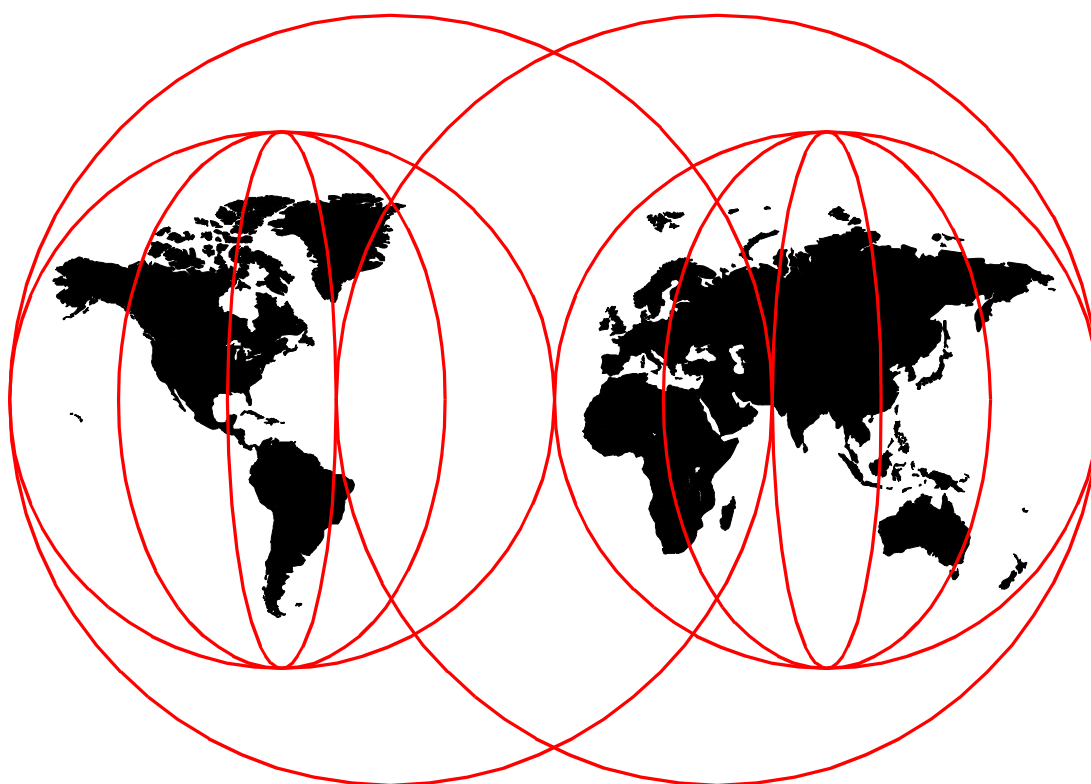


Management Central: A Smart Way to Manage AS/400 Systems

*Suehiro Sakai, Toni Buchanan, Masahiko Hamada
Paula Muth, Barry Stuart*



International Technical Support Organization

<http://www.redbooks.ibm.com>



International Technical Support Organization

SG24-5407-00

**Management Central: A Smart Way to
Manage AS/400 Systems**

October 1999

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix B, "Special notices" on page 223.

First Edition (October 1999)

This edition applies to Version 4, Release 4 of OS/400, Program Number 5769-SS1.

Comments may be addressed to:
IBM Corporation, International Technical Support Organization
Dept. JLU Building 107-2
3605 Highway 52N
Rochester, Minnesota 55901-7829

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© Copyright International Business Machines Corporation 1999. All rights reserved.

Note to U.S Government Users - Documentation related to restricted rights - Use, duplication or disclosure is subject to restrictions set forth in GSA ADP Schedule Contract with IBM Corp.

Contents

Figures	ix
Tables	xiii
Preface	xv
The team that wrote this redbook	xvi
Comments welcome	xvii
Chapter 1. Overview	1
1.1 Operations Navigator	1
1.2 Management Central	2
1.2.1 Inventory collection	3
1.2.2 Fix management	4
1.2.3 Integrated simple scheduler	4
1.2.4 Commands	4
1.2.5 Packages	5
1.2.6 Monitor performance data	5
1.2.7 Collect performance data	5
1.3 5250 emulator sessions	5
1.4 Online help	6
1.5 Product positioning	8
1.5.1 AS/400 Management Central	8
1.5.2 System Manager and Managed System Services	8
1.5.3 Tivoli Enterprise products	9
1.5.4 Tivoli IT Director	9
Chapter 2. Getting started with Management Central	11
2.1 Installing the products	11
2.2 Setting up your central system	12
2.2.1 Signon procedures	13
2.2.2 Security properties	13
2.2.3 Changing your central system	14
2.2.4 QUTCOFFSET system value	14
2.3 Endpoint systems	15
2.3.1 Adding endpoint systems through discovery	16
2.3.2 Adding endpoint systems manually	17
2.3.3 Deleting endpoint systems	17
2.4 System groups	17
2.4.1 Creating system groups	18
2.4.2 Removing endpoint systems from groups	18
2.4.3 Deleting system groups	18
2.5 Management Central server	19
2.5.1 Starting the Management Central server	19
2.5.2 Ending the Management Central server	20
2.5.3 Viewing the Management Central server job log	21
2.6 Using sharing	21
2.6.1 What you can do with sharing	22
2.7 Using the Columns dialog box and Include dialog box	23
2.8 Application Administration	23
2.8.1 Accessing Application Administration	24
2.8.2 Administering applications	25

2.9 Management Central tasks	27
2.9.1 Task naming conventions	27
2.9.2 Scheduling tasks	30
2.9.3 Creating new scheduled tasks based on completed tasks	32
2.9.4 Creating new scheduled tasks from old scheduled tasks	33
2.9.5 Starting a new task based on a current task.	34
2.9.6 Deleting scheduled tasks.	34
2.9.7 Deleting a task.	34
2.9.8 Stopping a task	34
2.9.9 Viewing task properties	35
2.10 Viewing task activities	35
2.10.1 Viewing the status of a current task	35
2.10.2 Viewing the job log for a task	35
2.10.3 Changing the AFP Workbench Viewer page size	37
Chapter 3. Running commands across multiple systems.	39
3.1 Command process.	39
3.2 Creating a command definition	39
3.2.1 Creating a new definition	39
3.2.2 Creating a definition based on an existing definition	42
3.3 Submitting a command	42
3.3.1 Submit command from list	43
3.3.2 Single run command	43
3.4 Viewing output.	44
3.5 Examples of the running command function in Management Central	45
3.5.1 Environment tests and notification	45
3.5.2 Security and authorization management	48
3.5.3 Running multiple commands	48
Chapter 4. Packaging and sending objects	51
4.1 Creating a package definition	51
4.1.1 Snapshots	54
4.2 Sending a package	55
4.3 Viewing status	55
4.3.1 Detail status.	56
4.4 Examples	57
4.4.1 Distributing licensed program products	57
4.4.2 Sending a batch job stream	59
4.5 Using Operations Navigator.	61
Chapter 5. Monitoring system performance.	63
5.1 Creating a new monitor	63
5.1.1 Selecting performance metrics to monitor	64
5.1.2 Setting threshold actions	66
5.1.3 Viewing and changing metric information.	68
5.1.4 Setting thresholds and threshold commands	69
5.2 Using a monitor	73
5.2.1 Starting a monitor	73
5.2.2 Checking the status of a monitor	74
5.2.3 Stopping a monitor.	75
5.3 Previous releases	75
5.4 Working with monitor graphs	75
5.4.1 Finding more detailed data	77
5.4.2 Changing monitor graph displays and characteristics.	78

5.4.3	Using graphs to change monitor properties	79
5.4.4	Viewing threshold trigger and reset events	81
5.5	Using Management Central Monitor: Examples	83
5.5.1	Disk storage early warning	83
5.5.2	Variations on disk storage early warning	84
Chapter 6.	Collecting inventory information	87
6.1	Collecting inventory	87
6.2	Viewing the inventory list	88
6.3	Searching the inventory list	89
6.4	Export inventory	90
6.5	Hardware inventory	91
6.6	Software inventory	93
6.6.1	Adding support	93
6.7	Fixes inventory	95
6.7.1	Viewing fixes inventory	95
6.7.2	Searching fixes inventory	96
6.8	Using Operations Navigator to view inventory	97
Chapter 7.	Managing fixes (PTFs)	99
7.1	Managing fixes with Management Central: The benefits	99
7.2	Obtaining fixes	99
7.2.1	Downloading fixes through ECS	100
7.2.2	Copying fixes from media	100
7.2.3	Adding product support	102
7.3	Installing fixes	102
7.3.1	Installing selected fixes	102
7.3.2	Installing all fixes for the system group	104
7.4	Sending fixes	106
7.5	Sending and installing fixes	109
7.6	Comparing and updating fixes	112
7.6.1	Setting up your model system	113
7.6.2	Comparing installed fixes	113
7.6.3	Comparing and updating fixes	116
7.7	Permanently installing fixes	116
7.8	Uninstalling fixes	119
7.9	Cleaning up fixes	123
7.9.1	Cleaning up fixes from a list	123
7.10	Cancelling restart (IPL) actions	124
7.11	Fix status	126
Chapter 8.	Collecting performance data	129
8.1	Benefits of using Management Central Collection Services	129
8.2	Starting Collection Services on a single system	130
8.3	Starting Collection Services on a system group	134
8.4	Customizing data collections	136
8.4.1	Creating a customized collection on a single system	136
8.4.2	Creating a customized collection on a system group	139
8.5	Performance data categories	140
8.6	Performance collections and the Scheduler	141
8.6.1	Example of a daily schedule	144
8.7	Starting Collection Services automatically	146
8.7.1	Adding an autostart job entry on a single system	146
8.7.2	Adding an autostart job entry on multiple systems	147

8.8	Time zone considerations	150
8.9	Managing collections	151
8.9.1	Cycling collections	151
8.9.2	Stopping collections	151
8.9.3	Managing collections for system groups	152
8.10	Managing collection objects	152
8.10.1	Why use collection objects in addition to database files	156
8.10.2	Retaining and deleting collection objects	157
8.11	Creating database files	157
8.11.1	Creating database files at the start of data collection	157
8.11.2	Creating database files later	157
8.12	Coexisting with PM/400	159
8.12.1	Example of changes made by PM/400	160
8.12.2	Recommendations	161
8.13	Collection Services or STRPFRMON	162
Chapter 9.	Advanced Job Scheduler	163
9.1	Installing Advanced Job Scheduler	164
9.2	Using the Advanced Job Scheduler in Management Central	166
9.2.1	Example of using Advanced Job Scheduler to schedule a task . . .	166
9.2.2	Monitor your jobs	169
Chapter 10.	Advanced topics	173
10.1	Work management	173
10.1.1	How a Management Central server job works	173
10.1.2	Require password on endpoint systems	175
10.1.3	Endpoint systems discovery	176
10.2	Management Central publishing LDAP server	178
10.3	WAN connection considerations	180
10.3.1	Using a switched line with PPP connection	180
10.3.2	Using a leased line	182
10.3.3	Using the Internet with a firewall	183
10.4	NLS consideration	185
Chapter 11.	Secure Sockets Layer (SSL) support	187
11.1	Why SSL	187
11.2	Management Central with SSL	188
11.3	Setup example	189
11.3.1	Scenario and configuration step	189
11.3.2	Digital Certificate Manager (DCM) setup	190
11.3.3	Management Central server authentication setup	201
11.3.4	Management Central with client and server authentication setup .	205
11.4	SSL and V4R3 systems	209
11.4.1	Environment variables and TCP/IP ports for Management Central	209
11.4.2	Setting up the environment variables	212
Appendix A.	PPP configuration sample	215
A.1	Example scenario	215
A.2	AS22 configuration for switched line answer mode	215
A.3	AS14 configuration for switched line dial-on-demand mode	220

Appendix B. Special notices	223
Appendix C. Related publications	225
C.1 International Technical Support Organization publications	225
C.2 Redbooks on CD-ROM	225
C.3 Other publications	225
How to get ITSO redbooks	227
IBM Redbook fax order form	228
Index	229
ITSO redbook evaluation	233

Figures

1. Operations Navigator main panel	1
2. Management Central simple network	2
3. 5250 emulator window	6
4. Welcome to AS/400 Operations Navigator window	7
5. Help Topics general window	7
6. Type of Installation dialog box	11
7. Custom installation showing Management Central subcomponent	12
8. Desktop icon for AS/400 Operations Navigator	12
9. Management Central server properties	20
10. Task Properties: Sharing tab	21
11. Application Administration opened through Management Central	24
12. Application Administration opened through an AS/400 connection	25
13. Customize Access dialog box	26
14. Basic task names	28
15. Deleted task	29
16. Task naming for definitions	30
17. Scheduled task names	30
18. Job names on the AS/400 system	32
19. AS/400 signon information	36
20. New Command Definition display	40
21. Options tab for New Command Definition	41
22. Sharing tab for New Command Definition	41
23. New Command Definition display based on an existing command definition	42
24. Select endpoint systems to run the command	43
25. Management Central Scheduler	43
26. Run Command window	44
27. Printer Output display	45
28. Central time zone system group	46
29. DSPSYSVAL command definition	46
30. Run the DSPSYSVAL command to Group_CT	47
31. Task output of Display Sysval command definition	47
32. New user profile command	48
33. Browse objects for selection	52
34. Package definition General tab	54
35. Snapshot Progress display	54
36. Object distribution detail status display	56
37. Object distribution status display	56
38. New package definition display	59
39. Package definition to submit a job stream	60
40. Command to submit the batch stream	60
41. Scheduling the batch job stream	61
42. New Monitor window	64
43. New Monitor window: General page	66
44. New Monitor window: Actions page	67
45. New Monitor window: Metrics page	68
46. Edit Thresholds window: Threshold 1 page	70
47. Edit Thresholds window: Threshold 1 enabled	71
48. Threshold 1 enabled with Host commands	72
49. Management Central: Available monitors displayed	73
50. Start Monitor window	74

51. Monitor Status window	74
52. Monitor Graph: Example CPU monitor	76
53. Monitor Graph: Displaying additional graphs	77
54. Monitor Graph: Details displayed	78
55. Graph Threshold Trigger value displayed	80
56. Monitor Systems and Groups: Adding and removing	81
57. Event Log	82
58. Event Log: Include window	82
59. Example Disk Storage monitor: General page	83
60. Example disk storage monitor: Metrics page	84
61. Disk Utilization Monitor: Detail and property panels	85
62. Selecting inventory collection	88
63. Software inventory output	89
64. Inventory search result	90
65. Exporting the inventory	91
66. Hardware inventory display	92
67. Hardware resource properties window	92
68. Add Support dialog box	93
69. Add Support selection list	94
70. Add Support dialog box after selection	94
71. Advanced information for Add Support	94
72. Fixes inventory list	95
73. Properties of fixes	96
74. Search fixes result window	97
75. Operations Navigator inventory display	98
76. Copy from Media window	101
77. Copying from Media window	102
78. Fix Status	103
79. Install Fixes: Summary window	104
80. Install Fixes: Welcome window for system group	105
81. Install Fixes: Select Fixes window	105
82. Install Fixes: How to Install window	106
83. Fix inventory list by product	107
84. Send Fixes: General window	108
85. Send Fixes: Options window	108
86. Send and Install Fixes: Where to Send and Install window	110
87. Browse Systems and Groups window	110
88. Send and Install Fixes: Advanced Send Options window	111
89. Send and Install Fixes: How to Install window	112
90. Compare and Update wizard: Model System selection	114
91. Compare and Update wizard: Product selection	114
92. Compare and Update wizard: Output selection	115
93. Compare and Update wizard: Inventory selection	115
94. Compare and Update wizard: Output	116
95. Permanently Install Fixes wizard: Welcome window	117
96. Permanently Install Fixes wizard: Selected Fixes window	118
97. Permanently Install wizard: How to Install window	118
98. Permanently Install wizard: Summary window	119
99. Fixes Inventory displayed	120
100. All Fixes list displayed: Fix selected to uninstall	120
101. Uninstall Fixes: Selected Fixes window	121
102. Uninstall Fixes: Type of Uninstall window	122
103. Uninstall Fixes: How to Uninstall window	122

104.Clean Up Fixes window	123
105.Clean Up Fixes window	124
106.Cancel Actions window	125
107.Cancel Actions window	126
108.Start Collection Services window: General page.	130
109.Start Collection Services window: Data to Collect page	132
110.Collection Services Properties window: General page	137
111.Collection Services Properties window: Data to Collect page	138
112.Start Collection Services window: Data to Collect page	139
113.Management Central Scheduler: Scheduling a performance collection	142
114.Stop Collection Services window.	143
115.Management Central Scheduler window: Scheduling stop collecting	143
116.Scheduler window: Scheduling daily Start Collection Services	145
117.Scheduled tasks displayed	145
118.Start Collection Services: Properties window	146
119.Run Command window	147
120.New Command Definition window: CRTJOB example	148
121.New Command Definition window: ADDAJE example	149
122.Run Command window: CRTJOB command selected	149
123.Collection Services Status: ITSCID01 group displayed.	152
124.Collection Services Properties window: Refresh page	153
125.Collection Objects display	154
126.Collection Objects display: Right side	155
127.Collection Properties: Data summary page	156
128.Create database files window	158
129.Change to collection made by PM/400	161
130.Advanced Job Scheduler container under Management Central	166
131.Run display	167
132.Schedule display	167
133.Advanced Job Scheduler selection window.	168
134.Schedule confirmation display	168
135.Creation confirmation display	169
136.Scheduled Jobs under Advanced Job Scheduler	170
137.WRKJOBS screen	171
138.Management Central AS/400 jobs and port (non-SSL)	174
139.Management Central properties (connection)	175
140.Error message for a different password.	176
141.How to verify AS/400 systems.	177
142.Discover Systems dialog	177
143.Error message for QYPSSRV job	178
144.Selecting the central system on an AS/400 connection.	178
145.Directory Services tab	179
146.Publish AS/400 information	179
147.Using a switched line.	180
148.Multiple sites using a switched line	182
149.Using a leased line	182
150.Using the Internet with the firewall.	183
151.Packet filter for Management Central	185
152.Multiple language support	185
153.AFP Viewer on an English PC for the job log of a Japanese system	186
154.Hardware inventory of a Japanese system on an English PC.	186
155.Password exposed in communication trace data	187
156.Server authentication.	188

157.Client and server authentication	189
158.Scenario of the example.	190
159.Digital Certification Manager page	192
160.Create Certificate Authority page	193
161.Certificate Authority policy data	194
162.Secure application selection.	194
163.Create a System Certificate Page	195
164.Create a System Certificate (target release)	196
165.Create a System Certificate	197
166.Select certificate assigned application	199
167.CWBCOSSL main window	200
168.CWBCOSSL message dialog box	201
169.IKeyMan database password prompt	201
170.Management Central properties (connection)	202
171.Select system for system group	203
172.Create Run Command	203
173.Operations Navigator SSL setup	205
174.Package definition (general).	206
175.Package definition (option).	207
176.Package definition (Advanced Options)	207
177.Select system groups for package distribution	208
178.Non SSL connection, QYPS_SSL = 0 and QYPS_AUTH_LEVEL = 0.	209
179.Two roles of the central system	210
180.QYPS_SSL = 1 and QYPS_AUTH_LEVEL = 1: Server authentication	211
181.QYPS_SSL = 1 and QYPS_AUTH_LEVEL = 2: Client/server authentication	212
182.QYPS_SSL = 1 and QYPS_AUTH_LEVEL = 0	212
183.Error message in the QYPSSRV job	213
184.Dialog box when changed SSL setting.	214
185.Sample environment.	215
186.Creating a new PPP connection profile on AS22	216
187.Specifying a name, description, and mode.	216
188.Creating a new PPP line for the connection.	217
189.Selecting the connect hardware adapter	217
190.Selecting the correct modem	218
191.Specifying the local interface to use and clicking the Routing button.	218
192.Adding a network for the new remote user.	219
193.Creating a new validation list for the connection	219
194Entering a user and password	219
195.Creating a new PPP connection on the AS14 system	220
196.Remember to specify dial-on-demand	221
197.Creating a new PPP line for the connection.	221

Tables

1. Management Central network systems terminology	3
2. QUTCOFFSET system value settings	15
3. Management Central functions	16
4. STRTCPSVR and ENDTCPSVR command authorities.....	19
5. Types of tasks and associated application tasks	28
6. Description of performance metrics	65
7. Threshold trigger actions	67
8. Threshold reset actions	68
9. Status of fixes.	126
10. Management Central jobs	173
11. Message descriptions	178
12. Summary steps	190
13. Create a Certificate Authority Page field	193
14. Create a System Certificate Page fields	195
15. Value for creating a system certificate	196
16. Environment variables and TCP/IP ports.....	210
17. Service entry names and assigned port numbers	210
18. Combination of QYPS_SSL and QYPS_AUTH_LEVEL	213
19. TCP/IP setting IP address	222

Preface

Discover the benefits of Management Central and more. Management Central is a key component of Operations Navigator that provides AS/400 administrators with the ability to manage multiple AS/400 systems that are interconnected across a TCP/IP network. It provides several constructs which help to manage groups of systems and their associated resources. This redbook discusses the capabilities of each of the functions that are available in V4R4, and introduces you to the graphical user interface way of managing the systems in your network. Find out how easy it is to manage your network with the click of a mouse!

With Management Central, the operator can monitor key resources, perform remote and long running operations, and distribute fixes and data across a group of systems. Management Central V4R4 also includes these functions:

- Inventory collection
- Software fix management
- Running commands
- Package and object distribution
- Monitoring performance data
- Collecting performance data (Collection Services) and the schedulers
- Management Central Scheduler
- Advanced Job Scheduler

Here is a preview of what you can find in this redbook:

Chapter 1 contains an introduction to Operations Navigator and Management Central. Terminology for the network systems helps you determine how you should set up your network. It also includes a brief comparison among the systems management products.

Chapter 2 provides you with the information that you need to work with the Management Central tasks, such as scheduling your tasks and viewing them. It also provides many short "how to" tasks that range from defining your endpoint systems and system groups to viewing your task activity.

Chapter 3 shows you how to save time when you have a repetitive task that needs to be performed on multiple systems or groups of systems. Running commands is a smart way to automate your tasks.

Chapter 4 shows you how to group together a set of AS/400 QSYS objects or integrated file system (IFS) files. You can send the package to multiple systems or groups of systems. Packaging your files and objects is another time-saver in automating your tasks.

Chapter 5 explains how Management Central allows operators and administrators to monitor AS/400 systems in the network by providing real-time performance-monitoring capabilities, such as notification of events and automatic responses to events. The performance metrics that Management Central monitors include CPU utilization (average and interactive), interactive response time, batch logical I/O, disk space utilization, disk arm utilization, and LAN utilization.

Chapter 6 shows you how to use the inventory collection tool to collect AS/400 hardware, software, and fix information. One of the keys to keeping your systems

current is having an up-to-date inventory. Once you have your inventory data collected, we show you how to export it.

Chapter 7 discusses the biggest nightmare for most operators and administrators: managing your software and fixes. Discover how easy these tasks have become with the addition of wizards that guide you through installing fixes, uninstalling fixes, and what is sure to be everyone's favorite, comparing and updating fixes.

Chapter 8 introduces the replacement to the AS/400 performance monitor: Collection Services.

Chapter 9 shows you how to use the Advanced Job Scheduler, which is the scheduler with more functionality than the Management Central scheduler.

Chapter 10 covers an advanced group of topics, including Management Central jobs, environment variables, the logic behind discovering endpoint systems, how to publish to a Lightweight Directory Access Protocol (LDAP) server, and considerations for system connections in a wide area network (WAN) environment.

Chapter 11 tackles the topic of Secured Sockets Layer (SSL) and shows you how to set up your Management Central environment to be SSL enabled.

Appendix A shows sample point-to-point protocol (PPP) connection configurations relevant to Management Central environment.

The team that wrote this redbook

This redbook was produced by a team of specialists from around the world working at the International Technical Support Organization Rochester Center.

Suehiro Sakai is an Advisory International Technical Support Specialist for the AS/400 system at the International Technical Support Organization, Rochester Center. He writes extensively and teaches IBM classes worldwide in all areas of AS/400 communications. Before joining the ITSO in 1995, he worked in the AS/400 Brand, for IBM Japan as an AS/400 Solution Specialist.

Toni Buchanan is an Advisory Software Engineer working with the Technology Solution Center at IBM in Rochester, Minnesota, where she does technical marketing and implementation services. She has 11 years of experience working with AS/400 software. Her areas of expertise include IBM Backup, Recovery, and Media Services/400 and IBM Advanced Job Scheduler. She has developed courses and given many presentations on these subjects. She has worked for IBM for 25 years.

Masahiko Hamada is an Advisory I/T specialist in IBM Japan. He has 12 years of experience with IBM mid-range systems. His areas of expertise include Object Oriented (OO) application development, AS/400 connectivity to Microsoft Windows 95/NT, and Client Access/400. He developed ToolBox/400 used in Japanese environments. Currently, his focus is on AS/400 Internet technologies. He has written several technical documents and taught classes in the USA, Europe, and Japan.

Paula Muth is a Software Engineer working with User Technologies at IBM Rochester, Minnesota, where she is the information product designer for systems management. Her areas of focus include Management Central, Performance Management/400, Performance Tools, and BEST/1 Capacity Planning Tool. Prior to that, she was a technical writer for the TCP/IP product and various other communications products. She has worked for IBM for 15 years.

Barry Stuart is a Senior I/T Specialist working in the IGS division of IBM in South Africa. He provides software support and services to AS/400 customers. He has worked with the AS/400 system since announcement, and also has experience with its predecessor systems: the S/34, S/36, and S/38. His areas of expertise include performance, communications, and backup and recovery, specifically BRMS. He has worked for IBM for 29 years.

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

Ken Brown
George DeStefano
Tony Dunbar
Ron Forman
Ron Haugen
Greg Hintermeister
Greg Hurlebaus
Joyce Lewis
Erik Lindberg
Brian Lucier
Bob Mahlik
Mike Murphy
Alexei Pytel
Alyson Riley
Mark Shade
Andy Streit
Susan Strubel
Sue Townsend
Patrick Wildt
IBM Rochester Development

Comments welcome

Your comments are important to us!

We want our redbooks to be as helpful as possible. Please send us your comments about this or other redbooks in one of the following ways:

- Fax the evaluation form found in "ITSO redbook evaluation" on page 233 to the fax number shown on the form.
- Use the online evaluation form found at: <http://www.redbooks.ibm.com/>
- Send your comments in an internet note to: redbook@us.ibm.com

Chapter 1. Overview

AS/400 Management Central is a suite of systems management applications that began to appear in Version 4 Release 3 (V4R3) of the OS/400 operating system as part of Operations Navigator. Management Central for V4R4 has been integrated into Operations Navigator. If you were a V4R3 user, you will no longer see the icon on the tool bar.

The primary objectives of Management Central are to:

- Make managing multiple systems as easy as managing a single system.
- Provide this management capability in the base operating system.
- Provide an easy-to-use graphical user interface to management functions.

In V4R3, Management Central provided real-time performance monitoring. In V4R4, Management Central adds a number of new integrated graphical applications to help manage your AS/400 systems. These applications include:

- Inventory collection
- Software fix management
- Running commands
- Packaging and sending objects
- Performance collection services
- Simple scheduler

Management Central is now an integrated part of AS/400 Operations Navigator in V4R4. The Operations Navigator tree hierarchy has been enhanced to include Management Central task activity, scheduled tasks, definitions, monitors, AS/400 endpoint systems, and AS/400 system groups. Before we describe the Management Central component, let us take a brief look at Operations Navigator.

1.1 Operations Navigator

Figure 1 shows the AS/400 Operations Navigator main panel. AS/400 Operations Navigator is a powerful graphical interface for Windows 95, Windows 98, and Windows NT clients. This allows Operations Navigator to fully integrate with the client desktop in the Windows environment. This is an advantage for administrators and end users who do not have an extensive knowledge of AS/400 control language (CL) commands.

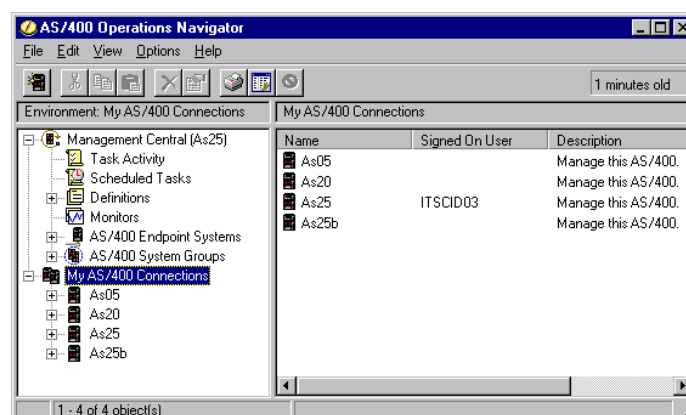


Figure 1. Operations Navigator main panel

Operations Navigator also provides many AS/400 functions that administrators, operators, or end users need to accomplish their daily work. For example, you can copy a user onto another system by dragging the user from one AS/400 system to another. Wizards guide you through setting up security and TCP/IP. You can work with messages, printer output (spooled files), and printers on the AS/400 system. You can schedule backup tasks. You can easily change the backup policies using the backup properties pages.

Operations Navigator V4R4 is included as part of IBM AS/400 Client Access Express for Windows. Client Access Express is shipped with the V4R4 operating system. All functions of the Express client, with the exception of PC5250 Display, Print Emulation, and Data Transfer, can be used without acquiring a license for the AS/400 Client Access Family for Windows product (5769-XW1).

1.2 Management Central

Now that you have been introduced to Operations Navigator, let us explore the Management Central component. Management Central is a key component of Operations Navigator that provides AS/400 administrators and operators with the ability to manage multiple AS/400 systems that are interconnected across a TCP/IP network. Management Central expands the single system management capabilities of Operations Navigator into an e-business network.

Figure 2 shows how Management Central uses a *central system*. In later chapters, you are introduced to other system concepts, such as a *model system* and a *source system*. Figure 2 shows a simple network. Management Central consists of a graphical interface that runs on a PC client that is attached to a central AS/400 system. The central system then broadcasts requests, collects data, receives response information, and provides the central data store for persistent management information.

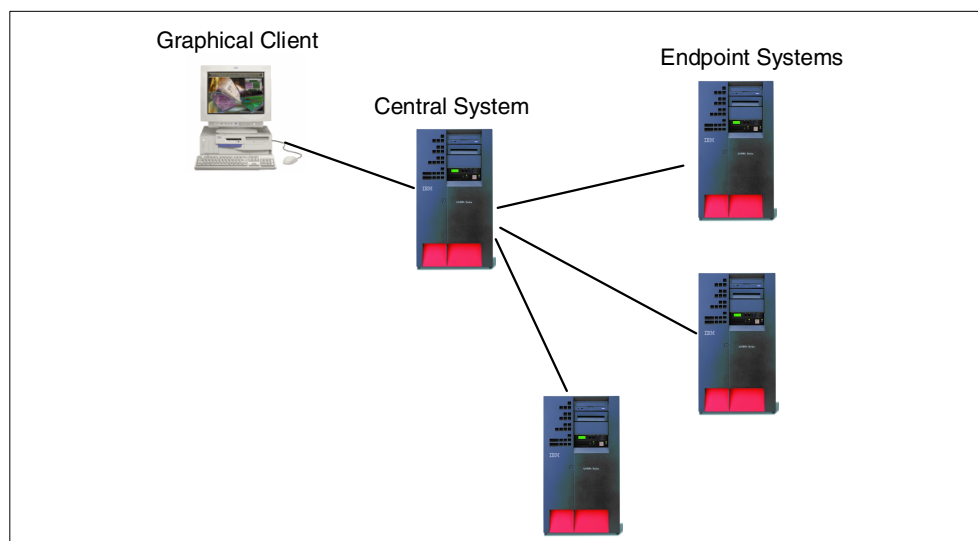


Figure 2. Management Central simple network

Table 1 on page 3 provides definitions for Management Central terminology as it relates to systems in your network. You do not need any special configuration for

these systems—just point and click! Depending on your business needs, you may find that different systems at various times can assume different roles.

Table 1. Management Central network systems terminology

Term	Definition
Central system	Any AS/400 system that you use to manage the other systems in your network.
Endpoint system	Any AS/400 system in your TCP/IP network that you choose to manage through your central system using Management Central.
System group	A logical collection of endpoint systems.
Model system	One of the AS/400 systems in your network that contains all the fixes for the various products that you use. Your central system can be a model system.
Source system	An AS/400 system on which you store objects to be sent to other systems. The objects include files, folders, save files, and fixes.
Backup system	The AS/400 system that replaces your central system when it requires maintenance or upgrades.

Although Management Central appears to be hierarchical in nature, it is actually implemented using a peer-to-peer model. This model allows more efficient use of system and network resources when doing such tasks as copying a large number of files. Management Central allows a referenced endpoint system to directly send the data to another endpoint system without moving the information to the central system first.

The central system in the Management Central network is really a repository for the data of the endpoint systems. Therefore, the central system and the endpoint systems do not represent the traditional concept of a manager system and managed systems. The central system is also an endpoint system in your network. Even though it is the central system, it needs to be an endpoint system so it can be managed.

1.2.1 Inventory collection

As we stated previously, Management Central provides an inventory collection tool. This tool collects the AS/400 hardware, software, and fix information, and then stores this information on a designated central system. Once this information is available on the central system, you can perform any of the following actions:

- Search a system to see if a particular fix has been installed.
- Identify which systems in your network have a particular hardware and software product or fix.
- Compare the fix levels of multiple systems to a model system.
- Export this information into a PC format, such as an HTML file or a Microsoft Excel spreadsheet.

For details on this function, see Chapter 6, “Collecting inventory information” on page 87.

1.2.2 Fix management

Fix management has never been easier. The term *fix* actually refers to program temporary fix (PTF). Fix management has been simplified with the use of wizards. To load and apply multiple fixes, you select fixes from the list and start the Install wizard. The wizard asks you friendly questions about the installation process. Wizards exist to help you install fixes, uninstall fixes, clean up (delete) fix save files and cover letters, and to compare fixes on a model system to other systems in your network and make them equivalent.

For details on this function, see Chapter 7, “Managing fixes (PTFs)” on page 99.

1.2.3 Integrated simple scheduler

Management Central also provides an integrated simple scheduler that allows you to set when certain tasks should occur. Using the Management Central scheduler, you can automate the process of collecting your hardware, software, and fix inventory on every Sunday night at 10 o'clock pm. You can schedule to clean up the save files and cover letters from your systems on the first of every month. And now you can install a set of fixes at any time that is convenient for your business.

The IBM Advanced Job Scheduler for AS/400 licensed program, which is available as a separate plug-in, provides advanced scheduling capabilities through Management Central. For details on this scheduler, see Chapter 9, “Advanced Job Scheduler” on page 163.

1.2.4 Commands

Another function that helps automate your operations is the command function. You can define an action or a task once (create a command definition), and then run it to multiple systems or even a group of systems (run command). The command function allows you to automate those actions or tasks that normally require you to do something repeatedly on separate systems. For example, these tasks may include varying on a device. The command definition allows you to:

- Create an AS/400 user profile on multiple systems or system groups.
- Set AS/400 system values or network attributes on multiple systems or system groups.
- Change an AS/400 user profile password on multiple systems or system groups.
- Set up your own help desk or operations run book to handle customer and system needs.

In fact, any AS/400 CL command that can be run in batch can be sent to multiple systems at once. You can run the command immediately, run it once on a given date and time, schedule the command as a recurring task that runs daily, weekly, or monthly, or create a definition that you can run with a single click.

For details on this function, see Chapter 3, “Running commands across multiple systems” on page 39.

1.2.5 Packages

Another useful function is the packages function. You can group together a set of AS/400 QSYS objects or Integrated File System (IFS) files (create a package definition). These package definitions can represent configuration data, Java applications, HTML Web pages, software programs, or whatever you decide. You can also use a package definition to view a group of files as a logical set or as a physical set by taking a snapshot of the files to preserve them for later distribution. The snapshot allows you to keep multiple version copies of the same set of files to transition when the new HTML Web pages are distributed to all your Web servers. You can then send these packages to multiple AS/400 systems or system groups.

You can also use the packages function to run an AS/400 CL command when the distribution of the package is completed. This means that you can distribute:

- A batch job stream and run it.
- A set of programs and start your application.
- A set of data files and run a program that acts on that data.

For details on this function, see Chapter 4, “Packaging and sending objects” on page 51.

1.2.6 Monitor performance data

If you prefer viewing real-time performance data, Management Central provides an easy-to-use graphical interface for monitoring system performance. For details on the monitoring function, see Chapter 5, “Monitoring system performance” on page 63.

1.2.7 Collect performance data

Use Management Central Collection Services to collect performance data for future analysis by the Performance Tools for AS/400 licensed program or other performance report applications. For details on Collection Services, see Chapter 8, “Collecting performance data” on page 129.

1.3 5250 emulator sessions

Occasionally in this redbook, we may show a 5250 emulator window. For an example, see Figure 3 on page 6. We show you this information from a 5250 emulator session *for your information only*. Unless you are specifically instructed to do something from an emulator session, do not use these sessions to manipulate the Management Central objects. Your manipulations can cause Management Central to operate incorrectly.

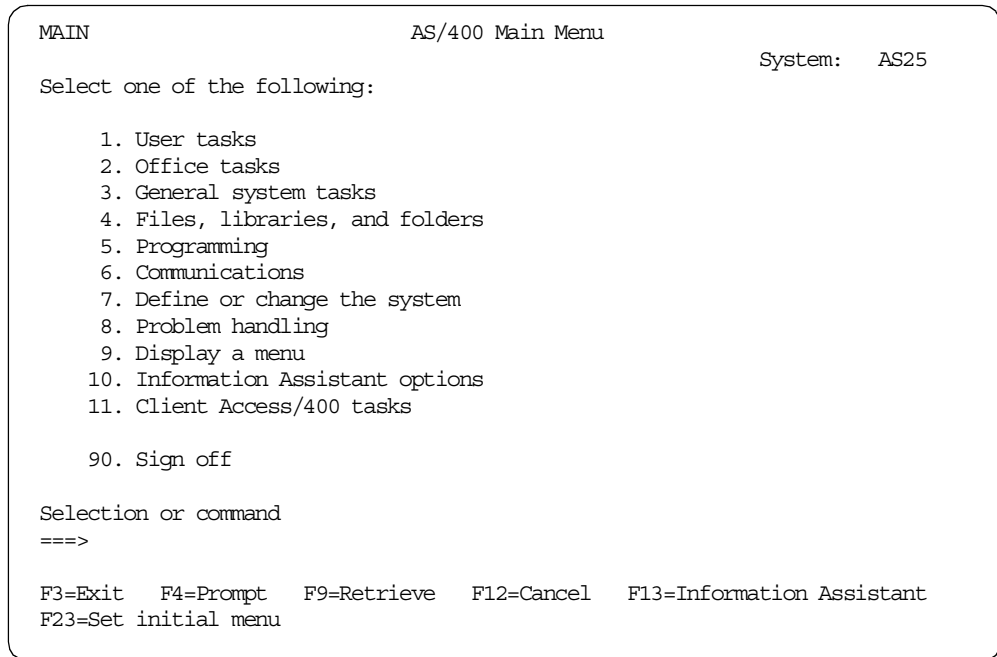


Figure 3. 5250 emulator window

1.4 Online help

Online help is available for all Operations Navigator functions. When you first start Operations Navigator, a Welcome window appears automatically. The Welcome window consists of useful information, such as what is new for the current release, what can you do with Operations Navigator, and what functions are supported by what OS/400 release level. You can access the Welcome window help anytime through **Help->Help Topics** on the menu bar of all AS/400 Operations Navigator windows. Figure 4 on page 7 shows the Welcome window that appears when you start Operations Navigator.

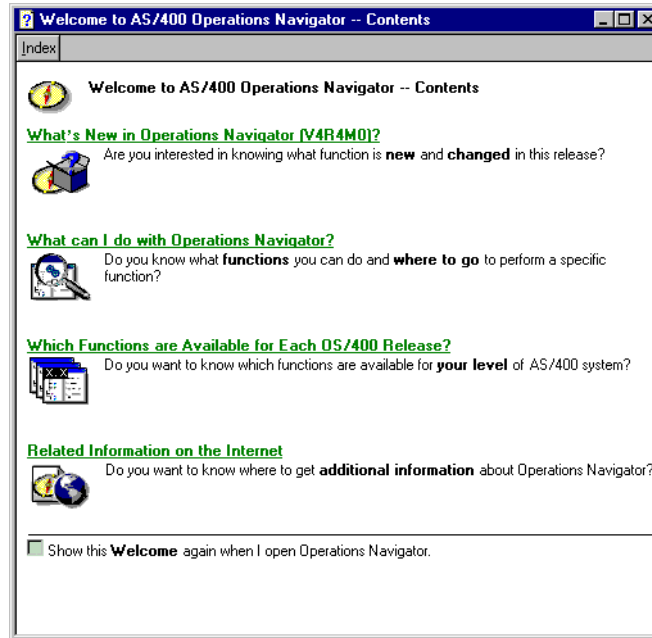


Figure 4. Welcome to AS/400 Operations Navigator window

Figure 5 shows a general help window from which you can either select a function from the *Contents* page or access the *Help Index*. Management Central has extensive task help, or How do I... help, that you can access from the *Help Topics* window. Do not be shy about using the online help!

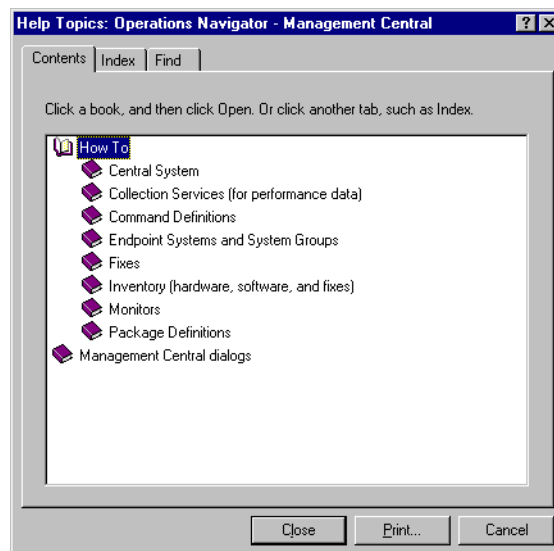


Figure 5. Help Topics general window

You can find more information about Operations Navigator at the following Web sites:

- IBM AS/400 Information Center, a one-stop shopping place for all your AS/400 information needs, located at: <http://www.as400.ibm.com/infocenter>
- AS/400 Operations Navigator, everything you ever wanted to know about this graphical user interface, located at: http://www.as400.ibm.com/oper_nav

1.5 Product positioning

With the availability of Management Central, you may ask the question: What is the relationship with the other systems management products such as System Manager for AS/400, Managed System Services for AS/400, and even Tivoli's IT Director? The AS/400 system is designed with an integrated operating system that delivers a relational database, security, communications, systems management, and many other functions as part of the OS/400 operating system. All of these functions have been tested and work together.

With the OS/400 operating system, the base systems management infrastructure supports the AS/400 management function, provides interfaces for independent software vendor (ISV) solutions, and exploits the capabilities of Tivoli on the AS/400 system. Integration has long been a strength of the AS/400 system and has reduced the overall complexity of systems operations and management. The AS/400 systems management functions continue to build on this strength.

We provide a brief look at the following products:

- AS/400 Management Central
- System Manager for AS/400 and Managed System Services for AS/400
- Tivoli Enterprise products
- Tivoli IT Director

1.5.1 AS/400 Management Central

Management Central aims to provide basic management functions for groups of AS/400 systems through a user-friendly graphical user interface. It provides many common management functions that all platforms require, plus it provides AS/400-specific functions. It extends the Operations Navigator functions to include the capabilities of managing multiple AS/400 systems using TCP/IP. And it adds value to the AS/400 system by lowering the customer's cost of ownership through easier management of multiple systems.

Its value-add consists of an easy-to-use graphical user interface that manages AS/400 systems from one AS/400 system.

1.5.2 System Manager and Managed System Services

System Manager for AS/400 and Managed System Services for AS/400 provide management functions for AS/400 systems. These are older products based on the IBM SystemView architecture for SNA environments. They can operate with NetView DM products on other IBM systems as endpoints or as a management server. Their function has stabilized.

System Manager provides product build, PTF maintenance, and service provider functions, which third-party vendors can use to build and service their products. This includes distributing PTFs to the customers for whom they provide service.

System Manager and Managed System Services are supported for all current AS/400 releases. Many of their functions are now available with Management Central using the TCP/IP-based support. System Manager provides the management server function, while Managed System Services is the endpoint system product.

Its value-add consists of providing the capability of managing AS/400 systems from an AS/400 system within an SNA environment. These products also manage UNIX systems, PCs, and Apple Macintosh clients (additional software required).

1.5.3 Tivoli Enterprise products

Tivoli Enterprise products aim to provide "The Power to Manage. Anything. Anywhere." Using an extensible framework as its basis, it allows many types of systems and devices across the enterprise to be managed from one central console. It includes basic and advanced management functions that all platforms commonly require. Tivoli Enterprise is designed for large companies. AS/400 systems are supported as endpoints.

Its value-add consists of a centralized management of large numbers of multiple types of systems, software products, and network environments. It manages AS/400 systems, UNIX systems, System/390 systems, and PCs.

1.5.4 Tivoli IT Director

Tivoli IT Director aims to provide extensive multi-platform management functions for small and medium businesses. It has basic and advanced management functions that all platforms commonly require. It is designed to be easy to install, easy to set up, and easy to use.

Its value-add consists of centralized management of servers and PC clients, along with advanced application management, automation of monitoring and event operations, and use of Internet technologies. It manages AS/400 systems, Windows NT, Windows 95, Windows 98, Windows 3.11, IBM OS/2 3.0 or 4.0, and Novell NetWare.

Chapter 2. Getting started with Management Central

This chapter discusses defining the systems in your network: your central system, endpoint systems, and system groups. Create groups of similar or related endpoint systems to make managing and monitoring your AS/400 systems even easier.

It also covers those areas that are common to the function that you are using. Some of these areas include: sharing, application administration, and task management. Regardless of which function you are using, collecting inventory, running commands, or collecting performance data, the tools that you use to manage your network are the same.

2.1 Installing the products

To use Operations Navigator (and therefore, Management Central), you must have Client Access Express installed on your PC. Operations Navigator is a separately installable component of Client Access Express that contains many subcomponents, which includes Management Central. We do not provide the details for installing Client Access Express or Operations Navigator in this book. You should refer to either of the following books for installation information:

- *Client Access Express for Windows - Setup*, SC41-5507
- *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191

However, you should know that Management Central is an optionally-installable component of Operations Navigator. When you install Operations Navigator, be sure you select to install Management Central. Figure 6 shows the Type of Installation dialog box.

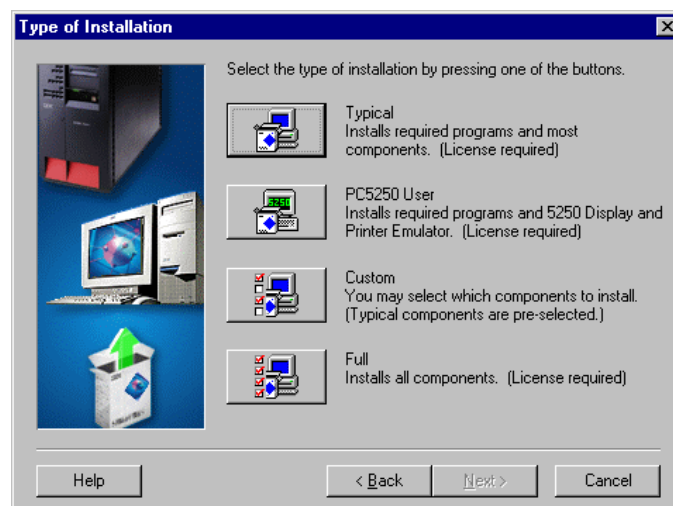


Figure 6. Type of Installation dialog box

If you are installing Operations Navigator for the first time, you do not want to use the Typical installation option. If you use the Typical installation option, you do *not* install Management Central. When choosing your installation option, be aware that:

- *Typical Install* does *not* install Management Central.
- *Full Install* installs all components including Management Central.
- *Custom Install* installs Management Central only if you specifically select the Management Central subcomponent.

Figure 7 shows the Custom installation dialog box with Management Central selected.

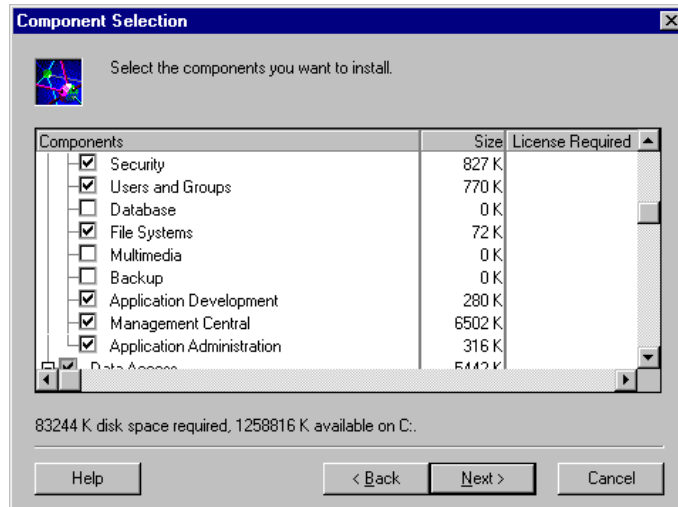


Figure 7. Custom installation showing Management Central subcomponent

Note

If you did not initially install Management Central when you installed Client Access Express, you can always go back and install it. To go back and install Management Central, go to your Client Access directory and open **Selective Setup**. Use the **Selective Setup** wizard to install Management Central.

After you install Client Access Express, an AS/400 Operations Navigator icon appears on the desktop as well as in the Client Access Express folder. Figure 8 shows the icon. To start Operations Navigator, double-click the icon on your desktop.



Figure 8. Desktop icon for AS/400 Operations Navigator

2.2 Setting up your central system

Management Central allows you to manage multiple AS/400 systems from a single AS/400 system in a TCP/IP network environment. To do this, you need to define a central system and be familiar with several property values. A central system is any single AS/400 system that you use to manage other systems in your network. The other systems in your network are called *endpoint systems*.

Once you add endpoint systems to your network, you need only to perform your AS/400 system administration tasks once. Your central system initiates and stores all your Management Central data.

To set up a particular AS/400 system as your central system, you must have authority to use the program that starts the Management Central server (program QYPSSTRS in library QSYS). Use the Display Object Authority (DSPOBJAUT) command to verify that you have that authority. Type the following command from the AS/400 command line:

```
DSPOBJAUT OBJ (QSYS/QYPSSTRS) OBJTYPE (*PGM)
```

To set up an AS/400 system as your central system, it must meet these requirements:

- Be connected through Client Access Express
- Be running V4R4 of the OS/400 operating system

2.2.1 Signon procedures

Operations Navigator and Management Central use one of the following signon procedures:

- Use Windows user name and password (no prompting). The user name and password of the Windows logon is used, and therefore, no additional logon to the AS/400 system has to be done.
- Use a default user ID (prompt as needed). A default user ID is prompted every time the user wants to sign on.
- Prompt every time. The user ID has to be typed every time the user wants to sign on.

Details on these options and the implications they have on how the user manages their AS/400 user ID and password are available from the redbook *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191, in Section 3.3, "AS/400 User ID and Password Management".

2.2.2 Security properties

The security properties for Management Central are:

- Require password on endpoint systems. This property specifies that the user profile used to sign on to the central system must have the same password on each endpoint system. Even if this box is not checked, the user profile used to sign on to the central system must exist on each endpoint system. For details on this property, see 10.1.2, "Require password on endpoint systems" on page 175.
- Use Secure Sockets Layer (SSL). This property specifies the use of SSL to ensure secure transmissions between the central system and the endpoint systems. SSL provides the transport and authentication of public key system certificates and encryption of data. An SSL connection can occur only between an SSL-enabled central system and an SSL-enabled endpoint system. For details on how to set up SSL, see Chapter 11, "Secure Sockets Layer (SSL) support" on page 187.

You can access the properties by following these steps:

1. Right-click **Management Central**, and select **Properties**.
2. Click the **Connections** tab.

2.2.3 Changing your central system

As a precautionary measure, you should consider including a backup system to your primary central system in case the central system becomes disabled or is unavailable for a period of time. Such occasions may include time for regularly scheduled maintenance or system upgrades on the central system. When those occasions occur, you will need to change your central system.

To change your central system, complete the following steps:

1. Right-click **Management Central**, and select **Change Central System**.
2. Choose an AS/400 system from your list of connected systems.
3. Click **OK**.

If you want to use a system that is not currently connected to Management Central as your central system, add the AS/400 system to your Operations Navigator network. Right-click **My AS/400 Connections**, and select **Add AS/400 connection**. Once you have connected the new AS/400 system to your network, you can begin to use it immediately as your central system. Changing the central server ends the connection to the current central system and closes other opened Management Central windows.

2.2.4 QUTCOFFSET system value

Suppose you have multiple systems in a network. The main system is in Richmond, Indiana, one is in Rochester, Minnesota, and one is in Los Angeles, California. You may need to use this system value if you find that the time on your endpoint systems does not match the time on the central system. The Coordinated Universal Time Offset (QUTCOFFSET) system value specifies the difference in hours and minutes between UTC, also known as Greenwich mean time, and the current system time.

You can change the system value from Management Central by using the run command. Follow these steps:

1. Create your command definition for the Change System Value (CHGSYSVAL) command.
2. Specify `CHGSYSVAL SYSVAL(QUTCOFFSET) VALUE(xxxxxx)` for the command syntax, where `xxxxxx` is the number of hours and minutes that the current system time differs from Coordinated Universal Time.
3. Run the command on the designated systems.

Specify the number of hours and minutes in which the current system time differs from Coordinated Universal Time (UTC) by subtracting from the local time to obtain Greenwich mean time. This value is five characters. The first character is a plus (+) or minus (-) sign. The next two characters specify hours ranging from 00 through 24. The last two characters specify minutes ranging from 00 through 59. The value can be separated by a colon (+00:00). The shipped value is +0000.

A change to this value takes effect immediately on the AS/400 system. Once you change the system value on the AS/400 system, the Management Central server must be ended and restarted for the change to take effect.

If your network has systems across many time zones, you need to set the QUTCOFFSET system value to "-0500" on the Richmond system, "-0600" on the Rochester system, and "-0800" on the Los Angeles system. Each system could use its local time for the system time. You could use QUTCOFFSET to calculate a common time among all the systems.

A situation where you may notice the effect of this system value setting is when you are using the performance monitor graph. Chances are that you would notice this because the time scale would not be accurate. You need to ensure that the QUTCOFFSET value is set correctly on your AS/400 systems according to the time zone in which the AS/400 system is located. If you are managing systems in the United States, refer to Table 2 for the values that should be set for the various time zones.

Table 2. QUTCOFFSET system value settings

	Eastern zone	Central zone	Mountain zone	Pacific zone
Daylight Savings Time	-4:00	-5:00	-6:00	-7:00
Standard	-5:00	-6:00	-7:00	-8:00

2.3 Endpoint systems

An endpoint system is any system in your TCP/IP network that you choose to manage through your central system with Management Central. You can let the system add or discover your endpoint systems, or you can add the endpoint systems manually.

To add an AS/400 system as an endpoint, the system must meet these requirements:

- Be connected to the central system, which means that the endpoint system must be accessible through TCP/IP.
- Be running the OS/400 operating system.

The level of OS/400 that is running on the endpoint system determines which Management Central functions are available on that system. The endpoint system cannot be running a release of OS/400 earlier than V3R1.

Table 3 on page 16 shows which Management Central functions are available at each release.

Table 3. Management Central functions

Release level on endpoint system	Function available
V4R4M0	Monitors, event log, fixes management, Collection Services, remote commands, package distribution, inventory
V4R3M0	Monitors, event log
Note: For releases prior to V4R3M0, you need the IBM Performance Investigator PRPQ for the OS/400 version installed on your system. The monitor function is not available on endpoint systems running a release of OS/400 earlier than V3R1M0.	

2.3.1 Adding endpoint systems through discovery

When you first start Management Central, right-click **AS/400 Endpoint Systems** and select **Discover Systems**. This action adds any connected AS/400 systems to your network as endpoint systems. If the AS/400 system is already defined as an endpoint system, the IP address is verified and updated if it has changed.

Use Discover Systems to add AS/400 systems as endpoint systems instead of adding them manually. Discover Systems searches your network for AS/400 systems, adds them if they are not already added, and updates any IP address changes for AS/400 systems that have already been added. For details on the discovery process, see 10.1.3, “Endpoint systems discovery” on page 176.

Consider the following points when using the discovery method:

- If you frequently rename your IP addresses. Use the option to discover your systems because the IP address is verified and updated if it has changed. On the other hand, be aware that the discovery option uses system resources.

You should be aware of the Management Central property that specifies how often the IP address must be verified when connecting to an endpoint system. Your choices are *Always* or *Never*. If you select *Always*, connecting to an endpoint system takes longer, but the IP addresses are always correct. If you select *Never*, connecting to an endpoint system is quicker because the connection uses the IP address currently stored in Management Central. You can run Discover Systems at any time to update the list of IP addresses stored in Management Central. To access this property value, right-click **Management Central**, and select **Properties**. Then select the **Connection** tab.

- If you are merging your endpoint systems with another department. This ensures that all systems are accounted for.
- If you are defining your endpoint systems for the first time and you have a large number of systems to add.
- If you have a number of other AS/400 systems that are IP-connected, discovery finds these systems as well. Because of that fact, you may find it more efficient to manually add your endpoint systems rather than deleting the systems that you do not want included.

2.3.2 Adding endpoint systems manually

You can also manually add endpoint systems to your Management Central network. To add an endpoint system to Management Central, complete these steps:

1. Right-click **AS/400 Endpoint Systems**, and select **New Endpoint System**.
2. Type the name of an AS/400 system that meets the version requirements.

2.3.3 Deleting endpoint systems

You can delete any endpoint system that you added. To delete an endpoint system, right-click on the endpoint that you want to delete, and select **Delete**.

Attention

When you delete an endpoint system under AS/400 Endpoint Systems, you delete the endpoint system from all system groups. If you delete an endpoint system, be aware that you lose the inventory information for that endpoint system.

There is nothing that prevents you from deleting your central system. Be aware that if you delete the central system, the discovery function (see 10.1.3, “Endpoint systems discovery” on page 176) does not work and you can no longer manage the system you deleted.

2.4 System groups

A system group is a collection of endpoint systems that you define. Endpoint systems can belong to several system groups at once. Once you create a system group, you can manage that entire group from your central system as if it were a single system. Being able to group AS/400 systems makes systems management more convenient. When you group your AS/400 systems, you gain the flexibility to perform an operation on a group of AS/400 systems, instead of having to perform the operation on each individual AS/400 system.

Some criteria for grouping your AS/400 systems includes:

- Organizational boundaries (for example, accounting or manufacturing)
- Geographical boundaries (for example, East Coast systems or Midwest systems)
- Administration responsibilities (for example, Lo Jean’s systems or My systems)
- Release boundaries (for example, all systems using V4R3 or all systems using V4R4)
- Different security groups (for example, those systems that are SSL-enabled and those that are not)

2.4.1 Creating system groups

To create a system group, follow these steps:

1. Open Management Central from your Operations Navigator window.
2. Right-click **AS/400 System Groups**, and select **New System Group**.
3. On the New System Group dialog box, specify a unique name for the new system group. You can type a brief description to help you later identify this group in a list of system groups.
4. From the **Available systems** list, select the endpoint systems that you want to include in this new group. Click **Add** to add the systems to the **Selected systems** list.
5. If you want to give other users the ability to view or change this system group, use sharing. Section 2.6, “Using sharing” on page 21, provides information about the sharing function.
6. Click **OK** to create the new system group.

The system group you create includes all the endpoint systems you just added. If you decide later that you want to add or remove endpoint systems from your system group, you can always edit that list of endpoint systems by using the Properties option for that particular system group.

2.4.2 Removing endpoint systems from groups

You can remove any endpoint system from a system group that you created. To remove an endpoint system from a system group, select the system group to expand the list of endpoint systems. Right-click on the endpoint system that you want to remove, and select **Remove**. Click **Remove** again when you are asked to confirm.

Note

When you remove an endpoint system from a system group, you do not delete the endpoint system from AS/400 Endpoint Systems.

However, when you delete an endpoint system under AS/400 Endpoint Systems, you delete the endpoint system from all system groups.

2.4.3 Deleting system groups

As pointed out previously, a system group is a collection of endpoint systems that you define. Once you create a system group, you can manage the entire group from your central system as if it were a single system. Now that you have created a system group, you may decide that the group is no longer useful for your environment, and therefore, want to delete the system group.

To delete a system group, follow these steps:

1. Open Management Central from your Operations Navigator window.
2. Select **AS/400 System Groups**. Notice that the groups you defined appear in the right panel of your Management Central window.
3. Right-click the name of the group that you want to delete and select **Delete**.

4. On the Confirm Delete dialog box, verify that the system groups shown are the ones you want to delete.
5. Click **Delete**.

As soon as you click Delete, the system groups that you selected disappear from Management Central.

2.5 Management Central server

Management Central starts and stops by using the Management Central server, which is integrated with other TCP/IP servers in Operations Navigator. You may experience occasions when the Management Central server ends unexpectedly or when you cannot complete the connection to the central system. In these situations, you need to start the server.

To start or end the Management Central server (QYPSSRV) on an AS/400 system, you must have authority on that system to use the Start TCP Server (STRTCPSVR) or End TCP Server (ENDTCPSVR) CL commands. These commands are shipped with the authorities listed in the Table 4.

Table 4. STRTCPSVR and ENDTCPSVR command authorities

User	Authority
QSYS	*ALL
QPGMR	*USE
QSYSOPR	*USE
QSRVBAS	*USE
QSRV	*USE
*PUBLIC	*EXCLUDE

To use the commands, you have the following choices:

- Use the above user profiles.
- Add a user profile to authorize to the commands.

2.5.1 Starting the Management Central server

To start the Management Central server, complete these steps:

1. In AS/400 Operations Navigator, expand **My AS/400 Connections** (or your active environment).
2. Expand the AS/400 system that you are using as your central system.
3. Expand **Network**.
4. Expand **Servers**.
5. Select **TCP/IP**.
6. Right-click **Management Central** and select **Start**.

2.5.1.1 Starting the server from the central system

You can choose to start the Management Central server at the same time that the TCP/IP servers start. Follow the same steps as in the previous section, but

instead of selecting **Start**, select **Properties**. Select **Start whenever TCP/IP is started**. Figure 9 shows you the Management Central Properties page. The default setting is to start the Management Central server at the same time that the TCP/IP servers start.

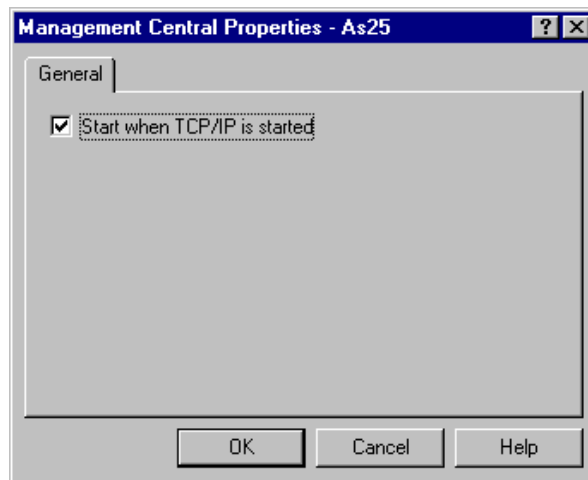


Figure 9. Management Central server properties

Note

For those of you looking for the 5250 display emulation equivalent for this property, there is none. You can change this property from the graphical interface only.

2.5.1.2 Starting the server automatically

To start the Management Central server on the endpoint system, type the following command from the AS/400 command line:

```
STRTCPSVR SERVER (*MGTC)
```

2.5.2 Ending the Management Central server

To end the Management Central server, complete these steps:

1. In AS/400 Operations Navigator, expand **My AS/400 Connections** (or your active environment).
2. Expand the AS/400 system that you are using as your central system.
3. Expand **Network**.
4. Expand **Servers**.
5. Select **TCP/IP**.
6. Right-click **Management Central**, and select **Stop**.

You can also issue the following command from the AS/400 command line to end the Management Central server:

```
ENDTCPSVR SERVER (*MGTC)
```


2.5.3 Viewing the Management Central server job log

The server job log is a good starting point for checking for errors that occur while using Management Central. To view the job log for the Management Central server (QYPSSRV), complete these steps:

1. In AS/400 Operations Navigator, expand **My AS/400 Connections** (or your active environment).
2. Expand the AS/400 system that you are using as your central system.
3. Expand **Network**.
4. Expand **Servers**.
5. Select **TCP/IP**.
6. Right-click **Management Central**, and select **Server Jobs**.
7. Right-click the most recent **Qypssrv** in the list of job names, and select **Job Log**.

2.6 Using sharing

Sharing saves you time, makes system administration easier, and reduces the amount of redundant tasks you need to do. Sharing allows users to use (or share) the same items such as systems groups, package definitions, command definitions, and system administration tasks.

To use sharing, right-click any task, definition, or system group and select **Properties**. Then select the **Sharing** tab. Figure 10 shows you the Sharing page.

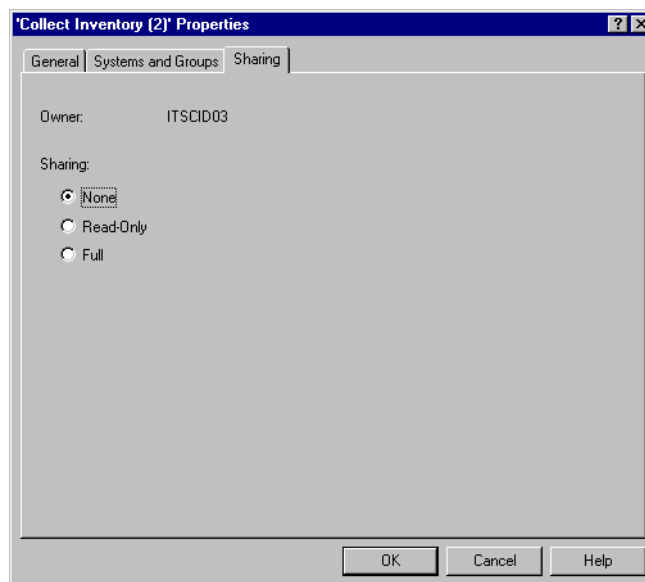


Figure 10. Task Properties: Sharing tab

If you are the owner of the item you want to share, you can set the level of sharing from the Sharing page. To use sharing, the owner of a particular system group, definition, or task must choose one of three levels of sharing for any given item:

- **None:** Only the user who created the item can see or use it.
- **Read-Only:** All users can see and use the item, but only the person who created the item can update or delete it.
- **Full:** All users can see, use, update, and delete the item.

2.6.1 What you can do with sharing

What you can do with sharing depends on the needs of your work environment. Here are some examples that you should consider:

- You can share system groups.

When you share system groups with read-only access, only one administrator controls the systems in a system group for all authorized users. This ensures that the system group is always up to date. For example, suppose you created a system group called "West Coast Systems." If you chose to share that group, all system operators could use that system group to gain access to the West Coast systems. You would be the only person who could update the contents of that group.

- You can share command definitions.

Part of your job may include maintaining a run book of commonly used commands. You can share the command definitions in that run book to ensure that the commands your system operators run are accurate. If you need to change one of those commands, you only need to do it once. Your users can share that one set of accurate commands.

- You can share package definitions.

You can also share package definitions by creating a package for all users to access. This function is very helpful if your package contains a snapshot. If you did not share that package, each user would have to create his or her own package and snapshot to use it.

- You can share tasks.

Tasks are long running actions in Management Central. You can share any actions that have been created and allow users to see the status of tasks. For example, suppose you needed to install 50 fixes on a system group containing 50 systems. If you shared that task, you could start the task and then go home. The second shift operator would see the status on her PC when she came to work.

- You can use global sharing to share all tasks.

