prompted for the new password (Figure 7-10) and enter the new password in both “Enter password” and “Confirm password”.

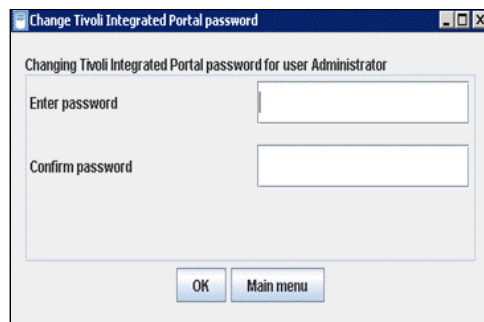


Figure 7-10 Change Tivoli Integrated Portal password

Once the new password has been entered and confirmed, the panel in Figure 7-11 is displayed.

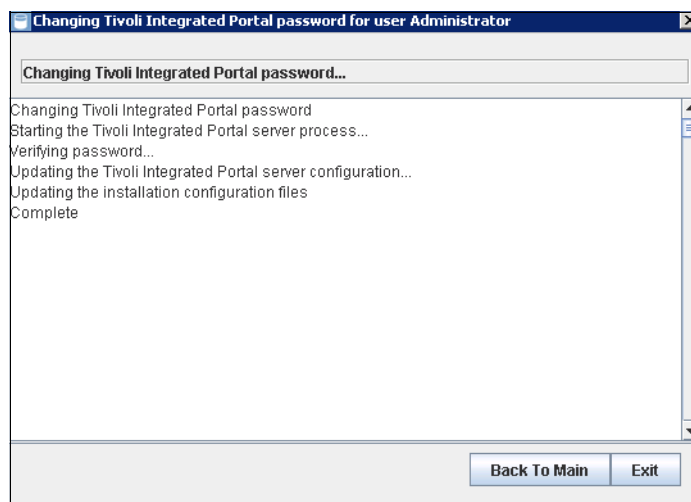


Figure 7-11 Output from change Tivoli Integrated Portal password

When the Tivoli Integrated Portal password has been updated into the Tivoli Integrated Portal, it needs to be synchronized with the Device Server and Replication Server. Therefore, the Tivoli Integrated Portal service will automatically restart and force a synchronization. If automatic restart of a Tivoli Integrated Portal service fails, an error message like Figure 7-12 is displayed.

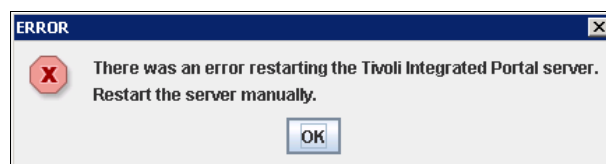


Figure 7-12 Error messages from Tivoli Storage Productivity Center password tool

The solution to restarting the service is to find the service, and start the service manually. For more information about starting a failed Tivoli Integrated Portal service, see 8.1.4, “Names of Tivoli Storage Productivity Center services” on page 535.

In a failure during a password change, check the messages that are displayed on the panel. The messages can also be found in the password tool log file that is located in <TPC base>\service\PWTool.log.

If a further debug is needed, the Tivoli Storage Productivity Center Password Tool provides the possibility for enabling more trace information. The default is to run with the INFO level, but it can be changed by editing the file.

The changepasswords.bat (Windows) or changepasswords.sh (UNIX) in a text editor as shown in Example 7-5 on page 477. Search for “DJava” and update the Java system property -Djava.util.logging.level=INFO with any of SEVERE, WARNING, INFO, CONFIG, FINE, FINER, FINEST, pending the loglevel that is needed. Loglevel FINEST being the most informative, and SEVERE the least.

*Example 7-5 changepassword.bat logging default*

---

```
:EXECJAVA
if %startjava% EQU 1 (
    if "%cmdline%" geq "1" ( "%JAVA_EXE%" -Djava.util.logging.level=INFO
com.tivoli.itsrm.tools.changepasswords.ChangePasswords "%TPC_DIR%" 1 ) else (
"%JAVA_EXE%" -Djava.util.logging.level=INFO
com.tivoli.itsrm.tools.changepasswords.ChangePasswords "%TPC_DIR%" %arg%)
```

---

In this example, we set loglevel to FINER as shown in Example 7-6.

*Example 7-6 changepassword.bat changed logging to FINER*

---

```
:EXECJAVA
if %startjava% EQU 1 (
    if "%cmdline%" geq "1" ( "%JAVA_EXE%" -Djava.util.logging.level=INFO
com.tivoli.itsrm.tools.changepasswords.ChangePasswords "%TPC_DIR%" 1 ) else (
"%JAVA_EXE%" -Djava.util.logging.level=FINER
com.tivoli.itsrm.tools.changepasswords.ChangePasswords "%TPC_DIR%" %arg%)
```

---

Save the file, and when changepassword.bat is executed next time, PWTool.log will now contain lines with the loglevel chosen as shown in Example 7-7.

*Example 7-7 logentry from PWTool.log*

---

```
14-06-2012 23:08:37
com.tivoli.itsrm.tools.changepasswords.be.tip.GetTIPPrimaryAdminIdCmd execute
FINER: ENTRY
14-06-2012 23:08:37
com.tivoli.itsrm.tools.changepasswords.be.tip.GetTIPPrimaryAdminIdCmd preExecute
FINER: ENTRY
```

---

PWTool.log can be found in the same directory as changepassword.bat:

C:\Program Files\IBM\TPC\service

When the password for Tivoli Integrated Portal has been changed, we can continue with the next user from our list, namely the DB2 administrator. You follow the same procedure as for the Tivoli Integrated Portal password, except that no service needs to be restarted.

If the options presented are not as expected, check the contents of the two files:

- ▶ <TPC base>/\_uninst/.tpcreg
- ▶ <TPC base>/config/InstallVariable.properties

The file contains several configuration parameters including the various IDs used:

- ▶ varCommonUsrID, which is the Tivoli Storage Productivity Center user ID
- ▶ varDBAdmUsr, which is the DB2 administrator user ID
- ▶ varTIPAdmUsr, which is the Tivoli Integrated Portal user ID

The files are located in:

C:\Program Files\IBM\TPC\\_uninst

For our installation, we use the recommended setting to share the same user ID for all Tivoli Storage Productivity Center functions, as shown in Example 7-8 on page 478.

#### Example 7-8 InstallVariable.properties file

```
...  
varCommonUsrID=db2admin  
varDBAdmUsr=db2admin  
varTIPAdmUsr=db2admin  
...
```

The InstallVariable.properties file contains all the settings chosen. It cannot be edited to change the current installation.

### 7.3.3 Change the DB2 password that is stored in IBM Tivoli Common Reporting and Cognos

Tivoli Common Reporting uses DB2 database connection for retrieving data for reports. Tivoli Common Reporting is installed with Tivoli Storage Productivity Center but the password tool is not able to change the password for the DB2 connection, so we need to remember to do it, and do it after we change the DB2 administrator password from the change password tool.

To configure Tivoli Common Reporting, we launch the Tivoli Common Reporting GUI, either from:

Web GUI → Reporting

Or directly on the URL:

[https://localhost:9569/tarf/servlet/component?b\\_action=cogadmin](https://localhost:9569/tarf/servlet/component?b_action=cogadmin)

Either option requires that we log in, and if we have changed the security in Tivoli Common Reporting, we need to be logged in with a user who has the “System Administrator” role in Tivoli Common Reporting.

In Tivoli Common Reporting Figure 7-13, we need to launch (1) then “Administration” (2).

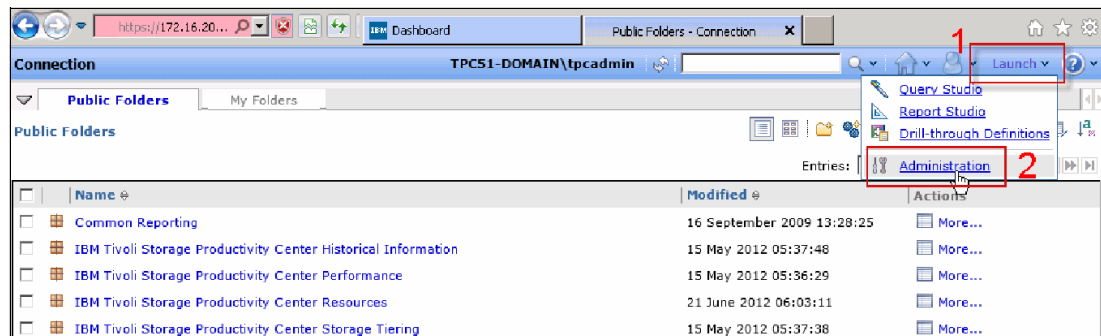


Figure 7-13 Launch Tivoli Common Reporting administration

From here, it is possible to do user management and also manage Tivoli Common Reporting connection to the DB2 database (TPCDB).

We click the “configure” tab (1) (Figure 7-14 on page 479), where we see the TPCDB (2), which we select by clicking it (2).



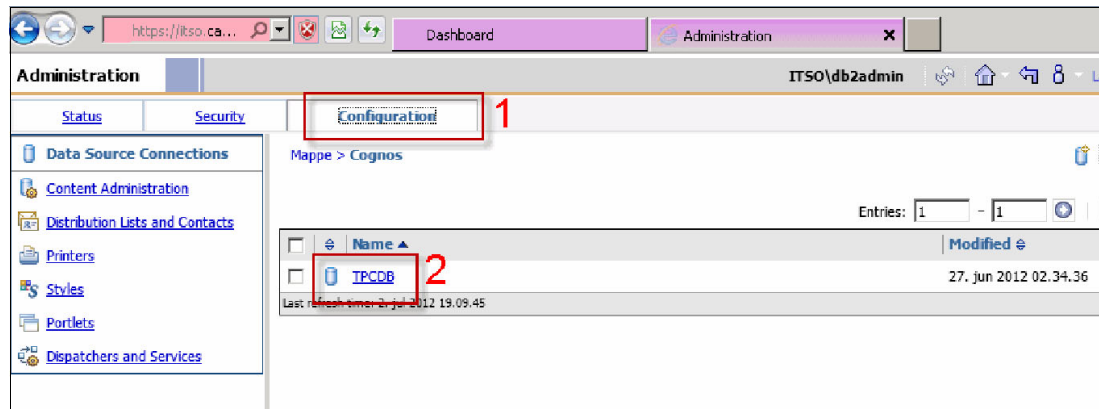


Figure 7-14 Tivoli Common Reporting administration of TPCDB

The next panel (Figure 7-15) looks almost identical to the previous, but the icon next to TPCDB (1) is a little different. And next to the properties (2) there is a new icon, which can be used for testing the connection from Tivoli Common Reporting to TPCDB. We discuss testing the connection later in this chapter.

We click the TPCDB name (1).

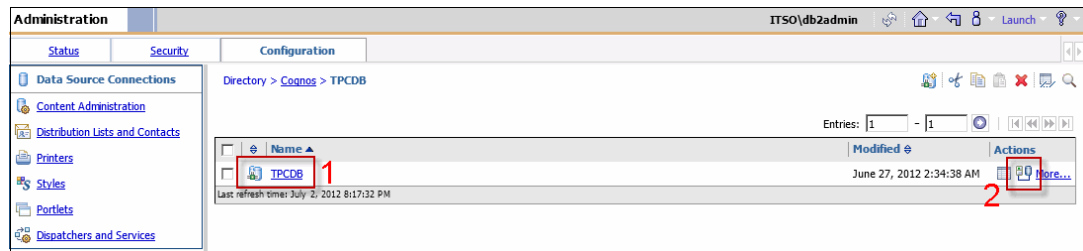


Figure 7-15 TPCDB properties

We have now reached where we manage the connection from Tivoli Common Reporting to TPCDB (Figure 7-16). We notice that the bread crumbs say TPCDB twice:

Directory → Cognos → TPCDB → TPCDB

To change the password for the connection, go to the “Set properties - db2admin” panel. To get to the panel, in the Actions column click the “Set properties” icon.

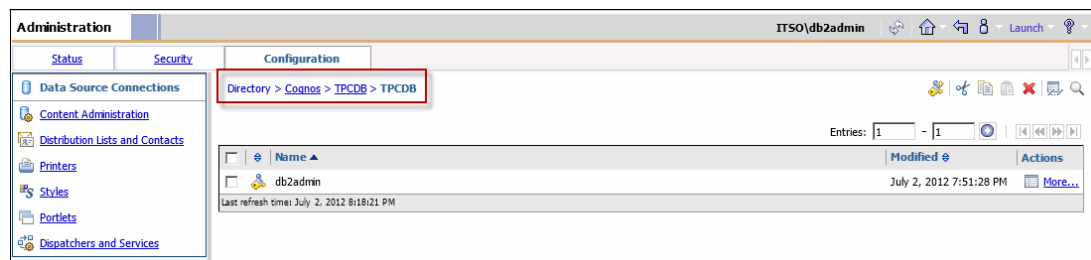


Figure 7-16 TPCDB connection

From the “Set properties - db2admin” panel (Figure 7-17 on page 480), we can change various things, like the icon, name, and even enter a description. It is recommended to leave this as is. We select the Signon tab.

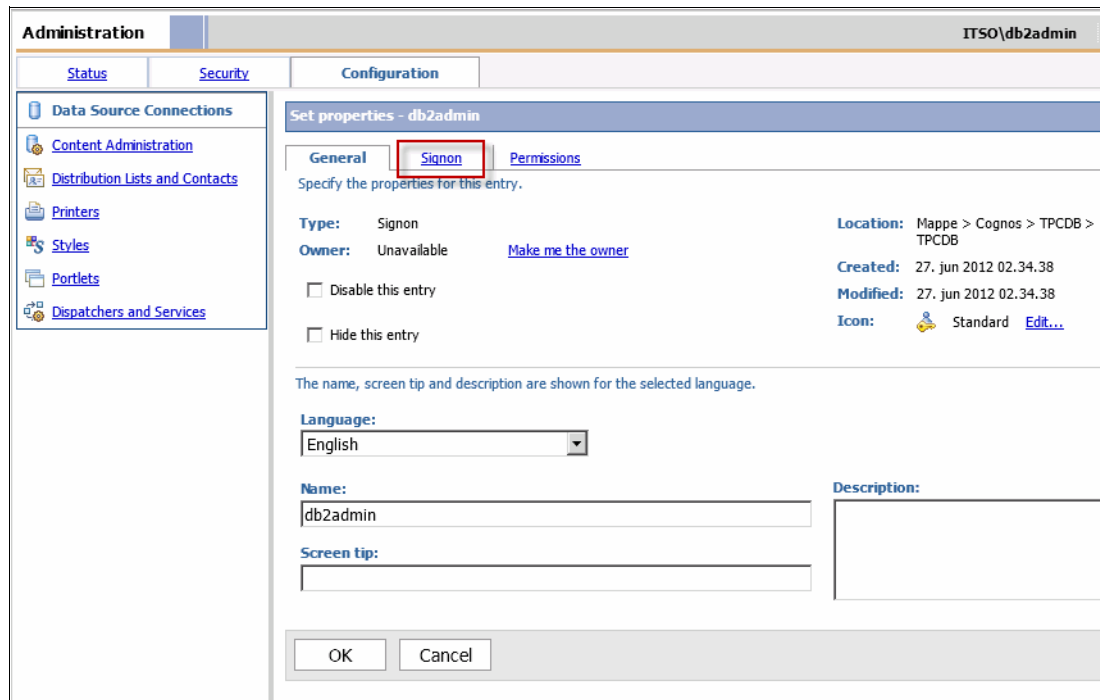


Figure 7-17 Tivoli Common Reporting properties for db2admin

On the next panel, we select “Edit the signon”, as shown in Figure 7-18.

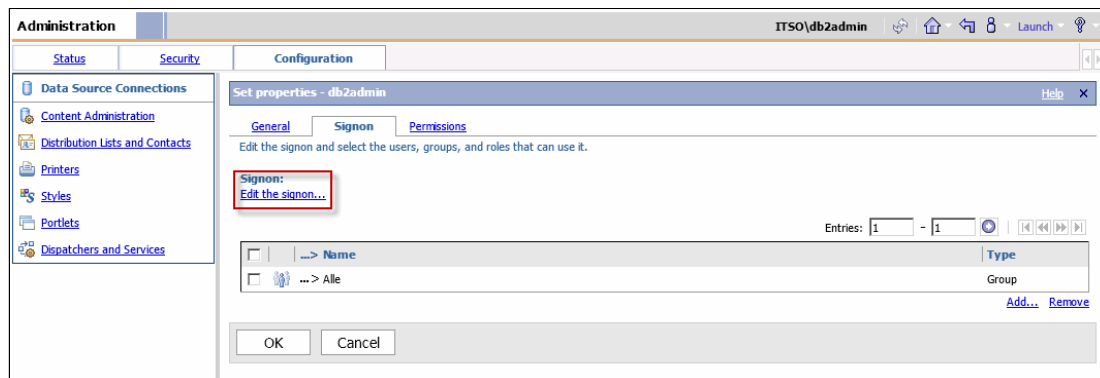


Figure 7-18 Tivoli Common Reporting db2admin signon

On the last panel (Figure 7-19 on page 481), we enter and confirm the new password for connection to TPCDB (1). We verify that we are using the right DB2 administrator username. In our case, we used the default db2admin id.

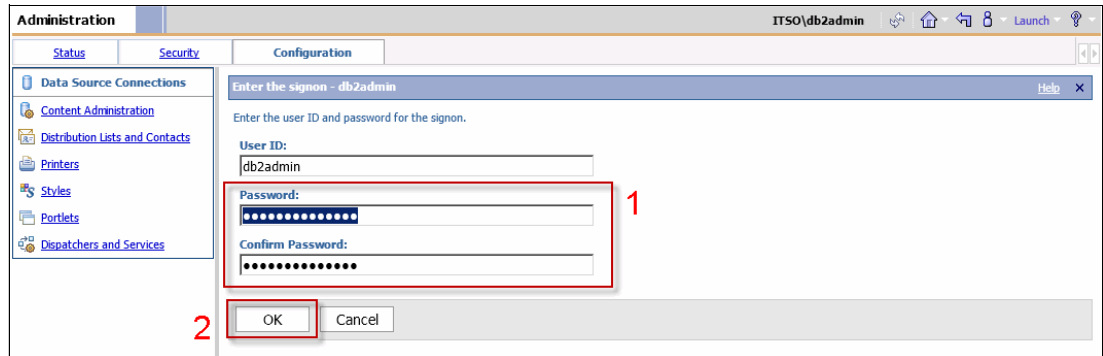


Figure 7-19 Tivoli Common Reporting change db2admin password

We acknowledge the changes by clicking **OK** (2) on this panel, and also on the panel that we will be returned to (Figure 7-18 on page 480). After we click **OK** twice, we return to Figure 7-20.

**Note:** Tivoli Common Reporting will not at this point verify that the entered password is valid.

From the breadcrumb trail, we click the first TPCDB link, the one in blue, which takes you further back one panel.

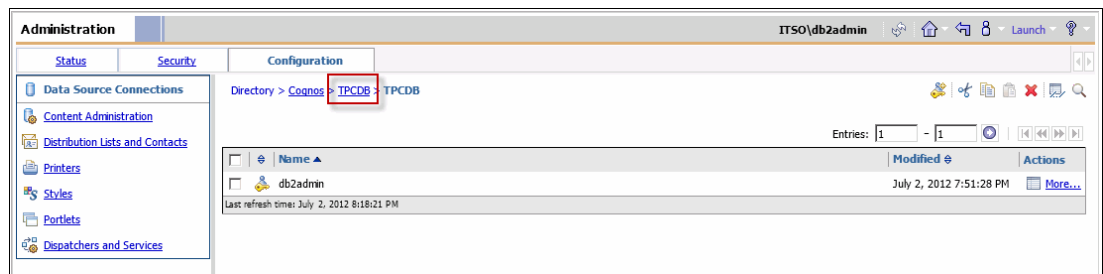


Figure 7-20 Tivoli Common Reporting db2admin properties

Tivoli Common Reporting has a test connection option, for validation of the connection from Tivoli Common Reporting to TPCDB. From Figure 7-21 we verify that we are the right place, by checking the bread crumb trail indicated by (1).

Directory → Cognos → TPCDB

Then, we select the “Test the connection - TPCDB” icon (2).

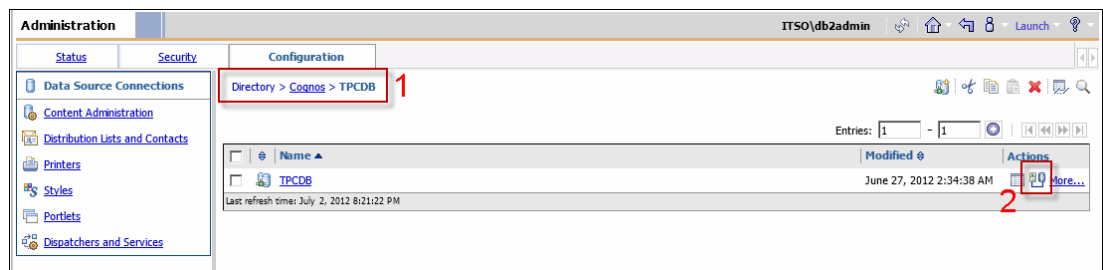


Figure 7-21 TPCDB test connection

From the test connection panel, we notice that there are two possibilities as shown in Figure 7-22. We can either test the current settings by selecting “signon” in (2), which is the default, but we can also enter a user name and password, which could be used for changing the user name from db2admin to another, as long as the new user name is also a member of the DB2ADMNS group. We can then test if the new user is valid prior to doing the change. We leave the default option “signon” in (2) and test our new password, by clicking the “Test” button (1).

