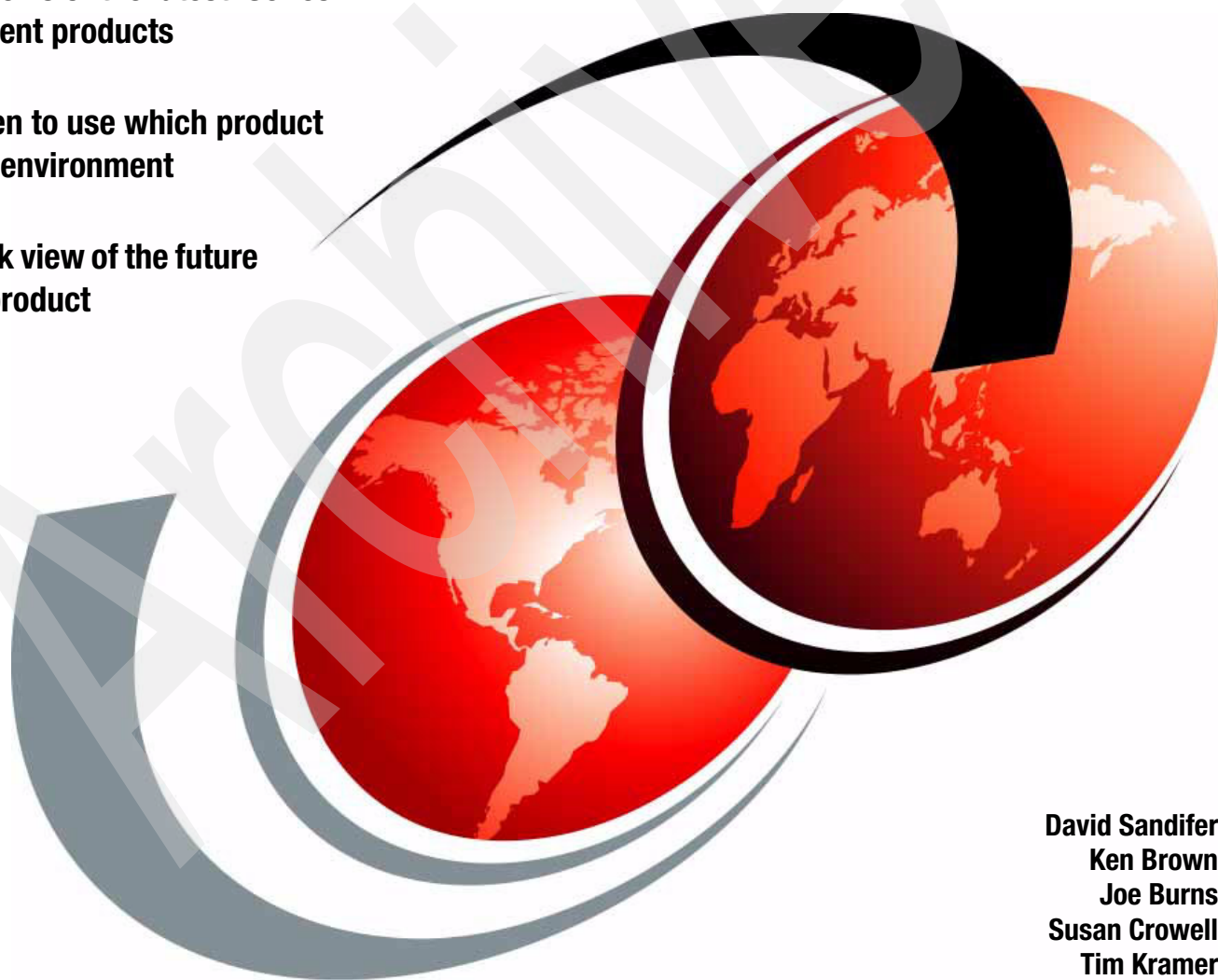IBM

IBM *e*server iSeries Systems Management Handbook

- Get overviews of the latest iSeries management products

- Learn when to use which product for which environment

- Get a quick view of the future for each product

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Ken Brown
Joe Burns
Susan Crowell
Tim Kramer

Redpaper

International Technical Support Organization

IBM @server **iSeries Systems Management Handbook**

November 2005

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This edition applies to the following product versions:
► Version 5, Release 3 of IBM i5/OS
► Version 5, Release 1 of IBM Director
► Version 2, Release 1 of Virtualization Engine console

Contents

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Preface

This IBM Redpaper provides a broad understanding of the systems management products available from IBM to help you manage iSeries™ systems. Its intended audience is those who manage iSeries systems either as stand-alone systems or along with other systems as part of a larger environment. An overview of the products is included with information about when to use which product. Product functions, features, and target environments are discussed along with some comparisons of the tools. The products discussed include iSeries Navigator, its Management Central functions and Web-based interface, IBM Director, Virtualization Engine™ console, and Tivoli® products that support iSeries.

The team that wrote this Redpaper

This Redpaper was produced by a team of specialists from around the United States working at the International Technical Support Organization, Rochester Center.

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Tim Kramer is a Senior Software Engineer working in the IBM @server Systems Management Software Development organization in Rochester, Minnesota, USA. During his 26 years with IBM, he has worked on office products (DisplayWrite/36, OfficeVision/400™), PC Support, and iSeries Navigator. He has worked on iSeries Navigator since its inception,

providing both application infrastructure support and support for key components like Work Management, Basic Operations. His current focus is the Web enablement of iSeries Navigator functions, which will make individual Navigator tasks available via servlet URLs, as well as within strategic IBM® Web consoles.

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

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iSeries systems management products

This chapter describes the purpose for this Redpaper and discusses some concepts about systems management tools in general. It then gives a brief overview of the products that are discussed later in their own chapters. These products are:

► iSeries Navigator, both native user and Web-based interfaces
► Management Central functions in iSeries Navigator
► IBM Director
► Virtualization Engine console
► Tivoli systems management products

1.1 Background information

The IBM @server i5 system has changed a great deal since its introduction. The name has changed from AS/400® (with several versions of what *AS* stands for) to iSeries to i5. Originally, the system ran with one processor, one operating system (OS) image, and that operating system was OS/400. Today each system can have one or multiple processors, be configured into one or multiple partitions, and run one or multiple operating systems including IBM i5/OS™, IBM AIX®, several versions of Linux® for Power, Windows®, and several versions of Linux for Intel® processors.

As the system has grown and changed, the tools that IBM provides to manage the system have also grown and changed. Originally, a non-programmable terminal was used with a command-line (CL) interface often known as the *green screen* interface. This powerful and relatively easy-to-use interface remains today. It has been joined by client-server based Graphical User Interfaces (GUI) and Web-based browser interfaces. These various management interfaces have many similar functions but also differ in how you interact with them and in their functional details.

The purpose of this paper is to describe the systems management tools that IBM provides to manage the i5 system. We give you information about the products' purposes and functions, and suggest ways to use them separately or together. We try to answer the question of "Which systems management tool should I use for which tasks in my i5 system environment?"

The tools we describe are:

► iSeries Navigator, both native user and Web based
► Management Central functions in iSeries Navigator
► IBM Director
► Virtualization Engine console
► Tivoli systems management products

We do not go into details for each tool but do give an overview of what each does.

1.2 Systems management tool concepts

Before we discuss the tools there are some concepts it would be good to understand. Regardless of the different functions in each product there are some aspects they share. Each system management tool has some interface so that you can interact with the product. This interface can use:

► A command line that lets you enter commands and see the results.

► A non-programmable terminal with menus and panels.

► GUI panels with which you enter information, select and click using a mouse, and see the results. This type of interface is usually installed on your personal computer.

► Web browser panels that act much like a GUI interface but that use a Web browser rather than having to install an interface component for the product.

Some tools use a combination of these interfaces and each of them has advantages and disadvantages. Command lines are good for entering quick commands and usually can be used to program and automate functions. The panel-based interfaces are good for displaying and easily using the functions, but some sort of display terminal is required for each type of interface, and installation of the tool's interface varies.

The way that the system management tool communicates with its interface and the system or systems that it manages also varies between products. Several common setups are:

► Direct connection from the interface to the managed systems.

Direct connection from a display device to the managed system
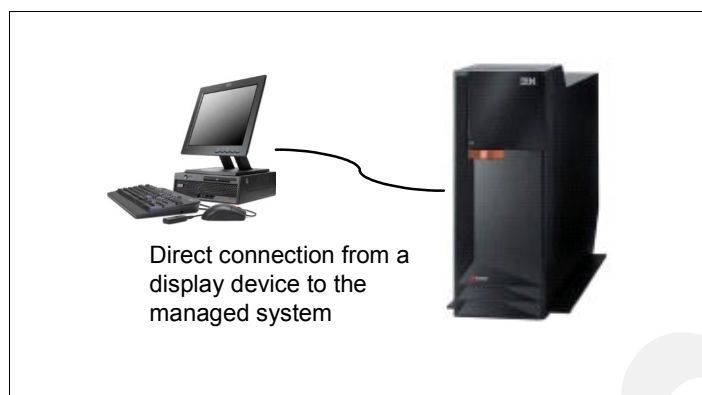
Figure 1-1   Direct connection from the interface to the managed systems

► Use of a central system along with separate, product-specific agents on each of the managed systems. The central system usually:

  – Connects to the user interface
  – Keeps a database of information it gathers from the managed systems
  – Communicates with the managed systems and keeps track of them

► Use of a central system that uses industry standard communication methods to manage systems that also support the same industry standard. Simple Network Management Protocol (SNMP) is an example of such an industry standard.

Using a central system to connect to each managed system

Figure 1-2   Central system connection to managed systems

The communication protocols used have varied over the years, but TCP/IP is the usual communication method used in systems management products today. Each of the tools we describe uses TCP/IP, and several of them use only TCP/IP.

System management products vary in which operating systems (OS) and hardware platforms they support. Those products that support one OS are tailored to that OS. In order to use the management product you usually have to know details about the OS, the terminology used for it, and how it works. These products usually have functions to manage each part of the OS and all of its details.

System management products that support multiple OSs use more general terminology and their functions are not tailored to only one OS. This helps to remove the user from the details of each OS. However, there may be various features of the OSs that cannot be managed by the product. So OS-specific management tools are still required for detailed work on the individual managed systems.

1.3 Virtualization and abstraction

Two terms you hear in the computer world are *virtualization* and *abstraction*. Virtualization for IBM servers includes several aspects. One thing it includes is software that is used to hide the details of different operating systems and hardware platforms from the administrators and system managers. The idea is that an administrator should be able to do a function like check on disk space used on any system or partition and not have to worry about different commands, terminology, or details of how that function is done on the various OSs. The term abstraction is also used since the physical details of the OS are hidden, or removed, and are replaced by an *abstract*, logical view. The IBM Virtualization Engine uses virtualization in its name because it has components that abstract the details of the various IBM server platforms and OSs and allow you to work with one consistent, logical view of your various systems.

Another idea included in virtualization is having different physical partitions or systems that are managed as one resource. For example, if the many Linux partitions on an i5 box could automatically shift work between themselves, then you could view those resources as one large, virtual Linux engine. The details of how the work balancing is done are handled by software so you do not have to manually allocate and reallocate resources. Storage resources can be virtualized using Storage Area Networks (SAN) and other technologies. This allows you to manage a collection of storage devices as though they were one.

Virtualization and having multiple partitions on a system often go together. iSeries hardware can run i5/OS, Linux, and AIX OSs in partitions. The details of the hardware are hidden by the OSs, and your one physical box becomes many virtual systems.

Examples of virtualization in IBM servers include:

► Dynamic LPAR
► Virtual I/O Server
► Integrated shared infrastructure for Blades
► Intelligent Resource Director (IRD)
► zSeries® Application Assist Processor (zAAP)
► Multi-node Load Balancing
► Virtual Disks in ESS and FAStT

1.4 Quick looks at iSeries systems management tools

The following sections give a quick look at the IBM products that we describe in this paper that can manage iSeries systems.

1.4.1 i5/OS character-based interface

Since the i5/OS character-based interface, commonly known as the green screen interface, is well known, we do not mention much about it. Just remember that you can sign onto one i5/OS using a terminal or terminal emulator and then enter commands to manage that one i5/OS. If you want to manage another i5/OS then you use a separate terminal or terminal emulator window and sign onto it also.

As its name implies, you can only manage i5/OS with the i5/OS command line. All of the details of i5/OS can be managed using this interface, but you need specific i5/OS training to understand how best to use the commands.

The command-line interface is required for system management and will continue to be enhanced along with i5/OS. Regardless of which other tools you use for systems management, the CL commands are required for some functions and are useful for programming management tasks.

1.4.2 iSeries Navigator

iSeries Navigator is a GUI interface to manage i5/OS. It duplicates many of the i5/OS command functions but uses the more intuitive and easy-to-use GUI panels and menus. It also has some unique functions not found in the green screen interface such as graphical pictures of disk locations in the hardware boxes.

One Navigator console can be used to work with all of your i5/OS systems. Only i5/OS is supported, and you must sign onto each i5/OS individually. Some of its functions can only be applied to one i5/OS at a time. Other functions can be applied against multiple i5/OSs at the same time. These multiple-system tasks are grouped into what is called Management Central, which is described later.

iSeries Navigator was originally installed on each personal computer that you wanted to use as a management console. Many of its functions are now also available using a Web browser. This allows the personal computer to only have the browser installed rather than having to install the full Navigator product. This means that you can manage i5/OS from almost anywhere without needing special products installed on your PC.

1.4.3 Management Central

Management Central is part of iSeries Navigator and allows you to perform some management tasks on multiple i5/OSs at one time. It uses the iSeries Navigator GUI console, or window. There are no plans to make its functions available from a Web browser. It allows you to group i5/OSs together and then perform such tasks as inventory collection and monitoring on each of the systems at one time.

Management Central uses a central system to save its information and to communicate with other systems. Each of those other systems has an agent to handle communication with the central system and to do system-specific functions. The GUI communicates with the central system. Only i5/OS is supported for the central system and for the agents.

1.4.4 IBM Director

IBM Director is part of the IBM Virtualization Engine set of products. It is a management solution that supports multiple hardware platforms and multiple operating systems. It uses a GUI console and also has a command-line interface. IBM Director allows you to group systems in order to manage them together.

Director uses a central management server to save its information and to communicate with its managed systems and its console. The managed systems can be Director agents or can be SNMP devices, BladeCenter® chassis, systems without Director agent installed, storage devices, and other platform types. The management functions you can do for each platform vary depending on how Director communicates with it. Managed systems with the Director agent installed have the most functions available.

IBM Director has been used for several years to manage IBM @server® xSeries® systems and now also supports iSeries, pSeries®, and zSeries systems.

1.4.5 Virtualization Engine console

The Virtualization Engine console (VEC) is a Web browser based interface. It is part of the Virtualization Engine set of products. It provides an interface that consolidates information from several different sources. For example, it communicates with IBM Director and with Management Central to display their monitoring information. VEC combines information from Management Central, iSeries Navigator, and Cluster Systems Manager (CSM) used on AIX, Tivoli monitoring, and other sources.

VEC is installed on a system and then uses various communication methods to talk to the other system management products. Those other products can be on the same system as VEC or can be on different systems. VEC gathers together the information supplied by the management sources it is connected to and uses a Web browser to display it. This allows you to use one console to manage multiple systems using multiple management tools.

1.4.6 Tivoli products

Tivoli is a software brand within IBM that provides systems management solutions. It has a wide range of products with many management functions and supports IBM and other companies' operating systems and hardware. Depending on the Tivoli product, a command line, GUI, or Web browser interface is used. Some products use the central management server and agents setup, while others communicate using industry standards.

Early Tivoli products were originally designed to support large enterprise environments, but now support for small and medium sized environments is also targeted. Several iSeries management products, such as IBM Director and VEC, can interoperate with Tivoli products.

2

iSeries Navigator

This chapter describes iSeries Navigator, both the Windows-based graphical user interface (GUI) and the tasks available on the Web. iSeries Navigator is the user interface of choice for i5/OS system administrators, system operators, and end users. This Windows-based GUI, which is a part of the iSeries Access for Windows product, provides an easy-to-use graphical interface for managing key iSeries resources.

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2.1 Overview

The main window of the iSeries Navigator application uses the familiar Windows Explorer view to assist users in navigating through key iSeries administration tasks. However, instead of exploring the contents of your desktop, iSeries Navigator lets you explore the resources of all the iSeries systems you need to access.
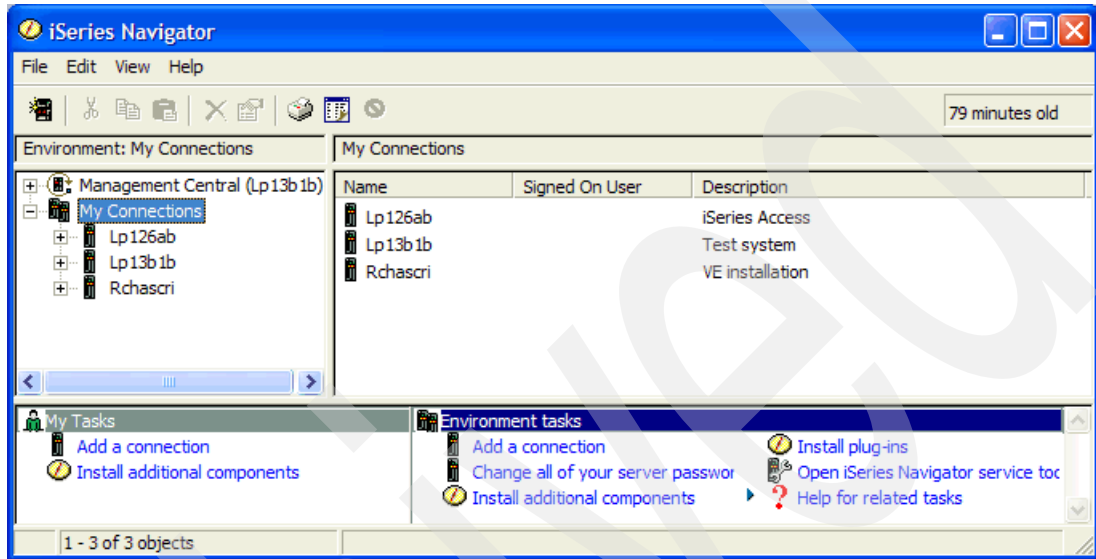
Figure 2-1   iSeries Navigator main panel

When a system is selected, you are presented with the main components of iSeries Navigator.
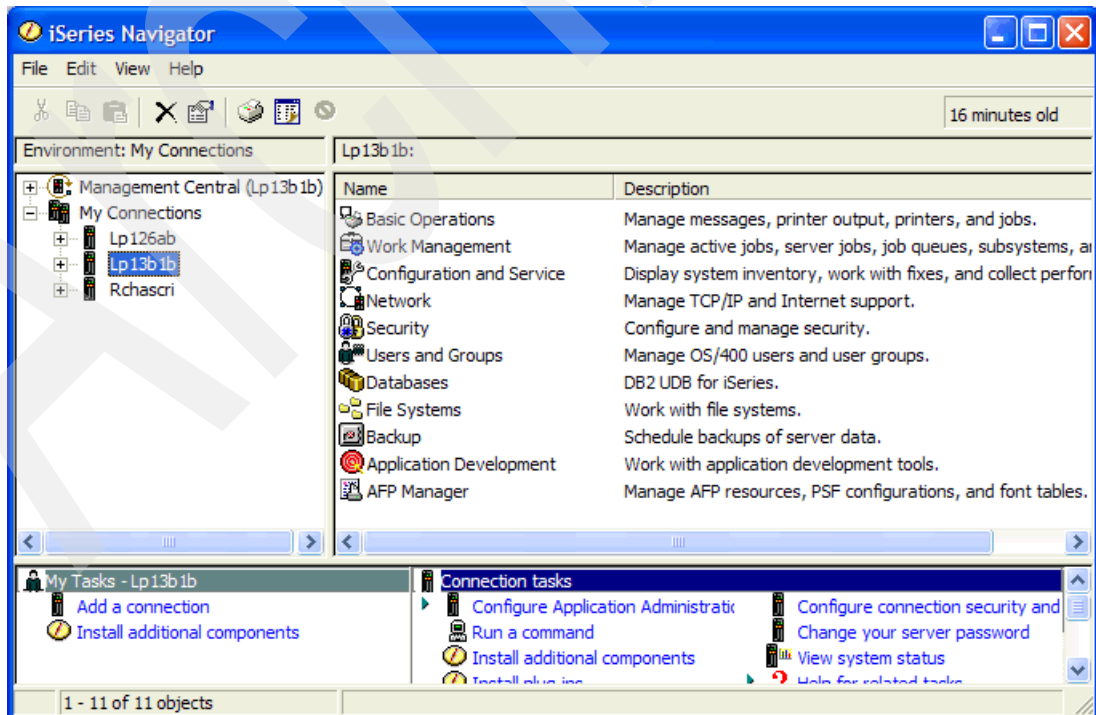
Figure 2-2   iSeries Navigator main components

With a few clicks of the mouse, an administrator can be monitoring workload on one system, handling printer output on another, configuring the TCP/IP network for another, and adding new users for still another iSeries, all without using any i5/OS commands.

2.2 iSeries Navigator tasks available on the Web

In i5/OS V5R3, iSeries Navigator began extending its interface to key iSeries resources by making several tasks available on the Web. This makes iSeries Navigator interfaces available from almost any place, since all you need is a browser and a connection to the desired iSeries system. You do not even need iSeries Navigator installed on your PC, since these Web tasks are installed on the iSeries as part of the base i5/OS operating system.

In V5R3, the Web enablement of iSeries Navigator began with 46 individual tasks that can be performed via unique URLs. These included iSeries Navigator functions from Basic Operations (5), Work Management (17), Configuration and Service (2), and Database (21), as well as a special Web task for the iSeries Navigator Tasks on the Web home page. This enablement on the Web will continue until all iSeries Navigator functions are available on the Web. For the next release of i5/OS the plan is to increase the number of iSeries Navigator tasks available on the Web to 99.

Do you want to view the current active jobs on your production system? Just select a stored favorite from your browser, and it will display the list. Figure 2-3 on page 10 shows the active jobs panel for the lp016ab system that was selected using the Web browser address:

```
http://lp016ab:2001/webnav/WnServlet?task=actjob
```

Figure 2-3   Active jobs in a Web browser

2.3 iSeries Navigator components

iSeries Navigator has several groupings of functions. These components aid in navigating to the desired action to take.

2.3.1 Basic Operations

This component, like its name suggests, contains lists of key i5/OS resources that are necessary in managing the operations of the iSeries.

► Messages
► Printer output
► Printers
► User jobs

The Messages, Printer Output, and User Jobs lists all default to show only those resources that apply to the current signed-on user. However, each list can be customized to show exactly the contents that you want to see.

Highlights of the component include:

► You can move printer output higher or lower in the queue, to a different printer altogether, or to your desktop, by using the familiar Windows drag-and-drop feature.

When you drop a piece of printer output on your desktop, a text file is automatically created. You can then easily copy all or portions of the file for use in other applications, such as sending an e-mail that contains information from the file.

► The AFP™ Viewer function is included with iSeries Navigator for full-function viewing of iSeries printer output.

► You can convert iSeries printer output to PDF format with the Convert to PDF Wizard.

► You can use NetServer™ print sharing to share an iSeries printer, just as you would share your desktop printer.

Table 2-1   Basic Operations tasks available on the Web

Task	Task ID (task=xxx)
Messages	msg
System Operator Messages	sysoprmsg
Send a Message	sndmsg
Printer Output	prtout
User Jobs	usrjob

2.3.2 Work Management

This component contains the lists and actions needed to manage the workflow throughout the iSeries. The basic unit of work on an iSeries is a *job*, and this component makes it easy to work with jobs in a variety of different list formats.

► Active Jobs
► Server Jobs
► Job Queues
► Output Queues
► Subsystems
► Memory Pools

The different Work Management views integrate the interfaces and functions from several i5/OS commands into an easy-to-use interface to allow you to more easily manage the i5/OS workflow.

The Active Jobs list is one of the most highly used lists within iSeries Navigator. It presents information similar to that of the WRKACTJOB command on i5/OS, but provides a powerful set of actions that you can quickly perform against the selected job.
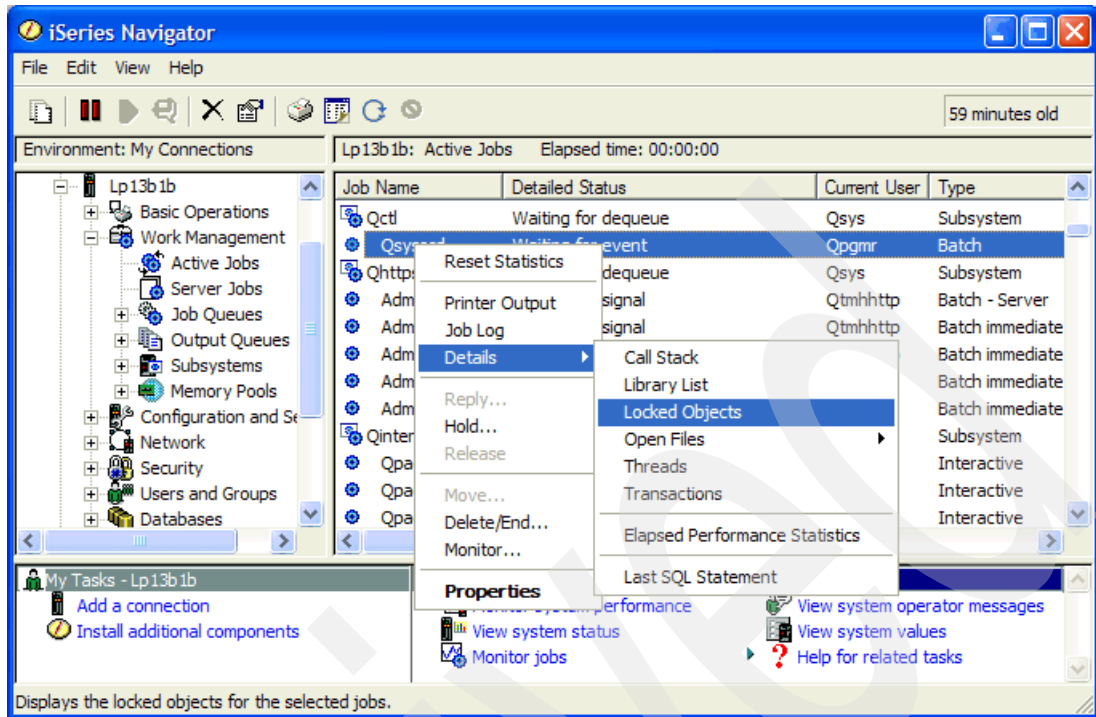
Figure 2-4   Active jobs actions

Highlights of the component include:

► You can move a job higher or lower in its queue, or to a different job queue altogether, by using the familiar Windows drag-and-drop feature.

► You can set up a Management Central job monitor to monitor for job status changes.

► You can easily view which jobs are using the most system resources, or which jobs need an operator response, with just a few clicks of the mouse.

Table 2-2   Work Management tasks available on the Web

Task	Task ID (task=xxx)
Active Jobs	actjob
Server Jobs	svrjob
Active Subsystems	sbs
Output Queues	outq
Delete a job	dltjob
Hold a job	hldjob
Release a job	rlsjob
Work with a job	wrkjob
Move a job	movjob
Show job properties	jobprop
Job log	joblog
Locked objects for a job	lockobj

Task	Task ID (task=xxx)
Call stack for a job	callstack
Open files for a job	openfiles
Library list for a job	liblist
Performance statistics for a job	perfstats
Threads for a job	threads

2.3.3 Configuration and Service

This component contains various functions for managing your system's configuration as well as service fixes. It contains several functions that need a Management Central connection.