Use global sharing to specify the status of all your system administration tasks None, Read-Only, or Full sharing. You access global sharing through the User Preferences dialog box by right-clicking on Management Central. When you specify a value other than None, the sharing value applies to all future tasks. Existing tasks are not affected.

For example, suppose you are in an environment where you are part of a five-person team that works around the clock. If you chose to globally share your tasks at the Full level, your team could see what you did and work with the tasks you started, even when you are not there.

2.7 Using the Columns dialog box and Include dialog box

You have probably noticed that the right panel of Operations Navigator shows you various columns depending on the kind of task or container with which you are working. If you want to change the default order of the columns, select **Options** from the menu bar, and then select **Columns**. You can add or remove columns, or even arrange the order in which they display to better fit your needs.

Closely tied to the Columns dialog box is the Include dialog box. The Include dialog box is a good filtering device. For example, you want to monitor the status of the remote commands that have been submitted. You are interested only in those commands that have a status of Failed. Here is what you would do if you wanted to see only the Failed commands:

1. Under Management Central, click **Task Activity**.
2. Select **Options** from the menu bar, and then select **Include**. You can monitor several attributes of a task. You can select to show only the status for a particular task, such as command, send files, inventory, fixes, or Collection Services. If you wanted to see the tasks that were started by a particular user, you could choose to filter on that criteria also.
3. From the **Status** field options, select **Failed**. You can monitor for other status values such as All, Active or Failed, or Completed. In this particular case, you are interested only in those tasks that did not complete.
4. From the **Type** field options, select **Command**. You can monitor for other tasks too such as send files, inventory, fixes, or Collection Services. When you select **Command**, you shorten the list of tasks that is displayed in the right panel.
5. Click **OK**. The right panel is refreshed, and you should see only those tasks with a status of Failed.

2.8 Application Administration

Application Administration is another optionally installable component of Operations Navigator. It allows system administrators to control the functions or applications available to users and groups at a GUI level on a specific AS/400 system. To modify the access settings, the user profile that you use to sign on to the AS/400 system must have the security administration (*SECADM) special authority granted.

It may seem that Application Administration would make a good security tool, but Application Administration was designed for *customizing* the functions available on your PC. You should not use it for administering security on your client PC for these reasons:

- Application Administration uses the Windows registry to cache restrictions on the client PC. A skilled user could obtain access to functions that they are restricted from using through Application Administration.
- If multiple interfaces exist to the same AS/400 resource, restricting a single interface through Application Administration does not restrict the other interfaces to the same resource. For example, you can restrict a user from accessing a database feature of Operations Navigator through Application Administration. However, the user still has access to database files by using

other database interfaces, such as Open Database Connectivity (ODBC) or AS/400 database CL commands.

2.8.1 Accessing Application Administration

Applications must be registered on the AS/400 system before they can be administered through Application Administration. By default, no applications are registered to be administered.

To control the Management Central functions, you must access Application Administration through Management Central. To do so, right-click **Management Central**, and select **Application Administration**.

When accessing Application Administration for the first time, if applications are detected on the PC that are not registered on the AS/400 system, a message box is presented. The message box invites you to add the applications. From the list, select the application you want to administer and click on the **Add-->** button to add this application to the Applications to be administered. Click **OK** to register the application on the AS/400 system. The application is now registered on your AS/400 system, which means an administrator on any PC can administer that application.

When opened through Management Central, the Application Administration dialog box shown in Figure 11 displays Management Central administrable functions.

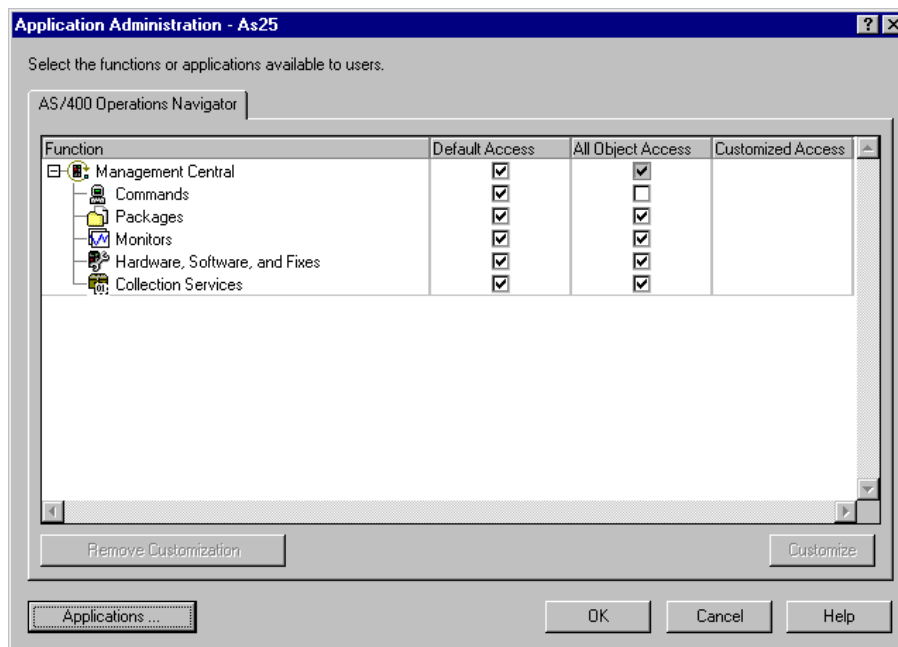


Figure 11. Application Administration opened through Management Central

If you open the Application Administration dialog box through your AS/400 system (by right-clicking on the specific AS/400 name), the dialog box displays Fixes Inventory and Collection Services as *read-only*, as seen in Figure 12 on page 25. You see only check marks, not boxes with check marks. Figure 12 shows you the hierarchical view of how you administer systems locally.

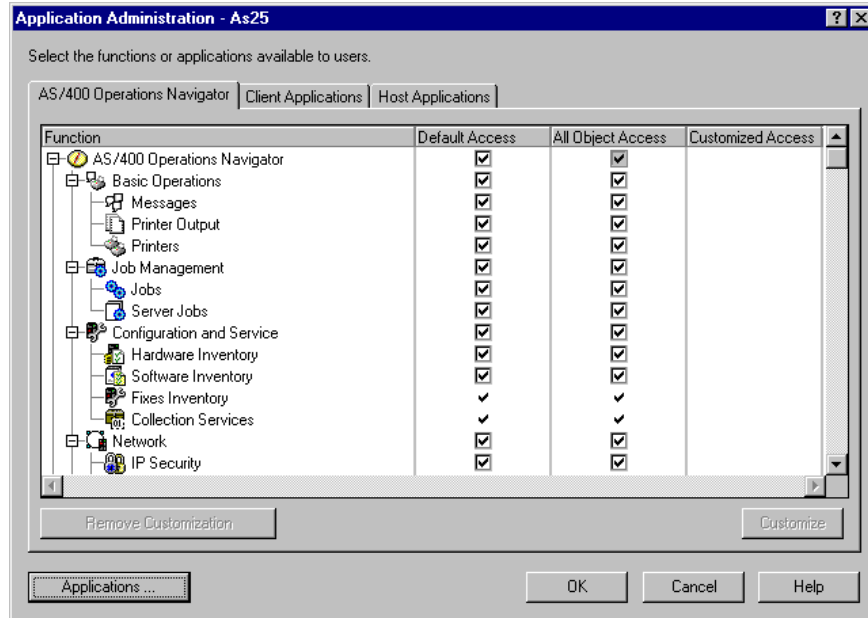


Figure 12. Application Administration opened through an AS/400 connection

When you administer your systems locally, Application Administration organizes applications to be administered into three categories accessible from separate tabs:

- **AS/400 Operations Navigator:** Includes Operations Navigator and any plug-ins.
- **Client Applications:** Includes all other client applications. Client Access Express falls into this category.
- **Host Applications:** Includes all applications that reside entirely on your AS/400 system and provides functions that are administered through Application Administration.

2.8.2 Administering applications

The graphical user interface of Application Administration makes an administrator's job easy and effective. To modify the access settings, the user profile that you use to sign on to the AS/400 system must have the security administration (*SECADM) special authority granted.

Typically, when you use Application Administration for Management Central, you can administer at the function level. For each function, you define who has access to it.

First, you define for a function who is allowed or denied access to it. Then, you can customize the functions that specific users and groups can access. These steps outline the suggested order you can follow to actually administer functions with Application Administration:

1. Set the Default Access setting at function level.
2. Set the All Object Access setting at function level.
3. Customize the access settings for your group profiles at function level.
4. Customize the access setting for your individual profiles at function level.

5. Set group access setting at group level.
6. Set user access at user level.

Steps 5 and 6 may seem to be redundant with steps 3 and 4, but it may be useful to review settings for special users and groups.

Changes you make to a function's access settings may not be immediately reflected on your client PC. Depending on the application, changes take effect:

- The next time the client PC signs on to the AS/400 system. This is the case for Operations Navigator functions, which also would apply to Management Central functions.
- The next time you restart the client PC, or 24 hours after the change is made, whichever comes first. This is the case for Client Access Express functions.

2.8.2.1 Administering applications at the function level

From the main dialog box as shown in Figure 11 on page 24, you can change the *access settings* for each function. The access settings are broken down into three columns:

- **Default Access:** Determines a user's access to a function when the user and its groups are explicitly allowed or denied access to the function. A checked box sets access to *allowed*. A cleared box sets access to *denied*.
- **All Object Access:** Indicates whether a user or group with all object system privilege is allowed access to the function. If selected, and the user or group has all object system privilege, this setting overrides all other access settings. If unchecked, all object system privilege is ignored when determining a user's access.
- **Customized Access:** Indicates whether users or groups are explicitly denied or allowed access to the function. To give users or groups specific access, select the function and click on the **Customize** button. From the Customize Access dialog box, shown in Figure 13, select a user in the left list and click on the **Add-->** button to allow or deny access to the selected user.

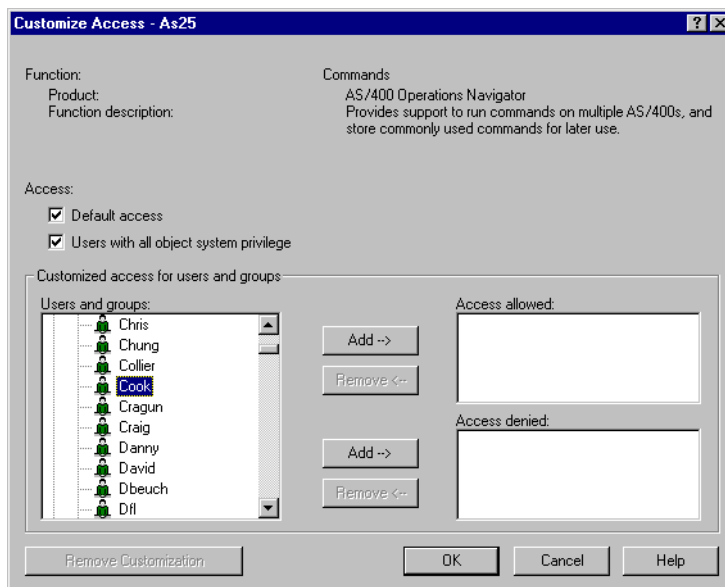


Figure 13. Customize Access dialog box

By using the Remove Customization button from the Customize Access dialog box or the main Application Administration dialog box, you can quickly reset the customized access to its default (no users, no groups have specific access settings).

2.9 Management Central tasks

Management Central introduces the concept of a *task* when you perform an action. For example, you create a task each time you run a command or collect inventory. You can follow the activity for a particular task when you choose to run it immediately, or you can monitor its activity when you schedule the task for a later time. The task activity is updated immediately when a status changes. There is no need to perform a refresh.

You can manipulate the following tasks from the *Task Activity* container:

- Commands
- Packages
- Inventory
- Collection Services
- Fix management

When you select **Task Activity** under Management Central, you see these columns in the right panel:

- **Task:** The name of the task
- **Type:** The type of task
- **Status:** How the task is doing
- **Systems and Groups:** The name of the endpoint systems and system groups on which the task is running
- **Description:** A brief description of the task
- **Started:** The date and time that the task was started
- **Started By:** The owner who started the task
- **Last Changed:** The date and time that the task status last changed

Tip

Open **Task Activity** into a separate window. This way, when tasks are started, you can see them immediately and watch their status update automatically, no matter where you are in Operations Navigator. To create a separate window, right-click **Task Activity** and select **Open**.

2.9.1 Task naming conventions

The Management Central tasks are named on a per-user basis, with the most current task shown at the top in the Task Activity window. Tasks receive their names in one of two ways. The first way is through actions taken by users from a menu option. The second way is through actions performed on a command definition or a package definition.

Management Central shows specific types of tasks in the Task Activity window. Table 5 shows the associated subtype for each type on which the task name is based.

Table 5. Types of tasks and associated application tasks

Type of task	Application task
Command	Run Command
Send files	Send Files
Inventory	Collect Inventory
Fixes	Send Fixes, Uninstall Fixes, Send and Install Fixes, Permanently Install Fixes, Clean Up Fixes, Cancel Fix Actions, Install Fixes
Collection Services	Start Collection Services, Stop Collection Services

Generally speaking, you see only your task activity unless other users have chosen to share an item by specifying Read-Only or Full from the Sharing Properties dialog box.

2.9.1.1 From a menu option

When you execute a menu option, for example, you want to collect inventory, Management Central names the task Collect Inventory. If you submit another request to collect inventory, you see Collect Inventory (2) for the task name. The task name is incremented by one for each additional task that you start. Figure 14 shows an example of the naming conventions used when several tasks were submitted to collect inventory.









Last changed: 6/29/99 8:25 AM			
Management Central (As25): Task Activity Started by: All Type: Inventory			
Task	Type	Status	Systems and Gro
 Collect Inventory (8)	Inventory	Completed	West Coast
 Collect Inventory (7)	Inventory	Completed	Midwest Systems
 Collect Inventory (6)	Inventory	Completed	East Coast
 Collect Inventory (5)	Inventory	Completed	Accounting
 Collect Inventory (4)	Inventory	Completed	West Coast
 Collect Inventory (3)	Inventory	Completed	Midwest Systems
 Collect Inventory (2)	Inventory	Completed	East Coast
 Collect Inventory	Inventory	Completed	Accounting

Figure 14. Basic task names

The task names continue to increment by one unless you delete a task. For example, you delete Collect Inventory (4) from the list. Then you submit another task to collect inventory. Collect Inventory (4) is removed from its sequential place in the list, and now you see a new Collect Inventory (4) task at the top of the list because it is the most current task. Figure 15 on page 29 shows the refreshed list after deleting the task and submitting another inventory collection task.









Last changed: 6/29/99 8:39 AM			
Management Central (As25): Task Activity Started by: All Type: Inventory			
Task	Type	Status	Systems and Gr
 Collect Inventory (4)	Inventory	Completed	Accounting
 Collect Inventory (8)	Inventory	Completed	West Coast
 Collect Inventory (7)	Inventory	Completed	Midwest System
 Collect Inventory (6)	Inventory	Completed	East Coast
 Collect Inventory (5)	Inventory	Completed	Accounting
 Collect Inventory (3)	Inventory	Completed	Midwest System
 Collect Inventory (2)	Inventory	Completed	East Coast
 Collect Inventory	Inventory	Completed	Accounting

Figure 15. Deleted task

The task names become a bit more complicated when you have tasks for more than one user that are displayed in the Task Activity window. Because Management Central provides task names on a per-user basis, you could see tasks with the same names, if other users selected Read-Only or Full from the Sharing Properties. If three users each submit a task to collect inventory, you would see three separate entries for Collect Inventory.

Tip

To help simplify the list of task names shown in the window, you can choose to display the tasks for a specific user. Use the Include dialog box under the **Options** menu and select **Started By** to show only the tasks started by a specific user. This action should remove any duplicate names for multiple users.

2.9.1.2 From a definition

The second way to name a task is to create a definition, either a command or package. When you create a definition, the name you assign to the definition name becomes the task name. Task names for definitions follow the same naming convention as task names executed from a menu action. For example, if you created a command definition and typed `DSPHDWRSC` for the definition name, Management Central gives the task name the same name as the definition name. Figure 16 on page 30 shows an example of task naming for a definition.

Management Central (As25): Task Activity Started by: All			
Task	Type	Status	Systems and Gro
 DSPHDWRSC (4)	Command	Completed	Accounting
 DSPHDWRSC (3)	Command	Completed	East Coast
 DSPHDWRSC (2)	Command	Completed	Midwest Systems
 DSPHDWRSC	Command	Completed	West Coast
 Collect Inventory (10)	Inventory	Completed	Accounting
 Collect Inventory (9)	Inventory	Completed	Accounting
 Collect Inventory (4)	Inventory	Completed	Accounting

Figure 16. Task naming for definitions

When you create a new definition based on an existing one, the task name for the new definition takes on the existing name with "Copy of" added to the name. If you select an existing definition, for example, DSPHDWRSC, and right-click **New Based On**, you see the name of the definition changes to Copy of DSPHDWRSC.

2.9.1.3 From Scheduled Task window to Task Activity window

You may encounter the situation where you have a task that is scheduled to run more than once, for example, weekly. In the Scheduled Task window, the task name appears as "Collect Inventory (11)." When the task runs the first time, a task name appears in the Task Activity window as "Collect Inventory (11) (2)." Management Central uses the task name and its number sequence from the Scheduled Task window, but then appends the applicable sequence number to the task name when it appears in the Task Activity window. An example is shown in Figure 17.













Management Central (As25): Task Activity Started by: All			
Task	Type	Status	Systems ar
 DSPHDWRSC (8)	Command	Completed	Midwest Sy
 Collect Inventory (11) (2)	Inventory	Completed	As25
 Start Collection Services (2)	Collection Services	Failed	East Coast
 Start Collection Services	Collection Services	Completed	As25
 DSPHDWRSC (7)	Command	Completed	Midwest Sy
 DSPHDWRSC (6)	Command	Completed	Midwest Sy
 DSPHDWRSC (5)	Command	Completed	Midwest Sy
 DSPHDWRSC (4)	Command	Completed	Accounting
 DSPHDWRSC (3)	Command	Completed	East Coast
 DSPHDWRSC (2)	Command	Completed	Midwest Sy
 DSPHDWRSC	Command	Completed	West Coas
 Collect Inventory (10)	Inventory	Completed	Accounting

Figure 17. Scheduled task names

2.9.2 Scheduling tasks

To assist you in organizing when you want your tasks to occur, Management Central provides an integrated scheduler, called the *Management Central Scheduler*. You have the option of choosing to perform a task immediately or

choosing a later time. You also have the option of installing the Advanced Job Scheduler and overriding the Management Central scheduler. For details about this scheduler, see Chapter 9, “Advanced Job Scheduler” on page 163.

When you schedule a task, the time at which the scheduler starts the task is based on the system time and date of the central system. For example, if you collect inventory on systems in California, and the central system is located in New York, the collection happens on New York time.

You can automate the process of collecting your hardware inventory, software inventory, and fixes inventory on whichever day fits your operating schedule. You may schedule a collection for every Saturday night at 10 o'clock PM. You can also schedule to clean up the save files and cover letters of the fixes from your systems on the first of every month. Or, you may simply want to install a set of fixes once. Using the scheduler function gives you the flexibility to do your work when it is convenient for you to do it.

In addition to managing your fixes, you can use the scheduling tool in Management Central for these tasks:

- Run commands on selected systems and groups
- Delete the save files and cover letters for selected fixes on selected systems and groups
- Send fixes or packages of files and folders to selected systems and groups
- Start installing fixes, uninstalling fixes, or installing fixes permanently
- Collect hardware, software, or fix inventory on selected systems and groups
- Start and stop Collection Services on selected systems and groups

2.9.2.1 Task names on AS/400 system

You can see your scheduled task on the AS/400 system as well as from the Scheduled Task container. To display the task on the AS/400 system, use the Work with Scheduled Job (WRKJOBSCDE) command. Type `WRKJOBSCDE` from any AS/400 command line.

Every task (regardless of whether it is scheduled) is assigned a unique identifier called the *task ID*. The task ID is limited to 10 characters, and follows the format `Qxxxxxxxxx`. Because a decimal value could potentially exceed this limit, the task ID is a hexadecimal value. Figure 18 on page 32 shows the job entries for two Management Central scheduled tasks.

```

Work with Job Schedule Entries
AS25
07/08/99 10:02:56

Type options, press Enter.
2=Change 3=Hold 4=Remove 5=Display details 6=Release
8=Work with last submission 10=Submit immediately

-----Schedule-----
Opt Job Status Date Time Frequency Recovery Action Next Submit
CHGSYSSEC SCD *MONTHSTR 05:00:00 *MONTHLY *SBMRLS 08/01/99
Q3332 SCD 07/30/99 10:48:24 *ONCE *SBMRLS 07/30/99
Q38C2 SCD 07/08/99 10:09:34 *ONCE *SBMRLS 07/08/99

Parameters or command
====>
F3=Exit F4=Prompt F5=Refresh F6=Add F9=Retrieve
F11=Display job queue data F12=Cancel F17=Top F18=Bottom
Bottom

```

Figure 18. Job names on the AS/400 system

Attention

We show you how you can view this information from a 5250 emulator session *for your information only*. Unless you are specifically instructed to do something from an emulator session, do not use these sessions to manipulate the Management Central objects. Your manipulations can cause Management Central to operate incorrectly.

In this particular case, you should not delete the job schedule entries from the 5250 emulator session. However, if you use the 5250 emulator session to change the scheduled time, the time is changed on the Management Central interface.

2.9.3 Creating new scheduled tasks based on completed tasks

To create a new task and schedule from a completed task, perform these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Select **Task Activity**.
3. Right-click the completed task that you want to use to create a new scheduled task, and select **Start Based On**.
4. In the **Start Based On** window, select the systems or groups you want to add. The systems and groups you select are added to the list of systems and groups on which you want to start the new scheduled task.
5. Select **Schedule**.

6. In the Management Central Scheduler window, select how often you want to run the task and when you want the task to start for the first time. Your selections appear in the *Summary* at the bottom of the window.
7. Click **OK**.

When you click OK, the Management Central Scheduler and the Start Based On windows close. You have now successfully scheduled your new task.

2.9.4 Creating new scheduled tasks from old scheduled tasks

You can create new scheduled tasks from tasks that you have already scheduled. Two options are provided:

- Schedule a task to run now
- Schedule a task to run later

2.9.4.1 Running scheduled tasks now

You can use tasks you already scheduled to create new scheduled tasks and run them now. To create a new scheduled task from an old scheduled task and run it now, complete these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Select **Scheduled Tasks**.
3. Right-click the scheduled task that you want to use to create a new scheduled task, and select **Start Based On**.
4. In the Start Based On window, select the systems or groups you want to add. The systems and groups that you select are added to the list of systems and groups on which you want to start the new scheduled task.
5. Click **OK**.

When you click OK, the Start Based On window closes, and your new task runs immediately. The old task that you used to create the new task will still run at its original scheduled date and time.

2.9.4.2 Running scheduled tasks later

You can use tasks you already scheduled to create new scheduled tasks with different start dates and times. To create a new scheduled task based on an old scheduled task, complete these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Select **Scheduled Tasks**.
3. Right-click the scheduled task you want to use to create a new scheduled task, and select **Start Based On**.
4. In the Start Based On window, select and add systems or groups. The systems and groups you select are added to the list of systems and groups on which you want to start the new scheduled task.
5. Select **Schedule**.
6. In the Management Central Scheduler window, select how often you want to run the task and when you want to start the task. Your selections appear in the **Summary** at the bottom of the window.
7. Click **OK**.

When you click OK, the Management Central Scheduler and the Start Based On windows close. You have now successfully scheduled your new task.

2.9.5 Starting a new task based on a current task

You may want to create a task (for example, to install a group of fixes) and run that task on a test system to make sure there are no unexpected results. Then you can start a new task based on that original task and select all the systems where you want those fixes installed. To start a new task based on a current task, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Click **Task Activity**.
3. Right-click a current task.
4. Select **Start Based On**.
5. Add or remove systems or groups from the **Selected systems and groups** list.
6. Click **OK**.

2.9.6 Deleting scheduled tasks

You may have an occasion to delete a scheduled task. When you want to delete a scheduled task, complete these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Select **Scheduled Tasks**.
3. Right-click the task that you want to delete, and select **Delete**.
4. In the Confirm Delete dialog box, click **OK** to delete the scheduled task.

2.9.7 Deleting a task

You cannot delete a task that is still running. If you want to delete a task that is running, you must first stop the task and then delete it.

1. Expand **Management Central**.
2. Select **Task Activity**. The right-hand panel displays a list of tasks.
3. Right-click on the task you want to delete, and select **Delete**.
4. A confirmation dialog box appears. You see the tasks that you selected to delete. If the selections are not correct, click on **Cancel** or change the selection by deselecting any items displayed. Hold the **Ctrl** key down and click any item in the list to deselect it. Once you confirm your selections, press **Delete**.

2.9.8 Stopping a task

To delete a task, you must first stop the task. Follow these steps:

1. Expand **Management Central**.
2. Select **Task Activity**. The right-hand panel displays a list of tasks. Right-click on the task you want to delete.
3. Right-click on the task you want to stop and select **Stop**.

4. A confirmation dialog box appears. You see the tasks that you selected to stop. If the selections are not correct, click on **Cancel** or change the selection by deselecting any items displayed. Hold the **Ctrl** key down and click any item in the list to deselect it. Once you confirm your selections, press **Stop**.

Note

When you stop a task, all activity for the selected task ends immediately.

2.9.9 Viewing task properties

To view the task properties, follow these steps:

1. Expand **Management Central**.
2. Select **Task Activity**. The right-hand panel displays a list of tasks.
3. Right-click on the task you want to view.
4. Select **Properties**. You see detailed information about the task.

2.10 Viewing task activities

You can manipulate scheduled tasks within the Scheduled Tasks container. When you select **Scheduled Tasks**, you see the following columns in the right-hand panel:

- **Task**: The name of the task
- **Type**: The type of task
- **When to Run**: Identifies how often a task is scheduled to run
- **Next Run**: Identifies the date and time that the task is scheduled to run next
- **Systems and Groups**: The name of the endpoint system or system group
- **Description**: A brief description of the task
- **Scheduled By**: The owner who scheduled the task to run
- **Created**: The date and time that the task was created

2.10.1 Viewing the status of a current task

To view the status of a current task, complete these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Click **Task Activity**.
3. Right-click a current task, and select **Status**.

2.10.2 Viewing the job log for a task

To view the job log, which contains error messages related to the task, you must have AFP Workbench Viewer installed on your PC. If you did not install AFP Workbench Viewer when you installed Client Access, you can install it now using Client Access Selective Setup. From the task bar, click **Start->Programs->IBM AS/400 Client Access Express->Selective Setup**. The wizard guides you through the steps to install AFP Workbench Viewer.

To view the job log after you have AFP Workbench Viewer installed, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Click **Task Activity**.
3. Right-click the task whose job log you want to view, and select **Status**.
4. In the Task Status window, right-click the system whose job log you want to view, and select **Task Output**.
If the task is running and you select **Task Output**, the job log displays immediately. You can see the task activity in progress.
5. In the Printer Output window, right-click the job log (QPJOBLOG) you want to view and select **Open**. If there is more than one printer output, you may need to scroll right to see the dates that the printer output was created.

It is possible to encounter the situation where you run a task on an AS/400 system to which you have no direct connection, that is, that the system does not appear under My AS/400 Connections or your active environment. If you select to display the status of that task, and then click **Task Output**, you see the AS/400 Signon Information window for Client Access Express as shown in Figure 19.

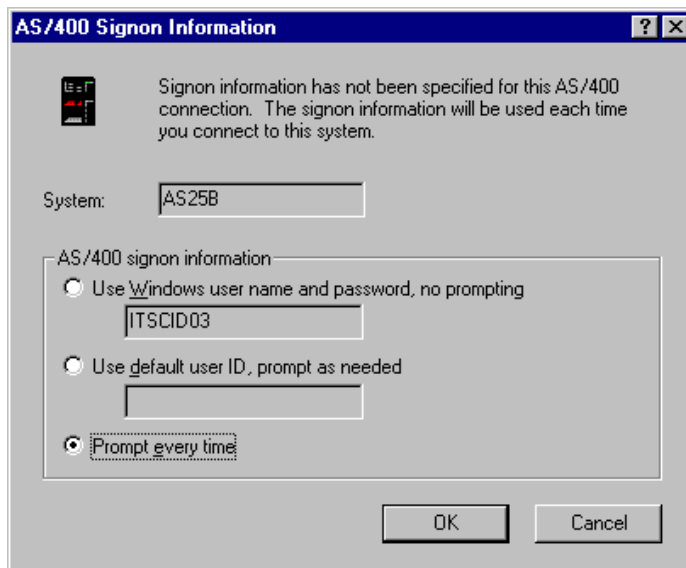


Figure 19. AS/400 signon information

Because you are attempting to look at output on a system to which you were not previously connected, you are asked for the AS/400 signon information. After you sign on, view the output, and return to the main Operations Navigator window, you see that the system is added under **My AS/400 Connections** or your active environment.

Note

Not all tasks have task output available for them. For example, you cannot show task output for inventory and Collection Services types of tasks.

2.10.3 Changing the AFP Workbench Viewer page size

Your AFP Workbench Viewer may have a shorter paper size defined than the output, which can result in what appears to be missing output. To change the paper size, follow these steps:

1. Select **View** from the menu bar.
2. Select **Paper Size**.
3. From the Paper Size dialog box, select **13.5 x 10** or **13.5 x 11** to show all lines.

Changing this setting applies to the current session only. To save the current settings, follow these steps:

1. Select **View** from the menu bar again.
2. Select **Save View**.
3. From the Save View dialog box, type a unique name and description.
4. Select **Save**.
5. Select **Options** from the menu bar.
6. Select **Preferences**.
7. From the drop-down box, select the name you saved from the Save View dialog box.
8. Click **OK**.

Chapter 3. Running commands across multiple systems

Management Central allows you to submit and run commands on multiple systems. Any AS/400 control language (CL) command that you can run in batch can also be submitted from the central system to multiple endpoint systems at the same time. A command can be run immediately, or it can be stored as a definition, allowing you to share commonly used or complex commands with other users that can be run repeatedly. This is similar to the F9 (Retrieve) function on a 5250 screen. However, the F9 function cannot be used across different users, and cannot be retrieved when you sign off from the screen.

When a command is run, a Management Central task is created on the central system. The task can then be monitored from the Management Central Task Activity screen. You can view the status, job log, and printer output, you can also handle inquiry messages.

Additional help is available whenever you see a ? in the upper right hand corner of a screen. Click on the ?, move the ? to a field, and click on the field for help text. Click the **Help** button for additional information about the function you are performing.

3.1 Command process

For a single run command, the command request is transmitted to the endpoint system through Management Central. The command must exist on the endpoint system and you must have authority to that command.

When you schedule a run command, the task is scheduled on the central system to be executed at a later time. When the date and time arrive, the command is processed the same way as a normal run command process.

3.2 Creating a command definition

There are several methods you can use to create command definitions. We show two examples in this section. The first method (described in the following section) creates a new definition. The second method (see 3.2.2, "Creating a definition based on an existing definition" on page 42) creates a definition based on the definition which already exists. Using the existing definitions helps you create the same command with different run attributes.

3.2.1 Creating a new definition

Use this method to create a new definition:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **Definitions**.
3. Right-click **Command**, and select **New Definition**. The New Command Definition window appears as shown in Figure 20 on page 40.

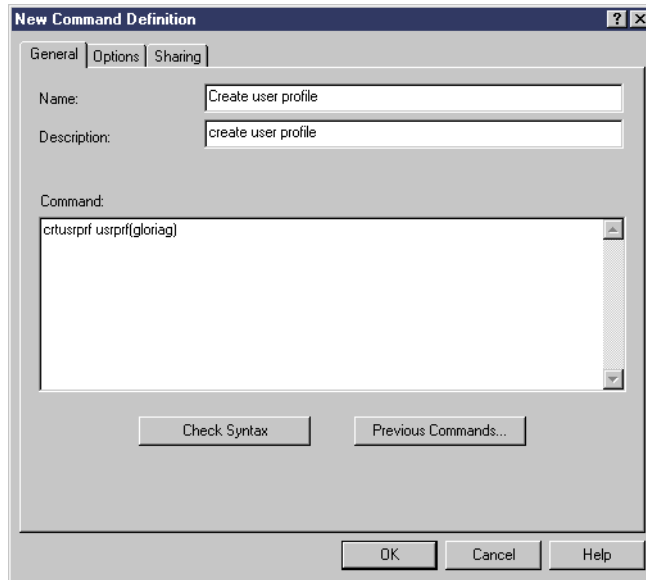


Figure 20. New Command Definition display

4. Specify a name for the definition and a brief description. You can type a command to be run in the Command field and click **Check Syntax** to validate the syntax of the command. Enter the entire command in the Command field of the Command Definition window as if entering from the command line on the AS/400 system. Currently Management Central does not prompt for the command parameters entries.

You have the option to use the **Previous Commands** button to select from a list of commands that were previously run from your PC. This list does not include commands that were run from other PCs, even by the same user.

5. To specify options concerning the job log or inquiry messages, click the **Options** tab. Use the Options page to specify how you want to handle the job log and inquiry messages when this command definition is run. Figure 21 on page 41 shows the Options tab. If you uncheck the *Automatically reply to inquiry messages if they occur* box and the command needs a reply, it waits for your response. You have to access the endpoint systems with Operations Navigator to reply to the message.

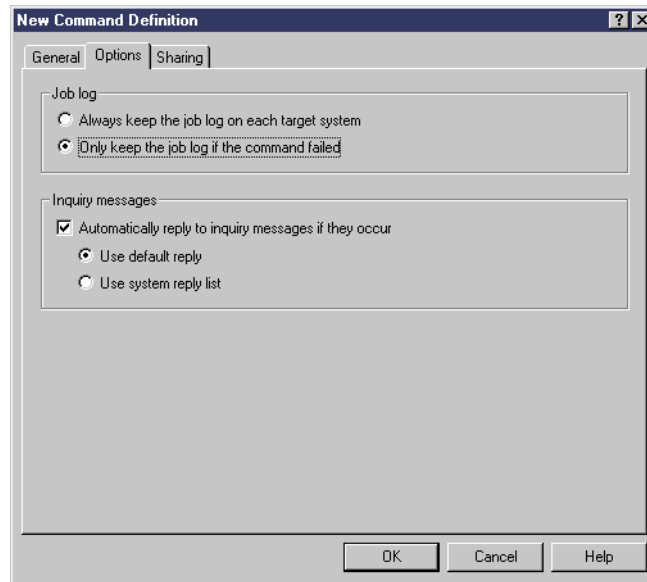


Figure 21. Options tab for New Command Definition

6. Click the **Sharing** tab to specify whether you want to share this command definition with other users. As shown in Figure 22, there are three sharing options.

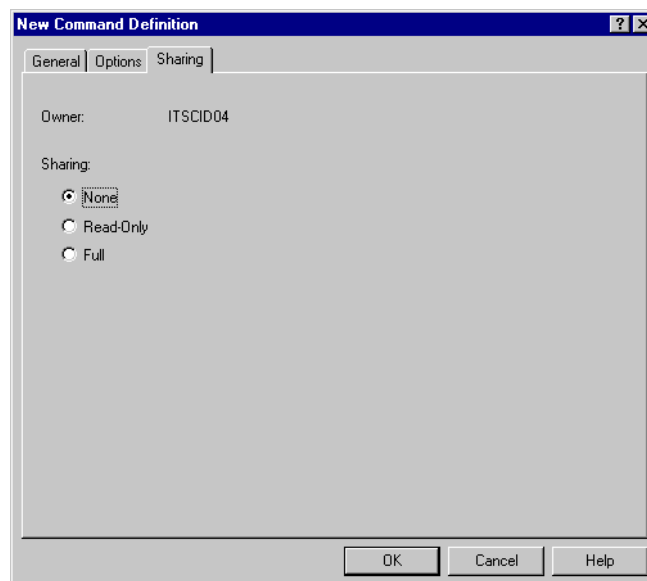


Figure 22. Sharing tab for New Command Definition

When you check the **Full** radio button, the command definition can be shared with other users on the central system. Other users can change all properties of the command definition except for the sharing property. When you check the **Read-Only** radio button, other users on the central system can use the command definition, but cannot change any properties of the definition. When you click **None**, the definition is not shared with other users.

7. Click **OK** to finish the definition. The new command definition is placed in the right panel of Command container.

3.2.2 Creating a definition based on an existing definition

Use this method to create a definition based on an existing definition. You can change the properties needed for the new command. Figure 23 shows a sample command definition window.

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **Definitions**. Click **Command** to see the commands that you created or those that were designated to be shared by other users.
3. Right-click on any command that you wish to use as a base. Select **New Based On**. You may then use the existing command to create a new one.

You can change any of the properties necessary to suit your needs. For example, you can choose the Options tab to change the options to reply differently to an inquiry message, you can run a different command with all the same options, or you can run a different command with the same options, but not to allow other users access to the command if a security issue is involved.

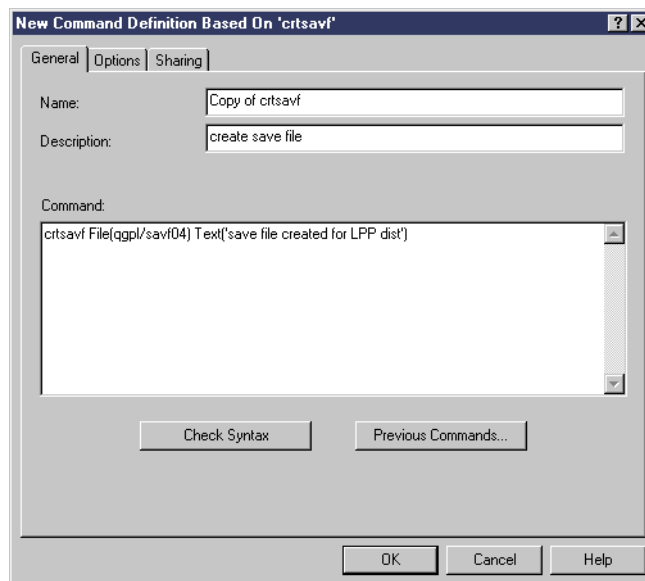


Figure 23. New Command Definition display based on an existing command definition

3.3 Submitting a command

When a command is run, a task is created. You can select the task in Task Activity under Management Central and view the status of the task on any system or group. If the task is scheduled, the task will appear under Scheduled Tasks. Only those tasks that the user has created and those that the user has been given authority are shown.

There are several methods you can use to submit your commands. Two examples are given in this section. The first method submits the command from a command definition list. The second method runs the command without creating a command definition.

3.3.1 Submit command from list

This method allows you to run a command from a list of existing command definitions. You can run a command without having to create a command definition each time you want to run it. Re-use the command as often as necessary. You may want to run the same command on different endpoint systems or at different times.

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **Definitions**.
3. Click on **Commands**. The right-hand panel displays the command list.
4. Right-click on the command definition, and select **Run**.
5. Select the systems or system groups to which you want to send the command definition, and click **Add** for each selection. See Figure 24 for an example.

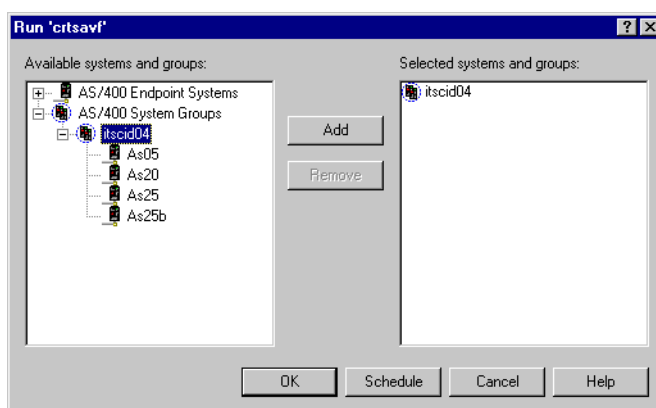


Figure 24. Select endpoint systems to run the command

6. Click **OK** to start the command task immediately or click **Schedule** to specify how often you want to run this task and when you want the task to start. Figure 25 shows an example window to schedule the command.

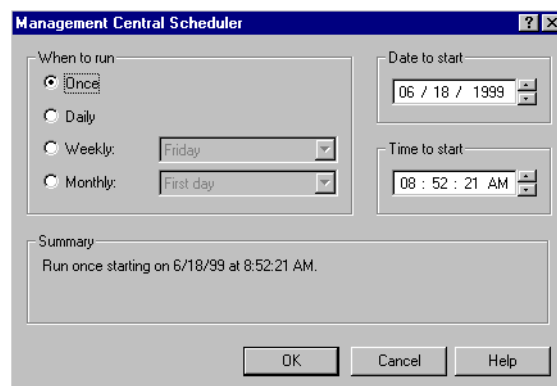


Figure 25. Management Central Scheduler

3.3.2 Single run command

This method allows you to run a command without creating a command definition. You can use this method for one time commands, or a command that is only run seldom. Once the run command has started, a task is listed in Task Activity under

Management Central. All commands run using this method have the task name of "Run Command".

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 Endpoint Systems** or **AS/400 System Groups**.
3. Select the system or group where you want to run the command.
4. Right-click the selected system or group, and select **Run Command**. Notice that the window that you see does not display the fields for a name or description as shown in Figure 26. You cannot set a sharing option, the Sharing tab is not available.

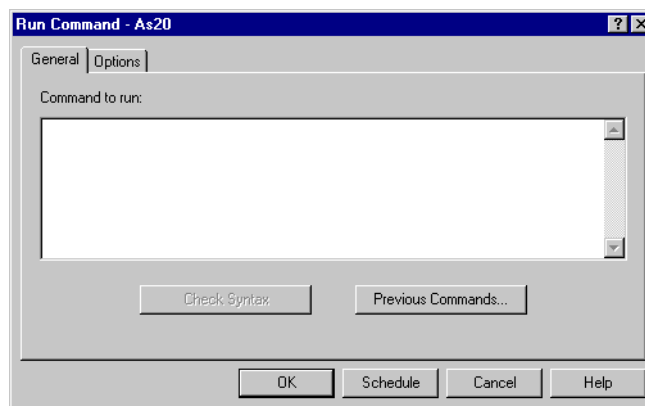


Figure 26. Run Command window

5. Enter the command to be run. Click **Check Syntax** to validate the syntax of the command. You can click **Previous Commands** to select from a list of commands that you previously ran from your PC.
6. To specify options concerning the job log or inquiry messages, click the **Options** tab.
7. Click **OK** to run the command immediately or click **Schedule** to run the command at a later date or time.

3.4 Viewing output

Management Central uses the AFP Viewer (provided with Client Access) to view output. If the output is not displayed correctly, you may need to customize the AFP Viewer. See 2.10.3, "Changing the AFP Workbench Viewer page size" on page 37, for more information about customizing it.

If the command generates a printer output or a job log, you can manage it the same as you can any spooled output from the window as shown in Figure 27 on page 45. To view the output, follow these steps:

1. Click **Task Activity** under **Management Central**. The tasks are listed in the right-hand panel.
2. Right-click on a task. Select **Status** from the menu. If you need additional help with the status information, select **Help** from the tool bar and select **Task Status Help**.
3. Right-click on the system in the status screen and click on **Task Output**.

4. If you need to sign on to the target system, a signon window appears.
5. Right-click on the printer output from the list, and select **Open** to view it.
6. You can select any of the other options available to work with the output.

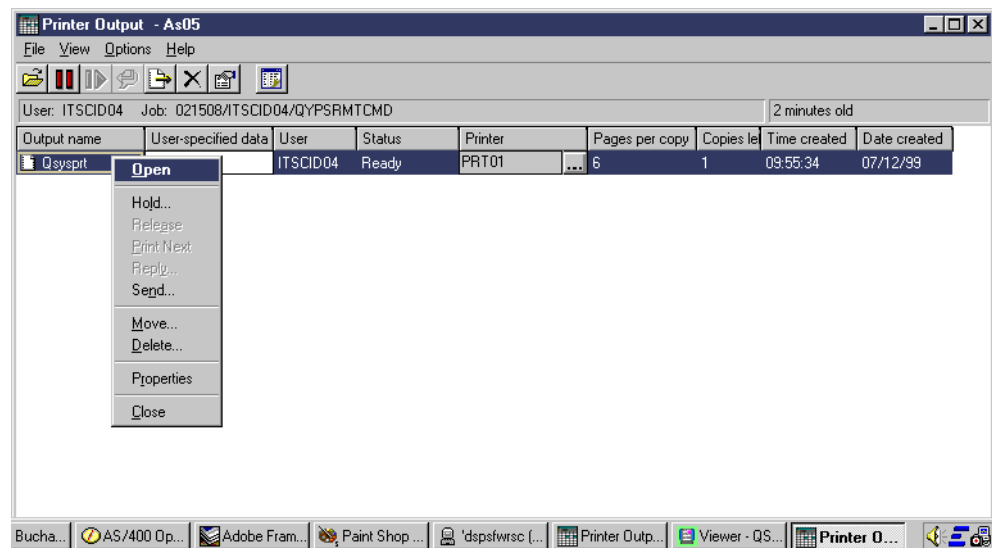


Figure 27. Printer Output display

3.5 Examples of the running command function in Management Central

The following sections offer examples of the some uses of the running command function. The examples give you ideas for making the system administration easier with the running command function of Management Central.

3.5.1 Environment tests and notification

Here are quick and easy commands that can be run on multiple systems at the same time:

- When you are using Management Central, it is important that all systems in the network have the correct QUTCFFSET system value configured. Suppose that you have endpoint systems located in the Central Time zone, and grouped in one system group as shown in Figure 28 on page 46. Make sure that all the endpoint systems have the correct system value.

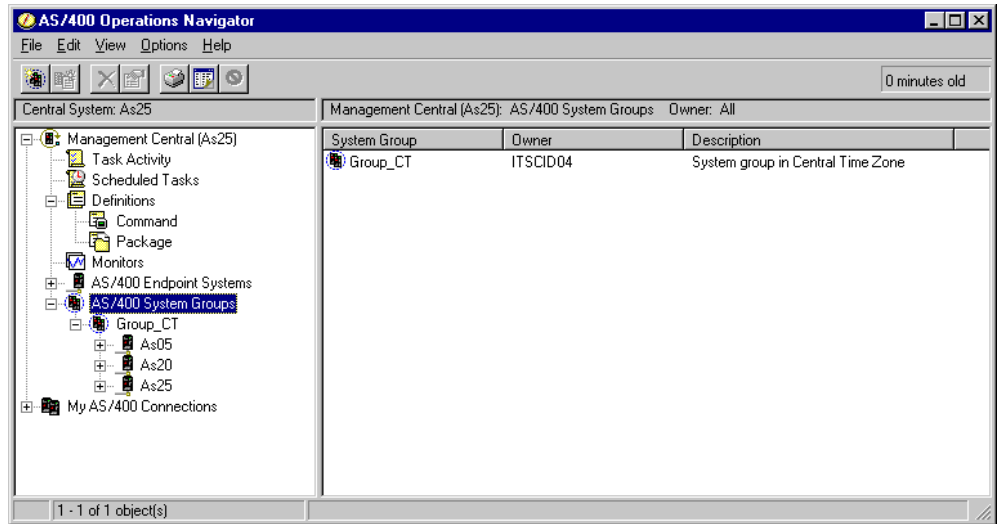


Figure 28. Central time zone system group

Create a command definition for the DSPSYSVAL command. Figure 29 shows a sample command definition window.

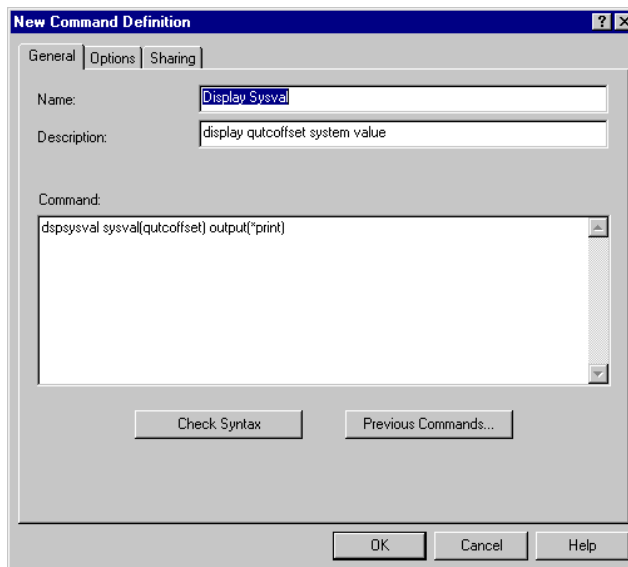


Figure 29. DSPSYSVAL command definition

Next, run the command definition, `Display Sysval`, to the system group, `Group_CT`. Figure 30 on page 47 shows the system group on which the command will be submitted.

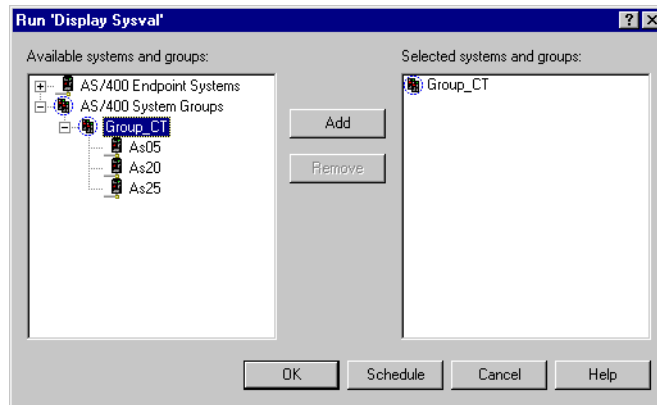


Figure 30. Run the DSPSYSVAL command to Group_CT

To review the output from the command, right-click on the task in the Task Activity panel, and select **Status**. A window similar to the example in Figure 31 appears.

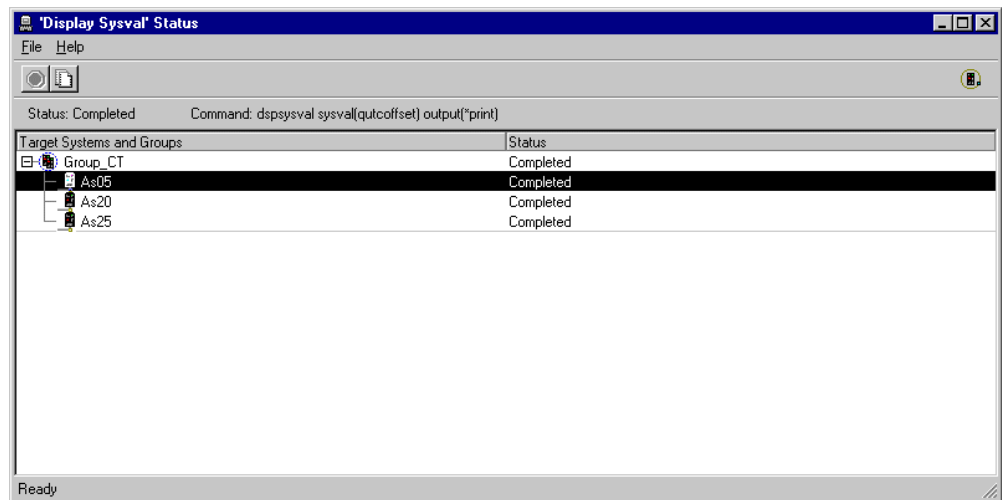


Figure 31. Task output of Display Sysval command definition

The print output is grouped in one window, so you do not have to look for the output. To view the output, right-click on one of the systems, and select **Task Output**.

When you need to change the system value, such as on the date on which it changes from standard time to the daylight saving time, you can run the following command to all the endpoint systems in the system group:

```
CHGSYSVAL SYSVAL(QUTCOffset) VALUE(' -0500')
```

- You can use the running command function to notify interactive users on all endpoint systems of pending action, such as the need to power down the system. An example is:

```
SNDBRMSG MSG('Please sign off. The system will be powered off in 10 minutes.') TOMSGQ(*ALLWS)
```

You can use the command definition to save this command and run it whenever you need. Or you can use the single **Run Command** from an endpoint system.

3.5.2 Security and authorization management

The following examples show scenarios for user profile management on multiple AS/400 systems:

- When your company has a new employee and you need a user profile for them on all endpoint systems, you can use the running command function to create the user profile. Enter `CRTUSRPRF` in the **Command** field. Figure 32 shows a sample command definition.

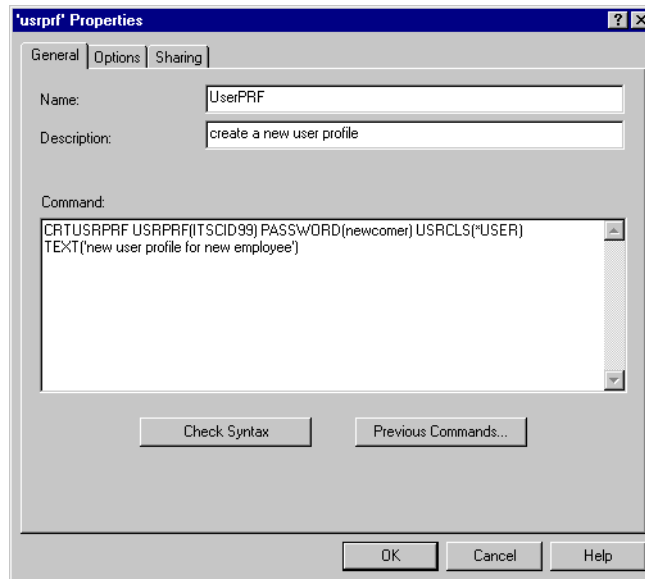


Figure 32. New user profile command

Be aware that the password is visible and sent to the endpoint systems in clear text. For this reason, you may want to use SSL connection, and may not want to share the command with other users. For a more detailed discussion about the SSL connection for Management Central, see Chapter 11, “Secure Sockets Layer (SSL) support” on page 187.

- When you no longer need a user profile, you can use the running command function to delete it on multiple endpoint systems. An example is shown here:

```
DLTUSRPRF USRPRF (ITSCID99) OWNNOBJOPT (*DLT)
```

- Management Central users can look at authority for a user on an endpoint system, using the command:

```
DSPUSRPRF USRPRF (xxx) TYPE (yyy)
```

Here, `xxx` is the user profile name, and `yyy` is a type of information (`*BASIC`, `*ALL`, `*CMDAUT`, `*OBJAUT`, `*OBJOWN`, and so on).

3.5.3 Running multiple commands

Management Central's running command does not give the capability to run multiple commands at one time. To get around this, send a CL program or a batch

job stream to the endpoint systems and run it. There are some advantages and disadvantages with the two methods.

To send and run a CL program, you have to create it before distributing and running it on all endpoint systems. It may be faster than a batch job stream when executing on the endpoint systems. Also, it is easier to browse an output from the program, because the output can be viewed directly from the Status window of the Task Activity.

To submit a batch job stream, you have to create a source file that contains commands. You do not have to compile or create a program from it. Executing a batch job stream may take longer time than executing an equivalent CL program. The output, if it produces, is not viewed directly from the *Status* window. It is a different job than what Management Central submits on the endpoint systems. To view it, you have to access the endpoint systems and locate the output by yourself.

If a CL program is frequently used, consider placing the program on the endpoint systems and run the `CALL` command to call the CL program.

For more details about sending a job stream and a CL program, and executing them, refer to 4.4.2, “Sending a batch job stream” on page 59.

Chapter 4. Packaging and sending objects

In Management Central, packaging and sending objects is used to send file objects, libraries, or integrated file system (IFS) files to endpoint systems or system groups. You can select related files and folders and group them together by creating a package definition on the central system. You can then treat them as a logical or physical package, such as configuration data, Java applications, HTML Web pages, and software programs.

Creating a snapshot of your files allows you to distribute today's version of the files at a later date. For example, you can keep more than one version of copies of the same set of HTML files, and send these copies when the new HTML Web pages are distributed to all of your Web servers.

Hint

When distributing a Java program, use the snapshot. This ensures that all programs and their dependencies are correct at that given moment in time. When the distribution takes place, there will not be any program dependency errors.

You have the ability to schedule recurring distributions and to run a command after distribution is successfully completed. This means that you can:

- Distribute a batch input stream and run it
- Distribute a set of programs and start your application
- Distribute a set of data files and run a program that acts on that data

Packaging and sending files uses a unique TCP/IP program. There are two other common methods of object transfer, but neither one has the ability to distribute to multiple systems. The FTP method of file distribution is from point A to point B. ObjectConnect/400 is an OS/400 utility that allows you to move objects between two AS/400 systems using save and restore commands. It moves the object directly to the target system without using save files or distribution queues, but it only allows you to send them between point A and point B. It uses AS/400 FTP server subcommands through a LAN or OptiConnect/400.

4.1 Creating a package definition

There are two steps involved in using packaging and sending files in Management Central. The first is creating the package definition, and the second is sending the package once it is created.

To create a new package definition, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **Definitions**.
3. Right-click **Package**, and select **New Definition**.
4. Specify a name and a brief description for the package definition.
5. Select the **Source** system.

This is the name of the AS/400 system that contains the files that are to be packaged. This defaults to the central system, but it does not have to be the central system. The source system must be an AS/400 system running Management Central on OS/400 V4R4 or later. The source system should not be designated as a target system to receive the distribution package. If the source system is part of a group, the rest of the systems in the group will receive the package, and the source system will show a message in the status column stating: *System ignored - same as source system*.

6. Click **Add** to browse the file system of the source system and select a combination of files and folders.

If you are not already signed onto the source system, you may be prompted for a user ID and password. You must have authority to the files that you are selecting on the source system.

Expand the "+" signs until you see the object that you want to send. See Figure 33 for an example.

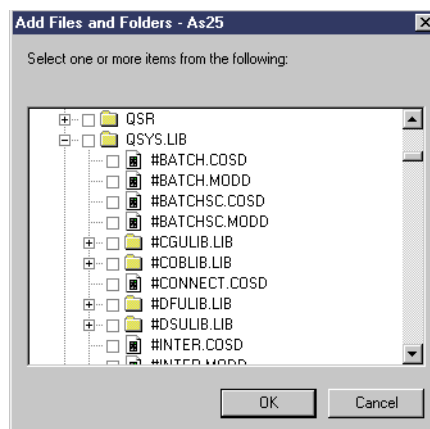


Figure 33. Browse objects for selection

Be aware that when you expand QSYS.LIB, it may take a while to display. In the QSYS.LIB file system (under the QSYS.LIB folder), all libraries and files that contain members will appear as folders. Libraries, physical files, physical file members, and programs can be selected. You select the files or folders by checking the box to the left of the object. After you make your selections, click **OK**. There is an icon to the left of the object in the selection list that indicates whether it is a file or a folder.

You can specify a target path where the files will be stored on the target system after they are received. You can specify a new name on the target system for any file or folder in the package. If you do not specify a target path, the source path will be used as a target. See Figure 38 on page 59.

To remove a row from the list of **Selected files**, highlight the row and click **Remove**.

You can select more than one file in the Selected files and folders field. Any combination of files from a single file system can be selected or specified. That is, you cannot mix a file in QSYS.LIB file system with a file in the IFS. Make sure that all path statements refer to the same file system. Files from one file system cannot be sent to a different file system (for example, IFS to QSYS and vice versa).

Subfolders can be included or excluded from the distribution using the Options tab. The default is to include all subfolders. Any files in the subfolders will be distributed. If the option is unchecked, then only the files in the path specified will be sent.

7. Check **Create snapshot** to create a snapshot of the selected files. See 4.1.1, “Snapshots” on page 54, for information about snapshots.
8. Select the **Sharing** tab to specify whether you want to share this package definition with other users.
9. Select the **Options** tab to specify additional options for this package definition. For example, you can specify whether to keep existing files or replace them when a file already exists on the target system. The default is to keep existing files.

Select **Advanced** to specify actions to be taken when creating a snapshot or when you are sending objects. You can specify:

- A current or previous release
- Whether to continue to save if some objects cannot be saved
- Whether to save while an object is in use
- Whether to allow all object differences on restore

Management Central creates a save file when sending the package definition if the definition does not have the associated snapshot, or when creating or updating a snapshot. These options take effect in the previous mentioned cases. If you send a definition with an associated snapshot, these options are ignored.

10. Select the **Actions** tab to specify a command to be run on the target system when this package has been successfully received. You can click **Check Syntax** to validate the syntax of the command. You must have authority to this command on the target system.
11. Click **OK**.

You can view or change the information about the package definition by right-clicking on the package definition and selecting **Properties**. Use the **General** page shown in Figure 34 on page 54 to see details about the package definition and the path to be used when the files are sent to the target system.

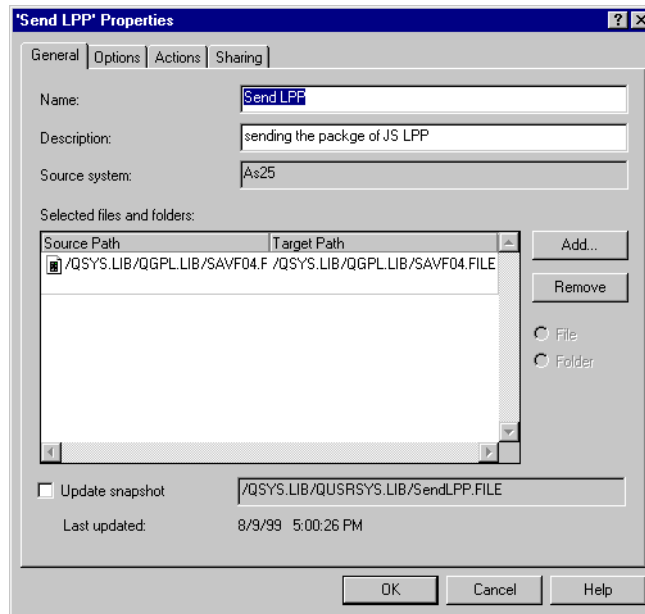


Figure 34. Package definition General tab

You can choose to create or update a snapshot on the source system of the selected files. The Updating Snapshot window, shown in Figure 35 is displayed as it creates or updates the snapshot on the source system. If a snapshot exists, you can see the date and time it was last updated in the General tab.

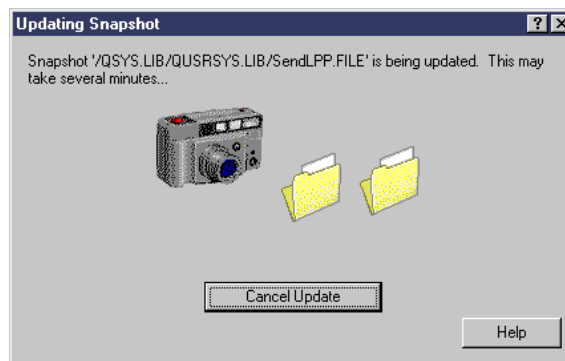


Figure 35. Snapshot Progress display

4.1.1 Snapshots

A snapshot is a save file that contains the data at a particular instant in time for all the files in a package. You can choose to create a snapshot file for the package definition at any time, and distribute that version of the files at a future time. Once the save file is created, it will remain on the source system until deleted. When the package definition is deleted, an option to delete the save file is presented.

When creating a snapshot, you can use the default name for the save file that contains the copy, or you can specify a new name when you indicate the path. You must specify both a name and a path. For example, specify `/qsys.lib/qusrsys.lib/myfile.file` to create a copy of your selected files in a save file called *myfile* in the QUSRSYS library. The path must be specified in the

format `/qsys.lib/libname.lib/filename.file`, where `libname` and `filename` are valid AS/400 names. A snapshot can contain only objects from the same file system. During an update, the snapshot (save) file is refreshed with the current version of all files listed in the package definition. The "Snapshot Updated" date and time is changed. You can cancel the create or update operation by clicking the **Cancel Update** button shown in Figure 35 on page 54 before finishing, but the snapshot may be unusable if it is canceled before finishing.

4.2 Sending a package

After you create your package definition, you can send it to one or more systems or groups. Any distribution task can be restarted by right clicking on the package definition under **Task Activity** and selecting the **Start Based On** option. The distribution runs from the beginning, and any objects already distributed will be sent again. You can change the target system for the distribution, but not the source system. This is useful in the case of a communication failure.

To send your package, follow these steps:

1. Expand **Management Central**. Expand **Definitions**. Select **Package**. The list of package definitions in the right-hand panel shows the owner, source system, and snapshot details for each definition that the user is authorized.
2. Right-click on the package definition that you want to send, and select **Send**. The window that appears displays a list for system selection. The destination of the last distribution sent is provided as the default.
3. Expand **AS/400 Endpoint Systems** or **AS/400 System Groups**.
4. Select the systems or groups to which you want to send the package definition. Click **Add**. Continue to select and add the systems or groups to which you want to send the package. If the same system is specified in two different system groups, the files will only be sent once to that system. If the source system is part of a group that you selected, it will ignore that system and send the package to the rest of the systems in the group. You will see a status of: *System ignored - same as source system*. Verify your list on the right-hand panel.
5. Click **OK** when your selection is finished to send the package immediately, or click **Schedule** to set a particular date and time to send the package. For more information about scheduling, see 2.9.2, "Scheduling tasks" on page 30.
6. Check **Task Activity** under **Management Central** to verify that the task completed successfully. The window shows the distribution task with a type of "Send Files".
7. A distribution can be stopped at any time. To stop a distribution, right-click on the task, and select **Stop**. This ends the entire distribution. Files already transferred will be left on the target system.

4.3 Viewing status

You can view the current status of tasks of sending packages. From the status window, you can also browse job logs and printer output of the task.

4.3.1 Detail status

You can check the status of the package distribution as it is running. If files are being sent, a save file will be created automatically during this step (unless the package already has a snapshot). To view the status, select the task from the right-hand window in the **Task Activity** container under **Management Central**. Right-click and select **Status** or double click on the task. A status of *Starting - preparing to send* indicates that work is being done on the source system before the target systems are contacted. The detail status shows how much data has been transferred to each target system, as well as the total amount of data to be transferred as shown in Figure 36.

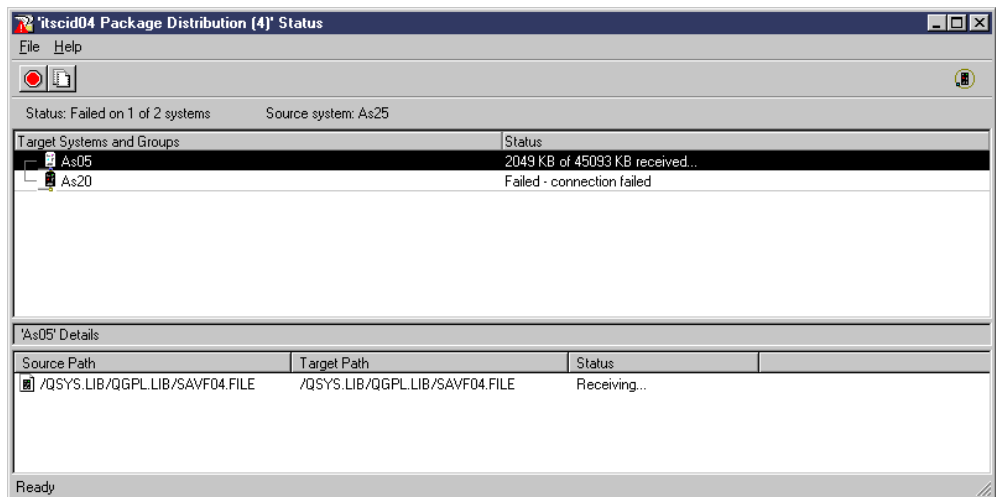


Figure 36. Object distribution detail status display

The bottom panel shows the files for this distribution and the status of each. A status of *skipped*, as shown in Figure 37, indicates that the file was not transferred because it already existed on the target system.