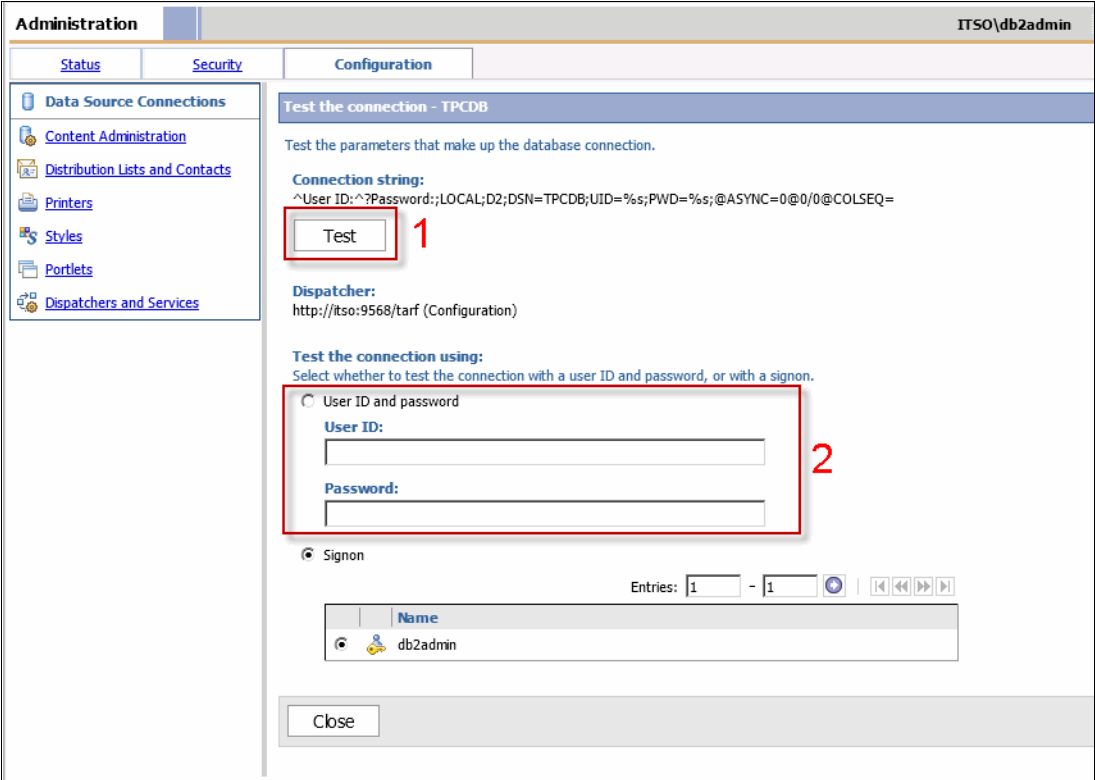


Figure 7-22 Test Tivoli Common Reporting connection to TPCDB

In case our new password matches, we see Figure 7-23.

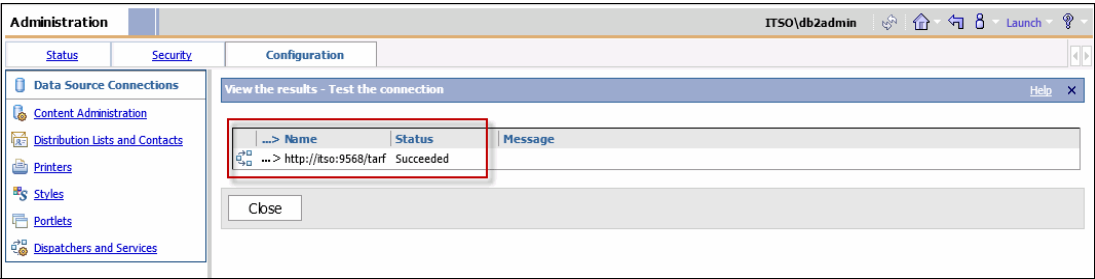


Figure 7-23 Tivoli Common Reporting connection to TPCDB succeeded

If the new password entered is not valid, we see Figure 7-24 on page 483.

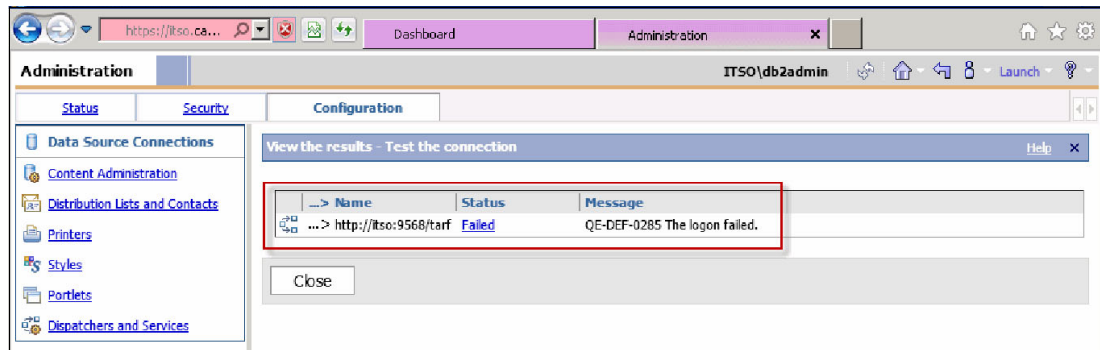


Figure 7-24 TPCDB test connection failed

If our validation fails, we need to go back and change the password again, and check that we received the right password and user name for our Tivoli Common Reporting to TPCDB connection.

## 7.4 LDAP configuration

When we discuss Lightweight Directory Access Protocol (LDAP) authorization, we are actually talking about two different things:

- ▶ A protocol
- ▶ A user repository

The protocol is LDAP. LDAP defines a communication protocol. That is, it defines the transport and format of messages used by a client to access data in an X.500-like directory. In this case, the user repository is the Microsoft Active Directory (AD).

The user repository is a centralized user database, where all users, their rights, and passwords are stored.

Microsoft defines the AD as<sup>4</sup>:

*Active Directory Domain Services (AD DS), formerly known as Active Directory Domain Services, is the central location for configuration information, authentication requests, and information about all of the objects that are stored within your forest. Using Active Directory, you can efficiently manage users, computers, groups, printers, applications, and other directory-enabled objects from one secure, centralized location.*<sup>4</sup>

LDAP configuration means configuring the Tivoli Storage Productivity Center Tivoli Integrated Portal to be able to access the AD. Therefore, users accessing resources can be authenticated against the AD and not created locally on the Tivoli Integrated Portal or Tivoli Storage Productivity Center server. It also means configuring the Tivoli Storage Productivity Center components, mapping the AD groups to the roles in different Tivoli Storage Productivity Center components, for example in Tivoli Storage Productivity Center, mapping an AD group against the role Superuser.

New in Tivoli Storage Productivity Center V5.1 is the possibility to let some Tivoli Storage Productivity Center roles be Local OS groups, and some roles be AD groups.

<sup>4</sup> <http://www.microsoft.com/en-us/server-cloud/windows-server/active-directory-overview.aspx>

**Note:** It is recommend having a mix of local OS and domain user groups, for fault tolerance.

Configuration of LDAP is a postinstallation step, due to the complexity of the task. It requires:

- ▶ Host name of AD server obtained for AD administrator
- ▶ Bind user obtained from AD administrator
- ▶ Configuration of the WebSphere Application Server, externalized in the Tivoli Integrated Portal console
- ▶ Restart of services
- ▶ In case of problems, some troubleshooting

**Tip:** In Tivoli Storage Productivity Center v4.x, authentication was either Local OS users or LDAP; this led to the possibility of logout scenarios. It is no longer possible to log out yourself, due to the creation of File repository user created in the Tivoli Integrated Portal, named TpcFileRepositoryUser, which has the same password as the Common User ID.

### 7.4.1 Planning for LDAP configuration

We created a schema to be used for LDAP configuration to be sure that we have all needed information (Table 7-1). The information being put into this table is shown by examples on the following pages.

Table 7-1 LDAP configuration schema

Resource	Value
Active Domain Server 1	
Active Domain Server 2	
TCP Port for Active Domain Server	389 <sup>a</sup>
Distinguished Name for BIND user	
Distinguished Name for realm of Tivoli Storage Productivity Center group	

a. This is the default port for AD. Ask the AD administrator for verification

The first step in LDAP configuration is obtaining an AD user with the possibility to query the AD. Normally any user can do that. It is recommended that this user is given a static password, meaning it has the same status as a service account in the AD. This user is referred to as the *BIND user*. This is the user who serves as the connection from the Tivoli Integrated Portal into the AD for retrieving information.

Once an account has been made, and the password obtained, information about that user is needed from the AD, namely the user's Distinguished Name (DN).

The DN consists of several elements, in total they exactly specify the location of the BIND user in the AD. This link of elements is similar to a file name, which consists of directories and file name.

To find the DN for the BIND user and Active Domain Controller (this is normally the Domain Controller) for the Domain, Microsoft has developed a tool, named `ldp.exe`. `ldp.exe` is a tool that can browse the AD. It can be found at your Windows Tivoli Storage Productivity Center server in:

`C:\Windows\system32\ldp.exe`

If not already on the Tivoli Storage Productivity Center server, it can be download from Microsoft Corporation at the following site:

[http://technet.microsoft.com/en-us/library/cc772839\(v=ws.10\).aspx](http://technet.microsoft.com/en-us/library/cc772839(v=ws.10).aspx)

When started, we need to provide information to get access to the AD. This depends on if the Tivoli Storage Productivity Center server is member of the AD or not. If Tivoli Storage Productivity Center server is not member, we need the AD Servers name, normally this is the Domain Controller (DC) of the domain. We also need firewall access from the server running the Tivoli Integrated Portal to the DC on port 389.

Launch `ldp.exe` and click **Connection** → **Bind** as shown in Figure 7-25. This starts the panel for connection to the AD.

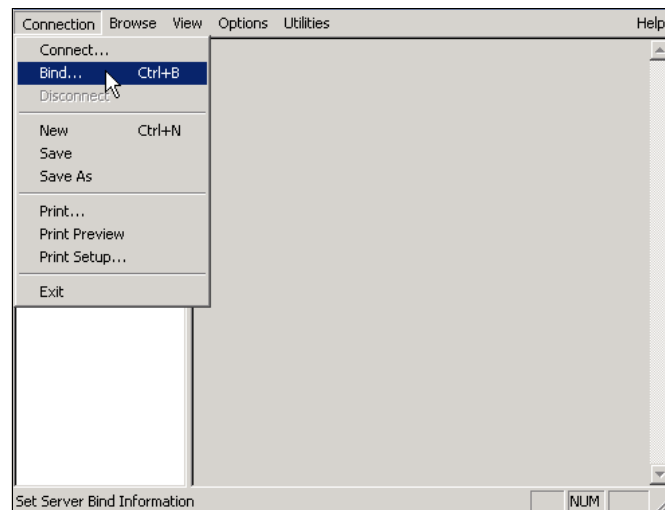


Figure 7-25 `ldp.exe`, bind to AD

There are several options available. If the server where `ldp.exe` is launched is a member of the AD, simply click **OK**. See Figure 7-26.

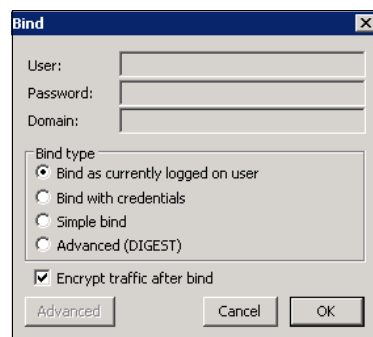


Figure 7-26 Bind panel with AD

If the server is not a member of the AD, we need to connect to the DC. Go to **Connection** → **Connect** and supply server either the IP or FQDN for the DC, and credentials obtained from AD administrator (Figure 7-27).

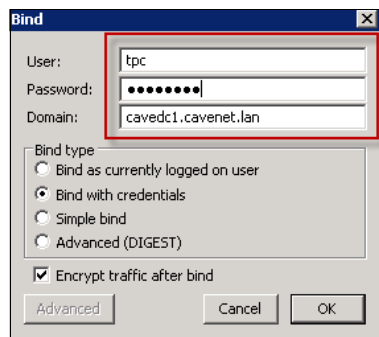


Figure 7-27 BIND panel with credentials

The reason for not needing to specify the AD server, if the server where Idp.exe is launched is member of the AD, is that it already knows the domain controller and services being offered in the domain.

We are looking for the right side window to show authenticated, as shown in Figure 7-28.

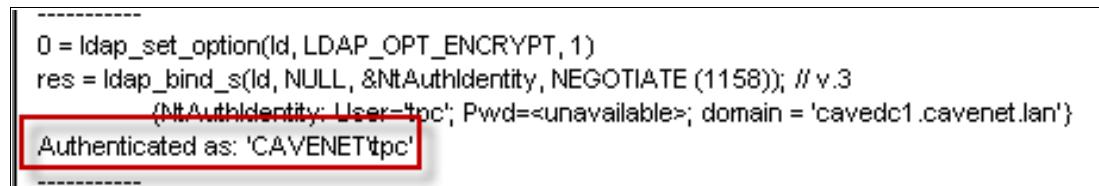


Figure 7-28 Authenticated access to AD

Now it is possible to start browsing the AD. Simply go to **View** → **Tree** as shown in Figure 7-29.

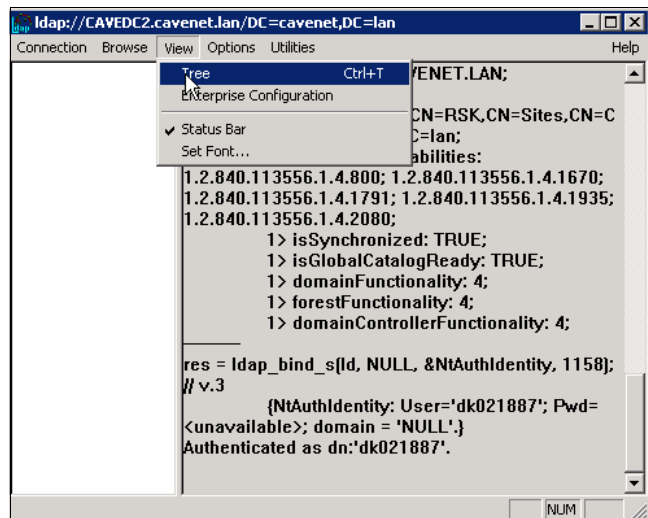


Figure 7-29 Idp.exe view tree

A new menu appears, where it is possible to specify information about what to browse in the AD. Simply press **OK**. This brings you to the top of the AD as shown in Figure 7-30 on page 487.



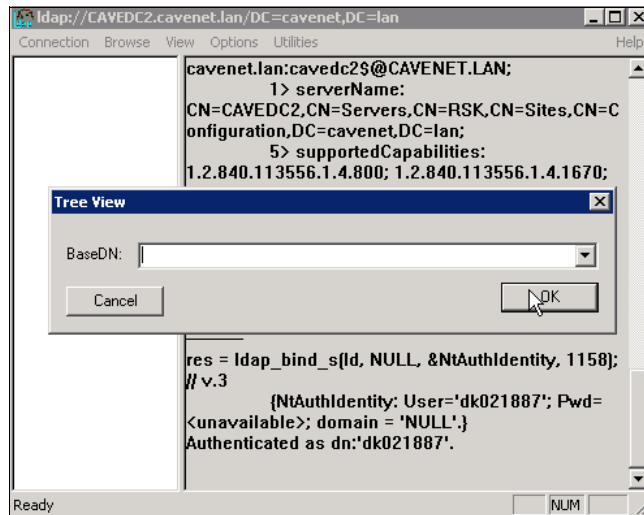


Figure 7-30 Top of the Active Directory

The top of the AD will look somewhat like Figure 7-31.

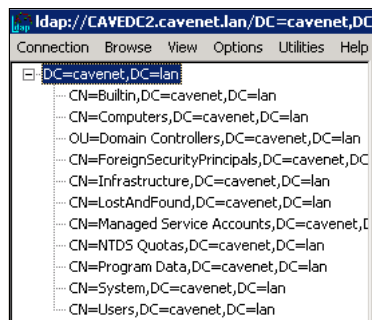


Figure 7-31 AD top tree

At the top of the AD, it is possible to browse various resources in the AD, like computers and DCs. The last (DC) is what we are interested in. We are looking for two things:

- DNS name of the DC
- Exact distinguished name (DN) for the BIND users mapping to the AD

The Domain Controller is available from the root of the AD (Figure 7-31). Select the “+” and expand it, then we are looking for the below line, and expand that by clicking “+”, (see Figure 7-32 on page 488).

“OU=Domain Controllers,DC=cavenet,DC=lan”

The last DCs in the above line vary from domain to domain. Expand all in this group and this will show the Domain Controllers for this domain, in our example Figure 7-32 on page 488.

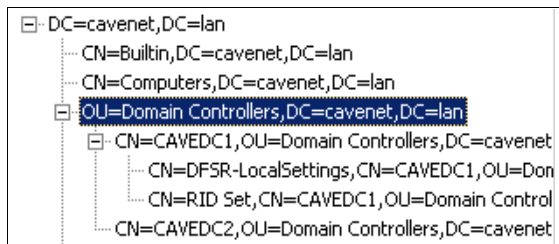


Figure 7-32 Domain Controllers

Select each of them in the right side of the window in Figure 7-33. Look for the string starting with `dnsHostName`, example:

`dnsHostName: CaveDC1.cavenet.lan;`

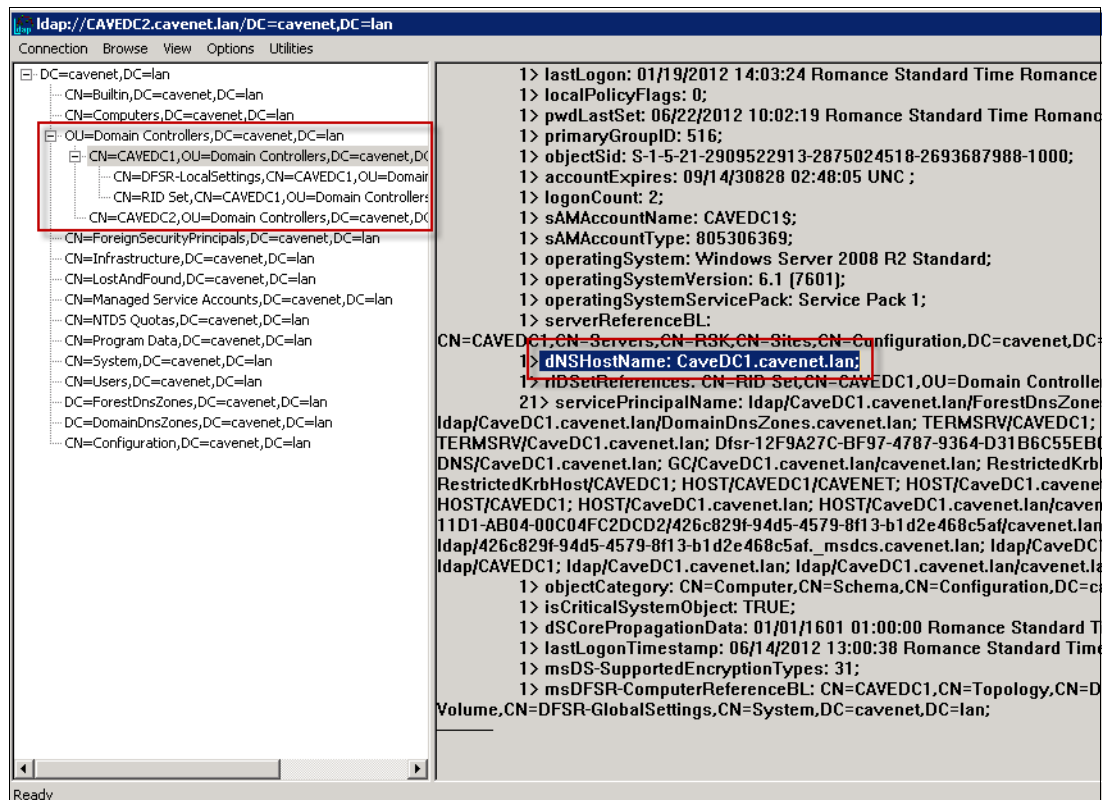


Figure 7-33 ldp.exe dnsHostName

This is the host name to be used during LDAP configuration. This should be put into Table 7-1 on page 484, as the value for “Active Domain Server 1”. The value for the second Domain Controller (DC) should be inserted into the table as Active Domain Server.

It is possible to start expanding menus and manually look for the BIND user. A better option is doing a search for the user.

Go to **browse** → **search**, or press CTRL+S, then enter information (Figure 7-34 on page 489).

If “Base DN” is not completed, select the drop-down menu (1) and select the top tree found previously. See Figure 7-34 on page 489.

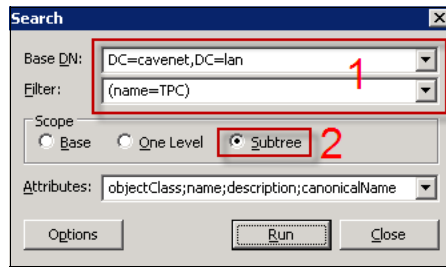


Figure 7-34 Idp.exe search

In the filter, it is possible to search for various things. In this case, we search for the BIND user (1). The format for the filter is a little strange, enter:

(CN=<username of BIND user>

In our example, the BIND user name is “TPC”.

Remember to change “scope” from “one level” to “Subtree” to search entire AD (2).

The search yields a result like Figure 7-35.

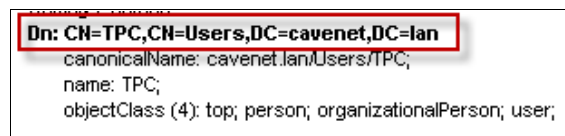


Figure 7-35 Idp.exe search result

We are looking for the string starting with “DN:” For our BIND user “TPC”, the mapping to the AD is:

CN=TPC,CN=Users,DC=cavenet,DC=lan

This is the string to be used in repository connection during LDAP configuration and should be added to Table 7-1 on page 484 as the value for “Distinguished Name for BIND user”.