- ► System values to configure system values
- ► History Log to display the history log
- ► Time Management to adjust system time and manage time zones
- ► Hardware to display hardware on the server
- ► Software to display software on the server
- ► Fixes Inventory to display and manage fixes
- ► Collection Services to collect performance data
- ► Logical Partitions to work with logical partitions

Highlights of the component include:

- ► You can graphically view a tower that contains disks, the physical location of a disk within a tower or rack configuration, and a disk's properties, such as percent of total storage currently utilized. You can also view and configure disk pools.
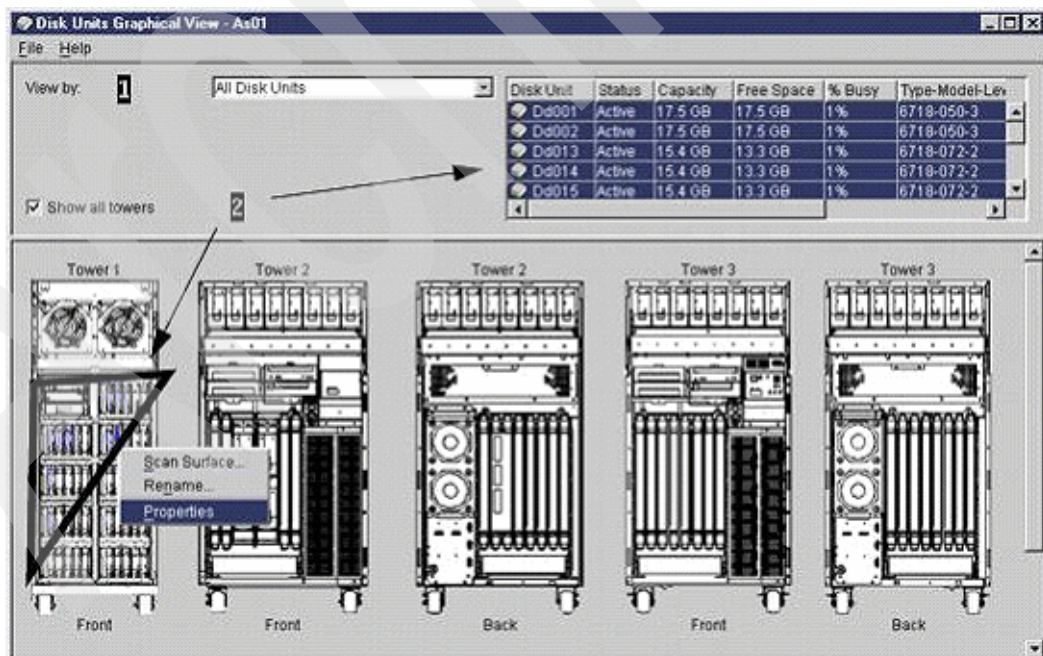
Figure 2-5   Disk units graphical view

Different disk actions are shown depending on the current status of the disk unit.
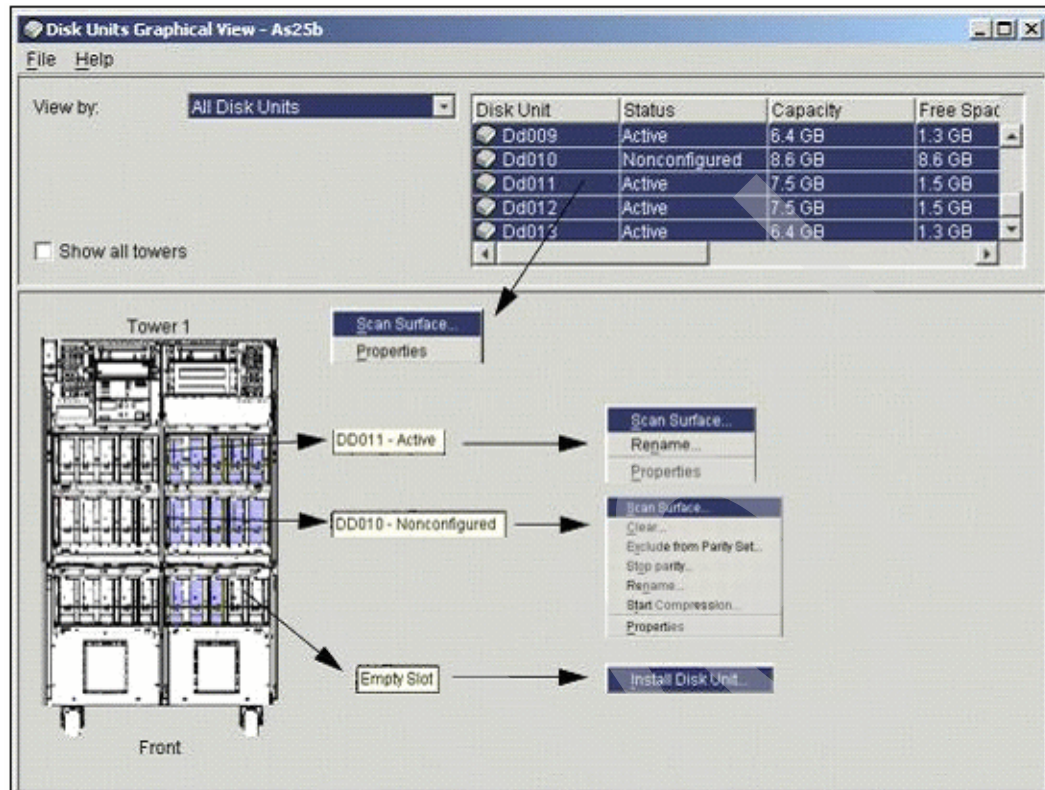
Figure 2-6 Disk units in a tower view

► After collecting a fixes inventory on your system, you can:
  – View a fix description and associated cover letter.
  – Install a fix or uninstall a temporary applied fix.
  – Send fixes to another iSeries server.

► Collection Services allows you to collect system-wide performance data. This data is used by Graph History and System Monitor function support. The performance database files generated from Collection Services data are also used by the Performance Management/400 (PM/400) service offering or the Performance Tools for iSeries (5722-PT1) product.

Table 2-3 Configuration and Service tasks available on the Web

Task	Task ID (task=xxx)
System Values	sysval
Time Management	timemgmt

2.3.4 Network

This component contains various functions for managing your system's TCP/IP and Internet support.

► TCP/IP Configuration to configure and monitor TCP/IP
► Remote Access Services to manage Remote Access Services
► Servers to manage and configure network servers
► IP Policies to manage IP traffic policies and rules
► Enterprise Identity Mapping (EIM) administration

► Internet to access iSeries internet applications

Highlights of the component include:

► TCP/IP Configuration provides wizards for configuring both IPv4 and IPv6 lines, interfaces, and routes. TCP/IP Configuration allows you to view and configure TCP/IP properties, such as domain and host name settings, and to start or stop TCP/IP interfaces. In addition, TCP/IP Configuration provides you with utilities to troubleshoot your network, such as trace route and PING.

► The DHCP monitor function (available from the TCP/IP Servers list) allows you to view and administer IP addresses that are managed by your DHCP server. This graphical interface allows you to view which IP addresses are leased, how long they have been leased, and when they are available to lease again.

► iSeries NetServer opens the door to file and print serving using Windows Network Neighborhood. No additional software is needed since iSeries NetServer is integrated in the server operating system and PC users in the network utilize the file and print-sharing functions included in the PC operating systems. You can configure iSeries NetServer properties and the properties of iSeries NetServer file and print shares with iSeries Navigator.

► Quality of Service (QoS) is used to give better service to selected network traffic by monitoring and controlling network bandwidth. The iSeries QoS solution provides both inbound admission and outbound bandwidth service, which allow you to give priority to different policies, reserve bandwidth, and restrict server connections. To complete a policy, you must select or define users, applications, performance limits, and schedules.

2.3.5 Security

This component provides the following functions to allow you to configure and manage your iSeries security:

► Permissions to specify access to iSeries objects for users and groups
► Authorization lists to create and maintain authorization lists
► Policies to set and maintain security and auditing policies
► Network Authentication Service to configure those services

Highlights of the component include:

► The Permissions dialog is available throughout several components of iSeries Navigator, wherever iSeries objects are being managed. This dialog gives you an easy-to-use interface for setting the permissions to access the selected object.
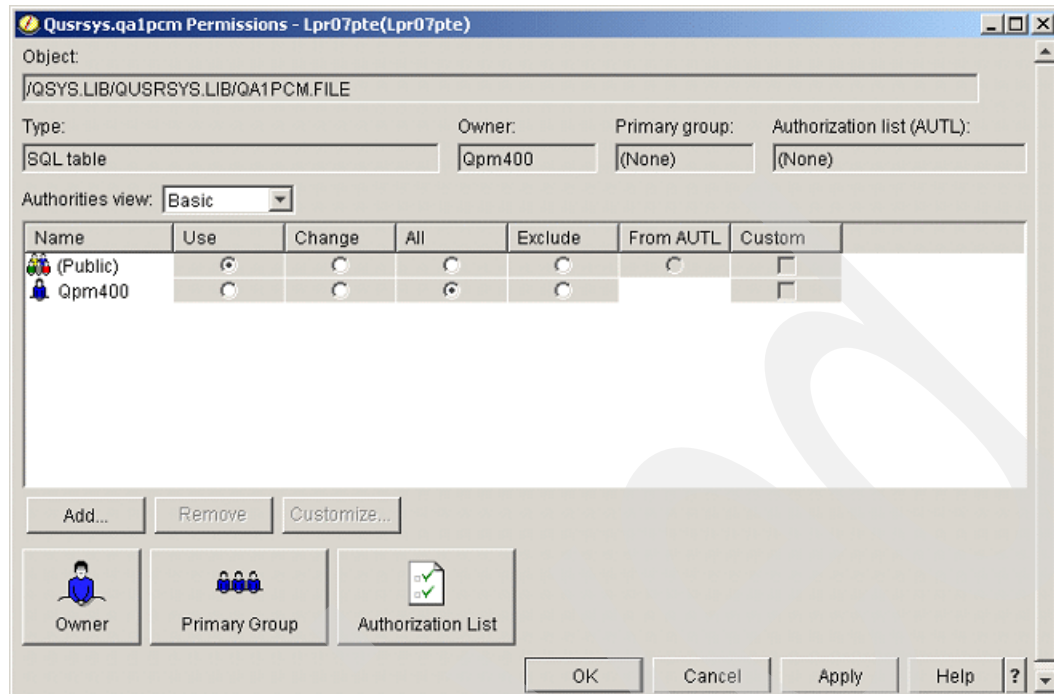
Figure 2-7   User permissions panel

► Authorization lists are provided to group objects with similar security requirements together. You can then assign specific permissions for desired iSeries users and groups to the authorization list, instead of having to assign the same permissions individually to each object.

2.3.6 Users and Groups

This component provides management of iSeries user and group profiles, organizing these profiles within the following lists:

► All users to view and work with all i5/OS users
► Groups to view and work with all i5/OS groups
► Users not in a group to view and work with all i5/OS users not in a group

Highlights of the component include:

► You can create a new user profile and base it on an existing user profile.

► You can add an existing user profile to another iSeries system by dragging the user profile to the target system.

► You can select to view the Printer Output, Jobs, Server Jobs, and Messages for that user, or you can select to view all the objects that user owns.
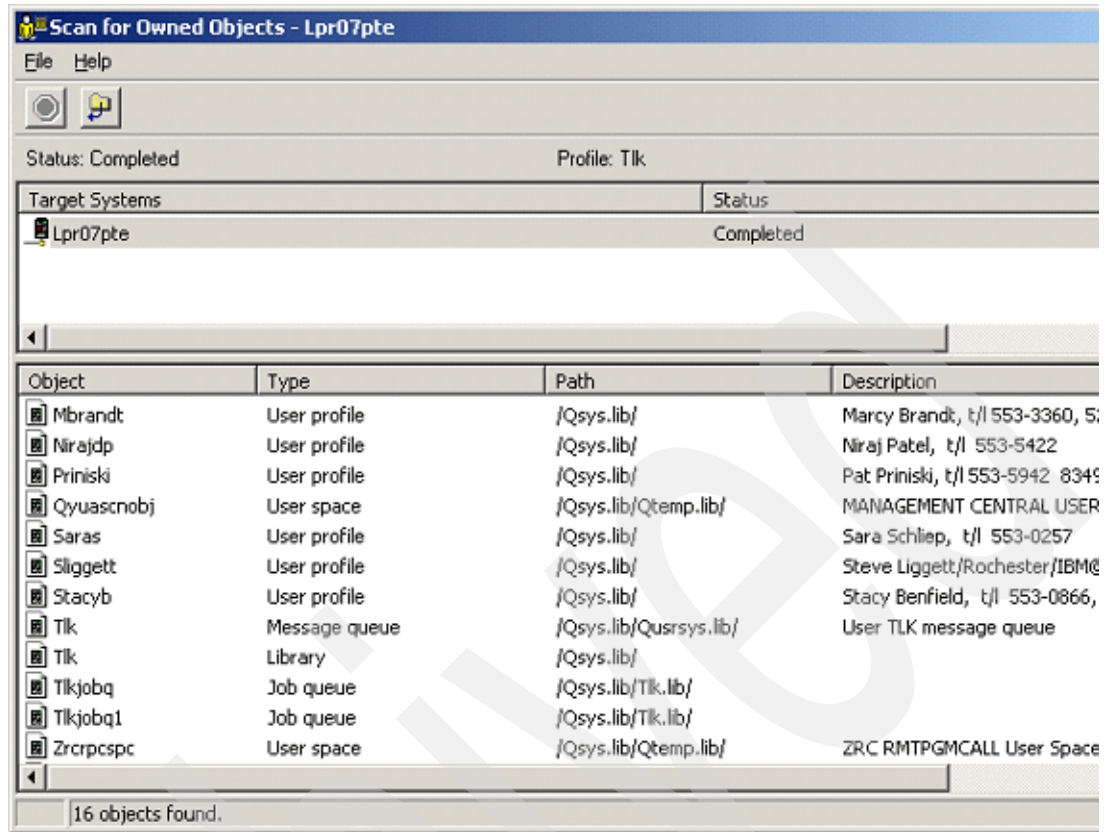
Figure 2-8   Objects owned by a user panel

2.3.7 Database

This component provides management of both local and remote iSeries DB2® databases. Within a selected database, the following can be managed:

► Schemas

  A schema is a database structure that contains your tables, views, and other object types. You can use schemas to group related objects and to find objects by name.

► Database Navigator Maps

► SQL Performance Monitors

► Transactions

Highlights of the component include:

► iSeries Navigator allows you to create a Database Navigator Map, which is a visual depiction of your database. The Navigator *map* is a snapshot of your database data at a specific time. With Database Navigator, you can explore the relationships of your database objects using a graphical representation that presents the tables in your database, the relationships between tables, and indexes and constraints that are attached to tables.

► The Generate SQL function allows you to reconstruct the SQL used to create existing database objects. This process is often referred to as reverse engineering. You can generate SQL for a schema, table, type, view, procedure, function, alias, and index.

► You can use the Run SQL Scripts window to create, edit, run, and troubleshoot scripts of SQL statements. When you have finished working with the scripts, you can save them to your PC.

► You can use Visual Explain to create a query graph that graphically displays the execution of your SQL statements. You can use this tool to see information about both static and dynamic SQL statements.

► With just the click of your mouse, you can perform an abundance of actions against the selected Database object.
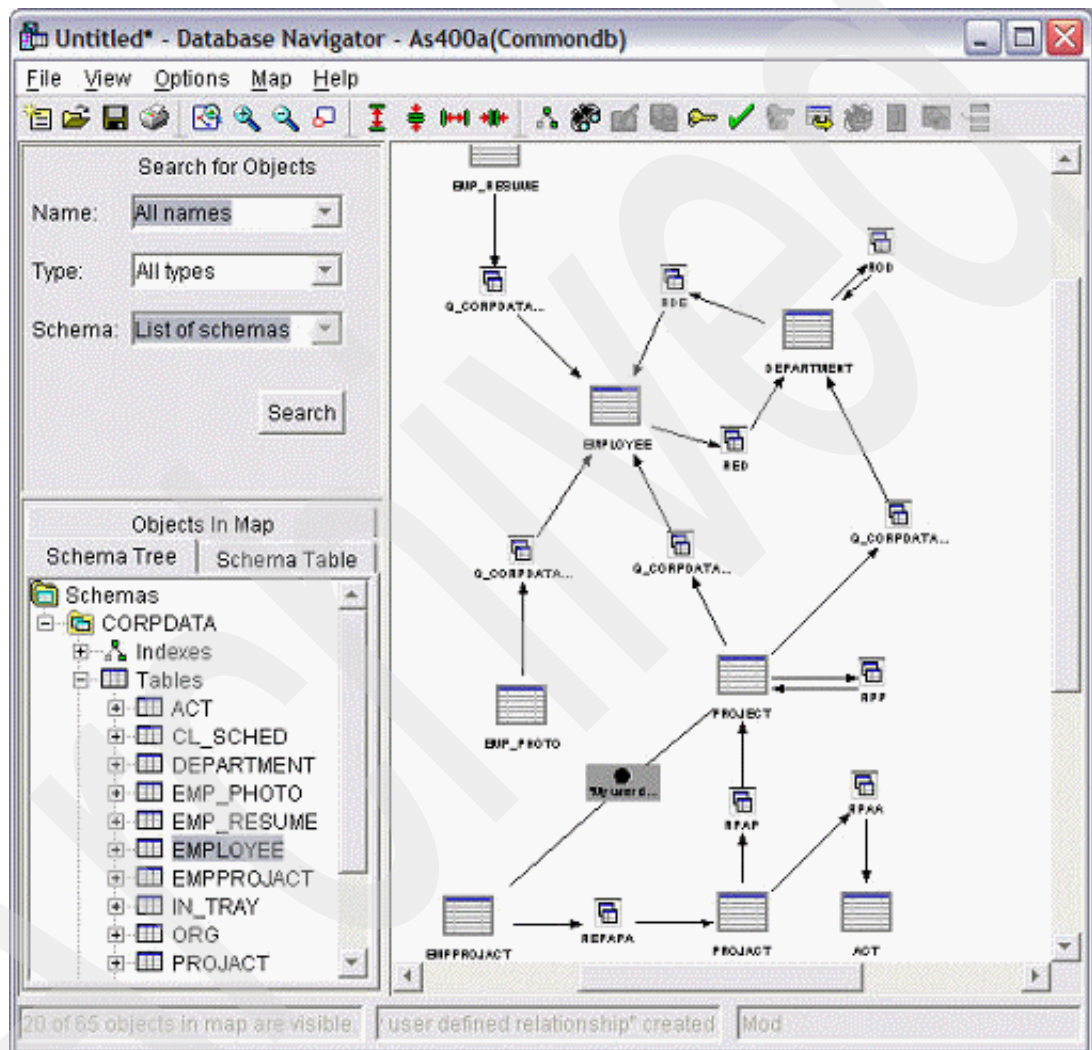
Figure 2-9   Database map panel
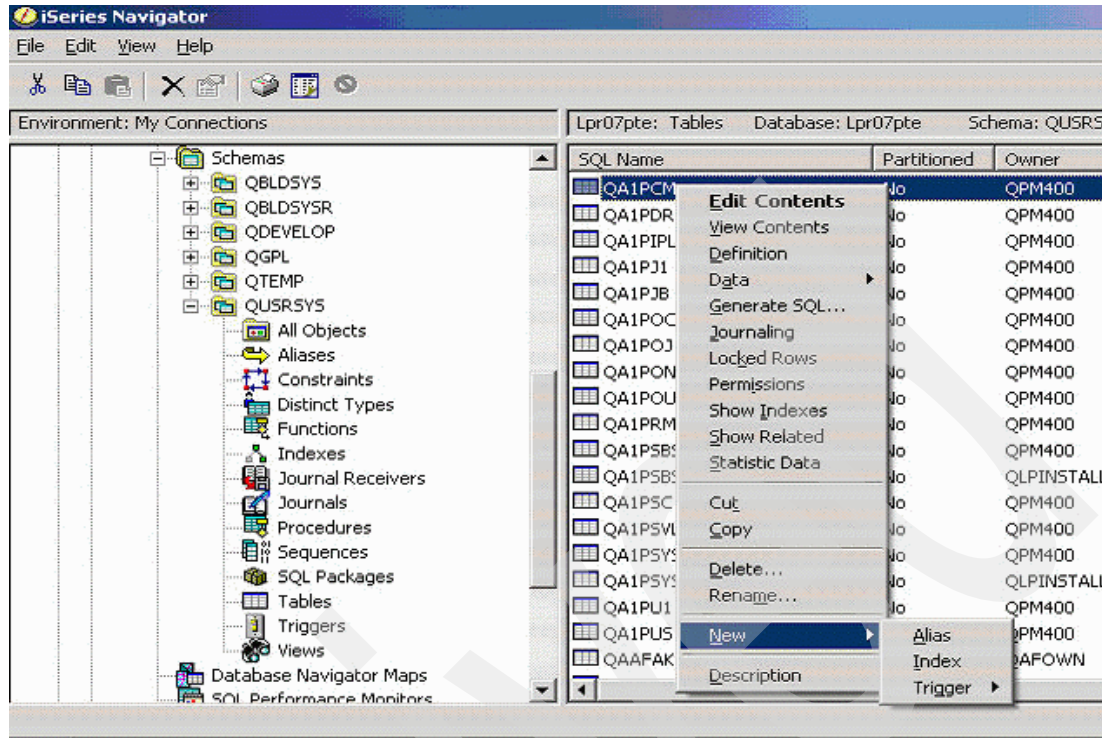
Figure 2-10   Database schema actions

Table 2-4   Database tasks available on the Web

Task	Task ID (task=xxx)
All objects	db.allobj
Aliases	db.alias
Create an alias	db.crtalias
Constraints	db.cst
Indexes	db.idx
Create an index	db.crtidx
Sequences	db.seq
Create a sequence	db.crtseq
Tables	db.tbl
Create a table	db.crttbl
Distinct types	db.typ
Create a distinct type	db.crttyp
Journals	db.jrn
Journal receivers	db.jrnrcv
SQL procedures	db.proc
SQL packages	db.pkg
Create a schema	db.crtschema

Task	Task ID (task=xxx)
Select a schema	db.selschema
Triggers	db.trg
Views	db.view
Functions	db.func

2.3.8 File Systems

This component provides you with an *explorer view* of the iSeries file system. From the following lists, you can quickly access the desired files you want to work with.

▶ Integrated File System to work with file system contents, shares, and permissions
▶ File Shares to view and use iSeries NetServer file shares

Within the Integrated File System GUI you can:

▶ Browse the file system.
▶ Copy an iSeries file to your PC.
▶ Enable editing for all files.
▶ Set up permissions to a file or folder.
▶ View jobs that are using a file or folder.

Highlights of the component include:

▶ You can quickly copy or move a file from one system to another by dragging it from its source location and dropping it on the intended directory.

▶ You can also drag a file to your desktop for use with PC applications and e-mail.

▶ You can easily change the permissions to any object within the file system by simply navigating to that object, right-clicking it, and selecting the **Permissions** action. From the Permissions dialog, you can:

  – Authorize a user.
  – Remove authorized users or groups from the object.
  – Change the owner.
  – Create an authorization list.
  – Add or remove users in the authorization list.
  – Customize security for the object.

▶ You can use iSeries Navigator to manage your Java programs that are stored in the i5/OS integrated file system. You can create a new Java program, which contains optimized instructions for your system and associates the Java program object with the class file, JAR file, or ZIP file. You can also run the Java program or make changes to the Java program and then compile it.

2.3.9 Backup

This component provides you with tools to schedule backups of your server data. The following backup policies are provided:

▶ Daily
▶ Weekly
▶ Monthly

Backup policies allow you to schedule daily, weekly, and monthly backups of your user data. You may want to specify one set of data to be backed up daily and a different set to be

backed up weekly. Or you may want to specify that all user data is backed up at the scheduled monthly backup. You can also specify a different tape drive or a different set of tapes to be used for each scheduled backup. And of course, there is a place to specify what time of day and what day of the week you want each scheduled backup to take place.

Highlights of this component include:

► Specify what, when, and where for a specific backup policy.
► Specify a user exit program to be run after the backup occurs.

2.3.10 AFP Manager

This component provides the tools for managing AFP resources, PSF configurations, and font tables on your iSeries server. AFP resources that you can work with include:

► Code pages
► Coded fonts
► Font character sets
► Form definitions
► Overlays
► Page definitions
► Page segments

2.4 Plug-ins

iSeries Navigator can easily be enhanced by allowing additional functions to be *plugged in* to the Navigator framework. These additional functions, or plug-ins, might be:

► In-house software that deals directly with your business
► Third-party iSeries software
► Other IBM software

By plugging additional client/server applications into iSeries Navigator, you can offer your users a single, easy-to-use interface for system administration and management functions.

Plug-in Support gives you the capability to:

► Plug in your custom tools and applications by adding new folders and objects to the iSeries Navigator hierarchy.

► Add context menu items to existing folders or objects in the iSeries Navigator hierarchy.

► Add property pages to the property sheet for a particular object.

► Distribute your software to PCs.

  You can deliver your user software on the iSeries server and use Client Access Selective Install to install your plug-in software from the iSeries server to your PCs.

  Also included is support for uninstall, fixes, and upgrade of your applications and support for multiple languages and system policies.

For a list of IBM products that can be plugged into iSeries Navigator, go to the Plug-in page on the iSeries Navigator Web site:

http://www-03.ibm.com/servers/eserver/iseries/navigator/availplugins.html

Two of the most popular iSeries Navigator plug-ins are:

► Backup Recovery and Media Services (BRMS)
► Advanced Job Scheduler

2.5 Use in Virtualization Engine

As of Virtualization Engine Release 2, iSeries Navigator functions can be accessed directly from the Virtualization Engine console in one of two ways:

► By launching the iSeries Navigator client application if its installed on your computer. This is done from the Virtualization Engine console Launch Pad.

► There are several links to specific iSeries Navigator Web tasks included throughout the Virtualization Engine console hierarchy. Clicking these links causes the Navigator Web task to be performed within the Virtualization Engine console, and does not require the iSeries Navigator client application to be present.

2.6 Summary

iSeries Navigator is the primary user interface for i5/OS systems management. Its familiar Explorer interface makes it easy to manage the day-to-day operations of your iSeries systems, as well as perform key system configuration tasks. With a few clicks of your mouse, you can monitor status and make changes for all your iSeries systems without having to use a single iSeries command. Ease-of-use and integration between components are key strengths of iSeries Navigator. Whether you need to manage jobs, configure your network, set system values, manage users, work with the database, or specify who can access key system files, iSeries Navigator is the tool to use. Beginning in i5/OS V5R3, several iSeries Navigator functions are now also available on the Web, which makes accessing key iSeries Navigator functions easier than ever.

2.7 Future directions

iSeries Navigator will continue to be enhanced to provide access to the latest iSeries functions and enhancements. In addition, individual components of iSeries Navigator are being Web enabled so that they can be accessed via a Web browser as well as from within the iSeries Navigator application. Forty-six tasks have been Web enabled in i5/OS V5R3, with many more to come in the upcoming releases. By Web enabling iSeries Navigator functions, commonly used system management functions can be accessed in a variety of ways, making it that much easier for you to manage your iSeries systems. These Web-enabled functions are also available to be accessed from new Web-based system management consoles, such as the Virtualization Engine console.

3

Management Central

This chapter describes Management Central functions that are part of the iSeries Navigator Graphical User Interface (GUI). What distinguishes Management Central functions is that they can be performed on several systems at one time while the other iSeries Navigator functions can only be performed on one system at a time. We explain:

- ► Terminology used to describe Management Central's components
- ► Functions you can use
- ► Plans for the future

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3.1 Management Central overview

Management Central is a portion of the function that appears in the iSeries Navigator GUI interface. It can manage i5/OS systems and partitions. Functions that appear in menus under a system listed in My Connections run on a single system basis, while Management Central functions can be invoked to a single system or to multiple systems in the network. Some of the functions that appear under a My Connections system such as running a command on a system or collecting inventory information really invoke a Management Central function to a single system or endpoint.

Some terms used with Management Central:

► Central system: The main system to connect to from the PC. It does all the communications to endpoint systems. The central system can also be an endpoint system.

► Endpoint systems: These are the target i5/OS servers you want to manage or use. The central system can also be an endpoint or target system. Management Central only works with i5/OS endpoints.

► Source system: Management Central has the availability to send fixes, files, folders, and system values to multiple systems. The source system is your master or source for this information. It can be the central system but does not have to be.

► System groups: This is a collection of one or more endpoints that is meaningful to your business (for example, it might be all production system, or development systems, or East Coast systems).

Figure 3-1 shows how the Management Central functions are organized. It is important for a user to expand Management Central because this establishes the communication links between the PC user and the Management Central server running on the iSeries Central System.
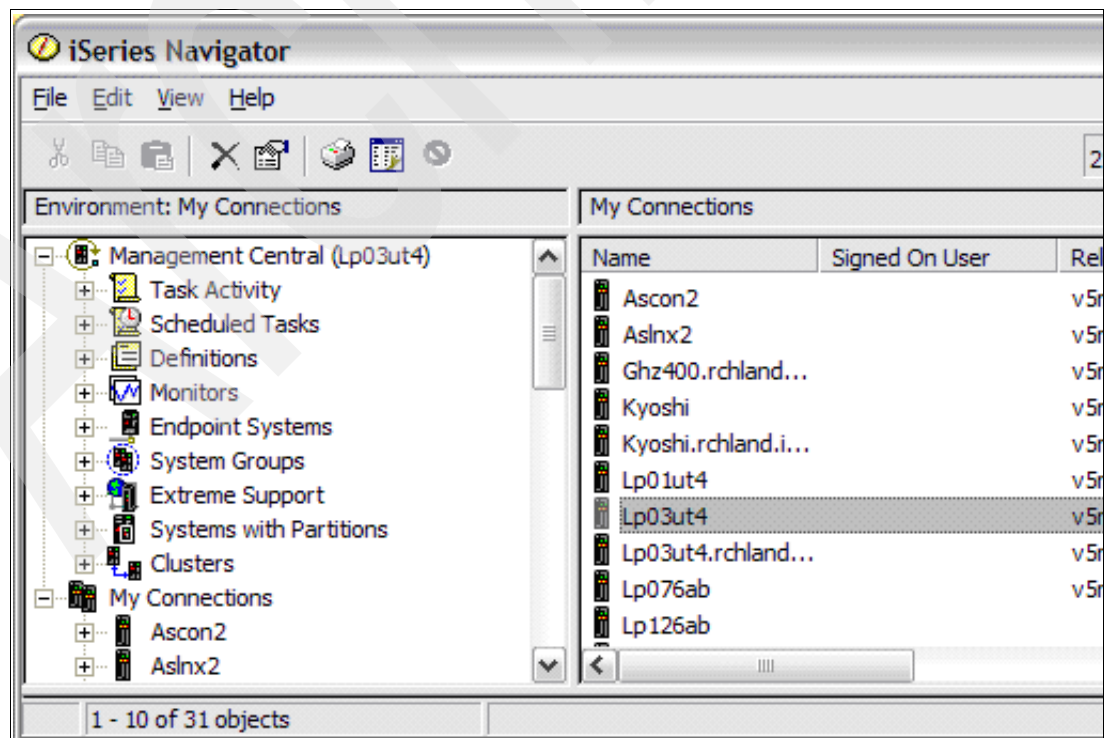
Figure 3-1   Management Central main panel

The central system should be at the highest i5/OS release in the network of systems to be used with a Management Central function. Also, the release of the iSeries Navigator GUI client should be at the release of the central system or a later release.

Management Central enables an authorized user to:

► Run operations on one or more endpoints. These are referred to as tasks and they may be run immediately or scheduled to run. For several types of operations, the user may create a definition of the operation to be saved for repeated use or to be shared with other users.

► View administrative information about the i5/OS systems in the network, such as fixes installed or results from a previously run task or operation. For example, running the command DSPOBJAUT OBJ(QMGTC2) OBJTYPE(*LIB) produces a report that can easily be viewed from the GUI by selecting **My Connection System** → **Basic Operations** → **Printer Output**. This command example shows how Management Central works in conjunction with the other functions in iSeries Navigator.

► Run monitors on one or more endpoints. For system monitors, up to 26 different metrics can be monitored based upon system measurement data gathered by the Collection Services function of i5/OS. Jobs, files, and message monitors are also available in Management Central. Using the Graph History capability with system monitors, a user can obtain a historical view of any of the 26 system monitor metrics for one or more endpoints.

► Utilize a number of administrative iSeries Navigator plug-in functions to that appear under Management Central such as Systems with Partitions (LPAR) and Service Agent.

3.2 What Management Central does

In this section we discuss what Management Central does.