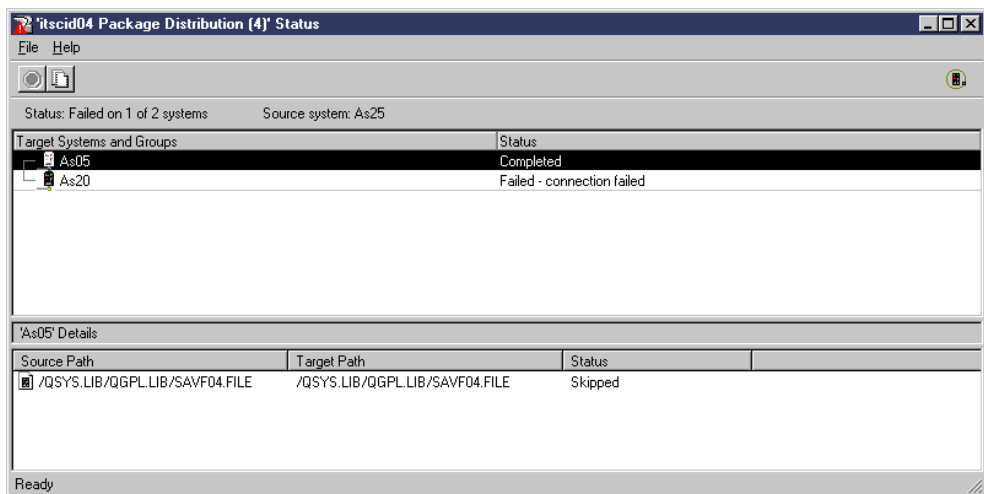


Figure 37. Object distribution status display

4.4 Examples

The following sections show you two examples that help you identify the areas where the packaging and sending files function of Management Central are applicable.

4.4.1 Distributing licensed program products

Installing a new software product or a new version of a software product on several systems can be a time-consuming task. With packaging and sending files, the task can be defined and scheduled for a convenient time. If the shift operator starts the task, the primary operator can verify completion or monitor its progress.

There are several steps required to distribute a licensed program product:

1. Create a save file to save the licensed product.
2. Save the licensed product in the save file.
3. Create a package definition to send the save file.
4. Send the package.

In the following scenarios, it is supposed to distribute the licensed program called 1MGTC01.

4.4.1.1 Creating a save file

You must create a save file on the source system to save a licensed program product to it. When you create a command definition to do this, you can run this command on other systems whenever necessary.

Follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **Definitions**.
3. Right-click on **Command** and select **New Definition**.
4. In the **Name** field, enter `Crtsavf` and any type of description in the **Description** field.
5. In the **Command** field, enter the command:

```
CRTSAVF FILE(QGPL/SAVF04) TEXT('save file for licensed program, 1MGTC01')
```
6. Click on the **Check Syntax** button to make sure the command is correct and select **OK**. Select **OK** again.
7. Click on **Command** under **Definitions** to list the commands in the right-hand panel.
8. Right-click on the command definition in the right-hand panel, and select **Run**.
9. Choose only the source system to run the command and click on **Add**. If the list shows any other systems, remove them from the list.
10. Click on **OK**.
11. Check the **Task Activity** under **Management Central** after the task has run to make sure it completed successfully.

4.4.1.2 Saving a licensed program product

Create a command definition to save the licensed product. This is beneficial if you want to save the product multiple times, such as before and after an upgrade.

Follow these steps:

1. Right-click on **Command** from the Management Central screen, and select **New Definition**.
2. Enter a name in the **Name** field and a description in the **Description** field.
3. In the **Command** field, enter the command:

```
SAVLICPGM LICPGM(1MGTC01) DEV(*SAVF) SAVF(QGPL/SAVF04)
```
4. Click on the **Check Syntax** button to make sure the command is correct, and select **OK**. Select **OK** again.
5. Click on **Command** under **Definitions** to list the commands in the right panel.
6. Right-click on the command definition, and select **Run**.
7. Choose only the source system to run the command, and click on **Add**. If the list shows any other systems, remove them from the list.
8. Click on **OK**.
9. Check **Task Activity** under **Management Central** to make sure the command completed successfully.

4.4.1.3 Creating the package definition

To create the package definition for the licensed program product, perform the following steps:

1. Expand **Management Central** and **Definitions**.
2. Right-click on **Package**, and select **New Definition**
3. Give the package a name and a description. Choose the source AS/400 as the **Source** system.
4. Click **Add** to select the file (SAVF04 in QGPL) that you created in 4.4.1.1, "Creating a save file" on page 57, from the list. Check the box to the left of the file name. Select **OK**. It shows you the path name for the source and the target system as shown in Figure 38 on page 59. You can change the path name of the target system, if you prefer.
5. Select the **Actions** tab. Type in the command to restore the licensed program:

```
RSTLICPGM LICPGM(1MGTC01) DEV(*SAVF) SAVF(QGPL/SAVF04)
```

You can use the **Check Syntax** button to verify the syntax of the command.
6. Select **OK**.

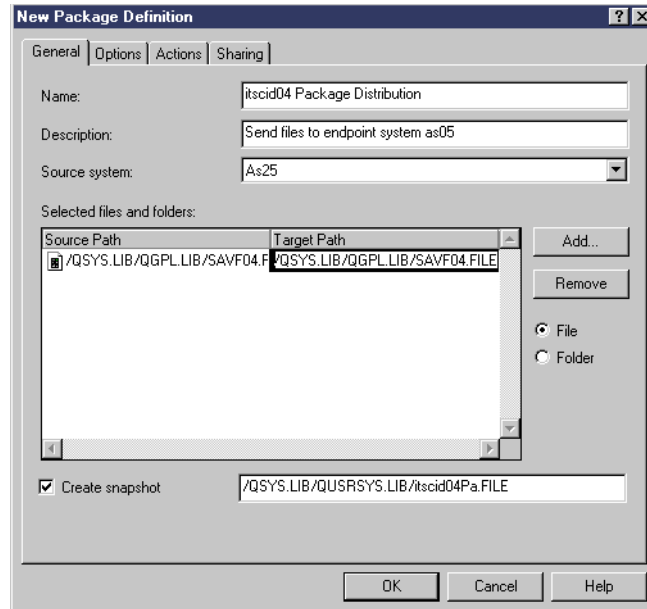


Figure 38. New package definition display

4.4.1.4 Sending the definition

To send the package definition, follow these steps:

1. Under **Management Central**, click on **Definitions->Package** to list the package definition that was created.
2. Distribute the package created by double clicking on the package definition, or right-click on it and select **Send**. Choose the endpoint systems or groups to receive the licensed program and restore it. Select **Add**. When you have all of the selected systems listed in the right-hand panel, select **OK** to send immediately or click **Schedule** to run at a later date or time.
3. Check in **Task Activity** under **Management Central** to make sure the job completed successfully.

4.4.2 Sending a batch job stream

Management Central's running command function allows you to submit one command. There may be cases where you want to send more than one command to the endpoint systems. One way to get around this restriction is to send a batch job stream, which is a database file member, then submit it on the endpoint systems. A sample scenario is to change the system values, QUTCFFSET and QTIME, at one o'clock in the morning on the day when it changes from standard time to daylight saving time. The systems are supposed to be in the Central Standard Time zone.

1. Create a source file member (CHGTIME in JOBSRC) and type the statement:

```
//BCHJOB JOB(itscid04) JOBQ(QBATCH)
          CHGSYSVAL  SYSVAL(QUTCFFSET) VALUE('-0500')
          CHGSYSVAL  SYSVAL(QTIME) VALUE('020000')
          ENDTCPSVR *MGTC
          DLYJOB DLY(20)
          STRTCPSVR *MGTC
//ENDBCHJOB
```

2. Expand **Management Central**, and expand **Definitions**.
3. Right-click on **Package**, and select **New Definition**.
4. Type in a name for the package.
5. Select the source system. In this scenario, we use AS25. Click the **Add** button to select the source file member for the batch job stream. When you finish selecting the file member, a window appears as shown in Figure 39.

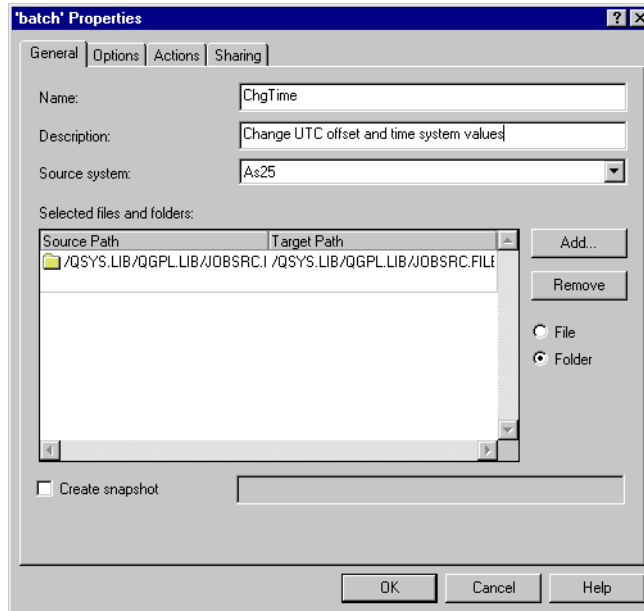


Figure 39. Package definition to submit a job stream

6. Click on the **Actions** tab to enter a command that is submitted after the package is sent to the endpoint systems as shown in Figure 40.

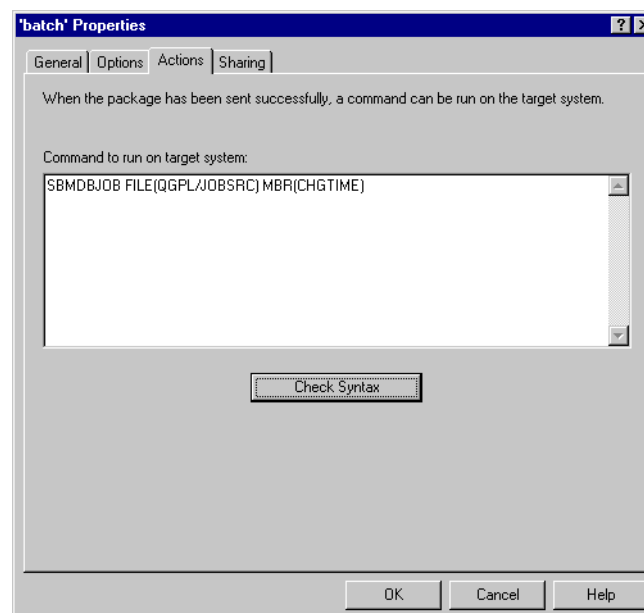


Figure 40. Command to submit the batch stream

7. Click **OK** to finish the definition.
8. Right-click on the package definition that you created in the right panel of the window and select **Send....**
9. Select the target endpoint system group, such as Group_CT, which needs to change to daylight saving time.
10. Click **Schedule** to schedule the date when daylight saving time begins. See Figure 41 for a sample scheduling window.

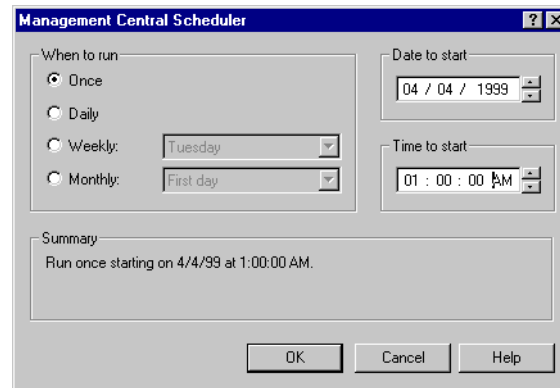


Figure 41. Scheduling the batch job stream

4.5 Using Operations Navigator

You can use Operations Navigator to send files or folders without creating a package definition. Notice that an Actions tab is not available to run a command in this method. You can monitor your job under **Task Activity** in **Management Central** after it starts.

Use the following steps to send files and folders:

1. In **Operations Navigator**, expand **My AS/400 Connections**.
2. Expand the system that has the files you want to send.
3. Expand **File Systems**.
4. Expand **Integrated File System**.
5. Expand **Root** (or the file system you want).
6. Click the folder from which you want to select. The files and folders appear in the right-hand panel. Select the files or folders by highlighting them. To select more than one file or folder, hold the Control key down while highlighting them.
7. Right-click on the selected files or folder, and select **Send**.
To select an entire folder, right-click the folder in the left panel, and select **Send**.
8. The Send Files window allows you to select the systems or groups to send the files or folders. The General tab displays the files and folders you selected. You cannot add or remove items from the list. If your list is not correct, you must return to your selection screen and select additional files or folders or deselect files or folders.

9. Click the **Options** tab to select whether to include subfolders and whether to replace the file if it exists on the target system.
10. When you finish your selections, click **OK** to send immediately. Or click **Schedule** to send them at a later date or time.

Chapter 5. Monitoring system performance

Management Central *monitors* can collect and display real-time performance data for your AS/400 systems. Detailed graphs help you visualize what is going on with your systems as it happens. You choose which AS/400 systems and performance measurements to display, and then, use Management Central functions to create and start the appropriate monitors. The performance measurements from which you can select are termed *metrics*. You can have multiple monitors active at the same time.

In addition, you can establish thresholds for selected metrics collected by each monitor and automate the triggering of warning messages or other actions when the measurements exceed these thresholds. This simple automation frees you to do other tasks. Management Central will continue to monitor your systems and perform any threshold commands or actions you specified, even if your PC is inoperative.

Note

To collect performance data for later analysis, you should use Management Central Collection Services. The monitors do not perform this function. Rather, monitor graphs show your immediate system performance data. For further information on Collection Services, refer to Chapter 8, "Collecting performance data" on page 129.

Do not forget that online Help is available for every component of a monitor or monitor graph. You can always click the **Help** button or right-click elements in monitor graphs to find What's This help. In many instances, the online Help offers ideas to improve the way you manage your AS/400 systems.

5.1 Creating a new monitor

Creating a new monitor is a quick and easy process that begins at the New Monitor window. In Management Central, right-click **Monitors** and select **New Monitor**. Then follow these easy steps:

1. Select performance metrics. Use the New Monitor – General page to name your monitor and select metrics. You can monitor any number of metrics on any number of AS/400 systems or system groups.
2. Set threshold actions. Use the New Monitor – Actions page to specify the actions you want to occur on your PC when a metric threshold is triggered or reset.
3. View and change your metric information. Use the New Monitor – Metrics page to edit the properties for each metric that you selected on the New Monitor – General page. You can edit the collection interval, retention period, maximum graphing value, and display time for each metric you select.
4. Set threshold commands. Use the Thresholds window to enable thresholds and specify commands to run on the host or the client whenever thresholds are triggered or reset. Click the **Edit Thresholds** button on the New Monitor – Metrics page to open the Thresholds window.

5. Run the monitor. Once you create your monitor, starting and stopping it is easy to do.
6. Work with monitor graphs. View your system performance data in an easy-to-use graphical interface. Manipulate your monitors directly from the monitor graphs.

The following sections describe these steps in greater detail.

5.1.1 Selecting performance metrics to monitor

The first step to follow for monitoring system performance in Management Central is to select the system metrics that you want to monitor. The General page in the New Monitor window allows you to view and change general information about monitors, including metrics. To access this page, right-click **Monitors** and select **New Monitor**. The New Monitor window is displayed as shown in Figure 42.

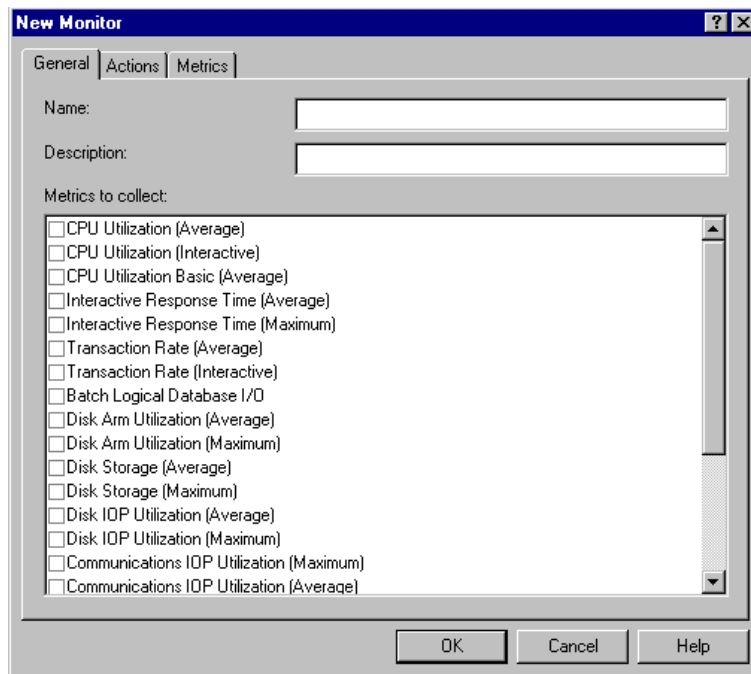


Figure 42. New Monitor window

On the General page, complete the following information:

- Enter a unique name for your monitor. You can enter any name for your monitor up to 256 characters long.
Note: Please do not use any symbols or punctuation.
- Enter a description for your monitor. Giving your monitor a description may help you distinguish any particular monitor from the other monitors you have running.

- Choose your metrics. You can select any metric, a group of metrics, or all the metrics from the list to be included in your monitor. Table 6 describes your options.

Table 6. Description of performance metrics

Metric name	Metric description
CPU Utilization	The percentage of available processing unit time consumed by jobs on your system
Interactive Response Time	The response time that interactive jobs experience on your system
Transaction Rate	The average number of transactions per second completed by jobs on your system
Batch Logical Database I/O	The average number of logical database input/output (I/O) operations currently performed by batch jobs on the system
Disk Arm Utilization	The percentage of disk arm capacity currently used on your system during the time you collect the data
Disk Storage	The percentage of disk storage that is full on your system during the time you collect the data
Disk IOP Utilization	How busy the disk input/output processors (IOPs) are on your system during the time you collect the data
Communications IOP Utilization	How busy the communications IOPs are on your system during the time you collect the data
Communications Line Utilization	The amount of data that was actually sent and received on all your system communication lines
LAN Utilization	The amount of data that was actually sent and received on all your local area network (LAN) communication lines
Machine Pool Faults	The number of faults per second occurring in the system's machine pool
User Pool Faults	The number of faults per second occurring in all of the user pools on the system

If you need more help with metrics, click the **Help** button on the New Monitor – General window for a more detailed discussion.

You can choose to run a monitor that contains any combination of these metrics on any AS/400 system or system groups. Figure 43 on page 66 displays an example of the New Monitor – General page for a new monitor that collects data for two metrics:

- CPU Utilization (Average)
- CPU Utilization (Interactive)

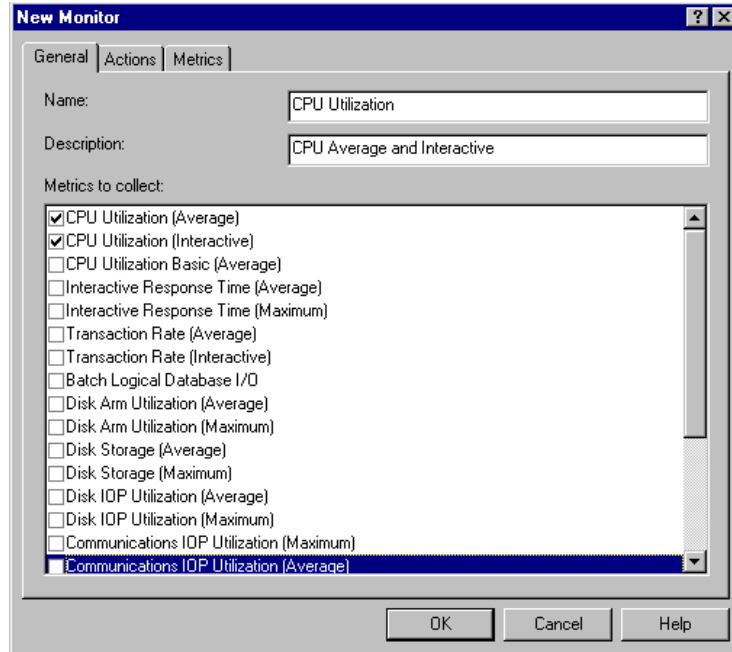


Figure 43. New Monitor window: General page

After you name your monitor and check the boxes to select the metrics you want, you are ready to view and change the threshold actions for the metrics you selected for your monitor.

5.1.2 Setting threshold actions

When you create a new monitor, you can specify actions you want to occur on your PC when a *threshold* is triggered or reset. A *threshold* is a setting for a metric that is collected by a monitor. When the metric reaches the threshold value (called the *trigger value*) you selected, this event causes your chosen *Threshold actions* to happen on your PC. For these actions to occur, the PC needs to be powered on and have an active connection to the central system.

Note

When creating a monitor, you can also set threshold *commands*, which are not the same as the threshold actions described in this section. For an explanation of threshold commands, see 5.1.4, “Setting thresholds and threshold commands” on page 69.

5.1.2.1 Threshold actions: What they do

Threshold actions allow you to determine what you want to happen on your PC when your metric reaches a certain value (called the *trigger value*). This way, threshold actions notify you when threshold events occur. You can also specify what you want to happen on your PC when your metric reaches a second value (called the *reset value*). You can choose to add events to the *Event Log* when your metrics reach trigger or reset values. You can set alarms on your PC. You can even set monitor graphs to open automatically on your PC when your metrics reach trigger or reset threshold values.

5.1.2.2 Threshold actions: How to set

From the New Monitor window, select the **New Monitor – Actions** page to set threshold trigger actions and threshold reset actions. An example of this page follows in Figure 44.

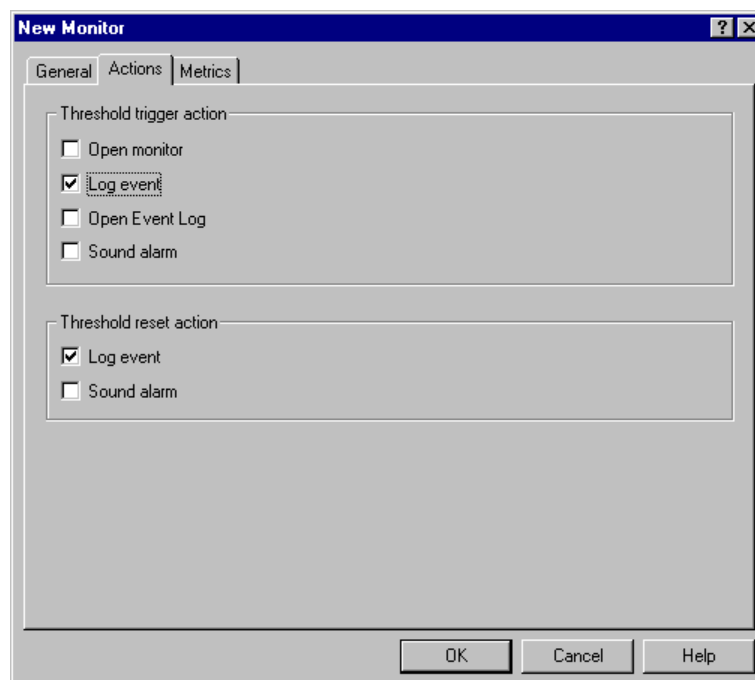


Figure 44. New Monitor window: Actions page

Table 7 explains each of the threshold trigger actions that you can select on the New Monitor – Actions page.

Table 7. Threshold trigger actions

Action	Result
Open monitor	Displays the monitor graph when system performance reaches a threshold trigger for a particular metric. This allows you to see a graphical view of your system performance data as it is being collected. You do not have to keep the monitor graph open on your PC all the time. It opens automatically if you select this action, and you can keep the monitor graph open even if you close Operations Navigator.
Log event	Adds an entry to the Event Log on the central system indicating that the threshold was triggered.
Open Event Log	Displays the Event Log when a threshold trigger occurs. Much like the Open Monitor function, this action opens the Event Log only when you really need it.
Sound alarm	Sounds an alarm on your PC when system performance reaches a trigger value.

You can also select from the *threshold reset actions* shown on the New Monitor – Actions page. Table 8 describes what each of these reset actions does.

Table 8. Threshold reset actions

Action	Result
Log event	Adds an entry to the Event Log on the central system indicating that the threshold was reset.
Sound alarm	Sounds an alarm on your PC when system performance reaches a reset value.

After you select the Threshold Actions you want, you are ready to view and change detailed metric information for each metric you selected for your monitor.

5.1.3 Viewing and changing metric information

The New Monitor – Metrics page allows you to view and change detailed information for each metric that you chose on the New Monitor – General page. To access this page from the New Monitor – General page, click on the **Metrics** tab as shown in Figure 45.

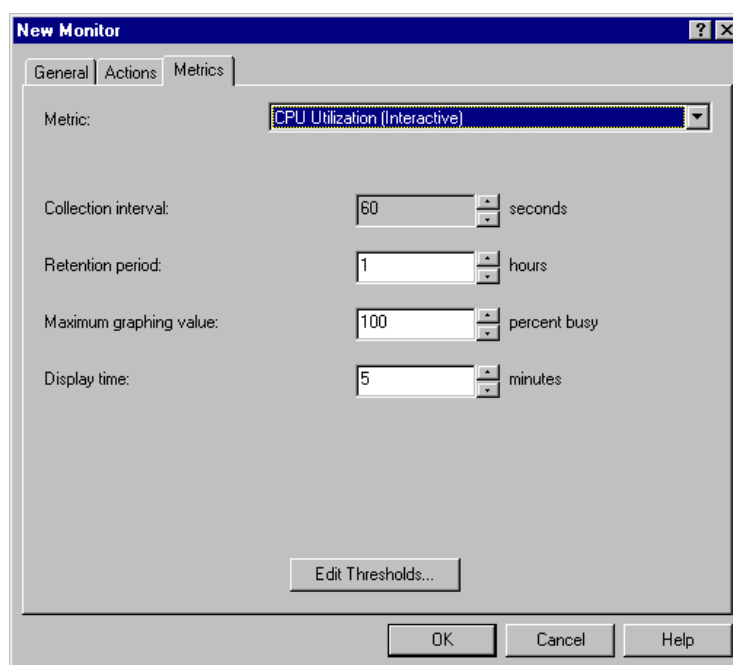


Figure 45. New Monitor window: Metrics page

To edit metric information, select the metric you wish to edit from the drop-down list on the New Monitor – Metrics page. As you select each metric, the other fields shown on this page display the default values for that metric. You may accept the defaults or change any of the following properties:

- Collection interval** Specifies how often metric information is collected. Increase or decrease this number as needed.
- Retention period** Specifies how long the metric information will be stored on the host system. At the end of this period, the metric information is deleted from the database even if your monitor is still running.

Maximum graphing value	Specifies the highest value that will appear on the vertical axis of the monitor graph for this metric.
Display time	Specifies the number of minutes that will appear on the horizontal axis of the monitor graph for this metric.

The Edit Threshold button on this page provides access to the capability to set threshold values and commands, as described in 5.1.4, “Setting thresholds and threshold commands” on page 69.

5.1.4 Setting thresholds and threshold commands

When you create a new monitor, you can choose to run commands on your host or client systems when thresholds are triggered or reset. A *threshold* is a setting for a metric that is collected by a monitor. When the metric reaches the threshold value (called the *trigger value*) you selected, this event causes your chosen *Threshold commands* to run automatically on the host or client system.

Note

When creating a monitor, you can also set threshold *actions*, which are not the same as the threshold commands described in this section. For an explanation of threshold actions, see 5.1.2, “Setting threshold actions” on page 66.

5.1.4.1 What threshold commands do

Use threshold settings to automate any command you want to run when thresholds are triggered or reset. For example, you can set an AS/400 command that prevents any new job from starting when CPU utilization reaches 90%. You can then set another command that allows new jobs to start when CPU utilization falls back to 70%. In another situation, you may have a monitor that is collecting data on average CPU utilization for a particular system. You can set thresholds and specify commands to keep the average CPU utilization between 20% and 90% or any boundaries you choose. In short, you can use threshold commands in any way that makes sense to you.

You can define up to two thresholds for each metric. For each threshold, you can define a *host command*, a *client command*, or both, to run when the threshold is triggered, and another host command, client command, or both, to run when the threshold is reset.

In the Host command field, you specify the command that you want to run on the AS/400 host system when the threshold is triggered or reset. In the Client command field, you specify the command to be run on the PC when the threshold is triggered or reset. Client commands run only if you are viewing the monitor on a PC when the threshold is triggered or reset. They also run on every PC where you are viewing this monitor.

5.1.4.2 How to set threshold commands

On the New Monitor – Metrics page, select the metric you wish to edit from the drop-down list. Click the **Edit Thresholds** button to access the Thresholds window, as shown in Figure 46 on page 70.

Figure 46. Edit Thresholds window: Threshold 1 page

The name of the metric you selected appears at the top of this window, followed by the name you gave this monitor.

This window presents you with two pages, labelled Threshold 1 and Threshold 2. On each page you can define a host command, a client command, or both to run when the threshold is triggered, and another host command, client command, or both to run when the threshold is reset.

By default, the Threshold 1 page is selected. First, turn this threshold on by selecting the **Enable Threshold** option. This activates the other input fields. Defaults similar to those shown in Figure 47 on page 71 are displayed.

Figure 47. Edit Thresholds window: Threshold 1 enabled

In the Threshold Trigger section, you can change the \geq (greater than or equal) default Threshold trigger Value to the $<$ (less than) value where appropriate. When you do so, the Threshold reset default automatically changes to the opposite value.

Select a threshold value in the adjacent field, labelled “percent busy” in the previous example, by entering a value or using the scrolling buttons. The label for this field varies depending on the metric you select. For example, if you select the metric *Machine Pool Faults*, this field will be labelled “faults per second”.

The Duration field defaults to a value of 1 interval. This field refers to the *Collection interval* you defined earlier on the Metrics page. It determines the number of collection intervals that the threshold value must reach before the threshold is triggered. By increasing the interval, you can disregard “spikes” when a value is sustained for a duration longer than 1. Change this value as needed.

In the Host command field, enter any command to be run on the AS/400 host system when the threshold is triggered.

In the Client command field, enter any command to be run on the PC when the threshold is triggered.

In the Threshold reset section, similar fields are presented. Complete them as required. An example of the completed page appears as shown in Figure 48 on page 72.

CPU Utilization (Average) Thresholds - CPU Utilization

Threshold 1 | Threshold 2

☒ Enable threshold

Threshold trigger

Value: \geq 90 percent busy

Duration: 1 intervals

Host command: CALL PGM(*LIBL/Stopjobs)

Client command:

Threshold reset

Value: < 25 percent busy

Duration: 1 intervals

Host command: CALL PGM(*LIBL/Startjobs)

Client command:

OK Cancel Help

Figure 48. Threshold 1 enabled with Host commands

Please note that in Figure 48, the program names Stopjobs and Startjobs are only examples and do not refer to real programs.

You may need to have a second Host or Client command triggered, perhaps by a different Threshold or Reset value, for the same metric. If so, at this point, select the **Threshold 2** page and complete it in the same way.

When you finish editing your thresholds for this metric, click the **OK** button. If you select more than one metric for this monitor, you return to the New Monitor – Metrics page. Select the next metric you wish to edit from the drop-down list. Click the **Edit Thresholds** button to access the thresholds window for this metric and complete as you require.

When you complete editing the thresholds for all the metrics you selected for this monitor, select the **OK** button from the New Monitor – Metrics page. The monitor will be created. Click on the **Monitors** option under **Management Central** and your monitor appears in the right-hand panel, along with any other monitors you created previously, as shown in Figure 49 on page 73.

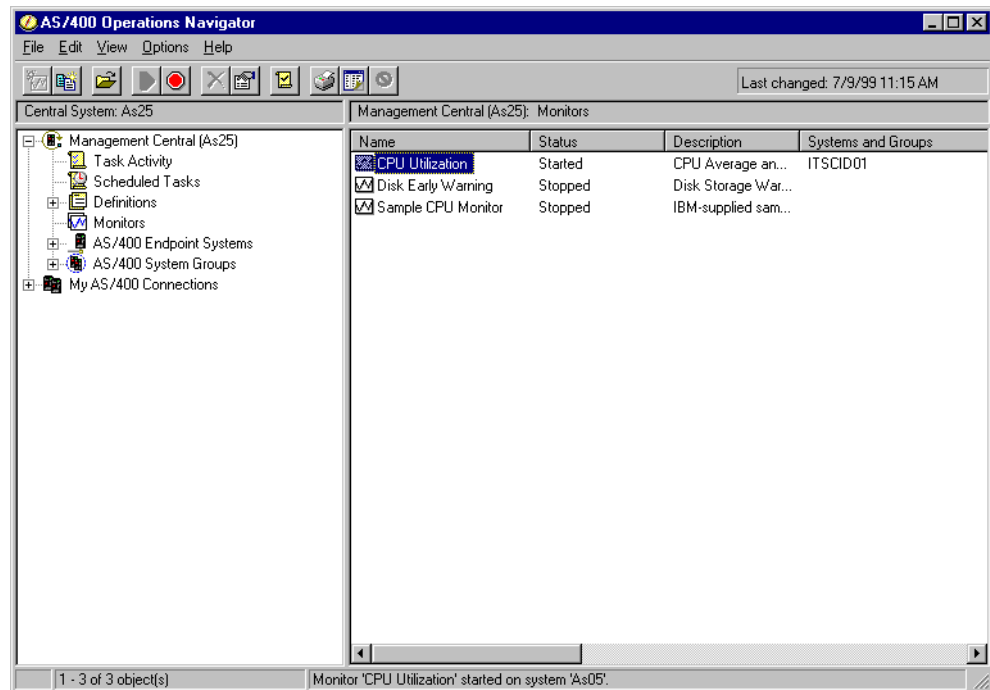


Figure 49. Management Central: Available monitors displayed

5.2 Using a monitor

Your next step is to use the monitor that you created on your AS/400 systems. Starting and stopping monitors are easy processes. In Management Central, select the monitor you wish to start or stop, and click the **start** or **stop** icons in your tool bar. You can also follow the simple steps described in the following section and in 5.2.3, “Stopping a monitor” on page 75.

5.2.1 Starting a monitor

To start your monitor, complete these steps:

1. In Management Central, select **Monitors**. Right-click the monitor you want to start and select **Start**. The Start Monitor window appears.
2. Select the systems or system groups on which you want to run the monitor. Click the **Add** button to include them. Click **OK**. As shown in Figure 50 on page 74, one system group, ITSCID01, has been selected this way.

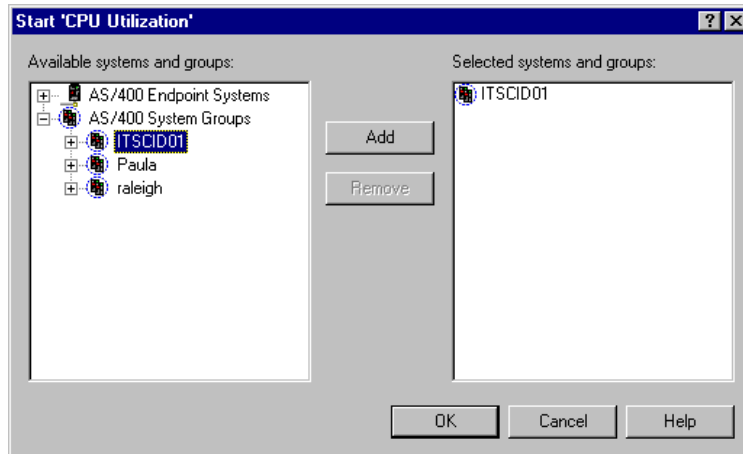


Figure 50. Start Monitor window

5.2.2 Checking the status of a monitor

Once you start or stop a monitor, you can get information about the status of the monitor. Under Management Central, click on **Monitors** to see monitor status information appear in the right-hand panel, as shown in Figure 49 on page 73.

Note: If the Status heading does not appear, click on the **View** option at the top of your Operations Navigator window, and click on **Details**.

Status information is automatically updated. For more detailed status information, right-click a monitor and select **Status** to view the window displayed in Figure 51.

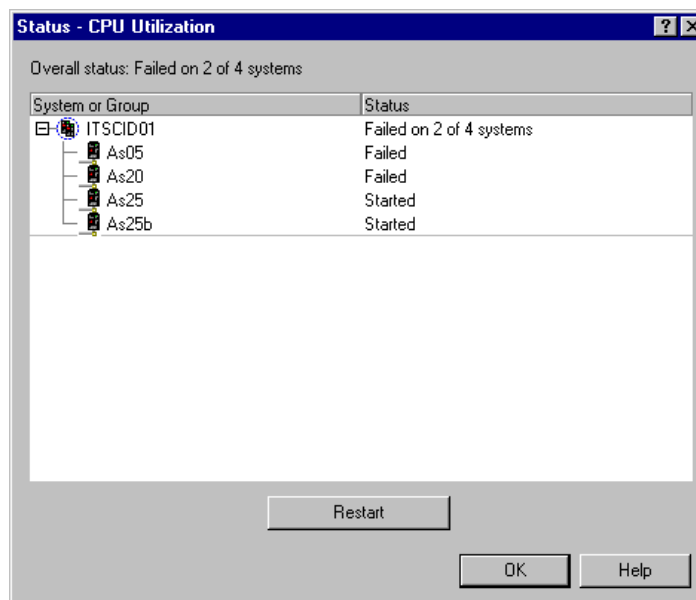


Figure 51. Monitor Status window

You can also watch a monitor's icon in the list of monitors for quick status information. A green icon means that the monitor is running successfully. A red icon means that a problem has occurred.

Once your monitor is up and running, the monitor graphs present real-time system performance data in an easy to use graphical interface. For information on how to use the graphs, refer to 5.4, “Working with monitor graphs” on page 75.

5.2.3 Stopping a monitor

To stop your monitor, follow these steps:

1. In Management Central, select **Monitors**.
2. Right-click the monitor that you want to stop, and select **Stop**.

5.3 Previous releases

To create and run a monitor for a V4R3M0 AS/400 system, using V4R4 Management Central, you must ensure the program QSYS/QYPSSTRS is called on the target V4R3M0 system. The syntax for this is:

```
CALL PGM(QSYS/QYPSSTRS)
```

For releases prior to V4R3M0, you need the IBM Performance Investigator PRPQ for the OS/400 version installed on your system. The Monitor function is not available on endpoint systems running a release of OS/400 earlier than V3R1M0.

5.4 Working with monitor graphs

After you create a new monitor, use the Management Central monitor graphs to view the system performance data the monitor collects. Monitor graphs allow you to interact with your system performance data by manipulating the graph elements themselves. Monitor graphs give you many visual cues to help you identify important system performance events. You can use monitor graphs to change monitor properties, get data in different levels of detail, and present system performance data in a variety of ways. You can also right-click any element of a monitor graph to get more detailed information and help.

To open the graph for a particular monitor, expand **Management Central** and select **Monitors**. Double-click the monitor whose graph you want to see (or right-click it, and select **Open**). A display similar to the one shown in Figure 52 on page 76 appears.

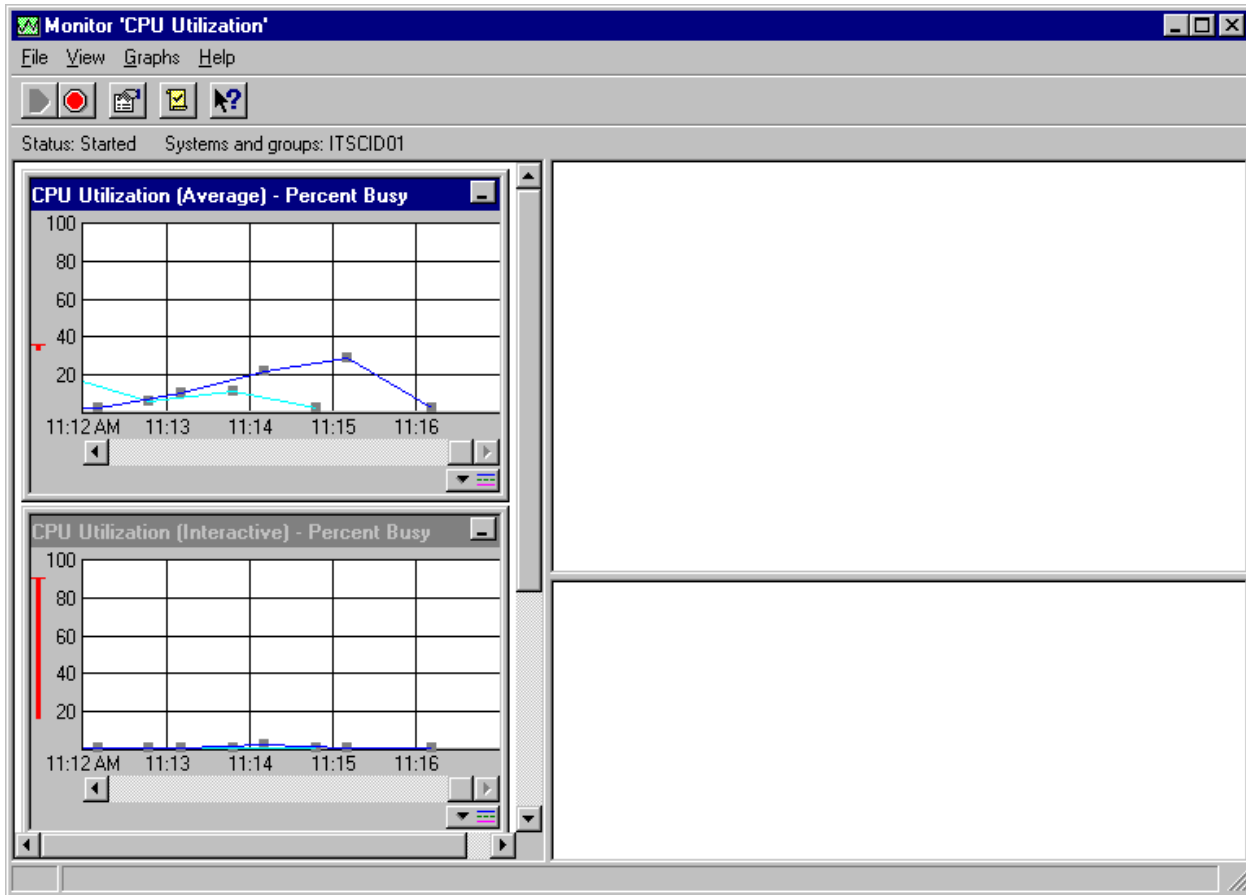


Figure 52. Monitor Graph: Example CPU monitor

The Monitor window contains three panels: Graphs, Details, and Properties. In this example, only the Graphs window is active. Figure 54 on page 78 displays an example where all three panels are active.

To find out which system is represented by each colored line, click on the **legend icon** at the lower right-hand corner of each graph.

When more than two metrics have been selected for a monitor, use the scroll bar to the right of the displayed graphs to scroll to the other graphs, as shown in Figure 53 on page 77.

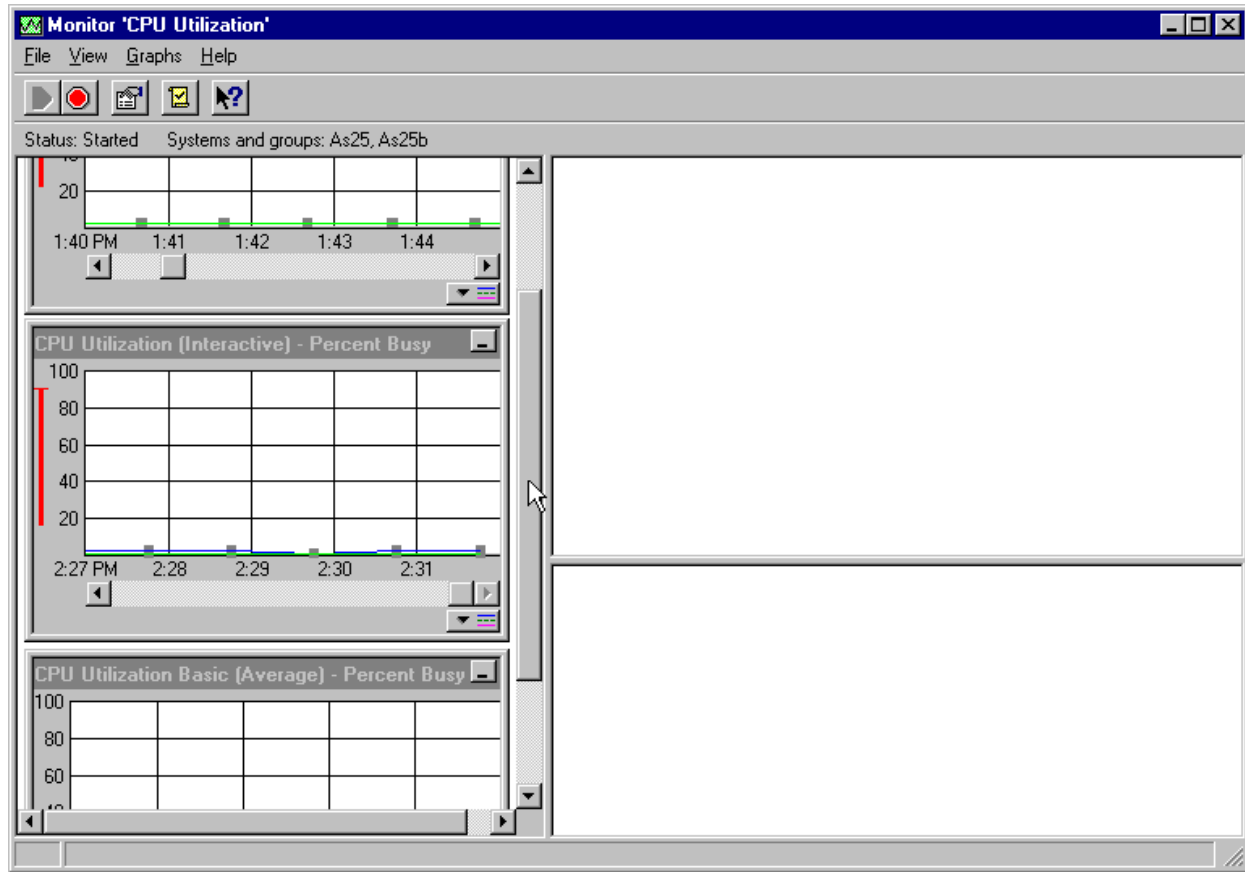


Figure 53. Monitor Graph: Displaying additional graphs

5.4.1 Finding more detailed data

You can use monitor graphs to find more information about system performance. For example, use your mouse to hover over a collection point (or data point) within a graph to get information about the exact time and the AS/400 system for which the data was collected. Click on one of the points on the graph that is marked by a small square. Each of these is a *data collection point* that represents one of the time intervals measured for your graph. Highly detailed information for that data point will appear in the upper right *Details* panel of the monitor window. Click on any item in the Details panel, and the lower right *Properties* panel shows properties for the item you selected in the Details panel. An example of this information appears in Figure 54 on page 78.

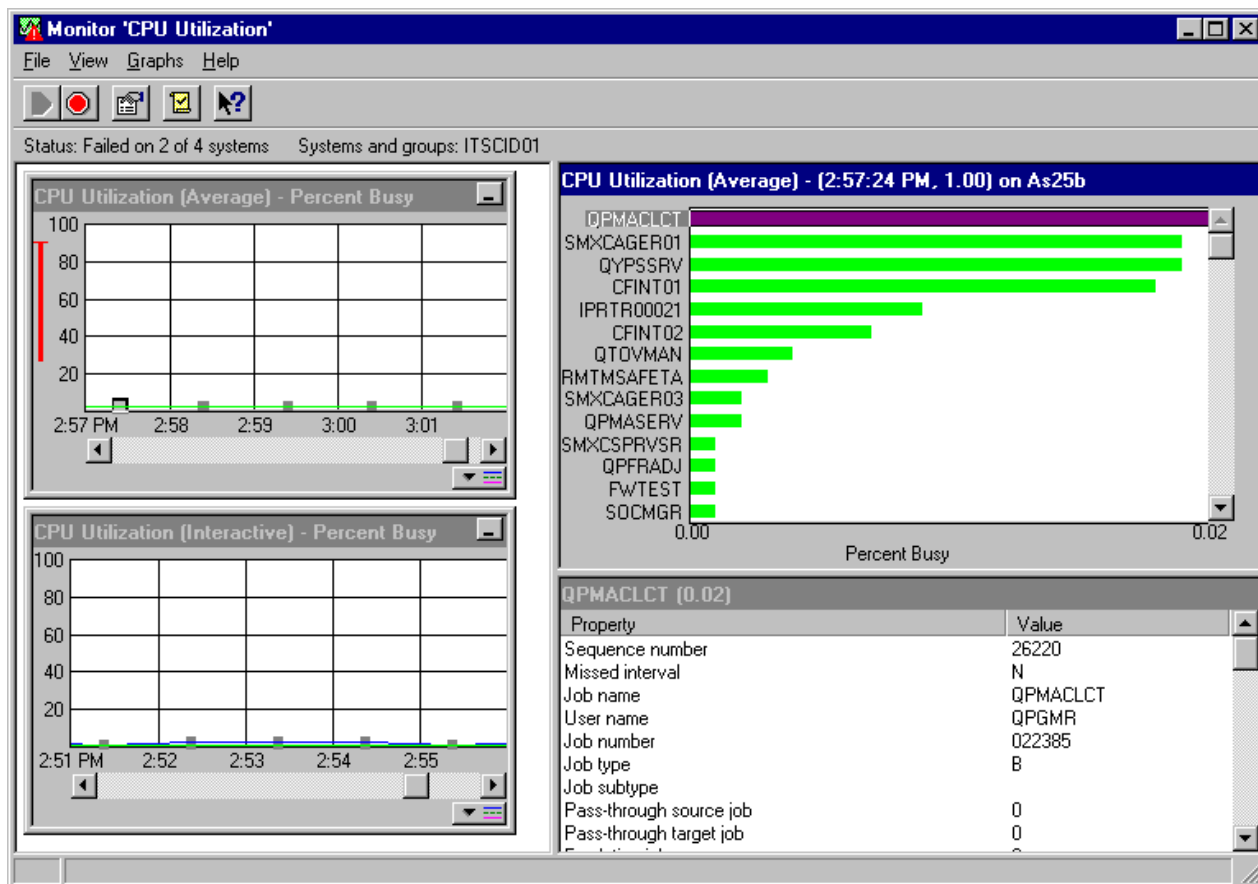


Figure 54. Monitor Graph: Details displayed

Here, the Details panel at the upper right shows a list of all the jobs that utilized CPU during the interval measured by the selected data collection point. For each job, the CPU utilization is displayed. Click on any of the jobs in the **Detail** panel, and the Property panel at lower right displays the properties of the selected job.

You can also select **Status** from the **File** menu to obtain detailed information about the status of your monitor.

5.4.2 Changing monitor graph displays and characteristics

Management Central monitors and monitor graphs contain a great deal of flexibility and functionality that you can use to get the most out of your system performance data. This section describes some tasks you can do to make monitoring your system performance even easier.

5.4.2.1 Changing the Details display

By default, the values in the Details panel are *normalized* to the largest value. This means that the job with the highest utilization during the selected interval is represented by a bar across the entire width of the panel, while the other jobs display with proportionately less utilization. Figure 54 shows an example of this type of display. You can change this so that the actual CPU percentage used by each job is shown. To make this change, right-click on the **Details** panel, and select **Normalize Details**. Then select **To Graph Scale**.

5.4.2.2 Creating different graph line colors for each AS/400 system

Your monitor graphs can become very busy when you are monitoring metrics for a lot of systems or groups. It can become difficult to determine which line belongs to which system. You can change the colors of graph lines and pick specific colors for specific systems. In the main Operations Navigator window, select **User Preferences** from the **Options** menu. Use this window to set the color, width, and style for each line representing of your AS/400 systems.

5.4.2.3 Sorting the bars on your monitor graphs

You can sort the bars that appear in the monitor graphs Details window in a way that makes sense to you. From the **View** menu, select **Sort Details** to arrange the properties in the Details window by Name or by Value. You can also select **Normalize Details** to sort the bars by the scale the monitor graph uses or by the largest value present.

5.4.2.4 Sizing or collapsing panels in the monitors window

You can resize the panels in the Monitors window to show only the information you want to see. For example, if you only want to see the graphs (and not the Details or Properties panels), resize the graphs panels so they fill the entire Monitors window. You can also use the Graphs menu to choose to Tile or Cascade graphs in the Monitors window.

5.4.2.5 Creating shortcuts to your monitors

Use a shortcut to access your monitors at any time without first opening Operations Navigator and Management Central. In Management Central, select **Monitors**. Then select **Create Shortcut** from the File menu to add a shortcut on your desktop.

5.4.3 Using graphs to change monitor properties

You can use monitor graphs to change information about your monitors. Here are some items you can change this way.

5.4.3.1 Changing threshold trigger and reset values

To examine your existing threshold trigger and reset values, move your mouse cursor over the upper or lower end of the *threshold indicator* (vertical red indicator bar) on the left side of your graph. This bar indicates the current threshold trigger and reset values for the monitor. The actual value appears, as shown in Figure 55 on page 80.

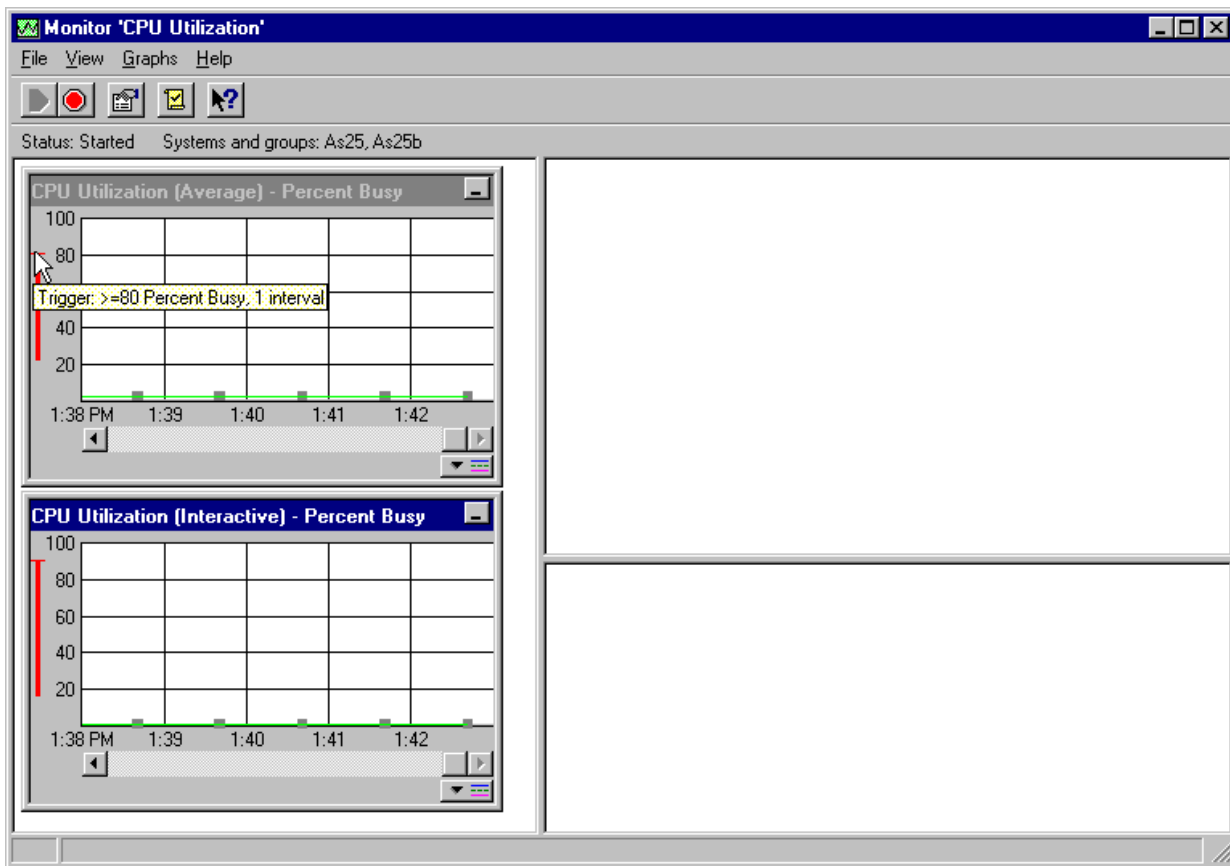


Figure 55. Graph Threshold Trigger value displayed

To change the trigger or reset value while the monitor is active, move the cursor over the upper or lower end of the red indicator bar, and hold down the left mouse button to select that end. Then, move the selected end up or down. As you move it, the newly selected value displays. Move the end until the required value displays and release the left mouse button to set that value.

If there is no threshold indicator (vertical red indicator bar) for a graph, this means no threshold trigger or reset values have been set for the metric shown on the graph.

To set a threshold for a metric where none exists, right-click on the graph for this metric and select **Thresholds** to see the Edit Thresholds window. On this window, you can activate and select values for this threshold as described in 5.1.4.2, “How to set threshold commands” on page 69.

5.4.3.2 Changing systems in a monitor

You can change your selection of systems being monitored while the monitor is active. From the **File** menu, select **Systems and Groups**. The window shown in Figure 56 on page 81 enables you to add and remove systems and groups to and from your monitor.

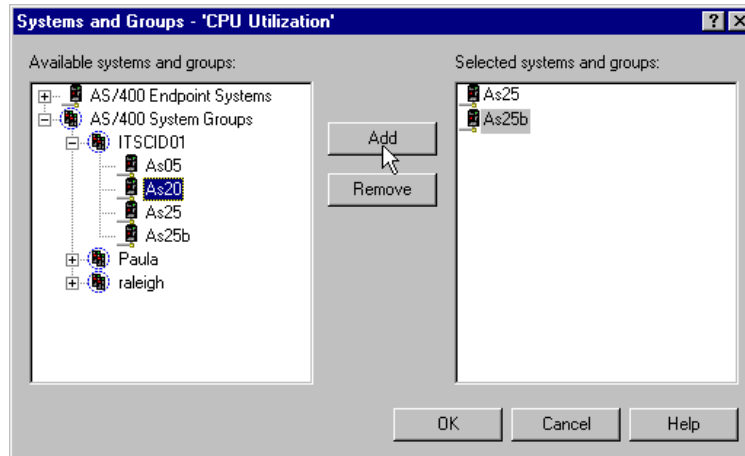


Figure 56. Monitor Systems and Groups: Adding and removing

Select the system or group you wish to add from the available systems and groups in the left-hand panel and click on **Add**. Select the system or group you wish to remove from the right-hand panel and click on **Remove**. Then click **OK**.

These changes take in effect immediately. The description at the top of your graph window reflects the change.

5.4.3.3 Changing monitor metrics

To add or remove metrics from your active monitor, select **Properties** from the **File** menu. The Properties window is identical to the New Monitor window shown in Figure 42 on page 64. Follow the same steps described in 5.1.1, “Selecting performance metrics to monitor” on page 64, to change your monitor metrics. These changes take in effect immediately. A new graph becomes active for each new metric you select. You may need to use the vertical slider bar to the right of the displayed graphs to see the new graph.

5.4.4 Viewing threshold trigger and reset events

When system performance reaches the thresholds that you set, threshold trigger events or reset events occur. These events are logged in the *Event Log*. In this log, you can view the events for a single monitor or a specified set of monitors. You can also specify the events based on the metric collected, or based on the endpoint system or system group that is monitored.

5.4.4.1 Using the Event Log

To open the Event Log, select the **Event Log icon** at the top of the Monitor Graph window. You can also open the Event Log from the Operations Navigator window. Expand **Management Central** and select the **Monitor** option. Then, right-click on the appropriate monitor displayed in the right panel, and select **Event Log**. An example of the Event Log appears in Figure 57 on page 82.

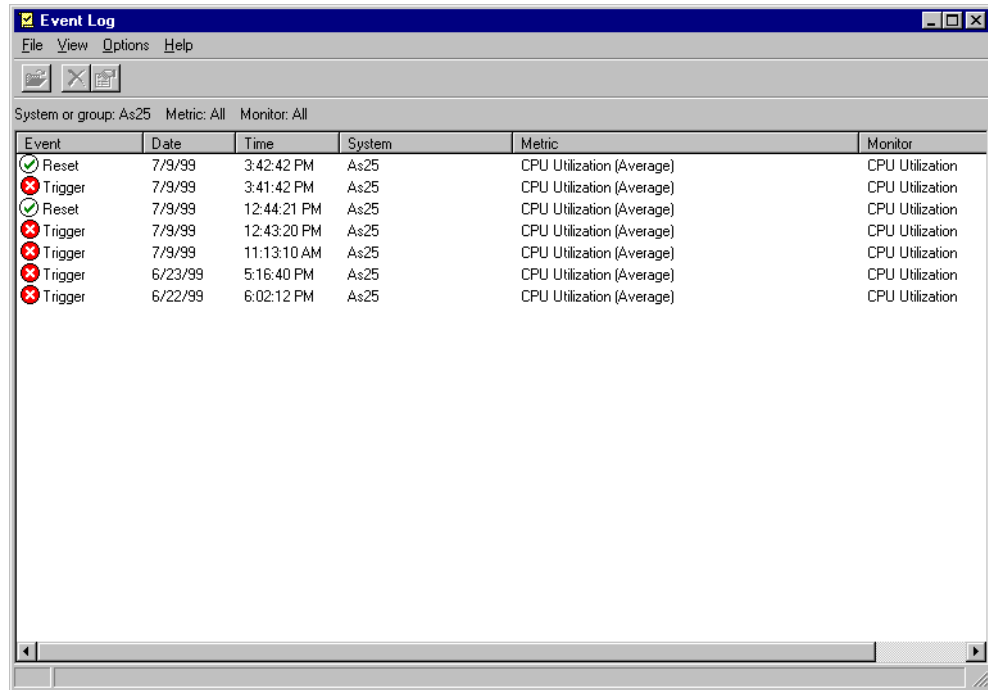


Figure 57. Event Log

From the menu bar in the Event Log window, select **Options->Include**. The Include window is shown in Figure 58.

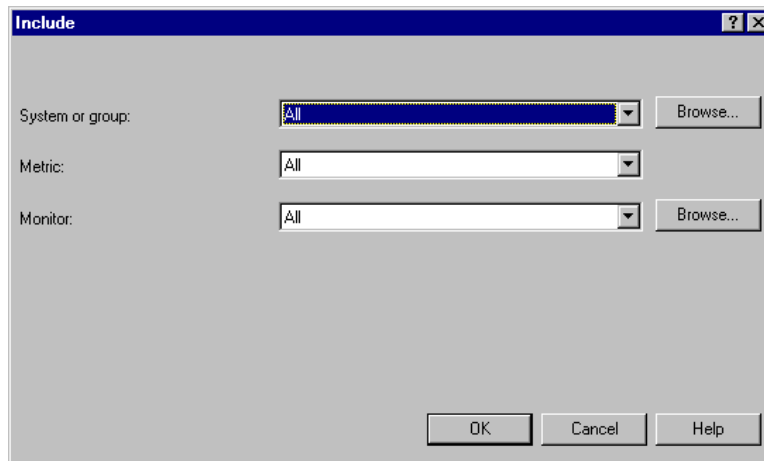


Figure 58. Event Log: Include window

Make selections from the drop-down lists for **System or group**, **Metric**, and **Monitor**. You can select detailed event information for particular systems, metrics, and monitors. Click **OK**. Any trigger and reset events that fit your selection are recorded in the Event Log. Right-click on the event entry and select **Properties**. The General and Trigger tabs on the Event Properties window show what data was captured for this trigger.

You can delete events from this log. You can also open the relevant monitor by double-clicking an individual event entry in the Event Log.

5.5 Using Management Central Monitor: Examples

As you become familiar with the Management Central Monitor, without any doubt you will discover how to use the functions in new ways that best suit your environment. Here are some practical examples to get you started.

5.5.1 Disk storage early warning

If the available disk storage capacity on your AS/400 systems drops to the minimum that you specified in the AS/400 system value QSTGLOWLMT, the system takes the action that you specified in the system value QSTGLOWACN. Among the actions you can specify for the QSTGLOWACN system value are *ENDSYS and *PWRDOWNSYS. Either action results in an interruption of production on the affected AS/400 system when the disk storage limit is reached. If either of these actions is specified on your AS/400 systems, you can avoid such an interruption by setting up an early warning monitor.

This example is based on the following assumptions:

- Your AS/400 system has the system value QSTGLOWLMT set at the default of 5%. This means the action specified in the QSTGLOWACN system value will occur if the disk storage utilization reaches or exceeds 95%.
- The disk storage utilization on your system normally does not exceed 85%.
- A 5% margin allows you sufficient time to track down the cause of excessive disk storage utilization and fix it before it reaches 95%.

Some or all of these assumptions may not be true of your environment. You should review your environment and create your monitor accordingly.

For this example, Figure 59 shows how to select the Disk Storage (Maximum) metric.

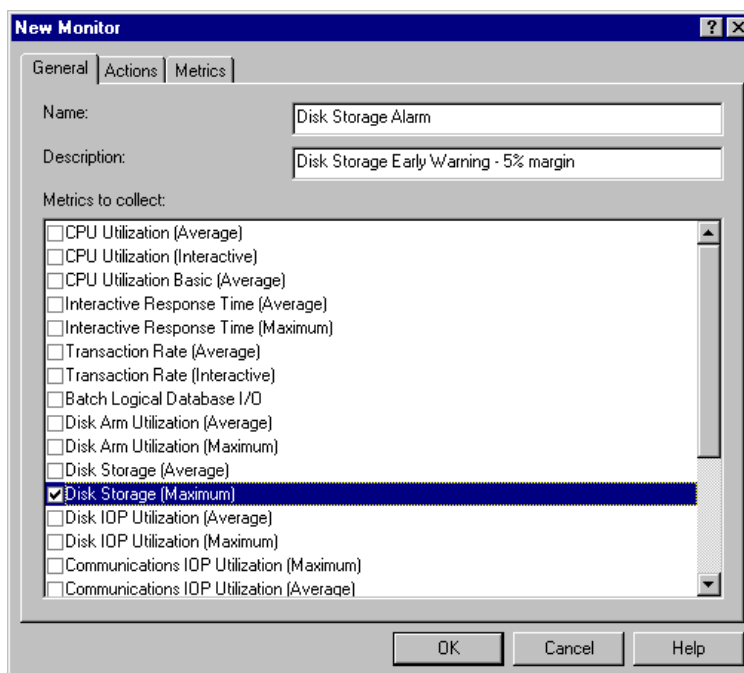


Figure 59. Example Disk Storage monitor: General page

On the Actions page, you can select the actions Open Monitor, Log Event, and Sound Alarm. A threshold event will cause the monitor to open on your desktop and an alarm to sound on your PC, in addition to logging the event in the event log. Even if you are busy with something else when a threshold event occurs, these actions should be sufficient to attract your immediate attention.

Figure 60 shows the Metrics page with suitable values selected for this monitor. For example, a collection interval of 120 seconds may be adequate for the purpose of this monitor.

The screenshot shows a 'New Monitor' dialog box with three tabs: 'General', 'Actions', and 'Metrics'. The 'Metrics' tab is active. It contains the following fields and values:

- Metric:** A dropdown menu showing 'Disk Storage (Maximum)'.
- Collection interval:** A numeric input field with '120' and a unit dropdown set to 'seconds'.
- Retention period:** A numeric input field with '1' and a unit dropdown set to 'hours'.
- Maximum graphing value:** A numeric input field with '100' and a unit dropdown set to 'percent full'.
- Display time:** A numeric input field with '10' and a unit dropdown set to 'minutes'.

At the bottom of the dialog, there is an 'Edit Thresholds...' button and three buttons: 'OK', 'Cancel', and 'Help'.

Figure 60. Example disk storage monitor: Metrics page

Click on the **Edit Threshold** button. On the Threshold 1 page, complete the following steps:

1. Enable Threshold.
2. Select a Threshold trigger value of 90 percent full.
3. Select a Threshold reset value of 85 percent full.

These values will cause a threshold event to occur when disk storage utilization reaches 90%. When disk storage utilization drops to 85% or below, a threshold reset event will occur.

5.5.2 Variations on disk storage early warning

There are many possible uses for this monitor and variations on the foregoing scenario. Here are some examples:

- In your environment, large objects may regularly be created and others deleted, causing the disk capacity utilization to fluctuate quite widely. In this case, you may choose to monitor the Disk Storage (Average) metric, rather than Disk Storage (Maximum). You may also select a longer interval to help smooth the fluctuations.