Next, we need the realm where our users are created. This realm is not necessarily the same as where the BIND user is created. The mapping to the realm should be chosen wisely. If too wide, for example an entire AD, we risk timeout issues due to too much information to search, or if too narrow, we do not get the groups off all the users needed to connect to Tivoli Storage Productivity Center.

Just like the BIND user, it is possible to search for the mapping of the needed group to the AD. See Figure 7-34. Just search for the name of the group to be used. Simply replace the name of the bind user, with the name of the group. It is possible to use a wildcard like “\*” for the search.

In our example, we are looking for the AD group named “TPC users”, so in the filter line, we enter the search string “(name=TPC Users)”. This yields this result (Figure 7-36 on page 490).

```

***Searching...
ldap_search_s(ld, "DC=cavenet,DC=lan", 2, "(name=TPC *)", attrList, 0, &msg)
Getting 2 entries:
Dn: CN=TPC Superusers,CN=Users,DC=cavenet,DC=lan
canonicalName: cavenet.lan/Users/TPC Superusers,
name: TPC Superusers;
objectClass (2): top; group;

Dn: CN=TPC Users,CN=Users,DC=cavenet,DC=lan
canonicalName: cavenet.lan/Users/TPC Users,
name: TPC Users;
objectClass (2): top; group;

```

Figure 7-36 AD group search

Again, we are looking for the string starting with “DN:”. In our case, this is:

Dn: CN=TPC Users,CN=Users,DC=cavenet,DC=lan

Dn: CN=TPC Superusers,CN=Users,DC=cavenet,DC=lan

If we map to the exact realm of either, we are only able to map Tivoli Storage Productivity Center roles to this exact group. If we have several groups for different purposes, like Figure 7-36, where we have a group for people administrating “TPC for Disk” and a “TPC Superusers” group for people who should have Superuser access to Tivoli Storage Productivity Center, like the above two DNs.

In the case where we have multiple groups, we need to choose the least common denominator for both groups. In our case, all groups are created under users, and the string for the realm should be:

CN=Users,DC=cavenet,DC=lan

This value should be added to Table 7-1 on page 484 as the value for “Distinguished Name for realm of TPC groups”.

After Table 7-1 on page 484 has been populated with all information, we are ready to start the LDAP configuration.

Before making any changes to the Tivoli Integrated Portal, it is recommended to make a backup as shown in Example 7-9.

Tivoli Integrated Portal backup is started using backupconfig.bat (backupconfig.sh on UNIX). On Windows, it is located in “C:\Program Files\IBM\TPC\bin”.

#### Example 7-9 Tivoli Integrated Portal backup

```

C:\Program Files\IBM\tipv2\bin>backupConfig.bat
ADMU0116I: Tool information is being logged in file C:\Program
Files\IBM\tipv2\profiles\TIPProfile\logs\backupConfig.log
ADMU0128I: Starting tool with the TIPProfile profile
ADMU5001I: Backing up config directory C:\Program
Files\IBM\tipv2\profiles\TIPProfile\config to file C:\Program
Files\IBM\tipv2\bin\WebSphereConfig_2012-06-14.zip
ADMU0505I: Servers found in configuration:
ADMU0506I: Server name: server1
ADMU2010I: Stopping all server processes for node TIPNode
ADMU7702I: Because server1 is registered to run as a Windows Service, the
request to stop this server will be completed by stopping the
associated Windows Service.
.....

```

ADMU5002I: 1.039 files successfully backed up

---

The Tivoli Integrated Portal backup will be collected and a compressed file created. In our example, Example 7-9 on page 490, the name of the file is “WebSphereConfig\_2012-06-14.zip”. The backup can be restored using `restroreconfig.bat` (`restoreconfig.sh` on UNIX). On Windows, it is located in the same directory as `backupconfig.bat`.

Log in to Tivoli Integrated Portal at URL: <https://localhost:9569/ibm/console>.

From there, launch the WebSphere Application Server admin console by selecting “WebSphere Administrative Console”, as shown in Figure 7-37.

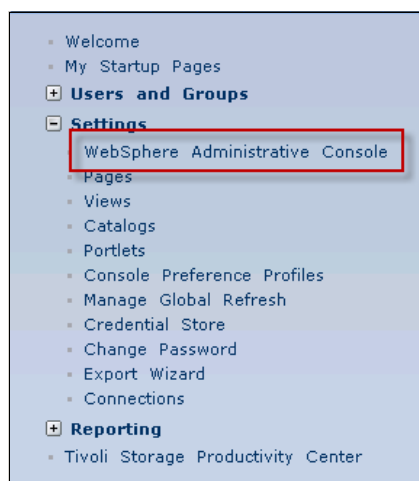


Figure 7-37 Launch WebSphere Application Server from Tivoli Integrated Portal

Alternatively, log in to the WebSphere Application Server admin console (ISC) directly with the URL: <https://localhost:9574/ibm/console/secure/securelogin.do?action=force>

Press **Global security** (1) to get to where repositories are configured. Then, click the **Configure** (2) as shown in Figure 7-38 on page 492 to start configuring the “Federated Repository”.

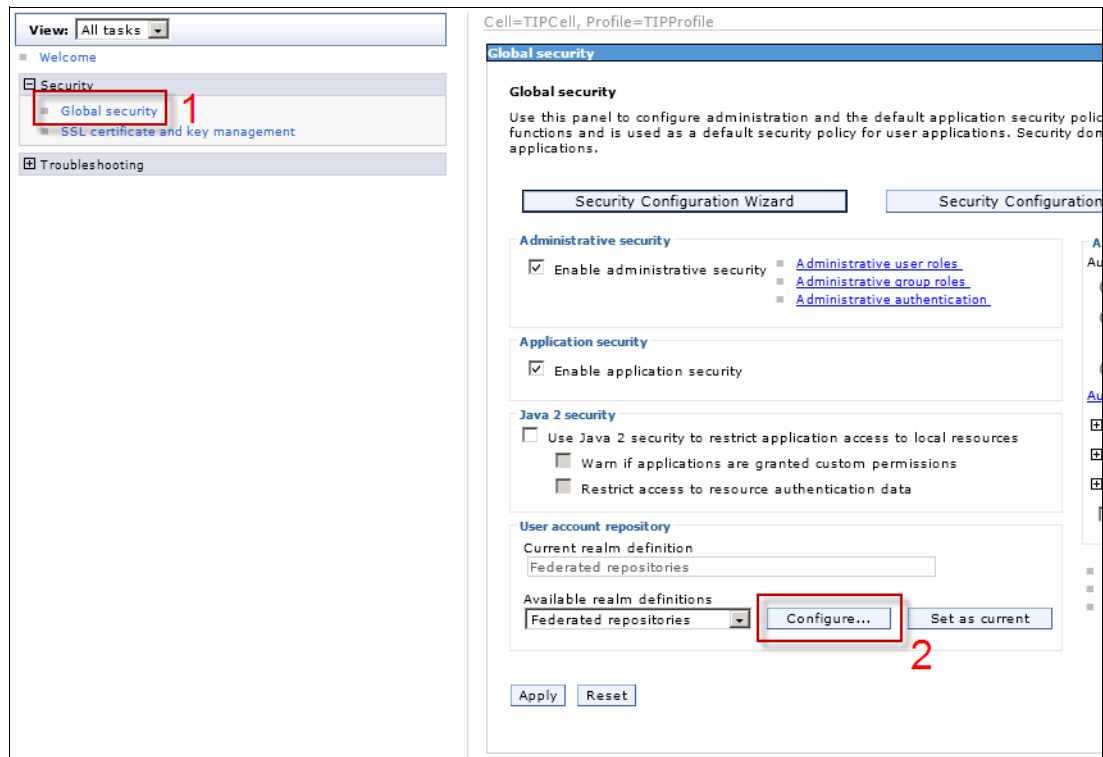


Figure 7-38 Login panel

Configure Federated Repository by clicking “Manage Repository” (Figure 7-39 on page 493). This starts the setup of AD using LDAP protocol.

On top of the panel (1) there is a trail of bread crumbs so you can see where you are, and click a previous item that you want to return to. Click **Configure** (2) for starting to configure the Federated Repository.

**Note:** The Tivoli Integrated Portal user name in Figure 7-39 on page 493 (db2admin) is the user entered during installation. This is the default admin user for Tivoli Integrated Portal, and should not be changed.

**Global security > Federated repositories** 1

By federating repositories, identities stored in multiple repositories can be managed in a single, virtual realm. The realm can consist of identities in the file-based repository that is built into the system, in one or more external repositories, or in both the built-in repository and one or more external repositories.

**General Properties**

\* Realm name  
defaultWIMFileBasedRealm

\* Primary administrative user name 2  
db2admin

**Server 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  
Password

☒ Ignore case for authorization

Repositories in the realm:

[Add Base entry to Realm...](#) [Use built-in repository](#) [Remove](#)

Select	Base Entry	Repository Identifier	Repository Type
<input type="checkbox"/>	o=defaultWIMFileBasedRealm	InternalFileRepository	File
<input type="checkbox"/>	o=localOS	localOS	Custom

You can administer the following resources:

**Additional Properties**

- [Property extension repository](#)
- [Entry mapping repository](#)
- [Supported entity types](#)

**Related Items**

[Manage repositories](#) 3

[Tivoli Integrated Portal realms - inbound](#)

[Apply](#) [OK](#) [Reset](#) [Cancel](#)

Figure 7-39 Federated repository

Launch “Manage repository” (3) (Figure 7-39), then the panel in Figure 7-40 on page 494 is displayed.

**Note:** The two already entered repositories “InternalFileRepository” and “LocalOS” should not be deleted; they cannot be reentered into the Tivoli Integrated Portal. Then, InternalFileRepository is the backup user for access to Tivoli Integrated Portal.

Click **Add** to start entering information about and how to connect to AD repository. In Figure 7-40 on page 494, we can see the trail of bread crumbs expanding (1).



Figure 7-40 Manage ISC Federated Repository

In the Repository window, there are several things to be entered (Figure 7-41 on page 495):

- ▶ “Realm name”: Should be something meaningful for the AD, for example the domain name
- ▶ “Directory type”: Choose “Microsoft Active Directory”
- ▶ “Primary Hostname”: The FQDN of the Domain Controller running the AD
- ▶ “BIND distinguished name”: The path to the BIND user in the AD
- ▶ “BIND password”: The BIND user’s password for connection to the AD

All the preceding information should have been entered into Table 7-1 on page 484.

Optionally, enter a second AD server, which should be done to prevent a single point of failure (SPOF). Below “Primary hostname”, there is an “Add” button. Next to that, complete the FQDN and port name for the secondary AD controller. The port is normally 389.



Enter Name of Repository (1), Type of AD (2), AD server (3), backup AD server (4), BIND user ID, password (5). See Figure 7-41.

Global security

Global security > Federated repositories > Manage repositories > New

Specifies the configuration for secure access to a Lightweight Directory Access Protocol (LDAP) repository with optional failover servers.

General Properties

\* Repository identifier

cavenet

LDAP server

\* Directory type

IBM Tivoli Directory Server

\* Primary host name

cavedc1.cavenet.lan

Port

389

Failover server used when primary is not available:

Delete

Select

Failover Host Name

Port

You can administer the following resources:

☐

cavedc2.cavenet.lan

389

Add

Support referrals to other LDAP servers

ignore

Security

Bind distinguished name

CN=TPC,CN=Users,DC=cavenet,DC=lan

Bind password

\*\*\*\*\*

Login properties

uid

LDAP attribute for Kerberos principal name

Certificate mapping

EXACT\_DN

Certificate filter

☐ Require SSL communications

☒ Centrally managed

☐ Use specific SSL alias

NodeDefaultSSLSettings

The additional properties will not be available until the general properties for this item are applied or saved.

Additional Properties

Performance

LDAP entity types

Group attribute definition

Apply

OK

Reset

Cancel

Figure 7-41 Example of Repository

Then, click **Apply** if the entered data is valid. The top of the window says “Save”, as shown in Figure 7-42.

Global security

Messages

Changes have been made to your local configuration. You can:

Save directly to the master configuration.

Review changes before saving or discarding.

The server may need to be restarted for these changes to take effect.

Global security > Federated repositories > Manage repositories > cavenet

Specifies the configuration for secure access to a Lightweight Directory Access Protocol (LDAP) repository with optional failover servers.

General Properties

Figure 7-42 Save entered information

In case invalid information is entered, various error messages are displayed, as shown in Figure 7-43.



Figure 7-43 Repository error messages

Correct the information. The message in Figure 7-43 normally appears when either “Distinguished Name for BIND user” or password is incorrect. When corrected, press **Apply** and try again.

Next, add the new LDAP definition to the Federated Repository configuration. This task is completed from the window “Federated Repository” (Figure 7-39 on page 493). Click “Add base to realm” and you will see Figure 7-44.

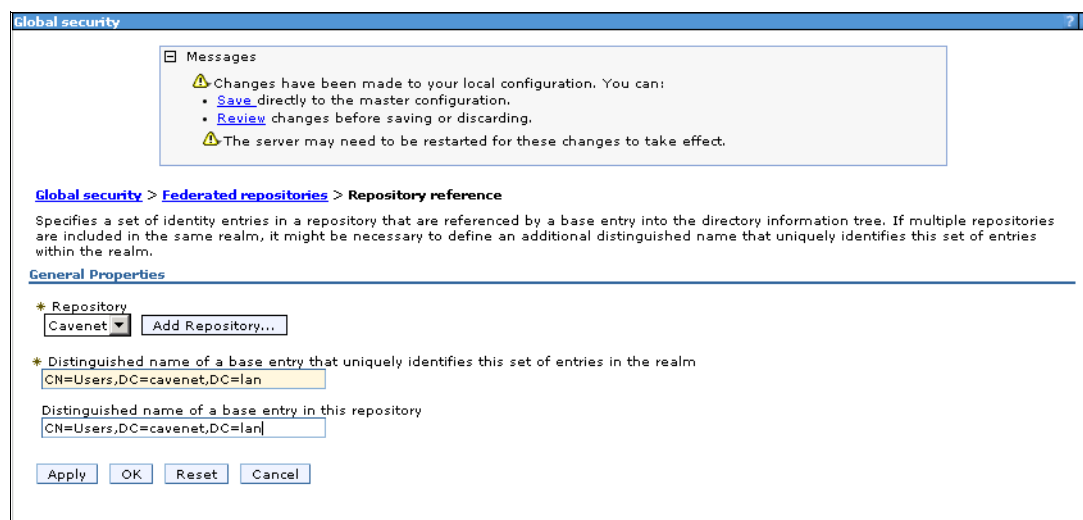


Figure 7-44 Example of realm

The default is adding the newly added LDAP repository. Information about what realm to use can be found in Table 7-1 on page 484 as the value for “Distinguished Name for realm of TPC group(s)”. Normally, information about “Distinguished Name for realm of TPC group(s)” is entered into both fields. Click **Apply** if the information provided is valid in the AD. It is possible to save the information, and we do so.

The Federated Repository now has three entries as seen in the lower left side of Figure 7-45 on page 497. Leave all of them because the bottom two cannot be reentered. They are respectively the Tivoli Integrated Portal File Repository, which is the Tivoli Integrated Portal’s own internal user database, and localOS is the operating system’s user repository.

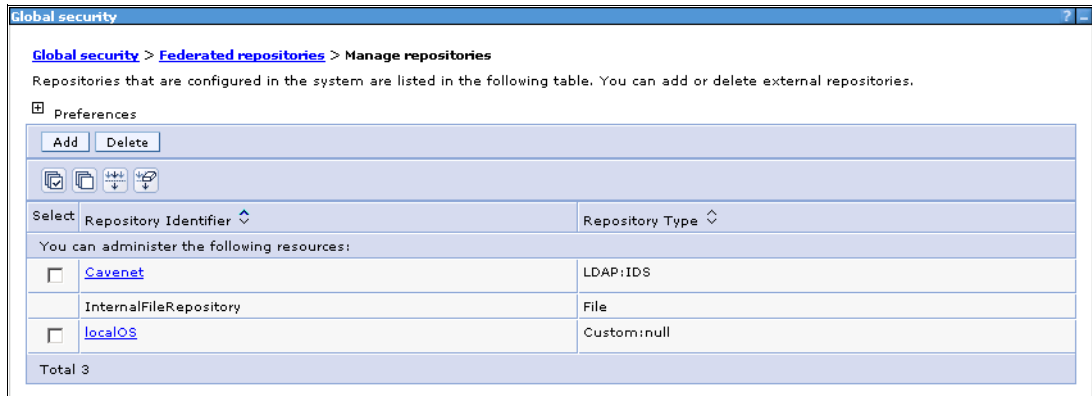


Figure 7-45 Federated Repository with LDAP

Returning to first panel, we do a last **Apply** and **Save** the configuration to the master configuration file. Next, restart the Tivoli Integrated Portal service. On Windows, this is from the service panel (see Figure 7-46). The restart of the Tivoli Integrated Portal service causes the Tivoli Integrated Portal WebSphere Application Server to synchronize with the Tivoli Storage Productivity Center WebSphere Application Server, thereby enabling Tivoli Storage Productivity Center for access of LDAP users.

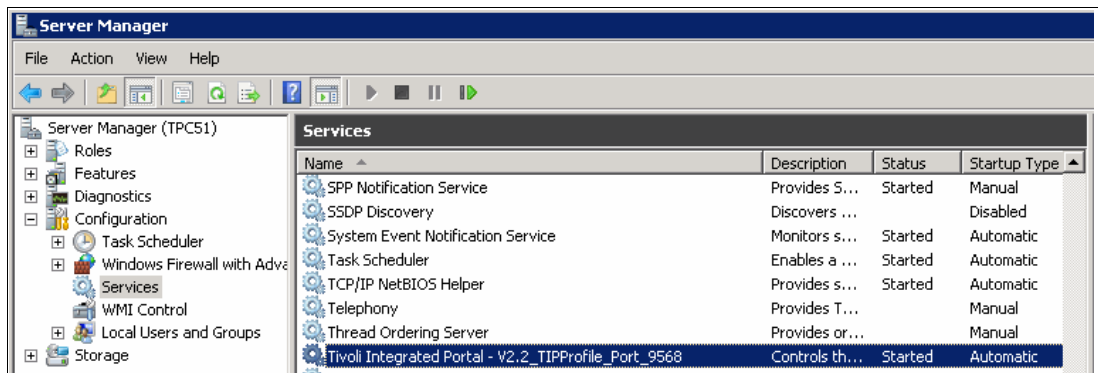


Figure 7-46 Tivoli Integrated Portal Services

When service has been restarted, log in to Tivoli Integrated Portal to verify that LDAP is working. Tivoli Integrated Portal is accessed at:

`https://localhost:9569/ibm/console`

In case the Tivoli Integrated Portal service is not starting, see 8.1.4, “Names of Tivoli Storage Productivity Center services” on page 535. Restart of Tivoli Integrated Portal can be viewed in the log file for Tivoli Integrated Portal located at:

`C:\Program Files\IBM\tipv2\profiles\TIPProfile\logs\server1\SystemOut`

See output example in Example 7-10.

*Example 7-10 Tivoli Integrated Portal log file example*

```
...
[29-06-12 01:57:27:243 CEST] 00000000 WsServerImpl A WSVR0001I: Server server1
open for e-business
[29-06-12 01:58:17:974 CEST] 0000003e SystemOut 0 JMXConnectorServer started
at: service:jmx:hessian://tpc51:9568/tar/f/hessian
```

[29-06-12 01:58:18:848 CEST] 0000003e SystemOut 0 The dispatcher is ready to process requests.

When Tivoli Integrated Portal service has been restarted, log in to the Tivoli Integrated Portal portal and navigate to “Users and Groups” (1), as shown in Figure 7-47, enter the group to search for (2). In our example, the group is called “TPC Users”. Enter the entire name or a portion of the name with wildcards. Verify result (3) that the output is from the AD, is not <hostname>\<username>, or contains CN=localOS, but actually contains some CNs, like when we configured LDAP.

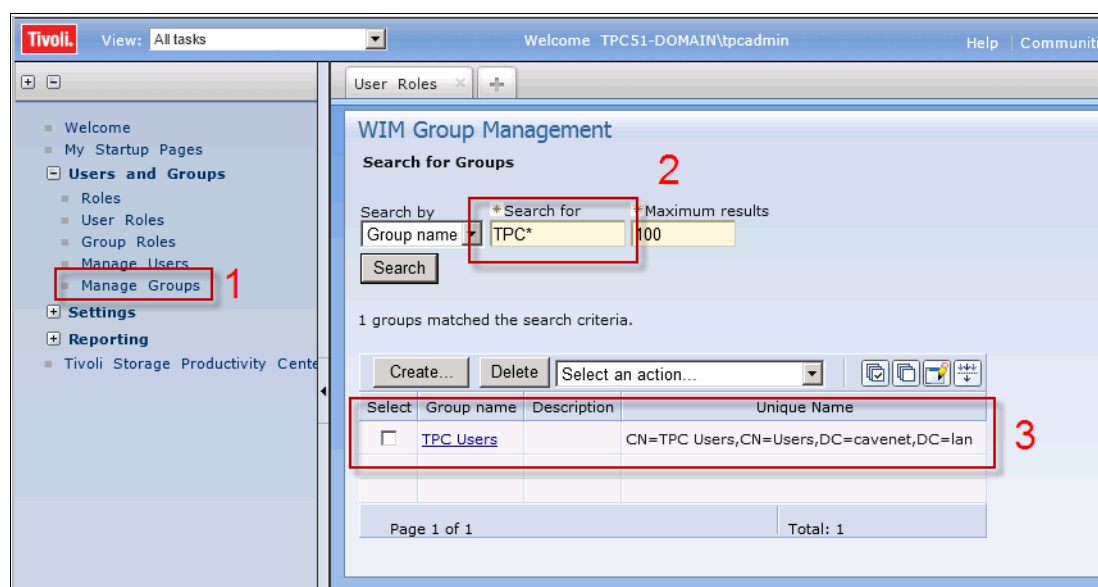


Figure 7-47 LDAP verification in Tivoli Integrated Portal

If our search, the Tivoli Integrated Portal returned a single member from the AD. We know that it is from the AD because in the column “Unique Name” in Figure 7-47, we see the last is the AD, and does not contain “LocalOS” or “FileRepository”.