3.2.1 Tasks and Scheduled Tasks

Figure 3-2 on page 26 shows the expanded Task Activity folder and the Scheduled Task activity folder. The same nine task types appear in both folders. Any operation or function that runs as a task can also be scheduled for subsequent execution. The Scheduled Tasks folders provide a view of what tasks are still scheduled to be run and details show when they will be run. In this example the IBM Advanced Job Scheduler (AJS) product is not shown. It is a license product and provides the user with many advanced scheduling capabilities. If it was installed, then another AJS scheduled task folder would appear.

Tasks are scheduled based upon the time of the central system. For example, if the central system is in New York and a command was scheduled to run at 3:00 p.m. on two targets (one in New York and one in Minnesota), the command would run on both systems at the same time (3:00 p.m. in New York and 2:00 p.m. in Minnesota).
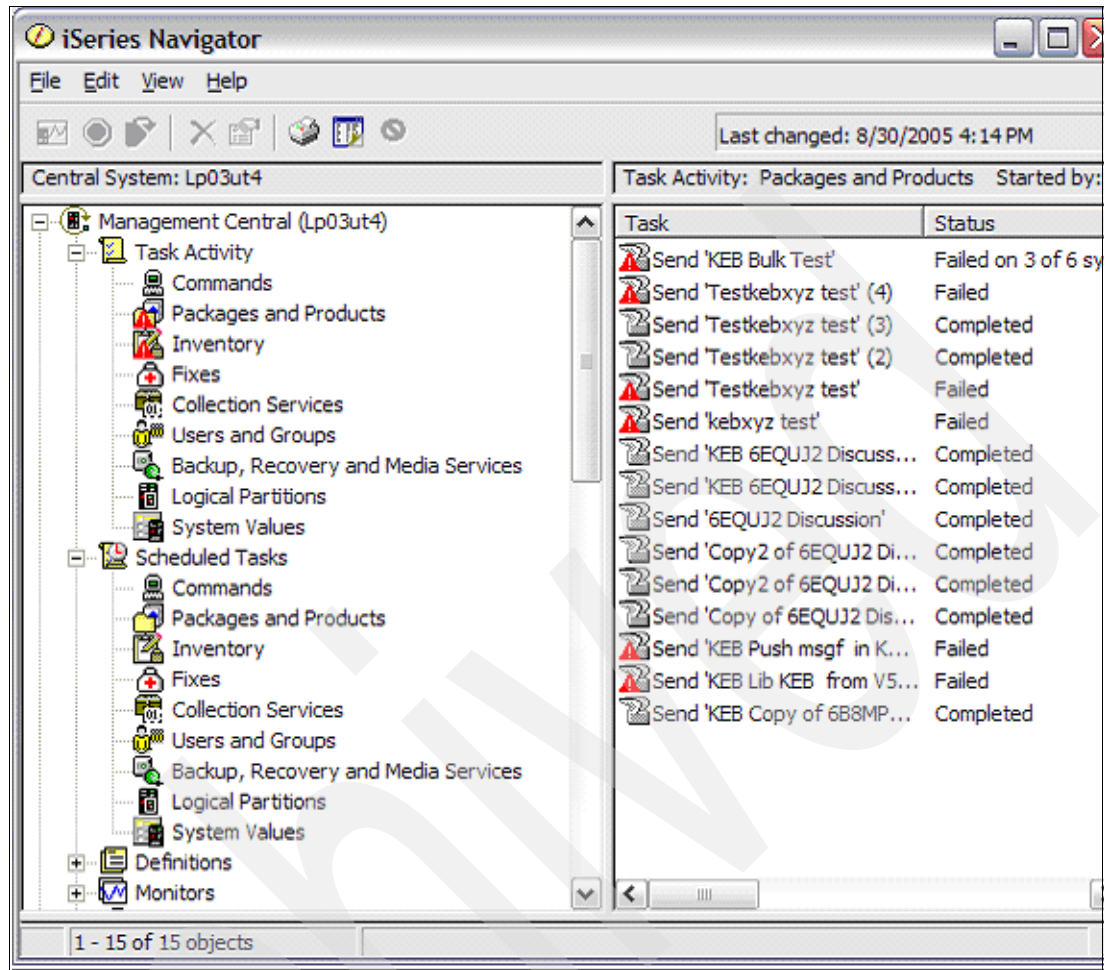
Figure 3-2   Scheduled tasks status panel

3.2.2 Task types

There are various types of tasks you can use in Management Central:

► Commands: You can use iSeries Navigator to run commands on multiple systems. For commands that you want to run on a regular basis, simply create a command definition and run it immediately or schedule it to run on endpoint systems in your network. For assistance anytime you are entering or selecting an i5/OS command, just click the **Prompt** button on the command properties window to see a complete list of the parameters and values for the command.

► Package and Products: You can package and send objects to systems in your network, and you can create snapshots of your data to preserve more than one version of the data.

To package and send software products to the systems in your network, you simply create a product definition to identify your application as a product to the iSeries server. The product definition contains all the information that you need to send and install a product across multiple systems, just like you would install an IBM licensed program. You can also generate fixes for these user-defined software products.

► Inventory: You can collect and manage various inventories on a regular basis and store the data on the Central System. For example, you can collect the inventory for users and groups, fixes, system values, hardware resources, software resources, service attributes, contact information, or network attributes.

You can search the hardware, software, fixes, and users and group inventories based on criteria that you specify. You can export the results of the search or an entire inventory to a PC file to use with PC applications and to perform other queries.

► Fixes: When managing fixes across your network systems you can take action to cause a fix-related operation to occur on one or more endpoints. Examples are sending and installing missing fixes to endpoints where needed. You can also send fix groups to endpoints, but not entire fix cumulative packages.

► Collection Services: A Collection Service task can be run by the user to start and stop Collection Services on one or more endpoints.

► Users and Groups: An administrator can use Management Central to keep track of the users, groups, and their privileges on multiple systems. They can also create, send, edit, and delete users across multiple systems.

► System Values: Based upon system values on a source or model system, you can run a task to update system values on one or more endpoints. Other functions that appear in the system values folder are tasks to synchronize the date and time across systems.

3.2.3 View results

The next three figures show examples of information useful to you as an administrator, such as installed products and the properties of a fix.
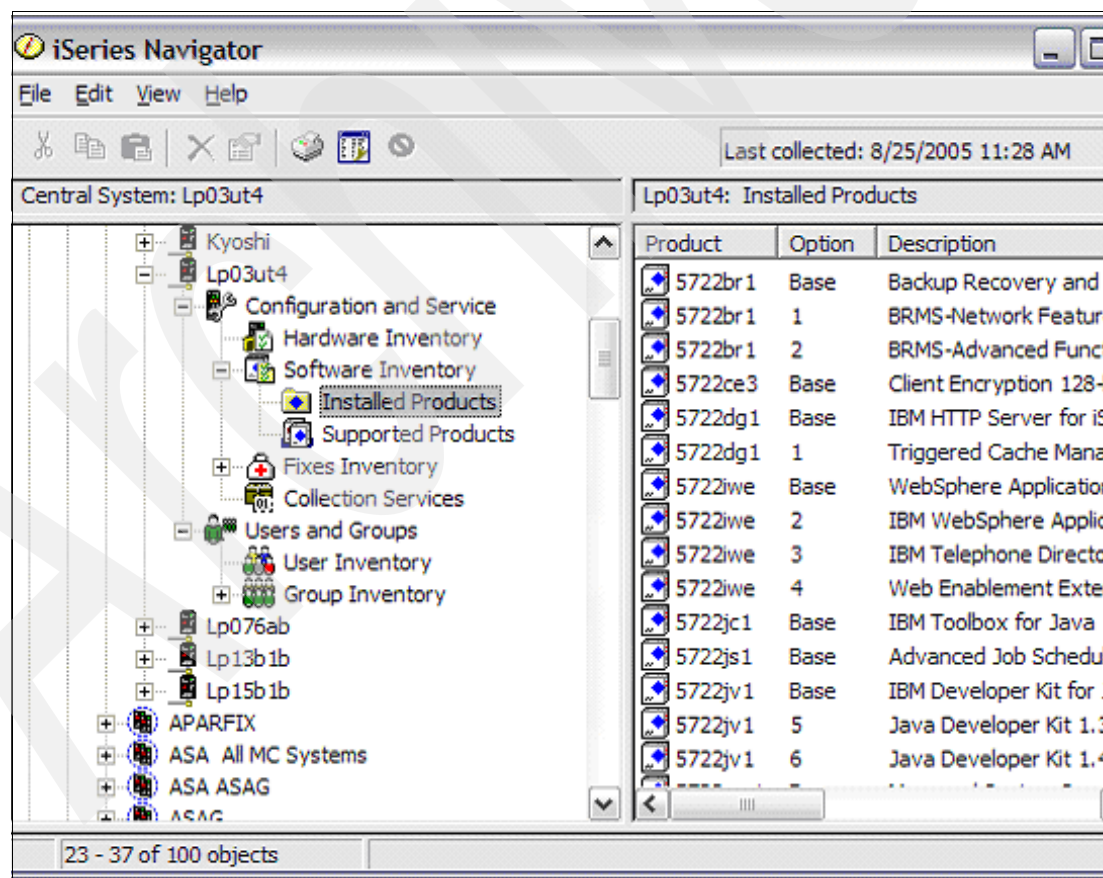
Figure 3-3   Installed Products panel
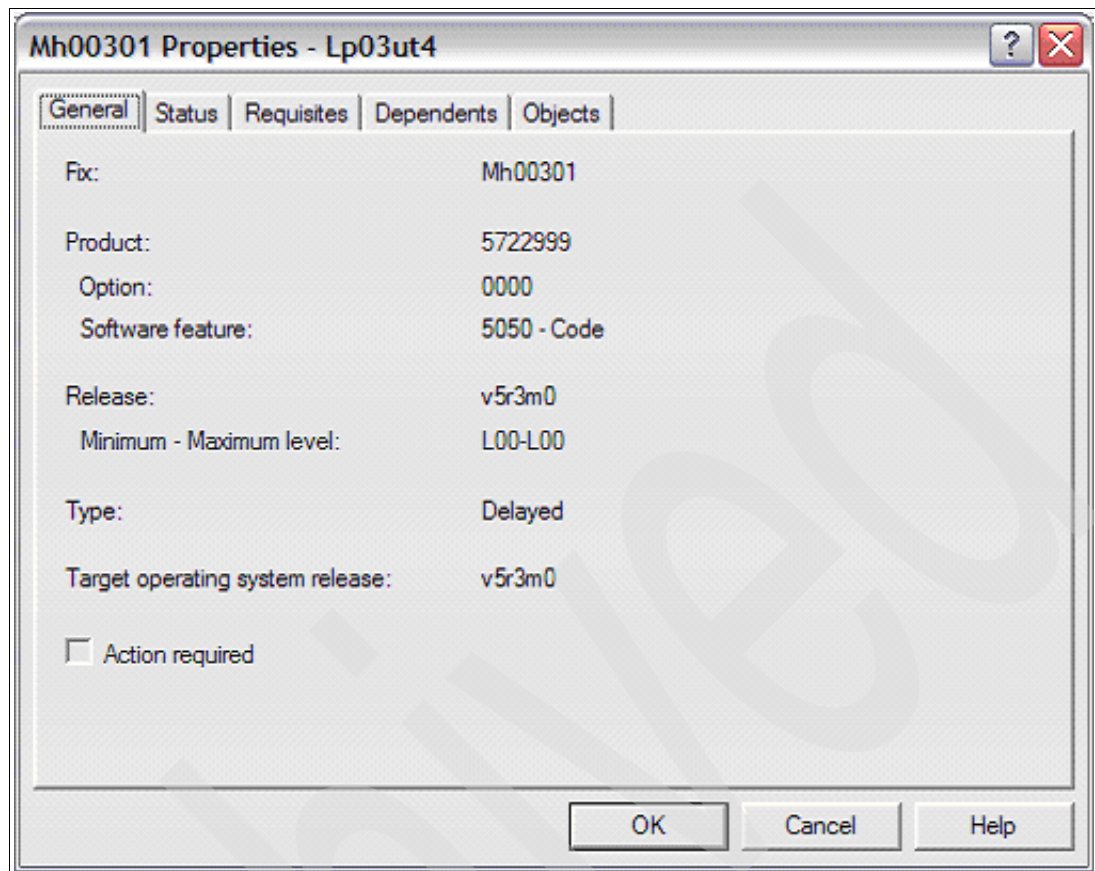
Figure 3-4   Fix properties panel
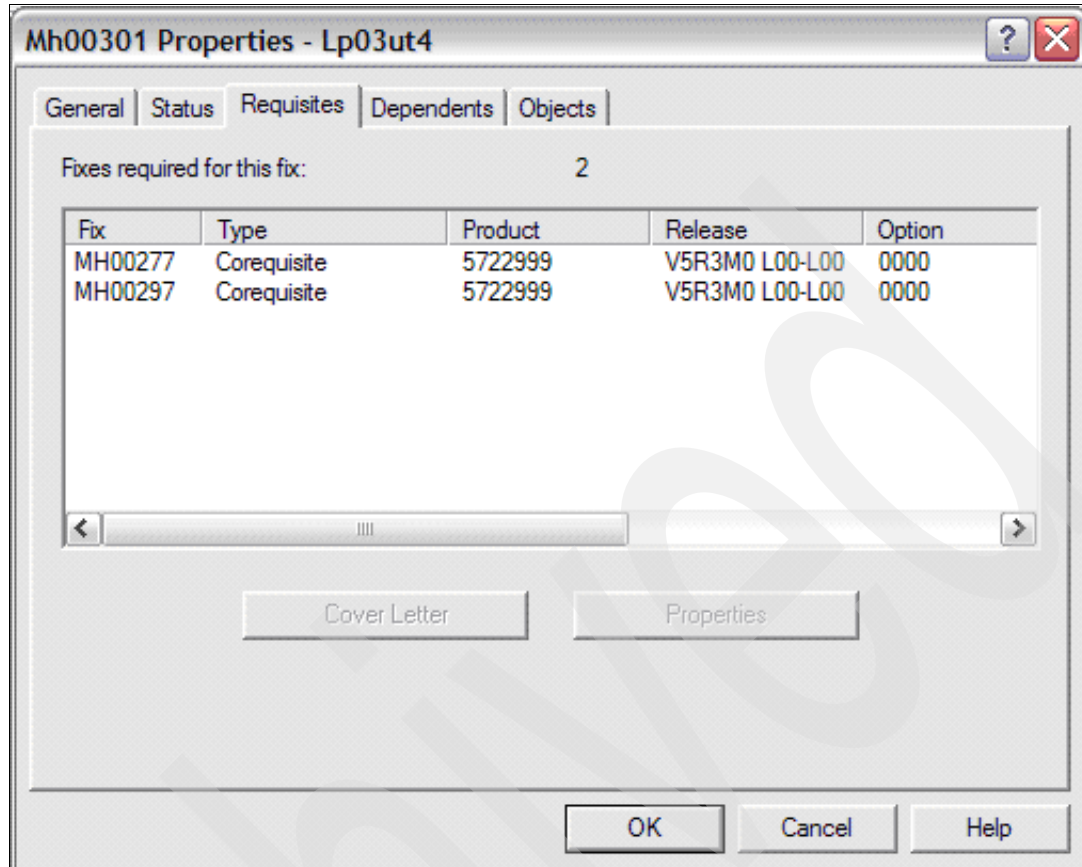
Figure 3-5   Fix requisites panel

Some of the useful administrative information is available as the result of running a function
against endpoint systems. Figure 3-6 on page 30 shows the results of comparing the PTFs
installed on the source system with other systems in the network in order to find missing fixes.
In this example we see that 427 fixes are missing from Lp13b1b as compared to our model
system Lp03ut4. The PTF compare wizard function would have asked the user if they wanted
to just view the results, or to send the missing fixes, or to send and install the missing fixes.
The user is also asked if they want to see extra fixes (those on the endpoints that are not on
the source or model system). This comparison can be done for all products or selected
products.
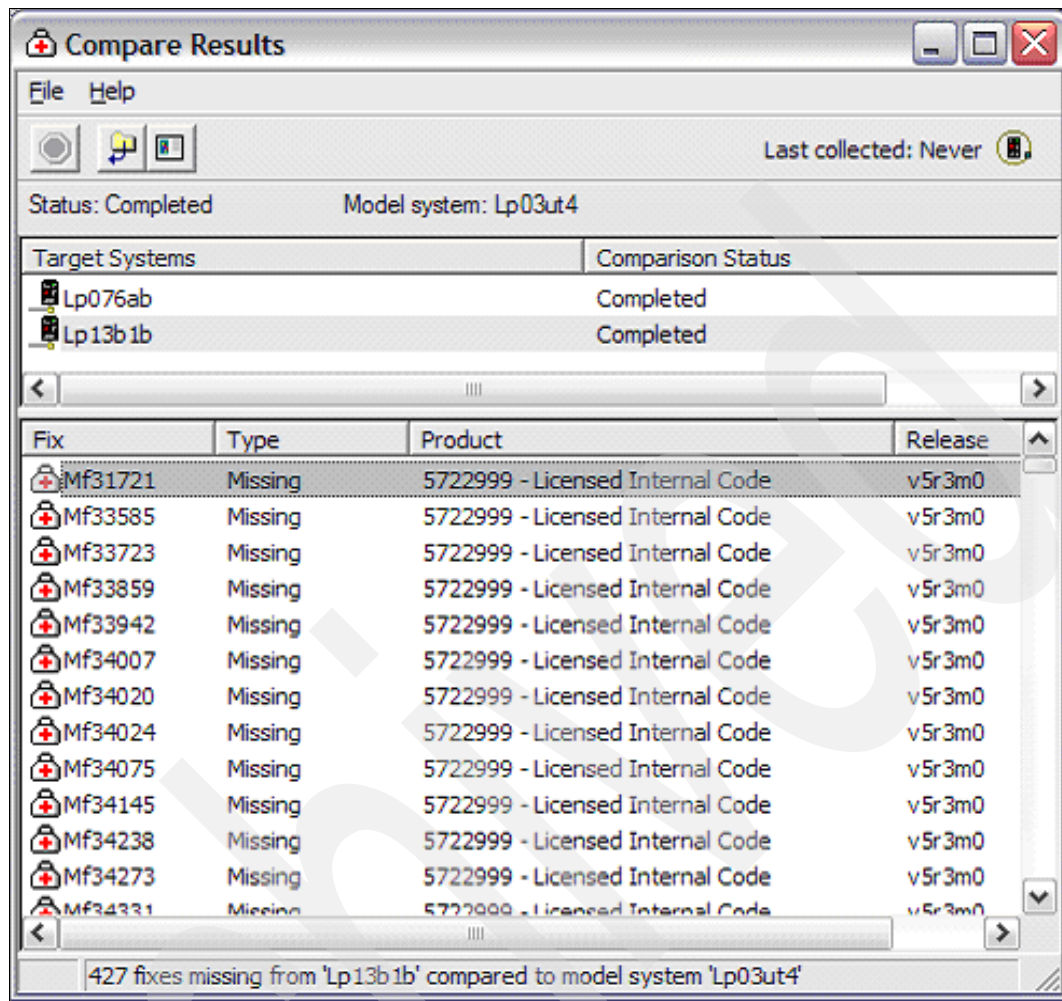
Figure 3-6   Fix compare results panel

3.2.4 Definitions

Definitions allow a user to define and save a command, package, product, or user definition.
This definition can be shared with other Management Central users, and can subsequently be
run as a task or scheduled to run on one or more endpoints.
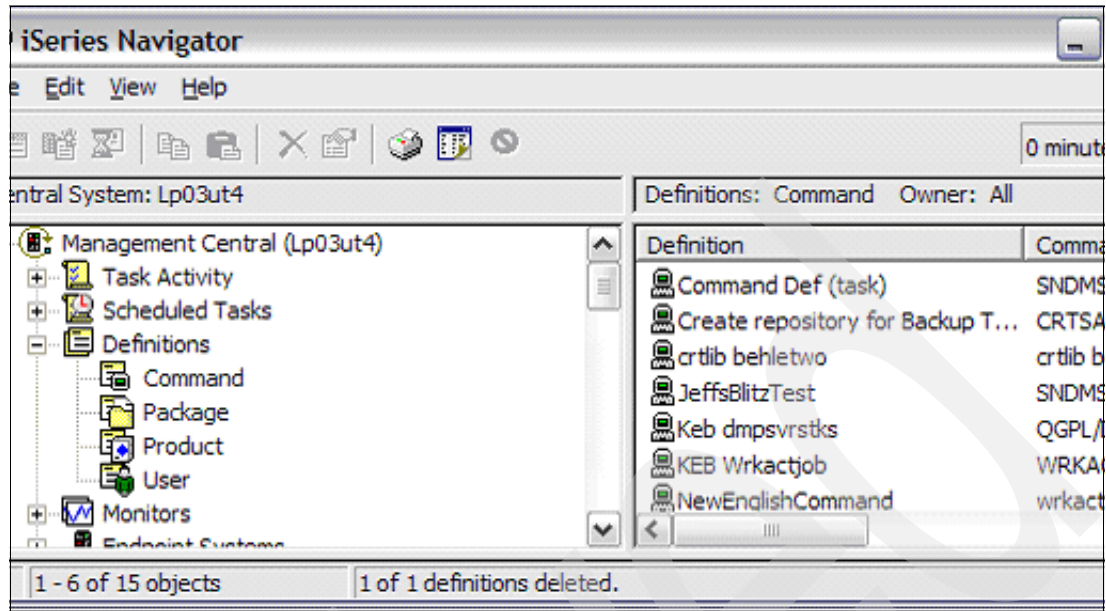
Figure 3-7   Definitions panel

Command definitions

Command definitions allow you to define a command, then run the command to multiple systems or groups of systems. Having a stored command definition allows you to easily share commonly used or complex commands with other Management Central users. When a command is run, a task is created.

Package definitions

Package definitions allow you to create a list of QSYS or Integrated File System (IFS) files and treat them as a logical or physical group (for example, configuration data, Java applications, HTML Web pages, software programs). Creating a package definition allows you to group related files and folders together, and send them to multiple endpoint systems or groups of endpoint systems.

You may choose to create a snapshot of your package definition at any time. A snapshot is a file that contains the data at a particular instant in time for all the files that were selected to be in a package. Creating a snapshot allows you to capture the contents of the selected files at a given time and then distribute that version of the files at a future time.

Product definitions

Product definitions allow you to create a product and then send and install the product to multiple endpoint systems or groups of endpoint systems. An advanced option provides a set of panels to help you send a product that you created to selected endpoint systems and specify a later date and time for the product to be installed on those systems. Subsequent updates or fixes can also be sent for the product definition created.

User definitions

User definitions allow you an easier way to create a new user on multiple endpoint systems or system groups. You only need to specify the name for the user, a brief description to help you identify this user in a list of users, and a new password for the user. All other properties of the new user are based on the properties stored in the user definition, unless you choose to change them. You can click **Edit User Settings** to change properties of the new user without changing the contents of the definition.

For example, you can create a user definition named Accounting Users, which specifies all the authorities, groups, and other properties that the users in your accounting department need. Then, at any time, you can create one or more new users on any endpoint system or system group by clicking **Create User** and by specifying a name and password for each new user.

3.2.5 Monitors

You can create monitors for your systems, jobs, messages, and files. These monitors allow you to monitor your system performance, job status, message queues, and system log text files across multiple platforms. They provide you with the flexibility you need to access information for the i5/OS systems you support.

Monitors use values to measure (metrics) and values to compare against (thresholds), which are described below, The current values of the metrics are collected on a schedule you select, compared to the threshold values you define, and then actions are taken based on the comparison.

Job monitors monitor a job or list of jobs based on job name, job user, job type, subsystem, or server type. Metrics, or values to monitor, for job monitors include eight of the 26 System monitor metrics, job status, and messages in the job log for the selected jobs.

Message monitors monitor any message queue for any group of messages that you select.

File monitors monitor selected files or all system logs for a text string, for a specified size, or for any changes to the file. You can also monitor the history log for a specified text string.
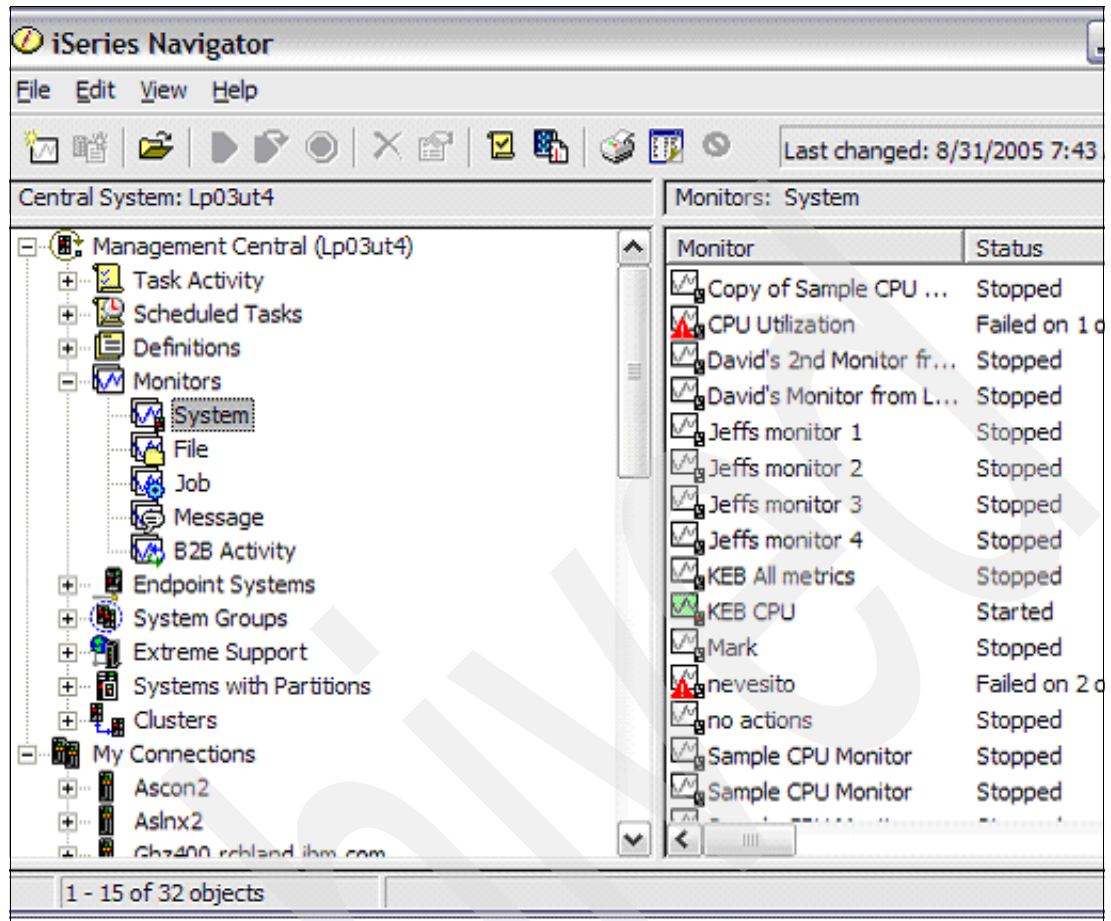
Figure 3-8   System Monitors panel

System monitors

System monitors let you visualize what is going on with your systems with detailed graphs that monitor the real-time performance of multiple iSeries servers. You can view and change information about the monitor, including the metrics to be collected by the monitor.

Use the Graph History window to see a graphical view of the metrics that have been collected for an extended period of time for a particular monitor. You can contrast this data with the real-time data for the last hour shown in the Monitor window. And finally, use iSeries Navigator for Wireless to monitor system performance and status remotely by using an Internet-ready telephone, a PDA with a wireless modem, or a Web browser on a PC.

The Monitor window shows a graphical view of the metrics for a monitor as they are being collected. You can have more than one monitor window open at the same time, and you can work with other windows while the Monitor windows are open. The Monitor window contains three panes: Graphs, Details, and Properties. A window can also be opened showing the event log (history of monitor threshold trigger and reset events).

The event log is a list of threshold trigger and reset events for your monitors. You can specify on the Properties page for each monitor whether you want events added to the event log. To see the Properties page for any monitor, select the monitor in the list of monitors and then select **Properties** from the File menu.
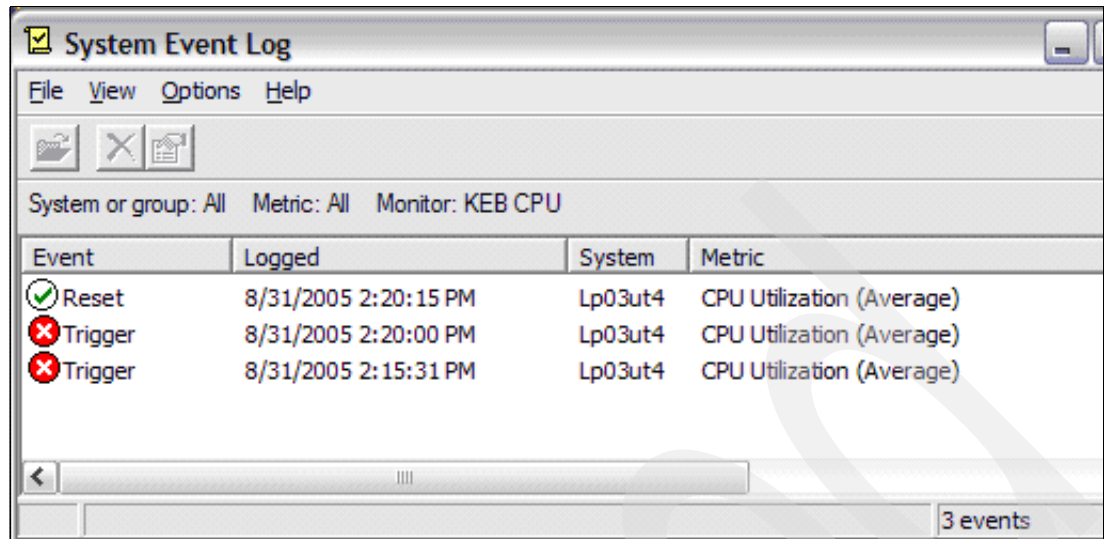
Figure 3-9   System event log panel

By default, the list of events is arranged in order by date and time. To change the order, you can click any column heading. For example, to sort the list by the endpoint system where the event occurred, click **System**.

You can customize the list of events to include only those that meet specific criteria by selecting **Options** from the menu bar and then selecting **Include**.

You can have more than one Event Log window open at the same time, and you can work with other windows while the Event Log windows are open. Event Log windows are updated continuously as events occur.