- In addition to, or instead of, selecting the threshold actions shown, you can use the Threshold trigger Host command field to send a warning message to all or some AS/400 system users.
- A batch job may regularly build large work files, which sometimes conflict with the disk storage requirements of high priority interactive tasks. In this case, it may be practical to use the Threshold trigger Host command field to hold the batch job, and the Threshold reset Host command field to release it again when disk storage requirements have eased.
- When planning to replace older disk models on your AS/400 system, you need to examine the storage utilization of these older models. This monitor can be used to display this and other relevant information about each individual disk drive. Click on one of the data points in the graph, and the Detail panel shows information about the storage capacity utilization for each disk drive. Click on the bar for each disk drive, and comprehensive information about that disk appears in the Property panel. For example, you see the model number and whether the unit is mirrored or compressed. Figure 61 shows an example of this. You can also determine whether the system needs rebalancing usage among the disk storage drives from this output. In this figure, the Detail panel has been normalized to the graph scale.

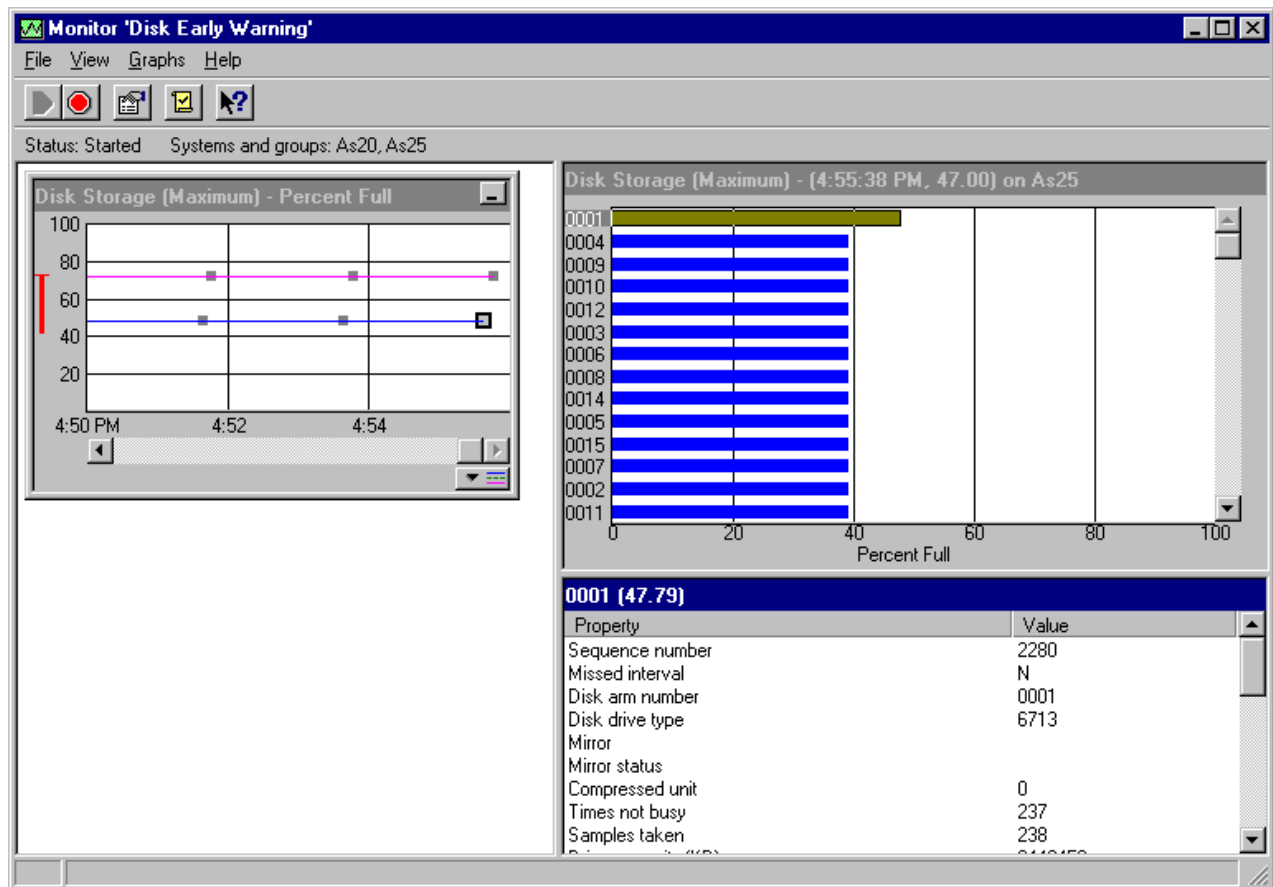


Figure 61. Disk Utilization Monitor: Detail and property panels

Chapter 6. Collecting inventory information

You can gather AS/400 hardware, software, and fixes inventory from endpoint systems and store the inventory on your central system. You must run the inventory collection for this information to be available. For the fix management of Management Central, the software and fixes inventory are required. Once this information is available on the central system, you can use it in several ways. You can search the information for particular hardware or software products and fixes inventory. You can export the information into different formats, such as a text format, Microsoft Excel spreadsheet, or HTML format.

You can schedule recurring inventory collection. We recommend that you collect your inventory on a regular basis to keep your systems current. It is useful to verify hardware and fixes installation before and after an upgrade. Regular collection can ensure your fixes levels are consistent. It can be used to monitor unplanned hardware, software, or fixes installation.

Based on the size of your system, you may want to schedule this function at non-peak times. It may slow down your system performance while it is gathering information.

6.1 Collecting inventory

The inventories are collected from the endpoint systems by the central system and stored in the central system.

To collect inventory, perform these tasks:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 Endpoint Systems** or **AS/400 System Groups**.
3. Right-click a system or a group and select **Inventory->Collect**. See Figure 62 on page 88 for an example.

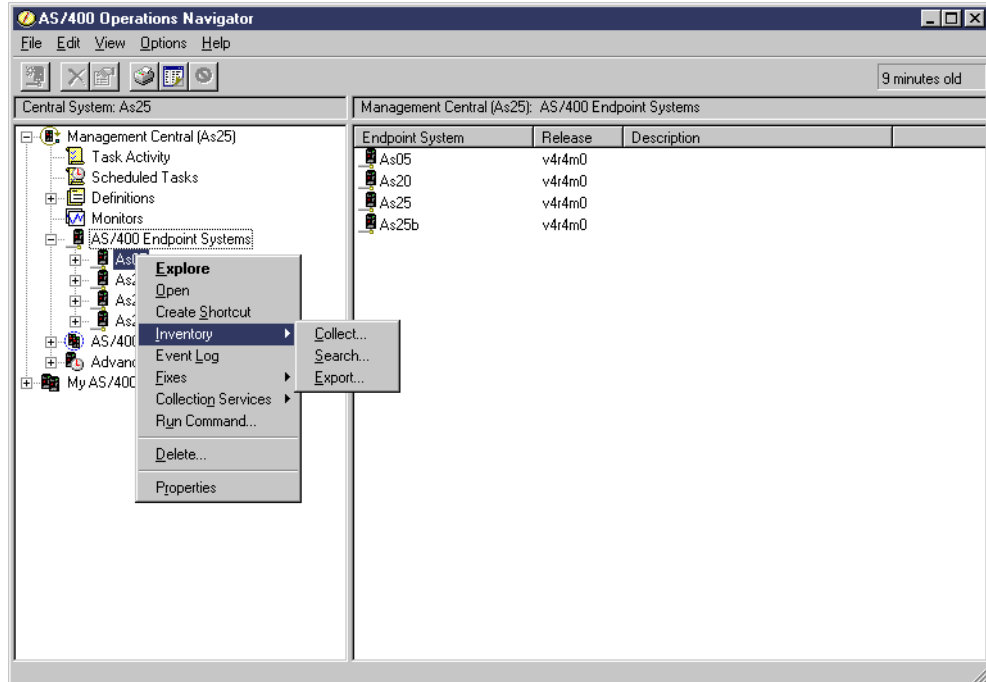


Figure 62. Selecting inventory collection

4. Select collection of **hardware**, **software**, or **fixes** inventory. If you select fixes inventory, it automatically selects software inventory as well.
5. Click **OK** to start collecting inventory immediately or click **Schedule** to specify when to collect inventory.

If you select to run your task immediately, you can select **Task Activity** to monitor your task.

If you schedule your inventory collection, you see your task in the Scheduled Tasks container. Right-click on the task and select **Properties** to view detailed information about the collection task. The General tab provides a summary of what inventory is to be collected. The Systems and Groups tab tells what systems will run the inventory collection.

6.2 Viewing the inventory list

Ensure that you run the collection before you try to view the inventory list. If inventory has not been collected, no inventory information is available. There will be a message above the blank inventory panel with the status of "Last Collected: never". Otherwise, the status will display the last collection date and time or the amount of time that has passed since the last collection (9 minutes old), as shown in Figure 62.

The properties page of the inventories shows an option for refreshing the list every time it appears or in timed intervals. To access the properties page and use these options, right-click on a particular inventory from the **Configuration and Service** container after you select your system under the **Endpoint Systems**. This option does not mean that the central system will refresh the lists from the endpoint systems. This option indicates how often the list is refreshed from the

data held in the central system only. To update the inventory on the central system with the endpoint systems data, collect the inventory again.

The procedure to view the fixes inventory list is explained in 6.7, “Fixes inventory” on page 95.

The following steps show you how to view the software inventory. The hardware inventory can be viewed similarly.

1. Expand your system or system group under **AS/400 Endpoint Systems** or **AS/400 Systems Group**.
2. Select **Configuration and Service**. This shows you hardware, software, and fixes inventory. Expand **Software Inventory** to display both Installed Products and Supported Products.
3. Select the inventory you wish to view. The list is shown in the right panel of the window. A sample inventory output is shown in Figure 63.

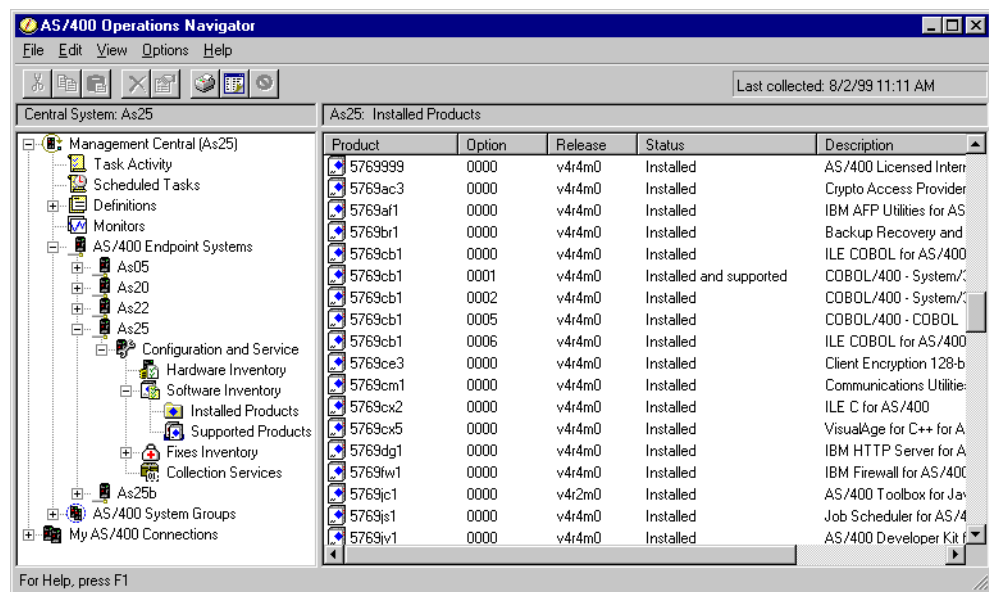


Figure 63. Software inventory output

4. Right-click and select **Properties** on any item in the list to view further details.

6.3 Searching the inventory list

You must collect the inventory before you can search through it. When you search against a system group, you may see the message *Some inventory never collected* on the search result window. See Figure 64 on page 90 for an example.

Resource	System	Status	Description
Cmn01	As20	Operational	V.24 Port
Cmn01	As05	Operational	V.24 Port Enhanced
Cmn02	As20	Not detected	LAN Port
Cmn03	As20	Operational	Token-Ring Port
Cmn04	As20	Operational	Virtual Port
Cmn05	As20	Operational	Token-Ring Port
Cmn06	As20	Operational	Token-Ring Port
Cmn07	As20	Operational	Comm Port
Cmn08	As20	Operational	V.24 Port
Cmn20	As05	Operational	Virtual Port
Cmn21	As05	Operational	Token-Ring Port
Cmn22	As05	Operational	Token-Ring Port
Cmn23	As05	Operational	Token-Ring Port
Cmn24	As05	Operational	Ethernet Port
Cmn25	As05	Operational	Token-Ring Port
Cmn29	As05	Operational	V.24 Port

21 items found in central system inventory.

Figure 64. Inventory search result

This means the inventory has never been collected on one or more of the systems you specified for the search. Some items may be shown in the list, but the list may be incomplete.

Use the **Search** facility to search for a specific item in the hardware, software, or fixes inventories of selected systems and groups. Use an asterisk (*) as a wild card to search for all items containing a specified string. For example, to search for all fixes beginning with SF100, specify **SF100*** in the **Search for** box. Once you enter your search criteria, Management Central searches the selected system or system group inventory. You can view the properties of a hardware or software product from the search list display by right clicking on it. You can export the results of your search. To view the fixes listing, see 6.7.1, “Viewing fixes inventory” on page 95.

To create a search, complete these steps:

1. Right-click the system you wish to search from the **AS/400 Endpoint Systems** or a system group from **System Groups** under Management Central.
2. Select **Inventory->Search**.
3. Enter your search criteria:
 - Hardware, software, or fixes list
 - Enter the item you wish to find, such as Lin01, 5769SS1, and SF100*.

Your results are displayed in a new window, similar to the one shown in Figure 64. You can right-click on any item in the list and select **Properties** to view more detailed information.

6.4 Export inventory

Use the Export Inventory dialog to save your inventory into a file on a PC. These exported files provide a history of your inventory and allow you to work with the data in a spreadsheet program or other application. You can export your inventory data in any of the following formats: HTML, TXT (text), CSV (comma separated

variable), or XLS (Microsoft Excel 97). Figure 65 shows the export dialog box and the file formats you can choose.

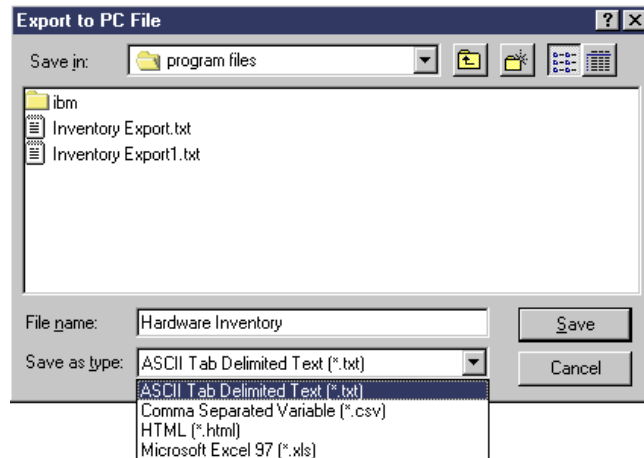


Figure 65. Exporting the inventory

To export inventory for a system or system group, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 Endpoint Systems** or **AS/400 System Groups**.
3. Right-click the system or group to export from, and select **Inventory -> Export**.
4. Select the type of inventory to export, such as hardware or software.
5. Click **Export**.
6. Specify the folder where you want to save the inventory.
7. Specify the name of the file in which you want to save the inventory.
8. Click **Save**.

You can now work with your inventory information from within your PC application.

6.5 Hardware inventory

The inventory list displays the resource, status, and description of all hardware on the systems. This is an easy way to check the current hardware inventory status of your systems. Figure 66 on page 92 shows the hardware inventory list.

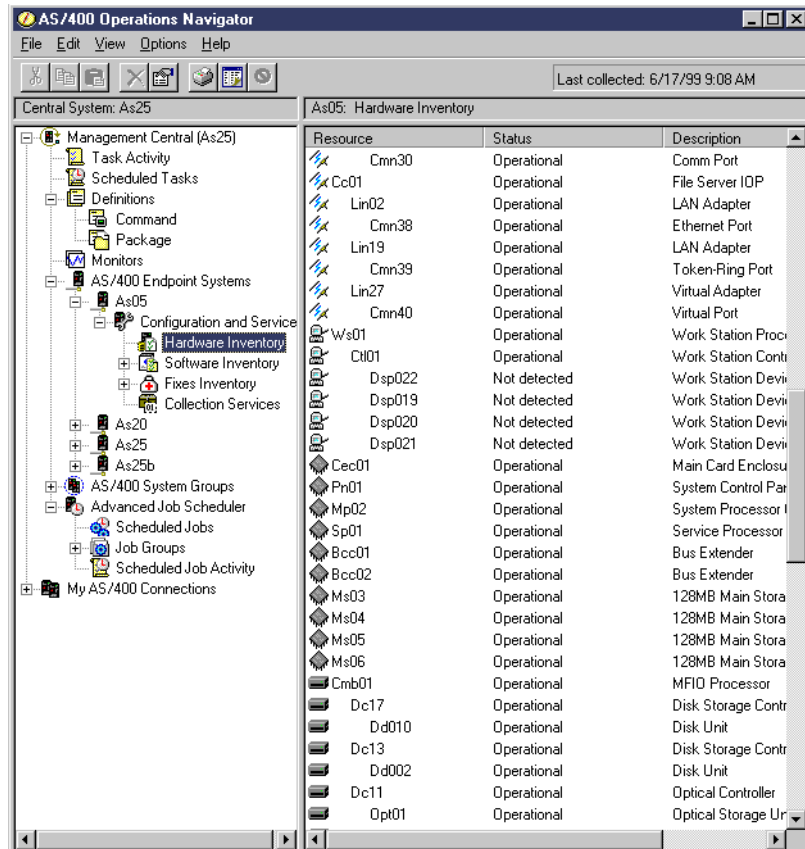


Figure 66. Hardware inventory display

You can right-click on any hardware listed and select **Properties** to view more information about the hardware. You can review a great deal of information under the General, Physical location, and Logical Address tabs shown in the display in Figure 67.

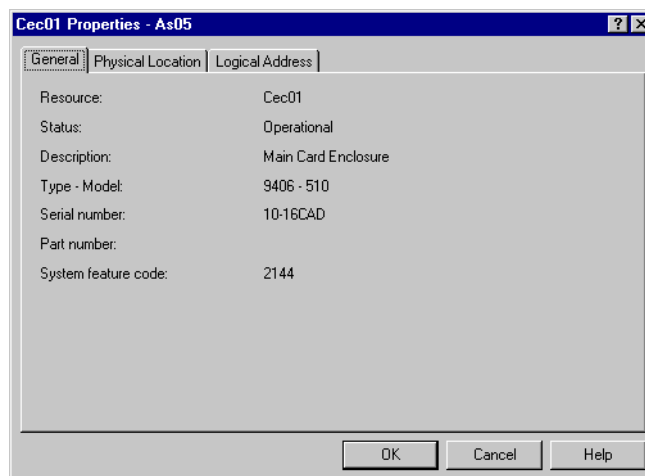


Figure 67. Hardware resource properties window

This information can be useful for upgrades as well as problem analysis. It can also be very useful to your marketing and service representatives.

6.6 Software inventory

Expand **Software Inventory** to view Installed or Supported Products. Software inventory has two categories (see Figure 63 on page 89 for an example): *Installed Products* and *Supported Products*.

Installed Products:

Displays a list of the software products that are currently installed on the selected system. You can right-click on any software listed and select **Properties** to view additional information. You can download fixes for an installed product regardless of whether it shows the status as supported.

Supported Products:

Displays a list of the software products that the selected system currently supports for the other systems that it manages in the network. For example, this list can contain products that are not installed on this system. A system that provides support typically orders the fixes and sends them to systems where the product is installed.

6.6.1 Adding support

You can add support for a product that is installed or not installed on a system. Adding a product to the Supported Products list allows you to copy save files to the source system for fixes to that product. You can then send (or send and install) these fixes to other systems in your network. Right-click on **Supported Products** under **Software Inventory**. The Add Support dialog appears as shown in Figure 68. Enter the appropriate information:

- **Product:** Product ID
- **Option:** Option of the software. Some products do not have options. Enter all zeroes in that case. An example of some that do are 5769SS1 (Operating System) and 5769BR1 (Backup and Recovery Media Services).
- **Release:** The release of the product you wish to support.
- **Software feature:** The feature code of the software to install. Specify *Code* or a feature code of the option, such as, 6050.

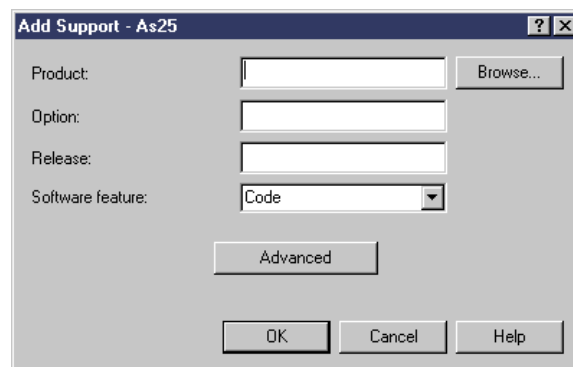


Figure 68. Add Support dialog box

If your information is not correct, you receive an error message that says:
Software is not valid.

You can click **Browse** to select from a list of all products in the central system inventory, as shown in Figure 69.

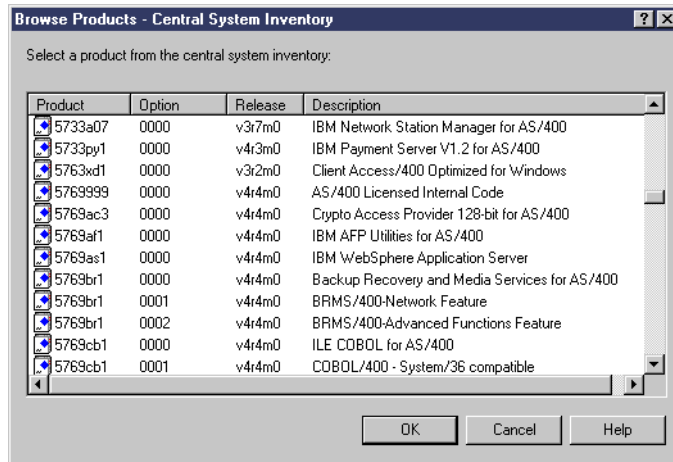


Figure 69. Add Support selection list

When you select products from the list, it fills in the information for you. See Figure 70 for an example.

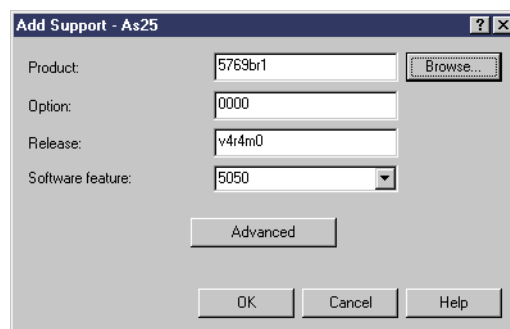


Figure 70. Add Support dialog box after selection

Click the **Advanced** button to specify additional information about the product you are adding to the Supported Products list for the selected system. You may specify the library where the product is to be located and registration information about the product in the window as shown in Figure 71.

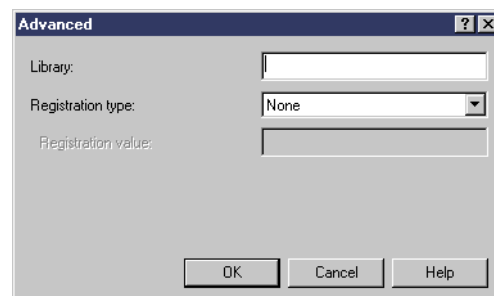


Figure 71. Advanced information for Add Support

6.7 Fixes inventory

When you select fixes inventory from the collection option, it automatically selects software inventory as well. You cannot select fixes inventory without including software inventory. The Fixes Inventory List shows all products installed and fixes contained within them. For each fix, you can view information such as the ID, associated product, release, or type.

6.7.1 Viewing fixes inventory

Inventory must be collected first to view it. See 6.1, “Collecting inventory” on page 87, for collection procedures.

To view the inventory list, follow these steps:

1. Expand your system or system group under **AS/400 Endpoint Systems** or **AS/400 Systems Group** under Management Central.
2. Expand **Configuration and Service**. Either select **Fixes Inventory** to view the list in the right panel, or click the “+” sign to view the list in the left panel. The list shows the installed or supported program products on the system. Once you select the product, it shows you the fixes in the right panel. Double click on the product or right-click and use **Open** or **Explore** to view the fixes for that product. Using Open displays the results in a new window as shown in Figure 72.

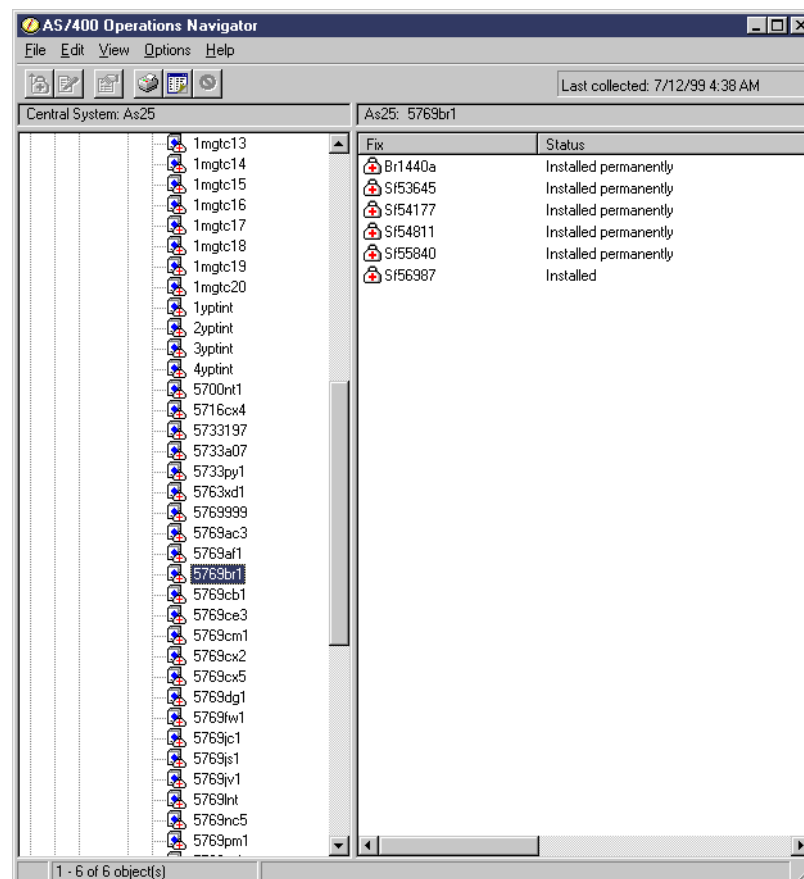


Figure 72. Fixes inventory list

From this list, you can perform various actions based on the status of the fix. Refer to Chapter 7, “Managing fixes (PTFs)” on page 99, for more information about the actions you can perform.

3. Right-click and select **Properties** on any item to view further details, such as the type of fixes and prerequisite fixes. See Figure 73.

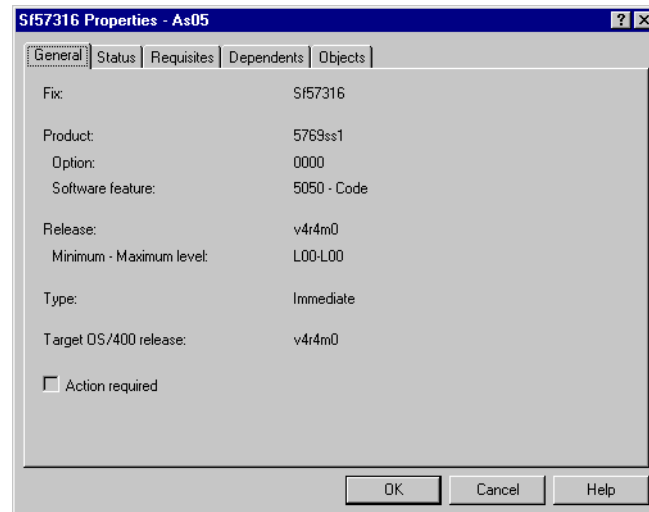


Figure 73. Properties of fixes

6.7.2 Searching fixes inventory

Refer to 6.3, “Searching the inventory list” on page 89, for information about how to search the inventory.

From the Search Results window, you can perform the same functions as you can from the view window. Right-click on the fix to view the available actions shown in Figure 74 on page 97.

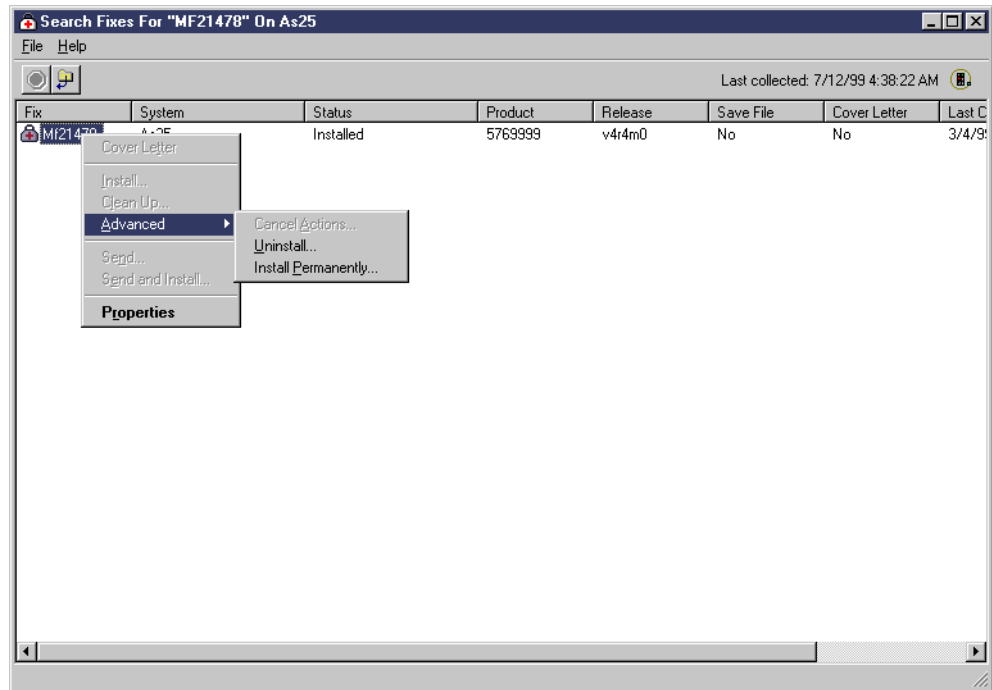


Figure 74. Search fixes result window

6.8 Using Operations Navigator to view inventory

There is another method available to view the inventory under AS/400 Connections using Operations Navigator. To view the inventory list from Operations Navigator, complete the following steps:

1. Expand **My AS/400 Connections**.
2. Expand the system that you want to view inventory.
3. Expand **Configuration and Service**.
4. Expand the inventory you wish to view, such as hardware, software, or fixes.

Note

To view the fixes inventory, you have to install Management Central on your Operations Navigator. Otherwise, the Fixes Inventory icon does not appear in the left panel.

5. Select the particular inventory you wish to view. The display will be similar to the view under Management Central, but will show subgroups under hardware and software inventories. Refer to Figure 75 on page 98 for the subgroups under the inventories.

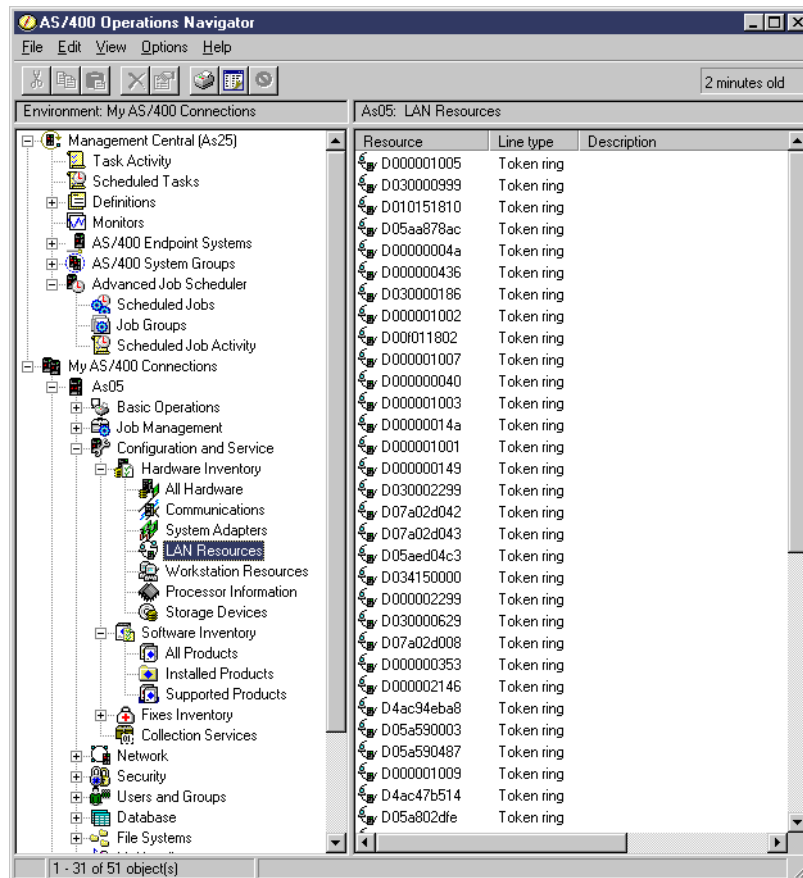


Figure 75. Operations Navigator inventory display

The difference from the view of Management Central is that when you click the icons, it goes to each AS/400 system to gather the information. It does not use the inventory information stored on the central system. This means the inventory information is always current, and can only be viewed. You cannot search or export this information.

As noted before, the fixes inventory under AS/400 Connection is unique. It uses the Management Central function, so that you can perform actions on items in the inventory list the same as you can in Management Central. For example, you can send and install fixes or view properties for any of the items in the list.

Hardware inventory allows you to selectively view inventory items. This is useful if you are looking for an individual item or a select group of items. For example, you may want to see a list of all your storage device hardware or your communications lines without viewing the entire inventory list.

Software inventory allows you to view three different lists. You can view Installed Products, Supported Products, or All Products (both Installed Products and Supported Products). It does not display the status (installed, supported, or installed and supported) in any of the three lists.

Chapter 7. Managing fixes (PTFs)

Use the Management Central tools and wizards to easily manage fixes (otherwise known as program temporary fixes (PTFs)) across systems. Fixes contain new or changed objects that are used to correct current or potential problems within licensed programs on your AS/400 systems. They can also provide new functions. Fixes replace one or more objects in the licensed program.

7.1 Managing fixes with Management Central: The benefits

One of the key benefits of Management Central is that it makes managing multiple systems as easy as managing a single system. Managing fixes is simplified by using the tools included in Management Central. These tools include several wizards to guide you through these tasks:

- Comparing and updating fixes
- Installing fixes
- Permanently installing fixes
- Sending and installing fixes
- Uninstalling fixes

For example, to install multiple fixes, you select the fixes from a list and start the Install wizard. You may find the Compare and Update wizard to be very beneficial. This wizard compares the fix level of a single system or multiple systems to a model system and then makes them the same. Using the collected inventory, you can have the system compare the fix levels for a group of systems to a *model* system, send the save files of the selected fixes to the *endpoint* systems from a *source* system, and then install the fixes. For definitions of the terms *model*, *source*, and *endpoint* systems, refer to Table 1 on page 3.

Use Management Central to complete your tasks on multiple systems quickly and efficiently.

Important

Before installing or removing fixes on an AS/400 system, you must have:

- A current backup of your user data
- A current backup of your operating system and licensed programs, or at least a backup taken since the last time you applied or removed fixes

7.2 Obtaining fixes

How you obtain a fix determines the form in which it is present on your system. This, in turn, determines how it can be used. You can use Management Central to install an individual fix on your AS/400 system if the fix meets one of these descriptions:

- It is present on your system in the form of a save file (and the corresponding licensed program product is installed on your system).

- It was loaded onto your system, either from media or from a save file, using the LODPTF command or PTF menu options.
- It was temporarily removed (*uninstalled*) on your system.

In all these cases, before the fix is installed, Management Central reports the status of the fix as *available*.

Note

Loading a fix from media using the LODPTF command or an option from the OS/400 PTF menu does not create a save file.

If the corresponding licensed program product is not on the system, the fix can only be present as a save file and cannot be installed on the system. You can only send it to and install it on other AS/400 systems which have the product installed. To send fixes to an endpoint system, the save files containing the fixes must be present on the source system.

In summary, from save files you can install fixes on both source and endpoint systems, wherever the corresponding licensed program products exist. Two ways in which to obtain fix save files on your source system are:

- Downloading the fix using Electronic Customer Support (ECS)
- Copying fixes from media

Note

These methods are intended for use only with individual fixes and not with cumulative fix package distribution. The cumulative package installation process is not designed for use over a network.

7.2.1 Downloading fixes through ECS

Management Central does not directly support this function. You should carry out the function using the `SNDDPTFORD` command on the AS/400 system.

7.2.2 Copying fixes from media

Management Central provides the Copy from Media function to facilitate the loading of fix save files into service on your source system. To use this capability, follow these steps:

1. Expand **Management Central**.
2. Expand the system onto which you will copy the fix save files for distribution. This is probably the system you have chosen to be your model system.
3. Expand **Configuration and Services**, and then **Fixes Inventory**.
4. Right-click on the licensed program product for which you will copy fixes.
5. Select **Copy from media** to see the window that is shown in Figure 76 on page 101.

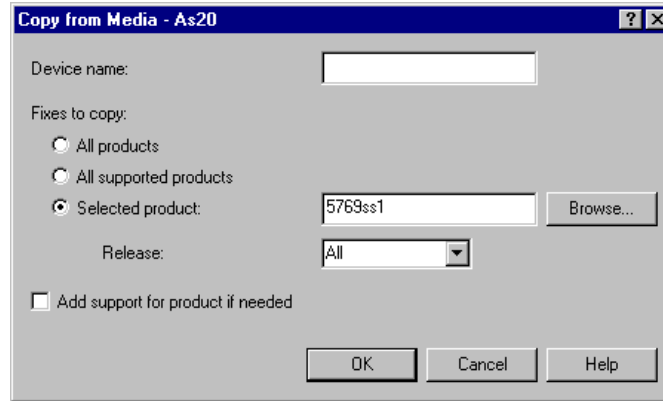


Figure 76. Copy from Media window

6. In the **Device Name** field, enter the name of the media device from which you will copy the fixes, for example TAP01 or OPT01.
7. The **Fixes to Copy** field defaults to the name of the product you selected in step 4. You can change this by clicking **Browse** to select another product from the list, or by selecting one of the following options:

All products	Fixes for all products, releases, options, and languages that are either supported or installed on this system are copied from the media.
All supported products	Fixes for all products by release that are currently supported on this system are copied from the media and copied to the system. Fixes for products that are installed but not supported are not copied.
Selected product	Fixes for the product and release that you specify are copied. Click Browse to see a list of products that are contained in the central system inventory.
8. The Release field defaults to All, unless you select **Selected product** in the previous (Fixes to Copy) field, when it changes to the appropriate release. *All* is the recommended selection. However, if fixes for multiple releases of the same product are present on your media and you require fixes for only one release, specify that release in this field. Otherwise, fixes for all products that are installed or supported at the corresponding release levels will be loaded to your system.
9. Select **Add support for product if needed** if you want to copy fixes for products that are not currently installed or already supported on this system. When a fix that is not currently installed or supported on the system is found on the media, the product is marked as supported and the fix is copied. If the fix affects a national language version, only the primary language of the system is supported.
10. Click **OK**. The Copying from Media window shown in Figure 77 on page 102 appears, and the fixes are copied into save files.



Figure 77. Copying from Media window

11. You can click **View Messages** from here to see the QSYSOPR (system operator) message queue.

After you copy the fixes, you should collect your fixes inventory again. You can then install the fixes or distribute them to other AS/400 systems.

7.2.3 Adding product support

You can add support for software products that are not installed on your AS/400 system, without using the Copy from Media function. This enables you to store fix save files for such products on your system. For details of how to do this, refer to 6.6.1, “Adding support” on page 93.

7.3 Installing fixes

This section describes the procedure for installing fixes on a single AS/400 system. You can follow this procedure, for example, when updating your model system before doing a compare and update to a number of other AS/400 systems. You can install a selected fix or fixes, or all fixes for a single licensed program product or for all licensed program products on the system.

7.3.1 Installing selected fixes

To install selected fixes, follow these steps:

1. Expand **Management Central**.
2. Expand the system on which you will install the fix.
3. Expand **Configuration and Services**, and then expand **Fixes Inventory**.
4. Click on the licensed program product for which you wish to install the fix. A list of fixes for that product appears in the right-hand panel, as shown in Figure 78 on page 103.

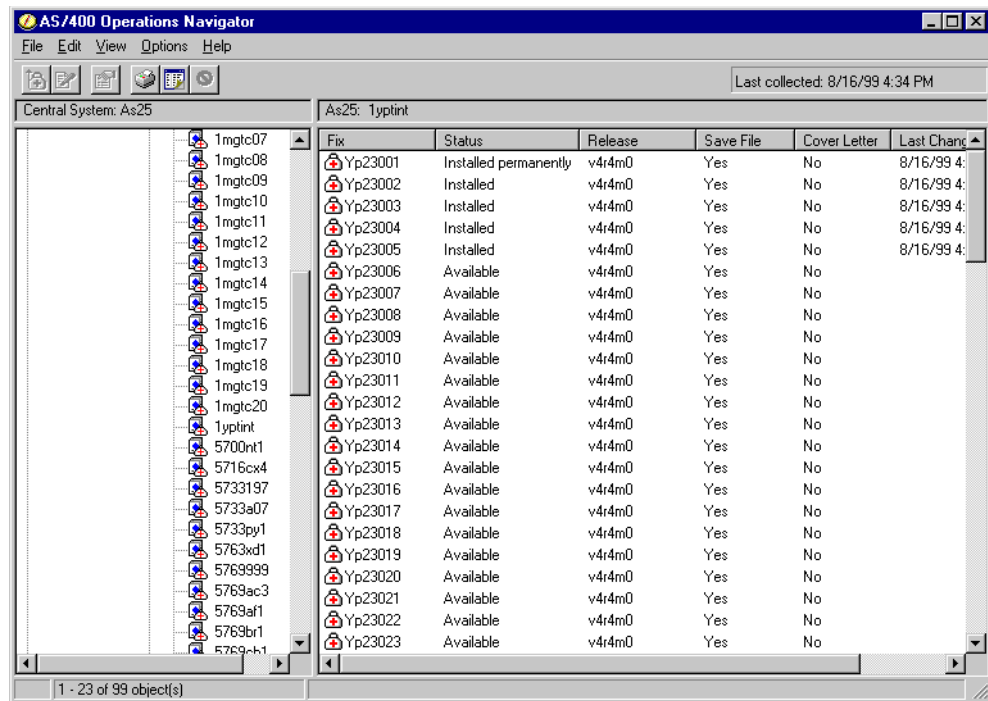


Figure 78. Fix Status

- To sort the fixes for this product by status, click the **Status heading** as shown in Figure 78. Only fixes with *Available* status can be installed.
- Right-click the fixes to be installed, and then click **Install** to see the Install Fixes – Welcome window of the Install wizard. Read any messages, and confirm or correct the displayed selections. Click **Next** on each of the following windows, until you reach the Install Fixes – Summary window which is shown in Figure 79 on page 104.

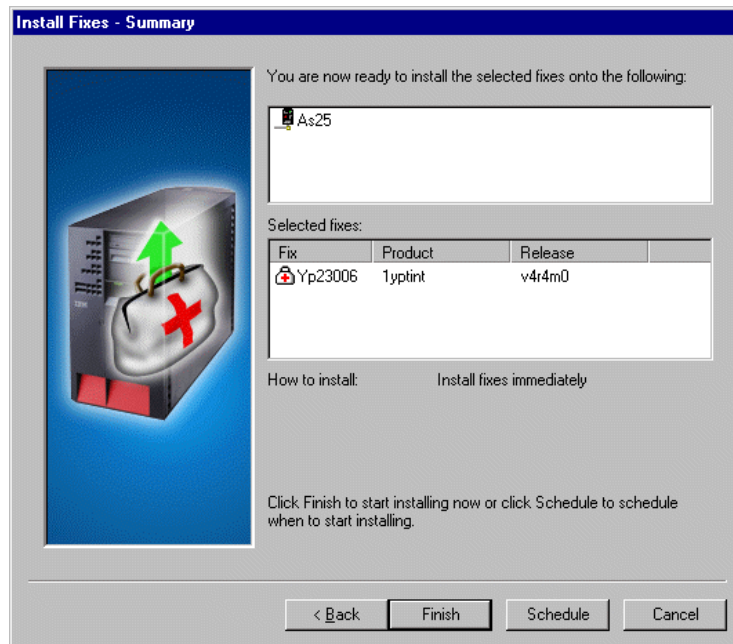


Figure 79. Install Fixes: Summary window

7. Check that all the details are correct, and click **Finish** or **Schedule** to submit the installation task.

Note

If the number of fixes you select for a single product, plus the number of fixes required by your selection exceeds 300, any other fixes for the product that are *loaded* or *temporarily removed* will also be applied. This does not include other unselected fixes with *save file* status. The status descriptions *loaded* and *temporarily removed* are not used by Management Central, but are displayed using the display PTF (DSPPTF) command from an AS/400 system command line.

7.3.2 Installing all fixes for the system group

To install all fixes for a licensed program product, or all fixes for all licensed program products on the system group, complete these steps:

1. Expand **Management Central**.
2. Expand the **System Groups**. Right-click the system group on which you will install the fixes.
3. Select **Fixes->Install....** The Install Fixes – Welcome window appears, as shown in Figure 80 on page 105.

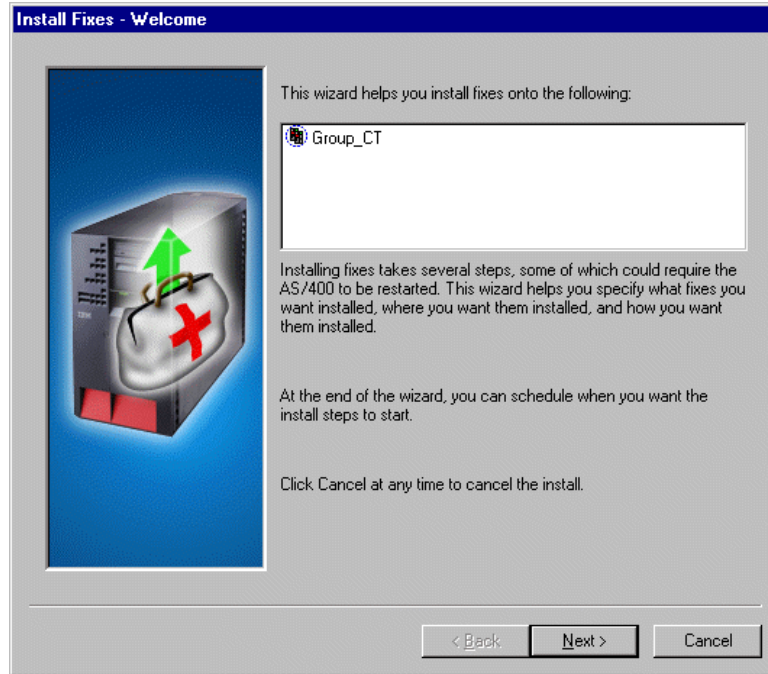


Figure 80. Install Fixes: Welcome window for system group

4. Click **Next** to view the Install Fixes – Select Fixes window displayed as in Figure 81.

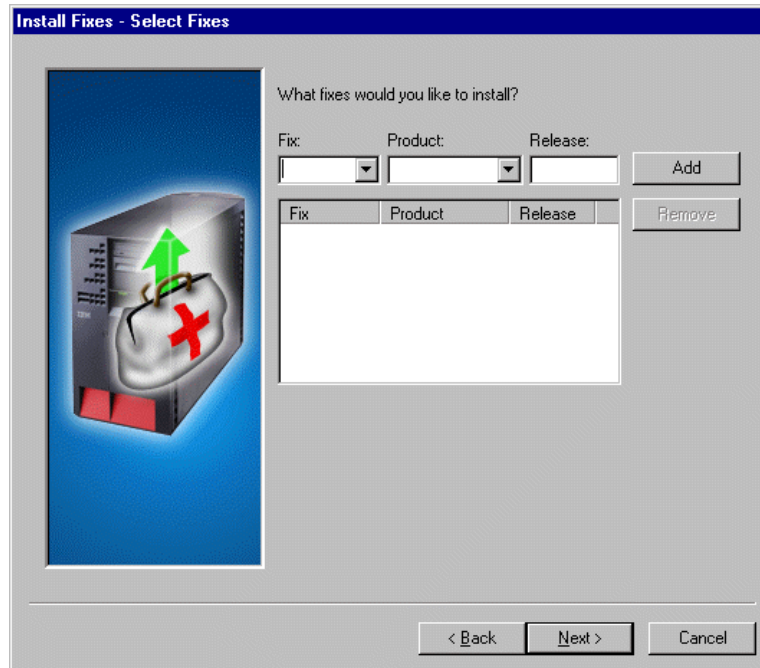


Figure 81. Install Fixes: Select Fixes window

5. Click the down arrow symbol in the Fix field to select all fixes, and type in the product number, such 5769SS1 for the Product. Click **Add** to add the fixes to be installed. Click **Next** to view the Install Fixes – How to Install window, which is displayed in Figure 82 on page 106.

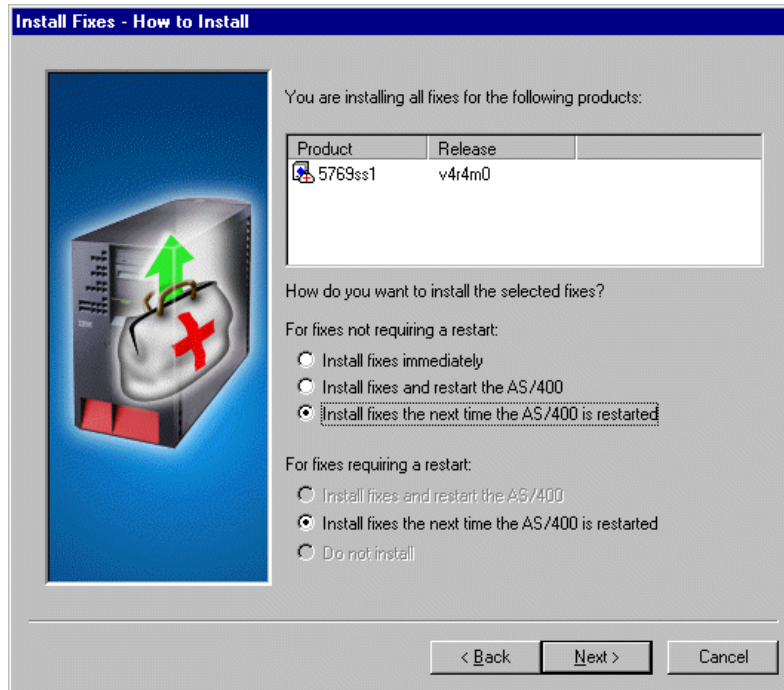


Figure 82. Install Fixes: How to Install window

6. Give careful thought to your selections on this window. The default selections as shown in Figure 81 on page 105 are recommended as the least disruptive to normal operations. They also prevent the installation from failing if one or more of the fixes concerned requires that the AS/400 be restarted. Click **Next** to reach the Install Fixes – Summary window.
7. Check that all the details are correct. Click **Finish** or **Schedule** to submit the installation task.

Note

This procedure installs all available fixes for a product except those fixes which we previously permanently uninstalled, even if save files for those fixes are present. If you wish to re-install such a fix, you must explicitly select it.

7.4 Sending fixes

Once a fix is present in a save file on an AS/400 system, you can send it to other AS/400 systems. To do so, perform these tasks:

1. Expand **Management Central**.
2. Expand the system to which you will send the fix.
3. Expand **Configuration and Services**, and then expand **Fixes Inventory**.
4. Click on the licensed program product for which you wish to send the fix. A list of fixes for that product appears in the right-hand panel, as shown in Figure 78 on page 103.

5. To view only fixes with save files, click on **Options**—>**Include**. Against the Save File panel, click on the drop-down list. Then, select **Fixes with Save Files**. Click **OK**.
6. If you wish also to see the Save File column, scroll the right-hand panel to the right to reach the Save File column. Click on **Options** —> **Columns**. Using the Remove, Add Before and Add After buttons, move the Save File column so that it displays in the same window. The window appears as shown in Figure 83.

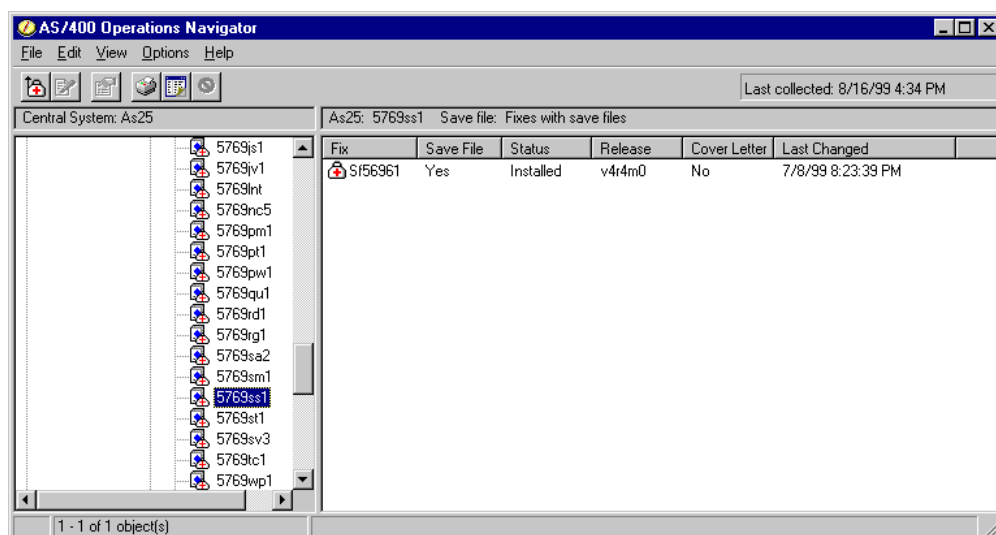


Figure 83. Fix inventory list by product

In this example, there is only one fix with a Save File status of "Yes" for the selected product. There can be many more.

7. Select from the list (scroll back to the left to click on the fix identifier).
8. Right-click the last fix selected, and then click **Send** to open the Send Fixes window as shown in Figure 84 on page 108.

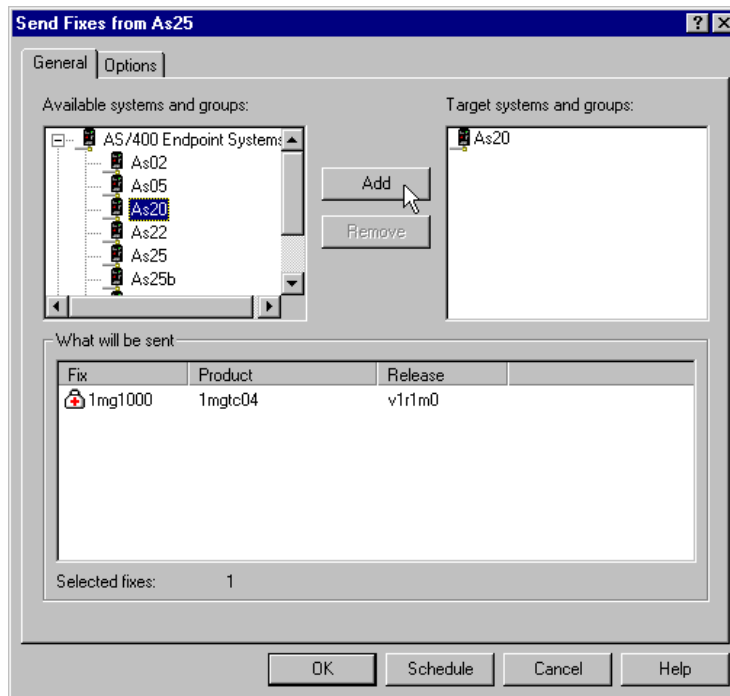


Figure 84. Send Fixes: General window

9. Select the system or systems to which you will send the fix and click **Add** after each one. Then click on the **Options** tab to display the Send Fixes – Options window which is shown in Figure 85.

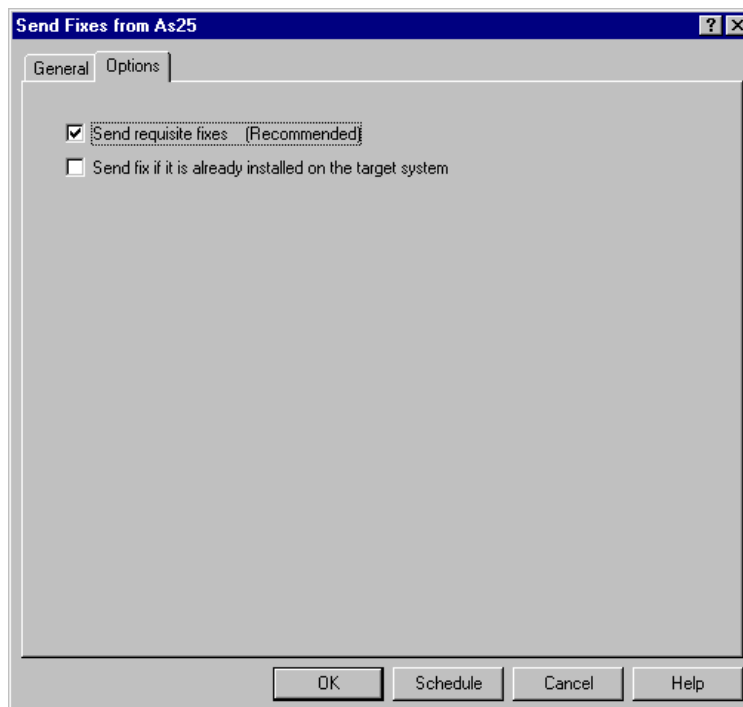


Figure 85. Send Fixes: Options window

10. The fixes you selected to send may require that other prerequisite or corequisite fixes be installed at the same time if they are not already installed on the target system:
- If the save files for all requisite fixes are present on your source system, and they are not installed or available on your target system, accept the default selection to **Send requisite fixes**. This is the recommended option. When you select this option and all requisite save files are not present on your source system, the Send operation will fail.
 - If the requisite fixes are all already installed or available on your target system, do not choose **Send requisite fixes**. When you do not select this option and all requisite fixes are not present on the target system with either Available or Installed status, the Install operation will fail.
11. By default, **Send fix if it is already installed on the target system** is not selected:
- When this value is selected, the fix is sent irrespective of whether the fix is already installed on the target system.
 - When this value is not selected, if the fix is already installed on the target system, it will not be sent.
12. Click **OK** or **Schedule**.

7.5 Sending and installing fixes

To send fixes from your central system to an endpoint system and initiate the installation process on that endpoint system in one operation, follow the first six steps described in 7.4, “Sending fixes” on page 106. When you select the fixes to be sent and installed, follow these steps:

1. Right-click the selected fixes, and then click **Send and install** to start the Send and Install Wizard. The second window of the Install Wizard, which is the Install Fixes - Selected Fixes window, lists all the fixes you selected.
2. Verify that this list is correct and click **Next** to see the Send and Install Fixes - Where to Send and Install window, as shown in Figure 86 on page 110.

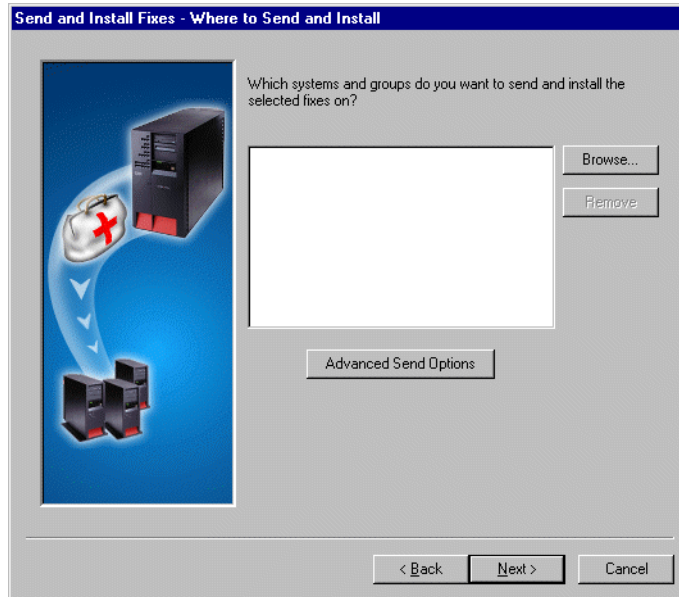


Figure 86. Send and Install Fixes: Where to Send and Install window

3. Click **Browse** to see the Browse Systems and Groups window, which is shown in Figure 87.

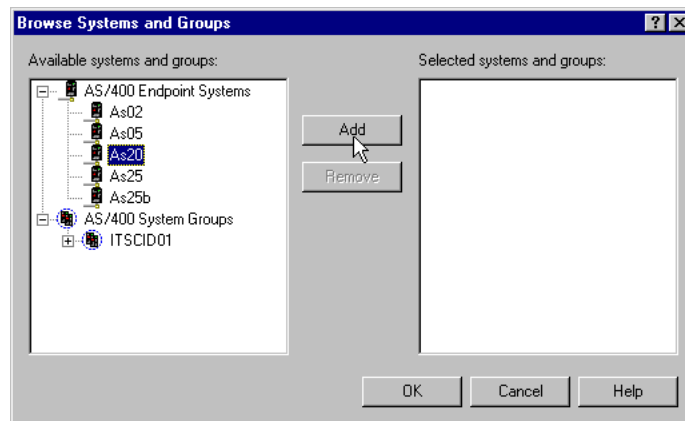


Figure 87. Browse Systems and Groups window

4. Expand the list of available systems and groups. Click on each AS/400 system or group to which you will send the fixes and click **Add**. Then, click **OK** to return to the Send and Install Fixes – Where to Send and Install window. The systems you selected are now displayed in this window.
5. Click on **Advanced Send Options**. The Send and Install Fixes – Advanced Send Options window is shown in Figure 88 on page 111.

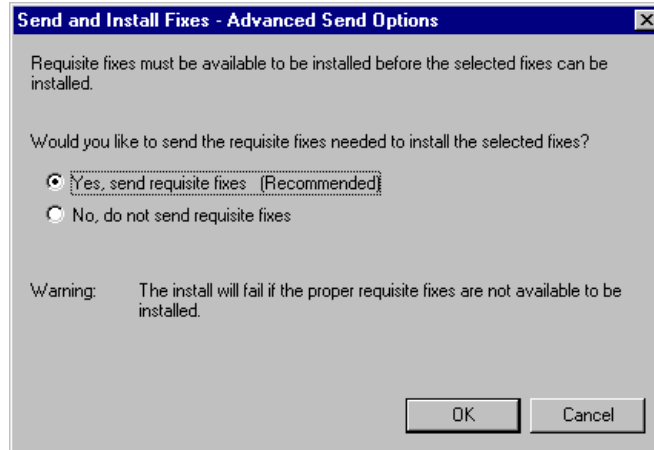


Figure 88. Send and Install Fixes: Advanced Send Options window

6. The fixes you selected to install may require that other prerequisite or corequisite fixes be installed at the same time if they are not already installed on the target system:
 - If the save files for all requisite fixes are present on your source system, and they are not installed or available on your target system, accept the default selection **Yes, send requisite fixes**. This is the recommended option.
 - Only if the requisite fixes are all already installed or available on your target system, select **No, do not send requisite fixes**. When you select this option and all requisite fixes are not present on the target system in Available or Installed status, the Install operation will fail.
7. Click **OK** to return again to the Send and Install Fixes – Where to Send and Install window. Click **Next** to move to the Send and Install Fixes – How to Install window, which is shown in Figure 89 on page 112.

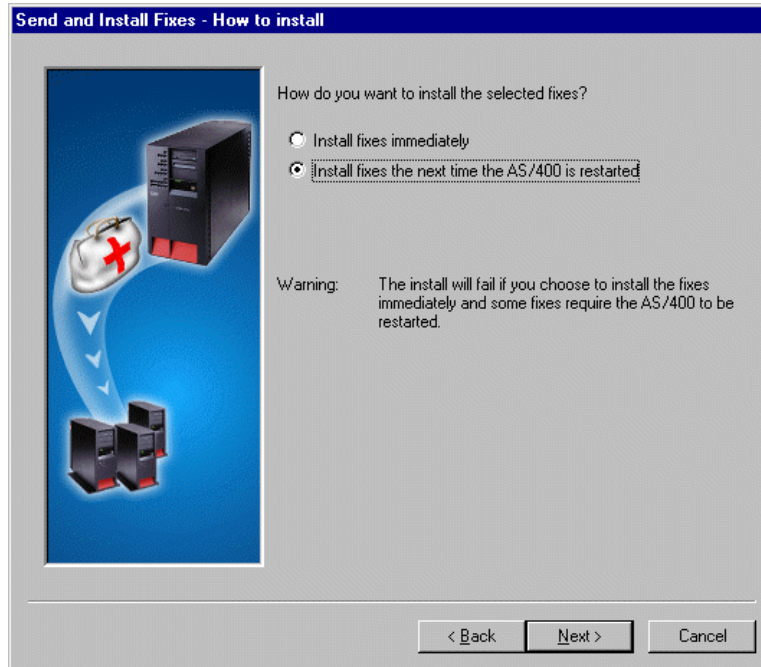


Figure 89. Send and Install Fixes: How to Install window

8. In this window, the default selection is **Install fixes the next time the AS/400 is restarted**. This selection is recommended since it will prevent the installation from failing if one or more of the fixes concerned requires that the AS/400 system be restarted. Make your selection and click **Next**.
9. On the Send and Install Fixes – Summary window, check that all details are correct and click **Finish** or **Schedule** to submit the installation task.

7.6 Comparing and updating fixes

To compare and update the levels of your fixes inventory, you first need to select a model system that has the appropriate fixes installed for the particular products you wish to compare. In some cases, your model system may be your central system. You should choose a model system that works best in your environment, one that has the appropriate fixes installed on it. You will use this model system to compare against other systems in your network to ensure that your other systems work just like the model system. For a further definition of a model system, refer to Table 1 on page 3.

Note

The Compare and Update wizard matches fixes according to product, product option, and release level. For fixes to be selected, the corresponding product must match all three values.

7.6.1 Setting up your model system

To set up your model system, follow these steps:

1. Determine which fixes you want installed on the model system.
2. Obtain and install the fixes. See 7.3, “Installing fixes” on page 102.
3. Collect your fixes inventory on all systems.
4. Verify that the save files for the fixes exist on the model system.

Note

The model system does not have to be the source system on which the save files exist. We assume that, in a practical scenario, the model system also has the save files, so that it can serve as the source system.

For information on how to do this, refer to steps 1 through 5 in 7.4, “Sending fixes” on page 106. The fixes can be on any one AS/400 system. This is the system from which you will send the fixes.

5. Use the Compare and Update wizard to determine which fixes are missing from the target systems when compared to your model system. You can have the wizard perform a compare only, which generates a list of differences, a compare and send missing fixes only, or a compare, send, and install missing fixes.

7.6.2 Comparing installed fixes

To compare fixes between a model system and another system or systems, follow the procedure described here:

Note

Collecting software inventory can take some time. If you need to refresh your inventory before doing the compare, you may be able to minimize the duration by initiating the software and fixes inventory before commencing this procedure.

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 Endpoint Systems** or **AS/400 System Groups**.
3. Right-click the system or group to compare.
4. Select **Fixes->Compare and Update**.
5. Follow the wizard's instructions to compare and update the systems. You are presented with a series of windows containing readily understandable prompts and questions, such as the example shown in Figure 90 on page 114.