We have now completed the LDAP configuration task. Next, start using the AD for centralized user management in the various Tivoli Storage Productivity Center components.

## 7.5 Tivoli Storage Productivity Center users and authentication

In Tivoli Storage Productivity Center V5.1, we have two new programs, a new web GUI and Tivoli Common Reporting and Cognos, together with some GUIs we also had in Tivoli Storage Productivity Center V4. To summarize their functions:

- ▶ Web GUI for overview and presentation of various metrics from TPCDB
- ▶ Stand-alone GUI for configuration
- ▶ Tivoli Storage Productivity Center for Replication for replication
- ▶ Tivoli Common Reporting and Cognos for advanced reporting

Each component has their own access to the new web GUI performed by:

- ▶ Users are authenticated against the Tivoli Integrated Portal.
- ▶ Tivoli Integrated Portal authenticates either against File Repository, Local OS, or LDAP/AD.

- ▶ Users credentials are obtained from TPCDB where the mapping between Tivoli Storage Productivity Center roles and user/groups are stored.
- ▶ User is presented with the menu item that is equivalent to what the credentials obtained by the WebSphere Application Server allows.

**Note:** All members of the repository have access to the new web GUI, but need to be granted specific roles for accessing resources outside the web GUI.

Each component has their own access to the Tivoli Storage Productivity Center for Replication GUI, the Tivoli Storage Productivity Center stand-alone GUI, and CLI programs. Access is performed as described here:

- ▶ User access requests are sent to Replication or Device Server
- ▶ Requests are first authenticated against File Repository or Local OS within Replication or Device Server

If a user does not exist in the above repositories, a request is sent to Tivoli Integrated Portal for LDAP/AD authentication.

The authentication mechanism described above is the reason that Local and File Registry users are able to log in to Tivoli Storage Productivity Center and Tivoli Storage Productivity Center for Replication even if Tivoli Integrated Portal is down.

### 7.5.1 Configuring users in Tivoli Integrated Portal

Tivoli Integrated Portal is a very central component in Tivoli Storage Productivity Center user management. All components will go through the Tivoli Integrated Portal for authentication of users against an external user repository, like LDAP/AD. This also means that it is not possible to authenticate users against the external repository in case Tivoli Integrated Portal is down. That is why is it recommended having a mix of External and Local OS users, and also the reason that the FileRepository user, tpcFileRegistryUser has been created to be able to and allow access even when Tivoli Integrated Portal is down.

Tivoli Integrated Portal has some built-in roles available, which grant access to different Tivoli Storage Productivity Center components. The main roles are:

- ▶ Administrator: Grants access to configure the Tivoli Integrated Portal (but not the WebSphere Application Server/ISC)
- ▶ All authenticated: Everyone who can access the Tivoli Integrated Portal
- ▶ chartAdministrator, chartCreator, chartViewer: Roles to be used with Tivoli Common Reporting access through Tivoli Integrated Portal
- ▶ iscadmins: Grants access to configure the WebSphere Application Server/ISC, for example to configure the Federated Repository
- ▶ Monitor and operator: Grants limited access to the Tivoli Integrated Portal
- ▶ tcrPortalOperator: Allows access to Tivoli Common Reporting through the Tivoli Integrated Portal by using a menu item

To grant specific users and groups access to Tivoli Integrated Portal, log in to Tivoli Integrated Portal with administrative privileges, and go to “Users and Groups” → “Roles” (1). See Figure 7-48 on page 500.

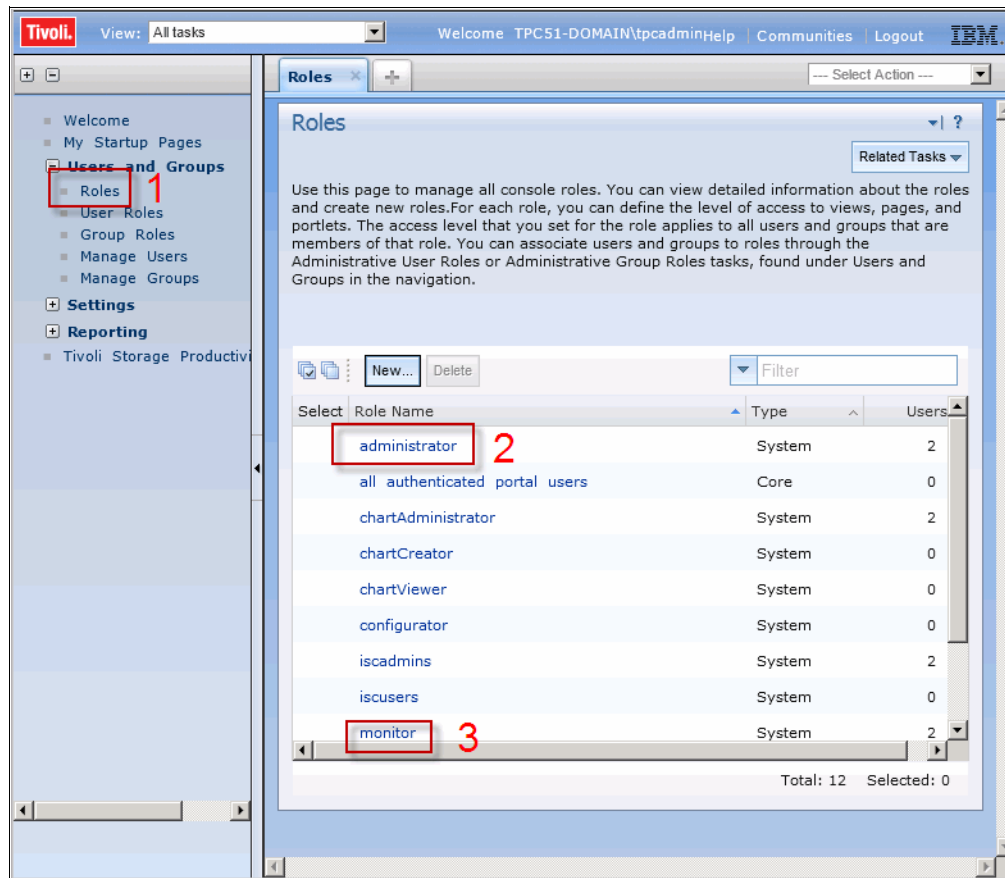


Figure 7-48 Tivoli Integrated Portal manage roles

From the right window select a role, either administrator (2) or monitor (3). It opens a new window as shown in Figure 7-49 on page 501.



We search for the name of the group “TPC\*” (1), note it accepts wildcards, then press **search** (2). The result of the search in both Local OS and AD is displayed (3). Select the groups to be granted the administrator role, finally click **Add** (4).

For a complete Administrator role (like tpcFileRepositoryUser or Common UserID), the group needs to be granted the following roles (for details about the roles, see the start of this section):

- ▶ tcrPortalOperator
- ▶ monitor
- ▶ administrator
- ▶ iscadmins
- ▶ chartAdministrator

Simply repeat the steps in Figure 7-50 on page 501 for each role. Verify the configuration by logging in to Tivoli Integrated Portal a user from the group, and see that the role to group mapping is working as intended.

## 7.5.2 Configuring Tivoli Storage Productivity Center stand-alone GUI

Stand-alone GUI allows for matching of users to various roles. The roles can be divided into three types:

- ▶ *Superuser*, which is the role that allows full control over Tivoli Storage Productivity Center, including user management.
- ▶ *Administrators*, are the roles to configure the different components. There is an Administrator role for tape, data, and disk. Membership of one of them will allow you to administer that component.
- ▶ *Operators*, which are the lowest access, are also divided into a role for each component, like Administrators. This allows access for doing basic tasks.

The roles allow for the possibility to have differentiated user access, so not all have full access. It is possible to map one or more roles to the same group. Which groups are available depend on the configuration that has been made. Default is Local OS groups and groups in the Tivoli Integrated Portal. With enabled external repositories, like LDAP/AD, it is possible to map the roles against the groups in the AD.

In our example, we map the roles in Tivoli Storage Productivity Center with the groups in the AD. Log in to Tivoli Storage Productivity Center stand-alone GUI, with administrative role, navigate to “Configuration → Role to group mapping” (1) in the Tivoli Storage Productivity Center role and click **Edit** (2). In the pop-up box, enter the name of the group and press **OK**, then click **Save** (3) (Figure 7-51 on page 503). If the group is recognized as a valid group (in either AD or Local OS), Tivoli Storage Productivity Center saves the configuration. Otherwise, an error message occurs, saying that the Tivoli Storage Productivity Center does not know the group entered.



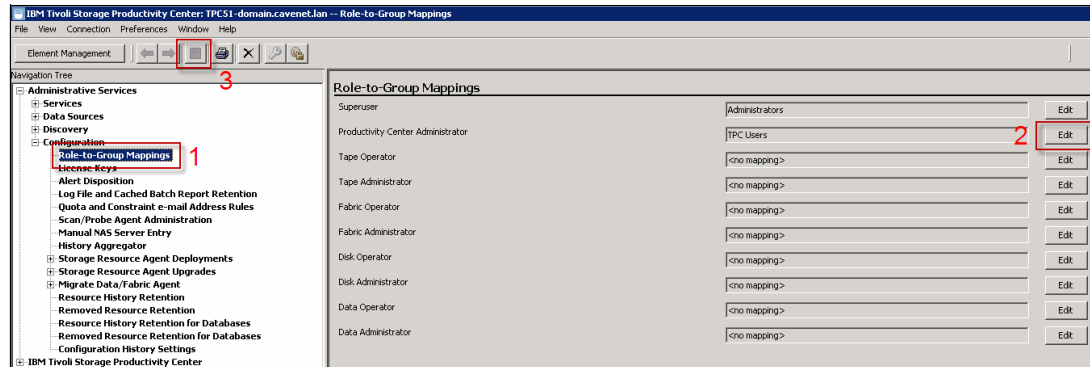


Figure 7-51 Tivoli Storage Productivity Center role configuration

Verify configuration by logging in to Tivoli Storage Productivity Center with a user from the new group, and see that the role to group mapping is working as intended.

**Note:** Ensure that there are no duplicated Tivoli Storage Productivity Center user names and group names across repositories. WebSphere Application Server will not allow these users to log in, and will throw an exception (CWWIM4538E Multiple principals were found for the “wimadmin” principal name) in the WebSphere Application Server logs.

### 7.5.3 Configuring Tivoli Storage Productivity Center for Replication

Tivoli Storage Productivity Center for Replication comes with different roles, which are based on the membership. A user will only be presented with the options his role allows:

- ▶ Administrator, who is the role for full access to Tivoli Storage Productivity Center for Replication
- ▶ Operator, is read-only access
- ▶ Monitor, limited access to Tivoli Storage Productivity Center for Replication

Tivoli Storage Productivity Center for Replication does not have its own user repository, but uses Tivoli Integrated Portal. This means that it is able to use all the users available for the Tivoli Integrated Portal. It also means users or groups have to be created in the Tivoli Integrated Portal FileRepository (locally in the Tivoli Integrated Portal) if that user or group is being granted access to Tivoli Storage Productivity Center for Replication.

We need to configure Tivoli Storage Productivity Center for Replication for user management, doing so by launching Tivoli Storage Productivity Center for Replication from “IBM Total Productivity Center” located in the start menu, or alternatively log in with administrative privileges to:

<https://<FQDN>:9559/CSM/>

Where “FQDN” is the name used during installation of Tivoli Storage Productivity Center.

Once logged in, navigate to **Administration** as shown in Figure 7-52 on page 504.

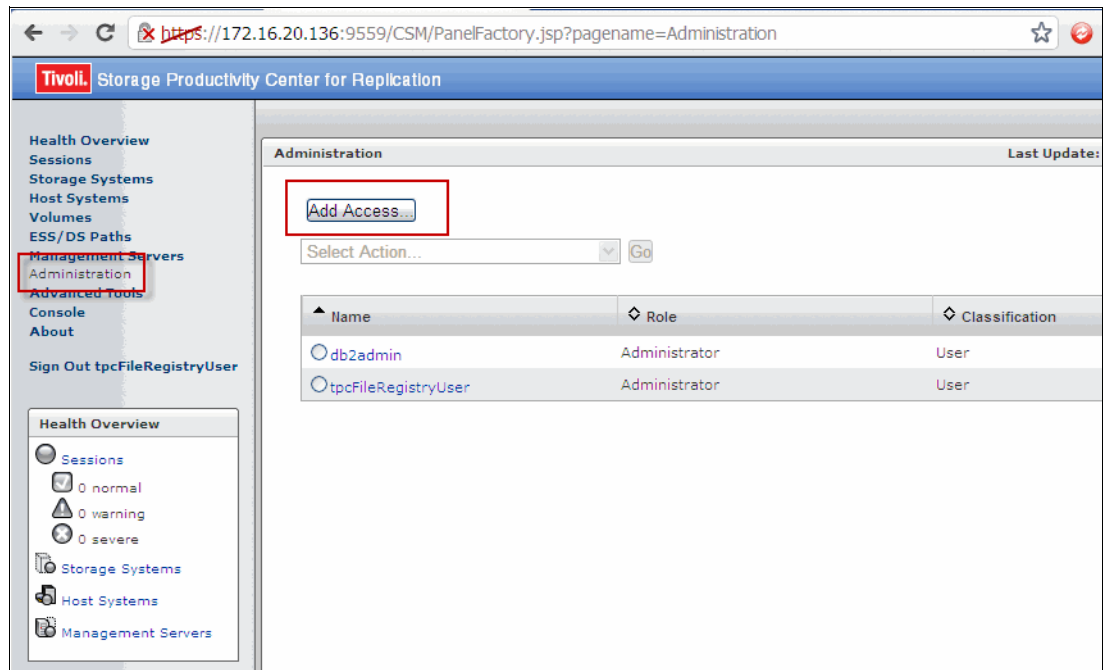


Figure 7-52 Tivoli Storage Productivity Center for Replication administration

Click **Add Access** to start the wizard helping with adding new users and groups to Tivoli Storage Productivity Center for Replication. See Figure 7-53.

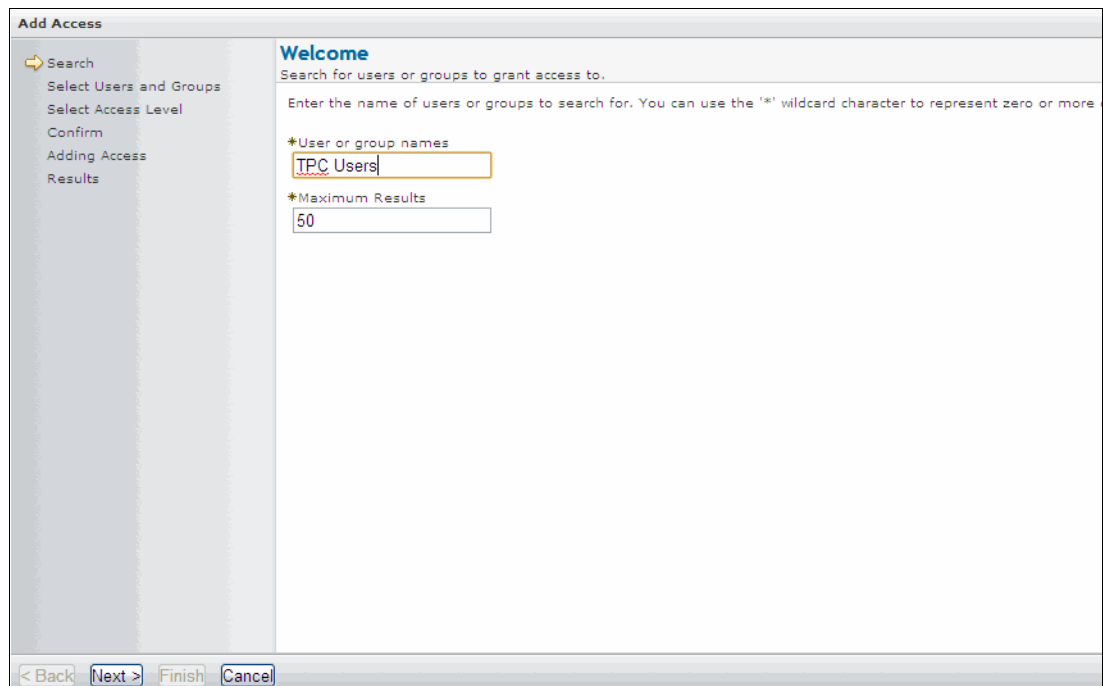


Figure 7-53 Tivoli Storage Productivity Center for Replication Add Access wizard

Add the name of the group or user to add. In our example, we use the same group as in Tivoli Storage Productivity Center, namely the “TPC Users” group.

Select the groups that are appropriate, then click **Next**, then select the “Access Level” to grant to the group. See Figure 7-54.

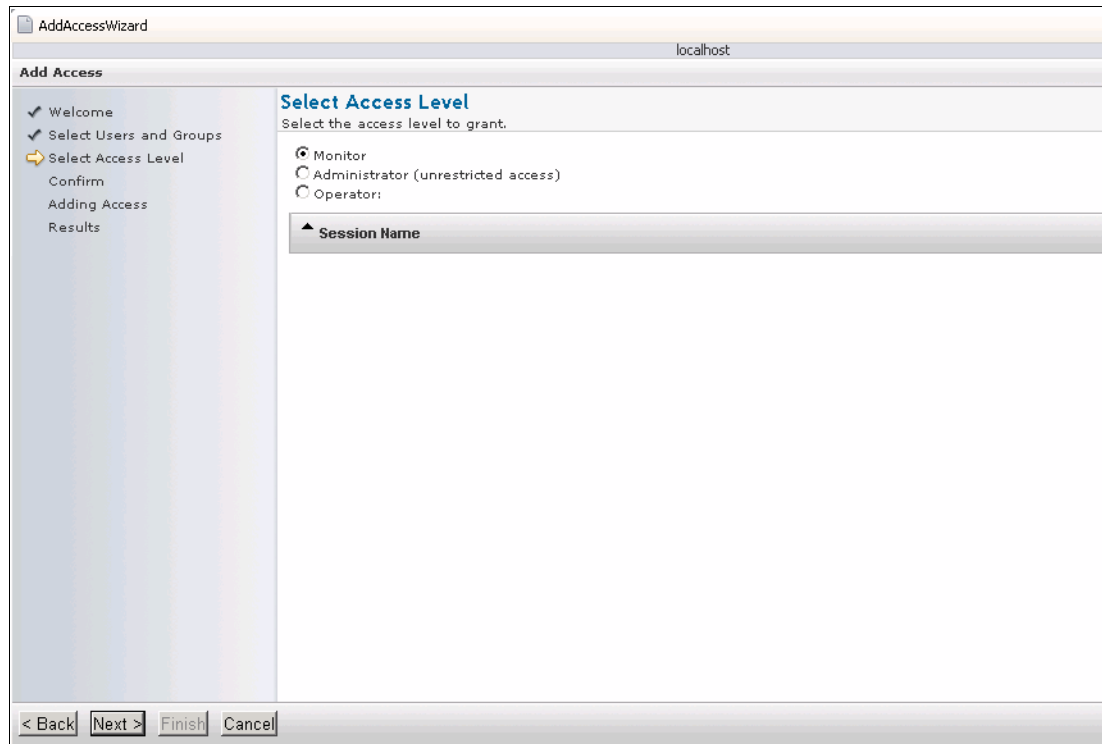


Figure 7-54 Tivoli Storage Productivity Center for Replication Add Access wizard, Select Access Level

Click **Next** and **Finish** as shown in Figure 7-55.

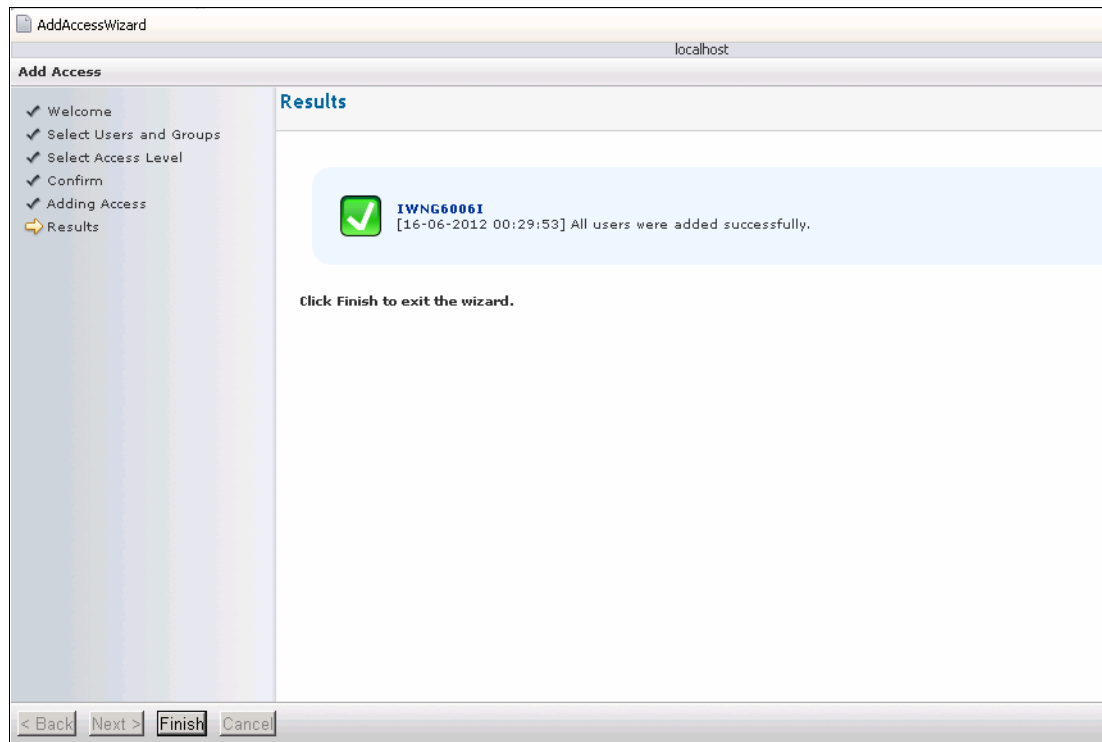


Figure 7-55 Tivoli Storage Productivity Center for Replication Add Access wizard, done

Verify configuration by logging in to Tivoli Storage Productivity Center for Replication with a user from the new group, and see that the role to group mapping is working as intended. It is possible to add individual users, following the preceding procedure for adding a group.