An example of a system monitor is shown in Figure 3-10 on page 35, where two endpoints are being monitored for a single metric CPU utilization. One has exceeded the threshold value setting twice. In the right pane we have examined one of the top 20 jobs using CPU at that time and have displayed the job properties for the job named Vems.
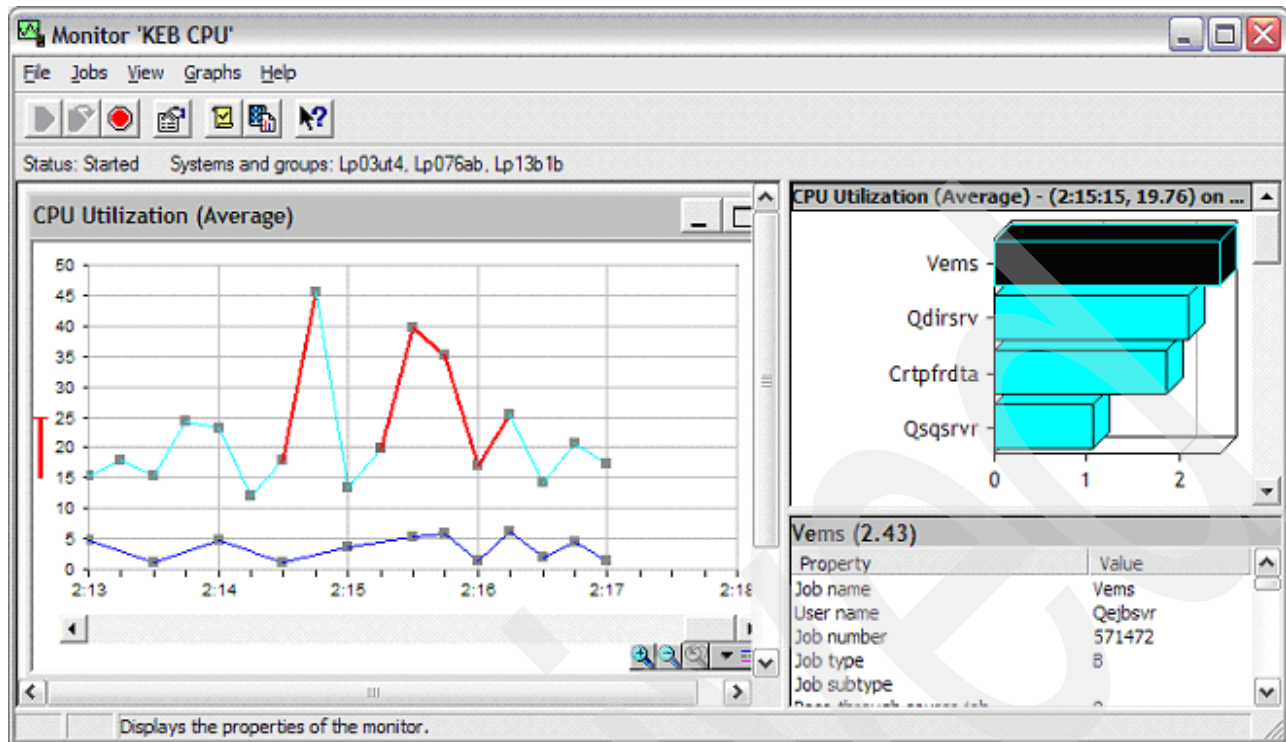
Figure 3-10   System Monitor graph

File monitors

You can use a file monitor to monitor all system logs, or you can select a set of specific files to monitor. You can monitor for a specified size or for specific text strings.

Job monitors

You can use a job monitor to monitor a job or list of jobs based on job name, job user, job type, subsystem, or server type. The metrics for job monitors include eight performance values, job status, and messages in the job log. For example, you might want to monitor a job's CPU usage, job status, and job log messages. The job monitor allows you to define commands to run when a specified threshold is met.

Message monitors

You can create a message monitor to monitor any message queue for any group of messages you select. The monitor can run on one or more systems. For example, you might monitor the system operator message queue on a group of systems for message ID CPI0953, which is sent when the threshold of a disk pool has been exceeded. The message monitor also allows you to specify a command to run on the server when the message count exceeds a specified level. So when the message monitor detects CPI0953, and the threshold of a disk pool is exceeded, you could specify to run a command that would delete objects that you no longer need from the disk pool.

For each message queue, you can specify two separate and independent message sets to monitor. For each message set you can specify the threshold (number of messages received in the queue) that will trigger an event and an operating system command that will run when the event is triggered.

You can also see the details of a message, reply to a message, send a message, delete a message, and see or change the properties of a message.

B2B Activity Monitors

Business to Business (B2B) monitors provide some specific metrics relating to WebSphere® transactions.

Metrics

A metric is a measurement of a particular characteristic of a system resource or the performance of a program or a system. You can specify the metrics to be monitored by a system monitor, job monitor, message monitor, file monitor, or a B2B activity monitor.

For a system monitor you can select from a wide range of available metrics (26 metrics), such as CPU utilization, interactive response time, transaction rate, disk arm utilization, disk storage, disk IOP utilization, and more.

For a job monitor, available metrics include job count, job status, job log messages, CPU utilization, logical I/O rate, disk I/O rate, communications I/O rate, transaction rate, and more.

For a message monitor, you can specify one or more message IDs, message types, and severity levels. You can also select from a list of predefined sets of messages that would be associated with a specific type of problem, such as a communications link problem, a cabling or hardware problem, or a modem problem.

For a file monitor, you can select to monitor files across multiple endpoint systems for specified text strings or for a specified size. Also, you can select to trigger an event whenever a specified file has been modified.

Thresholds

A threshold is a setting for a metric that is being collected by a monitor. This setting allows you to specify a trigger value, which, when exceeded, triggers an event. Actions can then be taken when the trigger value is reached. You can also specify actions to be taken when a second value, called the reset value, is reached. For example, when you create a system monitor you can specify an operating system command that stops any new jobs from starting when CPU utilization reaches 90 percent, and another operating system command that allows new jobs to start when CPU utilization falls to less than 70 percent.

You can choose to add an event to the event log whenever the trigger value or the reset value is reached. You can also use the trigger to display the event log.

3.3 Use with the Virtualization Engine

Management Central can be used with the Virtualization Engine console. The products can be installed separately or together. Management Central is a management source for the Virtualization Engine console and they communicate using a piece of code called a *bridge*. So you can use Management Central from its own iSeries Navigator console, or you can use it in combination with other products supported in the Virtualization Engine console.

3.4 Future directions

Management Central will continue to be supported for several more releases. Since its functions are mature and developed to the desired level we do not plan to make major enhancements or add to them. You may see some minor changes based on user requirements. This does not mean that you should not use Management Central or that its functions are dead ends. But as IBM systems management products move to common

components for user interfaces and infrastructures, the Management Central function will be included in those common products. So over time the Management Central functions will be duplicated in cross-platform products such as IBM Director. We plan to provide the replacement functions along with each i5/OS ordered at no additional charge, although they may be packaged as a separate product.

4

IBM Director

IBM Director is a comprehensive systems management solution that supports many operating and hardware systems. It is based on industry standards and can automate many functions required to manage systems including asset tracking, preventive maintenance, diagnostic monitoring, troubleshooting, and more. It has a graphical user interface (GUI) for easy access to its functions, and also provides a command-line interface.

This chapter tells you about:

- ► Functions provided and operating systems supported
- ► Ways to use the product
- ► Ways it interoperates with other IBM and industry solutions
- ► Future directions

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4.1 Functions provided and operating systems supported

IBM Director has several components:

► Management console with a graphical user interface: The console can be installed on a separate system or on the same system as the other components.

► Management server: This is installed on one system and uses a database to store information gathered from remote systems. It also has communication functions to access those remote systems and the management console.

► Management agent: This is installed on remote systems and provides operating system and hardware specific management functions. Agents communicate with the management server.

► Although no Director component is installed on them, remote systems and devices can be managed using industry standard facilities such as Simple Network Management Protocol (SNMP), Secure Shell (SSH), and Common Information Model Object Manager (CIMOM) implementations.

► Additional functions are available by installing extensions. An extension's code is installed on an existing console, server, or agents. Extensions are available from IBM and other companies.
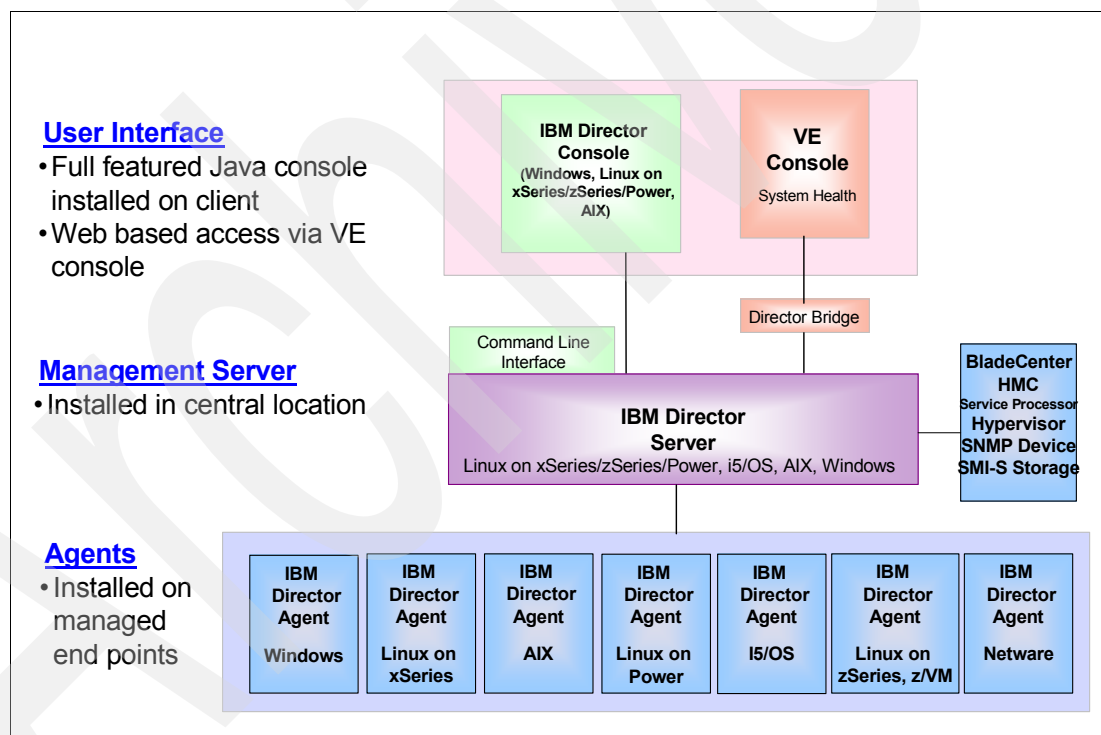
Figure 4-1   IBM Director components also showing the Virtualization Engine console connection

The IBM Director Console provides the GUI for all functions. It is configurable and can be used with three panes, two panes similar to Window's Explorer view, or one pane. Figure 4-2 on page 41 shows the three-pane view.
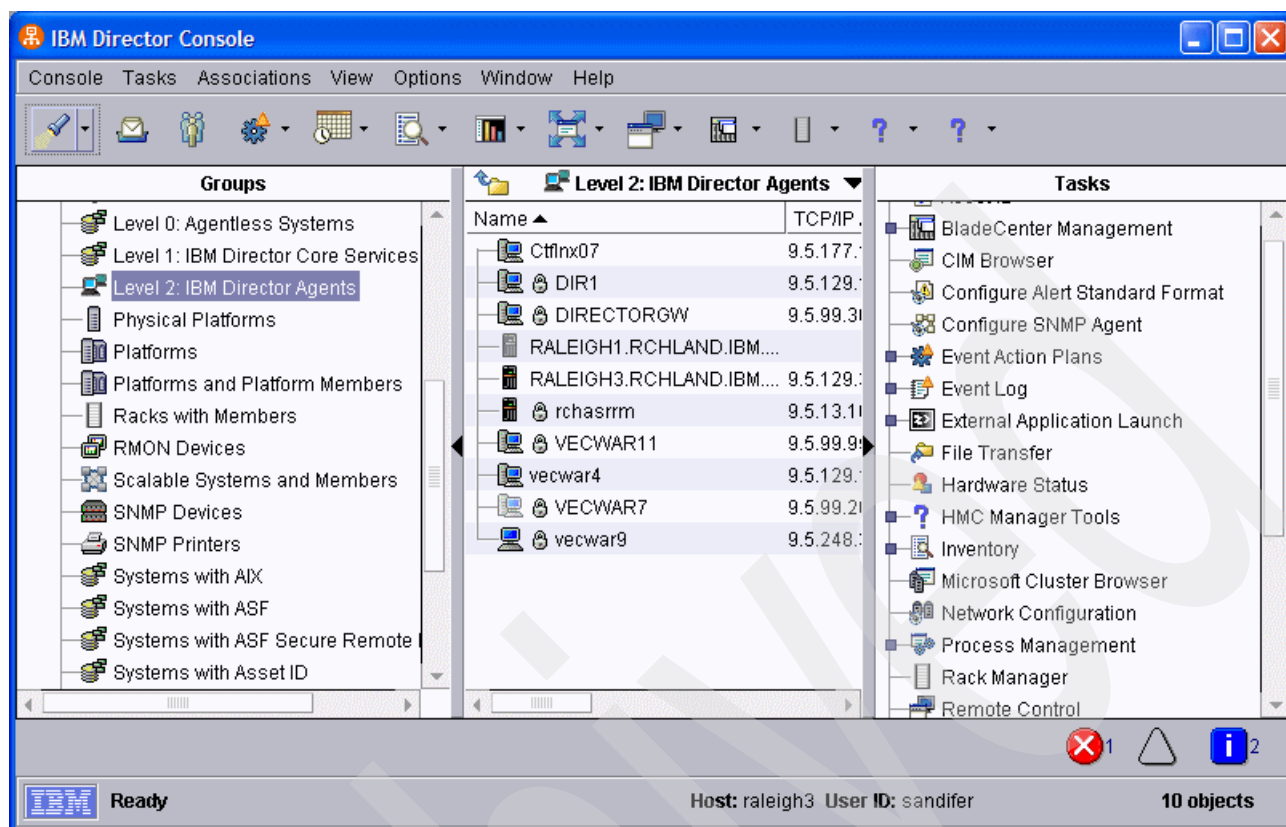
Figure 4-2 IBM Director console with three panes: Groups, systems in a group, and tasks

Figure 4-3 on page 42 shows the console with one pane listing the systems and the task menu pull-down with inventory tasks selected.
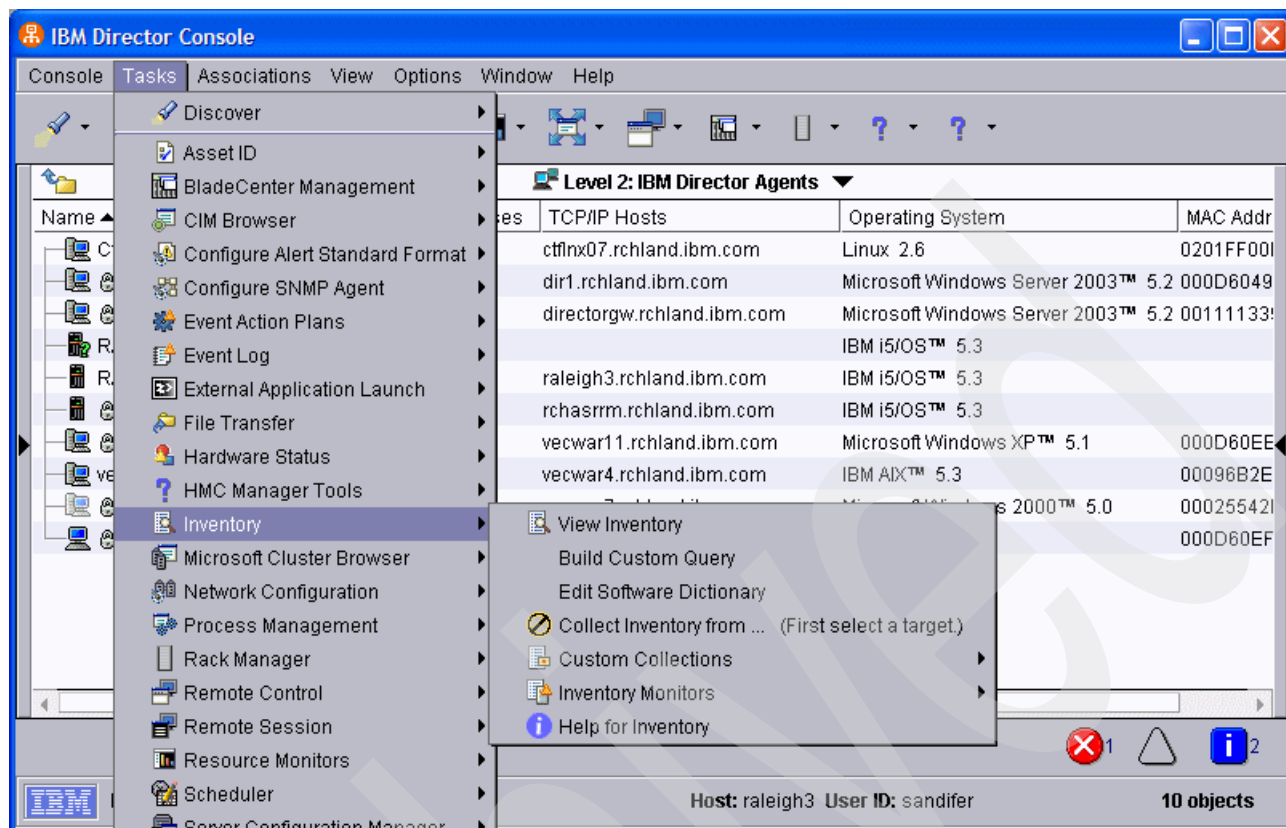
Figure 4-3   Console configured for one pane showing the systems and with the task menu pulled down

Figure 4-4 on page 43 shows a portion of the information available in iSeries hardware inventory. The number of fields is too large to fit on one screen, so several items including physical location and serial number are not visible.
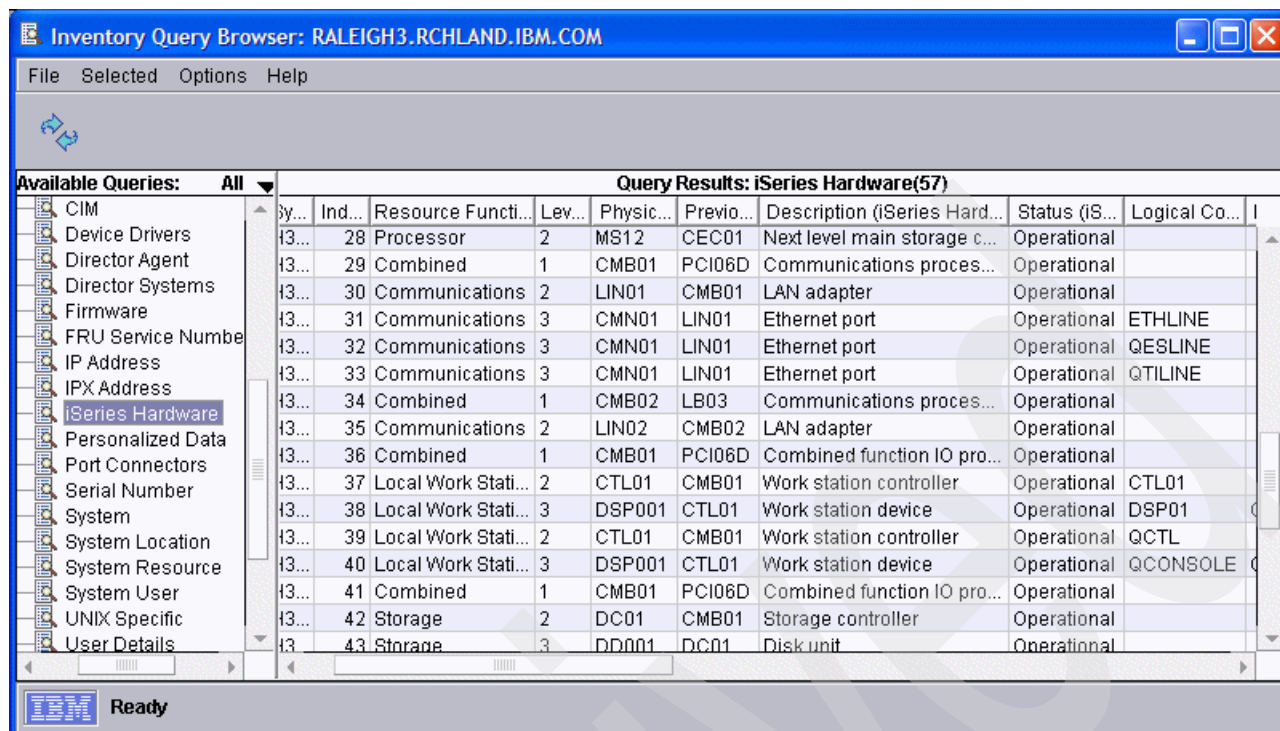
Figure 4-4   iSeries hardware inventory

IBM Director has many functions that work across all supported operating systems. Table 4-1 lists them and gives a brief explanation of what they can do for you, and what they do specifically on i5/OS.

Table 4-1   IBM Director functions

Function	What it does
Discovery	Automatically discovers the systems and devices in your environment. This includes i5/OS with a Director agent, SNMP, or secure shell installed and started.
Inventory	Gathers and stores in a central database information about the hardware, software, and fix components on your systems. The database can be viewed, exported, and customized. i5/OS hardware, installed software, Auxiliary Storage Pools, and PTFs are inventoried from Director agent systems.
Resource Monitors	Monitors the various resources on your systems such as CPU and disk utilization, and lets you know of any problems or unusual situations. I5/OS monitors include CPU, disk, IOP, file, job queues, message queues, and others.
Process Management	Monitors the important operating system and application processes and lets you manage them. You can view, control, and monitor i5/OS jobs, subsystems, and server jobs.
Event Action Plan	Defines events and actions to notify you if there is a problem. There are many predefined actions that you can take in response to events. These include run a program on the agent, run a program on the server, send an e-mail, send a page, send a Tivoli event, display the event, and others.

Function	What it does
Group Management	Creates and manages dynamic and static groups of systems so that tasks can be run against all of the systems at one time. Static groups are collections of remote systems that you list. Dynamic groups are defined based on inventory attributes such as operating system type, installed application, or installed hardware. Agents dynamically join or leave the group as their inventory attributes change.
Remote Session/ Remote Control	Establishes either a graphical remote session or command-line session to your remote systems so that you can centrally manage them. i5/OS remote telnet session is supported.
File Transfer	Transfers files and manages directories on systems and groups. Integrated File System (IFS) files and directories can be managed on i5/OS.
Task Scheduler	Schedules and monitors non-interactive management tasks. Any non-interactive Director task can be run immediately or scheduled to run later.
Software Distribution/ Update Assistant	Deploys firmware, device driver, fixes, and software packages to systems or groups. Software Distribution is supported on i5/OS. The Premium Edition allows you to select and package files, products, and PTFs for distribution to i5/OS agents.
SNMP management	Discovers and manages SNMP devices such as printers. i5/OS SNMP can also be managed.
Administrator Management	Creates and manages IBM Director administrator accounts to control which administrators can perform which functions on which agents. i5/OS-specific application management security has been added to the common Director functions.
BladeCenter Management	Discovers, configures, and manages BladeCenter chassis and their blades.
HMC Integration	Discovers and manages Hardware Management Console (HMC) systems for pSeries and iSeries. (This function will be available in 2006.)
Upward Integration	Provides hardware alerts and inventories for IBM and third-party systems management products such as Tivoli Enterprise™, Tivoli NetView, CA Unicenter TNG, HP Openview, and Microsoft® SMS and MOM. This is available on i5/OS through its CIMOM.

There are also extensions that can be added to the base IBM Director product for further management solutions. Some of these are supplied with iSeries Director, some can be downloaded, while others much be purchased. Software Distribution Premium Edition is one such product that applies to iSeries management. It allows you to package products, PTFs, and files together using a GUI interface and then distribute the package to an i5/OS agent. xSeries Management is an example of an extension that does not manage i5/OS agents but that can be installed on an i5/OS Director Management Server to manage surrounding xSeries systems.

For more information about extensions see the Web site:

http://www.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html

IBM Director supports various operating systems for its management console, server, and agents. The following lists show the support in general.

- Management Console:
  - AIX
  - Linux on iSeries, pSeries, xSeries, and zSeries
  - Windows

- Management Server:
  - AIX
  - i5/OS
  - Linux on iSeries, pSeries, xSeries, and zSeries
  - Windows

- Management Agent:
  - AIX
  - i5/OS
  - Linux on iSeries, pSeries, xSeries, and zSeries
  - NetWare
  - Windows

4.2 Ways to use IBM Director

IBM Director was designed to be an easy-to-install and easy-to-use systems management solution for a multi-platform, heterogeneous environment. It has been used for xSeries management for several years and in Virtualization Engine Releases 1.1 and 2.1 has added support for the other IBM @server platforms. Because IBM Director has been available for several years, it has kept its release numbering scheme even though it is part of the Virtualization Engine. Director 4.2 was part of Virtualization Engine 1.1 and Director 5.1 is part of Virtualization Engine 2.1.

4.2.1 General guidelines for use

IBM Director is most effective in an environment where you have several different operating systems, or have tens or hundreds of systems. You can manage all of these systems from one central location using the Director Console. IBM Director can manage your i5 hardware with i5/OS partitions, partitions for Linux or AIX, integrated xSeries servers (Integrated xSeries Server or Integrated xSeries Adaptor Windows or Linux), or surrounding AIX, Windows or Linux systems.

Director offers more of an advantage, as the environment contains a larger number and more varied types of operating systems and hardware platforms. For example, Director interfaces with the iSeries HMC system to allow you to manage partitions through the HMC using the Director console. IBM BladeCenter chassis and blade systems can also be managed from Director.

The advantages of using IBM Director include:

- Managing different operating systems and hardware platforms from one console.

- Using the same functions and user interface regardless of operating system involved. This *abstraction* of the operating systems' functions means that you do not have to learn the details of each operating system in order to manage them.

- Enhanced management functions for IBM hardware, especially xSeries.

- Licenses are included with each IBM hardware platform, reducing your cost of ownership.

► Upward integration with enterprise management products such as Tivoli, CA Unicenter, and others.

It should also be used when it provides functions that other available products do not. For example, its remote control function is useful when supporting Windows systems, and you need to be able to remotely see and control an agent system.

4.2.2 Use with Virtualization Engine

For Virtualization Engine Release 2.1 iSeries IBM Director is packaged with the Virtualization Engine console. The products can be installed separately or together. Director is a management source for the Virtualization Engine console, and they communicate using a piece of code called a *bridge*. So you can use Director from its own console, or you can use Director in combination with other products supported in the Virtualization Engine console.

Several of the Virtualization Engine functions, such as distribution of fixes and software updates, depend on Director being installed and in use. So although Director can be used as a stand-alone solution, it also is an integral part of IBM management components in the Virtualization Engine.

4.2.3 Use with other systems management products

IBM Director has several functions that allow it to interoperate with other IBM and third-party systems management products. One set of these functions is called the Upward Integration Module (UIM). It gathers hardware alerts and can send them in various formats to other systems management products. UIM can also gather inventory for a system and leave files for other systems management products to use. This allows Director's inventory to be collected and shared. The other systems management products that Director can share information with include:

► Tivoli Enterprise
    – Framework 3.7.1 and 4.1.1
    – TEC 3.8 and 3.9
    – Distributed Monitoring 5.1.1
    – Configuration Manager 4.2.x
    – Software Distribution 4.0
    – Inventory 4.0
► Tivoli NetView® for Windows 7.1.x
► Tivoli NetView for Linux 7.1.x
► CA Unicenter TNG 2.4, NSM 3.0, 3.1
► HP OpenView 6.4 (Windows only)
► HP OpenView 7.01 (Windows and Linux)
► Microsoft SMS 2.0, SP4 and SP5
► Microsoft SMS 2003
► Microsoft MOM 2005

Support for these products is available using free Web downloads found at:

http://www-03.ibm.com/servers/eserver/xseries/systems_management/xseries_sm.html

4.3 Future directions

IBM Director is the strategic systems management product for IBM @server® and IBM Storage products. It will continue to be enhanced and extended as user requirements help to guide the enhancements. Also, new IBM hardware and operating systems will be supported

and more system-specific and cross-platform tasks will be added. So installing and using IBM Director will continue to be a good investment for the foreseeable future.

One plan is to add Web-based interfaces for all Director functions. This will allow you to do the same tasks and functions that are in the Director Console today using a Web browser. Some of this exists today in the Virtualization Engine console, but it will be expanded and enhanced. Eventually you will not need to install the Director console but can use a Web browser, and the look and feel of the interface will be similar to other IBM Web-based consoles.

Some things being considered for additional i5/OS-specific support include:

► Resource monitors so that Director has at least the same monitoring capabilities as Management Central

► Functions to help manage partitions on i5 systems

► Management for i5/OS-specific aspects such as system values

We have to mention that these are plans we are looking at, but we cannot promise they will be implemented and released to you.

5

Virtualization Engine console

This chapter describes the IBM Virtualization Engine console (VEC). The Virtualization Engine console allows access to systems management information from an unparalleled list of operating systems including AIX, i5/OS, Linux on iSeries, pSeries, xSeries, zSeries, and Windows. It also easily launches IBM Director, iSeries Navigator, iSeries Navigator for Web, and WebSM interfaces. The console brings together all of these operating systems and consoles into one place.

VEC is meant for users who have resources to manage on multiple operating systems and is especially useful to users who already use more than one IBM console to monitor their resources. The VEC combines all the resources the user already monitors into one general "health" indicator while allowing the user to easily take corrective action when a problem is found by launching the console the user is already using.

Included in this chapter:

► Overview of the console and its functions
► Description of the launch in context feature
► Explanation of how the console works with other products in its environment
► Plans for the future

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5.1 Overview of IBM Virtualization Engine console

The IBM Virtualization Engine console provides views of information from multiple systems management sources in one Web interface. For example, you can view IBM Director resources along with Tivoli resources, and see monitors from IBM Director along with your monitors from Management Central.