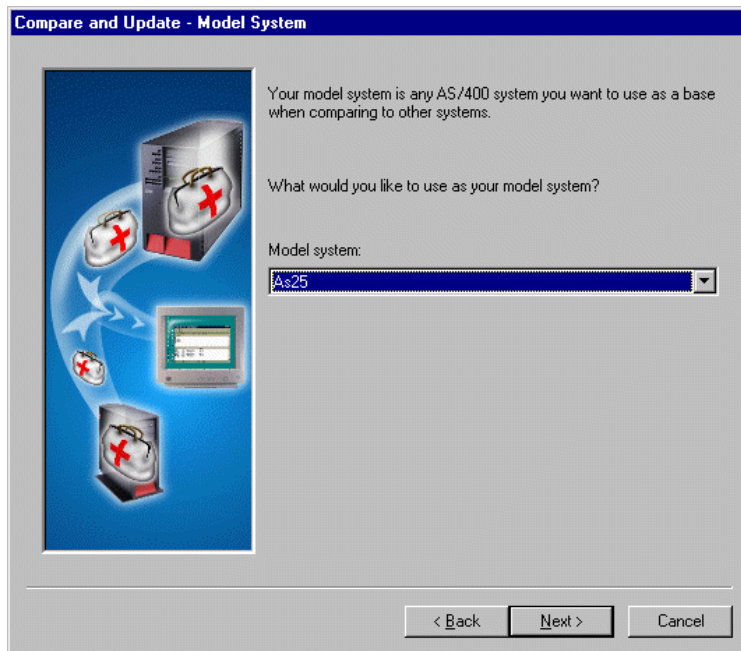


Figure 90. Compare and Update wizard: Model System selection

The model system may default to your central system, but you can change this if necessary. To do so, select another system from the **drop-down list**.

A later window lists all the installed products on the model system, as shown in Figure 91.

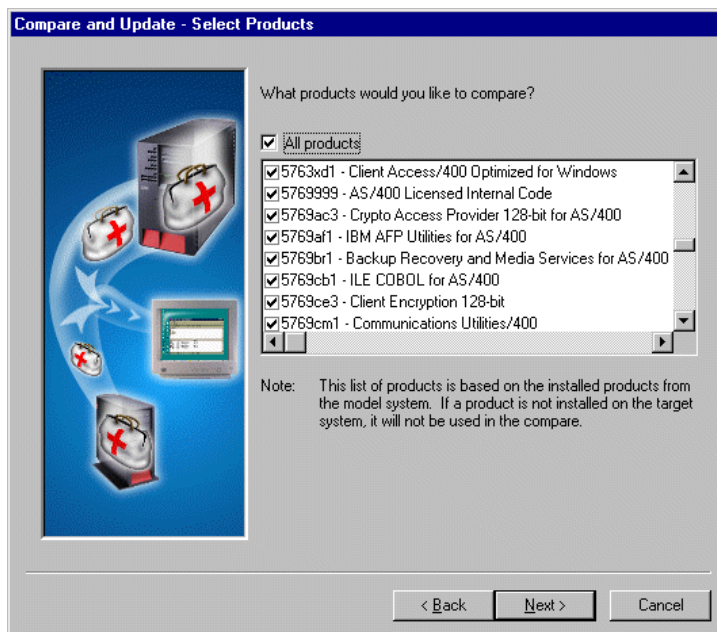


Figure 91. Compare and Update wizard: Product selection

As shown, by default all products are selected. You can change this by clicking on the **All products** field to clear the check mark. Then, scroll through the list of products and check only those products you wish to have compared.

In the next window, accept the default selection, **Show compare results only**, as shown in Figure 92.

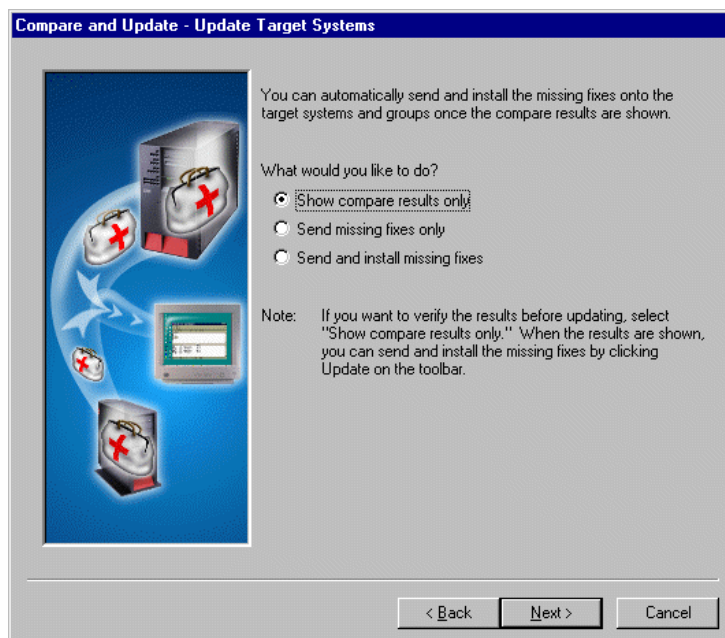


Figure 92. Compare and Update wizard: Output selection

Click on **Next**. A window appears, shown in Figure 93, which enables you to choose whether to first collect fresh data or to use data previously collected.

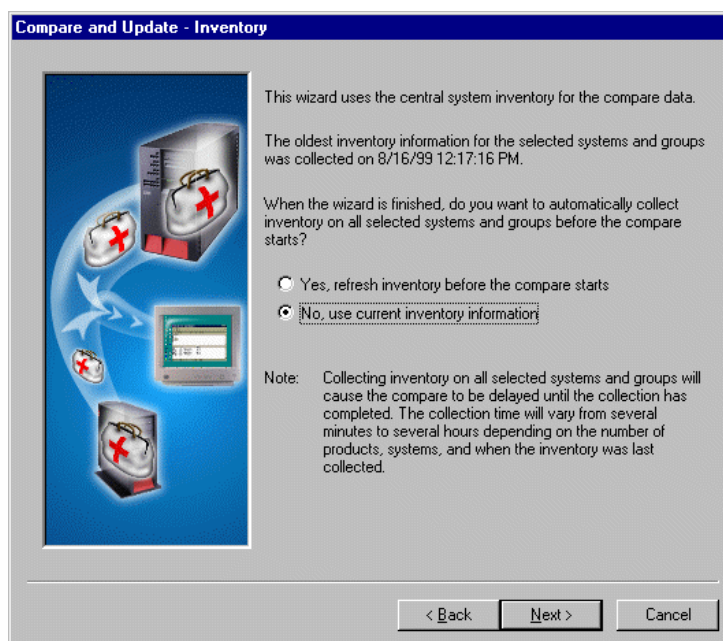


Figure 93. Compare and Update wizard: Inventory selection

When you finish, the Compare and Update Wizard produces a display similar to the example shown in Figure 94 on page 116.

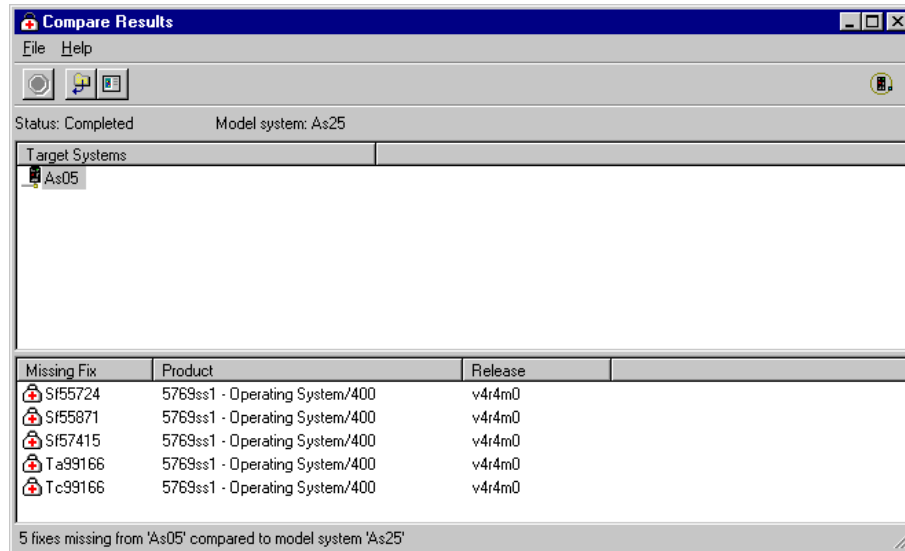


Figure 94. Compare and Update wizard: Output

7.6.3 Comparing and updating fixes

To compare and update fixes between a model system and another system or systems, simply follow the same steps described in 7.6.2, “Comparing installed fixes” on page 113. When you reach the Update Target Systems window shown in Figure 92 on page 115, check the **Send and install missing fixes** box.

When you finish, Management Central sends and installs any missing fixes on the target systems that you selected. The selected target systems will then have installed all the fixes that the model system has.

Note that the target systems may have fixes installed that do not exist on the model system. These remain installed.

7.7 Permanently installing fixes

Once a fix is thoroughly tested on your AS/400 system, it can be advantageous to install it permanently. When you do this, the old objects replaced by the fix are removed from the system. This frees some storage capacity on the system. If there are many temporarily applied fixes on your system, they can take up a material amount of storage space. Permanently installing fixes has the added advantage that the time required to install the next cumulative fix package is reduced. It also reduces the likelihood of problems being experienced during the next operating system upgrade.

Note

Permanently applying a fix means that you can no longer revert to the old objects. The fix is now a permanent part of the system until it is superseded. You cannot uninstall it, unless reinstalling the operating system from a system save made prior to permanently installing the fix. This may be impractical and will certainly be time consuming. Make sure that you are entirely satisfied with any fix before installing it permanently!

To permanently install a fix, follow these steps:

1. Expand the AS/400 system on which to install the fix under **Endpoint Systems**. Then, expand **Configuration and Service**.
2. Expand **Fixes Inventory**.
3. Click on the product to which the fix is related.
4. When the list of fixes for that product appears in the right-hand panel, right-click on the fix to be installed. Select **Advanced**, and then click on **Install Permanently** to start the Permanently Install Fixes wizard. The Welcome window is shown in Figure 95.

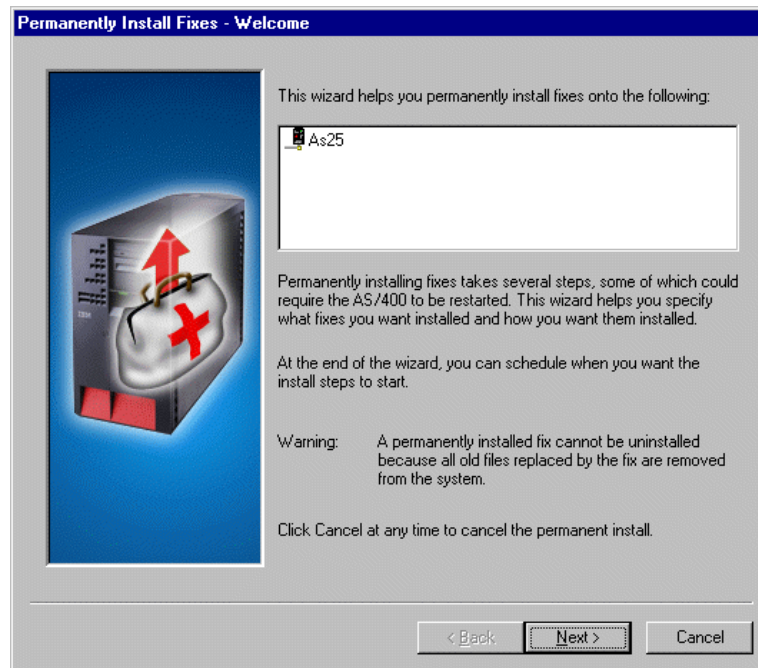


Figure 95. Permanently Install Fixes wizard: Welcome window

5. Read the information on this window to ensure that this is what you want to do. Click **Next** to move to the Selected Fixes window, which is displayed in Figure 96 on page 118.

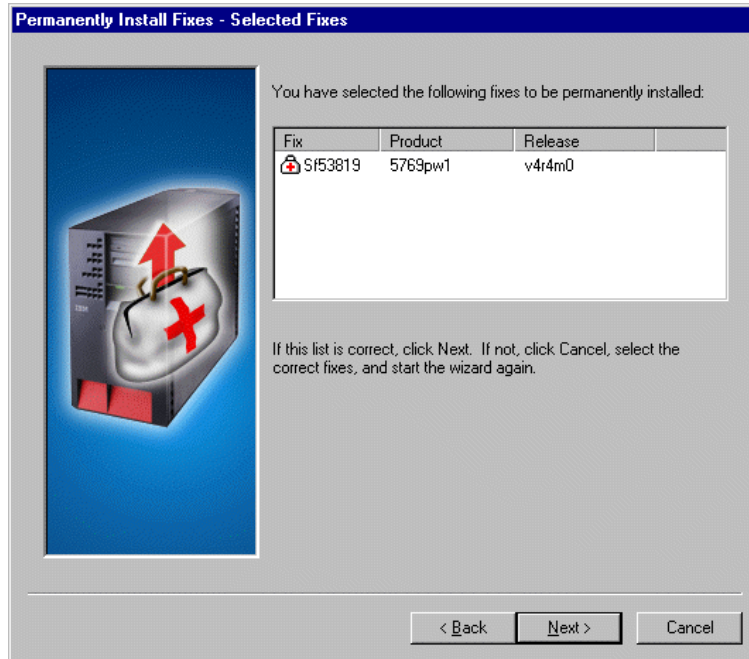


Figure 96. Permanently Install Fixes wizard: Selected Fixes window

- After verifying the information, click **Next** to move to the How to Install window, which is displayed in Figure 97.

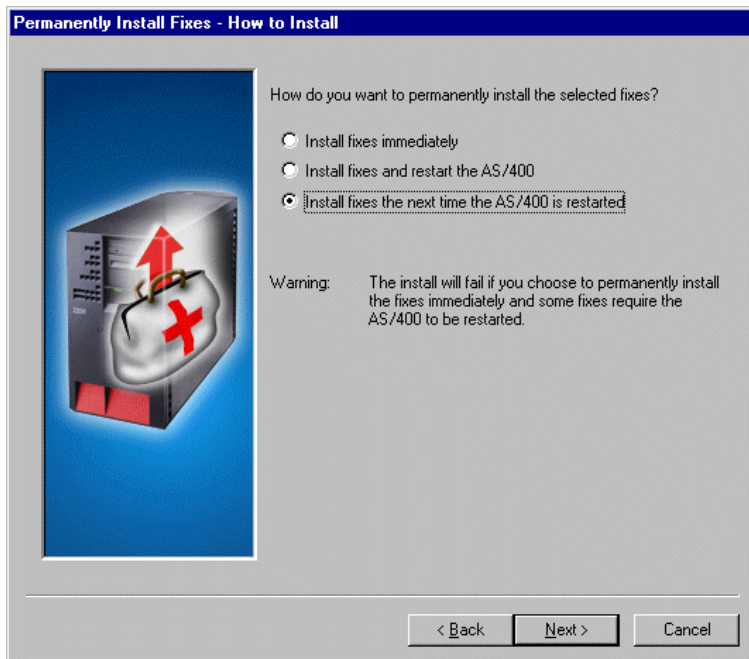


Figure 97. Permanently Install wizard: How to Install window

- Note the warning on this window before making your selection. We recommend that you accept the default, which is **Install fixes the next time the AS/400 is restarted**. Click **Next** to reach the Summary window, which is shown in Figure 98 on page 119.

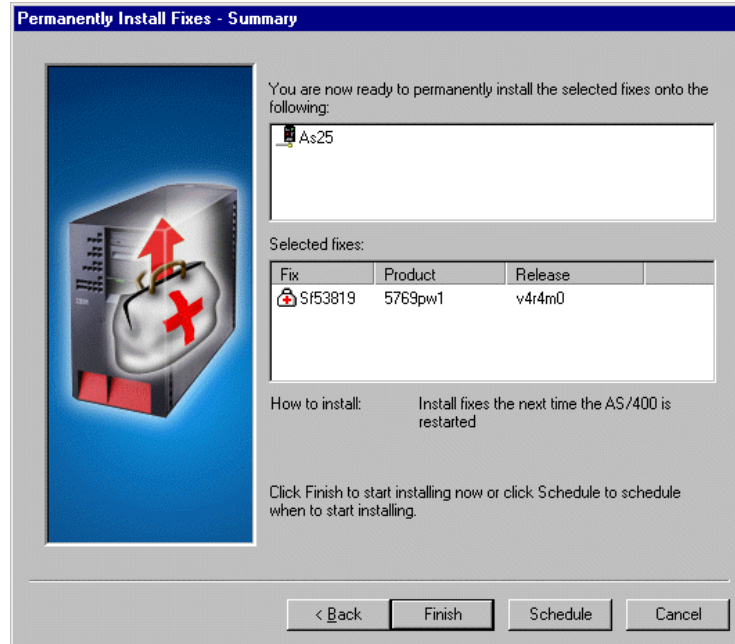


Figure 98. Permanently Install wizard: Summary window

8. Verify the displayed information, and click on **Finish** or **Schedule** to submit the task.

7.8 Uninstalling fixes

From time to time, it is necessary to remove or uninstall a fix. You can avoid possible unnecessary uninstallation activity if you first test the results of uninstalling a fix on your model system. When you are satisfied that uninstalling the fix in question solves the problem that was being experienced, you can replicate the uninstall on the rest of your AS/400 systems.

To uninstall a fix, perform the following steps:

1. In Management Central, expand **AS/400 Endpoint Systems**.
2. Expand the endpoint system on which you will perform the uninstall.
3. Expand **Configuration and Service**.
4. Click **Fixes Inventory** to see a list of installed fixes appear on the right, as shown in Figure 99 on page 120.

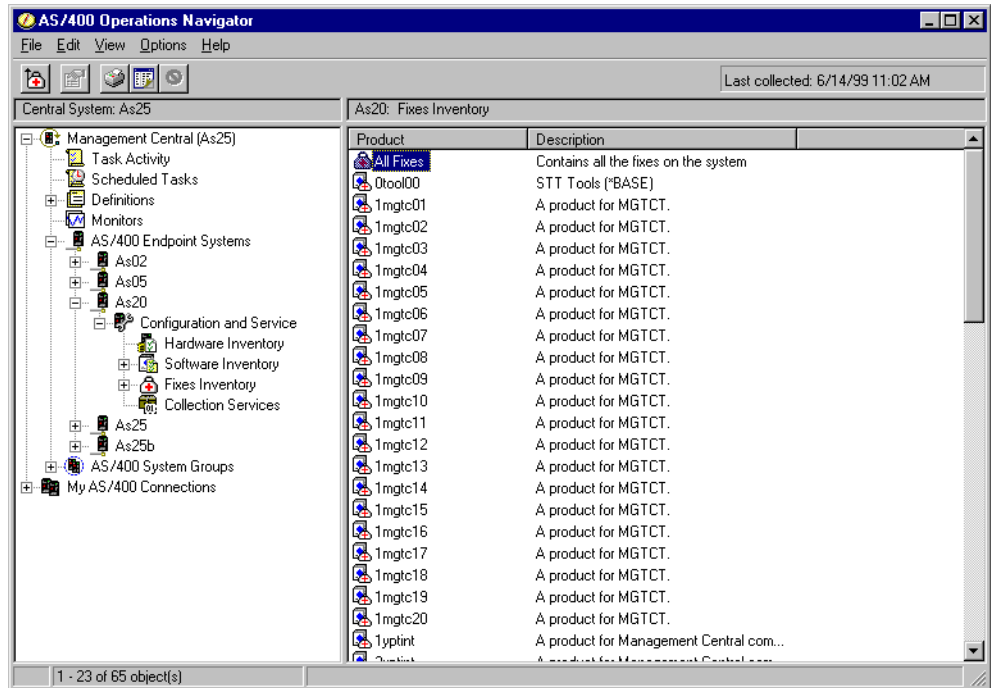


Figure 99. Fixes Inventory displayed

5. Scroll to the installed product in which the fix is to be uninstalled and click on it. If you do not know on which product the fix was installed, click on **All Fixes**, which is shown as selected in Figure 99. You can then scroll through a list of installed fixes, as shown in Figure 100.

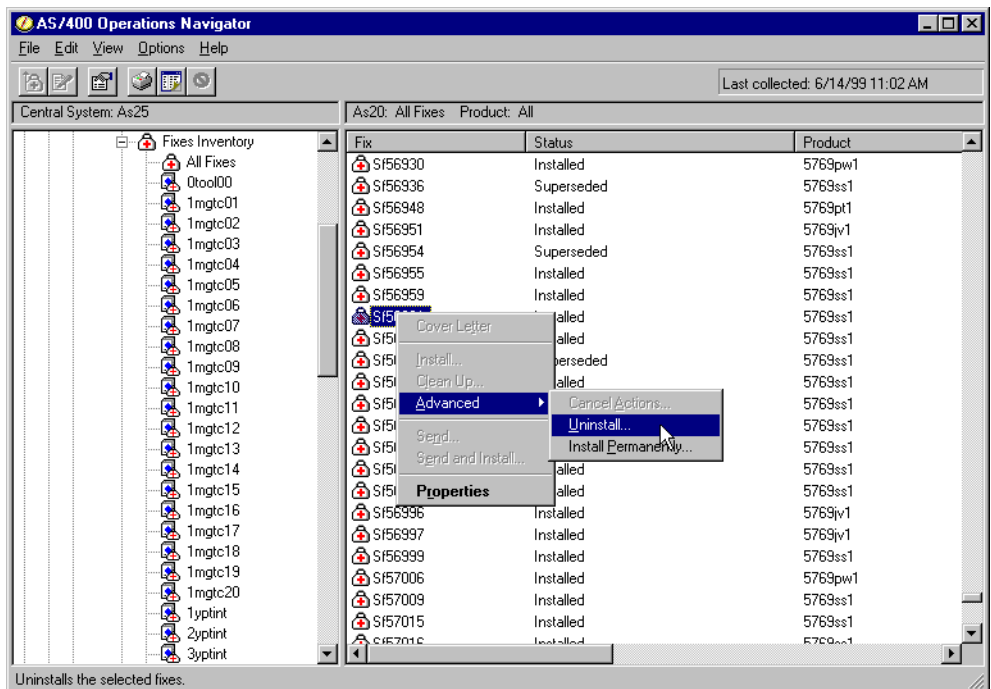


Figure 100. All Fixes list displayed: Fix selected to uninstall

6. Right-click on the fix to be uninstalled. At this point, you can first click **Properties** if you wish to see whether this fix is of *immediate* or *delayed* type. This determines what selections you can make later in the uninstall process. Click **Cancel** to exit.
7. Right-click on the fix to be uninstalled again. Select **Advanced**. Then, click on **Uninstall** as shown selected in Figure 100 on page 120. This starts the Uninstall Wizard and presents the Uninstall Fixes – Welcome window.
8. Check that the correct AS/400 system name is shown in this window and click **Next**. The Uninstall Fixes – Selected Fixes window appears as shown in Figure 101.

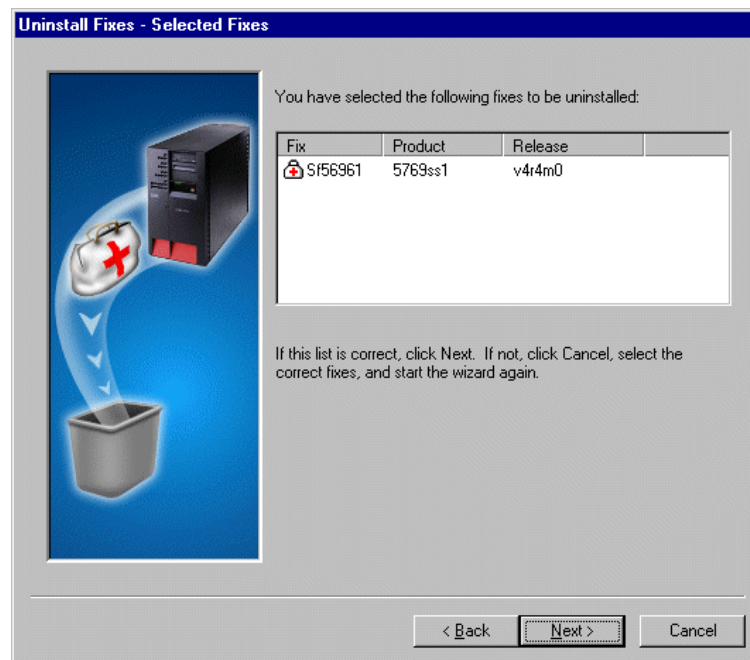


Figure 101. Uninstall Fixes: Selected Fixes window

9. Ensure the correct fix is listed and click **Next** to see the Uninstall Fixes – Type of Uninstall window, which is shown in Figure 102 on page 122.

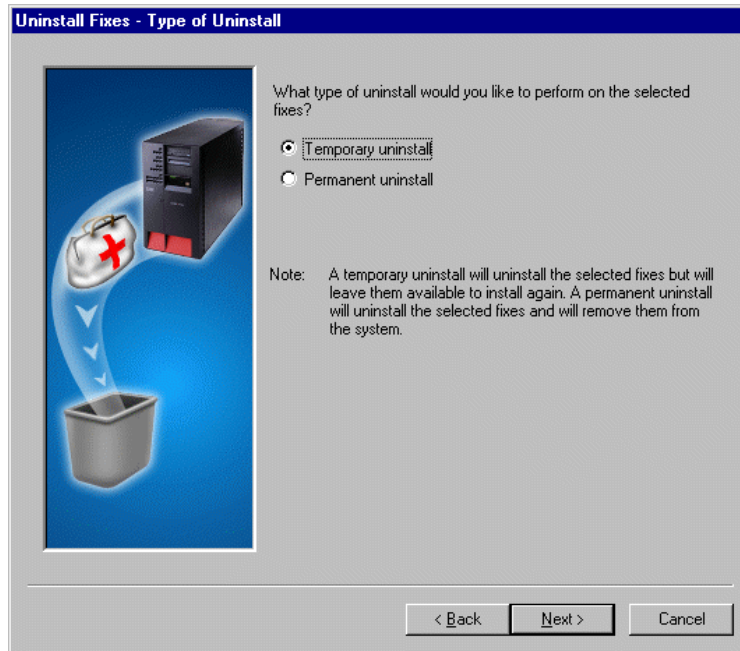


Figure 102. Uninstall Fixes: Type of Uninstall window

10. Select whether to perform a Temporary or Permanent uninstall and click **Next**. The Uninstall Fixes – How to Uninstall window is shown in Figure 103.

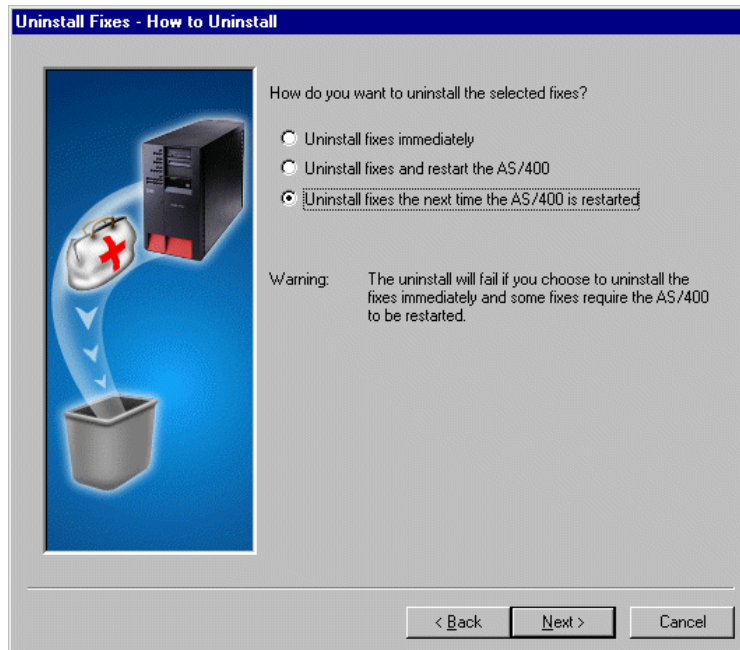


Figure 103. Uninstall Fixes: How to Uninstall window

11. If the fix you are uninstalling is of *delayed* type, do not choose to uninstall it immediately since this will fail. Select how you want to uninstall the fix and click **Next**.
12. On the Uninstall Fixes – Summary window that next appears, check that all details are correct. Click on **Finish** or **Schedule** to submit the uninstall task.

7.9 Cleaning up fixes

Over time, save files and cover letters for fixes tend to accumulate, particularly on your model system. Management Central provides you with a way to delete save files and cover letters for fixes that are no longer needed. This simplifies the management of fixes and also frees up storage space on your AS/400 systems.

The Clean Up Fixes dialog allows you to delete the save files and cover letters for the fixes that you specify. You can start cleanup immediately or schedule that activity to begin at a later time.

An easy way to clean up save files and cover letters is described here:

1. Under **Endpoint Systems**, right-click on the AS/400 system that you plan to clean up. Select **Fixes** and click on **Clean Up**. You are presented with the Clean Up Fixes window, which is shown in Figure 104.

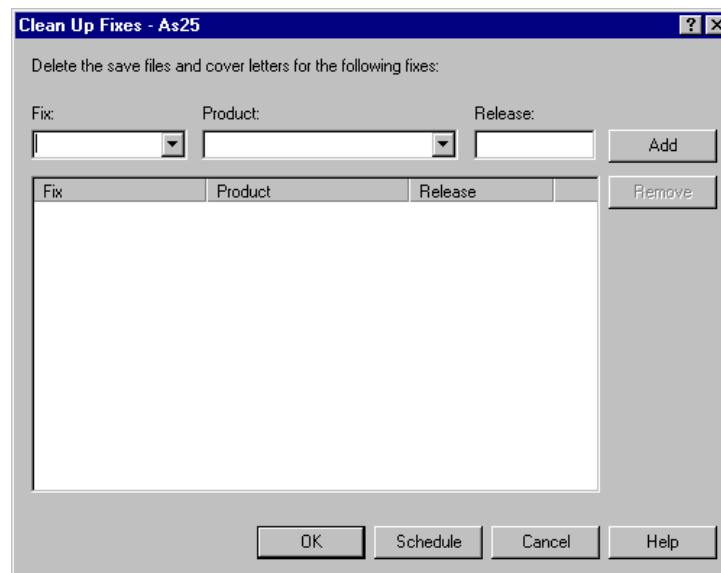


Figure 104. Clean Up Fixes window

2. Make one of the following selections:
 - To clean up all save files and cover letters on the system, from the drop down lists for **Fix** and **Product** select **All**. Then, click **Add**.
 - To clean up all save files and cover letters for a selected product only, from the drop down list for **Fix**, select **All**. In the **Product** field, enter the name of the product, and then click **Add**.
 - To clean up save files and cover letters for selected fixes only, in the drop down list for **Fix**, enter the ID for each fix. In the **Product** field, enter the name of the product associated with that fix, and then click **Add**.
3. Click **OK** or **Schedule** to submit the task.

7.9.1 Cleaning up fixes from a list

Use the following method of cleaning up fixes if you prefer to select the cover letters and save files to be deleted from a list of fixes:

1. Expand the AS/400 system you plan to clean up under **Endpoint Systems**, and then expand **Configuration and Service**.
2. Expand **Fixes Inventory**.
3. Click on the product for which you wish to clean up fixes and cover letters. Or, to select from all fixes and cover letters on the system, click on **All Fixes**. When the list of fixes appears in the right-hand panel, click on the **Status column heading** to sort the fixes according to status.
4. Select the fixes with a status of **Cover Letter** to clean up cover letters. To clean up save files, scroll the right-hand panel to the right to reach the **Save File** column and click on the heading to sort by the values in the column. Then, scroll down to the end of the column to find fixes with a Save File value of **Yes**. The window looks like the example shown in Figure 83 on page 107. Scroll back to the left to select the fix.
 - To select one fix, click on that fix.
 - To select several individual fixes, hold down the Control key and click on each fix you want to include.
 - To select a consecutive list of fixes, hold down the Shift key and click on the first and last fixes in the list.
5. Right-click on the last fix, and then click on **Clean Up** to view the window as shown in Figure 105.

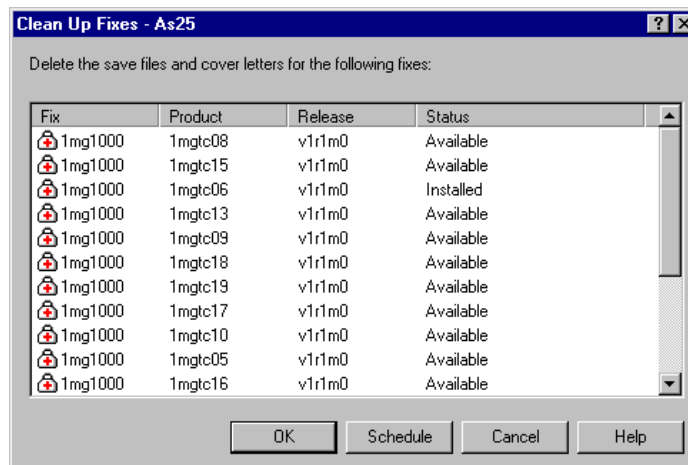


Figure 105. Clean Up Fixes window

6. You can scroll through the list. When you are satisfied that the list is correct, click **OK** or **Schedule** to submit the job.

7.10 Cancelling restart (IPL) actions

You may need to cancel an action for selected fixes that have restart actions (also known as unattended IPL actions) pending against them. Restart actions include:

- Install at next restart
- Install permanently at next restart
- Uninstall at next restart
- Uninstall permanently at next restart

Management Central provides you with a way to cancel these restart actions. To do so, follow these steps:

1. Under **Endpoint Systems**, expand the AS/400 system on which the restart action is scheduled. Then, expand **Configuration and Service**.
2. Expand **Fixes Inventory**.
3. Click on the product to which the fix is related. Or, to select from all fixes on the system, click on **All Fixes**. When the list of fixes appears in the right-hand panel, click on the **Status column heading** to sort the fixes according to status.
4. Scroll through the list to find the fix in question sorted under one of the following status descriptions:
 - Install at next restart
 - Install permanently at next restart
 - Uninstall at next restart
 - Uninstall permanently at next restart
5. Right-click on the fix, select **Advanced**, and then click on **Cancel Actions**. The Cancel Actions window will present information similar to what is shown in Figure 106.

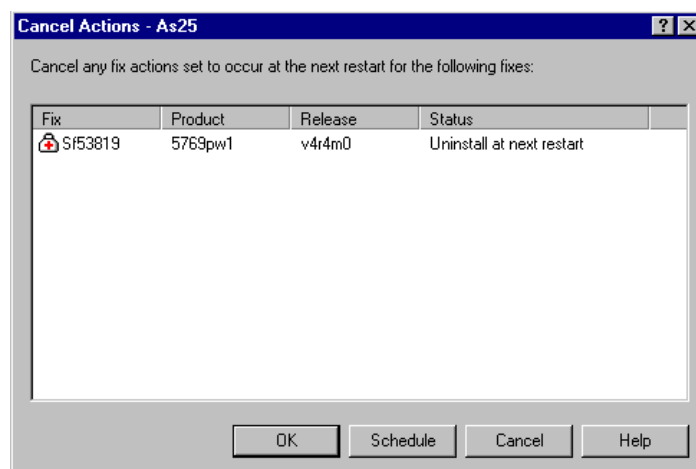


Figure 106. Cancel Actions window

In this example, fix SF53819 was previously selected to be uninstalled at the next restart, which has not yet occurred. The uninstall action is now cancelled, and the fix remains installed.

6. Click **OK** or **Schedule** to submit the cancellation job.

If there is only one fix with pending actions related to a particular product, or if you wish to cancel pending actions for all fixes related to a particular product, a more simple method is described here:

1. Under **Endpoint Systems**, expand the AS/400 system on which the restart action is scheduled. Then, expand **Configuration and Service**.
2. Expand **Fixes Inventory**.
3. Right-click on the product to which the fix is related. Select **Advanced**, and then click on **Cancel Actions**. The Cancel Actions window will contain information similar to what is shown in Figure 107 on page 126.

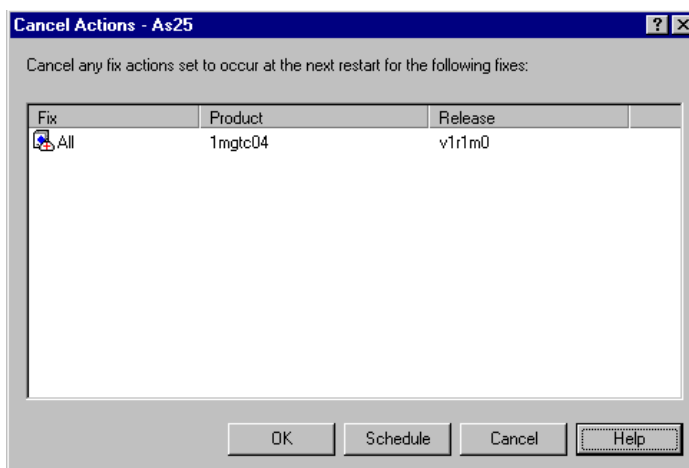


Figure 107. Cancel Actions window

4. Click **OK** or **Schedule** to submit the cancellation task.

7.11 Fix status

The meaning of all possible values for the status of fixes is provided in Table 9.

Table 9. Status of fixes

Status	Meaning
Available	The fix is ready to install on the local system. It either exists as a save file, or was loaded (LODPTF) but not applied (APYPTF), or was temporarily removed. Only if it exists as a save file is it also available for distribution to other systems.
Cover letter	The cover letter for the fix is on the system, but the fix is not on the system.
Damaged	The fix is damaged. If you have the save file, you can uninstall or install the fix again. If you do not have the save file, you must get the save file and install or uninstall the fix again.
Install at next restart	The fix will be installed the next time the system is restarted.
Install permanently at next restart	The fix will be installed permanently the next time the system is restarted.
Installed	The fix is installed and can be either uninstalled from the system or installed permanently. The fix is not a permanent part of the system.
Installed permanently	The fix is installed permanently and cannot be uninstalled.
Installed permanently - action pending	The fix is installed permanently, but you need to perform an action before the fix is active. Look at the cover letter to determine the required actions. If you do not perform an action, the fix becomes active the next time the system is restarted.
Installed - action pending	Indicates that the fix is installed, but that you need to perform an action before the fix is active. Look at the cover letter to determine the required actions. If you do not perform an action, the fix becomes active the next time the system is restarted.

Status	Meaning
On order	The fix has been ordered, but has not yet arrived on the system.
Superseded	The fix has been replaced by a later fix.
Supported only	The fix is stored on the system, but cannot be installed on the system. A supported only fix can only be distributed to and installed on other systems.
Uninstall at next restart	The fix will be uninstalled the next time the system is restarted.
Uninstall permanently at next restart	The fix was installed or available and will be uninstalled permanently the next time the system is restarted.
Uninstalled permanently - action pending	The fix is uninstalled permanently, but you need to perform an action before the fix is permanently uninstalled. Look at the cover letter to determine the required actions. If you do not perform an action, the fix is permanently uninstalled the next time the system is restarted.
Uninstalled - action pending	Indicates that the fix is uninstalled, but that you need to perform an action before the fix is no longer active. Look at the cover letter to determine the required actions. If you do not perform an action, the fix is uninstalled the next time the system is restarted.

Note

In the foregoing Status list, the suffix "action pending" represents either the ACN or PND suffixes. You find these suffixes in the corresponding status description for the same fix if you enter the `DSPPTF` command from an AS/400 system command line.

Chapter 8. Collecting performance data

To help you optimize the operation of your AS/400 system for the best possible response time and throughput, your AS/400 system has performance monitors that can collect performance data. This data enables you to identify needed adjustments to programs and to the operating environment of your AS/400 system. These adjustments can help your system reach peak performance. Performance data is also used when doing capacity planning.

You can collect, report, and use performance data in different ways. The Start Performance Monitor (STRPFRMON) command provided by the OS/400 operating system gives you many different collection options. It places the collected data in a set of database files. The Performance Tools for AS/400 licensed program (5769-PT1) enables you to analyze this data and produce a wide variety of reports. Performance Tools also includes a powerful modelling and capacity planning tool called BEST/1, which also uses these database files, as do various other applications.

Now Management Central Collection Services provides you with an easy, new way to collect the performance data that goes into these database files.

8.1 Benefits of using Management Central Collection Services

Management Central's *Collection Services* can collect performance data for future analysis by the Performance Tools for AS/400 licensed program (5769-PT1) or other performance report applications. You can use Collection Services instead of the OS/400 performance monitor function, STRPFRMON command, to collect your data and create database files. When you use the OS/400 performance monitor, your data is collected into as many as 30 database files. This collection is accomplished by a high priority (0) system job. Collection Services, on the other hand, stores your data for each collection in a single collection object. This means a lower system overhead when collecting performance data. You can then create as many different sets of database files as you need. You can use these database files with the Performance Tools for AS/400 licensed program (5769-PT1) or other applications.

Even if you elect to create the database files during collection, you will still experience a performance advantage by comparison with running the OS/400 Performance Monitor STRPFRMON function, since Collection Services uses a lower priority (50) batch job to update these files.

Collection Services allows you to:

- Easily manage your collection objects in the Operations Navigator graphical interface.
- Collect performance data continuously and automatically with minimal system overhead.
- Control what data is collected and how the data is used.
- Move performance data between releases without converting the data.

These capabilities introduce a new paradigm to the process of collecting performance data on the AS/400 system. The reduction in collection overhead

makes it practical, in many cases, to collect performance data in greater detail and at shorter intervals on a continuous basis. Collection Services enables you to establish a network-wide system policy for collecting and retaining performance data and to automate the execution of that policy as a routine matter. As long as you retain the collection objects, if the need arises, you have the capability to look back and analyze performance-related events down to the level of detail you collected.

Note

When you need to view *real-time* performance data, Management Central also provides an easy-to-use graphical interface for monitoring system performance. Please refer to Chapter 5, “Monitoring system performance” on page 63, for details.

8.2 Starting Collection Services on a single system

To start collecting system performance data, you need to start Collection Services on your system. To start Collection Services on a single endpoint system, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 Endpoint Systems**.
3. Expand the endpoint system from which you want to collect performance data.
4. Expand **Configuration and Service**.
5. Right-click **Collection Services**, and select **Start Collecting** to open the Start Collection Services window. The General page is displayed as shown in Figure 108.

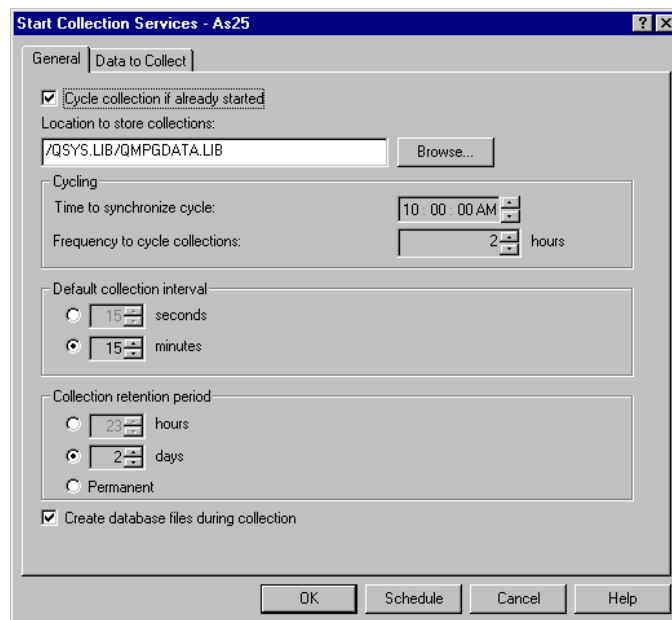


Figure 108. Start Collection Services window: General page

6. Use the Start Collection Services – General page to specify information about the collection of AS/400 performance data. The values shown on this page are the values stored on the AS/400 system. Changes made to the values on this page will change the values stored on the AS/400 system.

- Check the box **Cycle collection if already started**. This ensures that any changes that you make to Collection Services properties will be reflected on a new object when you click OK. When a collection is cycled, no more data is added to the collection object and a new collection object is created to store newly collected data. Cycling collections prevents the collection objects from becoming too large.
- If the library QMPGDATA (used by PM/400) exists on your AS/400 system, the Location to store collections field will default to this library. Otherwise, it will default to QPFRDATA. Change this if required. Click the **Browse** button to see a list of all libraries that exist on your AS/400 system. Scroll through the list and select a library. You can also enter your library name using the format `/QSYS.LIB/LIBNAME.LIB` as shown in the field. However, note that if you spell the name of an existing library incorrectly, or enter the name of a library that does not exist on your AS/400 system, the collection will fail after submission. Changes become effective when you cycle the collection.

Note

If you use Start Collection Services to change this value for an active collection, even if you do not check the **Cycle collection if already started** box, the collection will cycle when you click **OK**.

- In the **Cycling** panel, specify a time of day in the **Time to synchronize cycle** field. This ensures that your collection objects contain data that is collected at the same time each day. The time of day is the time registered by the QTIME system value on the AS/400 system, which is in the time format specified for your PC. In the **Frequency to cycle collections** field, specify how often collections are to be cycled. For example, if Collection Services is started at 3:00 PM, the Time to synchronize cycle is set to 12:00 AM, and the Frequency to cycle collections is 24 hours, the collection cycles at 12:00 AM the first time and continues to cycle once every 24 hours.
- In the **Default collection interval** panel, specify the collection interval for any data category that does not have a specific interval defined on the Data to Collect properties page (see Figure 109 on page 132). This is the amount of time, in seconds or minutes, that elapses between collections for all categories of AS/400 system performance data that support collection at specific time intervals. The recommended default collection interval is 15 minutes. A change to the default collection interval becomes effective immediately after you click OK on the Start Collection Services window. This means it is applied to the current collection of data even if you do not cycle the collection.
- In the **Collection retention period** panel, specify the length of time that cycled collection objects remain in the file system before being deleted. You may want to specify a retention period longer than the default of one day. Collection Services may delete collection objects and the data they contain from the system at any time after the retention period has expired.

Check the **Permanent** field if you do not want Collection Services to delete your collection objects for you. A change to the collection retention period becomes effective immediately after you click OK on the Start Collection Services window. This means it is applied to the current collection of data even if you do not cycle the collection.

- Select **Create database files during collection** only if you wish to generate database files automatically as data is collected. By default, this option is not selected, unless PM/400 is installed (see 8.12, “Coexisting with PM/400” on page 159). Note that if you select this option, you will lose the reduction in overhead achieved when Collection Services stores your data for each collection only in a single collection object. If you do not check this field, you can create these database files later. See 8.10.1, “Why use collection objects in addition to database files” on page 156, for more information.

7. Click the **Data to Collect** tab to select the page that is shown in Figure 109.

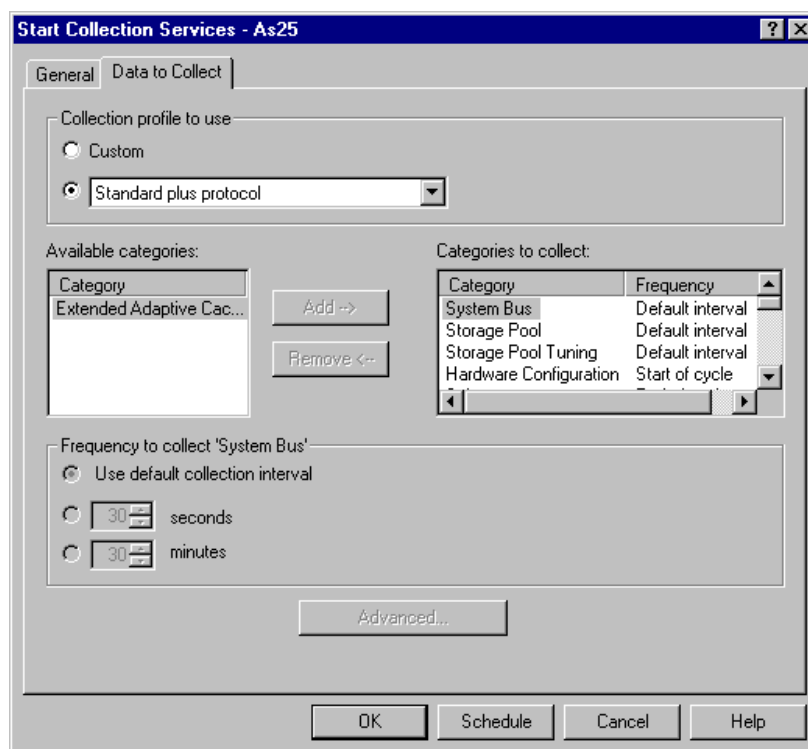


Figure 109. Start Collection Services window: Data to Collect page

8. For Collection profile to use, *Standard plus protocol* is the default selection. Click on the drop-down list to see the complete list of profiles. The profiles are:

- **Minimum:** This is the most commonly used set of performance data. This is the minimum data collection recommended and includes the following categories: System Bus, Storage Pool, Hardware Configuration, System CPU, System-Level Data, Job MI, Job OS400, Disk Storage, and IOP.

Note

When you select this profile, you cannot use Performance Tool (5769-PT1) to analyze the data collected with Collection Services. This profile does not produce the database, QAPMPOOLL, which is needed by Performance Tool.

- **Standard:** This includes the data categories typically needed by the tools in Performance Tools for AS/400 (5769-PT1), except for communications protocol data. It includes all the categories in the Minimum profile, plus: Storage Pool Tuning, Subsystem, SNADS Transaction, Local Response Time, APPN, and SNA. The data categories in this profile correspond to the *SYS value for the DATA parameter on the Start Performance Monitor (STRPFRMON) command.
- **Standard plus protocol:** The data categories in this profile include the data categories typically needed by the tools in Performance Tools for AS/400 (5769-PT1), including communications protocol data. Included are all the categories in the Standard profile, plus: Integrated PC Server, Communications Base, Communications Station, and Communications SAP. The data categories in this profile correspond to the *ALL value for the DATA parameter on the Start Performance Monitor (STRPFRMON) command.

If none of these profiles satisfies your requirements, check the **Custom** field above the drop-down list to specify a customized list of categories. If you select **Custom**, see 8.4, “Customizing data collections” on page 136, for more information. Also refer to 8.5, “Performance data categories” on page 140, for descriptions of the categories included in these profiles and from which you can create a customized profile.

9. You can now start Collection Services in one of three ways:

- Click **OK** to start Collection Services immediately. A Start Collection Services task is created. You can select the task under Task Activity in the Operations Navigator window and view the status of the task on any system or group. When the start task has completed, Collection Services begins collecting performance data and storing it in the collection object specified.
- Click **Schedule** to specify a later time to start Collection Services. If you wish to use this option, see 8.6, “Performance collections and the Scheduler” on page 141.
- If you want Collection Services to start whenever the system starts, see 8.7, “Starting Collection Services automatically” on page 146.

If you choose not to create the database files during collection, Collection Services will store the performance data from this collection in a single collection object, from which you can create as many different sets of database files as you need. For information on how to do this, see 8.11, “Creating database files” on page 157.

To collect performance data on more than one system, you can start Collection Services as described above individually for each system. Or, you can collect

performance data for a system group, as described in 8.3, “Starting Collection Services on a system group” on page 134.

8.3 Starting Collection Services on a system group

Collecting exactly the same system performance data on multiple systems is easier to manage if you include them all in a single system group. You can then start Collection Services for that group. This approach involves less effort to set the same properties on multiple systems than defining Collection Services for each individual system.

For information on how to create a system group in Management Central, see 2.4.1, “Creating system groups” on page 18.

To start Collection Services on an existing system group, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 System Groups**.
3. Right-click the system group from which you want to collect performance data, and select **Collection Services**.
4. Select **Start Collecting** to open the Start Collection Services window. The General page is displayed as shown in Figure 108 on page 130.
5. Use the Start Collection Services – General page to specify information about the collection of AS/400 performance data. Changes made to the values on this page will change the values stored on each AS/400 system in the system group.
 - Check the box **Cycle collection if already started**. This ensures that any changes that you make to Collection Services properties will be reflected on a new object when you click OK. When a collection is cycled, no more data is added to the collection object and a new collection object is created to store newly collected data. Cycling collections prevents the collection objects from becoming too large.
 - The Location to store collections field will default to QPFRDATA. Change this if required. If PM/400 is in use on any of the systems, you should preferably change this to QMPGDATA (see 8.12, “Coexisting with PM/400” on page 159, for details). Click the **Browse** button to see a list of all libraries that exist on your AS/400 system. Scroll through the list and select a library. You can also enter your library name using the format /QSYS.LIB/LIBNAME.LIB. as shown in the field. However, if you spell the name of an existing library incorrectly, or enter the name of a library that does not exist on your AS/400 system, the collection will fail after submission. Changes become effective when you cycle the collection.

Note

If you use Start Collection Services to change this value for an active collection, even if you do not check the Cycle collection if already started field, the collection will cycle when you click **OK**.

- In the **Cycling** panel, specify a time of day in the **Time to synchronize cycle** field. This ensures that your collection objects contain data that is

collected at the same time each day. The time of day is the time registered by the `QTIME` system value on the AS/400, shown in the time format specified for your PC. In the **Frequency to cycle collections field**, specify how often collections are to be cycled. Consider an example where Collection Services starts at 3:00 PM, the Time to synchronize cycle is set to 12:00 AM, and the Frequency to cycle collections is 24 hours. In this case, the collection cycles at 12:00 AM the first time and continues to cycle once every 24 hours.

- In the **Default collection interval** panel, specify the collection interval for any interval that does not have a specific collection frequency defined on the Data to Collect properties page (see Figure 109 on page 132). This is the amount of time, in seconds or minutes, that elapses between collections for all categories of AS/400 system performance data that support collection at specific time intervals. The recommended default collection interval is 15 minutes. A change to the default collection interval becomes effective immediately after you click **OK** on the Start Collection Services window. This means it is applied to the current collection of data even if you do not cycle the collection.
- In the **Collection retention period** panel, specify the length of time that cycled collection objects remain in the file system before being deleted. You may want to specify a retention period longer than the default of one day. Collection Services may delete collection objects and the data they contain from the system at any time after the retention period has expired. Check the **Permanent** field if you do not want Collection Services to delete your collection objects for you. A change to the collection retention period becomes effective immediately after you click **OK** on the Start Collection Services window. This means it is applied to the current collection of data even if you do not cycle the collection.
- Select **Create database files during collection** only if you wish to generate database files automatically as data is collected. By default this option is not selected. Note that if you select this option, you will lose the reduction in overhead achieved when Collection Services stores your data for each collection only in a single collection object. If you do not select this field, you can create these database files later. See 8.10.1, “Why use collection objects in addition to database files” on page 156, for more information.

6. Click the **Data to Collect** tab.

7. For **Collection profile to use**, *custom* is the default selection when starting collection services on a system group. If you wish to use a standard profile, click the drop-down list to see the list of standard profiles. For descriptions of the standard profiles, refer to step 8 in 8.2, “Starting Collection Services on a single system” on page 130.

If none of the standard profiles satisfies your requirements, check the **Custom** field above the drop-down list to specify a customized list of categories. If you select **Custom**, see 8.4.2, “Creating a customized collection on a system group” on page 139, for more information. Also refer to 8.5, “Performance data categories” on page 140, for descriptions of the categories included in these profiles and from which you can create a customized profile.

8. You can now start Collection Services in one of two ways:

- Click **OK** to start Collection Services immediately. A Start Collection Services task is created. You can select the task under Task Activity in the Operations Navigator window and view the status of the task on any system or group. When the start task has completed, Collection Services begins collecting performance data and storing it in the collection object specified.
- Click **Schedule** to specify a later time to start Collection Services. If you wish to use this option, see 8.6, “Performance collections and the Scheduler” on page 141.

Collection Services will store the performance data from this collection in a single collection object for each system in the group. From the collection object, you can create as many different sets of database files as you need. For information on how to do this, see 8.11, “Creating database files” on page 157.

8.4 Customizing data collections

If the standard collection profiles (described under step 8 in 8.2, “Starting Collection Services on a single system” on page 130, and under step 7 in 8.3, “Starting Collection Services on a system group” on page 134) do not satisfy your requirements, you can create your own customized data collection profile. For your customized profile, you can select from a list of available data categories, such as System CPU, Local Response Time, Disk Storage, and IOPs. For a list and descriptions of these categories, see 8.5, “Performance data categories” on page 140.

8.4.1 Creating a customized collection on a single system

To customize Collection Services on a single AS/400 system, follow these steps:

1. In AS/400 Operations Navigator, expand the AS/400 system from which you wish to collect performance data. You can select an AS/400 endpoint system under **Management Central** or an AS/400 system to which you have a direct connection under **My AS/400 Connections**.
2. Expand **Configuration and Service**.
3. Right-click **Collection Services**, and select **Properties**. The Collection Services – Properties window appears as shown in Figure 110 on page 137.

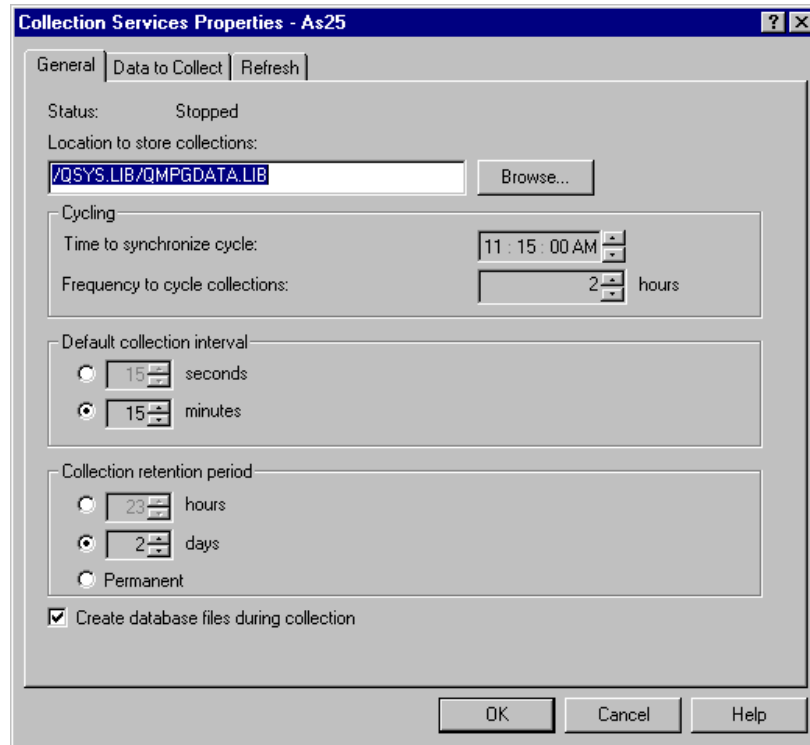


Figure 110. Collection Services Properties window: General page

4. Use the Collection Services Properties – General page – to specify information about the collection of AS/400 performance data. The values shown on this page are the values stored on the AS/400 system. Changes made to the values on this page will change the values stored on the AS/400 system.

For an explanation of the fields on this page, refer to step 6 in 8.2, “Starting Collection Services on a single system” on page 130.

5. Click the **Data to Collect** tab to view the window shown in Figure 111 on page 138.
6. For **Collection profile to use**, select **Custom**.

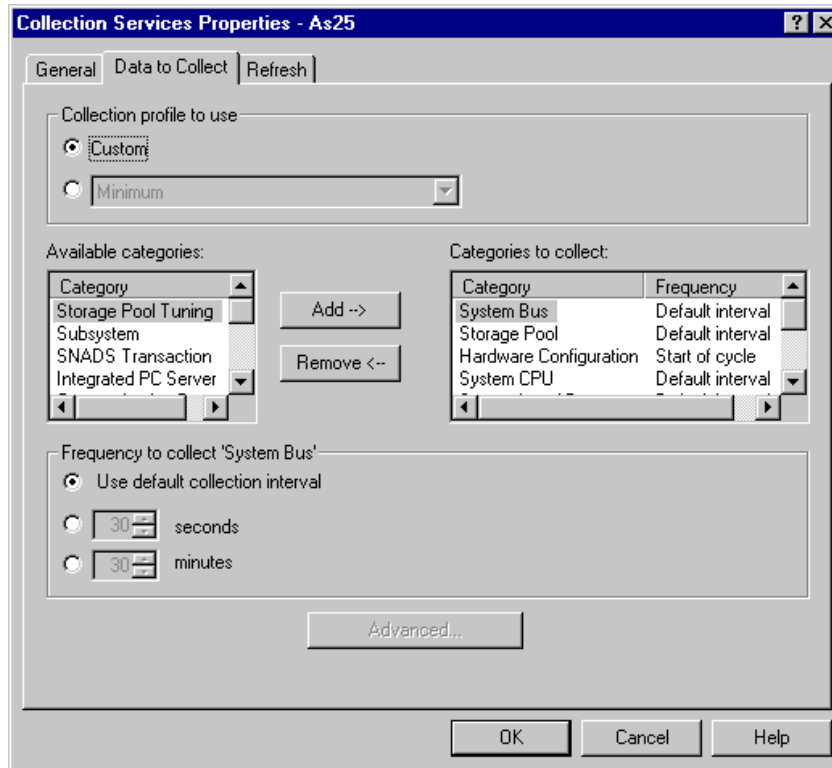


Figure 111. Collection Services Properties window: Data to Collect page

The Categories to collect panel shows the categories in the default profile previously selected (Minimum, in this example). The Available categories panel lists those categories not included in the Categories to collect panel. The Add and Remove buttons are active.

7. Select any categories in the Categories to collect panel that you do not wish to collect, and click the **Remove** button.
8. Select any categories in the Available categories panel that you wish to collect, and click the **Add** button.
9. As you select a category in the Categories to collect panel, the name of that category will appear in the heading of the Frequency to collect panel. To specify the collection interval for that category, select one of the fields, **Use default collection interval**, **seconds**, or **minutes** in this panel.
10. Click **OK** to save your customized values.

Once you customize Collection Services to the settings you prefer, you can right-click **Collection Services** again, and select **Start Collection Services** to begin collecting performance data.

Note

In the above procedure, instead of selecting **Properties** in step 3, you can select **Start Collecting**. In this case, click **OK** or **Schedule** in step 10 to start the collection.

8.4.2 Creating a customized collection on a system group

To create a customized collection for a system group, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Expand **AS/400 System Groups**.
3. Right-click the system group from which you want to collect performance data and select **Collection Services**.
4. Select **Start Collecting** to open the Start Collection Services window. The General page is displayed as shown in Figure 108 on page 130.
5. Use the Start Collection Services – General page to specify information about the collection of AS/400 performance data. The values shown on this page are the values stored on the AS/400 system. Changes made to the values on this page will change the values stored on the AS/400 system.

For an explanation of the fields on this page, refer to step 6 in 8.2, “Starting Collection Services on a single system” on page 130.

6. Click the **Data to Collect** tab to see the window that is shown in Figure 112.

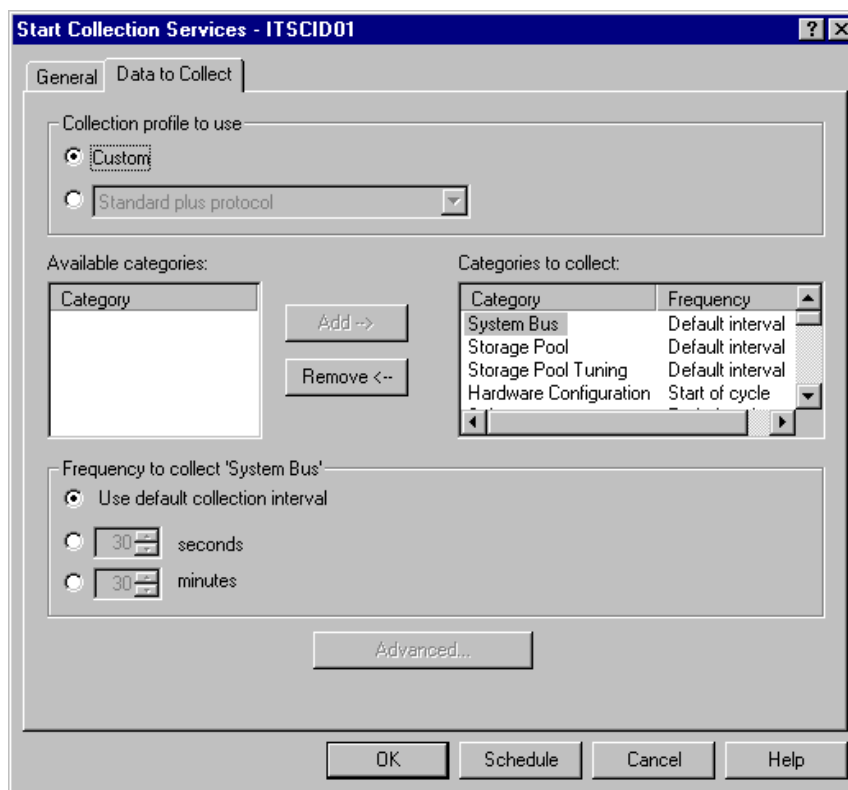


Figure 112. Start Collection Services window: Data to Collect page

7. For **Collection profile to use**, select **Custom**. The Categories to collect panel shows all categories as selected. The Remove button is active.
8. Select any categories in the Categories to collect panel that you do not wish to collect and click the **Remove** button.
9. As you select a category in the Categories to collect panel, the name of that category will appear in the heading of the Frequency to collect panel. To specify the collection interval for that category, select one of the fields in this

panel: **Use default collector interval, seconds or minutes.** For seconds or minutes, use the scroll buttons to select the required value.

10. You can now start Collection Services in one of two ways:

- Click **OK** to start Collection Services immediately. A Start Collection Services task is created. You can select the task under Task Activity in the Operations Navigator window and view the status of the task on any system or group. When the start task has completed, Collection Services begins collecting performance data and storing it in the collection object specified.
- Click **Schedule** to specify a later time to start Collection Services. If you wish to use this option, see 8.6, “Performance collections and the Scheduler” on page 141.

Collection Services stores the performance data from this collection in a single collection object for each system in the group. From the collection object, you can create as many different sets of database files as you need. For information on how to do this, see 8.11, “Creating database files” on page 157.

8.5 Performance data categories

When choosing an existing collection profile or creating your own customized profile, your choices will be facilitated by an understanding of what performance data is included in each category. A brief description of all the categories from which you can select is shown here:

System Bus	Data on the operation of each system bus.
Storage Pool	Storage pool configuration and operation data.
Hardware Configuration	Hardware Resource information, same as acquired by the Display Hardware Resources (DSPHDWRSC) command.
System CPU	Data on system CPU usage for each processor.
System-Level Data	General system-wide data.
Job MI	Information on every active task, job, and thread in the system, provided by the machine interface.
Job OS400	Information on every active job in the system, provided by the operating system.
Disk Storage	Base storage unit information and operational data for disk drives.
IOP	Data on IOP bus use and IOP utilization by adapter resources.
Storage Pool Tuning	Pool tuning configuration data for each system storage pool.
Subsystem	Data on active subsystems and subsystem pools.
SNADS Transaction	Transaction boundary information specific to active SNADS jobs in the system.

Local Response Time

Interactive response time information for each local workstation attached to a controller that supports collecting response time data. Response time information is reported for each workstation and is saved in a set of response time buckets. To view or change the definitions for these response time buckets, after clicking **Add** to add this category to your collection profile, click **Advanced**. Click on **Help** for detailed information on the response time buckets.

APPN

General APPN information and data classified according to transaction type and work activity.

SNA

Data for each active T2 task consisting of controller, task and session information.

Integrated PC Server

Information about Integrated PC Servers connected to IOPs.

Communications Base

Base protocol information for each communications line that is varied on.

Communications Station

Information for each station that is varied on for certain communication lines. Protocols supporting this data are Token Ring, Ethernet, DDI, Frame Relay, and X.25.

Communications SAP

Service Access Point (SAP) information for each configured SAP within varied-on Token Ring, Ethernet, DDI, and Frame Relay communications lines.