## 7.5.4 Configuring user in Tivoli Common Reporting

Tivoli Common Reporting and Cognos are used for advanced reporting. In Tivoli Storage Productivity Center V4, it was an add-on module for TCP, starting with Tivoli Storage Productivity Center V5.1 it is fully integrated Tivoli Storage Productivity Center. Like Tivoli Integrated Portal and Tivoli Storage Productivity Center for Replication, it has the possibility for using its own user repository, where both users and groups can be created. Because it is integrated into Tivoli Storage Productivity Center, it can also use the repositories that are available in Tivoli Integrated Portal, namely the Federated repository, for example LDAP/AD.

Tivoli Common Reporting and Cognos can either be launched as a separate program or from within Tivoli Integrated Portal. We will describe both scenarios starting by user management in Tivoli Common Reporting and Cognos.

Launch Tivoli Common Reporting either from Web GUI → Reporting, or directly on the URL:

<https://localhost:9569/tarf/servlet/component>

Next, start Administration by clicking “Launch” (1) → “Administration” (2). See Figure 7-56.

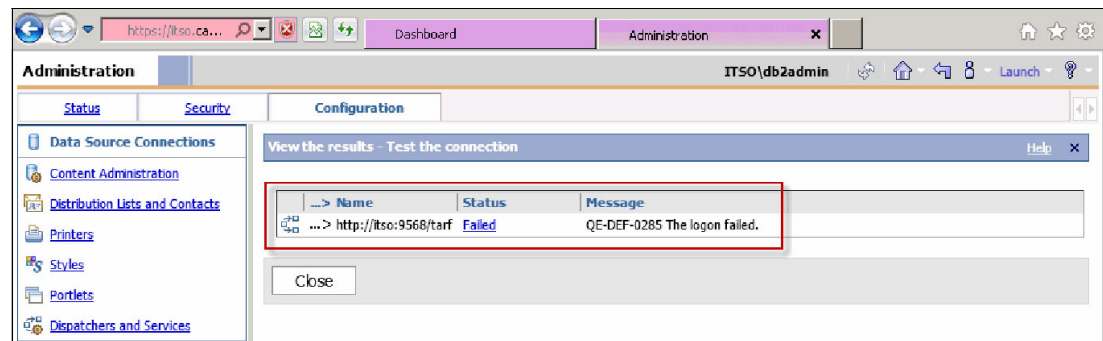


Figure 7-56 Tivoli Common Reporting launch administration

Then, go to **Security** by clicking (1). See Figure 7-57.

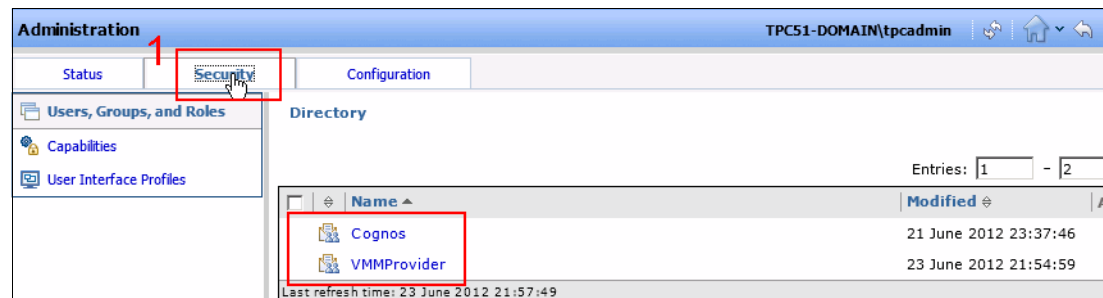


Figure 7-57 Tivoli Common Reporting security tab

We see two repositories in the red box, as shown in Figure 7-57. Cognos is the internal repository where all the roles reside, including one user named *anonymous*. The other repository “VMProvider” is the Tivoli Integrated Portal, meaning all the users known to Tivoli Integrated Portal, for example LDAP/AD users.

To add external users to existing roles, we select the “Cognos” repository. By default there are some credentials already granted. Tivoli Common Reporting and Cognos come with a predefined user, namely the “anonymous” user, and the group “Everyone”. The anonymous user is intended for read-only access to Tivoli Common Reporting and Cognos, where the Tivoli Common Reporting is a web portal for serving reports that should be available for all users, and not only authenticated users.

The “Everyone” group is as the name says, everyone with access to Tivoli Common Reporting. By default this group is member of “System Administrators” role, thereby granting all administrative rights to Tivoli Common Reporting.

**Note:** We recommend that access to System Administrators role is limited to less users than Everyone, namely the Common User ID, tpcFileRegistryUser, and local administrators or equivalent group. Local user and FileRepository user are added for fault tolerance, like the Tivoli Integrated Portal.

To add new members to the “System Administrators” role, we need to find it. The role is in the Cognos repository, so we select that and get to a new window with all the roles in Tivoli Common Reporting. See Figure 7-58.

Again, we see in the top of the window (1) a trail of bread crumbs, where it is possible to see where we are, and go back to previous menus by selecting them.

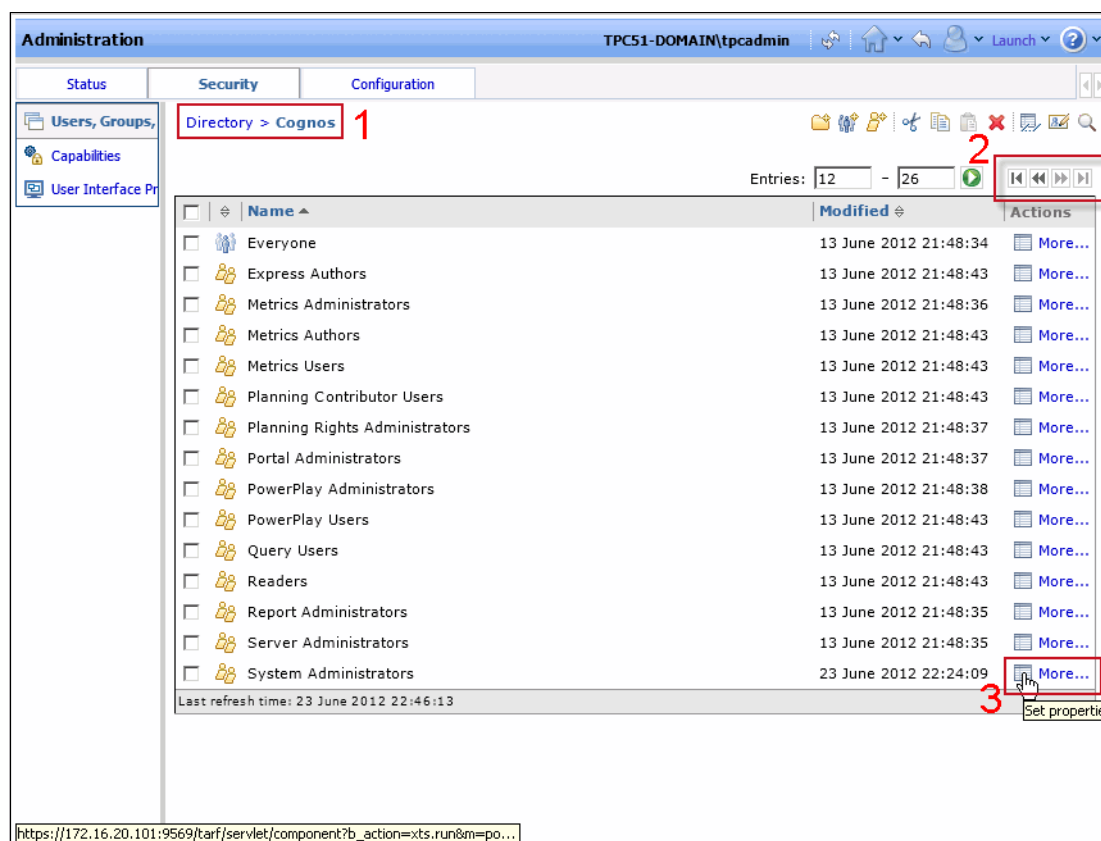


Figure 7-58 Tivoli Common Reporting Cognos system administrator role

There is more than one page of roles, so “System Administrators” will not appear on the first. Therefore, we go to second panel by selecting the right-side pointing arrows (2), which will bring us either to the next page or last page, in our case it is the same. Then, we click “properties” for the role (3), which brings us to the “Set properties” panel. See Figure 7-59.

**Set properties - System Administrators** Help

**General** **Members** **Permissions**

Specify the properties for this entry.

Type: Role Location: Directory > Cognos [View the search path, ID and U](#)

Owner: None [Make me the owner](#)

Created: 13 June 2012 21:48:35

Modified: 23 June 2012 22:24:09

Icon: Standard [Edit...](#)

☐ Disable this entry

The name, screen tip and description are shown for the selected language.

Language: English [Remove values for this language](#)

Name:

Description:

Screen tip:

Advanced routing

Routing sets: No values saved [Set...](#)

Figure 7-59 Tivoli Common Reporting Set properties panel

We go to members by clicking the “Members” tab in Figure 7-59. This will set properties for the “System Administrators” role Figure 7-60.

**Set properties - System Administrators** Help

**General** **Members** **Permissions**

Select the members of this entry.

Entries: 1 - 1

Name	Type
<input type="checkbox"/> Everyone	Group

Figure 7-60 Tivoli Common Reporting System Administrators role

In the left at (1), we can see the current users assigned the “System Administrators” role. At the right (2), we can either add or remove users. We go to **Add**. See Figure 7-61 on page 509.

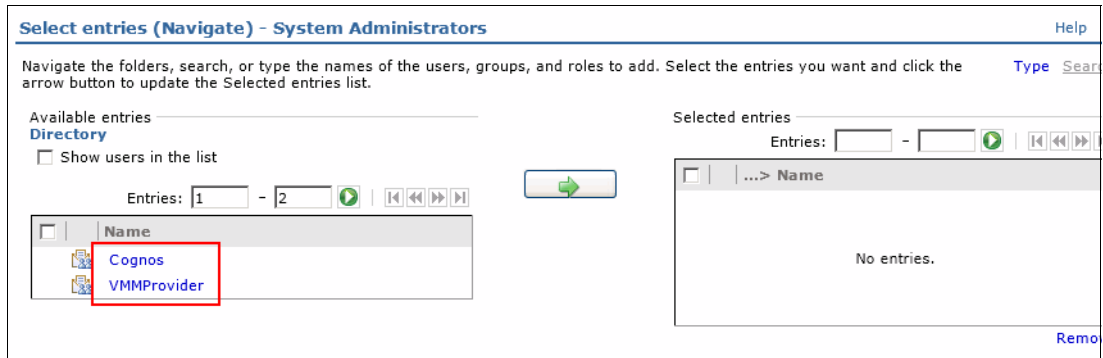


Figure 7-61 Tivoli Common Reporting Select entries

From here we select which repository to add users and groups from, either the internal Tivoli Common Reporting and Cognos repository (Cognos) or the external Tivoli Integrated Portal repository (VMProvider). In our example, we like to add the external AD group named “TPC Users”, so we select “VMProvider”. This brings us to Figure 7-62 where we can start searching for users to add to the role.

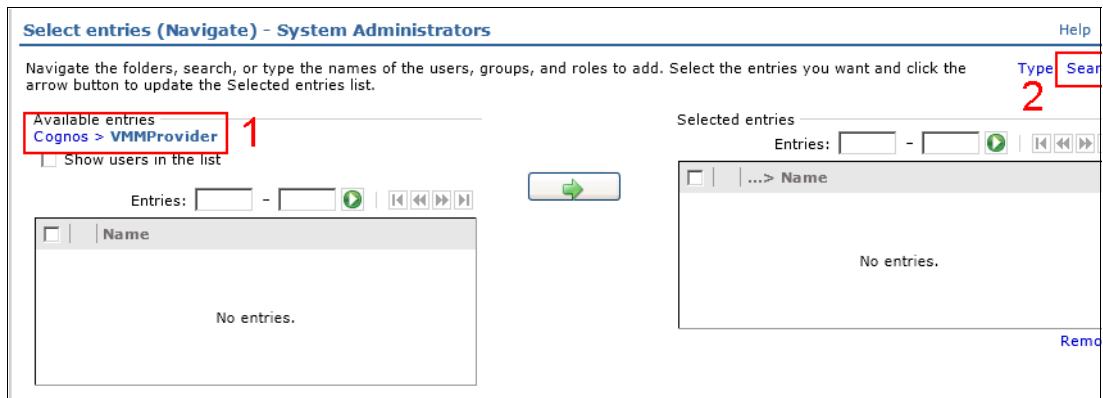


Figure 7-62 Tivoli Common Reporting Select entries, search

We notice at (1) again the bread crumbs, which are used widely all over the different Tivoli Storage Productivity Center components. We click **Search** (2) to start looking for our external users in Figure 7-63.

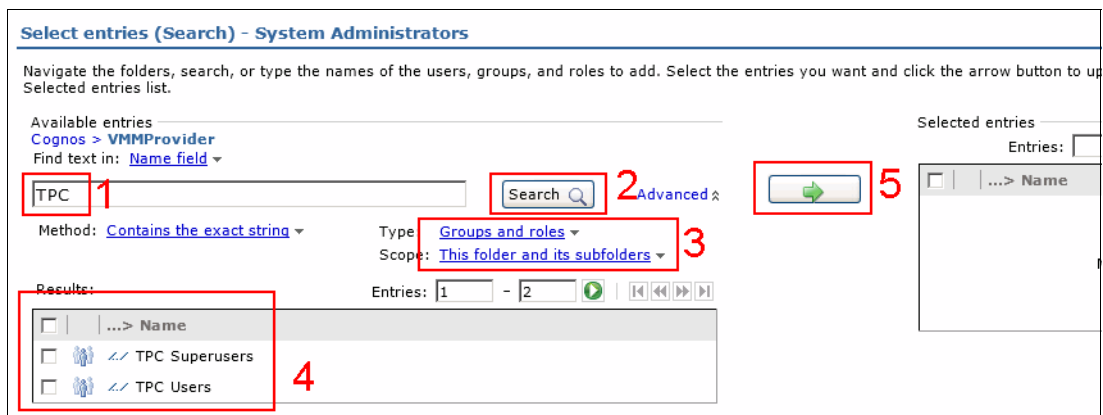


Figure 7-63 Tivoli Common Reporting select and add users

This is the main panel for adding users, and there are many possibilities, and options.

At (1) we enter the search string. This does not take a wildcard. It operates like Windows System Management where it is possible to enter a portion of the name you are searching for. In our example, we enter “TPC” as the search string, even though it is not case-sensitive.

We start the search by clicking the **Search** button at (2). In our case the Group appears at (4). In case no group or users appear, check the search string at (1) and then fine-tune the search criteria at (3) where it is possible to search for either “Groups”, which is default, or “Users”, or both by selecting from the drop-down menu.

Because we found the group that we are looking for, we select it by clicking the check box that is left of the name, then the add arrow at (5). Figure 7-64 is where you add groups and users.

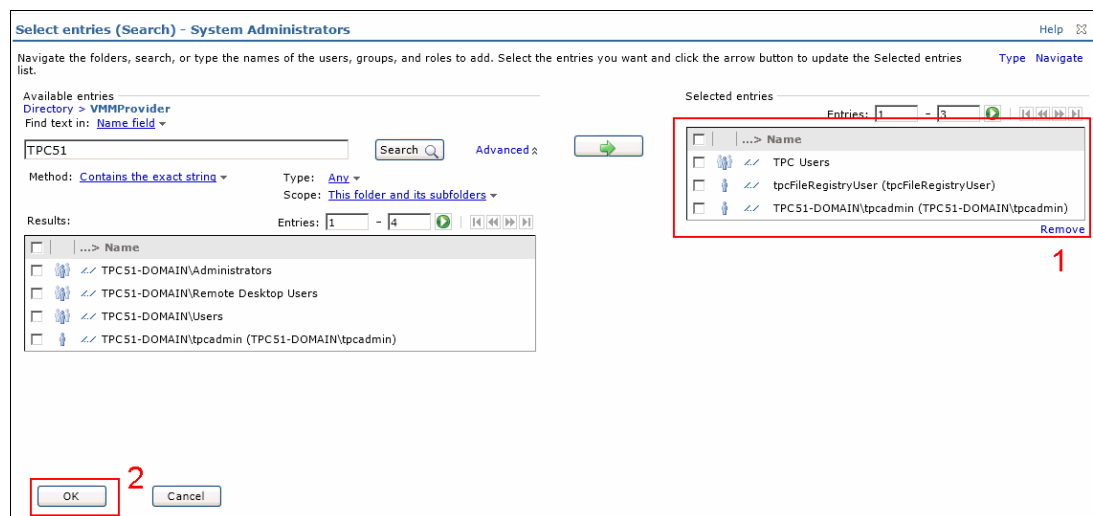


Figure 7-64 Tivoli Common Reporting add groups and users

We continue the search for our users, and add the ones that need to be granted “System Administrators” role. In our example it is:

- ▶ Tivoli Storage Productivity Center Users, which are the AD group with users that should administer Tivoli Common Reporting
- ▶ tpcFileRegistryUser, the Tivoli Integrated Portal backup user
- ▶ TPC51-DOMAIN\tpcadmin, which is the local OS user that has been used as the Common User ID. Notice that we get the host name (TPC51-DOMAIN) in front of the user

The above three users show the different possibilities for user repositories, AD, Tivoli Integrated Portal internal, and Local OS. When all users and groups have been added, we end by removing the user “Everyone” by selecting the check box next to its name in the red box (1) in Figure 7-64. Then, click remove just above (1) in Figure 7-64. We end with the users in Figure 7-64. Finally, we click **OK** in the left corner (2), which saves the configuration.

Verify the configuration by logging in to Tivoli Common Reporting and Cognos, with a user from the “TPC Users” group, and verify that the role to group mapping is working as intended.

## 7.5.5 Configuring Tivoli Common Reporting users in Tivoli Integrated Portal

Besides assigning groups and users to roles in Tivoli Common Reporting, it is also possible to keep users within the Tivoli Integrated Portal, and never have them to log in to Tivoli Common Reporting.



Access control to Tivoli Common Reporting in Tivoli Integrated Portal is controlled by four different roles:

- ▶ tcrPortalOperator
- ▶ chartAdministrator
- ▶ chartCreator
- ▶ chartViewer

This will give the users or groups the “Common Reporting” option when logging into the Tivoli Integrated Portal. See Figure 7-65.

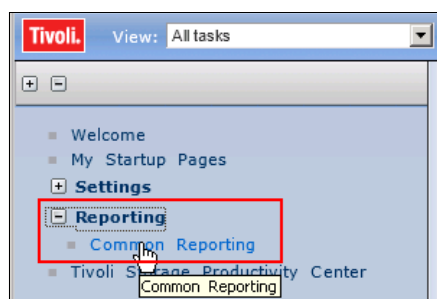


Figure 7-65 Tivoli Integrated Portal Tivoli Common Reporting reporting

When clicking “Common Reporting”, Tivoli Common Reporting and Cognos will start in the window to the right. See Figure 7-66.

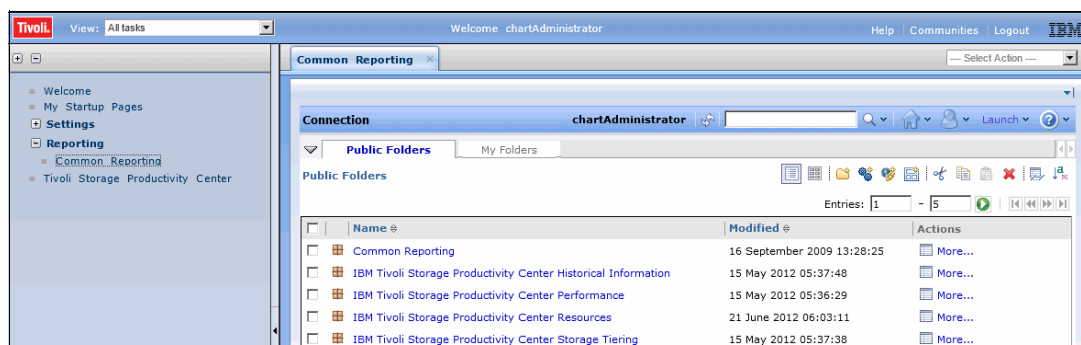


Figure 7-66 Tivoli Common Reporting and Cognos in Tivoli Integrated Portal

From this window, it is possible to operate Tivoli Common Reporting and Cognos just like you started it, except it is a little limited space. The advantage is that users do not have to log in to Tivoli Common Reporting and Cognos.