5.2 Health Center

Below is a screen shot of what the Virtualization Engine console looks like. At the top in the summary section an overall status is shown of your environment. In the workspace, you can see the resources, monitors, and tasks you have indicated interest in. These resources, monitors, and tasks can be returned from Cluster Systems Management, Enterprise Workload Management, IBM Director, IBM Integrated Tivoli Monitoring, and Management Central.

The Virtualization Engine console runs within the IBM Integrated Solutions Console, which uses WebSphere Portal Server 5.1 support. The console and bridges run on top of WebSphere Application Server 6.0.2 in Virtualization Engine Release 2. The console is made up of display components that run within the Integrated Solutions Console to provide a unique graphical view of your resources.
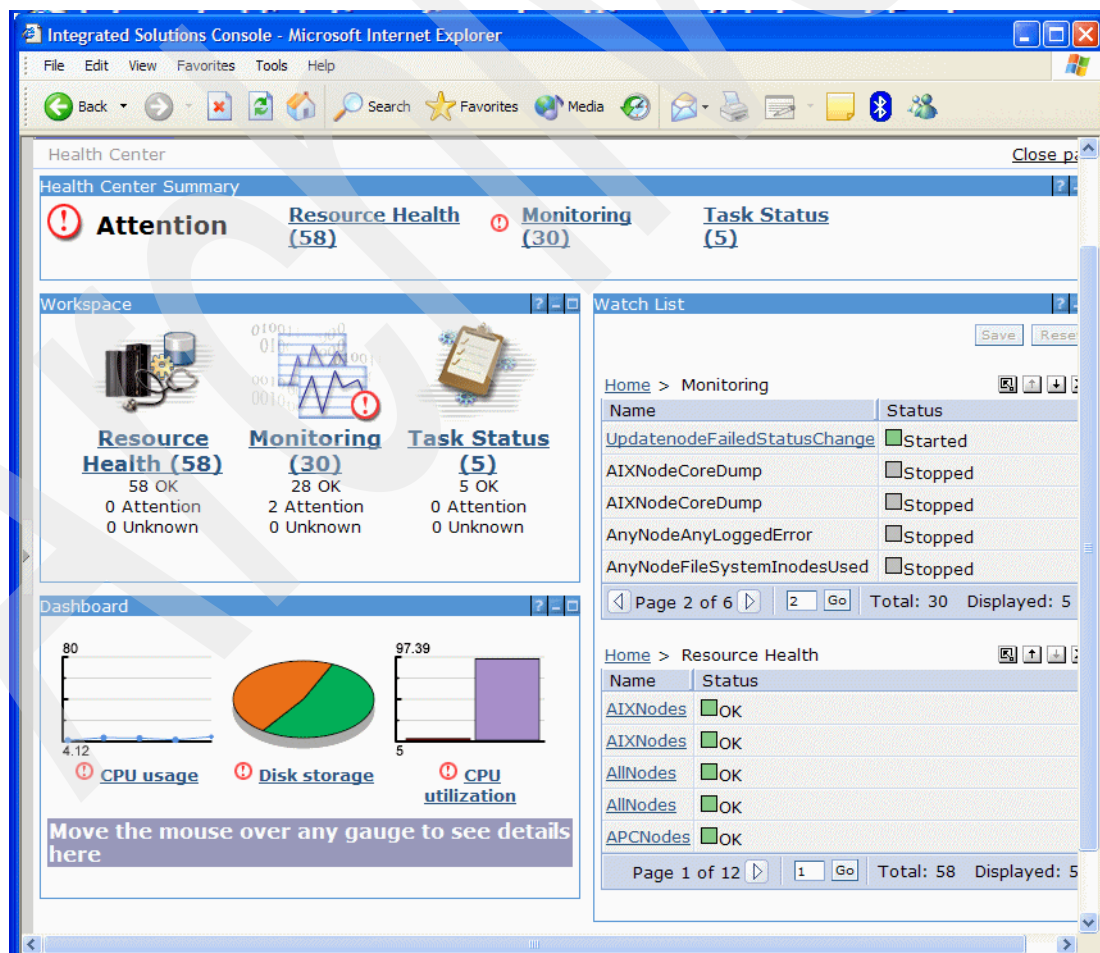
Figure 5-1   Virtualization Engine console Health Center view

On the top of the console is a status bar (Health Center Summary) that shows you first an overall status (in this case, Attention) and then an individual status of the three determiners of that status: Resources, monitors, and tasks.

The workspace directly below the Health Center shows you more detailed information about which of your resources, monitors, and tasks are at OK, Attention, and Unknown status.

To the right is a Watch List, which provides a shortcut to views of the Virtualization Engine that you have indicated interest in. This watch list can be filled with high-level views of resources or lower level views such as jobs on a specific machine.

Below the main workspace is a Dashboard, which shows graphs of system statistics, similar to a car's dashboard. You can choose which graphs show in the dashboard so that you will only see information about the metrics you are interested in.

Lastly, the Control Portlet at the bottom of the Virtualization Engine console allows you the opportunity to fine-tune the console by controlling how often refreshes are done on the GUI.

5.3 Overview of console functionality

The Virtualization Engine console provides information about your resources and monitors and provides the ability to take actions on those resources. For example, you can stop and start monitors from the console. In some cases, the user consoles of the products will be called to help you do the work using launch in context. For example, if you choose to work with workload monitors, the IBM Director console will be launched into the workload monitors screen and you can set up single sign-on so you do not even have to log in to the console to do work. Launch in context is covered in more detail in 5.6.2, "Launch in context" on page 55.

The Virtualization Engine console also allows you to view the topology of your environment so you can easily see what machines are part of your environment and their relationships to each other. Topology is covered in more detail in 5.5, "Topology" on page 52.

The Launchpad link in the console allows you to access other consoles easily by providing you with links to both Web and local user consoles. You can also add launch in context links to launchpad to provide you with an easy way to save links you have discovered using launch in context. Launchpad is covered in more detail in 5.6.1, "Launchpad" on page 55.

In summary, the Virtualization Engine console provides you with one place to see the health of your resources, monitors, and tasks and take corrective actions on them. Let us explore more about the console by learning about the environment of the console.

5.4 Console installed environment

In order to get the Virtualization Engine console in your environment, you will need to install several products. The console has five installers:

► Virtualization Engine console
► Cluster Systems Management bridge to Virtualization Engine console
► Enterprise Workload Manager bridge to Virtualization Engine console
► IBM Director bridge to Virtualization Engine console
► Management Central bridge to Virtualization Engine console

First, you install the Virtualization Engine console on the machine that you want to be your user box. Then you install a bridge for the product you want to bridge to on the same machine

as your management server. For example, if you want to see IBM Director and Management Central information returned to the Virtualization Engine console, you would install the IBM Director bridge to the Virtualization Engine console and the Management Central bridge to the Virtualization Engine console.

Each of the bridges communicate via Web services to the console, returning you the information you are used to seeing in the consoles of the products into a common Web browser interface. Single sign-on can be set up for each of them so that you can easily retrieve information from your traditional consoles. The Virtualization Engine console uses the latest in WebSphere Web services security to protect the information flowing back and forth between your console and bridge machines.

In VEC Release 2, all of your bridges can share the same WebSphere profile if they reside on the same machine. If you choose to install the Management Central bridge to Virtualization Engine console and the IBM Director bridge to Virtualization Engine console on an i5/OS box, a common WebSphere profile will be created for the two bridges to share. This decreases CPU usage and makes it easier to administrate the machines in your Virtualization Engine console install.

Below is a diagram that shows an installed environment of the Virtualization Engine console.
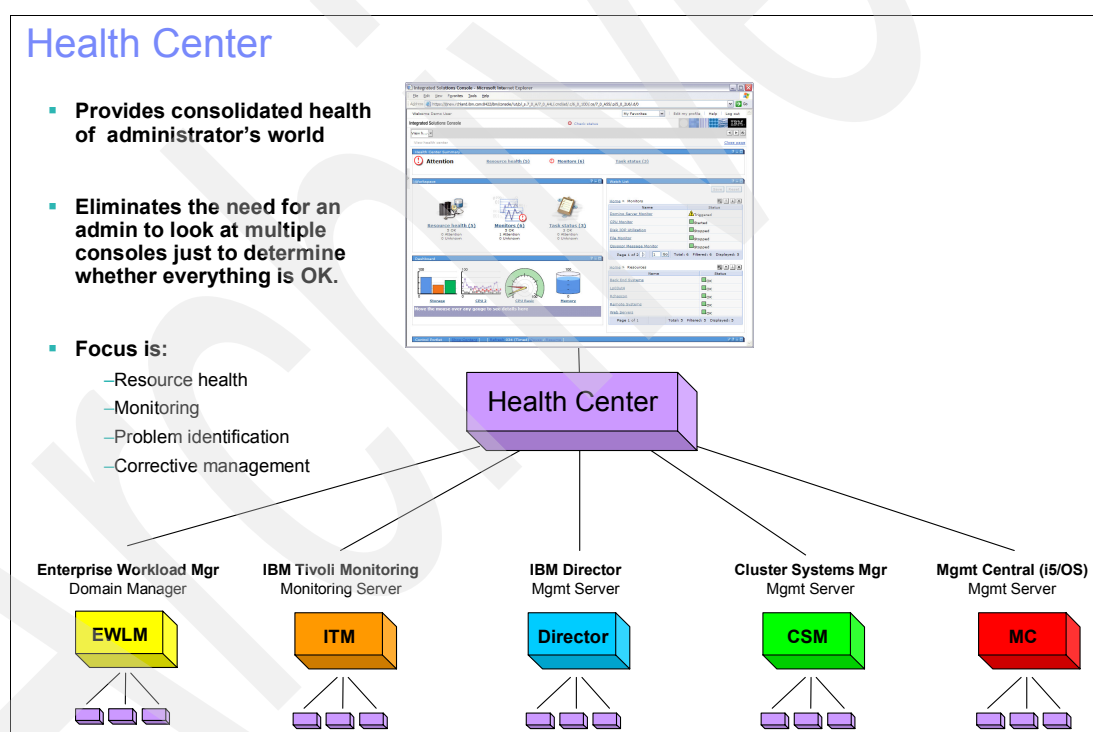
Figure 5-2   Virtualization Engine console environment

5.5 Topology

You can use topology to view your environment in a graphical environment. You can explore the resources between different machines in your environment using the topology viewer of the Virtualization Engine console.
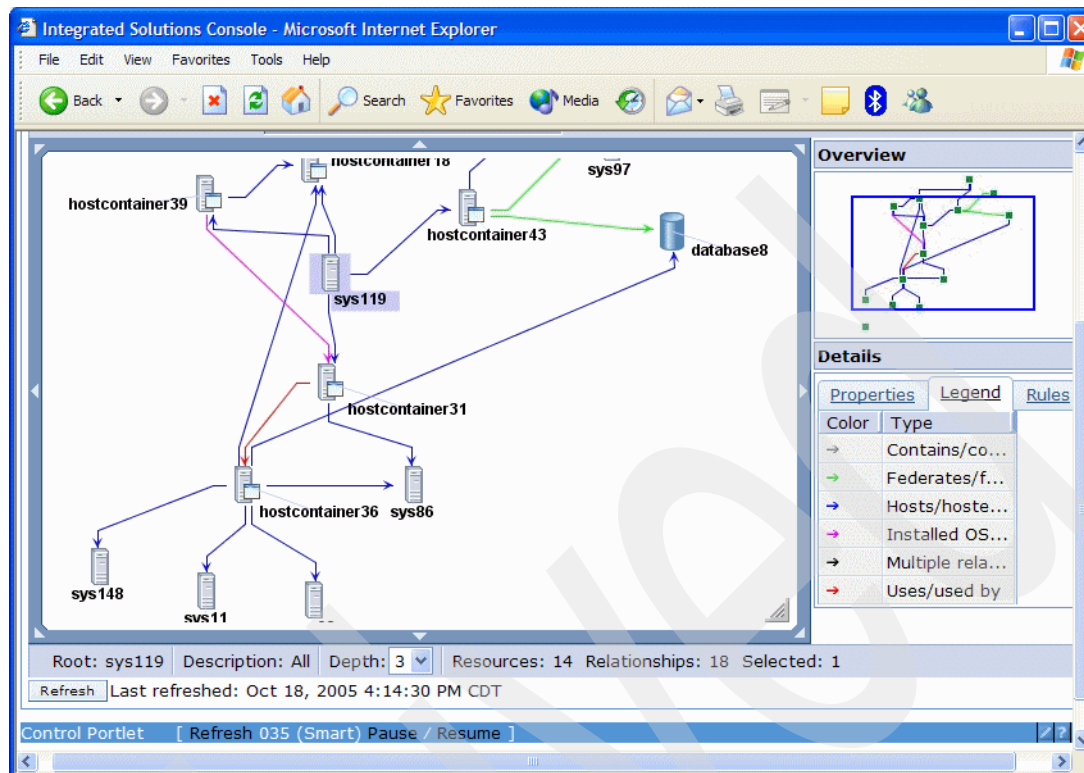
Figure 5-3   Virtualization Engine console Topology view

The simplest kind of topology is the Virtualization Engine environment topology. This is topology gathered from that products that have been installed into the Virtualization Engine environment you created during install. You can view features, software, settings, and systems through this view.

The creation of a Virtualization Engine environment during install (new in Release 2) allows all of your installs to easily share the same security information, eliminating the need for you to remember it each time you do a new install.

Topology will allow you to:

► Navigate through your resources.

► Create and delete resources.

► Create and delete relationships between resources.

► View and edit properties and resources.

► View your topology graphically, through a resource table view or through a relationship table view.

► View logical groupings of resources.
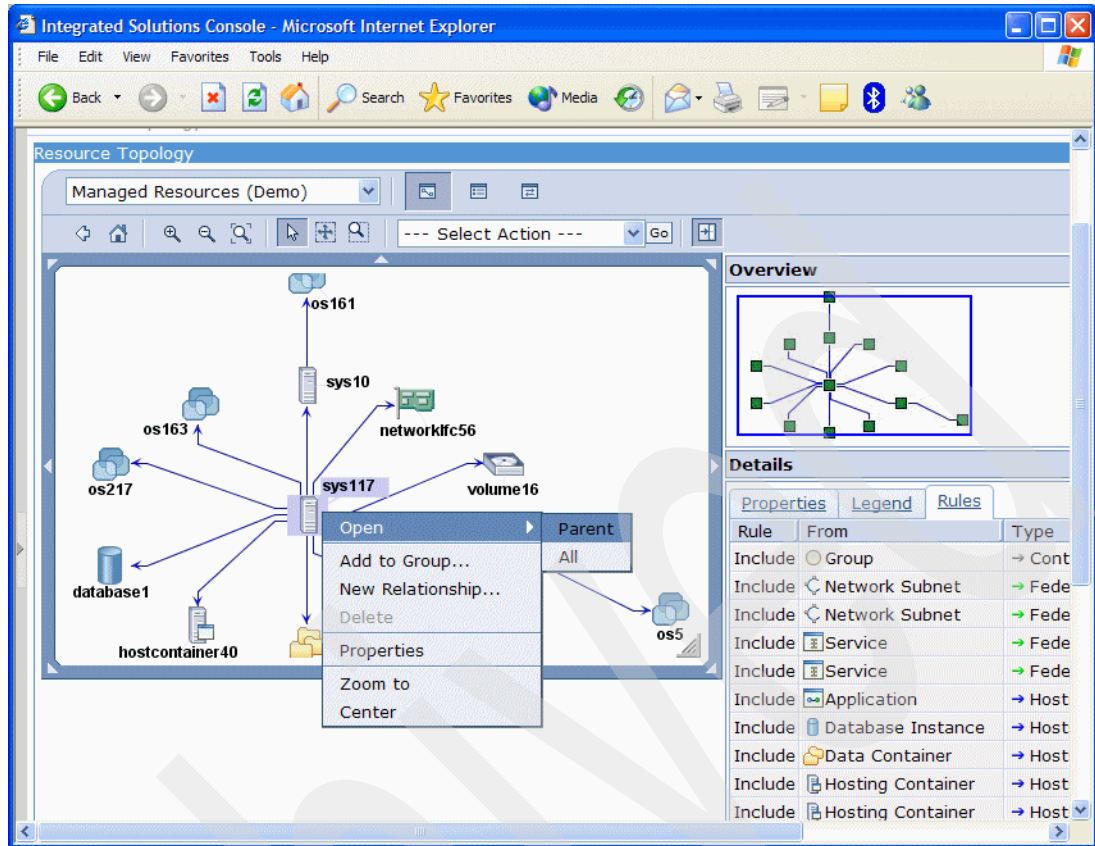
Figure 5-4   Virtualization Engine Topology view of actions that can be taken

If you choose to install Resource Dependency Services (RDS), you will be able to view a fuller topology of your environment. RDS allows you to see the following resources in your environment:

► Applications
► Data containers
► Database Instances
► Groups
► Hosting Containers
► Network Devices
► Network Subnets
► Operating Systems
► Services
► Storage Volumes
► Systems

In these days of multiple server farms, topology helps bring all your machines and their relationships down to a manageable level in one consistent interface.

5.6 Launch in context and launchpad

The VEC has several ways to easily link to existing consoles and Web pages. This allows you to launch easily into interfaces that are not contained in the VEC.

5.6.1 Launchpad

Launchpad presents a single place to manage your links to both Web and traditional consoles. Launchpad detects consoles on your machine to provide you with a list of consoles that are accessible from your machine. You can add additional Web consoles, create folders to organize your links, or move consoles between folders. This is a place to keep track of all the links you use during your day.
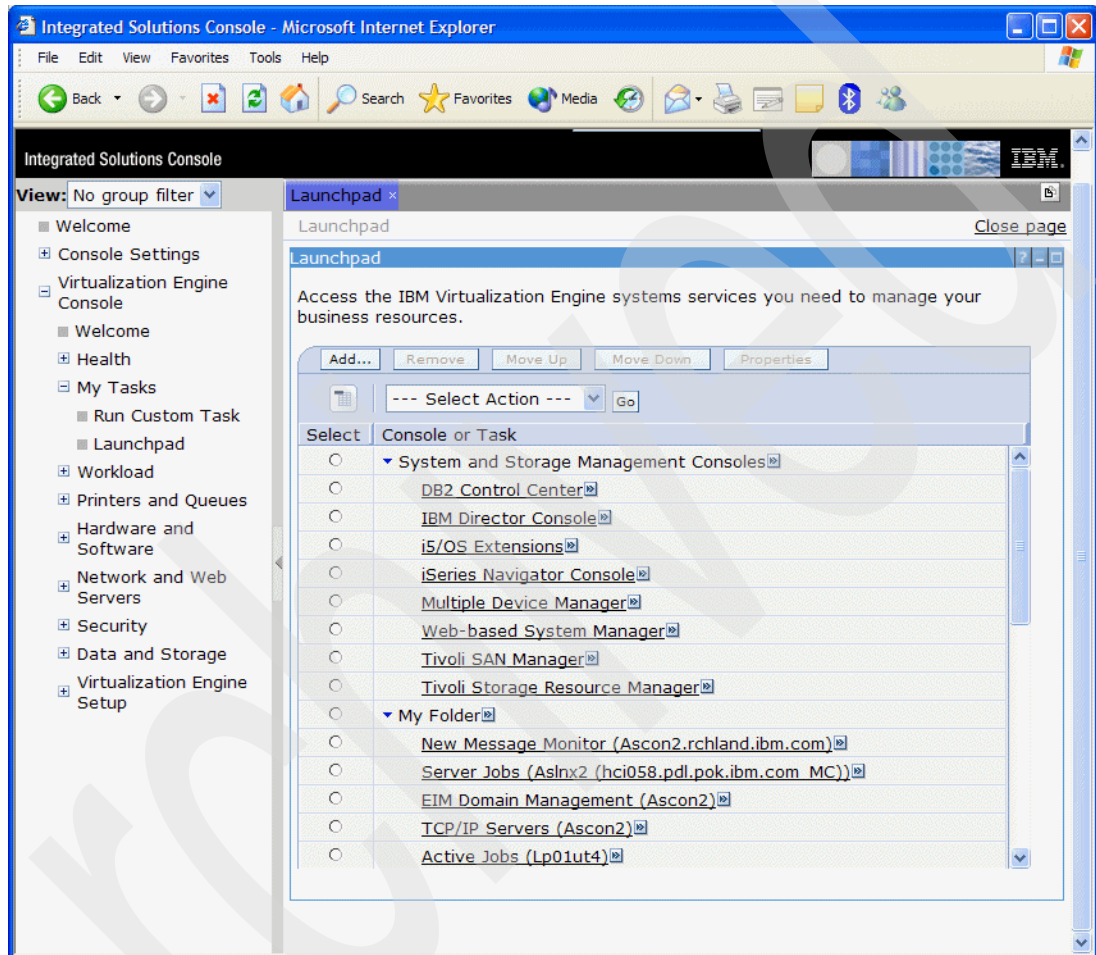
Figure 5-5   Virtualization Engine Launchpad view

5.6.2 Launch in context

The Virtualization Engine console's launch in context functionality provides a way to launch traditional consoles into a particular task.

Consoles such as IBM Director, WebSM, iSeries Navigator, and iSeries Navigator for Web can be launched for the categories:

▶   Event actions
▶   Messages and logs
▶   Remote access
▶   Workload management
▶   Workload monitors
▶   Printer and queue management
▶   Hardware problems

- ► Hardware status
- ► Software distribution
- ► Inventory
- ► System settings
- ► Network management
- ► User management
- ► Security configuration
- ► Database management
- ► File management
- ► Backup
- ► Storage management
- ► Resource grouping

Select one of those categories using the Virtualization Engine console and you will be presented with a view of what resources in your environment support running a task in that category on them.
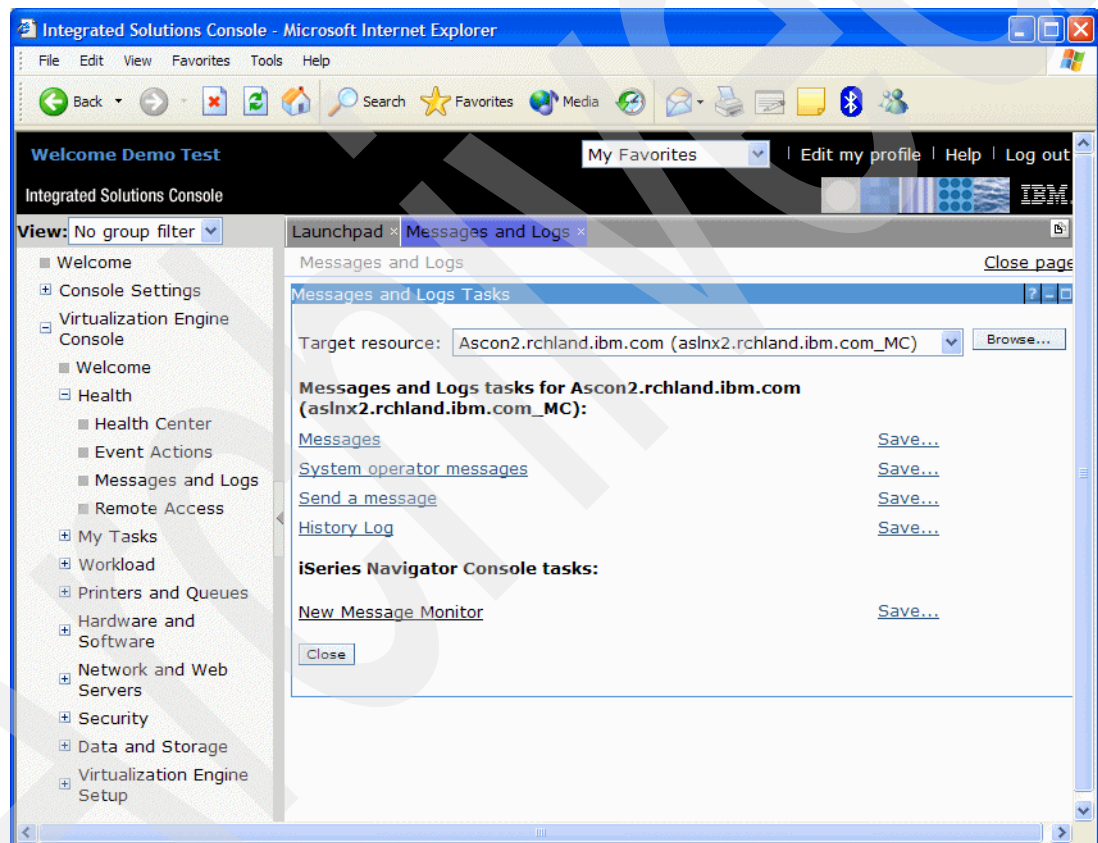
Figure 5-6   Messages and Logs view

You can save these links as part of launchpad for easy reference by clicking the **Save** link. In that way, launchpad and launch in context work together to provide you with the ultimate in bookmarking the consoles you are used to working with.

Launch in context functionality can be used either by choosing one of the categories shown in Figure 5-6 from the left-hand navigation bar of the console and then selecting a resource that can have the action performed on it, or by using a context menu in the Health Center that shows what actions are available on a particular resource.

Figure 5-7 shows what tasks are available through IBM Director on a resource that was added into Health Center.
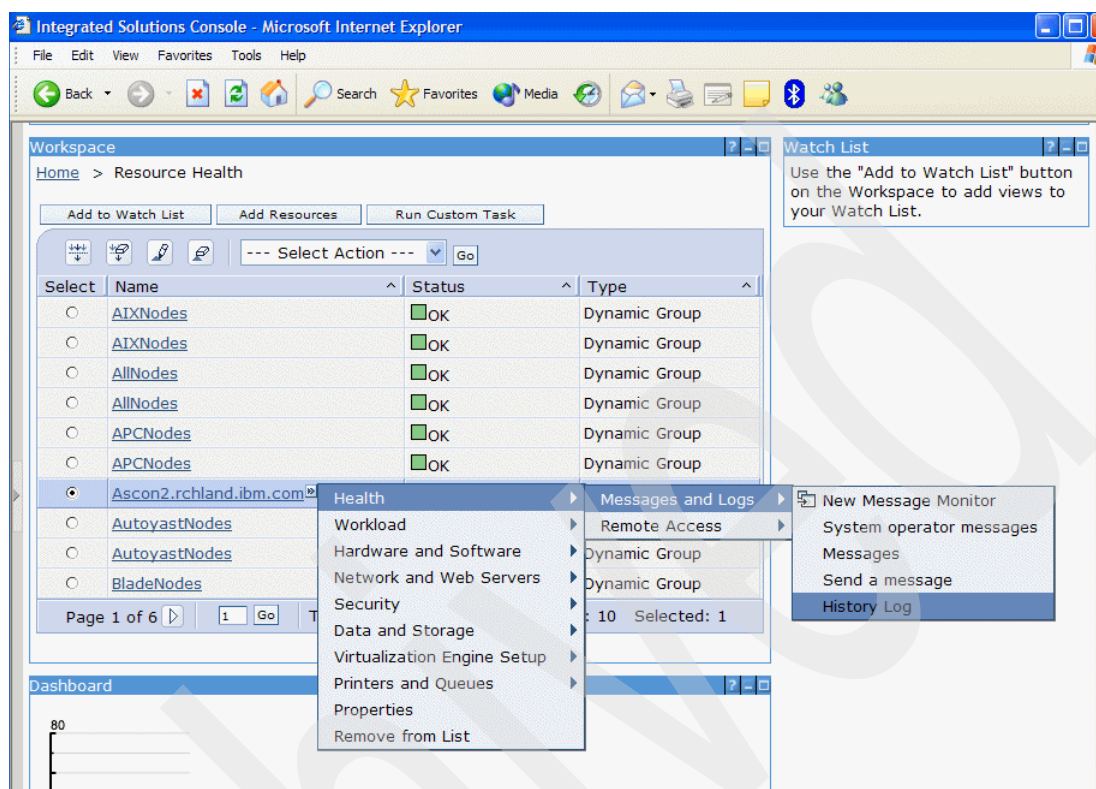
Figure 5-7   Resource Health context menu view

Launch in context functionality provides an easy way to use the Virtualization Engine console in conjunction with the consoles you are familiar with.

5.7 Summary

The Virtualization Engine console brings it all together. In addition to the functions that were highlighted here, the Virtualization Engine console also allows you to search for and apply fixes for your Virtualization Engine environment. It also has preferences panels that allow you to fine-tune how often information is retrieved from the management sources used by the console.

The Virtualization Engine console is a powerful tool that provides one place for you to go to see the status of your environment. Based on the problems you see, you can either take action in the console or link to another console to take corrective action. Topology allows you a graphical view of your environment, making it easier to understand the resources and relationships that make up your enterprise.

5.8 Future directions

The Virtualization Engine console and its internal components are strategic for IBM systems management user interfaces. It will continue to be supported and will continue to grow in both breadth and depth to become a more complete management interface. In addition, similar

tasks in different IBM products will be supported in a converged manner, providing a consistent interaction model that reduces your learning effort.

Some of the things planned for future releases include:

► Include more tasks from the existing management sources. Examples are iSeries Navigator Web-enabled functions and IBM Director tasks.

► Add more management sources. This includes emerging on demand and autonomic management solutions from IBM as they become available.

► Continue to improve the internal components for easier installation and less intensive resource requirements.

We have to mention that these are plans we are considering, but we cannot promise they will be implemented and released to you.

6

Tivoli products

This chapter focuses on Tivoli systems management software and its support of both the iSeries platform and i5/OS. The iSeries server line has progressed from being a most-valuable, mid-range, application-driven workhorse to a more powerful, more flexible multi-system growth engine that supports mid-range and above processing tiers and significantly plays a major role in an on demand enterprise-wide world.

The topics addressed in this chapter are:

► Tivoli IT Service Management (ITSM)
► Tivoli Product support of i5/OS
► Availability Management with IBM Tivoli Monitoring 6.1

The intent of this section is to show how systems management software, specifically systems management software from Tivoli Systems, has evolved from basic system functions that were directed at individual components and their management to an enterprise managed environment that could encompass multiple different systems types and underlying architectures.

Specifically to the iSeries, Tivoli has supported the base operating system (OS/400, now i5/OS) throughout extensive changes to both the hardware and software components. Technological changes have allowed the iSeries server line to become more flexible in support of multiple operating systems, which in turn allows the additional support of more and varied applications that enhance the value of both the hardware and base systems software. Tivoli adds to this additional manageability as its support expands beyond the base operating system to additional operating systems. For example, support for AIX and Linux provide the capability to manage those environments and the applications that execute under their control. This in turn allows the iSeries to continue to broaden its application support and receive the underlying management and control from Tivoli to support even more and additional mission-critical business systems.