Extended Adaptive Cache

Collection of Extended Adaptive Cache Simulator data for those adapters supporting this function. Extended Adaptive Cache Simulator is available on V4R4 systems with #2748 I/O Adapters, which also support Extended Adaptive Cache itself. The data reported for the Disk Storage category reflects the performance improvements that would result from installing one or more read cache devices. To view or change the cache size to be simulated, after clicking **Add** to add this category to your collection profile, click **Advanced**. For pointers to additional information on Extended Adaptive Cache, click on **Help**.

8.6 Performance collections and the Scheduler

As mentioned in the introduction of this chapter, the reduction in collection overhead makes it practical in many cases for you to collect performance data on a continuous basis. See 8.7, “Starting Collection Services automatically” on page 146, for ways to do this.

However, if you should require the capability, Management Central provides a quick and easy way to schedule your Performance collections. You may choose to use the Scheduler to temporarily override your normal collection policy for some specific purpose. For example, you may need a collection with greater granularity than that which you normally collect, on a particular day at a particular

time, for a purpose such as problem resolution or capacity planning. The Scheduler enables you to set this up beforehand.

In the Start Collection Services window, click the **Schedule** button to open the Management Central Scheduler window, which is shown in Figure 113.

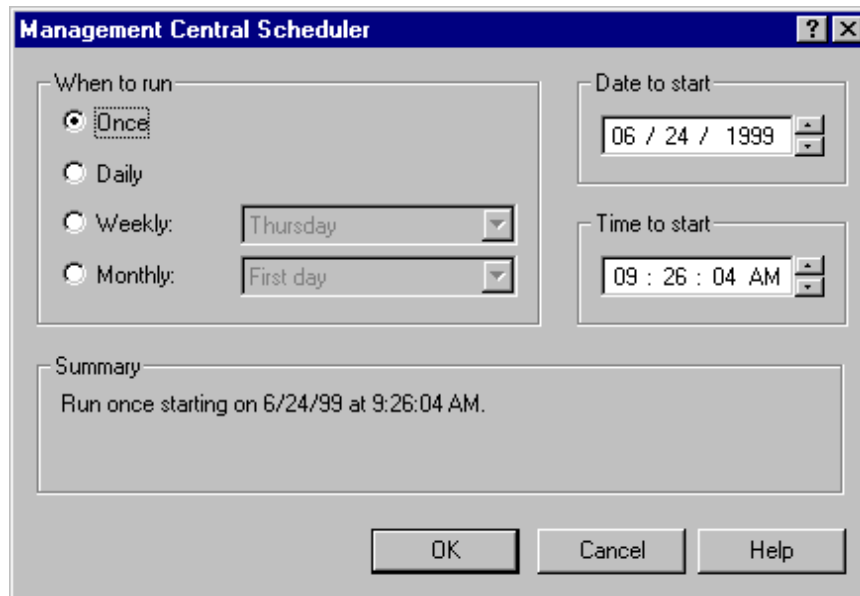


Figure 113. Management Central Scheduler: Scheduling a performance collection

The Scheduler provides you with the following options in the When to Run panel:

- Once** The task runs a single time beginning at the specified date and time.
- Daily** The task runs every day at the specified time beginning on the specified date.
- Weekly** The task runs every week at the specified time and day beginning on the specified date. You may either accept the default (today's date) or specify the day of the week when you want the task to run.
- Monthly** The task runs every month at the specified time and day beginning on the specified date. You may either accept the default (today's date) or specify a day of the month (1 through 31), First day, or Last day.

Of these options, the first option, *Once*, is appropriate to select when submitting a performance collection. When the option is submitted, performance collections continue to run around the clock, as long as the AS/400 system is available, until you end them. There is no parameter by which you can specify the duration of a performance collection in Collection Services. See also 8.13, "Collection Services or STRPFRMON" on page 162.

You should use the Daily, Weekly, or Monthly options to schedule performance collections only if you also schedule a second task to end the collection at corresponding intervals. For example, you may wish to collect performance data of two hours duration for each day, during the period when your AS/400 systems may be at peak load. To do this, you can schedule a performance collection to

commence Daily at 11:00 AM. To schedule another task which will end this performance collection Daily at 1:00 PM, perform these steps:

1. Expand **Configuration and Service** for the appropriate system.
2. Right-click **Collection Services** and select **Stop Collecting** to open the Stop Collection Services window shown in Figure 114.

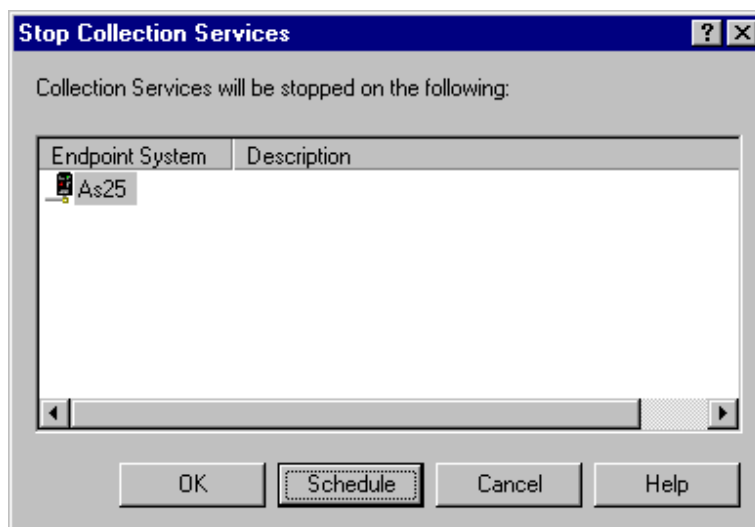


Figure 114. Stop Collection Services window

3. Click on **Schedule** to open the Management Central Scheduler window and complete it as shown in Figure 115.

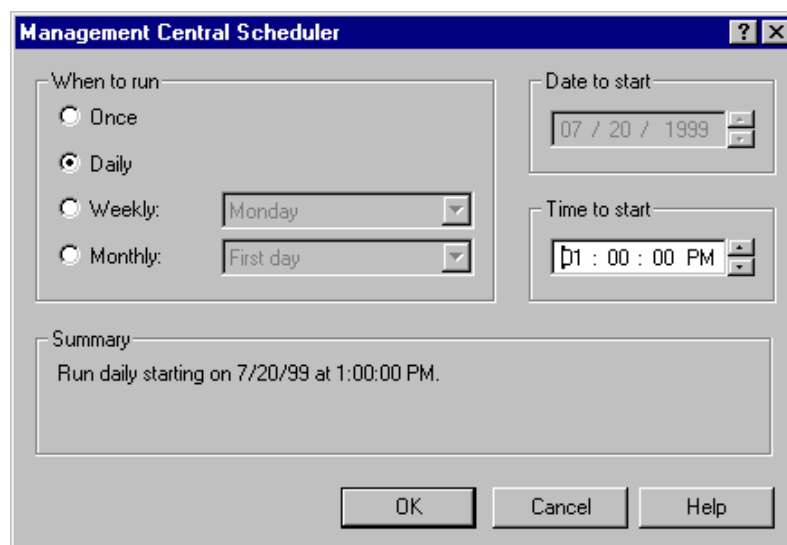


Figure 115. Management Central Scheduler window: Scheduling stop collecting

4. Click **OK** to submit the task to the scheduler.

See 8.6.1, “Example of a daily schedule” on page 144, for an example of another reason to use the Daily option.

If you select **Weekly**, you must also select the day of the week from the drop-down list.

If you select **Monthly**, you must also select the day of the month from the drop-down list.

Complete the **Date to Start** field. This is the date when the task will first run, corresponding to the QDATE system value on the AS/400 system. Click on the month, day or year portions of the field and use the scroll buttons, or just enter the desired date.

Complete the **Time to Start** field in the same way. This is the time when the task will first run, corresponding to the QTIME system value on the AS/400 system.

Note

If the scheduling of a task crosses a boundary from standard time to daylight savings time or from daylight savings time to standard time, the Time to Start may be an hour later or earlier than expected. See also 8.8, "Time zone considerations" on page 150.

When you click **OK**, a Start Collection Services task is scheduled. You can select the task under **Scheduled Tasks** in the Operations Navigator window and view the status of the task on any system or group. When the start task is completed, Collection Services begins collecting performance data and storing it in a new collection object.

8.6.1 Example of a daily schedule

When PM/400 is active on your AS/400 system, if you need to collect performance data at smaller intervals than the 15 minutes required by PM/400, the scheduler provides you with a way to automate the needed circumvention. See 8.12, "Coexisting with PM/400" on page 159, for a further explanation of this requirement. You need to start the collection again daily just after the time specified in the Time to synchronize cycle field.

To do this, follow these steps:

1. Click on **Configuration and Service** under the AS/400 system on which performance data is being collected. Right-click on **Collection Services**, and then click on **Start Collecting**.
2. On the Start Collection Services window, check the **Cycle collection if already started** field and select a **Frequency to cycle collections** of 24 hours. Select the required collection interval, ensure that the other values are correct, and click on **Schedule**.
3. On the Management Central Scheduler window, select **Daily** and the appropriate time. Figure 116 on page 145 shows an example of this window.

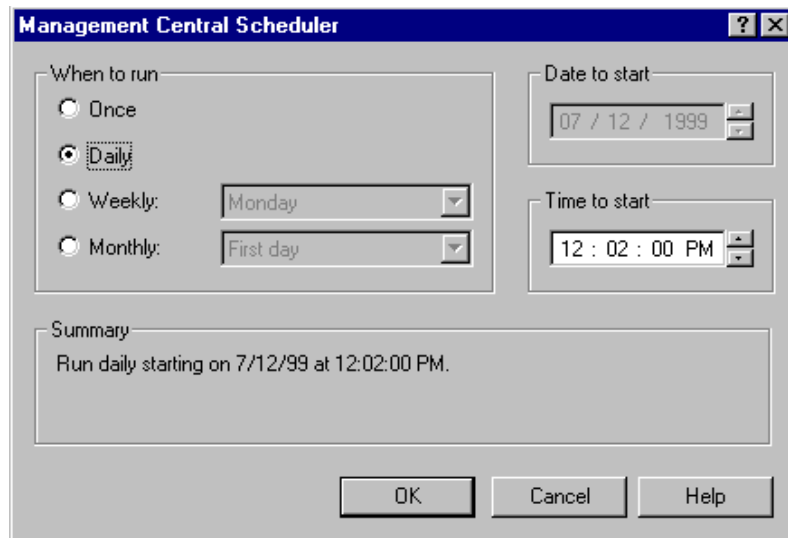


Figure 116. Scheduler window: Scheduling daily Start Collection Services

4. Click on **OK**.

You can examine the details of this submitted task in the following way:

1. Click on **Scheduled Tasks** to see the entry for the task, as shown in Figure 117.

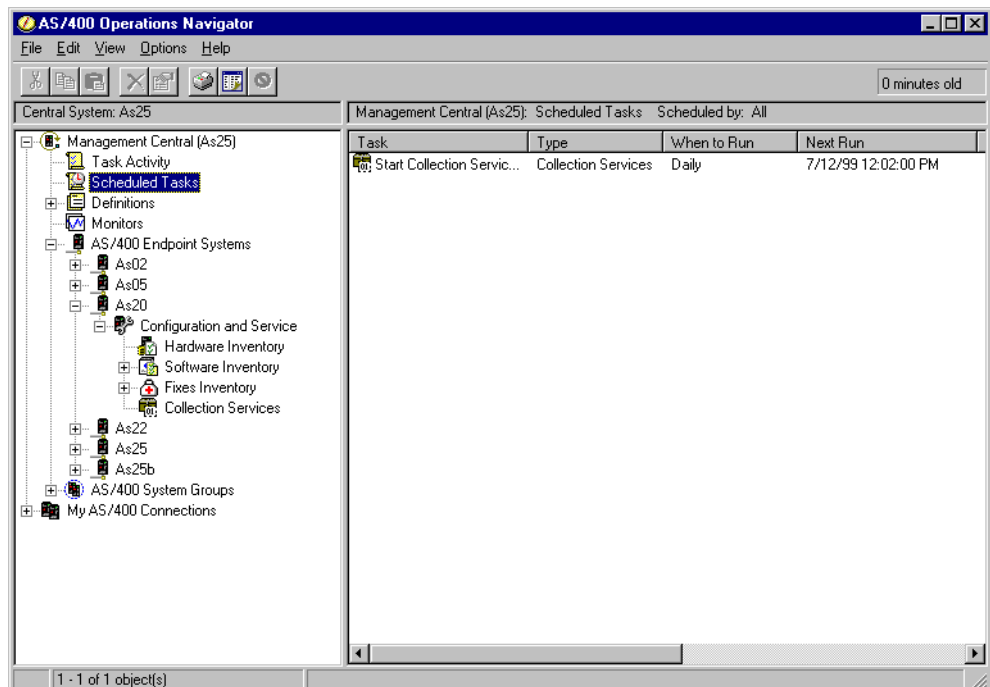


Figure 117. Scheduled tasks displayed

2. Right-click on the **Start Collection Services** entry, and click on **Properties** to view the window shown in Figure 118 on page 146.

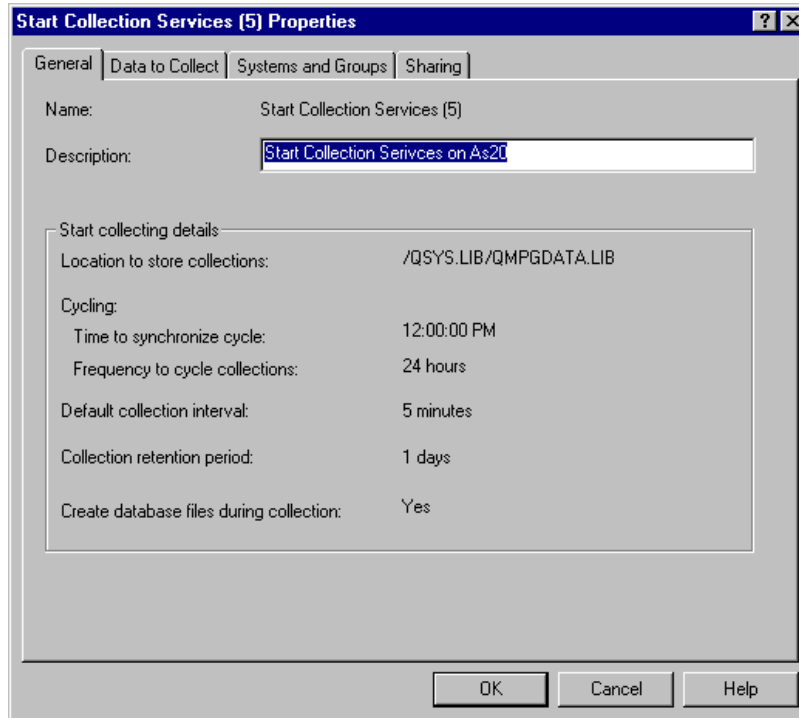


Figure 118. Start Collection Services: Properties window

3. Click on **Cancel** or **OK** to exit.

8.7 Starting Collection Services automatically

To start Collection Services automatically whenever the AS/400 system is started, you can include a call to the QYPSSTRC (Start Collector) API in your startup program (identified by the QSTRUPPGM system value).

Another way to start Collection Services automatically is to add an autostart job entry to the QSYSWRK subsystem.

8.7.1 Adding an autostart job entry on a single system

To add an autostart job entry on a single system using Management Central, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Select **AS/400 Endpoint Systems**.
3. In the right panel, right-click the system where you want to automatically start Collection Services, and select **Run Command**. The Run Command window is shown in Figure 119 on page 147.

2. On the New Command Definition window create the `CRTJOB` command as described in step 4 in 8.7.1, “Adding an autostart job entry on a single system” on page 146. An example is shown in Figure 120.

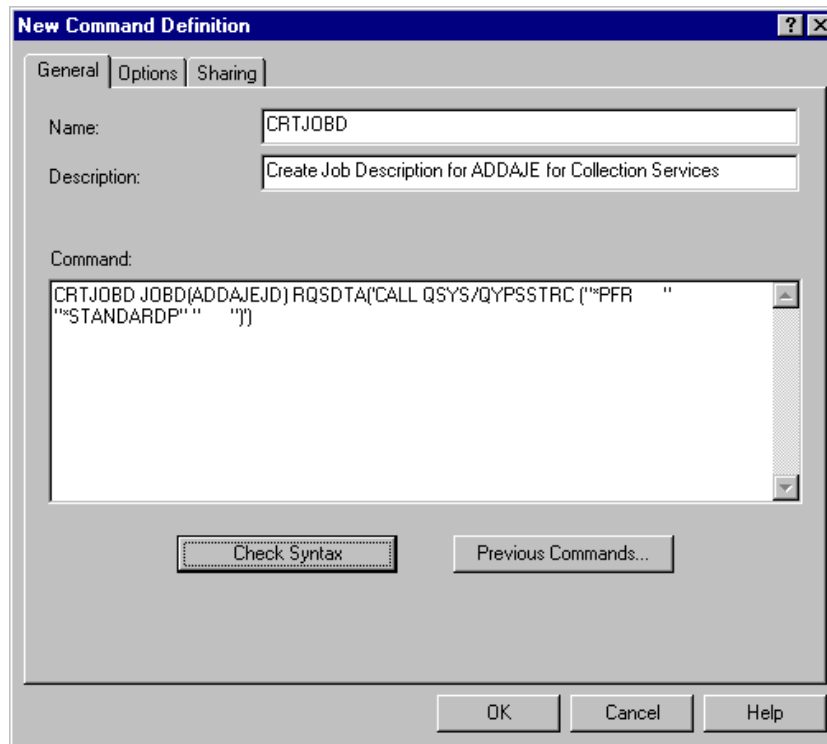


Figure 120. New Command Definition window: `CRTJOB` example

3. Click the **Check Syntax** button. Correct any errors, and then click **OK** to create the command.
4. Right-click on **Commands**, and select **New Definition** again.
5. On the New Command Definition window, create the `ADDAJE` command as described in step 7 in 8.7.1, “Adding an autostart job entry on a single system” on page 146. An example is shown in Figure 121 on page 149.

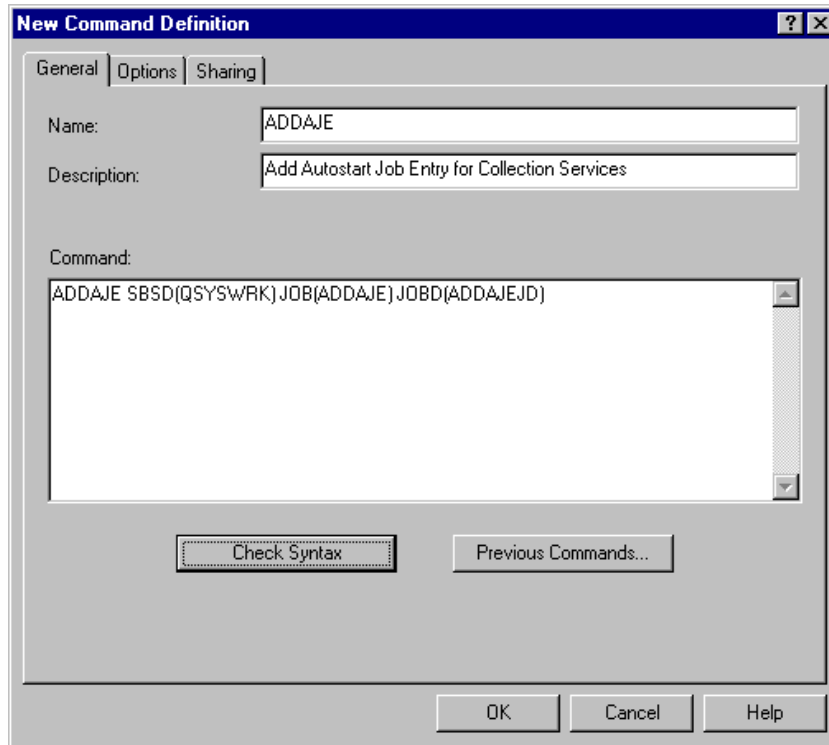


Figure 121. New Command Definition window: ADDAJE example

6. Click the **Check Syntax** button. Correct any errors, and then click **OK** to create the command.
7. Now click **Commands**. In the right-hand panel, double-click on the name of the job you created to create the job description (CRTJOB in the example).
8. In the left-hand panel of the Run Command window shown in Figure 122, expand **AS/400 Endpoint systems** and **AS/400 System Groups**. Select the systems or groups on which you will run the command, and click **Add** to include them.

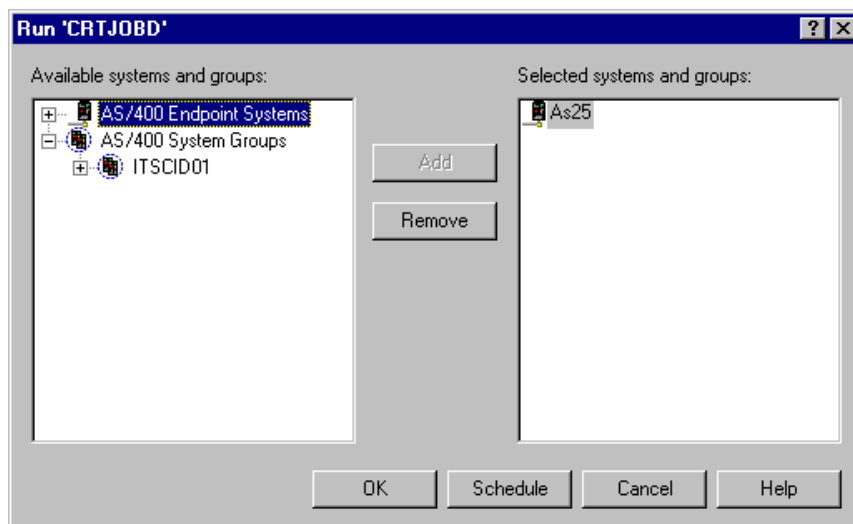


Figure 122. Run Command window: CRTJOB command selected

9. Click **OK** or **Schedule** to run the command on the selected systems.
10. Repeat steps 7 through 9 for the `ADDAJE` command you created in steps 4 through 6.

For further details on how to use the Management Central Remote Command capability, refer to Chapter 3, “Running commands across multiple systems” on page 39.

Another method to distribute and run these commands on multiple remote systems is to place them in a batch job stream. Use Management Central's Object Distribution capability to distribute the batch job stream with an action of `SBMJOB` or `SBMDBJOB`. For details on how to use Object Distribution, refer to Chapter 4, “Packaging and sending objects” on page 51.

8.8 Time zone considerations

When you review and analyze performance data, the actual local time of collection can be significant. For example, you may need to be sure which data was collected during the busiest period of the day, so that it represents the heaviest workload experienced by the AS/400 system under review. For this reason, if some of the AS/400 systems from which you collect performance data are located in different time zones, there are some considerations of which you should be aware:

- When you start Collection Services for a system group, it will start simultaneously on all systems in the group. Any differences in system time and date settings due to some systems being located in different time zones will not be taken into account.
- If you start Collection Services using the Scheduler, the time at which the Scheduler will start the task is based on the system time and date of the AS/400 system selected as your central system in Management Central.
- The collection objects for each endpoint system will reflect start and end times based on the `QTIME` and `QUTCOFFSET` (Coordinated universal time offset) system values of that endpoint system. If the endpoint system is in a different time zone from your Management Central client PC and these system values are correctly set, the start and end times reported for collection objects will be the times on the client PC. See the Figure 125 on page 154 for this scenario. The times in the Started and Ended columns reflect the time on the client PC no matter what system time the AS/400 system (AS25 in this case) has.
- The scheduling of a performance collection may cross a boundary from standard time to daylight savings time or from daylight savings time to standard time. If so, this time difference should be taken into account when scheduling the start time. Otherwise, the actual start and end times may be an hour later or earlier than expected. In addition, the start and end times reported for collection objects will be affected by this difference unless the `QUTCOFFSET` system value is adjusted each time the change to and from daylight savings time takes effect.

For further information on the `QUTCOFFSET` system value, refer to 2.2.4, “`QUTCOFFSET` system value” on page 14.

8.9 Managing collections

You can review the collection parameters for an active or stopped collection. Click **Configuration and Service** for the AS/400 system for which you wish to review the collection properties. Then, right-click **Collection Services** and click **Properties** to view the properties for the collection. This window also indicates whether the collection is currently active or stopped.

To display the selected parameters for a collection at the time it was started, click on **Task Activity** in Management Central. Then, right-click on the appropriate **Start Collection Services** entry and click on **Properties**. Note that the displayed values may no longer be current since they may have been changed for an active collection.

You can change selected parameters in an active collection without first ending the collection. Simply follow the steps described in 8.2, “Starting Collection Services on a single system” on page 130. As described in that section, some changes take effect immediately, while others require that you cycle the collection to implement them.

Note that you can make the same changes from the Properties window. To enter them in this way, right-click **Collection Services**, and click **Properties**. However, none of these changes will take effect immediately when entered from this window. You have to cycle the active collection to implement them.

8.9.1 Cycling collections

When a collection is cycled, no more data is added to the collection object and a new collection object is created to store newly collected data. This prevents collection objects from becoming too large. Cycling collections causes changes made to the collection properties to take effect.

Active collections are automatically cycled at least once every 24 hours. You may elect to have this happen as often as every hour. In addition, there are a number of different ways you can immediately cycle collections:

- Right-click on **Collection Services** under the AS/400 system on which the collection is active. Then click on **Cycle Collection now**.
- Right-click on **Collection Services**, and then click on **Properties**. Make a change to the **Properties** of the active collection, and click **Yes** in response to the dialog box that asks: Do you want to cycle collection now?
- Right-click on **Collection Services**, and then click on **Start Collecting**. Check the **Cycle again if already started** field, and click **OK**.
- If you use Start Collection Services to change the Location to store collections field value for an active collection, even if you do not check the Cycle collection if already started field, the collection cycles when you click **OK**.

8.9.2 Stopping collections

To stop a performance collection, follow these steps:

1. Expand **Configuration and Service** for the appropriate system.
2. Right-click **Collection Services** and select **Stop Collecting** to open the Stop Collection Services window, which is displayed in Figure 114 on page 143.

3. Click **OK** to stop the collection immediately or **Schedule** to stop it at the required time and day or date.

8.9.3 Managing collections for system groups

To check the status of a system group collection, right-click on the System Group name. Move your cursor to highlight **Collection Services**, and then click on **Status**. The Collection Services Status display is shown in Figure 123.

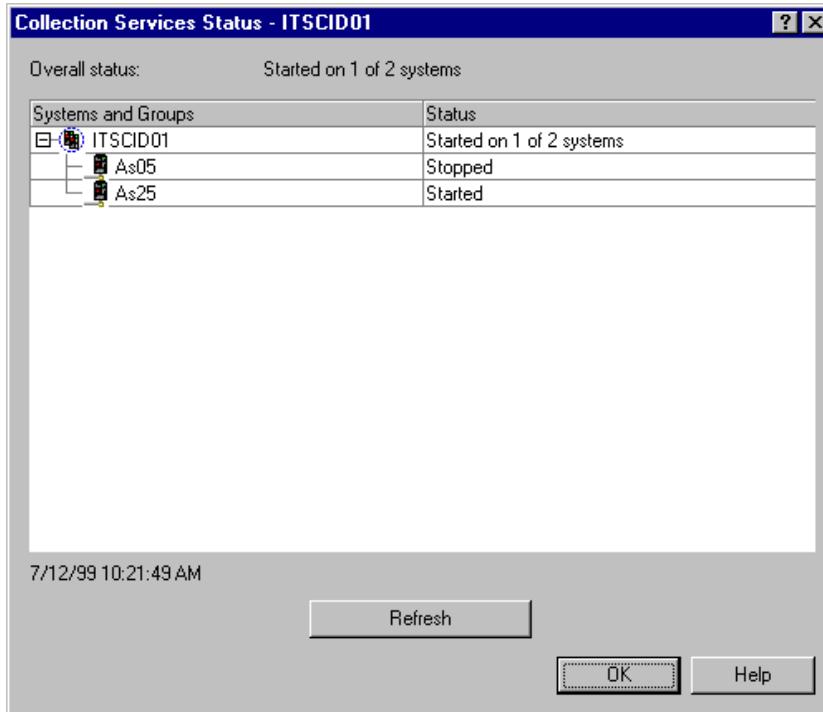


Figure 123. Collection Services Status: ITSCID01 group displayed

You cannot view the properties for a system group collection. However, you can view the properties of the collection for each individual system in the group. To do so, expand the system group name, and then expand an endpoint system. Click **Configuration and service**. Then right-click **Collection services**, and click **Properties** to view the properties for the collection. Unless you change the properties individually, the properties will be identical for all systems in the group.

In other respects, managing collections for system groups is described at the beginning of this chapter.

8.10 Managing collection objects

Once you start Collection Services, collection objects are automatically created on your AS/400 system in the specified library. Each collection is stored in a single object. You can view a list of these objects. You can also control how the list of collection objects for a particular collection will be *refreshed*, or updated. To do this, follow these steps:

1. Expand **Configuration and Service** for the AS/400 system from which performance data is being collected.
2. Right-click on **Collection Services**, and click on **Properties**.
3. Click the **Refresh** tab to view the page as shown in Figure 124.

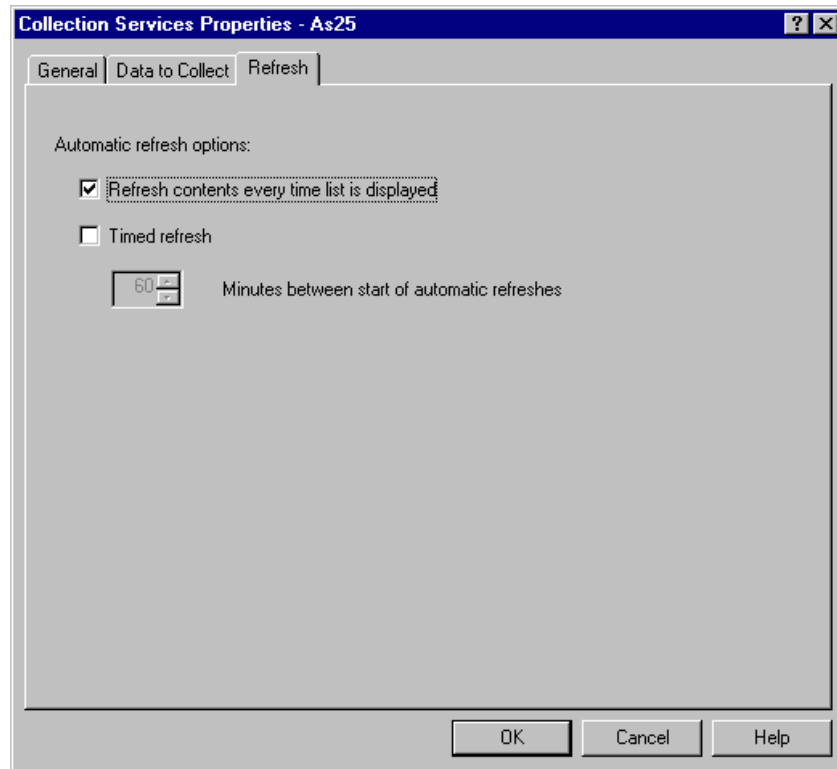


Figure 124. Collection Services Properties window: Refresh page

4. By default, no automatic refresh options are selected. This means that you must manually refresh the list by selecting **Refresh** from the **View** menu, clicking the **Refresh** toolbar button, or pressing **F5**. If you wish to have the list automatically refreshed, you can choose from the options shown:
 - **Refresh contents every time list is displayed:** Select this option to refresh the list every time it is displayed. If you do not select this option, the contents of the list will not change until you manually refresh it or specify timed refresh.
 - **Timed refresh:** Select this option to specify a time frame in which to automatically refresh the list that is opened or displayed. The list must be opened or displayed for the timed refresh to occur. Specify a value of 1 to 1440 minutes.
5. Click on **OK**.

For each collection object you can display a summary of the data it contains. You can also delete a collection object. If the collection object is in *Collecting* status, you have the option to cycle the collection immediately. In addition, you can choose to create database files from any collection object. To perform any of these actions, complete these steps:

1. Expand **Configuration and Service** for the AS/400 system from which performance data is being collected.
2. Click **Collection Services** to see a display similar to the example shown in Figure 125.

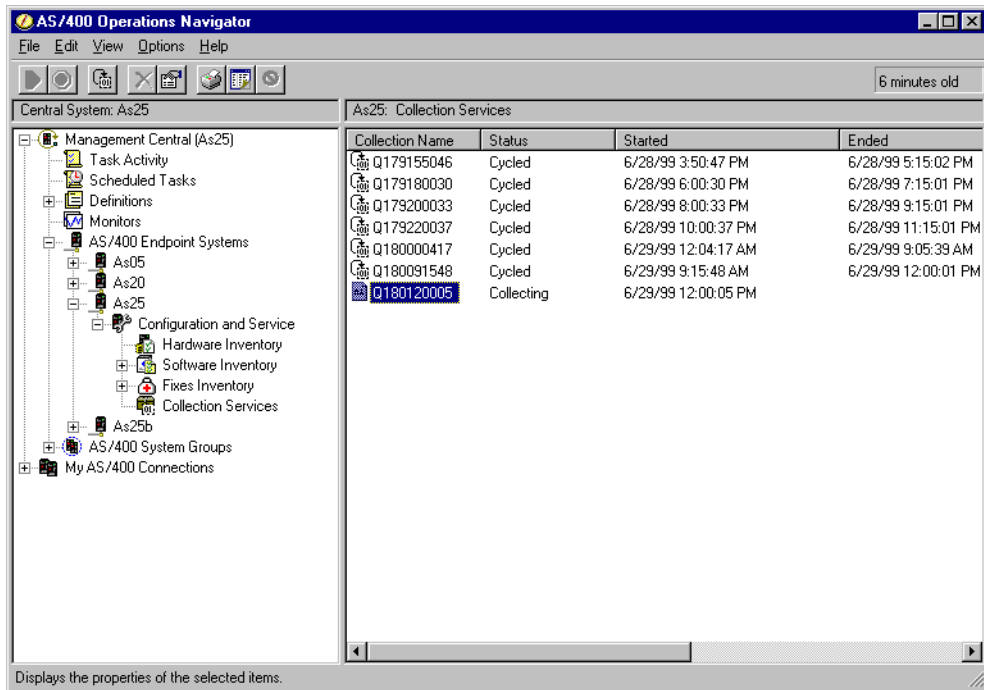


Figure 125. Collection Objects display

Collection names for existing collection objects are displayed, together with current status and times started and ended.

3. Use the horizontal scroll bar at the bottom of the display to see the fields shown in Figure 126 on page 155.

For each collection object, the expiration date, AS/400 system library in which it is store, and object size are displayed.

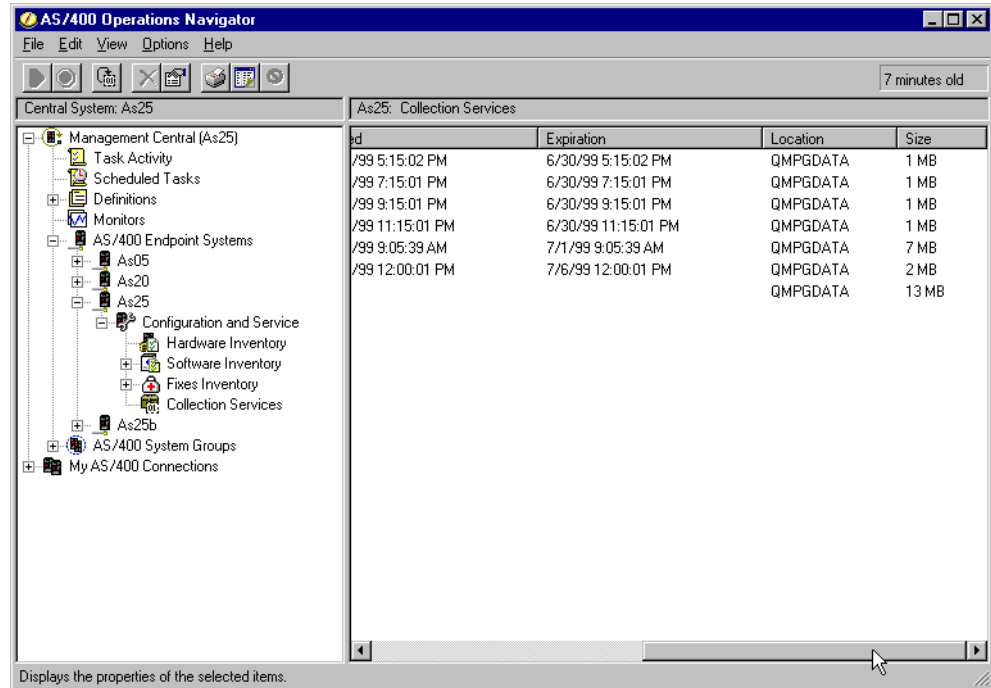


Figure 126. Collection Objects display: Right side

Note

No Ended or Expiration dates and times appear while a collection is still active, as can be seen in the last entry in Figure 125 and Figure 126.

4. Right-click the collection object you want to examine. The options presented to you include:
 - Create Database Files (see 8.11, "Creating database files" on page 157)
 - Cycle Collection Now (presented if status is Collecting)
 - Delete (presented if status is Cycled)
 - Properties
5. Make the appropriate selection. If you wish to review the characteristics of the data in the collection object, select **Properties**. Select the **Data Summary** page, shown in Figure 127 on page 156, to view the categories of data collected in this collection object, as well as the intervals at which they were collected.

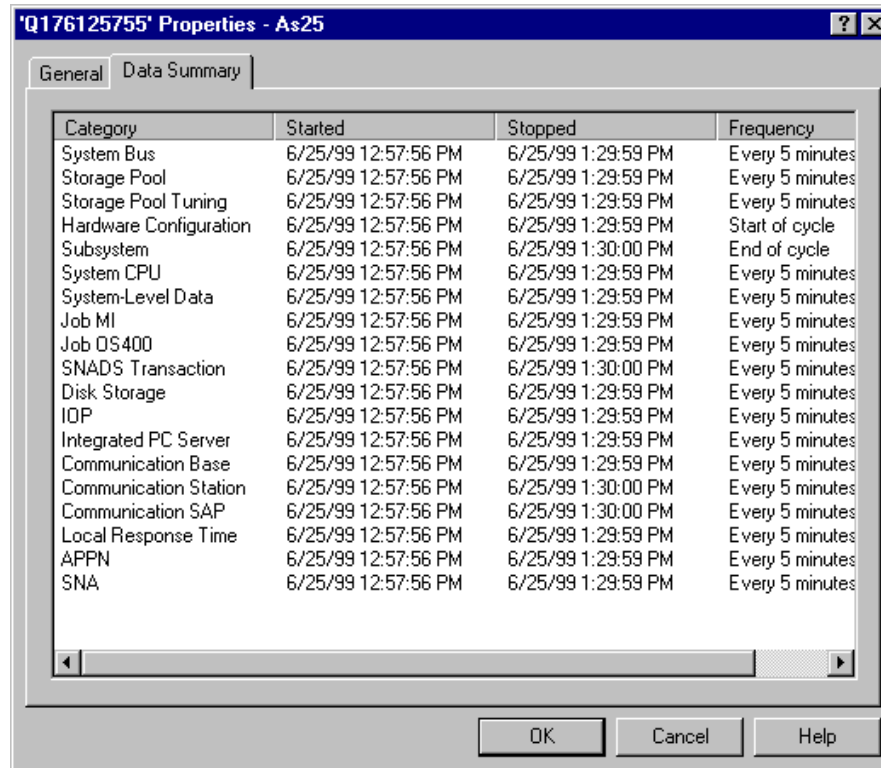


Figure 127. Collection Properties: Data summary page

6. To exit, click either the **OK** or the **Cancel** button.

8.10.1 Why use collection objects in addition to database files

There are a number of advantages to having the data first placed in a collection object before it is exported to database files:

- The collection overhead is lower.
- Because you can manage the collection objects separately from the database files, you can collect your performance data in small collection intervals (such as five-minute intervals) and then create your database files with a longer sampling interval (such as 15-minute intervals).
- From a single collection object, you can create many different sets of database files for different purposes, by specifying different data categories, different ranges of time, and different sampling intervals.

For example, you may collect performance data on the entire set of categories (all data, or the **Standard plus protocol** profile) in five-minute collection intervals for 24 hours. From that one collection object, you can create different sets of database files for different purposes. You can create one set of database files to run your normal daily performance reports. These files may contain data from all categories with a sampling interval of 15 minutes. Then, to analyze a particular performance problem, you can create another set of database files. These files may contain only data for a single category that you need to analyze, a specific time period within the 24 hours, and a more granular sampling interval of five minutes.

8.10.2 Retaining and deleting collection objects

Collection objects are retained until their expiration date has passed. The expiration date for each collection object is shown on the Properties page for that collection object. To keep the object on the system longer, you simply change the date on the Properties page. To do so, expand **Configuration and Service** for the AS/400 system from which the data was collected, and select **Collection Services**. Right-click any collection object in the list and select **Properties** to see or change the Expiration date for that collection. You can also select **None** as the Expiration date if you do not want Collection Services to delete your collection objects for you.

Collection Services deletes only cycled collection objects. A status of *Cycled* means that Collection Services has stopped collecting data and storing it in the object. The status of each collection object is shown in the list of collection objects when you expand Configuration and Service and select Collection Services. Collection Services deletes the expired collection objects the next time it starts or cycles a collection after the expiration date and time.

You can also immediately delete a collection object from the system. To do so, right-click on the collection object you wish to delete, and click **Delete**.

8.11 Creating database files

Collection Services places the data you collected into collection objects. To use this data with the Performance Tools for AS/400 licensed program (5769-PT1) or other applications, you must first place the data in a special set of database files.

You can create these database files in two ways. You can create them automatically up front as you start the collection of performance data. If you are also using PM/400, this is the method to use (see 8.12, “Coexisting with PM/400” on page 159, for a further explanation). Alternatively, to achieve all the advantages described in 8.10.1, “Why use collection objects in addition to database files” on page 156, you can create them later when you wish to export data to them from an existing collection object.

These methods are described in the following section, and in 8.11.2, “Creating database files later” on page 157.

8.11.1 Creating database files at the start of data collection

To create database files automatically as data is collected, simply select **Create database files during collection** on the **Start Collection Services** window. In addition to the collection object, the database files are created and the data is exported to them. The collection object is retained for the period you specified. During that period, you have the option to export the data again to new or existing database file members as often as you wish. You can also vary your selection of the data you export.

8.11.2 Creating database files later

To export performance data from an existing collection object to database files, follow these steps:

1. Expand **Configuration and Service** for the AS/400 system from which performance data is being collected.

2. Click **Collection Services**.
3. Right-click the collection object from which you want to export data to database files.
4. You can first select **Properties** to display the characteristics of the data in the collection object. On the Data Properties page, shown in Figure 127 on page 156, you can see the categories of data collected in this collection object as well as the intervals at which they were collected. You can use this information in selecting the data you will export. When you have reviewed this information, click either the **OK** or the **Cancel** button.
5. Right-click the collection object again and select **Create Database Files**. The Create Database Files window is shown in Figure 128.

Create Database Files from 'Q176125755' - As25

Member to create:

Path:

Data to include:

Category
System Bus
Storage Pool
Storage Pool Tuning
Hardware Configuration
Subsystem
System CPU

Range of data

From:

To:

Sampling interval

☐ seconds

☒ minutes

Figure 128. Create database files window

6. Complete this window as follows:
 - a. In the **Member to create** field, the default value is the name of the collection object. You can create database files and file members from the same collection object multiple times. If you specify the name of a database file member that already exists, the new data will overwrite the old data. For this reason, you should normally enter a unique name for each member.
 - b. The **Path** defaults to that in which the collection object was stored. If you wish to store the database files elsewhere, click **Browse** to select from the list of existing libraries on your AS/400 system.

- c. In the **Data to include** panel, select the categories from the collection object to be included in the database files. By default all categories are selected. Refer to 8.5, “Performance data categories” on page 140, for descriptions of these categories.
 - To select one category, click on that category.
 - To select several individual categories, hold down the Control key and click on each category you want to include.
 - To select a consecutive list of categories, hold down the Shift key and click on the first and last categories in the list.
- d. In the **Range of data** panel, you can select a different time period, as long as it is within the range contained in this collection object.

Note

If your Management Central client PC is in a different time zone than the endpoint system, take the time difference into account. For example, the client PC may be in Pacific Standard Time and the endpoint system is in Central Standard Time. The time shown in the window, such as 8:00 AM, means 10:00 AM on the endpoint system.

- e. In the **Sampling interval** panel, you can select a different sampling interval, as long as it is a longer interval than the interval contained in this collection object.
7. Click **OK**.

You can now use the database files you created with the Performance Tools for AS/400 licensed program (5769-PT1) or other applications.

8.12 Coexisting with PM/400

PM/400 uses Collection Services in the same way that it previously used the OS/400 Performance monitor. There are some implications of which you should be aware:

- If Collection Services is ended and PM/400 is active, on the hour, PM/400 will start it using the parameters required by PM/400. The message MPH7503: The performance monitor is not running. PM/400 requires the performance monitor to be running appears in the AS/400 system QSYSOPR message queue.
- The Location to store collections field will default to the value that PM/400 is configured to store when PM/400 is active. The default value of PM/400 is `/QSYS.LIB/QMPGDATA.LIB`. If you want to use a different library, you can change the PM/400 value:
 - a. Type `GO PM400` on the 5250 command screen.
 - b. Select Option 6, Work with PM/400 customization.
 - c. Change the library name in the field Performance data library.
- The Default collection interval field defaults to the value of 15 minutes when PM/400 is active. If you change this field to another (greater or smaller) value, for example 30 minutes or five minutes, on the hour, PM/400 will change this value back to 15 minutes. Display **Collection Services Properties** to see this change. However, the change does not take effect, unless another change

which takes effect immediately, or which causes the collection to cycle, is made at the same time (see 8.12.1, “Example of changes made by PM/400” on page 160). After the hour, click on the collection object and select **Properties** to see that the active collection interval remains unchanged. The collection continues to collect data at the smaller interval you specified, until the next time the collection is cycled or changed. The collection will not cycle until required to do so by the *Frequency to cycle collections* and *Time to synchronize cycle* values, unless required to do so before then because of other changes.

If you require that performance data be continuously collected at a *shorter* interval than 15 minutes while PM/400 is active, do the following tasks to reset this value after the collection is cycled:

- a. Set the **Frequency to cycle collections** value to 24 hours.
- b. Start the collection again just after the time specified in the *Time to synchronize cycle* field. Select the **Cycle collection if already started** field and the required **Default collection interval**.

You can automate this procedure using the scheduler (refer to 8.6.1, “Example of a daily schedule” on page 144, for details).

When making other changes to the collection, you should also keep in mind that they will cause any pending change of the Default collection interval field to take effect as described above.

Note

You need do not need to take any of these measures to ensure a collection interval that is *longer* than 15 minutes. You can always create database files with longer intervals than those in the collection object, as long as you retain the collection object.

- When PM/400 is active, the Create database files during collection field is checked as the default. If you change this, on the hour, PM/400 will change it back. The change will take effect immediately. The collection will not cycle (unless required to do so for other reasons).
- The Collection profile to use field defaults to the value Standard plus protocol when PM/400 is active. If you change this to any other value, on the hour, PM/400 will change it back. This is the case even if you select Custom and include all categories. The change will immediately be active. The collection will not cycle (unless required to do so for other reasons). Note that the only category excluded from this profile is Extended Adaptive Cache.

8.12.1 Example of changes made by PM/400

Here is an example of how PM/400 makes some of these changes:

1. On the Collection Services Properties – General page, select a **Frequency to cycle collections** value of 1 hour and a **Default collection interval** of 30 minutes.
2. On the Collection Services Properties – Data to Collect page, select **Minimum** as the **Collection profile to use**. Click **OK**.
3. Start Collection Services.

- After the QHOUR system value of the AS/400 system on which the data is being collected reaches the next hour, right-click **Collection Services** and click on **Open** (or double-click **Collection Services**). Right-click the current collection and click on **Properties**. Then, click on the **Data Summary** page to see data similar to what is shown in Figure 129.

Category	Started	Stopped	Frequency
System Bus	6/29/99 9:15:48 AM	6/29/99 10:00:01 AM	Every 30 min
System Bus	6/29/99 10:00:01 AM	6/29/99 12:00:00 PM	Every 15 min
Storage Pool	6/29/99 9:15:48 AM	6/29/99 10:00:01 AM	Every 30 min
Storage Pool	6/29/99 10:00:01 AM	6/29/99 12:00:00 PM	Every 15 min
Storage Pool Tuning	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	Every 15 min
Hardware Configuration	6/29/99 9:15:48 AM	6/29/99 12:00:01 PM	Start of cycle
Subsystem	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	End of cycle
System CPU	6/29/99 9:15:48 AM	6/29/99 10:00:01 AM	Every 30 min
System CPU	6/29/99 10:00:01 AM	6/29/99 12:00:00 PM	Every 15 min
System-Level Data	6/29/99 9:15:48 AM	6/29/99 10:00:01 AM	Every 30 min
System-Level Data	6/29/99 10:00:01 AM	6/29/99 12:00:00 PM	Every 15 min
Job MI	6/29/99 9:15:48 AM	6/29/99 10:00:01 AM	Every 30 min
Job MI	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	Every 15 min
Job OS400	6/29/99 9:15:48 AM	6/29/99 10:00:01 AM	Every 30 min
Job OS400	6/29/99 10:00:01 AM	6/29/99 12:00:00 PM	Every 15 min
SNADS Transaction	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	Every 15 min
Disk Storage	6/29/99 9:15:48 AM	6/29/99 12:00:01 PM	Every 5 min
IOP	6/29/99 9:15:48 AM	6/29/99 12:00:01 PM	Every 5 min
Integrated PC Server	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	Every 5 min
Communication Base	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	Every 15 min
Communication Station	6/29/99 10:00:01 AM	6/29/99 12:00:01 PM	Every 15 min

Figure 129. Change to collection made by PM/400

Note that for each collection category in the Minimum profile, there are now two entries: an earlier one showing the frequency of 30 minutes that you selected and a later one with a frequency of 15 minutes as required by PM/400. In addition, there are now entries for the additional categories in the Standard plus protocol profile.

The reason for this is that PM/400 changed the collection category from Minimum to Standard plus protocol. Because this change takes effect immediately, the default collection interval was also changed with immediate effect. Because the collection was not cycled, entries made before and after the change appear in the same collection object.

- Click **Cancel** to exit from this display.
- Now right-click **Collection Services**, and select **Properties**.

Note that the default interval has changed to 15 minutes and the default collection profile has changed to Standard plus protocol.

8.12.2 Recommendations

In view of the considerations in the previous section, when PM/400 is active, you should use the defaults for PM/400 wherever possible in your collections, to avoid unexpected results:

1. Ensure that Collection Services runs continuously.
2. Select a Default collection interval of 15 minutes or less.
3. Select the Standard plus protocol profile.
4. Avoid making interim changes to collection parameters while PM/400 is active.

If you need to collect Extended Adaptive Cache data for a period of an hour or longer, you should end PM/400 first to prevent any unwanted changes to your collection profile. To do so, on an AS/400 system command line, enter the following command to end the PM/400 subsystem:

```
ENDSBS SBS (Q1PGSCH) OPTION (*IMMED)
```

When you have completed your collection, to start PM/400 again, enter the following command on an AS/400 system command line:

```
STRSBS SBS (QMPGLIB/Q1PGSCH)
```

8.13 Collection Services or STRPFRMON

There are some situations in which you may still want to use the "green screen" `STRPFRMON` command. Here are some examples and their alternatives with Collection Services:

- If you need to run a trace, the `STRPFRMON` command provides the capability to select this option. To start the trace function without `STRPFRMON` command, you can use `TRCINT` command. An example of this command to start the trace is:

```
TRCINT SET (*ON) TRCTYPE (*TTPERF *MPL *TNS)
```

See Appendix A in *Work Management V4R4*, SC41-5306, for more information.

- If you wish to collect performance data once for a specified period, for example two hours, without having to submit both a Start and a Stop task to the Scheduler, the `STRPFRMON` command provides this capability. To achieve the same result, you can use the scheduling function of Management Central. See 8.6, "Performance collections and the Scheduler" on page 141, for scheduling.

Chapter 9. Advanced Job Scheduler

Management Central has its standard job scheduler. However, you can use another job scheduling function from Management Central when the central system has the IBM Advanced Job Scheduler installed. The IBM Advanced Job Scheduler is a separately purchased licensed program (5769-JS1) and needs to be installed separately on the central system and the PC to use it with Management Central. It provides a more robust type of scheduling than the Management Central Scheduler. When the Advanced Job Scheduler is installed, it overrides the Management Central job scheduler.

There are two steps involved in using Advanced Job Scheduler with Management Central. The licensed program product (5769-JS1) must be installed on the AS/400 system. You must also install Advanced Job Scheduler as an option under AS/400 Operations Navigator from the Client Access install menu. If more than one PC in the organization is using Management Central, each PC must have Advanced Job Scheduler installed.

Once you install Advanced Job Scheduler, you should no longer use the Scheduled Tasks container under Management Central to manipulate your tasks. You should use Scheduled Jobs under Advanced Job Scheduler.

Management Central tasks do not require the licensed program 5769-JS1 on each endpoint system. When Advanced Job Scheduler is installed on the central system, any jobs or tasks that are defined on that system gather any job information needed from the central system. You must set up all your job run attributes, applications, distribution lists, and other job definition information on the central system.

If systems in your network have Advanced Job Scheduler installed, you can schedule tasks outside of Management Central. Under **My AS/400 Connections** in Operations Navigator, expand **Job Management** to gain access to Advanced Job Scheduler on that system. You can schedule tasks on only that system. You will not be able to select from a list of systems to run the task.

Be aware that Advanced Job Scheduler uses the time on the PC for the scheduled time. It does not use the time on the central AS/400 or the endpoint system. If the time on the PC is behind the AS/400 time, it is possible to schedule a job that never runs. For example, if the current AS/400 time is 11:30 a.m. and the current PC time is 11:25 a.m., a job scheduled to run at 11:28 a.m. will not run since the time has already passed on the AS/400 system. Ensure that any job scheduled using Advanced Job Scheduler through Operations Navigator or Management Central has a run time that has not already passed on the AS/400 system.

The Advanced Job Scheduler graphical user interface (GUI) allows you to access many of the functions available. It allows you to:

- Schedule jobs
- Create groups
- Work with groups
- Submit jobs and groups immediately
- Jobs can be "edited" into groups

- Display the status of jobs
- Create calendars and holiday calendars

Some tasks must still be done from the standard AS/400 green screen, regardless if you are using Advanced Job Scheduler from My AS/400 Connections or Management Central. They include:

- Commands:
 - Start the job monitor
 - End the job monitor
 - Reset all jobs at once
 - Start the console monitor

These commands can be executed by using the run command in Management Central.

- Display:
 - Run calendar
 - Job scheduler log
- Updating:
 - Report distribution IDs and other report distribution related items
 - Job control defaults
 - Some system controls
 - Functional and job authorities
 - Job documentation
 - Job local data area
 - Fiscal calendars

For more information about Advanced Job Scheduler and how to use it, see the Advanced Job Scheduler topic in the AS/400 Information Center on the Web at: <http://publib.boulder.ibm.com/html/as400/infocenter.htm>

From the Information Center home page, click **Go**. Starting on the Welcome page that appears, follow these links: **Operations Navigator-> Management Central->Managing AS/400 Systems->Doing your tasks-> Scheduling tasks or jobs**.

9.1 Installing Advanced Job Scheduler

Client Access Express, Operations Navigator, and Management Central must all be installed on the PC before you can install Advanced Job Scheduler.

To install Advanced Job Scheduler, follow this procedure:

1. From the AS/400 system, use the Restore Licensed Program (RSTLICPGM) command or GO LICPGM, or option **11** to install the Job Scheduler licensed program (5769-JS1).
2. From **Operations Navigator**, expand **My AS/400 Connections** and expand the AS/400 that has the Job Scheduler licensed program installed.
3. Expand **File Systems**.
4. Expand **Integrated File Systems**.
5. Expand **Root**.

6. Expand **QIBM**.
7. Expand **Proddata**.
8. Expand **GUI Plugins**.
9. Drag and drop the **IBM.AdvJobScheduler** to your desktop. You can make a temporary directory on the local PC drive, net drive, or net server to copy the files.
10. Close **Operations Navigator**.
11. Start **IBM AS/400 Client Access Express**.
 - a. Choose **Selective Setup**.
 - b. Click **Next**.
 - c. Use the Source Directory `C:\WINDOWS\Desktop\IBM.AdvJobScheduler` (for Windows 95) or `C:\WINNT\Desktop\IBM.AdvJobScheduler` (for Windows NT). Or, use the path that specifies where the **IBM.AdvJobScheduler** folder is located. If you are using a network drive or a net server, you may need to check with your network administrator for the correct path.
 - d. Click **Next**.
 - e. Expand **AS/400 Operations Navigator**.
 - f. Select **Advanced Job Scheduler**. This may be the last item in the Operations Navigator options.
 - g. Select **Next**. The Install Completed window appears. Select **Next**. Several status windows come and go while the installation is taking place.
 - h. A warning dialog box may appear. Click **OK**.
 - i. Select **Finish** to complete and exit the setup. Close the readme file.
12. After the installation has completed, restart **AS/400 Operations Navigator**. Expand **Management Central**. Click on **Scan Now** in response to the message that has detected a new component being installed. You may see this window again when you access systems from **My AS/400 Connections**.
13. You should see an Advanced Job Scheduler container appear under the Management Central. See Figure 130 on page 166 for an example.

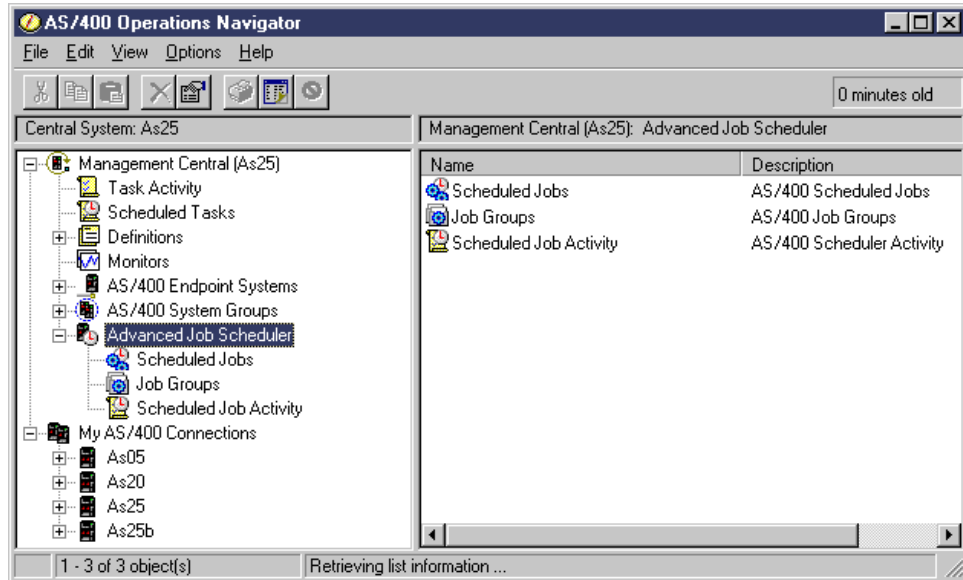


Figure 130. Advanced Job Scheduler container under Management Central

9.2 Using the Advanced Job Scheduler in Management Central

Advanced Job Scheduler can be used to schedule any task, command, or package definition that has the Schedule button available. The following example shows how to schedule a command.

Help is available for windows and fields. Press the **Help** button to receive additional information about the function you are performing. If the window has a **?** in the upper right hand, you can click on the **?**, move the cursor (along with the **?**), and click on the field for additional help.

9.2.1 Example of using Advanced Job Scheduler to schedule a task

You can use Advanced Job Scheduler to schedule an existing command to run once or multiple times based on specific criteria.

To schedule an existing command, complete the following steps:

1. Expand **Definitions** under **Management Central**, and select **Command**.
2. Right-click on an existing command shown in the right-hand panel and select **Run**. A screen appears similar to the example shown in Figure 131 on page 167.

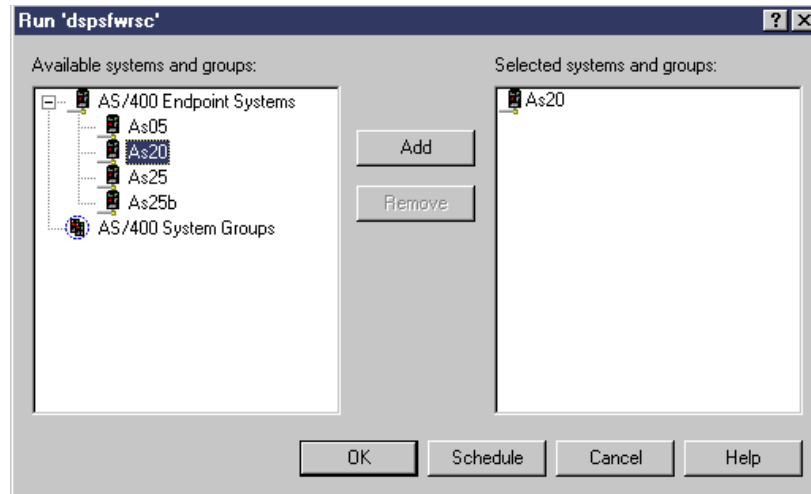


Figure 131. Run display

3. Select **Add** for the AS/400 endpoint systems or groups to run the command.
4. Select **Schedule**. A dialogue box similar to the example shown in Figure 132 appears. Note that this screen is different than the dialogue box displayed when using the Management Central scheduler.

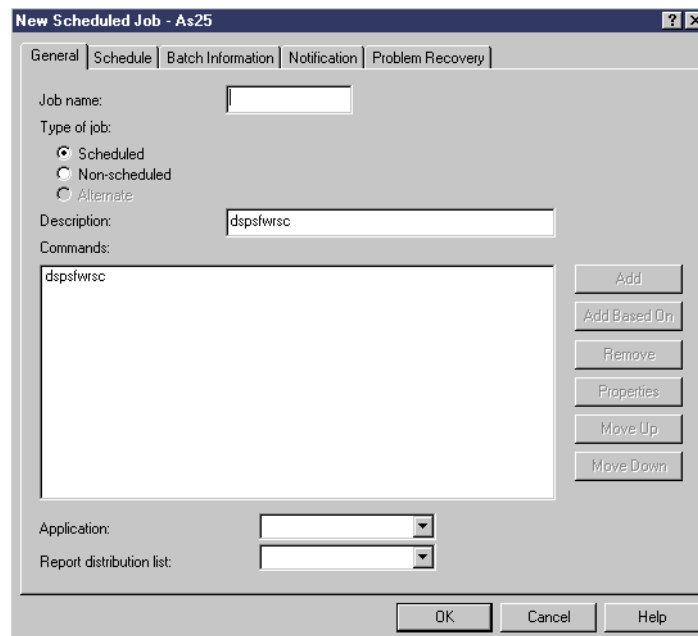


Figure 132. Schedule display

5. Enter a job name. You must enter a job name to continue. You can give it any meaningful name. You can select an application name from the pull-down menu or a report distribution list name or both. These must already exist within the Advanced Job Scheduler on the central system.
6. Select the **Schedule** tab. A window similar to the example in Figure 133 on page 168 appears.

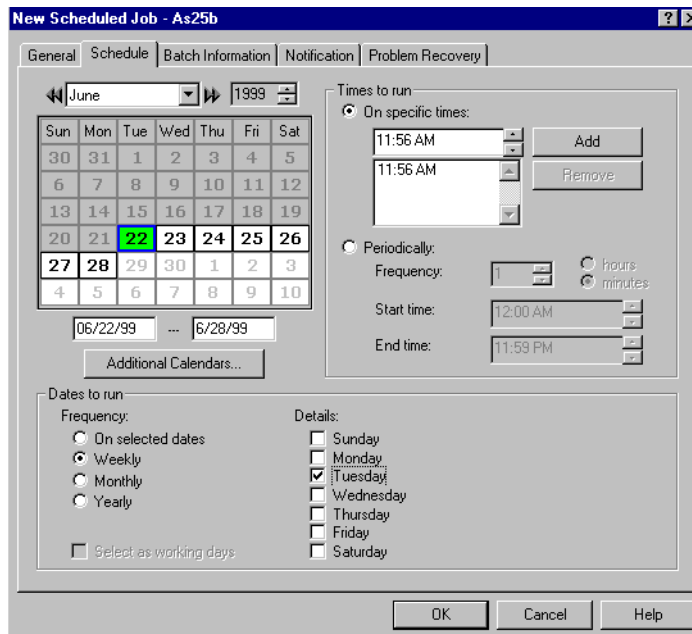


Figure 133. Advanced Job Scheduler selection window

7. The Schedule page provides you with a place to define when your new scheduled job will run. Use Help for more information about the individual fields. All information about the schedule is summarized in the Details box. If the job is a non-scheduled job, the Schedule page will not be active.
8. Select each of the other three tabs:
 - Batch Information
 - Notification
 - Problem Recovery

Change or review the parameters that control job information. When you have completed your selections, select **OK**.

9. The message as shown in Figure 134 appears. Be aware that the schedule confirmation display is the same as the one for Management Central Scheduler. It says to look in **Scheduled Tasks** under **Management Central**. You may see this job in the list, but we recommend that you use the **Scheduled Jobs** under **Advanced Job Scheduler** instead. Click **OK**.

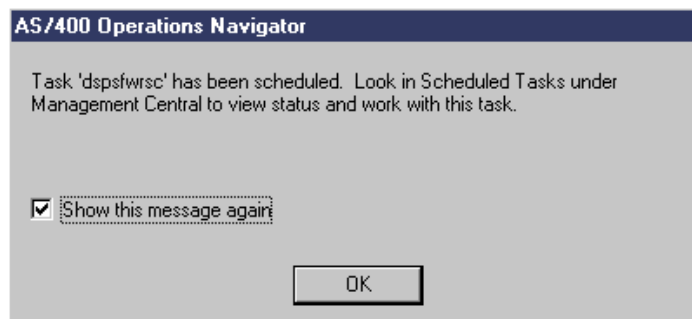


Figure 134. Schedule confirmation display

- 10.A window as shown in Figure 135 on page 169 appears. Click **OK**.



Figure 135. Creation confirmation display

9.2.2 Monitor your jobs

Once a job is started, use **Task Activities** under **Management Central** to monitor its progress and completion. For more information about monitoring jobs, see 2.10, "Viewing task activities" on page 35.

To view or change your scheduled jobs, expand **Advanced Job Scheduler** and select **Scheduled Jobs**. You see a list of scheduled jobs. The right-hand display shows you:

- **Job name:** The name given to this job
- **Status:** The status of the job
- **Next run:** Next scheduled run time
- **Schedule:** Type of schedule
- **Group:** Name of the group job
- **Sequence:** The sequence number within the group
- **Description:** The description given to the job on creation

We highly recommend that you use the **Scheduled Jobs** under the **Advanced Job Scheduler** to view or change a schedule. Advanced Job Scheduler does not update information in **Scheduled Tasks** under **Management Central**. It will always display "Once" in the "When to Run" column. See Figure 136 on page 170.