Besides the role to access Tivoli Common Reporting and Cognos, users need a Tivoli Common Reporting and Cognos role assigned to their group, which determines the access level in Tivoli Common Reporting and Cognos. Depending on the access level that is needed, grant the user one of the following roles:

- ▶ chartAdministrator
- ▶ chartCreator
- ▶ chartViewer

Access to Tivoli Storage Productivity Center Reporting and Cognos is granted like Administrative privileges to Tivoli Integrated Portal 7.5.4, “Configuring user in Tivoli Common Reporting” on page 506.

Verify configuration by logging in to Tivoli Storage Productivity Center Reporting and Cognos with a user from the group, and see that the role to group mapping is working as intended.

### **7.5.6 Access to the web GUI**

No configuration is needed. All authenticated users of the repository have access to the web GUI. When components outside the new GUI are launched, for example Reporting (Tivoli Common Reporting), the user will be presented with the public reports, and what the user ID or group is mapped to of Tivoli Common Reporting roles.

## **7.6 Install Tivoli Storage Productivity Center certificate**

Often when you work with Tivoli Storage Productivity Center 5.1 GUI, you get notified that there is a certificate conflict. This happens because we are trying to establish a secure connection to a site where the certificate is not known.

The reason for this problem is that the certificate was issued by IBM development, which is not listed as a trusted certificate authority.

### **7.6.1 Install certificate into Internet Explorer**

To overcome the problem with the certificate that has been issued by a not trusted certificate authority, we need to tell Internet Explorer (IE) to trust this certificate from now on, by following these steps.

Launch the web GUI for Tivoli Storage Productivity Center 5.1, either from the start menu Figure 7-67 on page 513. Or, on the URL: <https://localhost:9569/srm>

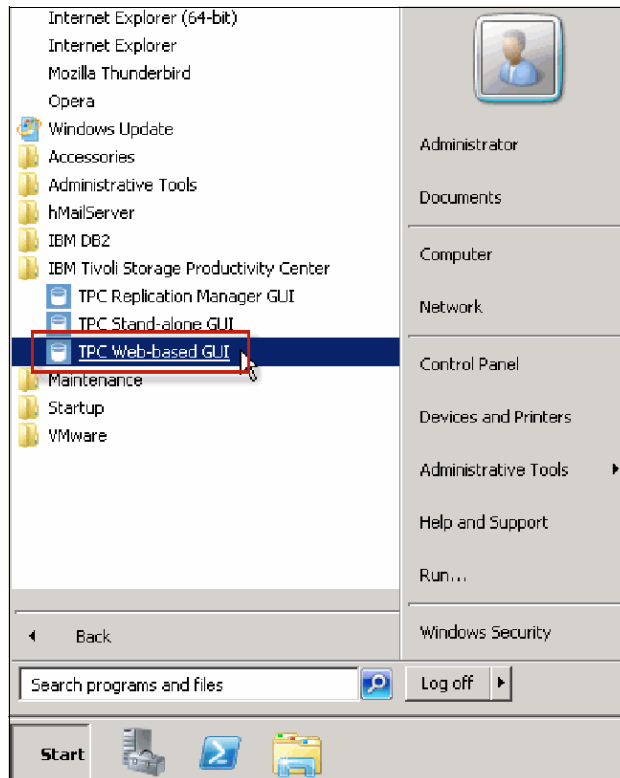


Figure 7-67 Start web GUI from start menu

This brings us to a page, see Figure 7-68 that says “There is a problem with this website's security certificate.” Most of the time there are two reasons for this, which are shown in the top of the message that is being displayed. See Figure 7-68.

- The security certificate presented by this website was not issued by a trusted certificate authority.
- The security certificate presented by this website was issued for a different website's address.

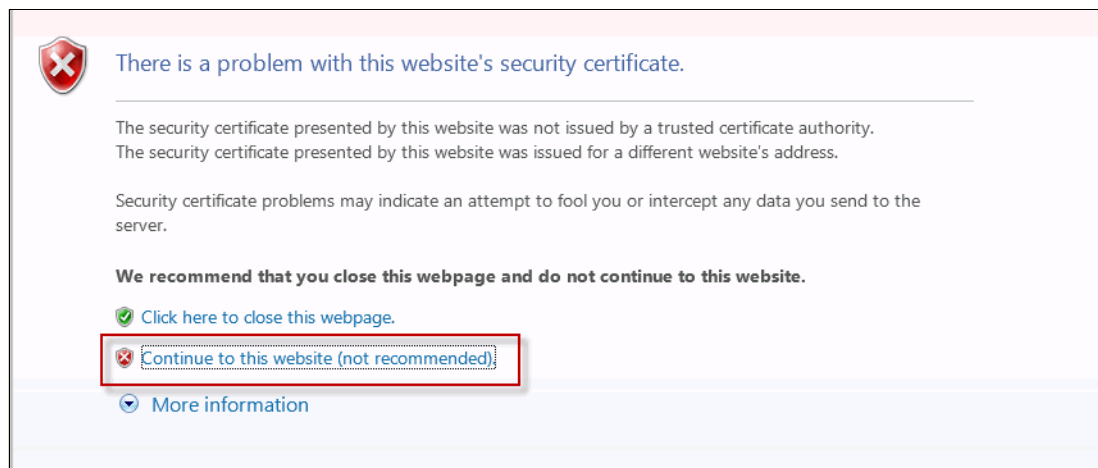


Figure 7-68 Internet Explorer certificate error

We continue to the website by clicking the red box that is shown in Figure 7-68, even though it is not recommended. This brings us to the next window (Figure 7-69 on page 514) where we

can import the Tivoli Storage Productivity Center certificate issued by IBM, so we in the future do not see this error.

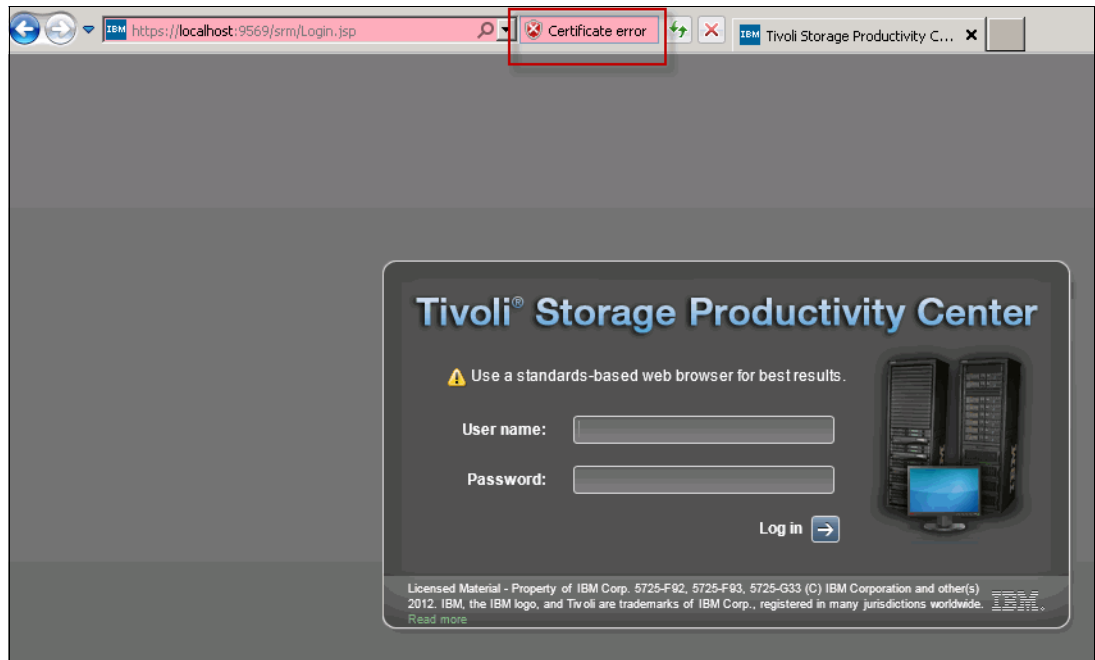


Figure 7-69 Tivoli Storage Productivity Center web GUI login with certificate error

To start importing the certificate, click the box that states “Certificate Error”, which is the red box in Figure 7-69. It might be needed to move the tabs further right so that the field can be read.

After you clicked the “Certificate error” field, we click “view certificates” (Figure 7-70).

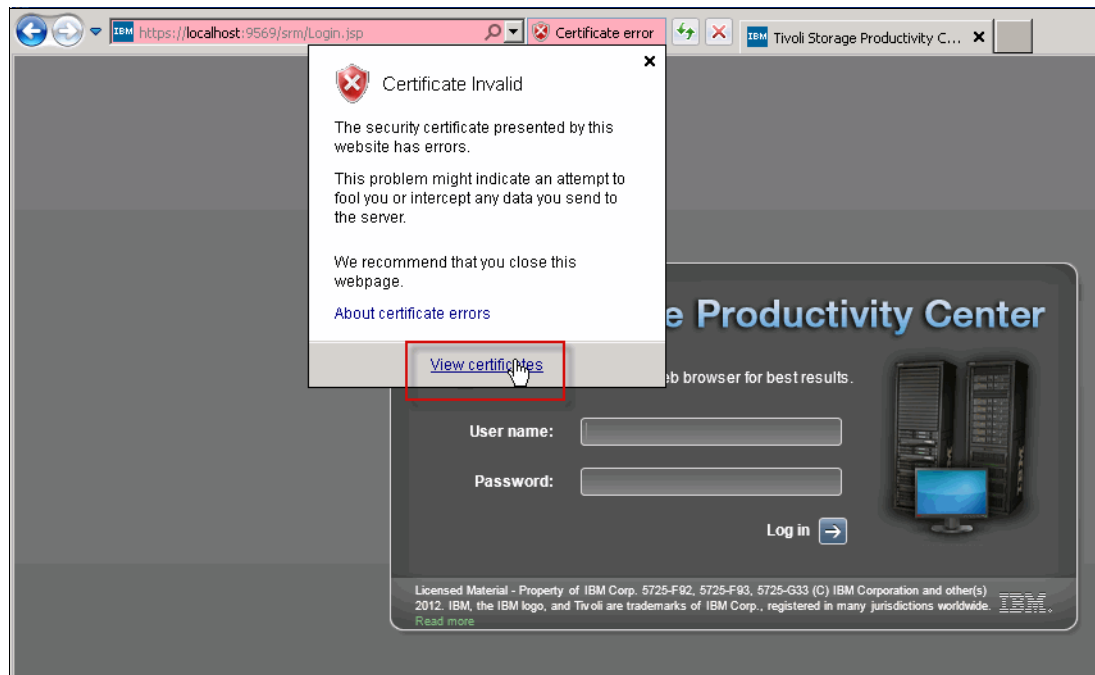


Figure 7-70 View certificate

The next window is the possibility to “Install Certificate”, which we do in Figure 7-71. This takes us through the procedure to import and store the certificate as a trusted certificate.



Figure 7-71 Certification path

Notice the text in (1) that says the certificate is issued to and from the Tivoli Storage Productivity Center Server that we are working on. We continue by clicking (2) so that we can see which certificate has a problem.

**Note:** If the “Install Certificate” button is disabled or missing, it means that you do not have sufficient rights. Close Internet Explorer and restart it as an administrator.

The window’s “Certification Path” shows the status of the certificates. See Figure 7-72 on page 516. We see that the first (bottom one) selected is OK, and we therefore do not need to do anything further with this.

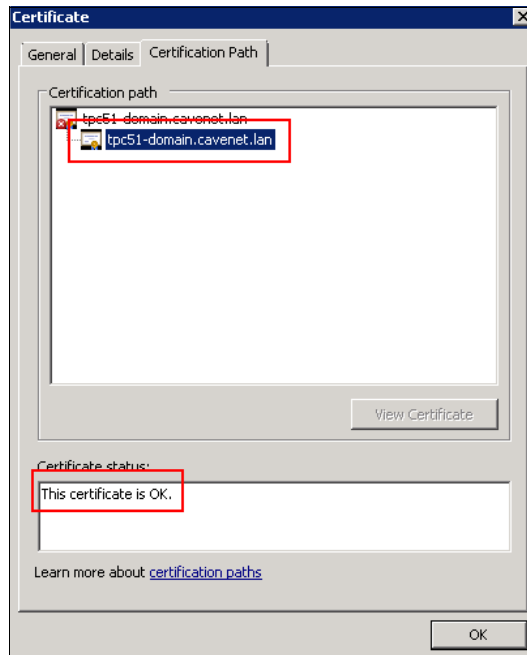


Figure 7-72 Certificate OK

We select the second (1) in Figure 7-73. That certificate is not OK. The error message (2) is that the certificate is not in the “Trusted Root Certification Authorities store”. We then add it to this store by clicking “View certificate” (3).

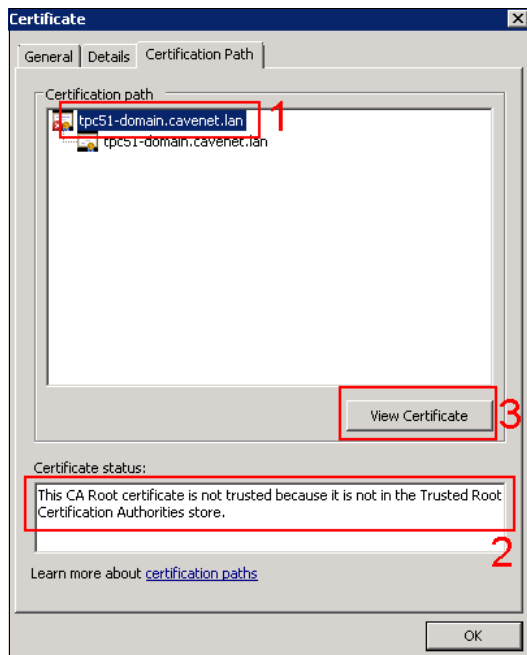


Figure 7-73 Certificate not OK

When the “Certificate Import Wizard” starts (Figure 7-74 on page 517), we follow the instructions on the window, and install in the default certificate store.

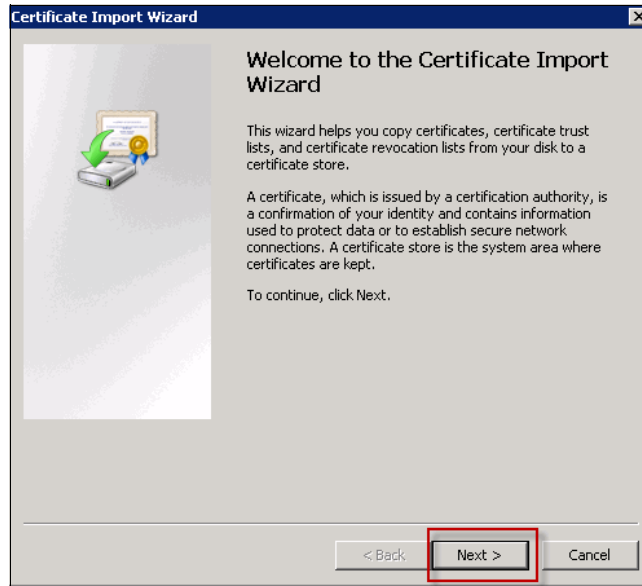


Figure 7-74 Certificate Wizard page 1

We need to place the certificate in the “Trusted Root Certificate” folder, so we select the bottom of the two options (1), and click “Browse” (2). See Figure 7-75.

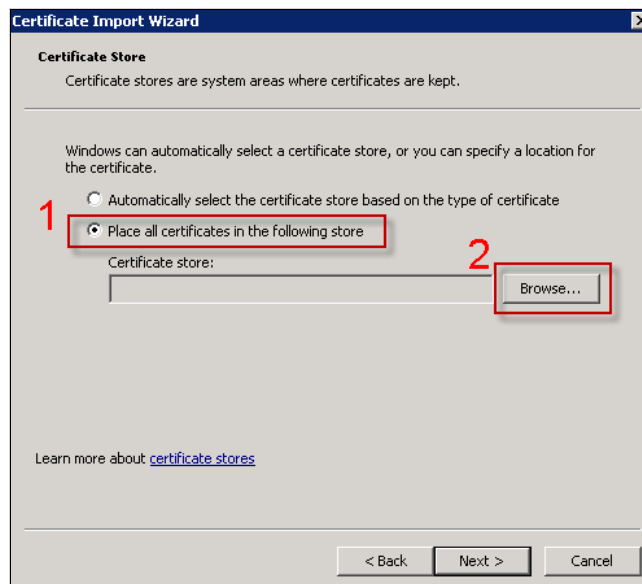


Figure 7-75 Certificate wizard browse store

The next window will let us choose the store to put the certificate in. We select “Trusted Root Certification Authorities”, which normally is the second choice in the list. See Figure 7-76 on page 518.

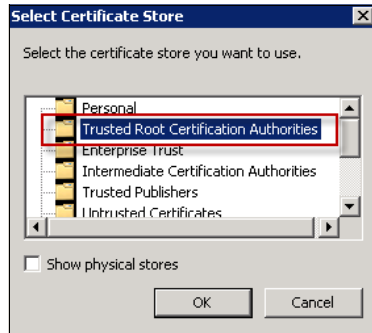


Figure 7-76 Certificate, select store

We continue by clicking **OK** in Figure 7-76.

We notice that it is the right store, and click **Next** in Figure 7-77.

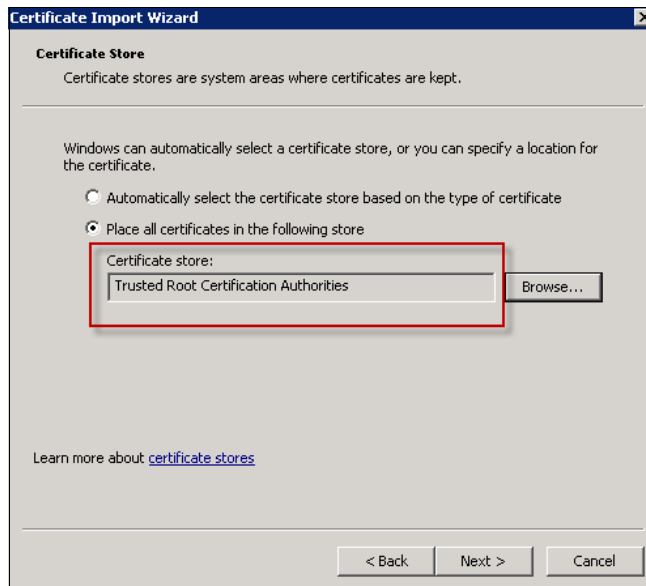


Figure 7-77 Certificate wizard page 2

After choosing which store to place the certificate in, and after clicking Next, this brings us to the final window for importing certificates. See Figure 7-78 on page 519.



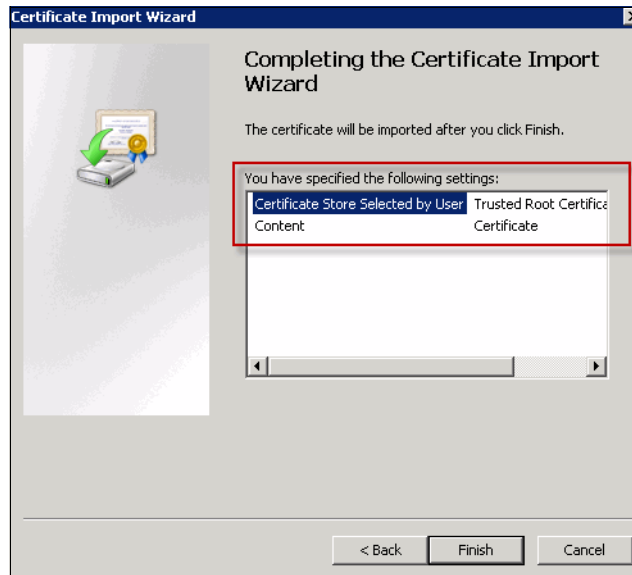


Figure 7-78 Certificate wizard page 3

Again we notice that it is the right store and it is a certificate, as shown in Figure 7-78.

We click **Finish**, and are presented with a security warning, as shown in Figure 7-79.



Figure 7-79 Import certificate security warning

Then, we finally get presented with a certificate that has been imported successfully as in Figure 7-80.

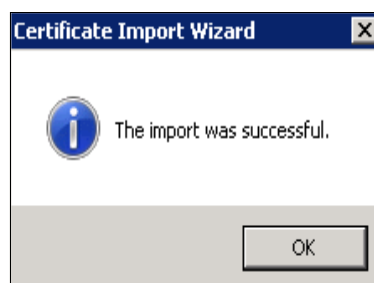


Figure 7-80 Certificate imported successfully

We click **OK** on the “Certificate Import Wizard” in Figure 7-80 on page 519 and **OK** on the “Certificate” window, which is shown in Figure 7-81. We need to restart Internet Explorer to verify that the certificate is installed correctly. We start the web GUI again this time. We should be taken directly to the login window, without seeing the security window (Figure 7-68 on page 513).

## Remove installed certificate in default store

After following the installing certificate procedure, if you still get the certificate error, it means that someone has installed the certificate into the default store. To solve the problem, we need to remove that installed license in the default store. Go to “Internet Options” in Internet Explorer. See Figure 7-81.

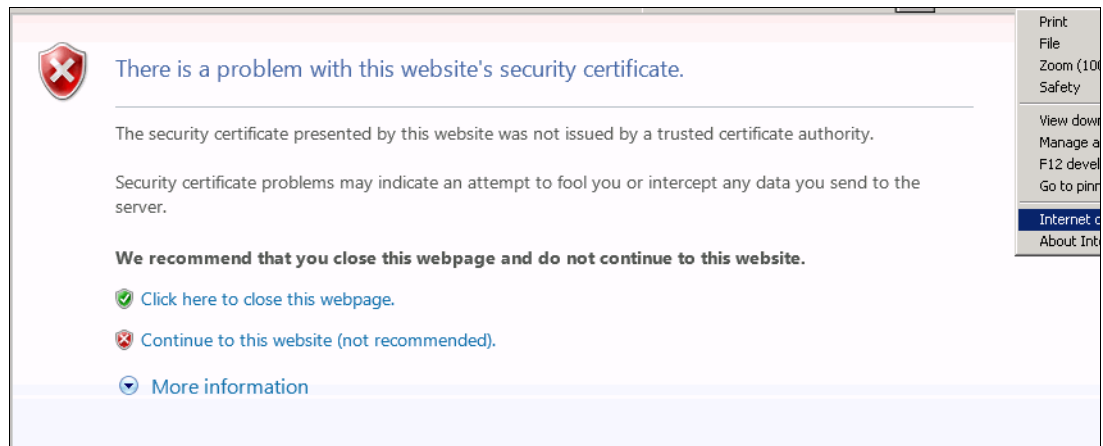


Figure 7-81 Internet Explorer options

We navigate to the tab “Content” (1) and click “Certificates” (2). See Figure 7-82.