The full list of Tivoli products and on what platforms they currently execute can be found at the following URL:

http://www.ibm.com/software/tivoli/sw-atoz/index.html

6.1 Tivoli IT Service Management (ITSM)

With the announcement of IT Service Management (ITSM), IBM now has available the first set of software and services to help users automate and standardize the way they design and integrate information technology (IT) processes—from releasing a security patch to changing or adding a server—across separate departments within their enterprise. ITSM helps users transform their business operations into an on demand environment. Users can evaluate their business designs, processes, and infrastructure to build responsive and automated IT environments.

Based on experience with thousands of IBM software and Global Services user engagements, the new IBM IT service management solutions translate IT processes into manageable pieces, or services, and then automate their integration—much the same way IBM integrates business processes for users through services-oriented architectures (SOAs).

As a result, users will no longer have to manually design IT processes individually within their own silos of operation, and then hand-code their integration across different departments. Instead, they can design IT processes once and automate their integration across all areas of operation.
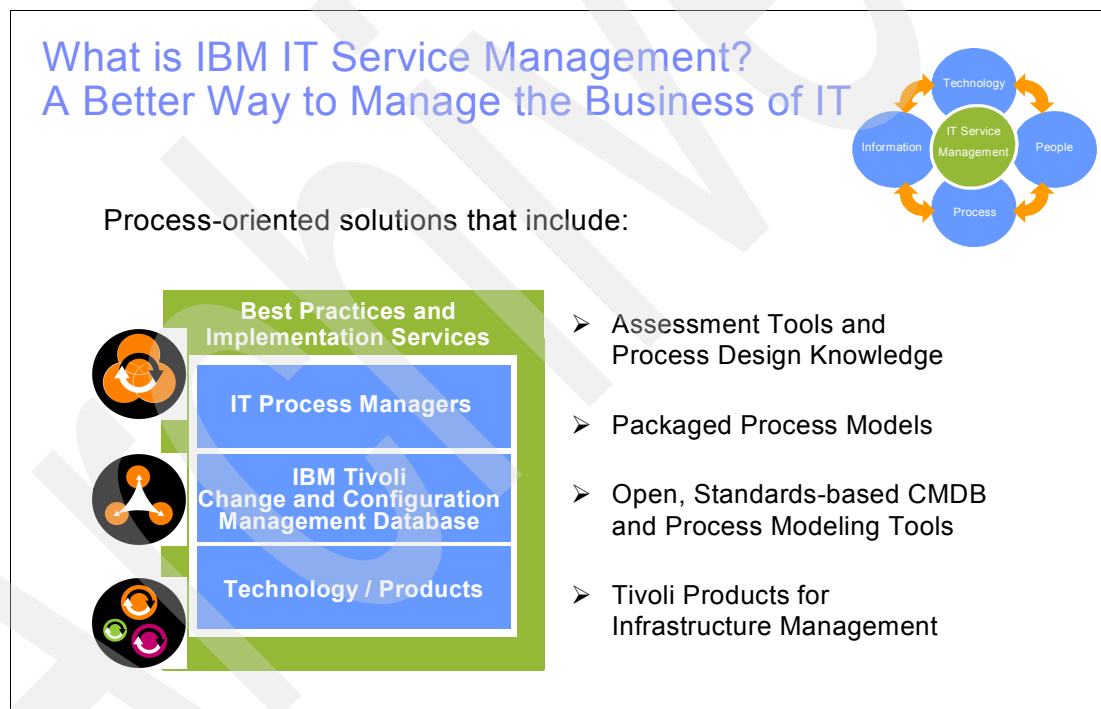
Figure 6-1   IT Service Management overview

Managing IT processes end-to-end helps companies keep people and IT resources focused on business priorities, such as delivering more accurate inventory information to the sales force. This approach also minimizes disruptions caused by common IT changes—such as updating a complex application residing on a dozen servers—which typically causes up to 80 percent of planned system outages. These solutions span IT process management for change, configuration, release, and information life cycle management. Built on IBM Tivoli, Rational®, WebSphere, and DB2 middleware, and extending the company's innovation in self-managing autonomic technology, the solutions include *tool mentors* that help implement actions prescribed by the IT Infrastructure Library (ITIL), a widely used industry guide of best practices.

These solutions include:

► IBM Tivoli Unified Process: A navigational tool to provide the *how-to* for customizing and implementing best practices for mapping, modifying, and improving IT processes. Users can identify specific actions for ITIL through *tool mentors* that help them improve IT process integration. Users learn how to alter a system, how to put the right steps in place, and what software and hardware are required. This online tool is available now at:

  `http://www.ibm.com/software/tivoli/itservices`

► IBM Tivoli Change and Configuration Management Database (CCMDB): A *virtualized* database that federates IT information spread across multiple databases. It provides a single view of an application running on a dozen servers, so IT staffers can make better decisions, such as administering passwords so the right people have access to the right systems. This is particularly important for organizations grappling with compliance and governance issues. Users can use the CCMDB to collect information—such as when the last time a change was made to an application—into a *discovery library*.

  Tivoli's IT Service Management Platform will allow users to build a CCMDB that will store configuration items and discover relationships between those items. It can also include change and configuration management processes.

  A CMDB is a logical database, consisting of many real databases, which provides critical information about IT infrastructure resources: Basic configuration information, relationships, incidents, problems, changes, service levels, etc. Tivoli has long provided many of the constituent databases that provide this information, such as the inventory information available through Tivoli Configuration Manager.

► IBM Tivoli Process Managers: Pre-packaged software to automate IT processes, such as coordinating application deployment across software, hardware, storage, and network technologies. These products can also be customized to a particular industry, such as health care or retail. IBM Process Managers will support change and release management, availability management, and information life cycle management. They can outline the people, resources, and information needed to create IT processes that are repeatable, measurable, and efficient. For example, IBM has designed process managers for three main components of the ITIL architecture—release management, availability management, and information life cycle management—which enable customization and allow for in-house or third-party product integration.

► Customized services from IBM Global Services around the new IT service management solutions: IBM's asset-based hybrid software services delivery model speeds the development and deployment of software and services to solve specific business problems. It combines software code, intellectual property, and best practices accumulated by IBM Global Services and their work with users.

In addition to new solutions, IBM is enhancing existing Tivoli products to support IT service management. For example, IBM Tivoli Provisioning Manager and IBM Tivoli Configuration Manager together automate the way changes are implemented in an IT infrastructure. The new versions automatically find and acquire security patches, determine which machines require them, deploy them, and then verify security compliance. Users can also automate the tracking of data center resources so they can more quickly determine what changes need to be made.

IT Service Management is a repeatable approach that senses and responds automatically to the changing needs to the business. This approach provides effective and efficient delivery of IT services in support of business goals by leveraging:

► Technology for infrastructure management that provides resilience, automation, and integration across the organization

► Information that is standardized, federated, and accessible across the organization

- ► People responsible for governance, with roles identified and understood
- ► Processes that are integrated across the organization for efficiency and automated to reduce costs and increase reliability

6.2 Tivoli product support

Tivoli has provided software support on the iSeries platform since its inception and on predecessor mid-range systems (AS/400). Successfully managing an IT infrastructure today cannot be done without an enterprise view. Certainly islands of computing exist and can be managed from a discrete point of view so that local, homogenous concerns can be addressed. But today's immediate business decisions, which must be timely, need to consider not just a set of local resources but how those resources interrelate to the total resources assigned to an enterprise application. Because of the nature of the application, certain components may exist in different environments, on different platforms, in different locales, and indeed in different corporate structures. With today's IT business relationships spanning not just one entity but many that could include suppliers and business partners, it is imperative that the management applications be aware globally of all of the factors that make up a successful enterprise application.

To address enterprise management concerns, users have successfully utilized Tivoli Software solutions to help manage both local and global resources. Whether that be an iSeries locally installed or part of a larger network, it is important that precious human resources be equipped with the proper tools, techniques, and methodologies to deliver timely and accurate responses to pressing IT issues whether they be local or global.

Current Tivoli software support is focused on systems availability, security, storage, and administration. This support is typically provided at the user level on i5/OS. There are Tivoli products that do not run on i5/OS but that support i5/OS management. For example, Tivoli Directory Integrator can synchronize the iSeries directory with other identity data sources across the organization. It can securely capture user information (including passwords) from MS Active Directory and synchronize it with i5/OS data, and visa-versa, so that all platforms in a distributed environment have access to the most recent authoritative security data.

Below is a list of the products that provide support for i5/OS as well as other iSeries operating systems.

6.2.1 Tivoli Configuration Manager

IBM Tivoli Configuration Manager can help you gain total control over your enterprise software and hardware. Its software distribution capability enables you to rapidly and efficiently deploy complex mission-critical applications to multiple locations from a central point. After systems have been deployed, the inventory module lets you automatically scan for and collect hardware and software configuration information from computer systems across your enterprise. Tivoli Configuration Manager also has the ability to enforce adherence to your company's policies by changing system configurations as needed to ensure compliance. And Tivoli Configuration Manager includes Microsoft software patch automation capabilities designed to save time, lower costs, and improve quality.

6.2.2 Tivoli Identity Manager

Tivoli Identity Manager (TIM) automatically manages access accounts from creation to deletion, including changes in user roles and corresponding access rights. TIM can manage predefined workflows that determine which systems and applications one should have access

to and automatically approves those access requests (even escalating action on the request if necessary). Tivoli Identity Manager can be a key element in centralizing and automating management of user access.

6.2.3 Tivoli Enterprise Console

IBM Tivoli Enterprise Console® (TEC) provides sophisticated, automated problem diagnosis and resolution to improve system performance and reduce support costs.

The last major release of TEC (3.9) delivered key new features to enhance the productivity and effectiveness of TEC operators. The Web console is a browser-based, fully functional console, allowing operators to manage, sort, and filter events, as well as trigger actions. The Web console has the key benefit of allowing operators to access events and do event management from anywhere, including from outside the firewall.

New rule sets have been created to improve the time to value for TEC. These rule sets include new built-in actions for escalation, notification, maintenance windows, and housekeeping tasks, among others.

The new eBusiness rule set pinpoints the root cause of an outage among a series of events from interdependent applications or devices. By understanding specific dependencies between DB2, WebSphere Application Server, and WebSphere MQ, TEC can correlate ITM PAC generated events to establish the true root cause of a complex outage.

TEC's root cause analysis rules also link network events and application events, for a truly holistic view of the network, effective event management, and optimal time to problem resolution.

6.2.4 Tivoli License Manager

IBM license management software offerings help companies achieve a total software asset management solution, enabling planning, management, and optimization of enterprise-wide software assets. With advanced software inventory, usage monitoring, contract and reporting capabilities, businesses can know exactly what software licenses they have, which ones are being used, and which ones they need. In addition, these offerings help organizations to efficiently manage the contractual and financial details of software contracts and agreements. Tivoli License Manager can:

► Generate significant cost savings by automating the manual process of data collection needed continually for budget planning, contract negotiations, and renewals, helping to verify that businesses pay only for the software they need.

► Guard against software license compliance problems, helping to meet your contractual licensing conditions.

► Increase productivity with the knowledge gained, allowing businesses to plan for future software deployments and upgrades and match resources with demand.

► Optimize software migrations and license model changes, data center consolidations, out-sourcing and in-sourcing events, as well as mergers and acquisitions.

6.2.5 Tivoli Business Systems Manager

IBM Tivoli Business Systems Manager enables you to:

► Align and manage IT in the context of business priorities.

► Utilize the IBM Tivoli Business Systems Manager executive dashboard to provide knowledge about key business services.

- ► Integrate service level data from IBM Tivoli Service Level Advisor on to the IBM Tivoli Business Systems Manager executive dashboard.
- ► Leverage data from existing Tivoli and third-party monitoring products.
- ► Display instantaneous (real-time) service level status and root cause analysis.

6.2.6 Tivoli Storage Manager

The IBM Tivoli Storage Manager family of offerings is designed to provide centralized, automated data protection that can help reduce the risks associated with data loss while also helping to reduce complexity, manage costs, and address compliance with regulatory data retention requirements. A Tivoli Storage Manager server can be installed on an iSeries partition running Linux or AIX. The IBM Backup and Recovery Management Services (BRMS) or a third-party product is used to provide the i5/OS agent function.

IBM Tivoli Storage Manager enables you to protect your organization's data from failures and other errors by storing backup, archive, space management, and bare-metal restore data, as well as compliance and disaster-recovery data in a hierarchy of offline storage. Because it is highly scalable, Tivoli Storage Manager can help protect computers running a variety of different operating systems, on hardware ranging from notebooks to mainframe computers and connected together through the Internet, wide area networks (WANs), local area networks (LANs), or storage area networks (SANs). It uses Web-based management, intelligent data move-and-store techniques, and comprehensive policy-based automation that are working together to help increase data protection and potentially decrease time and administration costs.

6.2.7 Tivoli Storage Manager for Mail

IBM Tivoli Storage Manager for Mail is a software module for IBM Tivoli Storage Manager that automates the data protection of e-mail servers running either Lotus® Domino® or Microsoft Exchange. This module utilizes the application program interfaces (APIs) provided by e-mail application vendors to perform online "hot" backups without shutting down the e-mail server and improving data-restore performance. As a result, it can help protect the growing amount of new and changing data that should be securely backed-up to help maintain 24x365 application availability.

For Lotus Domino databases, this module exploits the *transaction logging* feature of Domino, enabling the capture of just the database changes for logged databases. Thus, full database backups are not required as frequently as in previous Domino releases.

For Exchange, it uses the backup APIs provided by Microsoft to create a copy of the Exchange server storage group databases along with the associated transaction logs. The module can produce the different types of backups specified by Microsoft backup APIs: Full backups, incremental backups, differential backups, copy backups, and database copy backups.

Whether used with Microsoft Exchange running on Windows or Lotus Domino running on iSeries, Tivoli Storage Manager for Mail allows the continued 24x365 operation of e-mail servers while performing data backups and restores.

6.2.8 Tivoli Monitoring

IBM Tivoli Monitoring (ITM) provides monitoring for essential system resources, to detect bottlenecks and potential problems, and to automatically recover from critical situations. Tivoli Monitoring saves system administrators from manually scanning through extensive

performance data before problems can be solved. Using industry best practices, Tivoli Monitoring can provide immediate value to the enterprise.

IBM Tivoli Monitoring 6.1, which was recently released, represents the first major Tivoli Monitoring release since 2002. This new release will provide several compelling features to users. The Tivoli Availability Portal will provide users with a *single pane-of-glass* to view the real-time and historical status of their monitoring environment end-to-end, as well as the event console. ITM 6.1 is discussed further in 6.3, "Availability Management with IBM Tivoli Monitoring 6.1" on page 68.

6.2.9 Tivoli Monitoring for Business Integration

IBM Tivoli Monitoring for Business Integration provides complete management for IBM WebSphere MQ, IBM WebSphere MQ Integrator, IBM WebSphere MQ Workflow, and IBM WebSphere Interchange Server. From a central console, systems administrators can configure, monitor, and manage business integration software across host and distributed platforms. IBM Tivoli Monitoring for Business Integration offers stable, secure, and proactive monitoring and management through a powerful set tools that leverage common Tivoli technology to provide rapid time to value and greater ease of use.

IBM Tivoli Monitoring for Business Integration monitors the status of key WebSphere Business Integration components, such as queue managers, queues, channels, and message flows; identifies problems in real time; and notifies administrators by providing local correlation, root cause analysis, and corrective action capabilities for quick problem resolution. IBM best practices are incorporated to provide expertise in managing these products. IBM Tivoli Monitoring for Business Integration provides the information needed to understand the business impact of the business integrated environment as the data collected allows you to analyze performance and trends, and address issues before they affect end users.

6.2.10 Tivoli Monitoring for Messaging and Collaboration

IBM Tivoli Monitoring for Messaging and Collaboration ensures the availability and optimal performance of Lotus Domino server environments. IBM Tivoli Monitoring for Messaging and Collaboration provides stable, secure, and proactive monitoring and management tools that leverage common Tivoli technology to provide rapid time to value and greater ease of use.

IBM Tivoli Monitoring for Messaging and Collaboration monitors the status of Domino servers, identifies server and system problems in real time, notifies administrators, and takes automated actions to resolve Domino server problems. The product also collects monitoring data to help you analyze performance and trends, and helps you address problems before they affect end users. Using IBM Tivoli Monitoring for Messaging and Collaboration can help you maximize the business impact of your messaging and collaboration systems.

6.2.11 Tivoli Monitoring for Transaction Performance

IBM Tivoli Monitoring for Transaction Performance delivers unparalleled performance management for the Web and enterprise infrastructure. Using Tivoli Monitoring for Transaction Performance can help us avoid critical performance problems by proactively recognizing and isolating problems early, before they impact users and other end users.

While many performance monitors evaluate individual infrastructure elements that are included in business transactions, Tivoli Monitoring for Transaction Performance is an end-to-end transaction management solution that enables you to evaluate the transaction in

its entirety. By leveraging the software's comprehensive display, you can follow the path of an end-user transaction through your critical business infrastructure.

Tivoli Monitor for Transaction Performance provides a comprehensive display of an end-user transaction's path through your critical business transactions, including response time contributions for each step.

6.2.12 Tivoli Monitoring for Web Infrastructure

The term *Web infrastructure* refers to the underlying resources that comprise the middle-tier of today's e-business applications: Web servers and application servers. These resources are common elements of all Web-based applications that demand extremely high performance and availability, as these are often user-facing applications. Poor performance not only impacts end-user productivity, but also the image of the organization presenting the application. Web infrastructure must be managed.

IBM Tivoli Monitoring for Web Infrastructure is a critical tool to help ensure the optimal performance and availability of both application servers and the associated Web servers that feed them. It provides a single point of control to enable IT organizations to understand the health of the key elements of a Web-based environment. It allows administrators to quickly identify problems, alert appropriate personnel as required, and offer a means for automated problem correction leveraging IBM best practices. In addition, IBM Tivoli Monitoring for Web Infrastructure provides a real-time view of performance health and feeds a common data warehouse for historical reporting and analysis. Ultimately this tool increases the effectiveness of an IT organization and helps ensure optimal performance and availability of critical Web infrastructure.

6.2.13 Tivoli OMEGAMON/XE for Distributed Systems

IBM Tivoli OMEGAMON® XE for Distributed Systems provides an operating system performance and availability management solution for the distributed enterprise.

Tivoli OMEGAMON XE for Distributed Systems offers a unique approach to enterprise management—proactivity and advanced automation—especially important as IT structures become increasingly complex and heterogeneous. An integrated approach to management, Tivoli OMEGAMON XE for Distributed Systems enables you to see and manage your entire distributed enterprise from a single point of control.

Product highlights include:

► Supports multiple platforms: Manages performance and availability across the distributed enterprise. Includes monitoring agents for Windows, i5/OS, Unix (AIX, HP-UX, Solaris), Linux on Intel, and Linux on zSeries.

► Automation: Automatically recognizes problems and takes action to quickly resolve them.

► Quick deployment: Visual policy editor empowers non-programmers to set up policies and thresholds, even for situations that involve multiple platforms.

► Ease of management: Common cross-platform interface means that administrators can be trained to handle situations involving any platform.

► Response time management: Monitors response times and pinpoints problem areas before business-critical applications are affected.

► Robust architecture: Monitors the enterprise but offers low network overhead to grow with your company's requirements.

6.2.14 Tivoli Management Framework

Today's network computing enterprise requires an open, scalable, cross-platform approach that is also truly integrated. The IBM Tivoli Management Framework is the foundation for a suite of management applications that are making systems and network management easy.

The IBM Tivoli Management Framework makes it possible to:

- ► Shield administrators from platform-specific details of day-to-day operations. Common operations such as deploying applications and routine network maintenance can be performed with a single action; administrators are no longer required to repeat the same operation for each platform on your enterprise.

- ► Deploy applications to literally thousands of machines with one operation, all the while ensuring the applications remain available.

- ► Manage across firewalls.

By providing a truly open and comprehensive foundation for network computing management, the IBM Tivoli Management Framework simplifies today's most complex network computing challenges.

6.2.15 Tivoli Workload Scheduler

IBM Tivoli Workload Scheduler is an automated workload management solution that helps on demand businesses effectively manage and operate mission-critical applications within a secure, fault-tolerant, and scalable IT infrastructure. Tivoli Workload Scheduler provides a single point of control for distributed or z/OS® workloads, but is also able to manage both *end-to-end*, as your business requires. It analyzes the status of the production work and drives the processing of the workload according to your business policies. It supports a multiple-end-user environment, enabling you to distribute processing and control across sites and departments within your enterprise.

It can automate, plan, and control the processing of your enterprise's entire production workload, not just the batch subset. Tivoli Workload Scheduler functions as an *automatic driver* for your production workload to maximize the throughput of work, and optimize your resources, but also allows you to intervene manually as required. Tivoli Workload Scheduler also extends the scope for integrated systems management by supporting and monitoring workloads on multiple platforms and ERP applications.

6.2.16 IBM Tivoli Universal Agent

IBM Tivoli Universal Agent provides a universal monitoring solution for your custom applications and network devices. The Universal Agent extends the power of your existing IBM Tivoli OMEGAMON solutions to network devices and applications—components that can be difficult to manage. This capability is crucial when trying to manage your end-to-end application topology and systems health. The Tivoli Universal Agent collects information via numerous data providers (including SNMP, ODBC, and FILE) to monitor almost any device or application connected to a TCP/IP network. IBM Tivoli OMEGAMON solutions can then reveal consolidated views of performance and availability to help you diagnose and pinpoint problems more quickly. Highly adaptable, IBM Tivoli Universal Agent lets you create a vast array of custom approaches with a full-function, built-in tool kit.

6.2.17 IBM Automation Package for eServer iSeries

This orchestration package supports automated installs of Linux and Windows operating systems on the iSeries platform:

- ► SLES 8 distributions on POWER4™ hardware
- ► SLES 9 distributions on POWER4 and POWER5™ hardware
- ► Windows 2000/2003 Server Editions on supported IXS or attached IXA xSeries hardware

IXS/A and LPAR operating system installations are managed through the i5/OS V5R3 *hosting* LPAR using objects called network server descriptions (NWSDs). The iSeries Orchestration Package provides workflows that do provisioning and cleanup tasks for Linux and Windows servers running on hosted LPARs or IXS/As, respectively. The disk storage for these servers is also hosted by the i5/OS Bootserver in network server storage spaces (NWSSTGs).

Management of Linux on iSeries can be viewed as one piece of a broader datacenter management story. Tivoli Provisioning Manager can provision the software, collect inventory data about the hardware and software, provision storage devices and subsystems to allocate storage to applications, and provision network devices with appropriate IP configurations.

6.3 Availability Management with IBM Tivoli Monitoring 6.1

Based on the acquisition of Candle Corporation, the IBM Availability Management solutions portfolio has been enhanced to provide greater emphasis on managing complex environments. For example, solutions for Tivoli Monitoring, OMEGAMON, Tivoli Enterprise Console, System Automation, and NetView solutions solidly integrate performance and availability monitoring data from disparate platforms and applications.

The solutions, many of which combine related Tivoli products for simplification and greater value, add enhanced features and work through the IBM Tivoli Enterprise Portal to help IT avoid downtime and reduce time to resolution.
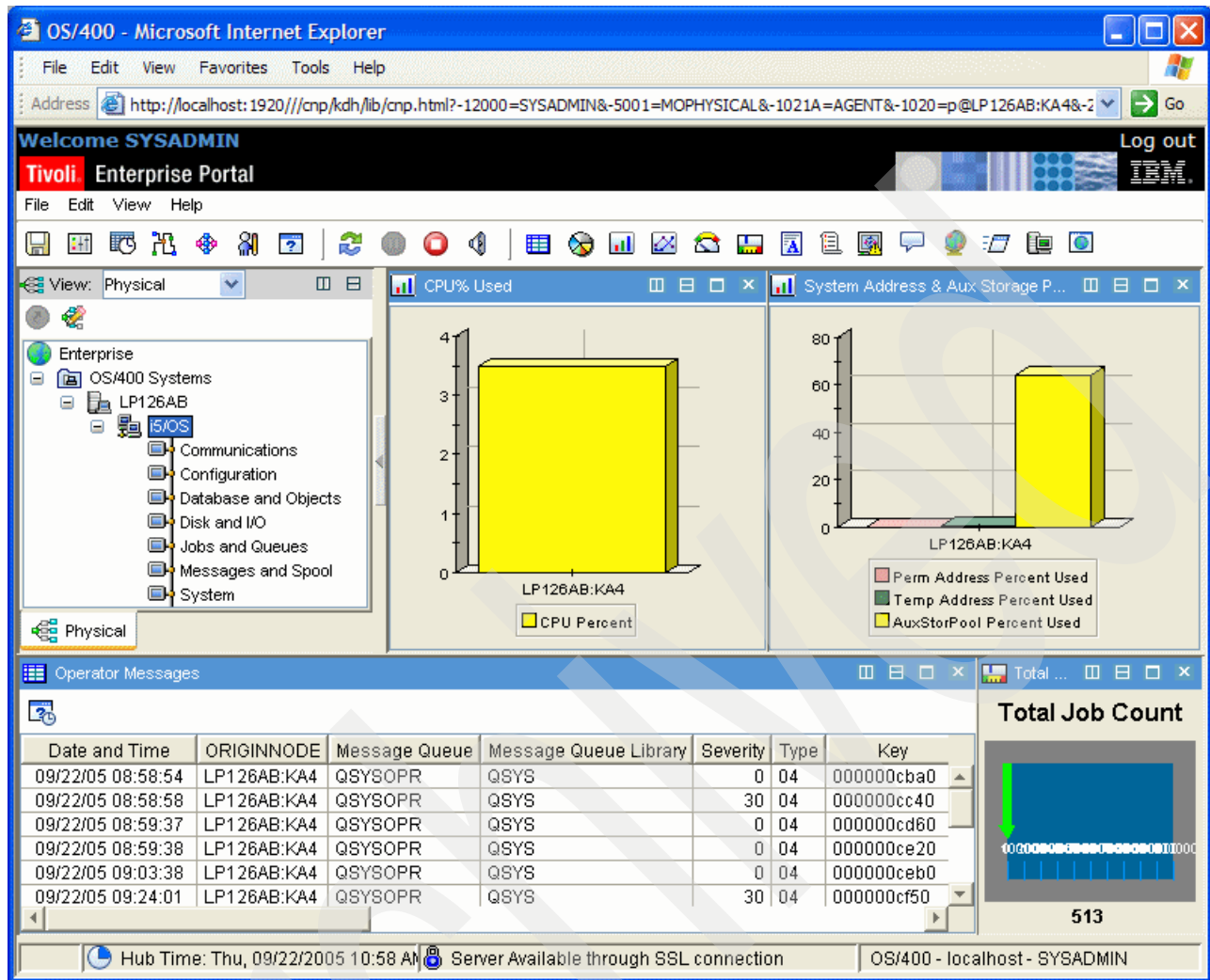
Figure 6-2   Tivoli Enterprise Portal Web browser version showing i5/OS system information

6.3.1 Tivoli Enterprise Portal: Integrated enterprise monitoring

End-to-end IT performance and availability management requires integrated solutions to monitor systems from mainframes through distributed servers, and networks to desktops. The new comprehensive IBM Tivoli Enterprise Portal correlates this enterprise monitoring information to help you manage complex IT infrastructures.

IBM provides the Tivoli Enterprise Portal (formerly CandleNet® Portal®) with IBM Tivoli Monitoring V6.1 products and IBM Tivoli NetView for z/OS V5.2, as well as IBM Tivoli OMEGAMON V3.1.0, so you can monitor and manage system and application performance across the enterprise from a single point of control.

The Tivoli OMEGAMON products support Tivoli's recently introduced IT Service Management solutions through focused monitoring and management of all the critical resources associated with key business applications. Integrating these tools with effective event and incident management processes can improve your overall IT service delivery.

Disk and I/O - SANDIFER-1 - SYSADMIN

File   Edit   View   Help

View: Physical

Enterprise
- OS/400 Systems
  - LP126AB
    - i5/OS
      - Communications
      - Configuration
      - Database and Objects
      - Disk and I/O
      - Jobs and Queues
      - Messages and Spool
      - System

Physical

Disk Unit

Arm Number	Drive Type	Drive Capacity	Average Queue Length	Aux Storage Pool Number
0001	6718	17548967	0	1
0002	6718	15355346	5	1
0003	6718	15355346	0	1
0004	6718	15355346	0	1
0005	6718	15355346	1	1

I/O Processor

Utilization Percent	Comm Percent	Disk Percent	Type	Name	IOP Bus Number	IOP
15.5	0.0	0.0	*MLTFUN	CMB01	NA	NA

TakeAction

Take Action

Action
Name: <Select Action>
Command:

Arguments...

Destination Systems

Run

Storage Pools

Number	Activity Level	Size	Database Fau	database F	Total Fau	ctive to Ineligib	ait to Ineligib
1	0	413028	0	0	0	0	0
2	147	4368864	0	0	0	0	0
3	267	3313752	0	0	0	0	0
4	1	256	0	0	0	0	0
5	22	512	0	0	0	0	0
6	18	81784	0	0	0	0	0
7	5	300	0	0	0	0	0

Hub Time: Thu, 09/22/2005 10:45   Server Available through SSL connection   Disk and I/O - SANDIFER-1 - SYSADMIN

Figure 6-3   Tivoli Enterprise Portal desktop version showing i5/OS disk and IOP metrics

6.3.2 OMEGAMON solutions convergence

IBM Tivoli Monitoring 6.1 solutions receive a powerful new infrastructure and user interface with substantial capabilities for maintaining service levels in distributed environments. These products gain a lightweight and highly scalable foundation composed of the Tivoli Enterprise Portal client, portal server, management server, and monitoring agents. The new product infrastructure works with Tivoli Monitoring V5 infrastructures and provides clear upgrade paths.

The Tivoli Enterprise Portal becomes the user interface and single point of control for Tivoli Monitoring 6.1 solutions, unifying your monitoring infrastructure for end-to-end enterprise performance management and simplified operator training.

In addition, an updated IBM Tivoli Data Warehouse provides configuration and collection improvements, eases long-term data management, and allows data analysis and reporting through the Tivoli Enterprise Portal.