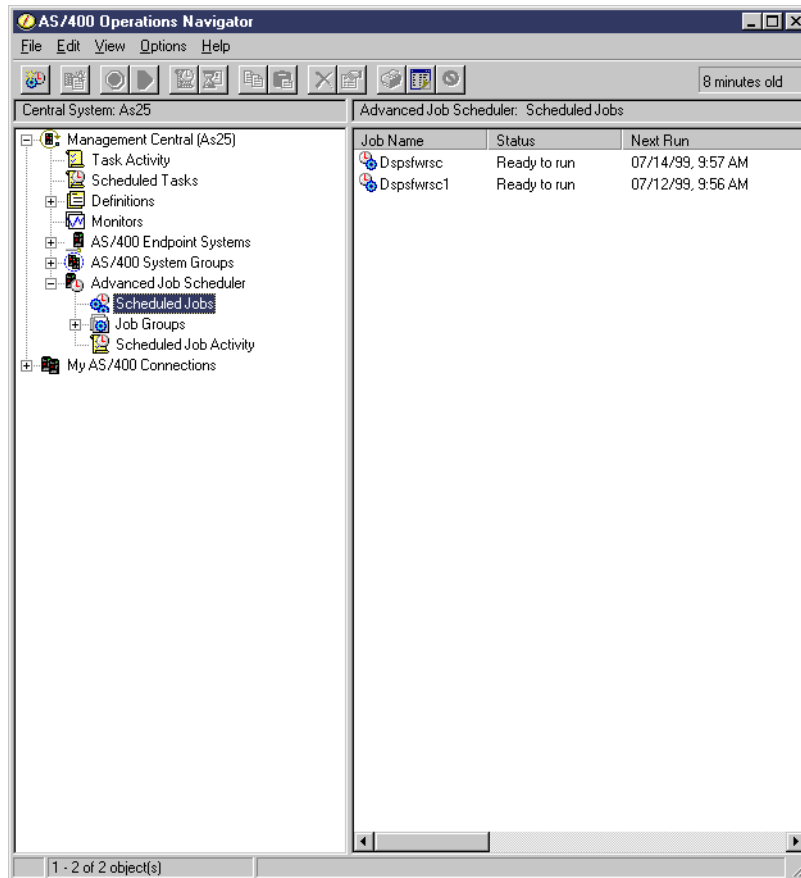


Figure 136. Scheduled Jobs under Advanced Job Scheduler

Right-click on a task to view or change it. You can perform several functions from this menu:

- **Activity:** Display the activity for the task, such as the completion status and start and stop times
- **New Based On:** Create a new scheduled task based on the properties of the existing one
- **Copy:** Allows you to copy a job from a system and paste it into a group
- **Hold Schedule:** Hold the task
- **Release Schedule:** Release a task that is held
- **Skip Next Run:** Prevent the task from running on the next scheduled run
- **Run:** Start the task immediately or schedule it for a different time
- **Status:** Display the status of the task while running
- **Rename:** Rename the scheduled job
- **Delete:** Delete the scheduled job
- **Properties:** Display or change the properties of the scheduled task

Information shown in Figure 136 on page 170 can be directly correlated to the AS/400 WRKJOBJS screen. See Figure 137 on page 171.

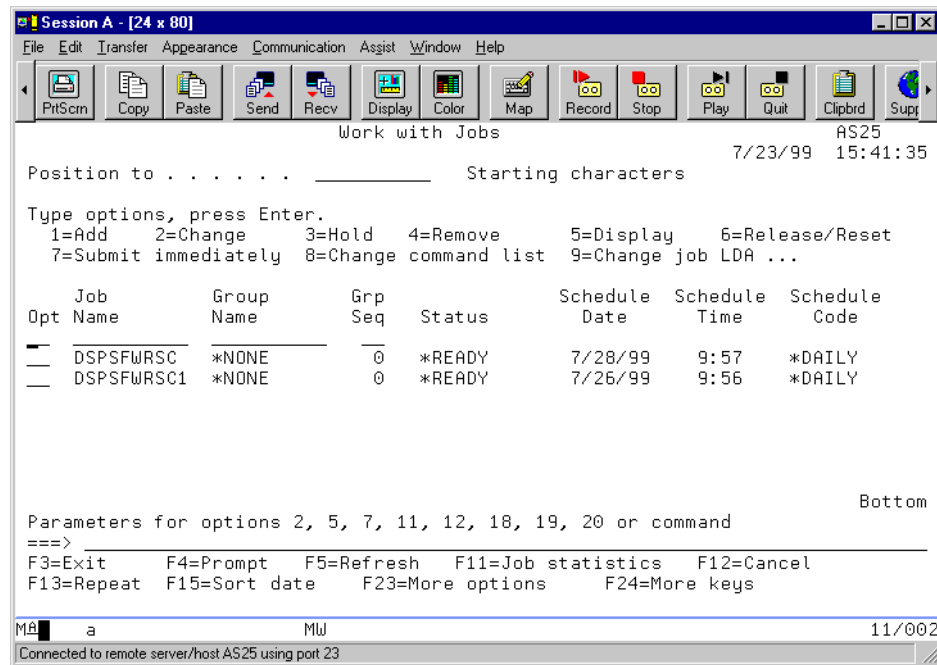


Figure 137. WRKJOBS screen

Make sure the task completes after the scheduled time. Select **Task Activity**. Right-click on the task from the list and choose **Status**. To view the job log, select one of the systems from the status window and right-click to select **Task Output**. You can also click on the computer paper icon from the tool bar or click **File -> Task Output** to view the job log. You may have a job log available, based on the settings you specified when you created the job.

Chapter 10. Advanced topics

This chapter discusses an advanced group of topics that includes Management Central jobs, the logic behind discovering endpoint systems, how to publish the inventory information to an LDAP server, and considerations for system connection in Wide Area Network (WAN) environment.

10.1 Work management

This section describes Management Central jobs and how the server and client communicate, as well as security considerations for controlling logging in an endpoint system. We also provide information about discovering endpoint systems and show you how to configure an LDAP server to publish the inventory information.

10.1.1 How a Management Central server job works

You can start the Management Central server job on your AS/400 system by using the following command:

```
STRTCPSVR SVR(*MGTC)
```

The name of the server job is QYPSSRV running in the QSYSWRK subsystem. The QYPSSRV job on the central system communicates with the QYPSSRV job on the endpoint systems. The endpoint system jobs submit other jobs for the Management Central functions as shown in Table 10.

Table 10. Management Central jobs

Job name	Description
QYSPRC	Management Central common service
QYPSBDTSVR	Package and fixes distribution
QPMASERV	Performance monitor API
QYPSRMTCMD	Running command
QYPSGETINV	Inventory collection
QYPSPTF	Fixes management
QYSPMCMD	Performance monitor database conversion
QYPSAPI	Management Central common service
QYIVPUBAGT	Inventory collection for LDAP
QYSPFRCOL	Performance collection
QYPSDISCOV	Discover system
QPMACLCT	Performance monitor API

Operations Navigator communicates with a Management Central server job as shown in Figure 138 on page 174.

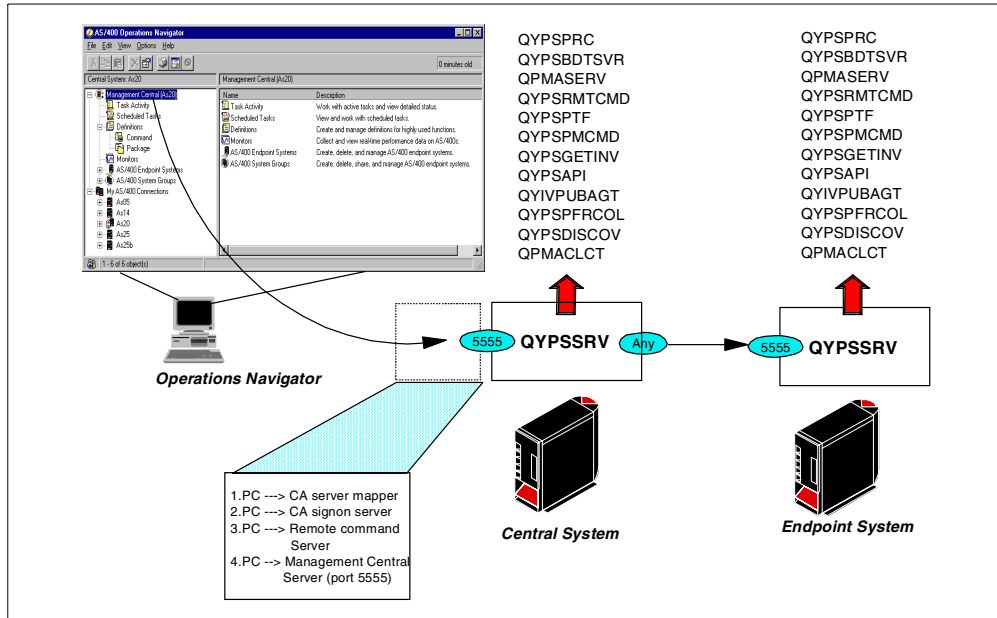


Figure 138. Management Central AS/400 jobs and port (non-SSL)

Before using the Management Central functions, you need to create the AS/400 connection for the central system. For the detailed steps to set up the connection to the central system, refer to 2.2, “Setting up your central system” on page 12. You do not need to create the AS/400 connections for the endpoint systems. This is because your PC is not connected to the endpoint systems directly when using Management Central.

Note

There may be some occasions where you need the connection to the endpoint systems. Refer to 2.10.2, “Viewing the job log for a task” on page 35, for more information.

When you start one of the Management Central functions from Operations Navigator, your client communicates with the central system as follows:

1. Operations Navigator communicates with the Client Access server mapper to get the port number of the server with which it needs to communicate.
2. Operations Navigator communicates with the Client Access signon server, and verifies the user ID and password.
3. Operations Navigator communicates with the remote command server to submit the AS/400 command to start the Management Central server.
4. The Management Central server job (QYPSSRV) is started, and the QYPSSRV job opens the Management Central port.
5. When you click the Management Central icon on Operations Navigator, Operations Navigator communicates with the Management Central port.
6. When you use the Management Central functions on the central server, the QYPSSRV job on the endpoint system starts the related jobs as shown in Table 10 on page 173.

For the central system and endpoint system, the same server job (QYPSSRV) is running.

10.1.2 Require password on endpoint systems

Management Central has many useful functions for the system administrator. Therefore, you need to take care of the system security. Basically, Management Central uses two security functions. One is the login control (user ID and password), and the other is the Secure Sockets Layer (SSL). In this section, we discuss login control. Endpoint systems that are running V4R3 or earlier do not require the user ID or password to monitor system performance.

Note

When you use a host command function of the monitor triggered or reset by threshold value, a valid user ID is required on V4R3 or earlier systems. It does not need the same password as on the central system.

If you need to control the Management Central function by user ID and password, you need to use V4R4 systems. The default setting on endpoint systems requires the same user ID and password as on the central system. There is the check box **Require password on endpoint systems** in the Connection tab of Management Central properties as shown in Figure 139. By unchecking this box, you can use different passwords on endpoint systems, but it is still required to have the same user ID. The check box is available only for the central system, and the box does not affect the property on endpoint systems. To change the property on endpoint systems, that is, to use a different password for Management Central functions, you need to change the central system to that endpoint system and uncheck the box. For the steps to change the central system, refer to 2.2.3, “Changing your central system” on page 14.

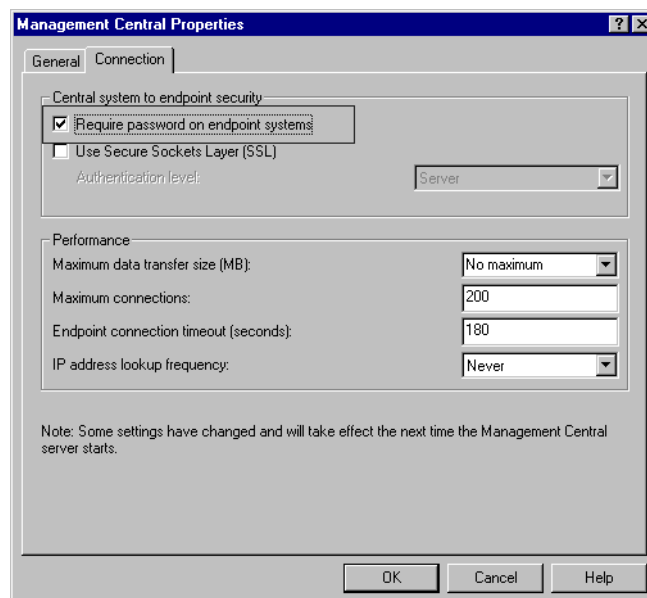


Figure 139. Management Central properties (connection)

The other way to change the property of each endpoint system is to run the CL command. Follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Right-click **AS/400 System Groups**, and select **New System Group**.
3. Define a new system group that includes all the AS/400 endpoint systems, where the password is to be required.
4. Refresh the list of system groups to display your new group.
5. Right-click the new group and select **Run Command**.
6. For Command to run, specify the following command:
`CHGENVVAR ENVVAR(QYPS_USER_PASSWORD) VALUE(0) LEVEL(*SYS)`
7. Click **OK**.

After these steps, you need to restart the Management Central on each system.

When you use the default setting for the property and try to use a different password, you will receive the error message shown in Figure 140.

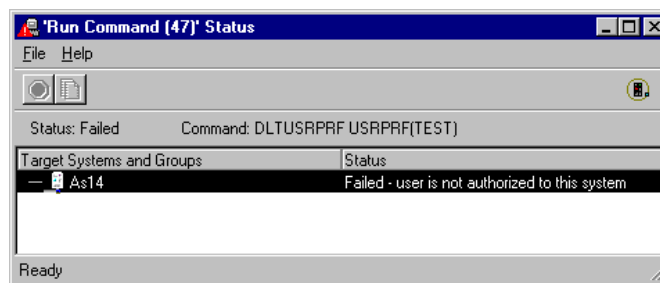


Figure 140. Error message for a different password

10.1.3 Endpoint systems discovery

Use the **Discover Systems** dialog to search the selected TCP/IP subnets for AS/400 systems. You can select to search every time the Management Central server starts. The AS/400 systems found during discovery are added as endpoint systems on the central system. If the AS/400 system is already defined as an endpoint system, the IP address is verified and updated if it has changed.

You can select which TCP/IP subnets to search and you can select whether to use File Transfer Protocol (FTP) or Simple Network Management Protocol (SNMP) to determine which systems are AS/400 systems. You can also specify the earliest OS/400 release you want to search for, and how long you want to wait for a system to respond.

10.1.3.1 Discovery logic

Specifies whether you want to use FTP or SNMP to determine which systems are AS/400 systems. As shown in Figure 141 on page 177, if you select only FTP, only those AS/400 systems that are running an FTP server are discovered. If you select only SNMP, only those AS/400 systems that are running an SNMP server are discovered. If you select both FTP and SNMP, FTP is used first. If no FTP server can be found for a system, then an attempt is made to find an SNMP server.

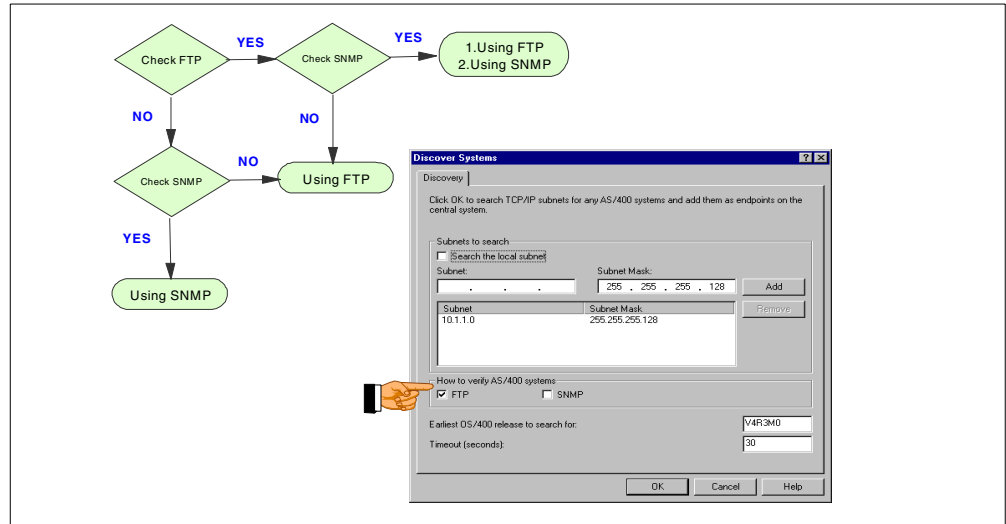


Figure 141. How to verify AS/400 systems

Note

With V4R4 Management Central, if you change the discovery option (for example, to find the system on other subnets) in the **Discover Systems** dialog, you need to restart the Management Central server job.

10.1.3.2 Tips

Do not delete the central system from the AS/400 Endpoint System list. If you do not have the central system under the AS/400 Endpoint Systems list, the endpoint discovery function does not finish, and the dialog box, shown in Figure 142, remains on the display.

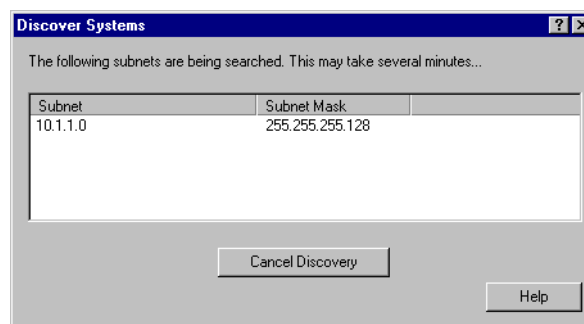


Figure 142. Discover Systems dialog

You can see the error message shown in Figure 143 on page 178 for the QYPSSRV Management Central server job log.

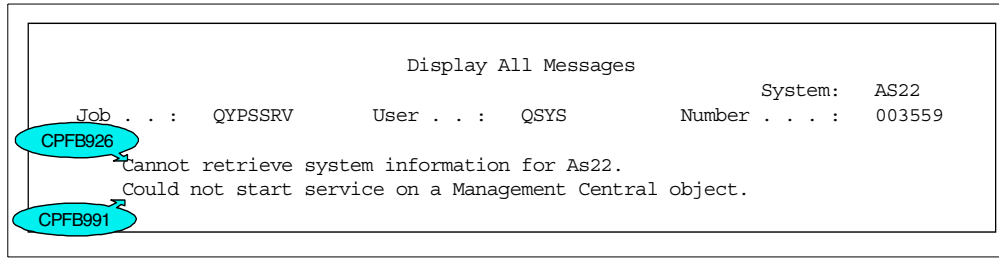


Figure 143. Error message for QYPSSRV job

Table 11 provides the message description.

Table 11. Message descriptions

Message ID	Description	Cause
CPFB926	Cannot retrieve system information for AS22.	System information could not be read from the database or is not available to the server.
CPFB991	Could not start service on a Management Central object.	An error was received while starting service on a Management Central object of type 205, name QYPSDISC, and owner QSYS.

Click **Cancel Discovery** the Discovery System dialog to stop this function. Add the central system into the endpoint system list manually, and then restart the discovery.

10.2 Management Central publishing LDAP server

There may be a system in the network, which collects inventory information of all the system with LDAP. Management Central does not use the LDAP published information for its management purposes. For this purpose, you can configure LDAP on the central system to publish AS/400 computers, when hardware or software inventory is collected for one or more endpoints.

Here is how to configure LDAP with Operations Navigator so this information is published:

1. Right-click on the AS/400 connection for the central system (AS22 in this example) and select **Properties** (see Figure 144).



Figure 144. Selecting the central system on an AS/400 connection

2. Select the **Directory Services** properties tab.

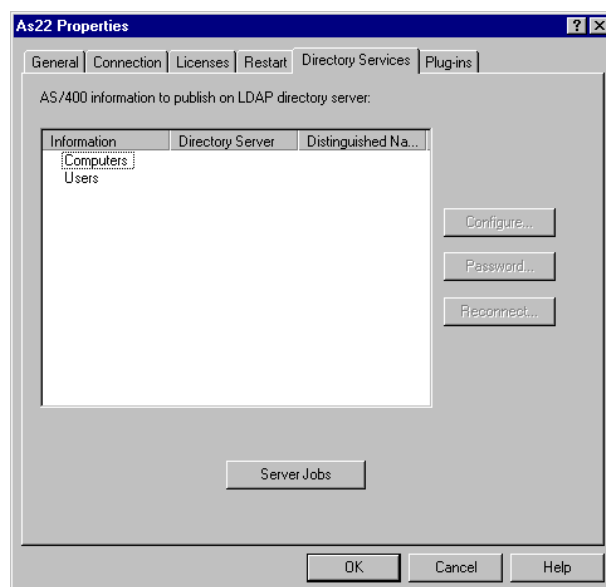


Figure 145. Directory Services tab

3. Select **Computers** and click on the **Configure** button. The check next to Computers in Figure 146 indicates that it is already configured and enabled to publish Management Central information to the LDAP server from the central system.
4. If Computers was not checked, use the dialog box, as shown in Figure 146, to supply the necessary LDAP server configuration information, and select **Publish AS/400 information for Computers**.

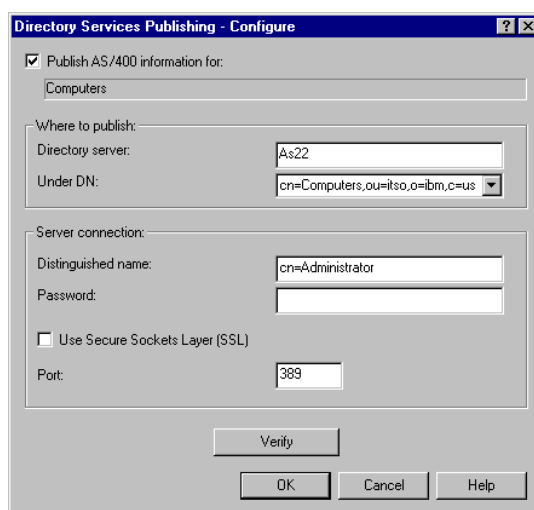


Figure 146. Publish AS/400 information

In the **Where to publish** panel, specify where you want to publish the AS/400 information. There are two parameters associated with this field:

- **Directory server:** Specifies the TCP/IP name or address of the directory server. In this sample, specify `AS22`.
 - **Under DN:** Specifies the distinguished name (DN) under which AS/400 information is published. In this sample, we specified `cn=computer,ou=itso,o=ibm,c=us`.
5. After the LDAP publisher configuration, perform the inventory collection of Management Central. The central system will publish the information of the system which is collected in the inventory.

Note

In Figure 146 on page 179, if you did not select Publish AS/400 Information for:, then the Management Central information is not published. Once you configure for the LDAP, it is easy to turn on and off the publishing of AS/400 Management Central information to the LDAP server with this check box.

10.3 WAN connection considerations

This section provides the system administrator with information on how to use the Management Central functions in a WAN environment. This section also discusses setting filter rules for the firewall.

Basically, we discuss the following types of connections:

- Using switched line with point-to-point protocol (PPP) connection
- Using leased line
- Using the Internet with a firewall

For each case, we can use all the functions of Management Central the same as for a local LAN except for multiple sites using a switched line. Usually WAN speed is slower than LAN speed. If you need to send large objects to the endpoint system, the WAN environment takes longer than the LAN environment. If you communicate using the Internet, you need to consider security.

The following section discusses the consideration for each connection type.

10.3.1 Using a switched line with PPP connection

When two systems are physically connected, through a telephone line, it is typically referred to as a point-to-point connection as shown in Figure 147.

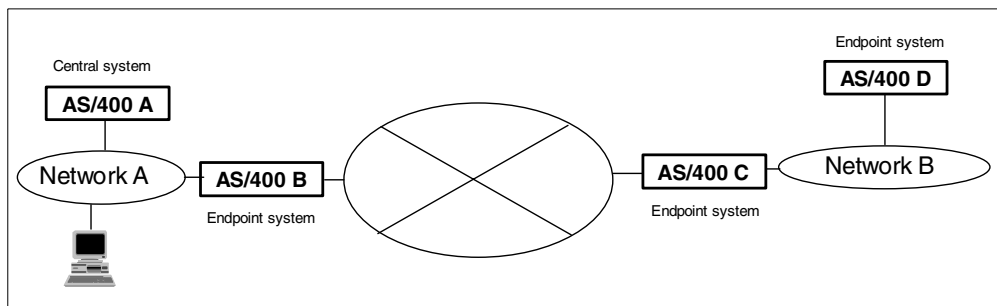


Figure 147. Using a switched line

Support for TCP/IP PPP is included on your AS/400 system as part of the wide area network (WAN) connectivity. With a switched line, a modem or integrated services digital network (ISDN) terminal adapter is used to connect the local AS/400 system to the remote system over a telephone line.

You need the connection between the central system and the endpoint system when you use Management Central functions. Management Central communications always starts from the central system to the endpoint systems. That means that the endpoint system should wait to receive a call from the central system. The central system must be able to contact the endpoint systems by dialing the telephone.

In Figure 147, AS/400 B specifies the line connection type as PPP and the mode type as "Switched line: dial, Switched line: Dial on-demand (dial only)" or "Switched line: Dial on-demand (answer enabled dedicated peer)" on the Point-to-Point profile properties dialog box. AS/400 C (the endpoint system) specifies the line connection type as PPP and the mode type as "Switched line: answer." For information on how to create the PPP profiles, refer to Appendix A, "PPP configuration sample" on page 215.

You need to consider the following points for this scenario for Management Central:

- Routing considerations between the AS/400 system and the remote system.
AS/400 B and AS/400 C must be enabled for the IP forwarding functions because AS/400 A (central system) has to communicate with the endpoint system (as AS/400 D) in Network B.
- Network A and Network B do not have the same IP address.
Network A's systems and Network B's systems communicate with each other using TCP/IP, so we do not have the same address in each network. If you have the same address in both networks, you have to consider using the Network Addressing Translation (NAT) function.
- How you want to handle authorization and security using this PPP connection profile. You need to know how you want to validate access to the AS/400 system (Challenge Handshake Authentication Protocol (CHAP) or Password Authentication Protocol (PAP)).
- If your customer has the DNS system in each network as the separate domain, you need to reconfigure each DNS system to exchange the DNS records, for example primary and secondary or use zone-transfer.
- If you have multiple branch offices that connect with switched lines in your environment as shown in Figure 148 on page 182, you have to separate the AS/400 systems into the system group with different subnets so that the system group has AS/400 systems on the same network (or the same site). Management Central functions communicate with the AS/400 systems in the same group at the same time when you select the system group for a function, such as the files distribution. The central system tries to communicate with the multiple AS/400 systems at the same time. However, in this scenario, you have only one line for the central system. If the central system site dials to one endpoint system group (AS/400 C and AS/400 D in Figure 148), you cannot dial to another site (AS/400 E and AS/400 E in Figure 148). You have to use Management Central functions serially for each system group.

Or, you can add more switched lines in the central system site, so that you can communicate with multiple sites at the same time.

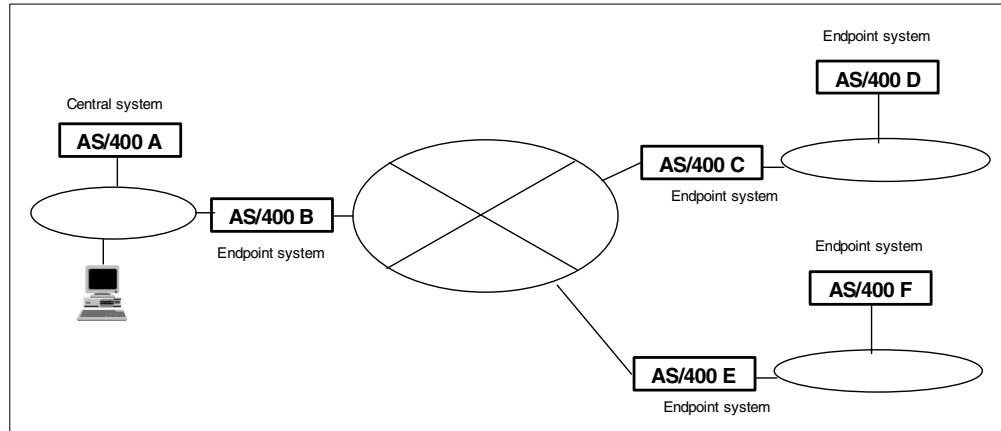


Figure 148. Multiple sites using a switched line

10.3.2 Using a leased line

In this scenario, you can use a point-to-point connection the same as you did in 10.3.1, "Using a switched line with PPP connection" on page 180. Then, AS/400 B (in Figure 147 on page 180) specifies the line connection type as PPP and the mode type as "Leased line: initiator" on the Point-to-Point profile properties dialog box. AS/400 C (the endpoint system) specifies the line connection type as PPP and the mode type as "Leased line: terminator." For information on how to create the PPP profiles, go to the Operations Navigator online help or the Information Center at: <http://publib.boulder.ibm.com/html/as400/infocenter.htm>

You can use a router instead of an AS/400 system as shown in Figure 149.

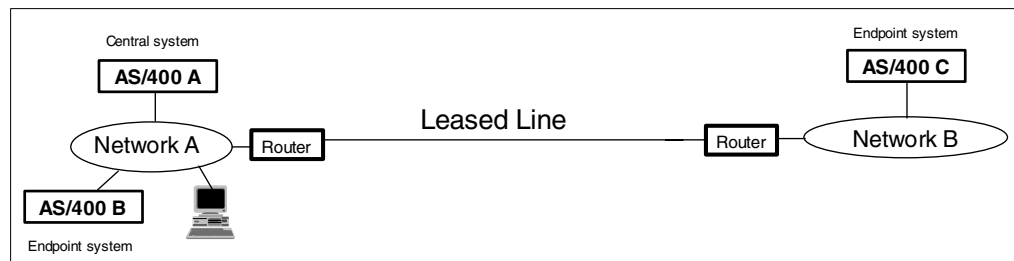


Figure 149. Using a leased line

You need to consider the following points for this scenario for Management Central:

- Routing considerations between the AS/400 system and the remote system.
Each router must be enabled for the IP forwarding functions because the central system has to communicate with the endpoint systems (as AS/400 C) in the other network.
- Network A and Network B do not have the same IP address.
Network A's systems and Network B's systems communicate with each other using TCP/IP, so we do not have the same address in each network. If you

have the same address in both networks, you have to consider using the NAT function.

- Using a leased line may be more expensive than using a switched line.
- If your customer has the DNS system in each network as the separate domain, you need to reconfigure each DNS system to exchange the DNS records, for example, primary and secondary or use zone-transfer.

10.3.3 Using the Internet with a firewall

Many customers are connecting to the Internet, but each Internet service that you use poses risks to your AS/400 system and the network to which it is connected. You need to create and enact a security policy that minimizes these risks. However, when you connect your AS/400 system to the Internet, you need to provide additional security measures to ensure the safety of your network (in previous scenarios, you do not consider security). Of course, we can use SSL function to protect the data integrity and privacy, but SSL does not protect that address to get in the network. If you do not take any measures, someone may break into your private network.

In this scenario, we recommend using a *firewall*. A firewall is a blockade between a secure network and another non-secure network, such as the Internet. Although most customers use a firewall to connect a branch network safely to the Internet, you can also use a firewall to secure one branch network from another branch network on the Internet as shown in Figure 150.

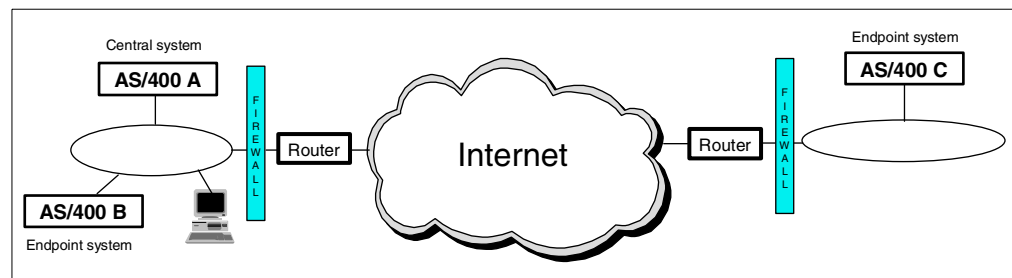


Figure 150. Using the Internet with the firewall

A firewall provides a controlled single point of contact (called a *chokepoint*) between your secure internal network and the untrusted network. The firewall lets users in your internal network use authorized resources that are located on the outside network. It also prevents unauthorized users on the outside network from using resources on your internal network.

When you use a firewall as your gateway to the Internet (or another network), you reduce the risk to your internal network considerably. Using a firewall also makes administering network security easier because firewall functions carry out most of your security policy.

You need to consider these points for this scenario for Management Central:

- Adding packet filter rules for Management Central functions.

When you use the Management Central functions in a non-SSL, the IP packets flow as shown in Figure 151 on page 185. To define a packet filter, specify the following:

On the firewall for the central system:

```
-action(permit) from(cs) to(es) protocol(tcp ge 1024/eq 5555)
interface(secure) routing(local) direction(inbound)
fragment(y) log(n) description("From the central system to /)

-action(permit) from(cs) to(es) protocol(tcp ge 1024/eq 5555)
interface(non-secure) routing(local) direction(outbound)
fragment(y) log(n) description("From the firewall to the
endpoint system")

-action(permit) from(es) to(cs) protocol(tcp eq 5555/ge 1024)
interface(non-secure) routing(local) direction(inbound)
fragment(y) log(n) description("From the endpoint system to
firewall")

-action(permit) from(es) to(cs) protocol(tcp eq 5555/ge 1024)
interface(secure) routing(local) direction(outbound)
fragment(y) log(n) description("From the firewall to the
central system")
```

On the firewall for the endpoint system:

```
-action(permit) from(cs) to(es) protocol(tcp ge 1024/eq 5555)
interface(non-secure) routing(local) direction(inbound)
fragment(y) log(n) description("From the central system to
firewall")

-action(permit) from(cs) to(es) protocol(tcp ge 1024/eq 5555)
interface(secure) routing(local) direction(outbound)
fragment(y) log(n) description("From the firewall to the
endpoint system")

-action(permit) from(es) to(cs) protocol(tcp eq 5555/ge 1024)
interface(secure) routing(local) direction(inbound)
fragment(y) log(n) description("From the endpoint system to
firewall")

-action(permit) from(es) to(cs) protocol(tcp eq 5555/ge 1024)
interface(non-secure) routing(local) direction(outbound)
fragment(y) log(n) description("From the firewall to the
central system")
```

In the previous sample, specify the IP address of the central system for CS, and specify the IP address of the endpoint system for ES.

Note

The TCP/IP port numbers used by Management Central are 5555 for non-SSL connections, and 5566 and 5577 for SSL connections. For a more detailed discussion about the port numbers, refer to 11.4.1, "Environment variables and TCP/IP ports for Management Central" on page 209.

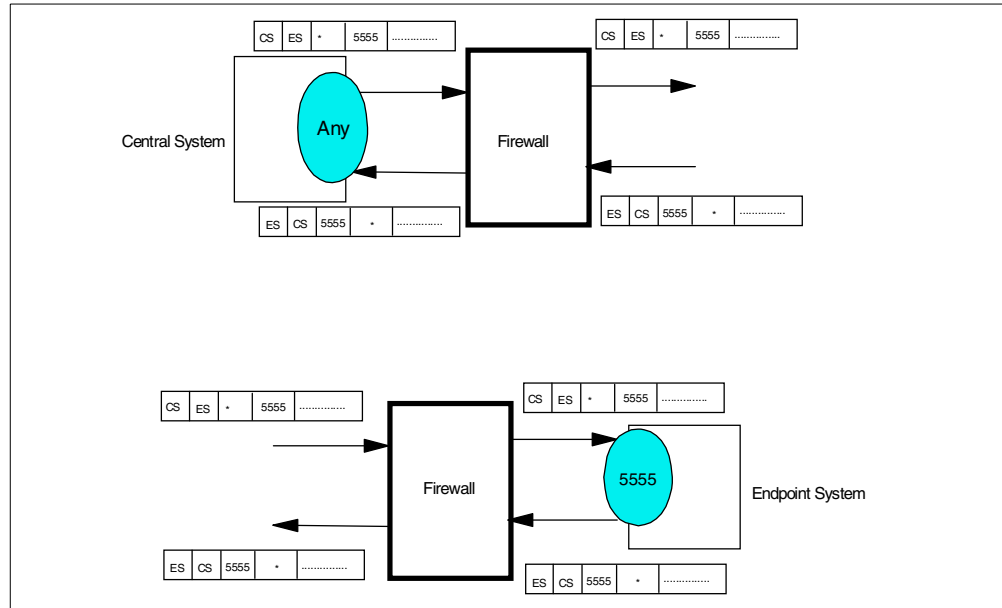


Figure 151. Packet filter for Management Central

- The central system and the endpoint system must have global addresses.
- We recommend using the Management Central functions with SSL for data security and integrity.

10.4 NLS consideration

When you have different systems with different languages as shown in Figure 152, you can use the Management Central function.

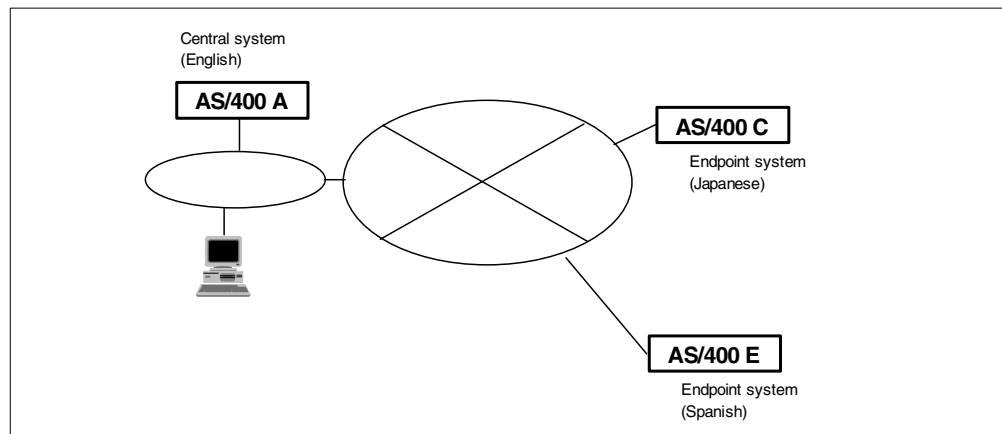


Figure 152. Multiple language support

However, you may encounter limitation for displaying the job log in your PC. If you use a PC that does not support the Japanese language, you will see unrecognizable information as shown in Figure 153 and Figure 154 on page 186. This situation occurs because the English PC does not have the Japanese fonts. However, if you use a Japanese PC, you can see the job log correctly.

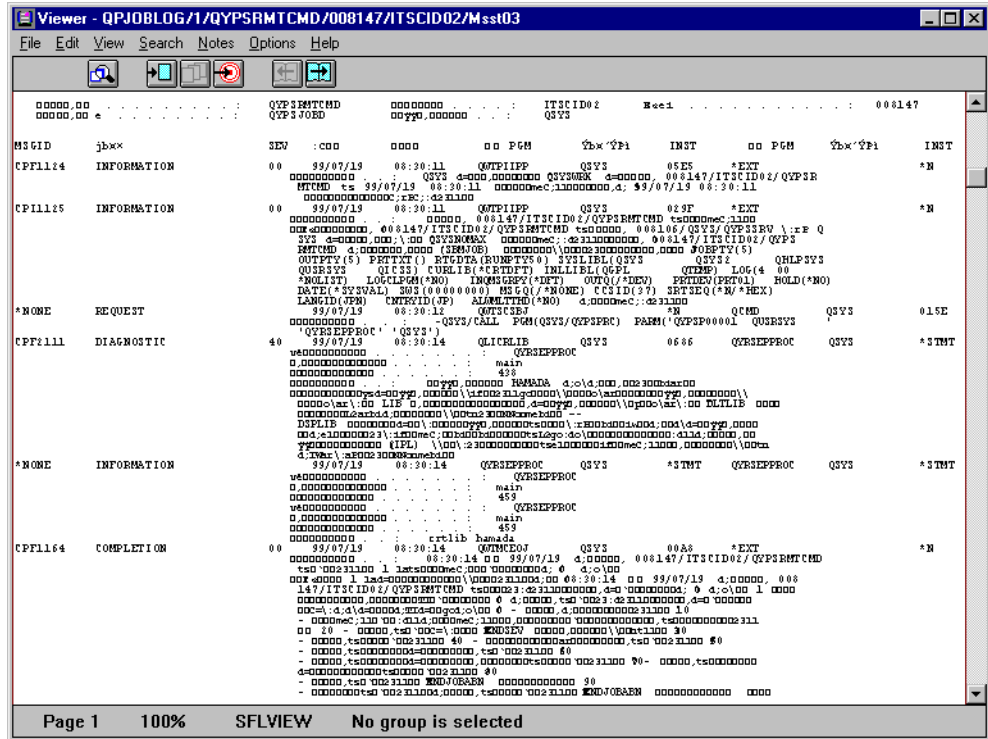


Figure 153. AFP Viewer on an English PC for the job log of a Japanese system

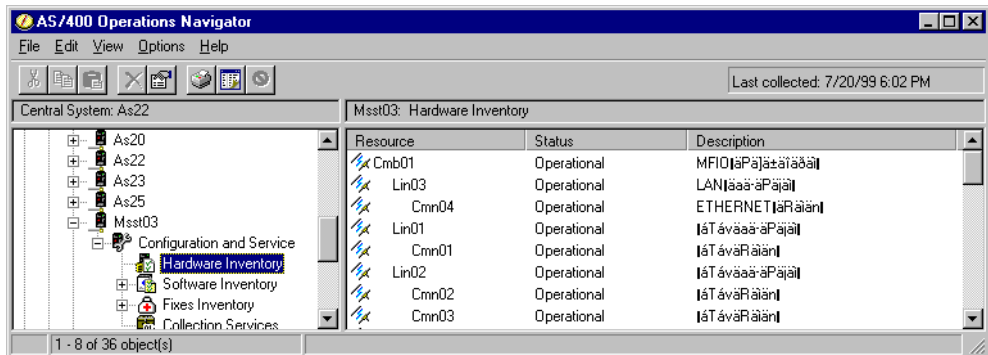


Figure 154. Hardware inventory of a Japanese system on an English PC

Chapter 11. Secure Sockets Layer (SSL) support

This chapter discusses Management Central with SSL. As we discussed in 10.3.3, “Using the Internet with a firewall” on page 183, we need to use the SSL in the Internet environment.

11.1 Why SSL

Most companies with connections to the Internet have implemented firewall solutions to protect their intranet from unauthorized users coming in and unauthorized sessions going out. Because firewalls work as filters, they cannot guarantee the security of the link between clients and servers and the data sent. Companies who want to use the Internet as one of their selling channels are greatly concerned about sending and receiving sensitive data, such as bank account or credit card numbers. For AS/400 Management Central environments, the needs are the same. The example that we provide is sending a command that creates a user profile with the Management Central running command function. You can see the contents of the entire command as shown in Figure 155.

SSL provides the transport and authentication of public key system certificates and encryption of data. An SSL connection can occur only between an SSL-enabled central system and an SSL-enabled endpoint system. An SSL-enabled system is a system on which the required administration and configuration tasks have been performed. SSL provides that the connection is private, and that encryption is used. You can choose to enable SSL for Management Central. In this section, we show you how to activate SSL for Management Central functions.

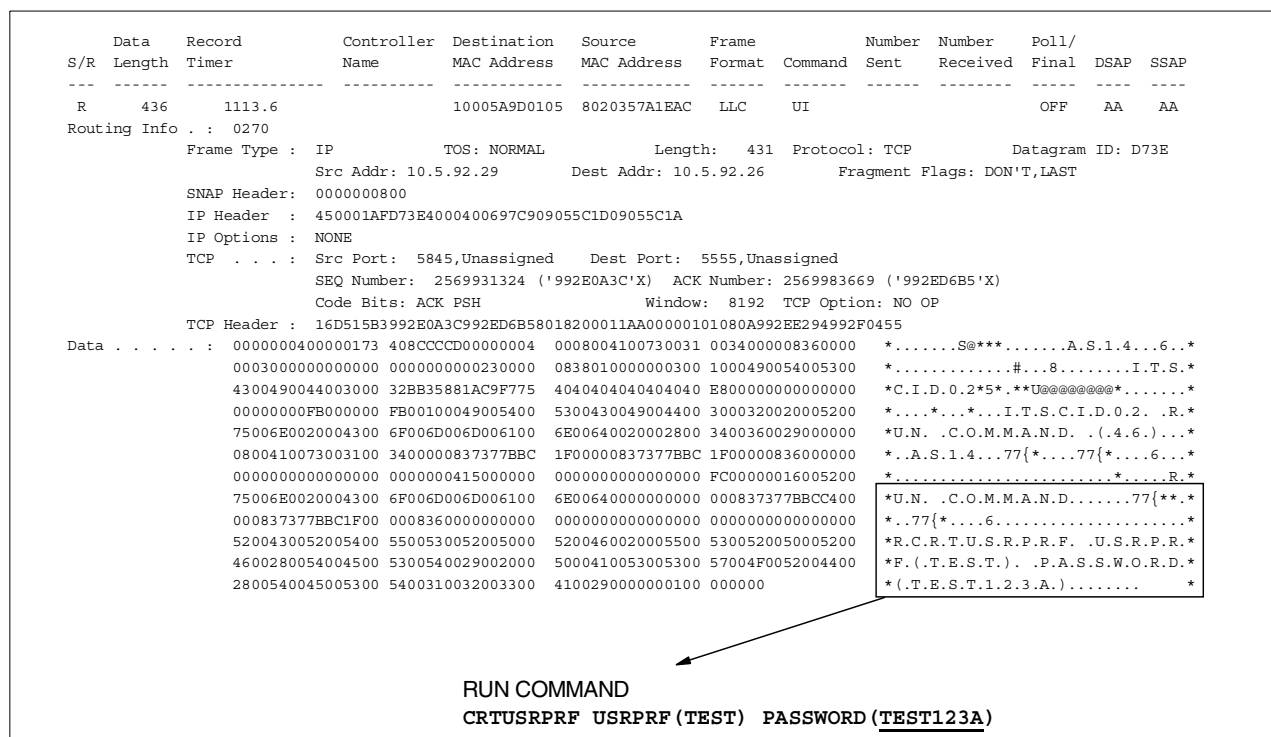


Figure 155. Password exposed in communication trace data

11.2 Management Central with SSL

Management Central with SSL is only available on AS/400 systems that are at V4R4 or later release level. Management Central has two authentication levels:

- Server authentication

Provides Certificate Authority (CA) authentication of the endpoint system server certificate. When the central system (SSL client) attempts to establish a connection with the endpoint system (SSL server), the central system authenticates the endpoint system server certificate for CA authenticity as shown in Figure 156. For this level, if you want to add a new AS/400 system to your management group as an endpoint system, you need to get the server certificate of the system from the CA. Because an AS/400 system can pose as a central system to your endpoint systems and collect their information as far as it has the server certificate from the same certificate authority, we do not recommend using this level for the Internet connection.

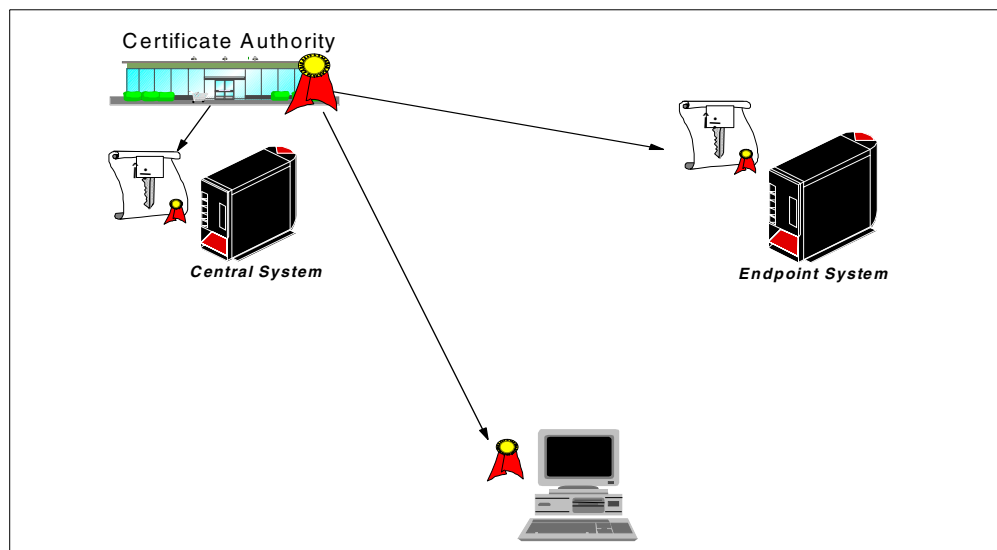


Figure 156. Server authentication

- Client and server authentication

Provides CA and Trusted Group authentication of both the central system and endpoint system server certificates. This is a stronger security level than the server authentication level. When the central system (SSL client) attempts to establish a connection with the endpoint system (SSL server), the central system and the endpoint system authenticate each other's server certificates for CA authenticity and for Trusted Group validation list authenticity. In this level, all systems in the network need to have the validation list (QUSRSYS/QYPSVLDL *VLDL). You can have the list on each system by either:

- Changing each system to a central system, and creating the list.
- Distributing the list from the central system to each endpoint system.

Figure 157 on page 189 shows the latter method to have the validation list. If users want to create a new AS/400 system as the central system, they need to get their system's server certificate using the same procedure for

the server authentication level. Also they need to get the validation list, which includes the information for every endpoint system. Generally, the validation list stores information to identify a user (typically a user ID) and authentication information (typically a password, PIN, account number, or digital certificate). The authentication information is stored encrypted. When users want to get the validation list, they need to access your secured AS/400 system. Because your system is secure, it is very difficult for a malicious user to access the validation list.

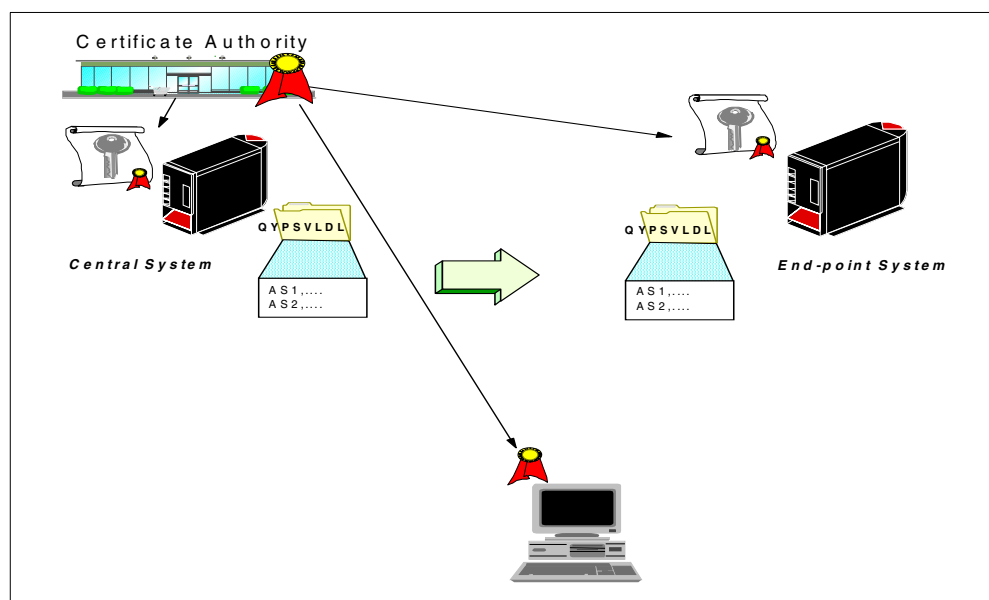


Figure 157. Client and server authentication

11.3 Setup example

Bringing SSL into play with Management Central is a three-step process.

1. You have to acquire a system certificate on the AS/400 system.
2. The PC client must be enabled to use SSL.
3. Management Central must be enabled to use SSL.

Management Central has two types of authentication when they are enabled to use SSL, as discussed in the previous section. In this section, we show sample setup steps for the client and server authentication. Because the client and server authentication setup needs the additional steps besides the server authentication setup, if you need only the server authentication, you can stop at 11.4.1.1, “Server authentication level” on page 210. Also see Table 12 on page 190 for an overview of the setup steps.

11.3.1 Scenario and configuration step

In this scenario, we have two AS/400 systems and one PC connected on the same LAN as shown in Figure 158 on page 190. AS20 is the local Certificate Authority and the central system. AS20 has its own server certificate. AS14 is the endpoint system that has the AS14 server certificate from AS20. The PC that uses Operations Navigator for Management Central has the AS20 CA as a trusted root. All the systems have the same trusted root, which is AS20.

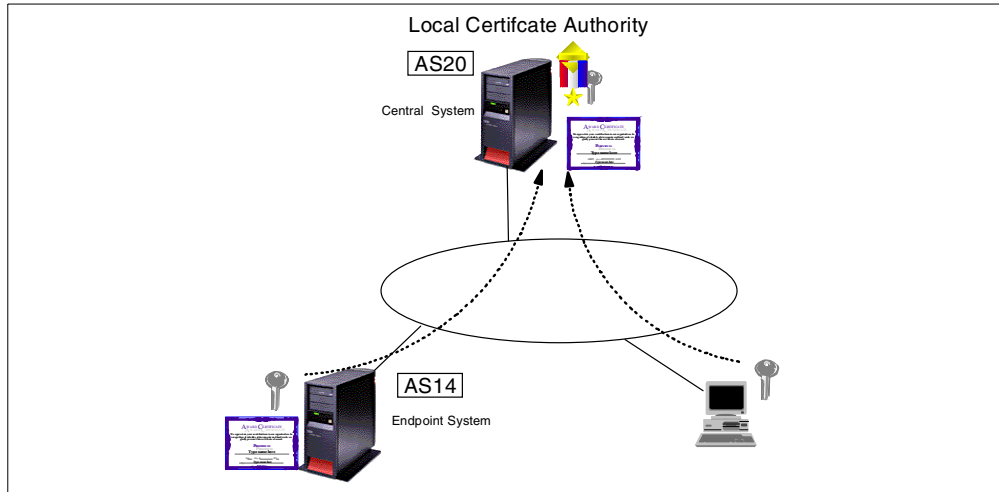


Figure 158. Scenario of the example

Table 12 shows the summary of steps when you use the intranet CA. The details for each step are explained in the following sections.

Table 12. Summary steps

Steps	Server authentication level	Client and server authentication level
Digital Certification Manager setup 1. Set up intranet CA. 2. Create other AS/400 server certificates. 3. Send created systems certificates to each AS/400 system. 4. Import system certificate. 5. Assign the certificate. 6. Set up a PC to run with SSL.	Must do	Must do
Management Central as server authentication setup 1. Central system setup 2. Endpoint system setup 3. Restart Management Central (central) 4. Restart Management Central (endpoint) 5. PC setup	Must do	Must do
Management Central as client and server (C/S) authentication setup 1. Populate the validation list 2. Copying the validation list to the endpoint systems 3. Central system setup for C/S authentication 4. Endpoint system setup for C/S authentication 5. Restart Management Central (central) 6. Restart Management Central (endpoint)	Not applicable	Must do

11.3.2 Digital Certificate Manager (DCM) setup

Your system administrator must complete the necessary SSL setup on each system before SSL will work properly. If SSL is not configured properly,

Management Central may not be able to communicate with any endpoint systems.

Before using Secure Sockets Layer (SSL), verify that the following tasks have been completed:

1. Install software to support SSL and manage digital certificates:
 - TCP/IP Connectivity Utilities for AS/400, 5769-TC1
 - Digital Certificate Manager, 5769-SS1 (base operating system option 34)
 - Cryptographic Access Provider, 5769-AC1, AC2 or AC3
 - IBM HTTP Server for AS/400, 5769-DG1
2. Import or create a Certificate Authority certificate using Digital Certificate Manager.
3. Import or create a system certificate to identify secure applications including QIBM_OS400_QYPS_MGTCTRL_SVR.
4. Add certificate information to the Client Access Express SSL client.

The following sections describe general SSL setup instructions.

Note

Make sure your Web browser's caching properties are set properly. On Netscape, select **Edit ->Preferences....** On the Preferences panel, expand **Advanced**. Then, select **Cache**. Make sure that **Every time** is selected under **Document in cache is compared to document on network:**. Click **OK** to close.

11.3.2.1 Setting up the intranet CA

Follow these steps to set up your intranet to use the certificate:

1. Select one AS/400 system to be the Certificate Authority. In this scenario, we use AS20 as the CA.
2. Run the following command to start the HTTP server on this system:

```
STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)
```
3. Access the Digital Certificate Manager using the Web interface. Use the URL:

```
http://(SystemName):2001/
```


Here, (SystemName) is the name of the system. For example, if the system was AS20, you would use `http://AS20:2001/` as the URL.
4. Sign onto the AS/400 system using the interface, if prompted. At the **AS/400 Tasks** page, select **Digital Certificate Manager**. Figure 159 on page 192 shows the Digital Certificate Manager main page.



Figure 159. Digital Certification Manager page

5. Create a Certificate Authority.

- a. Select **Certificate Authority (CA)**. Then, select **Create a Certificate Authority**. To complete the fields for the Create a Certificate Authority form shown in Figure 160 on page 193, use the sample information from Table 13 on page 193. Click **OK** to create.



Digital Certificate Manager

Create a Certificate Authority

The system will create a public-private key pair and store the key pair in the default CA certificate store.

Key size: (bits)

Certificate store password: (required)

Confirm password: (required)

Certificate Information

Certificate Authority name: (required)

Organization unit:

Organization name: (required)

Locality or city:

State or province: (required; minimum of 3 characters)

Country: (required)

Zip or postal code:

Validity period of Certificate Authority (1-2000): (days)

Figure 160. Create Certificate Authority page

Table 13. Create a Certificate Authority Page field

Field	Value
Key Size	2048
Certification Store password	Use whatever you want. It is important that you remember the password.
Server Name	AS20.ITSOROCH.IBM.COM
Organization Unit	IBM
Organization Name	ITSO
City	Rochester
State	Minnesota
Country	US

- b. At CA Certificate Created Successfully page, select **OK**. Then, select **OK** at the policy data page as shown in Figure 161 on page 194.

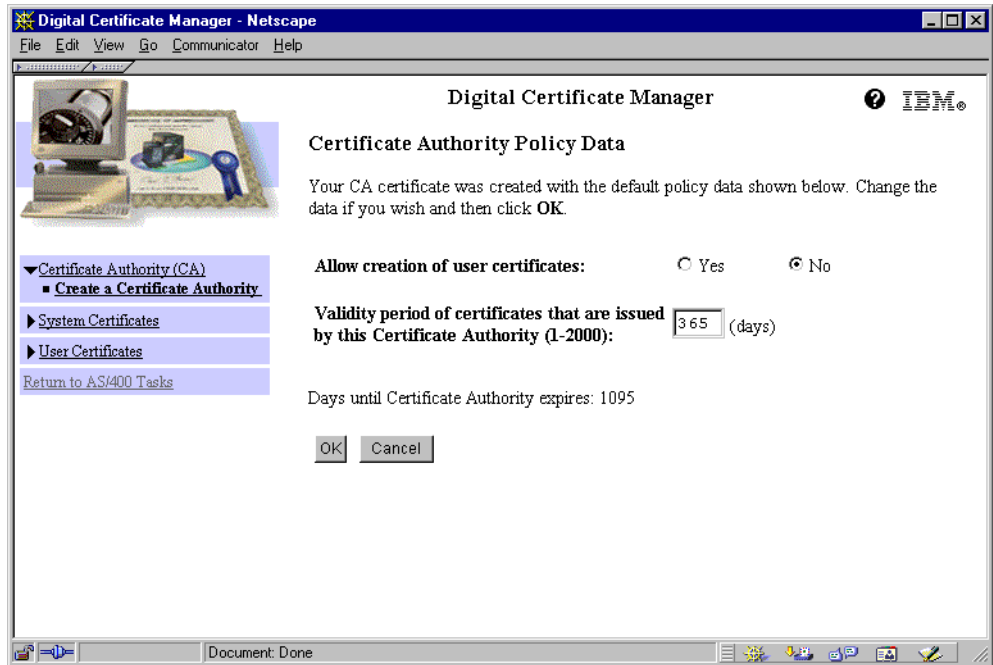


Figure 161. Certificate Authority policy data

- c. As shown in Figure 162, select **QIBM_OS400_QYPS_MGTCTRL_SVR** as an application that trusts this CA. Then, click **OK**. The CA is now created. You must create a system certificate for this system.

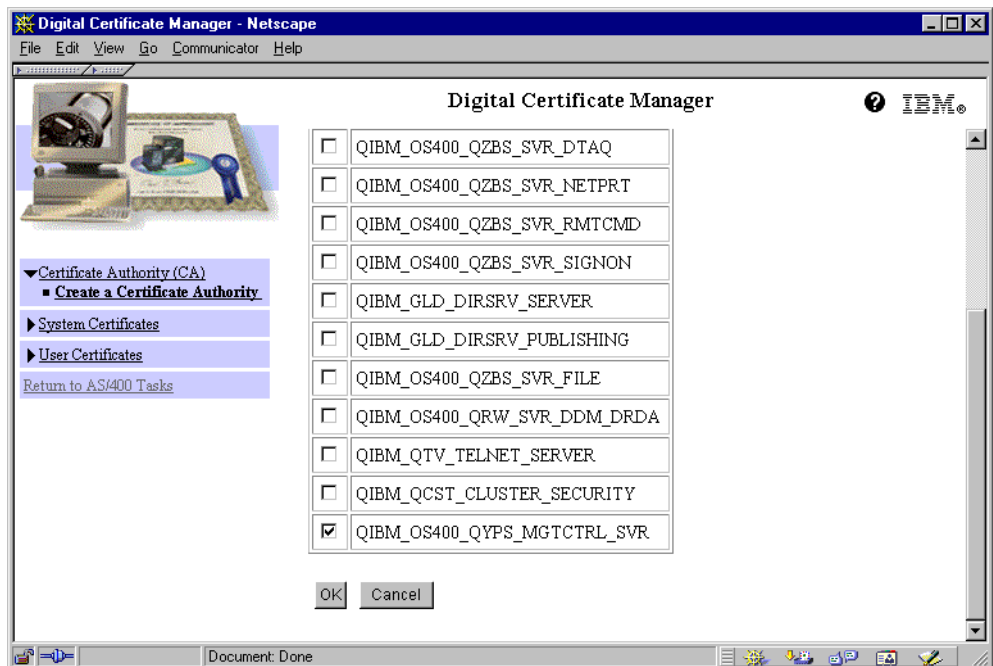



Figure 162. Secure application selection

6. Create a Server Certificate of CA system.
 - a. At Create a System Certificate page, use the same information that you used for the CA to create the system certificate for this system. Then, click

OK. Use the sample information from Table 14 to complete the page shown in Figure 163.



Digital Certificate Manager

Create a System Certificate

The system will create a public-private key pair and store the key pair in the default system certificate store.

Key size: (bits)

Certificate store password: (required)

Confirm password: (required)

Certificate Information

Server name: (required)

Organization unit:

Organization name: (required)

Locality or city:

State or province: (required minimum of 3 characters)

Country: (required)

Zip or postal code:

Figure 163. Create a System Certificate Page

Table 14. Create a System Certificate Page fields

Field	Value
Key size	2048
Certificate store password	password
Confirm password	password
Server name	Leave default value
Organization unit	ITSO
Organization name	IBM
Locality or city	Rochester
State or province	Minnesota
Country	US
ZIP code or postal code	blank

- b. DCM creates the system certificate in the *SYSTEM certificate store. The *SYSTEM certificate store consists of the following files in /QIBM/UserData/ICSS/Cert/Server:
 - DEFAULT.KDB contains the server certificate and private key.
 - DEFAULT.RDB is the certificate request file.
 - DEFAULT.STH is the password stash file.
- c. DCM displays the next page to select applications that will use this system certificate.

- d. Select **QIBM_OS400_QYPS_MGTCTRL_SVR** (Management Central server) as an application that will use this server certificate.
- e. Click **OK**.
- f. On the Secure Application Status page, click **Done**.

11.3.2.2 Create other AS/400 system server certificates

To create system certificates for other AS/400 systems, follow these steps:

1. From the main Digital Certificate Manager Web page (on your Certificate Authority system), select **Certificate Authority (CA)**. Then, select **Create a system certificate for another AS/400** (Figure 164).
2. At the first Create a System Certificate page, click **OK**.

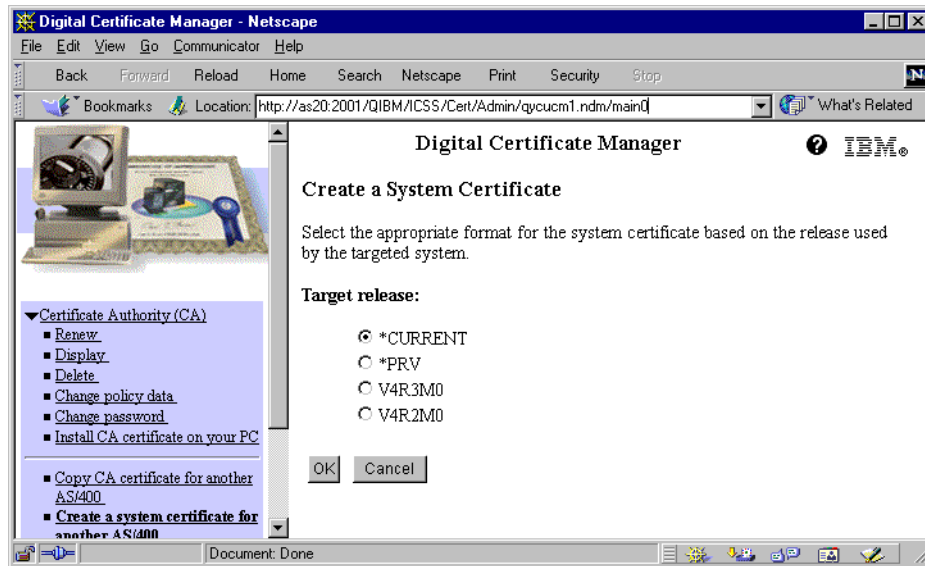


Figure 164. Create a System Certificate (target release)

3. At the second Create a System Certificate page (containing a form) as shown in Figure 165 on page 197, use the sample information shown in Table 15 for the form. Then, click **OK** to create it.

Table 15. Value for creating a system certificate

Field	Value
Key Size	2048
Key Label	ManagementCentral (Note all one word)
Certification Store Path	/MGTCTRL/AS14.KDB (provided the IFS directory /MGTCTRL exists, and substitute AS14 with your system name)
Certification Store password	Use whatever you want. It is important that you remember the password.
Server Name	AS14.ITSOROCH.IBM.COM
Organization Unit	IBM
Organization Name	ITSO

Field	Value
City	Rochester
State	Minnesota
Country	US

Digital Certificate Manager
? IBM

Create a System Certificate

The system will create a public-private key pair and store the key pair in the certificate store you define below.

After the certificate is created, you must transfer the certificate store (.KDB), the stashed password file (.STH), and the request file (.RDB) to the system that will use this system certificate.

Key size: (bits)

Current system certificate key label: (required)

Certificate store path and filename: (required)

Certificate store password: (required)

Confirm password: (required)

Certificate Information

Server name: (required)

Organization unit:

Organization name: (required)

Locality or city:

State or province: (required minimum of 3 characters)

Country: (required)

Zip or postal code:

Figure 165. Create a System Certificate

4. At the System Certificate Created Successfully page, click **Done**.
5. Click **Cancel** to return to the main Digital Certificate Manager page.

Repeat this procedure for all of your other AS/400 systems (other than the Certificate Authority system).

11.3.2.3 Send created system certificates to each AS/400 System

On the Certificate Authority AS/400 system, type the following commands in the order presented:

1. `ftp asxxx` (asxxx is the name of one of your other AS/400 systems for which you created a certificate)
2. `namefmt 1` (use local IFS naming)

3. `mkdir /MGTCTRL` (create remote directory)
4. `cd /MGTCTRL/` (remote change directory)
5. `lcd /MGTCTRL/` (local change directory)
6. `binary` (transfer in binary mode)
7. `mput ASxxx.*` (transfer.KDB.RDB.STH files; ASxxx is the name of the system to which you ran FTP)
8. `quit`

Repeat these steps for all of your other AS/400 systems.

11.3.2.4 Importing the system certificate

On each AS/400 system (except the Certificate Authority), import the system certificate into *SYSTEM Certificate Store:

The *SYSTEM Certificate Store consists of the following IFS files:

- /QIBM/UserData/ICSS/Cert/Server/DEFAULT.KDB
- /QIBM/UserData/ICSS/Cert/Server/DEFAULT.RDB
- /QIBM/UserData/ICSS/Cert/Server/DEFAULT.STH

On the initial setup only, if these files exist on the system already, delete them.

1. Bring up the main Digital Certificate Manager Web page for this system. Do not forget to start the HTTP *ADMIN server, if needed.
2. Export the certificate from the KDB file you brought to this system into an export file.