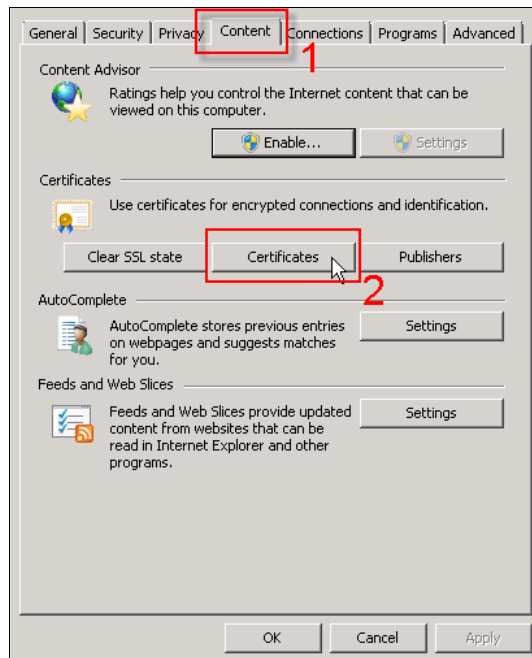


Figure 7-82 Internet options certificates

This brings up a window where the various certificate stores can be browsed. See Figure 7-83.

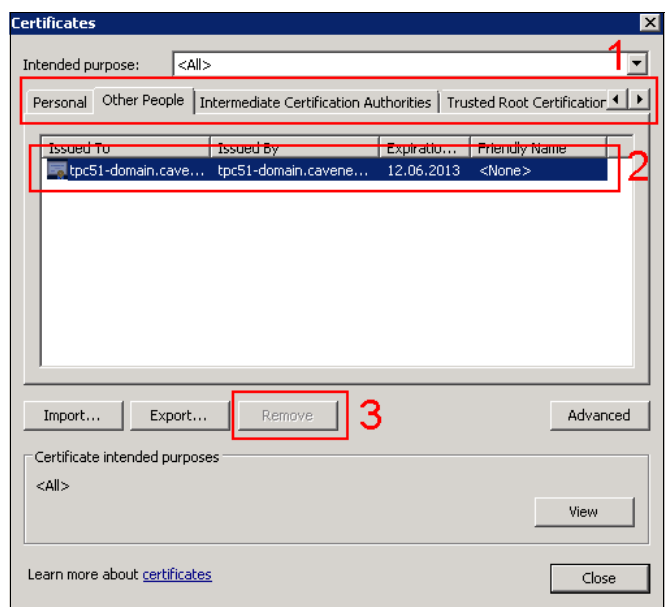


Figure 7-83 Remove certificate from store

We look through all stores, except the “Trusted Root Certification” store, by selecting the tpc51 certificate and clicking **Remove**. If for some reason (see Figure 7-83) the remove button is unavailable, we can use the built-in Certificate Manager in Windows by starting the CERTMGR program (Figure 7-84) by running:

Start → Run → CERTMGR.MSC

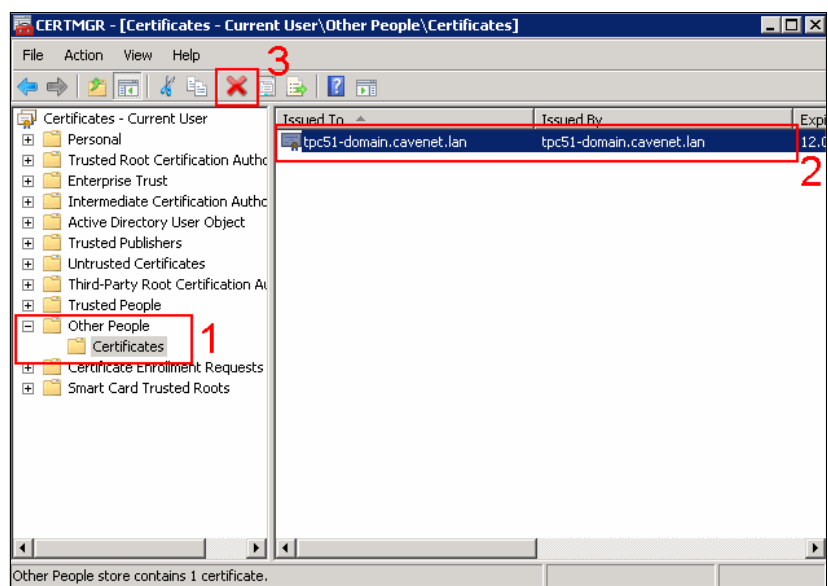


Figure 7-84 Windows Certificate Manager

We select the store “Other People” and expand the options (1). Then, we select the certificate (2) and finally delete it by clicking (3), or the delete button on the keyboard. We confirm that we want to delete the certificate, and go back to the beginning of installing a certificate in Internet Explorer 7.6.1, “Install certificate into Internet Explorer” on page 512.

Other possible scenarios that we might have to do for the security error message to be solved is adding the host name and localhost to the trusted security zone in IE. We start IE and go to “Internet options” by selecting the little gear symbol to the far right in Internet Explorer version 9 (1) (Figure 7-85), then select “Internet options”.

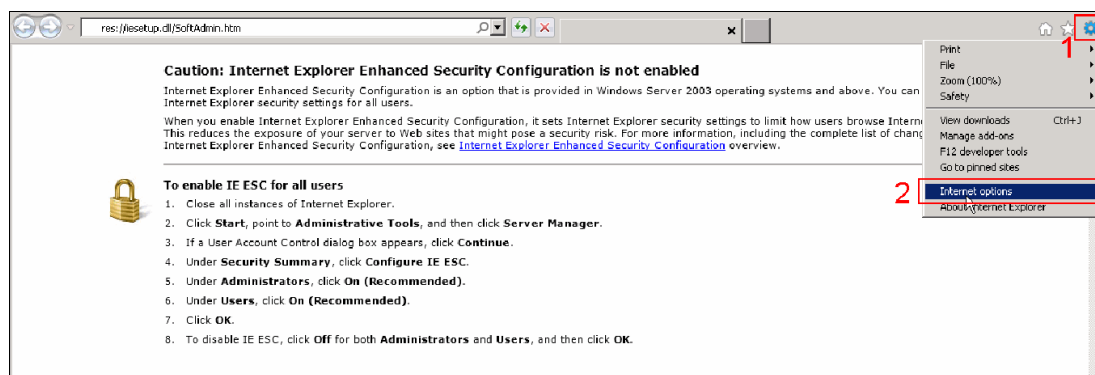


Figure 7-85 Internet options

From the “Internet options” menu, we select “Security” (1) (Figure 7-86), then “Trusted sites” (2) and then “Sites” (3).

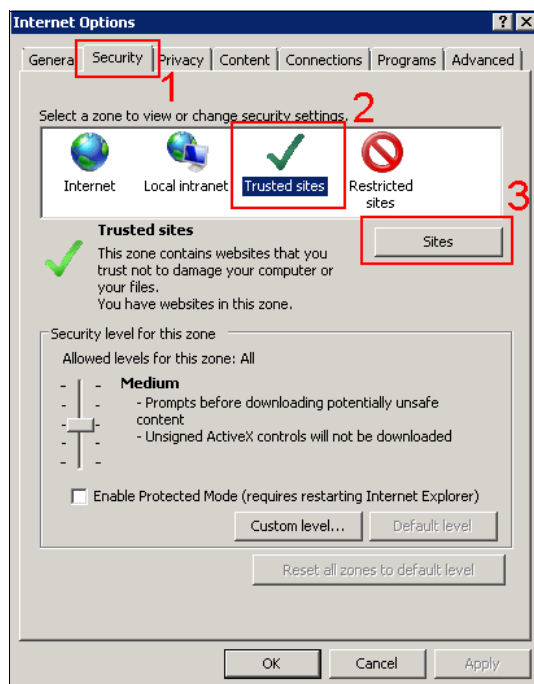


Figure 7-86 Security settings in Internet options

We add the two trusted sites:

- ▶ https://localhost
- ▶ https://<FQDN>

Where “FQDN” is the fully qualified domain name of the Tivoli Storage Productivity Center server. In our example, it is on the bottom (2) in Figure 7-87 on page 523.

We add sites by entering the name in (1) and clicking **Add** to the right of the name, and see the name appear in the bottom window (2).

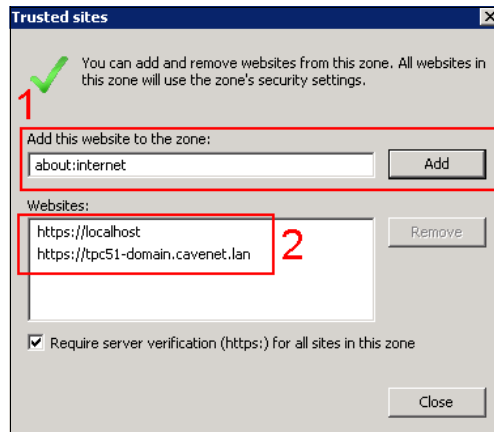


Figure 7-87 Internet options, trusted sites

We finish by clicking **OK**, and get back to “Internet options”.

We make one final adjustment of settings in Internet Explorer by going to the “Advanced” tab (1) in Figure 7-88.

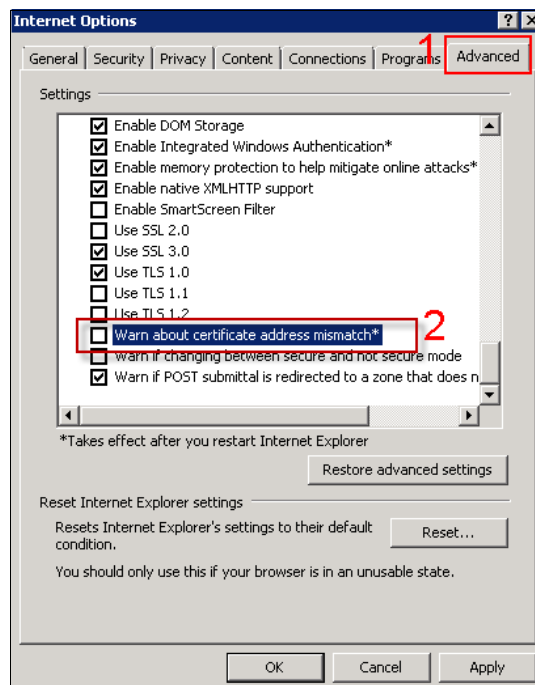


Figure 7-88 Internet options, advanced settings

We scroll all the way down, looking for the “Warn about certificate address mismatch” option, and make sure that it is not selected. If it is selected, clear it, by clicking to the left and make sure that we get an empty square like in Figure 7-88. We click **Apply** and **OK** to save our settings. We need to restart Internet Explorer for the settings to get into effect. Afterward, the web GUI should start with the security errors.

## 7.6.2 Install certificate into Firefox

Often when you work with Tivoli Storage Productivity Center 5.1 GUI, you will get notified that there is a certificate conflict. This happens because we are trying to establish a secure connection to a site where the certificate is not known. The reason for this problem is that the certificate was issued by IBM development, which is not listed as a trusted certificate authority.

To overcome the problem with the certificate that has been issued by a not trusted certificate authority we need to tell Firefox (FF) to trust this certificate from now on, by following these steps.

When starting the web GUI in FF it will complain with a warning (Figure 7-89). We expand the item “I Understand the Risks” (1) to get to where we can add an exception for this certificate (2).

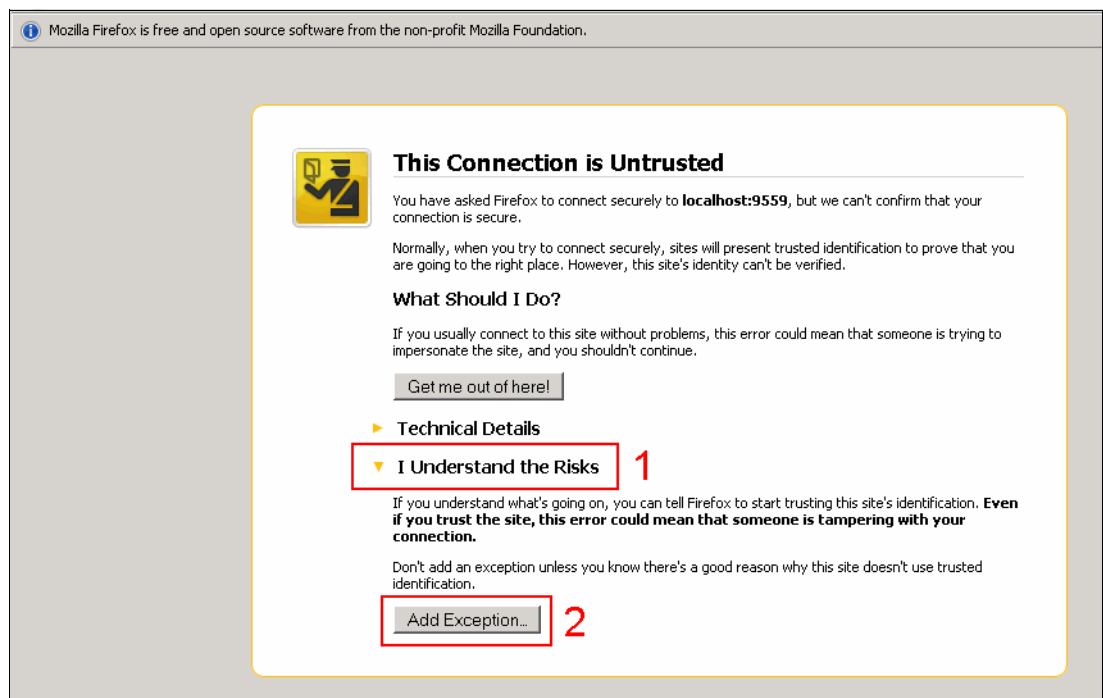


Figure 7-89 Certificate error in Firefox, expanded

When we click “Add Exception” for installing the Tivoli Storage Productivity Center certificate, we see a new window, Figure 7-90 on page 525, with details about the certificate that we are about to install.

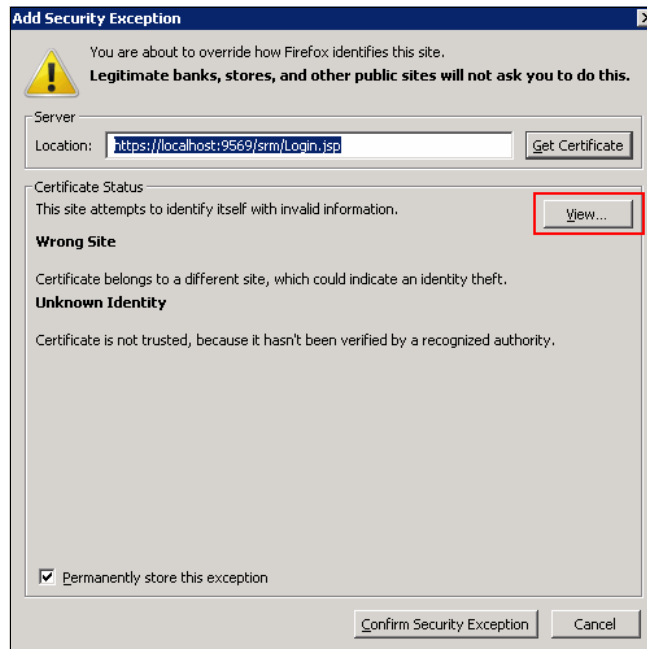


Figure 7-90 Add exception for Tivoli Storage Productivity Center certificate

We can click **View** and get details about the certificate as in Figure 7-91.

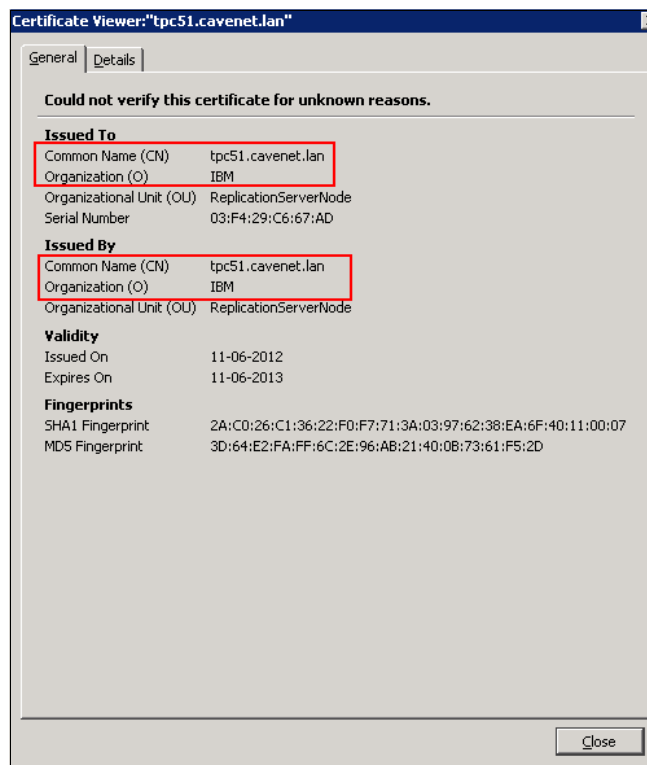


Figure 7-91 View certificate for Tivoli Storage Productivity Center

We see it is issued by, and issued to our Tivoli Storage Productivity Center servers FQDN, and that the organization is IBM. We accept this certificate by clicking **Close** in the lower right

corner, bringing us back to the window where we can accept the certificate, as shown in Figure 7-90 on page 525.

We click “Confirm Security Exception” in the bottom of the windows, and permanently add it to our login profile. Next time that we start the web GUI, we will see Figure 7-92 without any security warning.

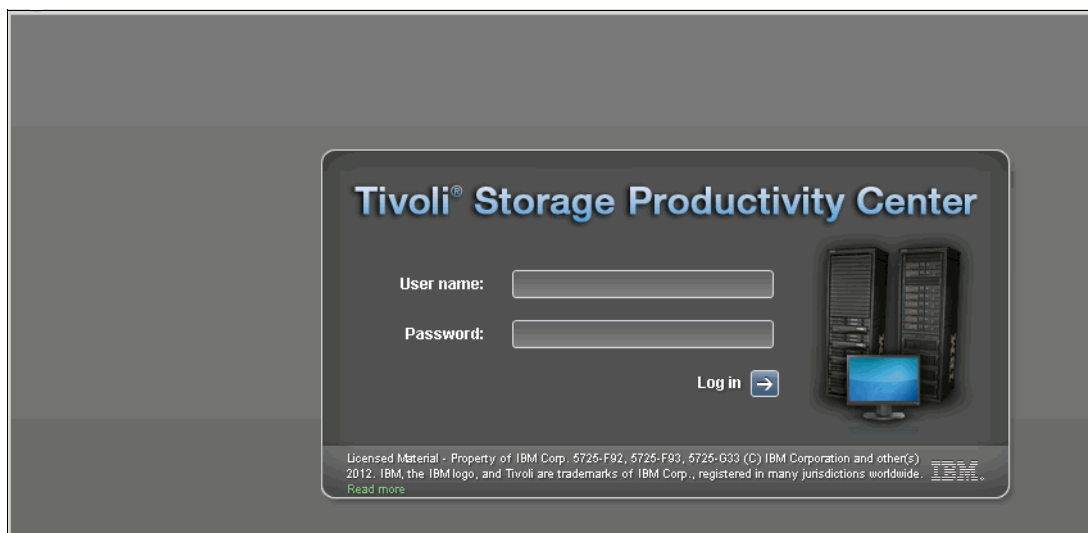


Figure 7-92 Web GUI in Firefox

## 7.7 Health alerts concept

Alerts are configured from Tivoli Storage Productivity Center stand-alone GUI. Target for alerts from Tivoli Storage Productivity Center can be either log file, mail, or traps towards various products like TEC or Omnibus.

If alerts are sent to the Windows event log, they could be picked up by another monitoring tool, so it is not necessary to have Tivoli Storage Productivity Center send the errors.

There are some advantages on letting Tivoli Storage Productivity Center handle the alert send, especially as traps:

- ▶ Formatted and documented
- ▶ Easy to retrieve sender
- ▶ Simplicity, no need for secondtool

Tivoli Storage Productivity Center picks up the alerts from the monitored devices, every minute. Based on either predefined rules within Tivoli Storage Productivity Center or custom created rules, different events can happen. The events are identical for both predefined and custom created.

Pre-defined alerts are asset-related, meaning if the status of a storage array changes, for example if it goes offline/online, cache increases/decreases, disks or controllers go online/offline, Tivoli Storage Productivity Center picks this up, and if the event is enabled, Tivoli Storage Productivity Center will notify accordingly.

Customs alerts are more related to performance, where a defined threshold value is breached, for example if the response time for a component (disk, controller, iogrp) exceeds a



custom defined value, or if there are too many errors on a fiber link, Tivoli Storage Productivity Center can notify accordingly.

### **Reformatting traps**

If different functions handle various parts of the Tivoli Storage Productivity Center application, it is important to have the trap sent to the appropriate team. For example, operation of the Tivoli Storage Productivity Center application is one department, and responsibility for some or all devices resides in one or more Storage Management teams. In this case it is essential to change the sender of trap, from Tivoli Storage Productivity Center server, to the device who is actually responsible for the trap. Because the traps are well-defined, it is easy to make this change, and thereby ensures that the responsible team for the device receives the alert.