IBM Tivoli Monitoring solutions provide visibility into the monitoring infrastructure and add resource and performance metrics. They also support HACMP™ and Microsoft clusters, virtualization, and translation into nine languages for local language support.

These solutions support the Tivoli IT Service Management solutions and can improve overall enterprise performance and availability by integrating with key IT processes. They also provide event and monitoring information that can help you talk about availability with business counterparts.

6.3.3 Display events with Tivoli Enterprise Console

IBM Tivoli Enterprise Console V3.9 can now be rendered in a Tivoli Enterprise Portal workspace to display filtered and prioritized events, along with metrics and other information provided by IBM Tivoli Monitoring, OMEGAMON, System Automation, and other solutions. The integration of Tivoli Enterprise Console with Tivoli Enterprise Portal also enables the transfer of OMEGAMON situations to Tivoli Enterprise Console for filtering, correlation, and root cause analysis.

IBM Tivoli NetView for z/OS V5.2 focuses on availability management, while OMEGAMON for Mainframe Networks 3.1.0 addresses performance management. Now, through the Tivoli Enterprise Portal, you can integrate these two solutions for a complete view of network performance and availability data to improve efficiency and reduce the time to problem resolution.

6.3.4 Putting the pieces together

Disparate platforms and application stacks burden many IT infrastructures with nearly endless combinations of application servers, operating systems, networks, and network protocols, creating a significant availability and performance challenge. At the same time, more businesses expect IT departments to deliver IT services aligned with business goals, compelling IT to overcome the challenges of complexity, change, compliance, and costs.

End-to-end management of IT processes helps companies keep people and IT resources focused on business priorities. Integrating IT processes with IBM Tivoli solutions that monitor and manage all the critical resources associated with key business applications can improve your overall IT Service Management.

6.4 IT Service Management and the Virtualization Engine

How can today's IT organizations gain the power to continually optimize their infrastructures and quickly integrate and adapt their business processes? By implementing IBM IT Service Management (ITSM) software solutions and leveraging IBM Virtualization Engine technology and products.

Through these integrated solutions, IBM is able to help integrate business and IT processes at every level—starting at the hardware platform and moving up through operating systems, middleware components, and finally to the applications that drive business. This goal of end-to-end automation is to help organizations achieve higher levels of flexibility and performance, while controlling and even reducing IT costs.

The IBM Virtualization Engine platform delivers capabilities that enable simplification within a server or storage environment, or across an infrastructure. Resource virtualization features, such as partitioning and LPAR simplification tools, help simplify single-system environments. Virtualization Engine console is just one example of a component that virtualizes a cross-platform infrastructure.

The IBM strategy is to increasingly integrate virtualization and self-managing autonomic capabilities into the server platforms. This will enable IBM systems to precisely monitor and

manage server availability and operating system performance while allowing enterprise systems management software, such as IT Service Management solutions, to focus on automating IT and business processes, and maximizing application performance and availability.

ITSM software solutions complement the management capabilities built into the Virtualization Engine and help IT staffs meet or exceed their service-level goals for availability, response time, utilization, and more. They also help organizations to more effectively and efficiently execute standard IT processes such as change, release, security, and availability management by bringing people, technology, and processes together in an automated fashion.

The Virtualization Engine gives you the capability to automatically manage single, clustered, and heterogeneous server resources for workload, visualization, software distribution, and health monitoring. It is backed up by IT Service Management solutions, which provide capabilities for provisioning, monitoring, security, storage, networks, and the automating of IT processes—from middleware technologies to the enterprise-wide applications that drive business. Together, they are ready to help organizations deliver on demand IT management.

6.5 Future directions

Tivoli will continue to provide management solutions for enterprise environments that encompass multiple different system types and underlying operating systems, middleware, and architectures. i5/OS will continue to be supported where appropriate.

Tivoli's systems management support for i5/OS will continue to be as a managed system as part of the enterprise environment. The other OSs that can run on iSeries will also continue to be supported as managed systems or as central managing systems depending on the product.

7

When, why, and where to use the products

This chapter gives guidelines and suggestions on when to use each of the iSeries systems management products described in this paper. Each product is designed to work in certain environments and perform functions meant for that environment. So each has its advantages and disadvantages, depending on what you are trying to accomplish. The tools can also be used separately or together, so we discuss how they can used in combinations. We also give you some idea of where the products are heading for the future.

7.1 What you want to manage

Which operating system (OS) you want to manage is one good way to tell which products to use. For example, both the character-based green screen and iSeries Navigator interfaces only manage i5/OS (although they do have some management functions for Windows on Integrated xSeries Servers), so they can supply your management needs only if i5/OS is the only OS you want to deal with.

IBM Director concentrates on OSs that IBM produces or that run on IBM hardware platforms. This covers i5/OS, AIX, various Linux distributions, and various Windows versions. You will still need the native OS management tools such as green screen commands, Linux shell, and Windows GUI to manage details on an OS, but basic operation and monitoring can be done from the Director console.

If you have non-IBM OSs and hardware then you will need to look at Tivoli products. Tivoli supports various UNIX® versions including Sun and HP, other Linux distributions, and other OSs, depending on the product. Because Virtualization Engine console uses the other products (such as Tivoli Monitoring, IBM Director, and Management Central) as its management sources, it can manage the same OSs that they can manage.

Table 7-1 shows which products are best suited if we consider only the operating systems that they can manage.

Table 7-1   Best suited products

Operating system environment	Systems management product
i5/OS	iSeries Navigator with Management Central
i5/OS with Windows clients	IBM Director
i5/OS, Windows, Linux, or AIX	IBM Director
i5/OS, Windows, Linux, AIX, or other UNIX versions, zOS, and other OSs	Tivoli products
Any combination of OSs	Virtualization Engine console using Management Central, IBM Director, or Tivoli products as management sources
Any combination of OSs	Native OS management tools will still be required such as: ► i5/OS green screen ► Linux and UNIX shells ► Windows Administration functions ► Etc.

In general, iSeries Navigator and Director are meant to manage IBM hardware and OSs that run on that hardware, while Tivoli products can manage those and other OSs plus their applications and infrastructure. So if you want to do application-specific management then Tivoli products should be considered. For example, WebSphere runs in i5/OS jobs and Director and iSeries Navigator can monitor those jobs if you select which jobs belong to WebSphere. However, Tivoli provides products that can monitor and manage WebSphere-specific performance metrics, application servers, administration servers, internal events, and configurations. Tivoli products use in-depth knowledge of the application to assist in management of it. Because Virtualization Engine console uses the other products as its management sources, it can manage the same hardware, software, and infrastructure as they can.

Table 7-2 shows which products are best suited if we consider what else you want to manage besides the operating system.

Table 7-2   Best suited products

What to manage	Systems management product
Jobs, subsystems, resource, files, etc. on i5/OS	iSeries Navigator with Management Central
Jobs, services, resource, files, etc. on i5/OS, Windows, Linux, or AIX	IBM Director
Jobs, services, resource, files, etc. on i5/OS, Windows, Linux, AIX, other UNIX versions, zOS, or other OSs	Tivoli products
Middleware and applications	Tivoli products
SNMP devices	IBM Director Tivoli products
BladeCenter chassis and Blades, Hardware Management Console, IBM storage devices	IBM Director
Historical data, cross-platform security, system provisioning, business systems management, etc.	Tivoli products

The breadth and depth of functionality is often different between the products. By breadth of function I mean how many different things can be done by the product. Depth of function means how deep of an understanding does the product have of the thing it is managing. iSeries Navigator is tailored to i5/OS and provides functions to manage it. These functions are deep in their understanding of i5/OS and how to manage it, but their breadth of management is limited to what i5/OS needs. For example, Management Central has monitors for interactive CPU, which is i5/OS specific. If a monitor causes an event, then a program can be run in response or a window can be displayed. This shows depth of OS knowledge but has only a limited breadth in what you can do in response to the event. In a response to a CPU threshold event, Director can display a window, run a program, send an e-mail, send a page, send a Tivoli event, or do several of these things in combination. Tivoli products usually have a breadth of function that is lacking in Director and iSeries Navigator. Tivoli also provides a breadth of products for storage management, backup and recovery, security, network management, and other areas.

This depth and breadth aspect of management products often means that you will use several products in combination. For example, you can monitor CPU utilization on many agents using Director, but as you analyze a problem on i5/OS you may need to use green screen commands to see the system details. You can use Tivoli products or Director to get breadth of management and then use iSeries Navigator for depth of i5/OS management. Virtualization Engine console combines the breadth of coverage from its management sources with their depth of management through native functions, launch in context, and its launchpad.

7.2 How to manage

iSeries Navigator with Management Central can manage tens and hundreds of i5/OSs. IBM Director has a limit of 5,000 agents, although it can manage any number of SNMP devices on top of that. Tivoli products can manage thousands of systems. For example, Tivoli Configuration Manager can support upwards of 100,000 targets. So how you want to group

the systems to manage is one thing to consider when selecting a product. If you want to group i5/OS together and manage them from one console then iSeries Navigator meets the requirements. But if you want to group different OSs together and manage them from one console then Director or Tivoli products would be needed. If you also want to manage your network and applications from one location, then only Tivoli products will meet your requirements. Again, Virtualization Engine console brings the management functions from each of these management sources into one console.

Where you want to manage from is another consideration in using a management product. iSeries Navigator native console only runs on a Windows computer as it connects to i5/OS systems. The Management Central functions run only on i5/OS. So if you use iSeries Navigator with Management Central you will manage from a Windows console or a Web browser and have a central system on i5/OS. IBM Director can have its console and its management server on various OSs. So you have a wider choice of hardware and OS platform to use for your consoles and management server. Tivoli products in general have consoles that run on Windows systems or a Web browser. Their central systems usually can be on Windows, AIX, HP UNIX, or Sun Solaris. So if you want your central management server system to be i5/OS, then iSeries Navigator and Director will work, but for Tivoli products you will need a Windows or UNIX system. Virtualization Engine console can be installed on various OSs including i5/OS.

Table 7-3   Where products manage from

Product	Console OSs	Management server/ Central system OSs
iSeries Navigator with Management Central	Windows Web browser on any OS for Web-enabled tasks	i5/OS
IBM Director	AIX Linux on iSeries, pSeries, xSeries, or zSeries Windows	AIX i5/OS Linux on iSeries, pSeries, xSeries, or zSeries Windows
Virtualization Engine console	Web browser on any OS	AIX i5/OS Linux on iSeries, pSeries, xSeries, or zSeries Windows
Tivoli products in general	AIX Sun Solaris HP UNIX Windows Web browser on any OS for some products	AIX Sun Solaris HP UNIX Windows

7.3 Other things to consider

A significant portion of initially installing and using a systems management product is educating your operators and support personnel. Each systems management product has some of its own terminology, user interface standards, function detail differences, and other items that you need to learn to be effective. In general, the more functions and varied support that a product has means a steeper learning curve with more time and expense required. However, if you need the breadth of function and varied support for your environment then you need to account for the added complexities in the education required.

In general, iSeries Navigator is relatively easy to learn and use assuming that you have knowledge of i5/OS. Using more advanced features such as PTF management takes additional time to learn. Some features, such as monitoring, require some knowledge of how you use the systems. For example, at what CPU utilization percentage do you consider the system overloaded or under worked?

IBM Director was designed to be installed and have the user doing useful work in a day or two. The latest release has also added some enhancements to the user interface to simplify its use. Director does support more OSs and hardware platforms than iSeries Navigator, and they have similar functions, which differ in details. So the terminology and user panels differ, and moving from one to the other will take some readjustments. But basic concepts such as what an inventory means are the same, and both are relatively easy to learn and use.

Tivoli products are designed to have a broad range of functions and support multiple operating systems. So installing and learning how to use them takes some extra time and effort, as you would expect. If you have a very large or complicated environment you may want to include some services help in your purchase of products. But again, the basic concepts of systems management such as inventory and monitoring are similar across the IBM products. Their implementation details vary depending on various factors such as purpose and design targets, so their user interfaces and terminology also vary.

Of course, the cost of system management products is always of interest to users and to IBM. iSeries Navigator with Management Central is included with i5/OS and its support is included with i5/OS support. Although its cost is included in the cost of i5/OS, using it incurs no additional charge. IBM Director and Virtualization Engine console are also included with i5/OS. Director agent licenses are included with each IBM hardware platform. If you want to manage non-IBM hardware then additional licenses must be purchased. Also, several of the Director extensions are charged. Support for Director and Virtualization Engine console after the first year must also be purchased. All Tivoli products and their support are chargeable. Depending on the product, there are usually charges based on the number of systems and processors that you want to manage.

7.4 Using products in combination

You can use all of these products at one time and even use all of them to manage the same systems. Of course, you have to install all of the products and use several interfaces to run all of their functions. But usually you will want to use just a few of the products, and preferably just one. Using only one product and console to manage all aspects of all systems is not a reality today, so you will need to combine products. Several of the iSeries systems management products are designed to work with each other while others are more standalone.

iSeries Navigator with Management Central is basically a stand-alone management product. It does not have functions to communicate its data and events to other products other than being able to export some data in spread sheet formats. However, through the use of a bridge, as explained in the Virtualization Engine console chapter, it can be a management source for the Virtualization Engine console. Also, its Web-enabled tasks are included in the Virtualization Engine console.

IBM Director can cooperate with Tivoli products for monitoring, events, and inventory. Director does the work and then Tivoli receives the events and inventory files to include in Tivoli products' database and user interface. This allows you to have department or small group systems management using Director yet feed into the larger enterprise's Tivoli infrastructure. Director can also export some data in spreadsheet formats.

Tivoli products are designed to work with each other and share data and events. For example, Tivoli Monitoring can send events to Tivoli Enterprise Console (TEC). TEC can use the Tivoli Management Framework to send a command to a system in response to an event. The Tivoli Data Warehouse receives data from a number of other Tivoli products and stores it in a common database.

The purpose of the Virtualization Engine console is to work with the other systems management products and provide one console that shows information gathered from all of the management sources. So the Virtualization Engine console by definition works well with the other products.

7.5 Where we are heading

IBM in general is moving its systems management products toward common user interfaces, common industry standards, and, when possible, common internal components.

The common user interface is starting to show now in the Virtualization Engine console and some Tivoli products. It is planned to be Web browser based using common internal components. The common internal components will help to keep the look and feel of different products similar and reduce the user's learning effort. It is also planned that various products will be able to share the same browser window. You can see the start of this today as various iSeries Navigator, Director, and Tivoli functions use the shared Virtualization Engine console interface. We are also moving toward common command-line interfaces based, when possible, on industry standards.

IBM wants to use industry standards whenever possible to make its management applications more consistent across platforms and to make it easier for other vendors to provide consistent management applications for IBM hardware and operating systems. One example of using an industry standard is the Distributed Management Task Force (DMTF) Common Information Model (CIM) standard. We also use open source implementations when possible such as the Pegasus implementation of the CIM Object Manager (CIMOM). Pegasus is used by IBM Director for some of its inventory and event functions. We continue to participate in and drive industry standard solutions for the systems management arena.

To reduce development cost for IBM and to make our system management products more consistent across platforms, we use common internal components when possible. IBM Director itself is an example of this usage of common components. Director's infrastructure and extensions allow such things as HMC integration, BladeCenter management, and similar functions to be built once to operate across several OSs. Common internal components are currently used in the Virtualization Engine console as mentioned above, and other common agent, central management server, and console components are being considered.

IBM Director, Virtualization Engine console, and other Virtualization Engine and on demand components will continue to implement IBM virtualization and on demand strategies. Tivoli will continue to build on those strategies to provide solutions that provide capabilities for provisioning, monitoring, security, storage, networks, and the automating of IT processes from middleware technologies to the enterprise-wide applications that drive business.

A

Tivoli **OMEGAMON** solutions

Following the acquisition of Candle Corporation products, IBM has worked to merge and consolidate them with existing Tivoli products. This appendix provides more information about Tivoli's products, especially for zSeries, which are based on the OMEGAMON family of Candle products.

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OMEGAMON solution convergence

The Tivoli OMEGAMON products support Tivoli's recently introduced IT Service Management solutions through focused monitoring and management of all the critical resources associated with key business applications. Integrating these tools with effective event and incident management processes can improve your overall IT service delivery.

OMEGAMON solutions include:

► IBM Tivoli OMEGAMON XE on z/OS V3.1.0 integrates OMEGAMON XE for Sysplex, OMEGAMON XE for OS/390®, and OMEGAMON XE for IBM Cryptographic Coprocessors. In addition, the product provides address space CPU use times and percentages, and enhanced system CPU and zAAP processor use and reporting.

► IBM Tivoli OMEGAMON XE for CICS® on z/OS V3.1.0 combines OMEGAMON XE for CICS and OMEGAMON XE for CICSPlex® into a single product. In addition, the product monitors important operational areas of the CICS Transaction Server V3.1, such as TCP/IP services' dispatcher status, Task Control Block (TCB) modes and pools; and Java Virtual Machine status, pools, class cache, programs, and profiles.

► IBM Tivoli OMEGAMON XE for IMS™ V3.1.0 brings together OMEGAMON XE for IMS and OMEGAMON XE for IMSPlex into a single product. In addition, the product adds lock table enhancements for additional owner and identification information, an Extended Transaction Reporting Facility (TRF), Open Transaction Manager Access (OTMA) extensions, and cold queue reporting. It also provides shared queues extensions and IMS Connect CPU time statistics.

► IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS V3.1.0 merges OMEGAMON XE for DB2 and DB2 Performance Expert into one tool, while IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS V3.1.0 merges OMEGAMON XE for DB2 and DB2 Performance Monitor into another tool.

► IBM Tivoli OMEGAMON XE for Mainframe Networks V3.1.0 begins the convergence of the IBM Tivoli Monitoring for Network Performance V1.2 and IBM Tivoli OMEGAMON XE for Mainframe Networks V2.1 into a single product. New capabilities include data collection through z/OS Communications Server Network Management Interfaces (NMI) and initial integration and interoperability with Tivoli NetView for z/OS V5.2.

► IBM Tivoli OMEGAMON DE on z/OS 3.1.0 displays information in the Tivoli Enterprise Portal from a wide variety of tools, including multiple OMEGAMON XE monitors and third-party software, so you can see what is going on with applications as they use resources on multiple platforms across the network.

IBM Tivoli Monitoring V6.1 solutions receive a powerful new infrastructure and user interface with substantial capabilities for maintaining service levels in distributed environments. These products gain a lightweight and highly scalable foundation composed of the Tivoli Enterprise Portal client, a portal server, management server, and monitoring agents. The new product infrastructure works with Tivoli Monitoring V5 infrastructures and provides clear upgrade paths.

The Tivoli Enterprise Portal becomes the user interface and single point of control for Tivoli Monitoring V6.1 solutions, unifying your monitoring infrastructure for end-to-end enterprise performance management and simplified operator training. Tivoli Monitoring solutions, which all benefit from the Tivoli Enterprise Portal, include the following:

► IBM Tivoli Monitoring V6.1 - UNIX, Windows, i5/OS, and Linux

► IBM Tivoli Monitoring for Databases V6.1 - DB2, Oracle, Microsoft SQL, and Sybase

► IBM Tivoli Monitoring for Applications V6.1 - mySAP and Siebel

- ► IBM Tivoli Monitoring for Messaging and Collaboration V6.1 - Microsoft Exchange
- ► IBM Tivoli Monitoring for Microsoft .NET V6.1 - Biztalk Server, Commerce Server, Content Manager, Host Integration Server, ISA Server, Microsoft .NET framework, SharePoint Portal Server, and UDDI Services
- ► IBM Tivoli Monitoring for Virtual Servers V6.1 - Citrix and VMWARE ESX

OMEGAMON and System Automation solutions

IBM Tivoli System Automation solutions now include two components, a base product focused on z/OS and an end-to-end product for heterogeneous environments. The base product, Tivoli System Automation z/OS V3.1, gains custom-dialog enhancements, additional sample policies, and tighter integration with the Tivoli OMEGAMON classic interface for z/OS, IMS, CICS, and DB2.

OMEGAMON and Tivoli System Automation solutions can now work together to speed problem resolution. Tivoli System Automation for z/OS V3.1 can respond to OMEGAMON alerts, creating a rich automated environment to keep your systems running their best.

The end-to-end product, Tivoli System Automation for Multiplatforms V3.1, integrates Tivoli System Automation for Multiplatforms with Tivoli System Automation for z/OS, so you can automate heterogeneous applications at the business level. The resulting end-to-end solution provides a single point of control for automation management on z/OS, Linux for zSeries, z/VM®, Linux, or AIX platforms. These two Tivoli automation solutions also integrate with Tivoli Workload Scheduler, Tivoli Storage Manager, and Tivoli Provisioning Manager.

In addition, these Automation solutions are further enhanced by two additional products that became part of the Tivoli portfolio as a result of the Candle acquisition by IBM. IBM Tivoli AF/OPERATOR® on z/OS is a robust console automation solution that helps protect your z/OS or OS/390 mainframe environment by reducing human error and increasing control over system resources. IBM Tivoli AF/OPERATOR ensures timely completion of critical but repetitive tasks and quick response to system events on the enterprise console, without the need for human intervention.

Also included in this Automation arena is IBM Tivoli AF/REMOTE®, an outboard automation solution for secure remote access to mainframe and distributed systems regardless of location. IBM Tivoli AF/REMOTE provides integrated access to these systems via TCP/IP network and dial-up, so remote administrators gain the same TN3270 console emulation functions available to data center operators. IBM Tivoli AF/REMOTE also provides automatic notification and escalation of problems via e-mail and wireless devices. As an outboard solution, IBM Tivoli AF/REMOTE can integrate monitoring and automation packages and frameworks, while also automating tasks that cannot be initiated by a host-based system itself.

Product details

This appendix provides more details about the functions of the various iSeries systems management products and how some of them compare to each other. It lists monitor metrics specifically for i5/OS found in:

► Management Central
► IBM Director
► IBM Tivoli Monitoring (ITM) Release 6.1 (based on the OMEGAMON XE agent)
► IBM Tivoli Monitoring (ITM) Release 5.1 (based on the Tivoli enterprise framework agent)

A brief comparison of the functions in iSeries Navigator with Management Central and IBM Director is also provided.

Functional comparison

This section compares the tasks and functions available in:

► iSeries Navigator with Management Central
► IBM Director

Because of the broad range of Tivoli products, we do not try to list all of their functions. However, we do list the Tivoli monitoring metrics for OS/400 and i5/OS below. In general, Tivoli products have similar functions as MC and Director, and quite often have more functions.

Figure B-1 gives an overview of how iSeries Navigator and IBM Director compare in broad functional areas.

```
          IBM Director                          iSeries Navigator
     SNMP Browser              ◄──────────────  "Not available"
     Remote Control (Windows)  ◄──────────────  "Not available"
     Remote Session            ──────────────►  5250 Session
     Software Distribution     ──────────────►  Software/File Packaging & Distribution
     Customized Pane Layout    ◄─────────────►  2 Pane Layout
     Discovery                 ◄──────────────  Discovery
     User Administration       ◄──────────────  Application Administration
     Inventory                 ◄─────────────►  Hardware, Software & Fix Inventory
     Group Management          ◄──────────────  System Group
     Process Management        ◄──────────────  Work Management
     Process Task              ──────────────►  Command
     File Transfer             ──────────────►  Integrated File System
     Resource Monitor          ◄─────────────►  System, Message & Job Monitoring
     Thresholds                ◄──────────────  Thresholds
     Events                    ◄──────────────  Events
     Event Action Plans        ◄──────────────  Threshold Actions
     Operating System support  ◄──────────────  I5/OS only
     HMC, BladeCenter, etc.    ◄──────────────  iSeries platform only
       integration
     Manual resource compares  ──────────────►  Compare and update resources

           Arrowhead points toward product with "better function".
                 Double arrowhead means "about equal".
```

Figure B-1   iSeries Navigator and IBM Director comparison

Monitoring

To give you a general idea of how the products compare with their monitoring functions, the following sections list the metrics available with each product. For details about each metric and how to enter monitor parameters you need to read each product's documentation. For Management Central's metrics we also provide a table to compare it to the other products.

Management Central metrics

Table B-1 on page 85 lists monitor metrics available in Management Central (MC). It also indicates if the same or similar metric is available in:

► IBM Director
► IBM Tivoli Monitoring (ITM) Version 6.1, with OMEGAMON-based agent

▶ IBM Tivoli Monitoring Version 5.1, Resource Model based agent

The metric name is a general term and it might be slightly different in each product's documentation. An X on a line means that the product can monitor the same metric. A line with *akin* means that the product has a similar metric that might meet your requirements.

Table B-1   Management Central metric comparison

Management Central metric	Director	ITM 6.1	ITM 5.1
System monitors:			
Batch Logical Database I/O			
Communication IOP Utilization Maximum	akin	akin	
Communication IOP Utilization Average			
Communication Line Utilization Maximum	akin	akin	
Communication Line Utilization Average			
Disk IOP Utilization Maximum	akin	akin	
Disk IOP Utilization Average			
CPU Utilization Average	X	X	X
CPU Utilization Interactive Jobs			akin
CPU Utilization Interactive Feature			X
CPU Utilization Database Capability			X
CPU Utilization Secondary Workloads			X
CPU Utilization Basic Average			X
Disk Arm Utilization Maximum	akin	akin	
Disk Arm Utilization Average			
Disk Storage Maximum	akin	akin	akin
Disk Storage Average			
Interactive Response Time Maximum	akin		
Interactive Response Time Average			
LAN Utilization Maximum	akin		
LAN Utilization Average			
Machine Pool Faults	X		akin
Transaction Rate Average			
Transaction Rate Interactive			
User Pool Faults Maximum	akin		akin
User Pool Faults Average			
File monitors:			
File Status Modified	X	akin	X
Size	X	akin	X
Text Contents Added			
Job monitors:			
Joblog Message			X
Job Status	X	X	X
CPU Percent Utilization		X	X
Logical I/O Rate			
Disk I/O Rate			X
Communications I/O Rate			
Transaction Rate		X	
Transaction Time		X	
Thread Count			X
Page Fault Rate			

Management Central metric	Director	ITM 6.1	ITM 5.1
Job summary monitors: Count CPU Percent Utilization Logical I/O Rate Disk I/O Rate Communications I/O Rate Transaction Rate Transaction Time Thread Count Page Fault Rate Jobs included in the summary values can be specified by the user or selected from a predefined list of server jobs.	akin		X X X
Message monitors: Message ID Message Type Message Severity	X akin X	X X X	X
B2B monitors: Active Transaction Count Active Transaction Duration			

IBM Director metrics

The following list shows the metrics available in IBM Director for i5/OS. The metrics are grouped into general categories.

- ► Directory
  - – Attributes
  - – Exists
  - – Owner
  - – Size
  - – Modified
  - – Type
- ► File
  - – Checksum
  - – Attributes
  - – Exists
  - – Owner
  - – Size
  - – Last Modified
  - – Object Type
- ► I/O Processor
  - – Auxiliary IOP Use %
  - – IOP All Comm Use %
  - – IOP Disk Use %
  - – IOP LAN Use %
  - – IOP Memory Free
  - – IOP Operations Status
  - – IOP Optical Use %
  - – IOP SDLC Use %
  - – IOP System Function Use %
  - – IOP tape Use %
  - – IOP Twinaxial Use %

- – IOP x.25 Use %
- – Primary IOP Use %
- ► Job
  - – Exists
- ► Job Queue
  - – Job Queue Status
  - – Jobs in Queue
- ► Job Statistics
  - – Batch Jobs Ended, Output Waiting
  - – Batch Jobs Ending
  - – Batch Jobs Held on Job Queue
  - – Batch Jobs Held while Running
  - – Batch Jobs on Held Job Queue
  - – Batch Jobs on Unassigned Job Queue
  - – Batch Jobs Running
  - – Batch Jobs Waiting for Messages
  - – Batch Jobs Waiting to Run
  - – Jobs in System
- ► Messages
  - – Severity
  - – ID
  - – Text
  - – Time of day
- ► Net Server Statistics
  - – Average Response Time
  - – File Opens/Minute
  - – Kbytes Received per Minute
  - – Kbytes Sent per Minute
  - – Password Violations
  - – Print Jobs Queued/Minute
  - – Session Starts/Minute
- ► Physical disk
  - – Disk Arm Utilization %
  - – Disk Average Queue Length
  - – Disk Mirroring Status
  - – Disk Operational Status
  - – Disk Processor Utilization %
  - – Disck Read Commands/Minute
  - – Disk Read Kbytes/Mintue
  - – Disk Space Free
  - – Disk Space Used %
  - – Disk Write Commands/Mintue
  - – Disk Write Kbytes/Mintue
- ► Storage Pools
  - – Active to Ineligible
  - – Active to Wait
  - – Database Faults per Second
  - – Database Pages per Second
  - – Non-database Faults per Second
  - – Non-databae Pages per Second
  - – Wait to Ineligible
- ► Subsystem
  - – Subsystem % of job Limit
  - – Subsystem Active Jobs
  - – Subsystem Status

- ► System
    - – CPU Utilization %
    - – Current Temp Storage Used
    - – Max Temp Storage Used
    - – Permanent Addresses Used %
    - – System ASP Used %
    - – Temporary Addresses Used %
- ► System Logs
    - – File Status
    - – Size
- ► User Statistics
    - – Users Disconnected
    - – User Signed Off, Output Waiting
    - – Users Signed On
    - – Users Suspended by Group Jobs
    - – Users Suspended by System Request
- ► Process/Job-Name Monitors
    - – Current Active Processes
    - – Maximum running at once
    - – Maximum running yesterday
    - – New executions counted
    - – Times failed to start
    - – Times started
    - – Times stopped
    - – Total execution time
    - – Yesterday's execution time
    - – Yesterday's new executions

IBM Tivoli Monitoring 6.1 metrics

The following list shows the metrics available with ITM 6.1 for i5/OS. These metrics were also available in the Candle OMEGAMON XE agent for OS/400. The metrics are grouped into general categories and the metric name is shown.

- ► Accounting Journal (OS400_Acct_Jrn) Attributes
    - – OS400_Acct_Jrn.Accounting_ Code
    - – OS400_Acct_Jrn.Completion_Code
    - – OS400_Acct_Jrn.CPU_Time
    - – OS400_Acct_Jrn.Database_I/O_Operations
    - – OS400_Acct_Jrn.Date_and_Time
    - – OS400_Acct_Jrn.Job_Name
    - – OS400_Acct_Jrn.Job_Number
    - – OS400_Acct_Jrn.Job_Type
    - – OS400_Acct_Jrn.ORIGINNODE
    - – OS400_Acct_Jrn.Start_Date_and_Time
    - – OS400_Acct_Jrn.Start_Time
    - – OS400_Acct_Jrn.Time
    - – OS400_Acct_Jrn.Transaction_Number
    - – OS400_Acct_Jrn.Transaction_Time
    - – OS400_Acct_Jrn.User
- ► Alert Notification (OS400_Alert) Attributes
    - – OS400_Alert.Analysis_Available
    - – OS400_Alert.Delayed
    - – OS400_Alert.Description
    - – OS400_Alert.First_Cause
    - – OS400_Alert.Held

- OS400_Alert.ID
- OS400_Alert.Local
- OS400_Alert.ORIGINNODE
- OS400_Alert.Message_ID
- OS400_Alert.Message_Severity
- OS400_Alert.Operator_Generated
- OS400_Alert.Origin_System
- OS400_Alert.Problem_ID
- OS400_Alert.Resource
- OS400_Alert.Resource_Type
- OS400_Alert.Type
- ► Communications (OS400_Comm) Attributes
  - OS400_Comm_Async.Error_Percent
  - OS400_Comm_Async.IOP_Bus_Address
  - OS400_Comm_Async.IOP_Bus_Number
  - OS400_Comm_Async.IOP_Name
  - OS400_Comm_Async.Line_Description
  - OS400_Comm_Async.ORIGINNODE
  - OS400_Comm_Async.Utilization_Percent
  - OS400_Comm_Bisync.IOP_Bus_Address
  - OS400_Comm_Bisync.IOP_Bus_Number
  - OS400_Comm_Bisync.IOP_Name
  - OS400_Comm_Bisync.Line_Description
  - OS400_Comm_Bisync.ORIGINNODE
  - OS400_Comm_Bisync.Receive_Error_Percent
  - OS400_Comm_Bisync.Send_Error_Percent
  - OS400_Comm_Bisync.Utilization_Percent
  - OS400_Comm_Ethernet.IOP_Bus_Address
  - OS400_Comm_Ethernet.IOP_Bus_Number
  - OS400_Comm_Ethernet.IOP_Name
  - OS400_Comm_Ethernet.Local_RNR_Percent
  - OS400_Comm_Ethernet.Line_Description
  - OS400_Comm_Ethernet.ORIGINNODE
  - OS400_Comm_Ethernet.Remote_RNR_Percent
  - OS400_Comm_Ethernet.Response_Time_Percent
  - OS400_Comm_Ethernet.Utilization_Percent
  - OS400_APPN_Topology.CPNAME
  - OS400_APPN_Topology.Date_and_Time
  - OS400_APPN_Topology.NETID
  - OS400_APPN_Topology.Node_Congestion
  - OS400_APPN_Topology.Node_Type
  - OS400_APPN_Topology.ORIGINNODE
  - OS400_APPN_Topology.TransGroup_Controller_Name
  - OS400_APPN_Topology.TransGroup_DestNode_CPNAME
  - OS400_APPN_Topology.TransGroup_DestNode_NETID
  - OS400_APPN_Topology.TransGroup_Number
  - OS400_APPN_Topology.TransGroup_Operational
  - OS400_APPN_Topology.Time
  - OS400_APPN_Topology.Update_Type
  - OS400_Comm_Token_Ring.IOP_Bus_Address
  - OS400_Comm_Token_Ring.IOP_Bus_Number
  - OS400_Comm_Token_Ring.IOP_Name
  - OS400_Comm_Token_Ring.Line_Description
  - OS400_Comm_Token_Ring.Local_RNR_Percent
  - OS400_Comm_Token_Ring.ORIGINNODE

- – OS400_Comm_Token_Ring.Remote_RNR_Percent
- – OS400_Comm_Token_Ring.Response_Time_Percent
- – OS400_Comm_Token_Ring.Utilization_Percent
- – OS400_Comm_X25.Average_Utilization_Percent
- – OS400_Comm_X25.IOP_Bus_Address
- – OS400_Comm_X25.IOP_Bus_Number
- – OS400_Comm_X25.IOP_Name
- – OS400_Comm_X25.Line_Description
- – OS400_Comm_X25.Local_RNR_Percent
- – OS400_Comm_X25.ORIGINNODE
- – OS400_Comm_X25.Receive_Error_Percent
- – OS400_Comm_X25.Receive_Utilization_Percent
- – OS400_Comm_X25.Remote_RNR_Percent
- – OS400_Comm_X25.Send_Error_Percent
- – OS400_Comm_X25.Send_Utilization_Percent
- – OS400_Comm_SDLC.Controller_Poll_Percent
- – OS400_Comm_SDLC.IOP_Bus_Address
- – OS400_Comm_SDLC.IOP_Bus_Number
- – OS400_Comm_SDLC.IOP_Name
- – OS400_Comm_SDLC.Local_RNR_Percent
- – OS400_Comm_SDLC.Line_Description
- – OS400_Comm_SDLC.ORIGINNODE
- – OS400_Comm_SDLC.Receive_Error_Percent
- – OS400_Comm_SDLC.Remote_RNR_Percent
- – OS400_Comm_SDLC.Send_Error_Percent
- – OS400_Comm_SDLC.Utilization_Percent
- ► Controller Description (OS400_Controller) Attributes
  - – OS400_Controller.Category
  - – OS400_Controller.Name
  - – OS400_Controller.ORIGINNODE
  - – OS400_Controller.Status
- ► Database Member (OS400_DB_Member) Attributes
  - – OS400_DB_Member.File
  - – OS400_DB_Member.File_Attribute
  - – OS400_DB_Member.Increments_Left
  - – OS400_DB_Member.Library
  - – OS400_DB_Member.Member
  - – OS400_DB_Member.ORIGINNODE
  - – OS400_DB_Member.Percent _Delete_Records
  - – OS400_DB_Member.Percent_Used
  - – OS400_DB_Member.Records_Unused
  - – OS400_DB_Member.Records_Used
  - – OS400_DB_Member.Source_File_Flag
  - – OS400_DB_Member.Source_Member_Type
  - – OS400_DB_Member.SQL_Type
- ► Device Description (OS400_Device) Attributes
  - – OS400_Device.Category
  - – OS400_Device.Job_Name
  - – OS400_Device.Job_Number
  - – OS400_Device.Job_User
  - – OS400_Device.Name
  - – OS400_Device.ORIGINNODE
  - – OS400_Device.Passthru_Device
  - – OS400_Device.Status
- ► Disk Unit (OS400_Disk_Unit) Attributes

- – OS400_Disk_Unit.Arm_Number
- – OS400_Disk_Unit.Aux_Storage_Pool_Number
- – OS400_Disk_Unit.Average_Queue_Length
- – OS400_Disk_Unit.Average_Service_Time
- – OS400_Disk_Unit.Checksum_Number
- – OS400_Disk_Unit.Drive_Capacity
- – OS400_Disk_Unit.Drive_Type
- – OS400_Disk_Unit.IOP_Bus_Address
- – OS400_Disk_Unit.IOP_Bus_Number
- – OS400_Disk_Unit.IOP_Name
- – OS400_Disk_Unit.ORIGINNODE
- – OS400_Disk_Unit.Percent_Busy
- – OS400_Disk_Unit.Percent_Permanent_Used
- – OS400_Disk_Unit.Percent_Used
- ► I/O Processor (OS400_I/O_Processor) Attributes
- – OS400_I/O_Processor.Comm_Percent
- – OS400_I/O_Processor.Disk_Percent
- – OS400_I/O_Processor.IOP_Bus_Address
- – OS400_I/O_Processor.IOP_Bus_Number
- – OS400_I/O_Processor.Name
- – OS400_I/O_Processor.ORIGINNODE
- – OS400_I/O_Processor.Type
- – OS400_I/O_Processor.Utilization_Percent
- ► Job (OS400_Job) and Job Queue (OS400_Job_Queue) Attributes
- – OS400_Job.Acct_Code
- – OS400_Job.Acct_Status
- – OS400_Job.Async_I/O
- – OS400_Job.Client_Access_Application
- – OS400_Job.CPU_Percent
- – OS400_Job.CPU_Time
- – OS400_Job.CPU_Time_Overall
- – OS400_Job.DDM_Target
- – OS400_Job.Emulation_Active
- – OS400_Job.End_Status
- – OS400_Job.Function_Name
- – OS400_Job.Function_Type
- – OS400_Job.Job_Queue
- – OS400_Job.Job_Queue_Library
- – OS400_Job.Job_Queue_Priority
- – OS400_Job.Message_Queue
- – OS400_Job.Message_Queue_Library
- – OS400_Job.Mode
- – OS400_Job.Multiple_Request_Terminal_Job
- – OS400_Job.Name
- – OS400_Job.Number
- – OS400_Job.ORIGINNODE
- – OS400_Job.Passthru_Source
- – OS400_Job.Passthru_Target
- – OS400_Job.Pool
- – OS400_Job.Priority
- – OS400_Job.Response_Time
- – OS400_Job.Response_Time_Overall
- – OS400_Job.Submit_Date_and_Time
- – OS400_Job.Submit_Time
- – OS400_Job.Subsystem

- OS400_Job.Signed_On_User
- OS400_Job.Start_Date_and_Time
- OS400_Job.Start_Time
- OS400_Job.Subtype
- OS400_Job.Synch_I/O
- OS400_Job.S36_Environment
- OS400_Job.Timeslice
- OS400_Job.Transaction_Count
- OS400_Job.Transaction_Count_Overall
- OS400_Job.Transaction_Time
- OS400_Job.Transaction_Time_Overall
- OS400_Job.Type
- OS400_Job.User
- OS400_Job_Queue.Library
- OS400_Job_Queue.Name
- OS400_Job_Queue.Number_Jobs
- OS400_Job_Queue.ORIGINNODE
- OS400_Job_Queue.Status
- OS400_Job_Queue.Subsystem
- ► Line Description (OS400_Line) Attributes
  - OS400_Line.Category
  - OS400_Line.Name
  - OS400_Line.ORIGINNODE
  - OS400_Line.Status
- ► Message (OS400_Message) Attributes
  - OS400_Message.Data
  - OS400_Message.Date_and_Time
  - OS400_Message.Help_Data
  - OS400_Message.ID
  - OS400_Message.Key
  - OS400_Message.Message_Queue
  - OS400_Message.Message_Queue_Library
  - OS400_Message.ORIGINNODE
  - OS400_Message.Select
  - OS400_Message.Send_Job_Name
  - OS400_Message.Send_Job_Number
  - OS400_Message.Send_User
  - OS400_Message.Severity
  - OS400_Message.Time
  - OS400_Message.Type
  - OS400_Message.Type
  - OS400_Message.ID
- ► Network (OS400_Network) Attributes
  - OS400_Network.Alert_Backup_Focal_Point
  - OS400_Network.Alert_Controller
  - OS400_Network.Alert_Default_Focal_Point
  - OS400_Network.Alert_Filter
  - OS400_Network.Alert_Hold_Count
  - OS400_Network.Alert_Log_Status
  - OS400_Network.Alert_Primary_Focal_Point
  - OS400_Network.Alert_Request_Focal_Point
  - OS400_Network.Alert_Status
  - OS400_Network.APPN_Node_Type
  - OS400_Network.Current_System_Name
  - OS400_Network.Defaut_Local_Location_Name

- – OS400_Network.Default_Mode
- – OS400_Network.Local_CPNAME
- – OS400_Network.Local_NETID
- – OS400_Network.Max_Intermediate_Sessions
- – OS400_Network.Message_Queue
- – OS400_Network.ORIGINNODE
- – OS400_Network.Output_Queue
- – OS400_Network.Pending_System_Name
- ► Object (OS400_Object) Attributes
  - – OS400_Object.Change_Date_and_Time
  - – OS400_Object.Change_Time
  - – OS400_Object.Compress_Status
  - – OS400_Object.Create_Date_and_Time
  - – OS400_Object.Create_Time
  - – OS400_Object.Extended_Attribute
  - – OS400_Object.Last_Used_Date_and_Time
  - – OS400_Object.Last_Used_Time
  - – OS400_Object.Library
  - – OS400_Object.Licensed_Program
  - – OS400_Object.Name
  - – OS400_Object.ORIGINNODE
  - – OS400_Object.Owner
  - – OS400_Object.Percent_Days_Used
  - – OS400_Object.PTF_Number
  - – OS400_Object.Operating_System_Level
  - – OS400_Object.Restore_Date_and_Time
  - – OS400_Object.Restore_Time
  - – OS400_Object.Save_Command
  - – OS400_Object.Save_Date_and_Time
  - – OS400_Object.Save_Device_Type
  - – OS400_Object.Save_File
  - – OS400_Object.Save_Library
  - – OS400_Object.Save_Time
  - – OS400_Object.True_Size
  - – OS400_Object.Type
  - – OS400_Object.Use_Reset_Date_and_Time
  - – OS400_Object.Use_Reset_Time
- ► Storage Pool (OS400_Storage_Pool) Attributes
  - – OS400_Storage_Pool.Activity_Level
  - – OS400_Storage_Pool.Active_to_Ineligible
  - – OS400_Storage_Pool.ATI_ATW_Ratio
  - – OS400_Storage_Pool.Active_to_Wait.
  - – OS400_Storage_Pool.Database_Fault
  - – OS400_Storage_Pool.Number
  - – OS400_Storage_Pool.Nondatabase_Fault
  - – OS400_Storage_Pool.ORIGINNODE
  - – OS400_Storage_Pool.Size
  - – OS400_Storage_Pool.Total_Fault
  - – OS400_Storage_Pool.Wait_to_Ineligible
  - – OS400_Storage_Pool.WTI_ATW Ratio
  - – OS400_Storage_Pool.Active_to_Wait
- ► Subsystem (OS400_Subsystem) Attributes
  - – OS400_Subsystem.Current_Jobs_Active
  - – OS400_Subsystem.Description_Library
  - – OS400_Subsystem.Max_Jobs_Active

- OS400_Subsystem.Name
- OS400_Subsystem.Number_Pools
- OS400_Subsystem.ORIGINNODE
- OS400_Subsystem.Pool_Activity_Level
- OS400_Subsystem.Pool_Name
- OS400_Subsystem.Status
► Security Journal (OS400_Security_Jrn) Attributes
► Authority Failure (AuthFail) Journal Entries
- OS400_Security_Jrn_AuthFail.Job_Name
- OS400_Security_Jrn_AuthFail.Job_Number
- OS400_Security_Jrn_AuthFail.Object
- OS400_Security_Jrn_AuthFail.Object_Library
- OS400_Security_Jrn_AuthFail.Object_Type
- OS400_Security_Jrn_AuthFail.ORIGINNODE
- OS400_Security_Jrn_AuthFail.User
- OS400_Security_Jrn_AuthFail.Validation_Value
- OS400_Security_Jrn_AuthFail.Violation_Type
► General Security (AuditJrn) Attributes
- OS400_Security_Jrn_AuditJrn.Entry_Type
- OS400_Security_Jrn_AuditJrn.Job_Name
- OS400_Security_Jrn_AuditJrn.Job_Number
- OS400_Security_Jrn_AuditJrn.ORIGINNODE
- OS400_Security_Jrn_AuditJrn.User_Profile
► Change Authority (ChgAuth) Journal Entries
- OS400_Security_Jrn_ChgAuth.ADD
- OS400_Security_Jrn_ChgAuth.Auth_List_Name
- OS400_Security_Jrn_ChgAuth.AUTLMGT
- OS400_Security_Jrn_ChgAuth.Command_Type
- OS400_Security_Jrn_ChgAuth.DLT
- OS400_Security_Jrn_ChgAuth.EXCLUDE
- OS400_Security_Jrn_ChgAuth.Job_User
- OS400_Security_Jrn_ChgAuth.Object_Name
- OS400_Security_Jrn_ChgAuth.OBJEXIST
- OS400_Security_Jrn_ChgAuth.Object_Library_Name
- OS400_Security_Jrn_ChgAuth.OBJMGT
- OS400_Security_Jrn_ChgAuth.OBJOPR
- OS400_Security_Jrn_ChgAuth.Object_Type
- OS400_Security_Jrn_ChgAuth.ORIGINNODE
- OS400_Security_Jrn_ChgAuth.READ
- OS400_Security_Jrn_ChgAuth.UPDATE
► User Profile Change (CP) Journal Entries
- OS400_Security_Jrn_ChgUserProf.ALLOBJ
- OS400_Security_Jrn_ChgUserProf.Command_Type
- OS400_Security_Jrn_ChgUserProf.JOBCTL
- OS400_Security_Jrn_ChgUserProf.ORIGINNODE
- OS400_Security_Jrn_ChgUserProf.Password_Changed
- OS400_Security_Jrn_ChgUserProf.Password_Expired
- OS400_Security_Jrn_ChgUserProf.SAVSYS
- OS400_Security_Jrn_ChgUserProf.SECADM
- OS400_Security_Jrn_ChgUserProf.SERVICE
- OS400_Security_Jrn_ChgUserProf.SPLCTL
- OS400_Security_Jrn_ChgUserProf.USER
► Job Description (JobDesc) Attributes
- OS400_Security_Jrn_JobDesc.Job_Description
- OS400_Security_Jrn_JobDesc.New_User

- – OS400_Security_Jrn_JobDesc.Old_User
- – OS400_Security_Jrn_JobDesc.ORIGINNODE
- ► Network Attribute Change (Network) Journal Entries
  - – OS400_Security_Jrn_Network.Changed_Attribute
  - – OS400_Security_Jrn_Network.New_Attribute_Value
  - – OS400_Security_Jrn_Network.Old_Attribute_Value
  - – OS400_Security_Jrn_Network.ORIGINNODE
- ► Ownership Change (ChgOwner) Journal Entries
  - – OS400_Security_Jrn_ChgOwner.New_Owner
  - – OS400_Security_Jrn_ChgOwner.Object_Name
  - – OS400_Security_Jrn_ChgOwner.Object_Library
  - – OS400_Security_Jrn_ChgOwner.Object_Type
  - – OS400_Security_Jrn_ChgOwner.Old_Owner
  - – OS400_Security_Jrn_ChgOwner.ORIGINNODE
- ► Program Adopt (ProgAdopt) Journal Entries
  - – OS400_Security_Jrn_ProgAdopt.ORIGINNODE
  - – OS400_Security_Jrn_ProgAdopt.Owner
  - – OS400_Security_Jrn_ProgAdopt.Program_Name
  - – OS400_Security_Jrn_ProgAdopt.Program_Library
- ► Profile Swap (ProfSwap) Journal Entries
  - – OS400_Security_Jrn_ProfSwap.Entry_Type
  - – OS400_Security_Jrn_ProfSwap.New_Target
  - – OS400_Security_Jrn_ProfSwap.Old_Target
  - – OS400_Security_Jrn_ProfSwap.ORIGINNODE
  - – OS400_Security_Jrn_ProfSwap.Source_Location
  - – OS400_Security_Jrn_ProfSwap.User_Profile
- ► Password (Password) Journal Entries
  - – OS400_Security_Jrn_Password.Device_Name
  - – OS400_Security_Jrn_Password.Job_User
  - – OS400_Security_Jrn_Password.ORIGINNODE
  - – OS400_Security_Jrn_Password.Violation_Type
- ► Restoring Job Description (RestoreJob) Journal Entries
  - – OS400_Security_Jrn_RestoreJob.Job_Description
  - – OS400_Security_Jrn_RestoreJob.Job_Description_Library
  - – OS400_Security_Jrn_RestoreJob.ORIGINNODE
  - – OS400_Security_Jrn_RestoreJob.User
- ► Restoring Program (RestoreProg) Journal Entries
  - – OS400_Security_Jrn_RestoreProg.ORIGINNODE
  - – OS400_Security_Jrn_RestoreProg.Program
  - – OS400_Security_Jrn_RestoreProg.Program_Library
  - – OS400_Security_Jrn_RestoreProg.Program_Owner
- ► System Value (SYSVAL) Journal Entries
  - – OS400_Security_Jrn_SYSVAL.New_Value
  - – OS400_Security_Jrn_SYSVAL.Old_Value
  - – OS400_Security_Jrn_SYSVAL.ORIGINNODE
  - – OS400_Security_Jrn_SYSVAL.System_Name
- ► Spool File (OS400_Spool_File) Attributes
  - – OS400_Spool_File.Copies
  - – OS400_Spool_File.Current_Page
  - – OS400_Spool_File.Date_and_Time
  - – OS400_Spool_File.Device
  - – OS400_Spool_File.Form_Type
  - – OS400_Spool_File.Job_Name
  - – OS400_Spool_File.Job_Number
  - – OS400_Spool_File.Job_User

- – OS400_Spool_File.ORIGINNODE
- – OS400_Spool_File.Output_Queue_Name
- – OS400_Spool_File.Output_Queue_Library
- – OS400_Spool_File.Page
- – OS400_Spool_File.Priority
- – OS400_Spool_File.Status
- – OS400_Spool_File.Time
- – OS400_Spool_File.User_Data
- ► System Status (OS400_System_Status) Attributes
- – OS400_System_Status.AuxStorPool_Percent_Used
- – OS400_System_Status.CPU_Percent
- – OS400_System_Status.ORIGINNODE
- – OS400_System_Status.Perm_Address_Percent_Used
- – OS400_System_Status.Temp_Address_Percent_Used
- – OS400_System_Status.Total_Job_Count
- ► System Values (OS400_System_Values) Attributes
- – OS400_System_Values_Acct.QABNORMSW
- – OS400_System_Values_Acct.QACGLVL
- – OS400_System_Values_Acct.QACTJOB
- – OS400_System_Values_Acct.QADLACTJ
- – OS400_System_Values_Acct.QADLSPLA
- – OS400_System_Values_Acct.QADLTOTJ
- – OS400_System_Values_Acct.QAUDCTL
- – OS400_System_Values_Acct.QAUDENDACN
- – OS400_System_Values_Acct.QAUDLVL
- – OS400_System_Values_Acct.QBASACTLVL
- – OS400_System_Values.ORIGINNODE
- – OS400_System_Values.QAUTOCFG
- – OS400_System_Values.QAUTOVRT
- – OS400_System_Values.QBASPOOL
- – OS400_System_Values.QDSCJOBITV
- – OS400_System_Values.QMODEL
- – OS400_System_Values.QPWEXPITV
- – OS400_System_Values.QPWDEXPITV
- – OS400_System_Values.QPWRRSTIPL
- – OS400_System_Values.QRCLSPLSTG
- – OS400_System_Values.QRMTSIGN
- – OS400_System_Values.QSECURITY
- – OS400_System_Values.QSFWERRLOG
- – OS400_System_Values.QSRLNBR
- – OS400_System_Values.QUPSMSGQ
- – OS400_System_Values_Device.QDEVNAMING
- – OS400_System_Values_Device.QDEVRCYACN
- – OS400_System_Values_IPL.QABNORMSW
- – OS400_System_Values_IPL.QIPLDATTIM
- – OS400_System_Values_IPL.QIPLSTS
- – OS400_System_Values_IPL.QIPLTYPE
- – OS400_System_Values_IPL.QPWRRSTIPL
- – OS400_System_Values_IPL.QRMTIPL
- – OS400_System_Values_Perf.QHSTLOGSIZ
- – OS400_System_Values_Perf.QINACTIV
- – OS400_System_Values_Perf.QINACTMSGQ
- – OS400_System_Values_Perf.QMAXSGNACN
- – OS400_System_Values_Perf.QMAXSIGN
- – OS400_System_Values_Perf.QMCHPOOL

- OS400_System_Values_Perf.QMAXACTLVL
- OS400_System_Values_Perf.QPRFADJ
- OS400_System_Values_Perf.QSRVDMP
- OS400_System_Values_Perf.QSTRPRTWTR
- OS400_System_Values_Perf.QSTRUPPGM
- OS400_System_Values_Perf.QTOTJOB
- OS400_System_Values_Perf.QTSEPOOL
- OS400_System_Values_Prob.QPRBFTR
- OS400_System_Values_Prob.QPRBHLDITV
- OS400_System_Values_User.QCCSID
- OS400_System_Values_User.QCHRID
- OS400_System_Values_User.QCMNRCYLMT
- OS400_System_Values_User.QCNTRYID
- OS400_System_Values_User.QCTLSBSD
- OS400_System_Values_User.QDATE
- OS400_System_Values_User.QDATEFMT
- OS400_System_Values_User.QDAY
- OS400_System_Values_User.QHOUR
- OS400_System_Values_User.QMINUTE
- OS400_System_Values_User.QMONTH
- OS400_System_Values_User.QSECOND
- OS400_System_Values_User.QSYSLIBL
- OS400_System_Values_User.QTIME
- OS400_System_Values_User.QUPSDLYTIM
- OS400_System_Values_User.QUSRLIBL
- OS400_System_Values_User.QUTCOFFSET
- OS400_System_Values_User.QYEAR

Product-provided situations:

► OS400_Network_Attribute_Changed
► OS400_System_Value_Changed
► OS400_Snads_Job_Missing
► OS400_Snads_Ended
► OS400_Snads_Router_Failed
► OS400_Snads_Critical
► OS400_Disk_Util_Critical
► OS400_Disk_Util_Warning
► OS400_Pool_Transitions_High
► OS400_Job_Avg_Response_Time_High
► OS400_Comm_IOP_Util_Warning
► OS400_CPU_Util_Warning
► OS400_Disk_IOP_Util_Warning
► OS400_Pool_Faulting_Warning
► OS400_Interactive_Jobs_CPU_High
► OS400_Disk_Capacity
► OS400_Perm_Address_Warning
► OS400_Temp_Address_Warning
► OS400_System_ASP_Warning
► OS400_Address_Critical
► OS400_Communications_Line_Failed
► OS400_OMA_Message_Log

ITM 5.1 metrics

The following list shows the metrics available with ITM 5.1 for OS/400. The metrics are grouped into general categories and the metric name is shown as it appears in the Managed Object Format (MOF) language files. In general, the MOF metric name is several words put together, and a capital letter shows where each individual word starts.

- ► Auxiliary Storage Pool
  - – aspName
  - – totalMBytes
  - – totalAvailableMBytes
  - – protectedMBytes
  - – protectedAvailableMBytes
  - – unprotectedMBytes
  - – unprotectedAvailableMBytes
  - – overflowStorageMBytes
  - – numberDiskUnits
  - – allocatedToSystemStorageMBytes
  - – assignedDisks
- ► Configuration Object
  - – cfgObjectName
  - – status
- ► CPU Utilization
  - – numberOfProcessors
  - – basicAverageCPUPct
  - – basicInteractiveCPUPct
  - – interactiveThresholdPct
  - – interactiveLimitPct
  - – databaseCapabilityCPUPct
  - – databaseThresholdPct
  - – databaseLimitPct
  - – secondaryWorkloadsCPUPct
- ► Physical Disks
  - – diskName
  - – driveCapacityMBytes
  - – driveAvailableMBytes
  - – diskProtectionType
  - – mirroredUnitProtected
  - – diskNumber
- ► Distribution Queue
  - – distributionQueueName
  - – status HighPriority
  - – statusNormalPriority
  - – remoteNetworkID
  - – remoteLocation
  - – highPriorityQueueDepth
  - – highPrioritySendDepth
  - – highPriorityFromSendTime
  - – highPriorityToSendTime
  - – highPriorityForceSendTime
  - – normalPriorityQueueDepth
  - – normalPrioritySendDepth
  - – normalPriorityFromSendTime
  - – normalPriorityToSendTime
  - – normalPriorityForceSendTime
- ► History Log

- – listOfJobs
- ► Job
  - – jobName
  - – status
  - – typeCommaSubtype
  - – cpuUsage
  - – auxiliaryIO
  - – priority
  - – systemPoolNumber
  - – threadCount
  - – subsystemDescriptionName;
- ► Job Log
  - – jobName
  - – foundCount
- ► Job Queue
  - – jobQueueName
  - – numberOfJobs
  - – jobQueueStatus
  - – subsystemName
- ► Management Central
  - – centralSystemStatus
  - – agentStatus
  - – eventsSent
- ► Network Attribute
  - – attributeName
  - – value
- ► Object and File
  - – objectName
  - – objectSize
  - – objectOwner
  - – lastChangedDate
  - – lastUsedDate
- ► Output Queue
  - – outputQueueName
  - – status
  - – numberOfFiles
  - – numberStartedWriters
  - – writerJobStatus
  - – printerDeviceName
  - – operatorControlled
  - – dataQueueName
  - – authority
  - – authorityToCheck
  - – remoteSystemName
  - – remotePrinterQueue
  - – spooledFilesASPAttribute
  - – spooledFilesASP
- ► Storage Pool
  - – storagePoolName
  - – totalSizeMBytes
  - – machinePortionMBytes
  - – activityLevel
  - – databaseFaults
  - – nonDatabaseFaults
  - – databasePages

- – nonDatabasePages
- – activeToWaitTransitions
- – waitToIneligibleTransitions
- – activeToIneligibleTransitions
- ► Subsystem
  - – subsystemName
  - – status
  - – maximumActiveJobs
  - – currentActiveJobs
  - – signonDeviceFileQualifiedName
  - – currentJobs
- ► System wide
  - – usersSignedOn
  - – usersTemporarilySignedOff
  - – usersSuspendedBySystemRequest
  - – usersSuspendedByGroupJobs
  - – usersSignedOffWithWaitingPrinterOutput
  - – batchJobsWaitingForMessage
  - – batchJobsRunning
  - – batchJobsHeldWhileRunning
  - – batchJobsWaitingToRun
  - – batchJobsHeldOnJobQueue
  - – batchJobsOnHeldJobQueue
  - – batchJobsOnUnassignedQueue
  - – batchJobsEndedWithWaitingPrinterOutput
  - – jobsInSystem
  - – permanentAddressesPct
  - – temporaryAddressesPct
  - – systemASPMbytes
  - – systemASPUsedPct
  - – totalAuxiliaryStorageMbytes
  - – totalAuxiliaryStorageAvailableMbytes
  - – unprotectedStorageUsedMBytes
  - – maximumUnprotectedStorageUsedMBytes
- ► OS/400 System Values
  - – systemValueName
  - – value
- ► TCP/IP Interfaces and Connections
  - – interfaceName
  - – interfaceStatus
- ► TCP/IP Service
  - – serviceName
  - – serviceStatus

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