Tivoli Storage Productivity Center cannot act as an SNMP source, it can only send alerts.





## Hints and tips

In this chapter, we provide useful information that we found in the writing of this book. The information spans the content of this book, from installation and migration through working scenarios.

## 8.1 Hints and tips

In this section, we included useful hints and tips that we discovered during the writing of this book.

### 8.1.1 URL for Tivoli Storage Productivity Center components

Not all IBM Tivoli Storage Productivity Center components have nice icons or shortcuts placed in the start menu of Windows. Here is a list of the most important URLs for Tivoli Storage Productivity Center 5.1:

#### Web GUI

- ▶ New Tivoli Storage Productivity Center 5.1 installation: <https://<hostname>:9569/srm>
- ▶ Upgrade from Tivoli Storage Productivity Center 4.x: <https://<hostname>:16311/srm>

#### Tivoli Integrated Portal

- ▶ New Tivoli Storage Productivity Center 5.1 installation  
<https://<hostname>:9569/ibm/console/logon.jsp>
- ▶ Upgrade from Tivoli Storage Productivity Center 4.x:  
<https://<hostname>:16311/ibm/console/logon.jsp>

#### Tivoli Productivity Center for Replication

- ▶ New Tivoli Storage Productivity Center 5.1 installation <https://<hostname>:9559/CSM>
- ▶ Upgrade from Tivoli Storage Productivity Center 4.x: <https://<hostname>:3080/CSM>

#### Integrated Solutions Console

One of the few things that requires you to access administrative console (which is the Integrated Solutions Console (ISC)) when you configure LDAP.

Usually you log in to the WebSphere Administrative Console through Tivoli Integrated Portal (Settings → WebSphere Administrative Console), but you can also use these shortcuts.

- ▶ New Tivoli Storage Productivity Center 5.1 installation  
<https://<hostname>:9574/ibm/console/secure/securelogon.do>
- ▶ Upgrade from Tivoli Storage Productivity Center 4.x:  
<https://<hostname>:16316/ibm/console/secure/securelogon.do>

#### Tivoli Common Reporting/Cognos

Usually, you launch Cognos from the Tivoli Storage Productivity Center web GUI, but you could also use these shortcuts:

- ▶ New Tivoli Storage Productivity Center 5.1 installation  
<https://<hostname>:9569/tarf/servlet/component>
- ▶ Upgrade from Tivoli Storage Productivity Center 4.x:  
<https://<hostname>:16311/tarf/servlet/component>

### 8.1.2 Request for Enhancements tool

More than a year ago, IBM changed the way how you as an end user can provide ideas how to enhance Tivoli storage software products. This capability is not limited to software products but also includes the IBM SAN Volume Controller and IBM Storwize V7000.

## Ten things you need to know

In this section, we gathered the 10 things you need to know to get started with the Request for Enhancements (RFEs) tool:

### 1. What is RFE?

The RFE Community is a website where customers can collaborate with product management and other product users through their ability to search, view, comment on, vote for, watch, submit, and track product RFEs: <http://www.ibm.com/developerworks/rfe>

### 2. Pre-requisites

You need an IBM ID (IBM developerWorks® ID), which is free for everyone to get

### 3. What is different from the current process?

No need to involve customer support or IBM sales representatives. Improved ability to monitor and manage requirements (watch lists, voting, commenting, and so on)

### 4. What will happen to my existing requirements?

Existing requirements are managed with the old process, but some may be transferred to the new system

### 5. What does the status mean?

Planned for future release, the request is approved and planned for delivery within the next year or next generally available (GA) release. IBM will confirm this request at GA and will update the status to “Delivered”. If the status is “Uncommitted Candidate”, this request will not be delivered within the next year, but the theme is aligned with our two-year strategy. IBM is soliciting feedback for this request, and within one year from submission, status will be updated to either “Rejected” or “Planned for Future Release”.

See Figure 8-1 for a diagram of the states.

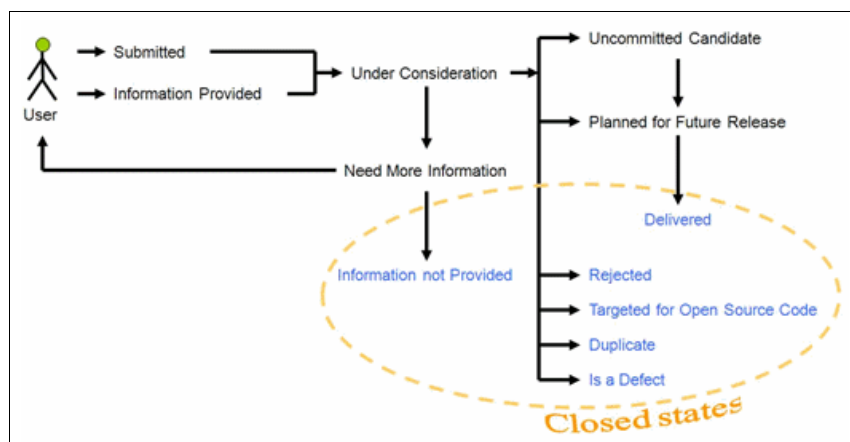


Figure 8-1 Possible states of a request

When a request is created:

- The author has 24 hours to modify any field.
- After 24 hours, the RFE is locked and bridged to the back-end system.
- The submitter can add comments at any time, but not modify the original information.

### 6. What is the process of response once I submit an RFE?

IBM works to provide an initial response within the first 30 days of submission, and a more definitive response within 90 days. Not all requests will meet these commitments because sometimes we will need more information from you to understand the request, or we will

need to do a rough sizing estimate before a decision can be made on its inclusion in a future version of our product.

7. What information do I need to enter?

Headline, priority, IBM brand, product, component, operating system, description, use case, and business justification

8. Priority definitions:

**Low** RFE would be a nice feature to have  
**Medium** Lack of the RFE functionality is a minor road block to deployment/adoption  
**High** Lack of RFE functionality is a major road block to deployment/adoption  
**Urgent** Deployment/adoption cannot continue without this RFE

9. Which Tivoli Storage Products are available in RFE?

Tivoli started with the Tivoli Storage Productivity Center family of products, and added more products since. This is the current list of supported products:

- IBM Information Archive (IBM IA®)
- IBM Storwize V7000
- IBM System Storage Archive Manager
- IBM System Storage SAN Volume Controller
- Tivoli Advanced Allocation Manager for z/OS
- Tivoli Advanced Audit for DFSMSHsm
- Tivoli Advanced Backup and Recovery for z/OS
- Tivoli Advanced Catalog Management for z/OS
- Tivoli Advanced Reporting for DFSMSHsm
- Tivoli Storage FlashCopy Manager
- Tivoli Storage Manager Family
- Tivoli Storage Optimizer for z/OS
- Tivoli Storage Productivity Center Family

10. More things that you might want to know:

Tutorial:

[https://www.ibm.com/developerworks/rfe/execute?use\\_case=tutorials](https://www.ibm.com/developerworks/rfe/execute?use_case=tutorials)

Frequently asked questions:

[https://www.ibm.com/developerworks/rfe/execute?use\\_case=changeRequestFAQ](https://www.ibm.com/developerworks/rfe/execute?use_case=changeRequestFAQ)

For example:

- Votes versus watchlists
- Categories

## Getting started

1. Go to:

<http://www.ibm.com/developerworks/rfe>

2. Log in or create a user ID:

Once you are logged in, you will see a page like what is shown in Figure 8-2 on page 533

3. Search or submit RFE

or

4. Look through your “My stuff” section

IBM developerWorks. Technical topics Evaluation software Community Events Search developerWorks

developerWorks > RFE Community >

# IBM RFE Community

Welcome Request for Enhancement (RFE) Community users! Here you have an opportunity to collaborate directly with the IBM product development teams and other product users.

- ➔ Search for RFEs (view, comment, vote, and watch)
- ➔ Submit RFEs
- ➔ Track your RFEs (My RFEs)

**RFE activities for all brands**

- ➔ Search RFEs
- ➔ Submit RFEs

Before you submit a request, search the existing database to minimize the number of duplicate entries. You can add your own comments to existing requests and share information across the community.

Submit your own idea for a new RFE. Our development team will review your request and provide status updates throughout its lifecycle.

**Browse RFEs**

- ➔ Top 20 watched RFEs
- ➔ Top 20 voted RFEs
- ➔ Submitted RFEs
- ➔ Planned RFEs
- ➔ Delivered RFEs

**My stuff**

Select a topic you would like to view. The data will be displayed in the list to the right.

- ☒ My watchlist
- ☐ My votes
- ☐ My RFEs
- ☐ My group memberships
- ☐ My saved searches
- 

**My watchlist**

Keep track of RFEs you're interested in.

- [Add user defined properties to ports](#)
- [Include virtualization layer in Data Path Explorer...](#)
- [Include virtualization layer in Data Path Explorer...](#)
- [Data Path Explorer for Tape](#)

➔ View all

➔ My RSS feeds  
Add RSS feeds to your personalized page.

➔ My notifications  
Manage your RFE Community notifications.

**Spotlight**

- ➔ Announcements
- ➔ Give us your feedback

**Brands**

- All brands
- Information Management
- Rational
- Tivoli
- WebSphere

**Latest RFE submitted**

Product: Software Architect

Headline: [Rational Software Architect - Export capabilities \(sys4449\)](#)

Submitter's display name: [BrandSynergy](#)

**IBM's latest RFE response**

**RFE with most votes**

**Most watched RFE**

**Consumability survey**

Participate in the [Rational Consumability Survey](#) to help us improve your experiences with Rational products!

Figure 8-2 RFE start page

## Submitting a new request

Submitting a new request is straight forward, so here we show you how you find Tivoli Storage Productivity Center in the tool.

To find Tivoli Storage Productivity Center in the list of products, use Figure 8-3 on page 534 and complete the following steps:

- ▶ Select **Tivoli** as the Brand
- ▶ Select **Storage** as the Product family
- ▶ Select **Tivoli Storage Productivity Center (TPC) Family** as the Product
- ▶ Select the Tivoli Storage Productivity Center Component
- ▶ Most of the time enhancements are not tied to an operating system so you should select **All** as the operating system

RFE Community

Submit a request for enhancement (RFE)

Use this form to submit an idea for a new product feature, also called a request for enhancement (RFE). The product development team will review your input and provide status updates as decisions are made regarding the RFE. Before you submit a new RFE, please [view RFEs that have already been submitted](#). If your idea has already been submitted, you can add comments to the existing RFE, thereby indicating your agreement with the idea. We may use this information to help prioritize development of new features.

**Note:** The company and business justification will not be visible on the Jazz.net site for RFEs submitted for Jazz products.

The fields indicated with an asterisk (\*) are required to complete the transaction. If you do not want to provide us with the required information, please use the Back button on your browser to return to the previous page.

A key icon indicates that the field is displayed only to the original submitter. The key icon next to an RFE indicates that the RFE is a private RFE.

<b>Submitter:*</b>	mstandau
<b>Company:*</b>	<p>The Company field is visible to you and IBM only, as shown by the key icon (40 characters or less):</p> <input type="text" value="ITSO"/> <p>(You have 36 characters left)</p>
<b>Headline:*</b>	<p>Please enter a summary of your request (125 characters or less). Only the first 25 characters are visible if the RFE is private.</p> <input type="text"/> <p>(You have 125 characters left)</p>
<b>Submitter's ranking of priority:*</b>	<p>What impact does this request have on your ability to use the product?</p> <div>Medium</div> <a href="#">Priority definitions</a>
<b>Brand:*</b>	<div>Tivoli</div>
<b>Product family:*</b>	<div>Storage</div>
<b>Product:*</b>	<div>Tivoli Storage Productivity Center (TPC) Family</div>
<b>Component:*</b>	<p>What component would you expect to include this feature?</p> <div>TPC for Disk</div>
<b>Operating system:*</b>	<div>ALL</div>
<b>Visibility:</b>	<p>Public</p> <p>Public RFEs are visible to all users; Private RFEs are visible only to the original submitter. The visibility is automatically set when the RFE is created.</p>
<b>Country:</b>	Germany
<b>PMR ID:</b>	<p>If applicable, enter the Problem Management Record (PMR) ID. For example, 12345.AY7.ABC (with no spaces or other special characters)</p> <input type="text"/> <p>(You have 13 characters left)</p>
<b>Description:*</b>	<p>Please enter a detailed description of the new feature that you want (5000 characters or less):</p> <div></div> <p>(You have 5000 characters left)</p>
<b>Use Case:*</b>	<p>Please describe the scenario (use case) this feature would be used in (5000 characters or less):</p> <a href="#">Use case example</a> <div></div>

**Spotlight**

- [Announcements](#)
- [Give us your feedback](#)

**Brands**

- [All brands](#)
- [Information Management](#)
- [Rational](#)
- [Tivoli](#)
- [WebSphere](#)

**RFE activities**

- [Search RFEs](#)
- [Submit RFEs](#)

**My stuff**

- [My watchlist](#)
- [My votes](#)
- [My RFEs](#)
- [My group memberships](#)
- [My saved searches](#)
- [My RSS feeds](#)
- [My notifications](#)

**Groups**

- [Group directory](#)
- [Create a new group](#)

**Browse RFEs**

- [Top 20 watched RFEs](#)
- [Top 20 voted RFEs](#)
- [Submitted RFEs](#)
- [Planned RFEs](#)
- [Delivered RFEs](#)

**Help**

- [Tutorials](#)
- [Frequently asked questions](#)
- [RFE status values and definitions](#)
- [Contact us](#)

Figure 8-3 Submitting a request for enhancements



## Helpful functions

There are a number of helpful functions that you might want to explore. In Figure 8-4, we pointed out those functions with red frames.

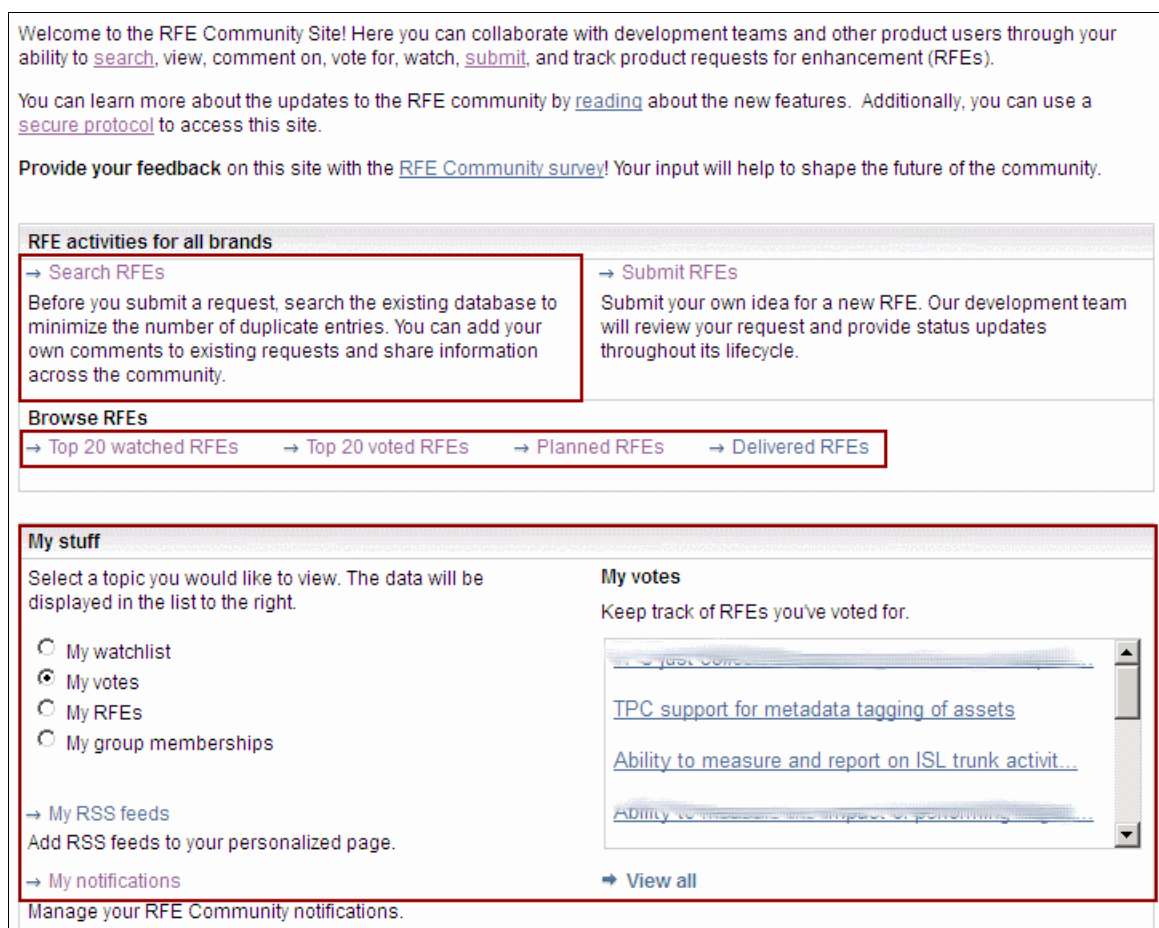


Figure 8-4 Helpful functions on the main page

### 8.1.3 Tivoli Storage Productivity Center PM metrics that are calculated versus raw statistics

- ▶ Which metrics can Tivoli Storage Productivity Center provide that are not part of the raw statistics of the storage systems?
- ▶ See the “*Using the SVC for Business Continuity*” IBM Redbooks publication, SG24-7371-00.

### 8.1.4 Names of Tivoli Storage Productivity Center services

Some of the names have changed in Tivoli Storage Productivity Center 5.1 because a new version of WebSphere is used under the covers. In Figure 8-5 on page 536 you can see the Tivoli Storage Productivity Center services.

Name	Status	Startup Type	Log On As
IBM Cognos Content Database	Started	Automatic	Local System
IBM Tivoli Storage Productivity Center - Data Server	Started	Automatic	Local System
IBM Tivoli Storage Resource Agent - 'C:\Program Files\IBM\TPC'	Started	Automatic	Local System
IBM WebSphere Application Server V8.0 - TPCDeviceServer	Started	Automatic	Local System
IBM WebSphere Application Server V8.0 - TPCReplicationServer	Started	Automatic	Local System

Figure 8-5 Tivoli Storage Productivity Center services on Windows

The DB2 and Tivoli Integrated Portal services are missing in this screen capture because they are displayed alphabetically sorted.

If you created scripts to manage Tivoli Storage Productivity Center, for example, to take offline backups of the database, you might need to change them because in order to stop services you now need to use the new service names.

# 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

The following IBM Redbooks publications provide additional information about the topic in this document. Note that some publications referenced in this list might be available in softcopy only.

- ▶ *IBM SONAS Implementation Guide*, SG24-7962
- ▶ *IBM SONAS Concepts, Architecture, and Planning Guide*, SG24-7963

You can search for, view, download or order these documents and other Redbooks, Redpapers, Web Docs, draft and additional materials, at the following website:

[ibm.com/redbooks](http://ibm.com/redbooks)

## Other publications

These publications are also relevant as further information sources:

- ▶ *Tivoli Common Reporting User's Guide*, SC23-8737
- ▶ *Tivoli Storage Productivity Center User's Guide*, SC27-4048

## Online resources

These websites are also relevant as further information sources:

- ▶ Tivoli Storage Productivity Center reporting in the web-based GUI  
[http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc\\_V51.doc/fqz0\\_c\\_webbasedgui\\_rpting\\_ic\\_ov.html](http://pic.dhe.ibm.com/infocenter/tivihelp/v59r1/topic/com.ibm.tpc_V51.doc/fqz0_c_webbasedgui_rpting_ic_ov.html)
- ▶ Tivoli Storage Productivity Center developerWorks site  
<http://www.ibm.com/developerworks/servicemanagement/sm/tpc/index.html>
- ▶ Tivoli Storage Productivity Center support site  
[http://www-947.ibm.com/support/entry/portal/product/tivoli/tivoli\\_storage\\_productivity\\_center?productContext=1039251977](http://www-947.ibm.com/support/entry/portal/product/tivoli/tivoli_storage_productivity_center?productContext=1039251977)

## Help from IBM

IBM Support and downloads

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# IBM Tivoli Storage Productivity Center V5.1 Technical Guide

(1.0" spine)

0.875" <-> 1.498"

460 <-> 788 pages







# IBM Tivoli Storage Productivity Center V5.1 Technical Guide



**Install and use Tivoli  
Storage Productivity  
Center V5.1**

**Learn to effectively  
use the new  
web-based GUI**

**Use IBM Cognos to  
create custom reports**

IBM Tivoli Storage Productivity Center V5.1 products offer storage infrastructure management that helps optimize storage management by centralizing, simplifying, automating, and optimizing storage tasks associated with storage systems, data disaster recovery, storage networks, and capacity management.

IBM Tivoli Storage Productivity Center V5.1 products include:

- ▶ IBM Tivoli Storage Productivity Center V5.1
- ▶ IBM Tivoli Storage Productivity Center Select Edition V5.1

Tivoli Storage Productivity Center V5.1 is designed to provide device management capabilities, such as automated system discovery, provisioning, data replication, configuration, and performance monitoring for storage systems and storage networks.

Tivoli Storage Productivity Center Select Edition V5.1 offers the same features as Tivoli Storage Productivity Center V5.1 but at attractive entry-level pricing for operations with smaller capacities. It is licensed per storage device, such as disk controllers and their respective expansion units.

This IBM Redbooks publication is intended for storage administrators and users who are installing and using the features and functions in IBM Tivoli Storage Productivity Center V5.1. The information in this book can be used to plan for, install, and customize the components of Tivoli Storage Productivity Center in your storage infrastructure.

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