On the 5250 screen, run these commands in the order shown:

```
COPY OBJ('/MGTCTRL/as14.kdb')
TOOBJ('/QIBM/UserData/ICSS/Cert/Server/default.kdb')
COPY OBJ('/MGTCTRL/as14.RDB')
TOOBJ('/QIBM/UserData/ICSS/Cert/Server/default.rdb')
COPY OBJ('/MGTCTRL/as14.sth')
TOOBJ('/QIBM/UserData/ICSS/Cert/Server/default.sth')
```

3. Click on **System Certificates**. You should keep *SYSTEM as the "Certificate Store." Enter your password and click **OK**.
4. Under **System Certificates**, select **Work with certificates**. On the Work with Certificates page, select **ManagementCentral** as the certificate, and click on **Set Default**.
5. At the Set Default Key page, click **Done**.
6. This should again bring up the "Work with certificates" page. Click on **Cancel** to return to main page.

11.3.2.5 Assigning the certificate for usage by Management Central

Now you need to assign the certificate so Management Central can use it. Follow these steps:

1. Click on **Work with secure applications** (Figure 166 on page 199).
2. At the Work with Secure Applications page, select the application to use the system certificates by choosing **QIBM_OS400_QYPS_MGTCTRL_SVR**, and clicking on **Work with System Certificate**.

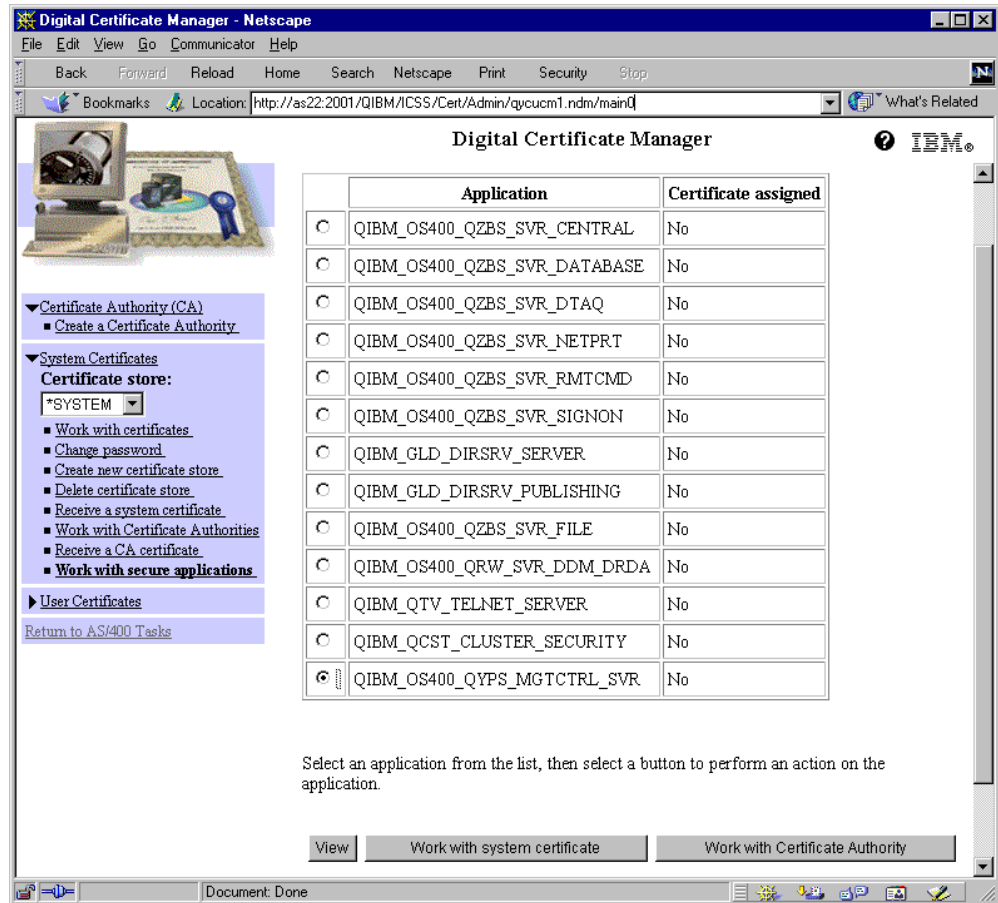


Figure 166. Select certificate assigned application

3. At the Work with System Certificate page, select **ManagementCentral** and click **Assign new certificate**.
4. The next page tells you that the certificate was assigned to the application. Click **OK**. Now this AS/400 system is ready to run Management Central using SSL!
5. On the Work with Secure Applications page, make sure that all other applications listed (in particular, those containing QZBS) get the same certificate assigned by doing the following tasks for each application:
 - a. Select the application and click on **Work with system certificate**.
 - b. On the next page, select **ManagementCentral**, and click **Assign new certificate**. On the next page, click **OK**.

11.3.2.6 Setting up a PC to run with SSL

If you have not setup a PC to run with SSL, you need to load the SSL support for Client Access Express. Here are the steps:

1. Install the Secure Socket Layer component on your PC.
 - a. Bring up the Client Access Express window by clicking on the Client Access icon on your desktop. Click on **Selective Setup**, which brings up the CAE Install wizard. Click **Next**.
 - b. Click **Next**.

- c. At Component Selection, select **Secure Sockets Layer (SSL)**, and be sure that **Client Encryption: 128-bit** is selected. Click **Next**.
 - d. Click **Next** again to start copying.
 - e. Click **Next**, and then click **Finish**.
2. Download CA certificate on your PC.

If you have an AS/400 system as an intranet CA, you can use the CWBCOSSL tool. This tool automates the downloading of an AS/400 CA to the PC and Java key databases for Client Access Express Secure Sockets Layer (SSL) support.

Note

The CWBCOSSL tool is available on the Web at:

<http://www.as400.ibm.com/clientaccess/cadownload.htm>

The shipped default Client Access Express key databases contain CAs from well-known signers, such as VeriSign and Thawte. If your Client Access Express host servers have system certificates assigned to them from a well-known CA, there is no need to run this tool. The default key database already trusts certificates issued by well-known CAs.

For the intranet CA, follow these steps:

- a. Run `CWBCOSSL.exe` on your PC.
- b. On the CwbCoSSL-Client Access Express Certification Authority Downloading Version 2.5 window as shown in Figure 167, specify the AS/400 name of CA. Click the **Start CA Download** button.

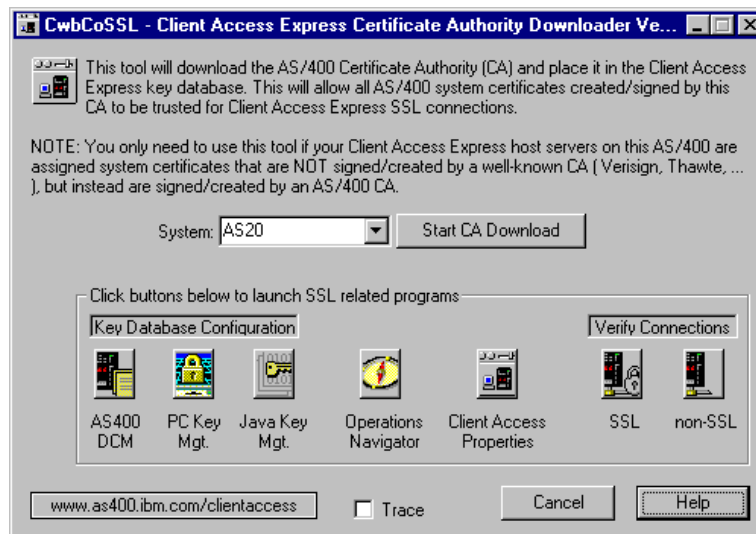


Figure 167. CWBCOSSL main window

- c. The CWBCOSSL tool downloads the certificate authority in binary format automatically. The dialog box, which is shown in Figure 168 on page 201, appears. Click **Yes**.

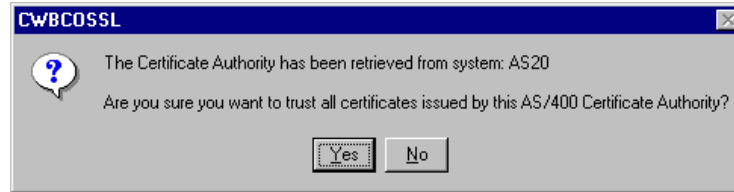


Figure 168. CWBCOSSL message dialog box

- d. Prompt for the PC key database password. You need to type the correct password (the default is ca400), and click **OK** (Figure 169).

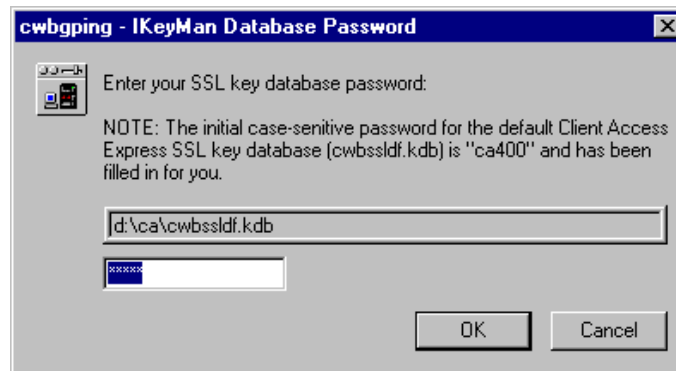


Figure 169. IKeyMan database password prompt

- e. The CWBCOSSL dialog box displays. Click **OK** to finish.

11.3.3 Management Central server authentication setup

After you set up DCM, you need to configure the central system and endpoint systems to use the server authentication.

11.3.3.1 Central system setup

For central system setup, follow these steps:

1. In AS/400 Operations Navigator, right-click **Management Central** and select **Properties**.
2. Click the **Connection** tab. You can see the window as shown in Figure 170 on page 202.

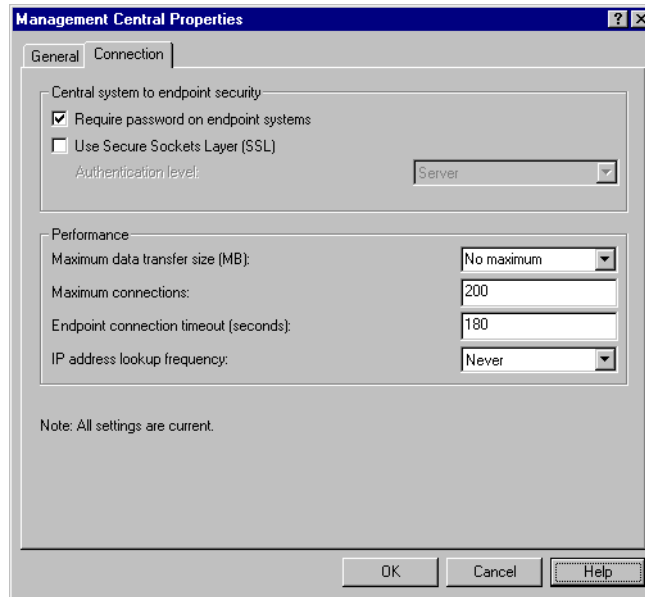


Figure 170. Management Central properties (connection)

3. Select **Use Secure Sockets Layer (SSL)**.
4. For the Authentication level, specify *Server*.
5. Click **OK** to set the value on the central system.

11.3.3.2 Endpoint systems setup

To setup the endpoint systems, follow these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Right-click **AS/400 System Groups**, and select **New System Group**.
3. Define a new system group that includes all AS/400 endpoint systems to which you want to connect using SSL as shown in Figure 171 on page 203.

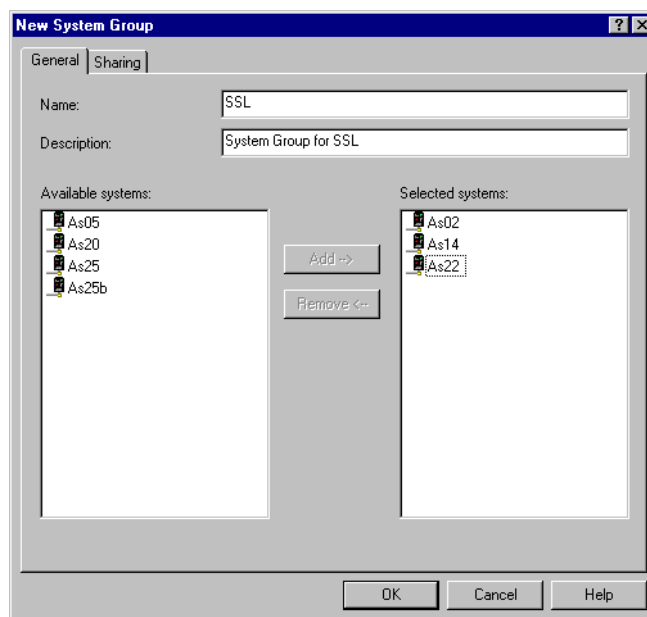


Figure 171. Select system for system group

4. Refresh the list of system groups to display your new group.
5. Right-click the new system group and select **Run Command**.
6. For Command to run, specify the following command (Figure 172):

```
CHGENVVAR ENVVAR(QYPS_AUTH_LEVEL) VALUE(1) LEVEL(*SYS)
```

If you have never used this AS/400 system as a central system, the command will fail because the environment variable does not exist. If this happens, run the following command:

```
ADDENVVAR ENVVAR(QYPS_AUTH_LEVEL) VALUE(1) LEVEL(*SYS)
```

The environment variable QYPS_AUTH_LEVEL with the value of "1" gives the server authentication level of security. For more information about the environment variables, refer to 11.4.1, "Environment variables and TCP/IP ports for Management Central" on page 209.

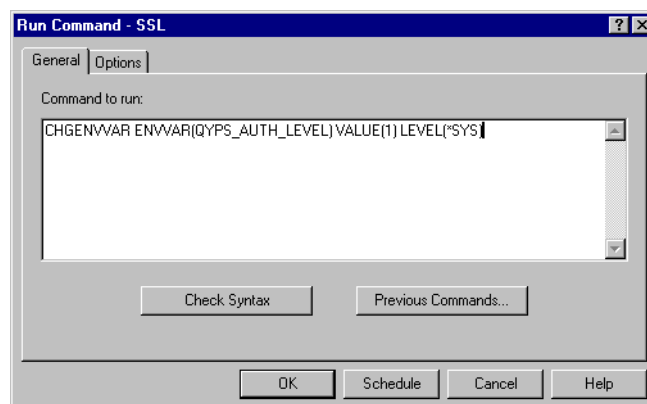


Figure 172. Create Run Command

7. Click **OK**.

11.3.3.3 Restarting the Management Central

To restart Management Central on the central system and on endpoint systems, follow these steps:

1. In AS/400 Operations Navigator, expand **My AS/400 Connections** (or your active environment).
2. Expand the AS/400 system that you are using as your central system.
3. Expand **Network**.
4. Expand **Servers**.
5. Select **TCP/IP**.
6. Right-click Management Central and select **Stop**.
7. Right-click Management Central and select **Start**.

11.3.3.4 PC setup

To setup your PC, complete these tasks:

Note

If you have not restarted OS/400 host server after you created the server certificate for your system, you need to restart the host servers using the following command before running the next step:

```
STRHOSTSVR *ALL
```

1. Bring up AS/400 Operations Navigator.
2. For SSL-enabled systems under **My AS/400 Connections**, right-click the **Properties** for the central system. You can cancel out of a signon prompt if one appears. If you want to see job log or printer output of the endpoint system, you do this step for the endpoint system.
3. Click the **Connection** tab (Figure 173 on page 205). Under **Security**, check **Use Secure Sockets Layer (SSL)**. This tells Client Access to use SSL. Keep clicking **OK** until you return to the Operations Navigator main windows. Finish setting this window for all SSL-enabled systems.

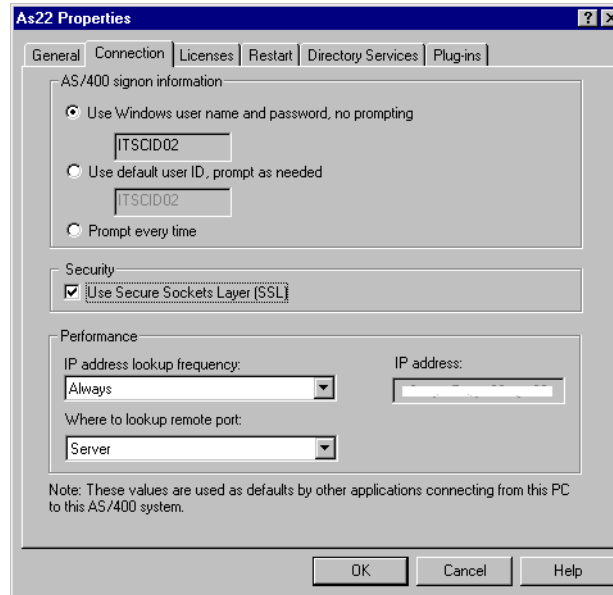


Figure 173. Operations Navigator SSL setup

4. Close and reopen Operations Navigator.

If you do not need the client and server authentication level of security, this completes the SSL configuration steps. If you need client and server authentication, continue to the following section.

11.3.4 Management Central with client and server authentication setup

If you want to connect each system using client/server trusted group, you need to populate the trusted group validation list (QUSRSYS/QYPSVLDL *VLDL) on each endpoint system. After that, you can change the configuration to use the client and sever authentication.

11.3.4.1 Populating the validation list

Populate the trusted group/validation list (QUSRSYS/QYPSVLDL *VLDL) on the central system by using these steps:

1. In AS/400 Operations Navigator, expand **Management Central**.
2. Right-click **AS/400 System Groups**, and select **New System Group**.
3. Define a new system group, which includes all endpoint systems that you want in the trusted group, including the central system. You can even select the SSL group that was created in the previous step.
4. Right-click the new system group created in the previous step and select **Run command**.
5. Run any simple command on the new system group.

This action transports and authenticates the system certificate of each endpoint system to the validation list of the central system.

11.3.4.2 Copying the validation list to the endpoint systems

Now the central system validation list includes the endpoint system's certificate. However, the validation list of each endpoint system does not include other

systems' certificates. Therefore, you need to distribute the validation list (QUSRSYS/QYPSVLDL *VLDL) from the central system to each endpoint system.

Note

Instead of distributing the validation list from the central system, you can populate the list on each endpoint system. To create it, change an endpoint system to a central system. Then, run a simple command to all other endpoint systems as described in 11.3.4.1, "Populating the validation list" on page 205. Repeat this operation on all endpoint systems. The more endpoint systems you have, the easier the distribution method is.

Follow these steps:

1. In AS/400 Operations Navigator, expand Management Central.
2. Click the "+" sign of the **Definition**. Right-click **Package**, and select **New Definition**.
3. In the New Package Definition window, specify the validation list file of the central system (in this scenario, we use AS20). Your specified file name is /QSYS.lib/QUSRSYS.lib/QYPSVLDL.VLDL as shown in Figure 174.

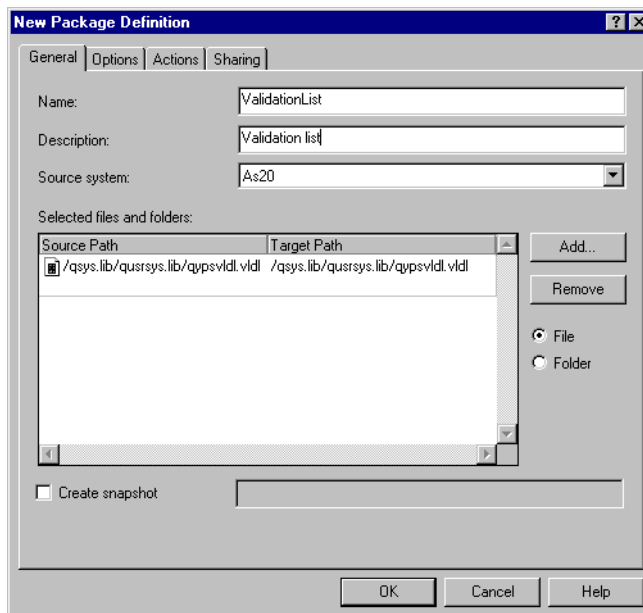


Figure 174. Package definition (general)

4. Click the **Option** tab. The window, which is shown in Figure 175 on page 207, appears. Because your target systems have the same file name already, you need to select **Replace the existing file with the file being sent**.

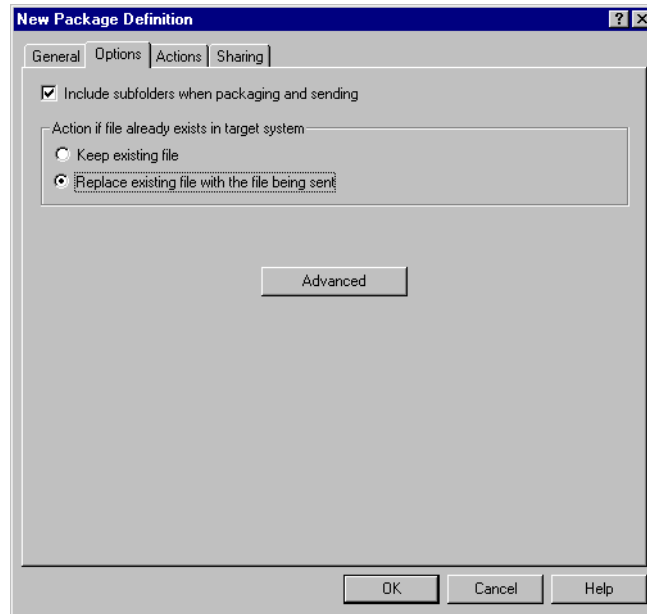


Figure 175. Package definition (option)

5. Click the **Advanced** button. You see the window that appears in Figure 176. At this window, specify whether certain differences that are encountered during a restore operation are allowed. Select **Yes** so that the object is restored.

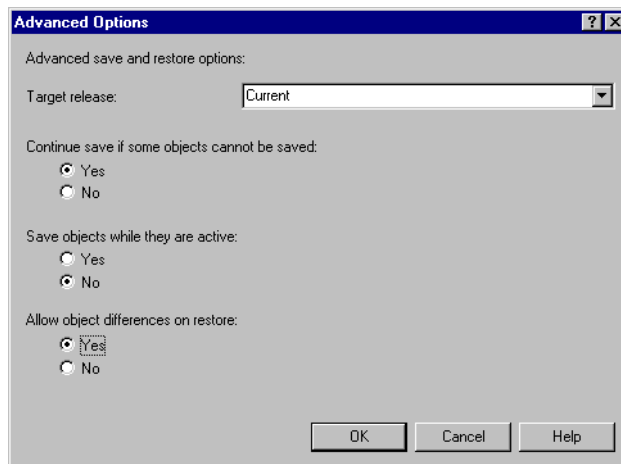


Figure 176. Package definition (Advanced Options)

6. Click **OK**. Refresh the list of package definitions to display your new package.
7. Right-click the new package (Validation List) and select **Send**. In the next window (Figure 177 on page 208), select the trusted group and click **OK**.

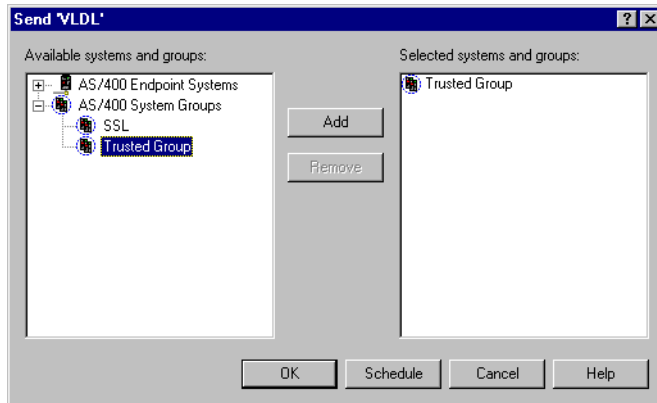


Figure 177. Select system groups for package distribution

If the function runs successfully, each endpoint system will have the correct validation list.

11.3.4.3 Central system setup for client and server authentication

Follow this process:

1. In AS/400 Operations Navigator, right-click **Management Central** and select **Properties**.
2. Click the **Connection** tab. The window as shown in Figure 170 on page 202 appears.
3. Select **Use Secure Sockets Layer (SSL)**.
4. For the Authentication level, specify **Client and Server**.
5. Click **OK** to set the value on the central system.

11.3.4.4 Endpoint systems setup for client and server authentication

Complete these tasks:

1. Right-click the trusted system group and select **Run Command**.
2. For Command to run, specify the following command:

```
CHGENVVAR ENVVAR(QYPS_AUTH_LEVEL) VALUE(2) LEVEL(*SYS)
```

11.3.4.5 Restarting Management Central on the central system

Perform these steps:

1. End the Management Central server for the central system:
 - a. In AS/400 Operations Navigator, expand **My AS/400 Connections** (or your active environment).
 - b. Expand your central system.
 - c. Expand **Network**.
 - d. Expand **Servers**.
 - e. Select **TCP/IP**.
 - f. Right-click **Management Central** and select **Stop**.
2. Start the Management Central server for the central system. Right-click **Management Central** and select **Start**.

11.3.4.6 Restarting Management Central on the endpoint systems

Perform these steps:

1. End the Management Central server for the endpoint system:
 - a. In AS/400 Operations Navigator, expand **My AS/400 Connections** (or your active environment).
 - b. Expand your endpoint system.
 - c. Expand **Network**.
 - d. Expand **Servers**.
 - e. Select **TCP/IP**.
 - f. Right-click **Management Central** and select **Stop**.
2. Start the Management Central server for the endpoint system. Right-click **Management Central** and select **Start**.

11.4 SSL and V4R3 systems

You may wonder what if you have V4R3 systems in your Management Central network. Management Central on V4R3 *does not* support SSL. Can you still use SSL for V4R4 endpoint systems in this network? The answer is *yes*. To configure Management Central to use SSL in this environment properly, it is better to discuss the two components of SSL on Management Central. They are:

- **Environment variables:** QYPS_SSL and QYPS_AUTH_LEVEL
- **TCP/IP ports used by V4R4 Management Central:** 5555, 5566 and 5577

Note

Even only with V4R4 systems, you may not want to use SSL for an entire Management Central network. A sample of this scenario would be endpoint systems that are connected through the Internet (with SSL), and endpoint systems that are connected in a secure private network (without SSL).

Depending on how you configure Management Central to use SSL, such as shown in Figure 170 on page 202, Management Central changes the environment variables and uses different TCP/IP ports. Before we discuss how you can set up Management Central for the mixed releases environment, we look at the environment variables and the TCP/IP ports used by Management Central in more detail.

11.4.1 Environment variables and TCP/IP ports for Management Central

When you configure Management Central without SSL, the environment variables QYPS_SSL and QYPS_AUTH_LEVEL are set to 0, and the port 5555 is used for Management Central connection as shown in Figure 178.

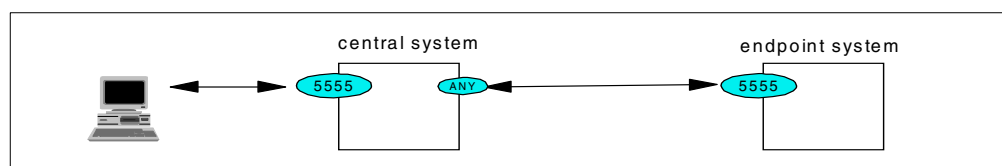


Figure 178. Non SSL connection, QYPS_SSL = 0 and QYPS_AUTH_LEVEL = 0

When you configure Management Central to use SSL, the environment variables are changed, and Management Central uses a different port. Table 16 shows the summary of which values are set to the environment variables and which port is used.

Table 16. Environment variables and TCP/IP ports

Connection	QYPS_SSL	QYPS_AUTH_LEVEL	Port number
No SSL	0	0	5555
Server authentication	1	1	5566
Client and server authentication	1	2	5577

As shown in Figure 178 on page 209, the port numbers we discuss here are for the remote ports. Management Central uses any port numbers for the local ports. The port numbers are defined in the service table of TCP/IP configuration as shown in Table 17.

Table 17. Service entry names and assigned port numbers

Service table entry name	Port number
as-mgtctrl	5555
as-mgtctrl-ss	5566
as-mgtctrl-cs	5577

The central system plays two roles for the SSL session as shown in Figure 179. One is the role as the SSL server and the other is the role as the SSL client. The role as the SSL server uses communication between the central system and Operations Navigator on the PC. To use the SSL server in this environment, you need to configure Operations Navigator to use SSL. The role as the SSL client uses communication between the central system and the endpoint systems. In this case, the endpoint system is the SSL server and the central system is the SSL client.

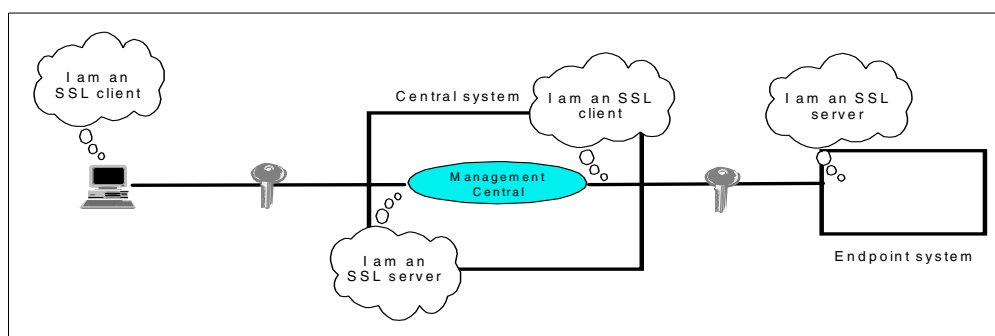


Figure 179. Two roles of the central system

11.4.1.1 Server authentication level

To use the server authentication level, you select **Use Secure Sockets Layer (SSL)** and select **Server** for the **Authentication level** in the **Connection** tab of Management Central properties on the central system. This sets the environment variables QYPS_SSL and QYPS_AUTH_LEVEL to 1. You complete the SSL

configuration on the central system. Now you need to configure the PC client and the endpoint systems to use SSL connection. Refer to 11.3, “Setup example” on page 189, for the detailed setup steps.

You need to enable SSL for your PC that is using Operations Navigator. Although the as-mgtctrl port (5555) is still opened, you cannot use the port. You have to use the as-mgtctrl-ss (5566) to communicate with the central system as shown in Figure 180. Now you need to enable the endpoint systems to use SSL. In this case, the central system tries to communicate with the as-mgtctrl-ss (5566) port of the endpoint systems because the central system is setup to use SSL. If you do not configure the endpoint systems to enable SSL, the endpoint systems do not open as-mgtctrl-ss port. To open this port, you need to change the environment variable using the following command:

```
CHGENVVAR ENVVAR(QYPS_AUTH_LEVEL) VALUE(1) LEVEL(*SYS)
```

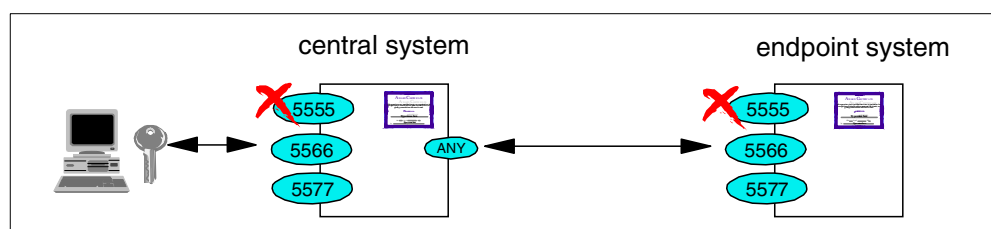


Figure 180. QYPS_SSL = 1 and QYPS_AUTH_LEVEL = 1: Server authentication

When you start the Management Central with this configuration, the QYPSSRV job opens all the ports and creates the validation list that is used in the server and client authentication level. The endpoint system sends the server certificates to the central system to populate its validation list. This allows the central system to identify the endpoint systems in its validation list. Although the central system has the validation list, Management Central does not use the validation list for the server authentication level. The validation list is used in the client and server authentication level, as discussed in the following section.

11.4.1.2 Client and server authentication level

If you want to use the stronger authentication, change the central server to use the client and server authentication. You select **Use Secure Sockets Layer (SSL)** and select **Client and server** for the **Authentication level** in the **Connection** tab of Management Central properties. This sets the environment variables QYPS_SSL to 1 and QYPS_AUTH_LEVEL to 2. For this level, the QYPSSRV job opens the three ports but accepts connections only through the as-mgtctrl-cs (5577). The central system tries to connect to the as-mgtctrl-cs (5577) port of the endpoint system. However, Operations Navigator does not support client and server authentication on SSL, which means that the Operations Navigator does not communicate to the port 5577. If the central system uses only as-mgtctrl-cs (5577) port, your client PC cannot communicate with the central system. For that reason, the central system permits you to use the 5566 port for the communication with PC as shown in Figure 181 on page 212. Endpoint systems must enable SSL with the client and server authentication level. In this case, the central system tries to communicate with the as-mgtctrl-cs (5577) port of the endpoint systems, because the central system is configured to use the client and server authentication level. Also the endpoint system must open the port as-mgtctrl-cs (5577), and must accept Management Central

connection through only this port. If you configure the endpoint systems to disable the client and server authentication level, the endpoint systems do not open as-mgtctrl-cs port. To open and accept connection only through this port, you need to change the environment variable on the endpoint systems using the following command:

```
CHGENVVAR ENVVAR (QYPS_AUTH_LEVEL) VALUE (2) LEVEL (*SYS)
```

You need to restart Management Central for this command to take effect. After establishing the connection on the port as-mgtctrl-cs (5577), the central and endpoint system authenticate each other using the validation lists. With this reason, you need to have the appropriate validation list in your system at this level.

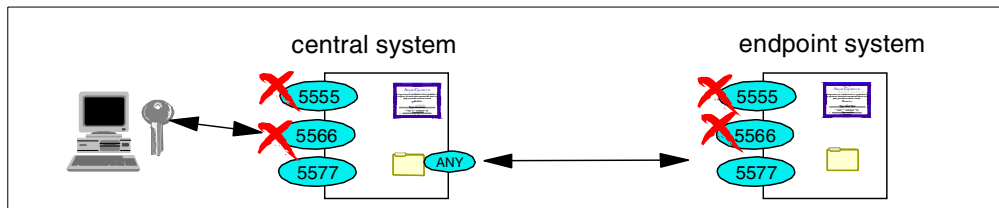


Figure 181. QYPS_SSL = 1 and QYPS_AUTH_LEVEL = 2: Client/server authentication

11.4.2 Setting up the environment variables

If you configure the central system using the server authentication level or client and server authentication level, the central system cannot communicate with the V4R3 systems. The reason is that the V4R3 systems open only the port 5555, and the central system with the server authentication or the client and server authentication level does not try the port 5555. You need to permit the central system to use the port 5555 to communicate with the V4R3 systems as shown in Figure 182.

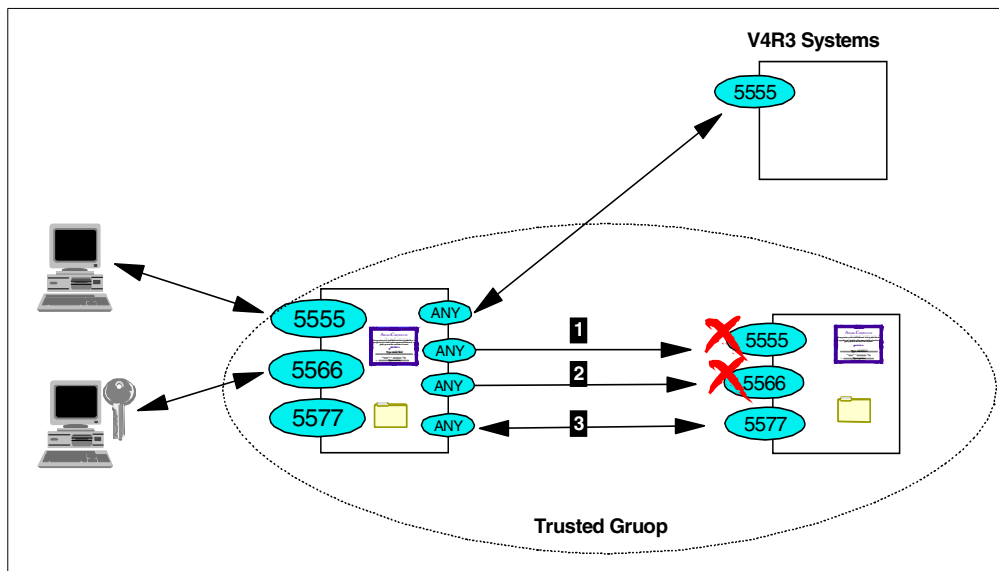


Figure 182. QYPS_SSL = 1 and QYPS_AUTH_LEVEL = 0

To make this scenario happen, change QYPS_SSL to 1 and QYPS_AUTH_LEVEL to 0 on the central system. However, you cannot configure this setting from Operations Navigator. You need to use the following command run on the central system after you configure to use the server authentication level of SSL:

```
CHGENVVAR ENVVAR(QYPS_AUTH_LEVEL) VALUE(0) LEVEL(*SYS)
```

You need to restart Management Central for this command to take effect. Changing QYPS_AUTH_LEVEL to 0 causes the central system to work as if it were in a non-SSL mode. The QYPS_SSL value is still 1. When the system cannot communicate in non-SSL mode, the central system can use SSL mode. The SSL-enabled PCs can communicate with the central system using the as-mgtctrl-ss (5566) port as shown in Figure 182 on page 212.

In this configuration, the central system tries to communicate with the as-mgtctrl (5555) port of endpoint systems first (1 in Figure 182). If that connection fails, the central system tries to connect with the as-mgtctrl-ss (5566) port of the endpoint system (2 in Figure 182). If this connection also fails, the central system tries to communicate with the as-mgtctrl-cs (5577) port of the endpoint system (3 in Figure 182). To V4R3 endpoint systems, the first try to the port 5555 succeeds. Figure 183 shows the error messages logged on the endpoint system's QYPSSRV job log when the endpoint system is configured to use the client and server authentication (set QYPS_AUTH_LEVEL to 2).

```
Connection to system AS22.ITSOROCH.IBM.COM rejected. Authentication
level 0. Reason code 99.
Connection to system AS22.ITSOROCH.IBM.COM rejected. Authentication
level 1. Reason code 99.
```

Figure 183. Error message in the QYPSSRV job

These messages show that the central system tries to connect to as-mgtctrl port and as-mgtctrl-ss port but rejected.

Table 18 shows you the environment variables that you can change by using the CHGENVVAR command. The combination with QYPS_SSL set to 1 and QYPS_AUTH_LEVEL set to 0 on the central system as shown in Table 18 can communicate with all levels of authentication including non-SSL connection. We recommend that you do not change the environment variables using CL command except for the case in this section as shown in Figure 182.

Table 18. Combination of QYPS_SSL and QYPS_AUTH_LEVEL

Endpoint \ Central	(0,0)	(0,1)	(0,2)	(1,0)	(1,1)	(1,2)
(0,0)	YES	NO	NO	YES	NO	NO
(0,1)	NO	YES	NO	YES	YES	NO
(0,2)	NO	YES	YES	YES	YES	YES
(x,y) means (QYPS_SSL, QYPS_AUTH_LEVEL).						

Note

After you changed QYPS_SSL = '1' and QYPS_AUTH_LEVEL = '0', you try to change same settings of central system by using Operations Navigator. You see the dialog box shown in Figure 184.



Figure 184. Dialog box when changed SSL setting

Click **OK**. Your central system environment variables are changed to QYPS_SSL = 0 and QYPS_AUTH_LEVEL = 0. Change those environment variables using the `CHGENVVAR` command.

Appendix A. PPP configuration sample

This appendix describes the configuration of the protocols used for connecting systems in a point-to-point manner, also known as PPP. For more information on the PPP protocols, please refer to *OS/400 TCP/IP Configuration and Reference*, SC41-5420.

A.1 Example scenario

In this appendix, we provide the configuration sample for the PPP connection in 10.3.1, "Using a switched line with PPP connection" on page 180. Figure 185 shows the sample network used in the scenario.

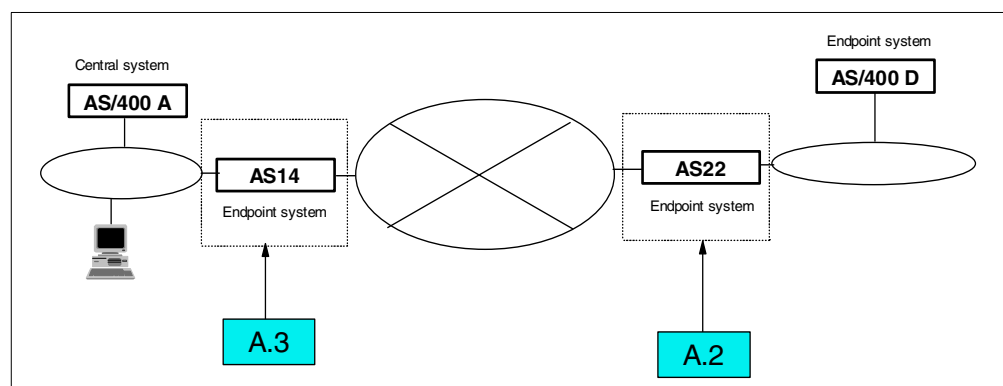


Figure 185. Sample environment

In this environment, you create the PPP profile for two systems. These are for the AS22 system and the AS14 system in Figure 185. You need to create the AS14 system, which is in the same subnet of the central system, as dial-on-demand mode. Since the AS22 is not in the same location as the central system, you need to create it as the answer mode.

A.2 AS22 configuration for switched line answer mode

Create a new profile for the PPP connection on the AS22 system as shown here:

1. Start Operations Navigator by clicking **Start->Programs->IBM AS400 Client Access->AS/400 Operations Navigator**. The **AS/400 Operations Navigator** window appears (Figure 186 on page 216).
2. Double-click on the My AS/400 Connection icon (A).
3. Double-click the system icon (B) for the AS/400 system that you are configuring. The system components appear.
4. Double-click the **Network** icon (C). The network components appear.
5. Double-click the **Point-to-Point** icon (D).
6. Right-click on the **Connection Profiles** item, and select **New Profile**.

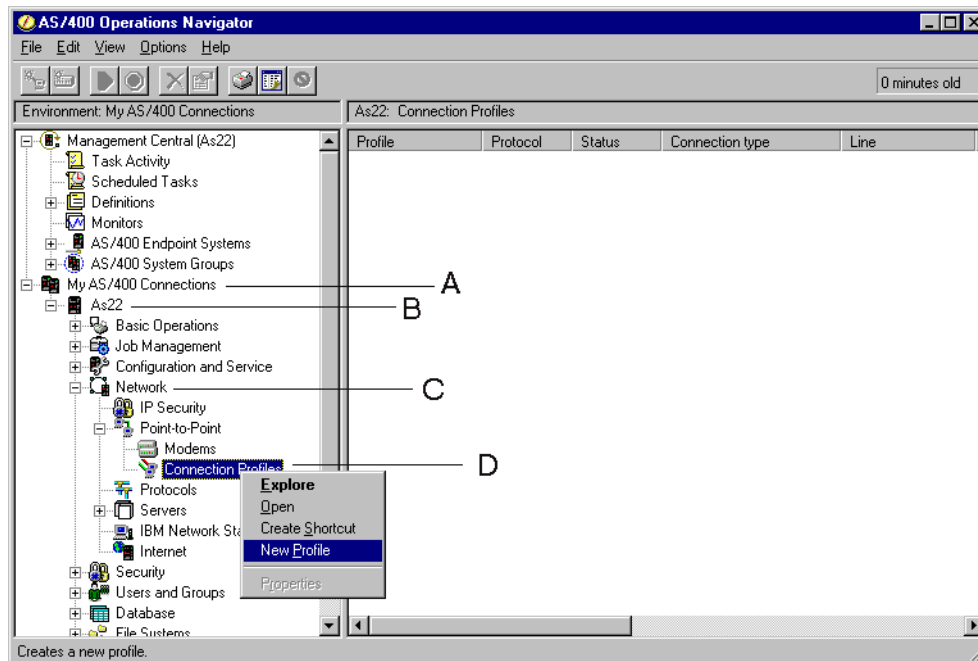


Figure 186. Creating a new PPP connection profile on AS22

7. Click on the **General** tab and change the options.

Specify the name, description, type, and mode. Select PPP for **Type**, switch line for **Mode (Line connection type)**, and Answer for **Mode (Mode type)** as shown in Figure 187.

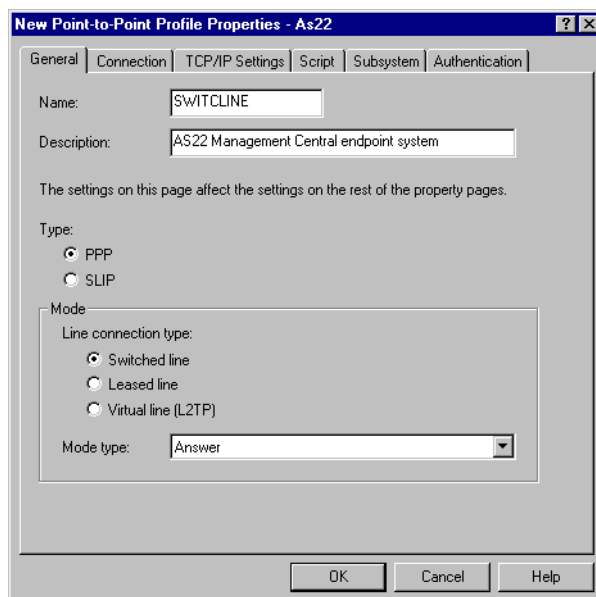


Figure 187. Specifying a name, description, and mode

8. Create a new PPP line.

- a. In the **Connection** tab, as shown in Figure 188 on page 217, specify analog line for **type of line service**, and the line name for **Name**. Click **New**. Select the hardware adapter you are using.

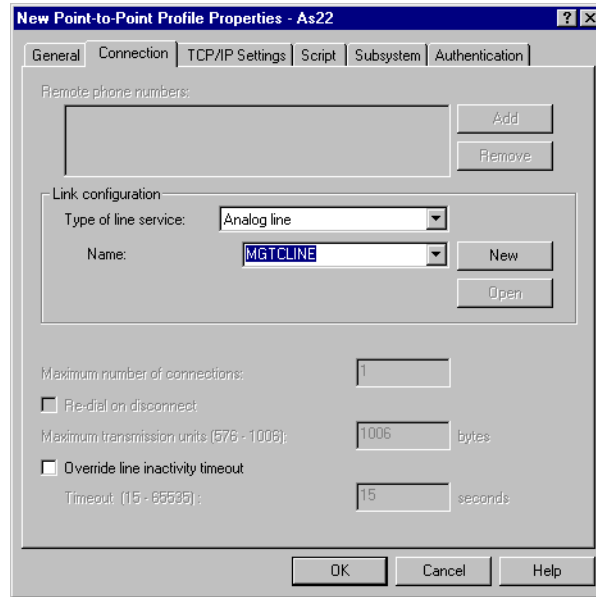


Figure 188. Creating a new PPP line for the connection

- b. You see the New Analog Line properties window as shown in Figure 189. Select the hardware resource and click the **Modem** tab.

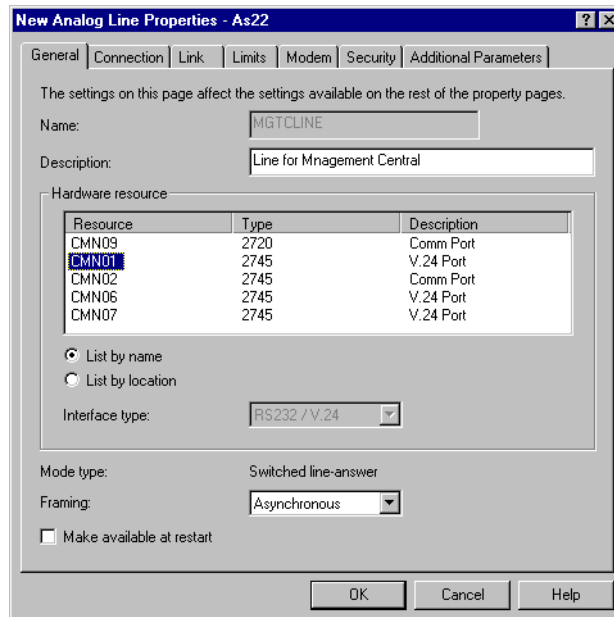


Figure 189. Selecting the connect hardware adapter

- c. In the **Modem** tab as shown in Figure 190 on page 218, specify the modem type that you are using. Click **OK** to return New Point-to-point Properties dialog box.

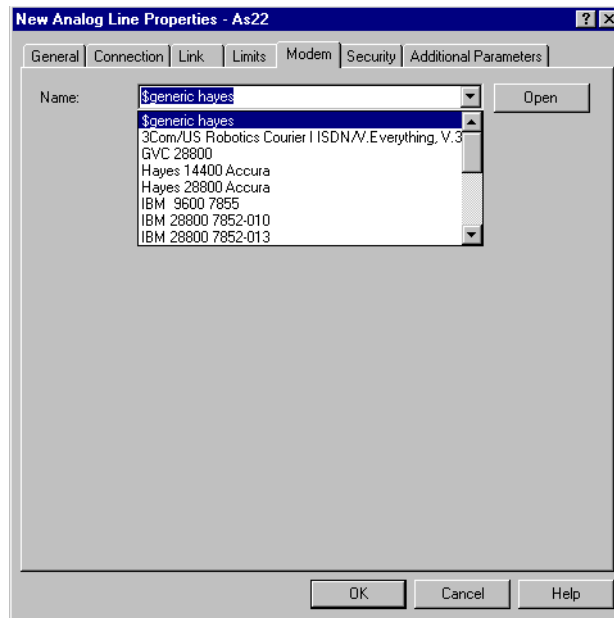


Figure 190. Selecting the correct modem

9. Change the TCP/IP setting.

- a. In the New Point-to-point Properties dialog box, select the **TCP/IP setting** tab. Specify the IP address information and click **Routing**. In this sample, we specified Route specified for **Remote IP address**.

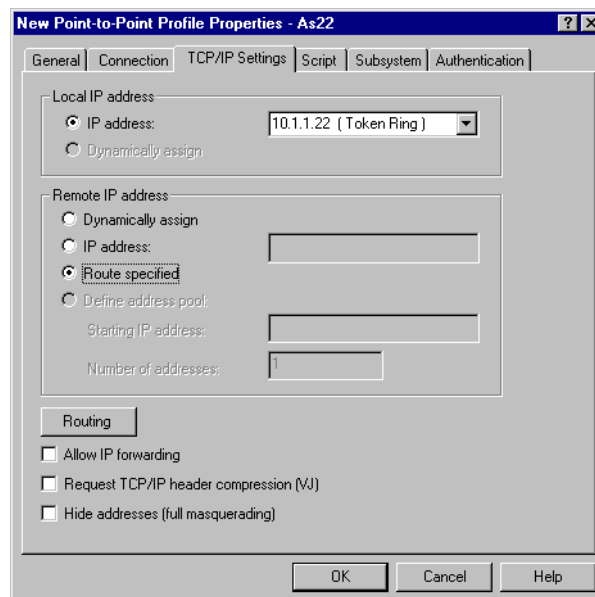


Figure 191. Specifying the local interface to use and clicking the Routing button

- b. In the SWITCHLIN Routing dialog box, click **New** to add a new entry. Specify the user information and IP address as shown in Figure 192 on page 219. Click **OK**.

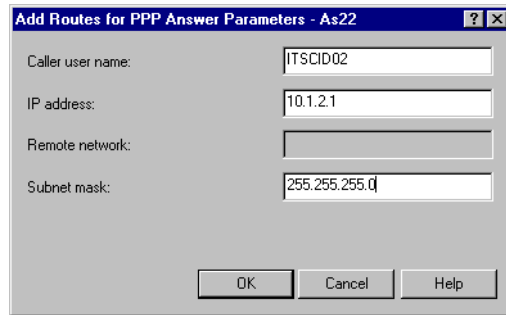


Figure 192. Adding a network for the new remote user

- c. Click **OK** to confirm the routing settings in the SWITCHLIN Routing dialog box.

10. Change authentication.

- a. In the New Point-to-point Properties dialog box, select the **Authentication** tab. Select the **Require remote system identification** and specify the name for **Validation list name**. Click **New** to create the validation list.

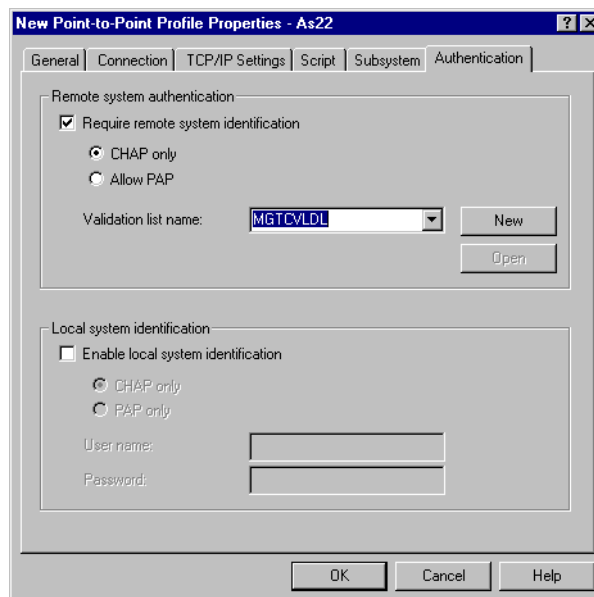


Figure 193. Creating a new validation list for the connection

- b. In the New Validation List dialog box, click **Add** to add a new remote user as shown in Figure 194.

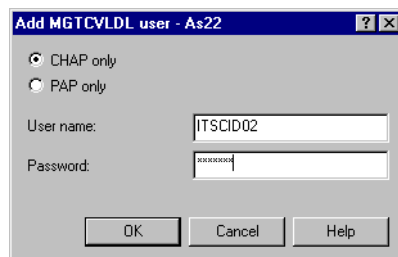


Figure 194. Entering a user and password

- c. Confirm the password and click **OK**. You return to the New Validation List dialog box. Click **OK** to confirm the creation of the validation list.
- d. In the New Point-to-point Properties dialog box, click **OK** to finish these steps.

A.3 AS14 configuration for switched line dial-on-demand mode

You configure the PPP connection for the AS14 system almost same as described in the previous section. The difference in the process is shown here:

1. Start Operations Navigator by clicking **Start->Programs->IBM AS400 Client Access->AS/400 Operations Navigator**. The AS/400 Operations Navigator window appears (Figure 186 on page 216).
2. Double-click on the My AS/400 Connection icon (**A**) as shown in Figure 195.
3. Double-click the system icon (**B**) for the AS/400 system that you are configuring. The system components appear.
4. Double-click the **Network** icon (**C**). The network components appear.
5. Double-click the **Point-to-Point** icon (**D**).
6. Right-click on the **Connection Profiles** item, and select **New Profile**.

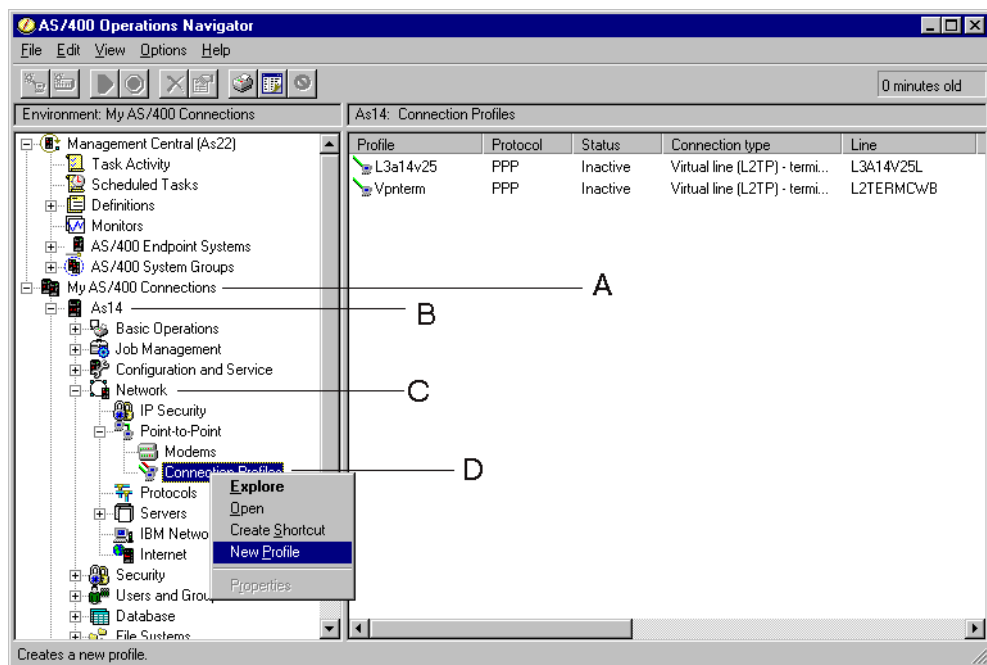


Figure 195. Creating a new PPP connection on the AS14 system

7. Click the **General** tabs and change the options.

Specify the name, description, type, and mode. Select PPP for **Type**, switch line for **Mode (Line connection type)**, and Dial-on-demand (dial only) for **Mode (Mode type)** as shown in Figure 196 on page 221.

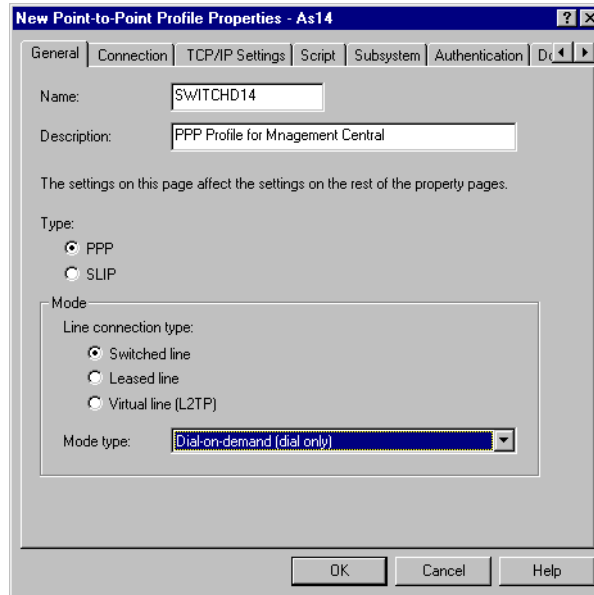


Figure 196. Remember to specify dial-on-demand

8. Create a new PPP line.

- a. In the **Connection** tab as shown in Figure 197, add up to three remote phone numbers. If additional numbers are required to reach an outside phone line, ensure that you include them in the remote phone number. Also, specify analog line for **type of line service** and the line name for **Name**. Click **New**. Select the hardware adapter you are using.

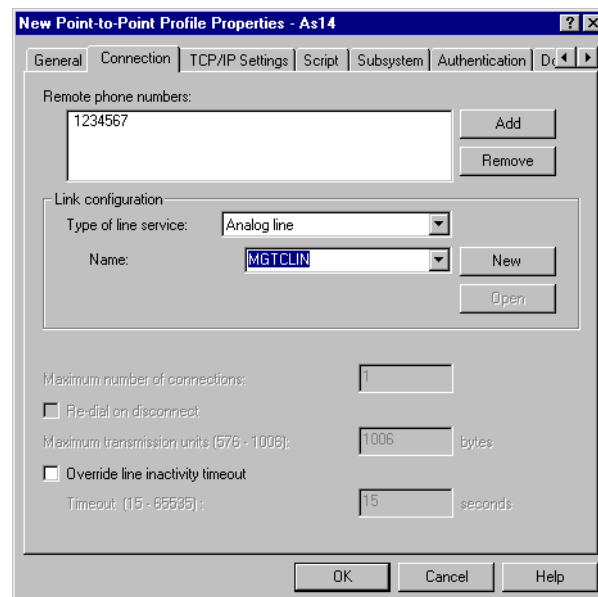


Figure 197. Creating a new PPP line for the connection

In Figure 197, you can see that the PPP connection will drop the PPP connection after being idle for 60 seconds.

- b. The New Analog Line properties dialog box appears the same as shown in Figure 189 on page 217. Select the hardware resource and click the **Modem** tab.
 - c. In the **Modem** tab as shown in Figure 190 on page 218, specify the modem type that you are using. Click **OK** to return New Point-to-point Properties dialog box.
9. Change the TCP/IP setting.

In the New Point-to-point Properties dialog box, select the **TCP/IP setting** tab. Specify the IP address information as shown in Table 19.

Table 19. TCP/IP setting IP address

Local IP address	Remote IP address
10.1.2.1	10.1.1.21

10. Change the authentication.

In the New Point-to-point Properties dialog box, select the **Authentication** tab. Create a validation list the same as you created for the AS22 system.

Appendix B. Special notices

This publication is intended to help system administrators to manage the AS/400 systems. The information in this publication is not intended as the specification of any programming interfaces that are provided by Management Central.

References in this publication to IBM products, programs or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent program that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program or service.

Information in this book was developed in conjunction with use of the equipment specified, and is limited in application to those specific hardware and software products and levels.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10504-1785.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact IBM Corporation, Dept. 600A, Mail Drop 1329, Somers, NY 10589 USA.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The information contained in this document has not been submitted to any formal IBM test and is distributed AS IS. The information about non-IBM ("vendor") products in this manual has been supplied by the vendor and IBM assumes no responsibility for its accuracy or completeness. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

Any pointers in this publication to external Web sites are provided for convenience only and do not in any manner serve as an endorsement of these Web sites.

Any performance data contained in this document was determined in a controlled environment, and therefore, the results that may be obtained in other operating environments may vary significantly. Users of this document should verify the applicable data for their specific environment.

Reference to PTF numbers that have not been released through the normal distribution process does not imply general availability. The purpose of including these reference numbers is to alert IBM customers to specific information relative

to the implementation of the PTF when it becomes available to each customer according to the normal IBM PTF distribution process.

The following terms are trademarks of the International Business Machines Corporation in the United States and/or other countries:

AFP	APPN
AS/400	AT
CT	IBM ®
Netfinity	NetView
OS/2	OS/400
RS/6000	SP
System/390	SystemView
XT	400

The following terms are trademarks of other companies:

C-bus is a trademark of Corollary, Inc. in the United States and/or other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and/or other countries.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States and/or other countries.

PC Direct is a trademark of Ziff Communications Company in the United States and/or other countries and is used by IBM Corporation under license.

ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks of Intel Corporation in the United States and/or other countries. (For a complete list of Intel trademarks see www.intel.com/tradmarx.htm)

UNIX is a registered trademark in the United States and/or other countries licensed exclusively through X/Open Company Limited.

SET and the SET logo are trademarks owned by SET Secure Electronic Transaction LLC.

Other company, product, and service names may be trademarks or service marks of others.

Appendix C. Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

C.1 International Technical Support Organization publications

For information on ordering these ITSO publications see “How to get ITSO redbooks” on page 227.

- *AS/400 Client Access Express for Windows: Implementing V4R4M0*, SG24-5191
- *IBM Firewall for AS/400 V4R3: VPN and NAT Support*, SG24-5376

C.2 Redbooks on CD-ROM

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at <http://www.redbooks.ibm.com/> for information about all the CD-ROMs offered, updates and formats.

CD-ROM Title	Collection Kit Number
System/390 Redbooks Collection	SK2T-2177
Networking and Systems Management Redbooks Collection	SK2T-6022
Transaction Processing and Data Management Redbooks Collection	SK2T-8038
Lotus Redbooks Collection	SK2T-8039
Tivoli Redbooks Collection	SK2T-8044
AS/400 Redbooks Collection	SK2T-2849
Netfinity Hardware and Software Redbooks Collection	SK2T-8046
RS/6000 Redbooks Collection (BkMgr Format)	SK2T-8040
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037
IBM Enterprise Storage and Systems Management Solutions	SK3T-3694

C.3 Other publications

These publications are also relevant as further information sources:

- *Client Access Express for Windows - Setup*, SC41-5507
- *Performance Tools V4R2*, SC41-5340
- *Performance Management/400e V4R4*, SC41-5347
- *OS/400 TCP/IP Configuration and Reference V4R4*, SC41-5420
- *Work Management V4R4*, SC41-5306

You can also refer to the AS/400 Information Center on the Web at:
<http://publib.boulder.ibm.com/html/as400/infocenter.html>

How to get ITSO redbooks

This section explains how both customers and IBM employees can find out about ITSO redbooks, redpieces, and CD-ROMs. A form for ordering books and CD-ROMs by fax or e-mail is also provided.

- **Redbooks Web Site** <http://www.redbooks.ibm.com/>

Search for, view, download, or order hardcopy/CD-ROM redbooks from the redbooks Web site. Also read redpieces and download additional materials (code samples or diskette/CD-ROM images) from this redbooks site.

Redpieces are redbooks in progress; not all redbooks become redpieces and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

- **E-mail Orders**

Send orders by e-mail including information from the redbooks fax order form to:

In United States	e-mail address usib6fpl@ibmmail.com
Outside North America	Contact information is in the "How to Order" section at this site: http://www.elink.ibm.link.ibm.com/pbl/pbl/

- **Telephone Orders**

United States (toll free)	1-800-879-2755
Canada (toll free)	1-800-IBM-4YOU
Outside North America	Country coordinator phone number is in the "How to Order" section at this site: http://www.elink.ibm.link.ibm.com/pbl/pbl/

- **Fax Orders**

United States (toll free)	1-800-445-9269
Canada	1-403-267-4455
Outside North America	Fax phone number is in the "How to Order" section at this site: http://www.elink.ibm.link.ibm.com/pbl/pbl/

This information was current at the time of publication, but is continually subject to change. The latest information may be found at the redbooks Web site.

IBM Intranet for Employees

IBM employees may register for information on workshops, residencies, and redbooks by accessing the IBM Intranet Web site at <http://w3.itso.ibm.com/> and clicking the ITSO Mailing List button. Look in the Materials repository for workshops, presentations, papers, and Web pages developed and written by the ITSO technical professionals; click the Additional Materials button. Employees may access MyNews at <http://w3.ibm.com/> for redbook, residency, and workshop announcements.

IBM Redbook fax order form

Please send me the following:

[illegible]

First name	Last name
------------	-----------

Company

Address _____

City	Postal code	Country
------	-------------	---------

Telephone number	Telefax number	VAT number
------------------	----------------	------------

☐ Invoice to customer number _____☐ Credit card number _____

Credit card expiration date	Card issued to	Signature
-----------------------------	----------------	-----------

We accept American Express, Diners, Eurocard, Master Card, and Visa. Payment by credit card not available in all countries. Signature mandatory for credit card payment.

Index

Numerics

5250 emulator 5
5769-JS1 163
5769-PT1 129

A

actions 66
Advanced Job Scheduler for AS/400 4
AFP Workbench 37
AS/400 COMPUTERS 178
as-mgtctrl 210
as-mgtctrl-cs 210
as-mgtctrl-ss 210
Available 126
 status of fix 126

B

backup system 3
Best/1 129

C

CA 188
central system 2, 3
 changing 14
 setting up 12
Certificate Authority 188
CHGENVVAR 176
Client Access Express 11
 Custom Install 12
 Full Install 12
 Typical Install 12
client and server authentication 188
collection object 129, 133
collection parameters 151
Collection Services 1, 129
 collection interval 131
 create database 132
 custom 133
 customized profile 136
 frequency 131
 minimum 132
 overhead 156
 retention period 131
 standard 133
 standard plus protocol 133
 synchronize 131
command
 options 40
 schedule 43
 sharing 41
 syntax 40
corequisite 109
Cover letter 126
 status of fix 126
CWBCOSSL 200

cycle 131

D

Damaged 126
 status of fix 126
DEFAULT.KDB 195
DEFAULT.RDB 195
DEFAULT.STH 195
definition 39
 command 39
dial-on-demand 220
directory server 180
Discover Systems 16, 176
 FTP 176
 SNMP 176

E

ECS 100
Electronic Customer Support 100
Enable Threshold 70
endpoint systems 3, 15
 adding 16
 deleting 17
 removing 18
Event Log 66, 81
expiration date 157

F

firewall 180, 183, 187
fix management 4
fixes 95, 99
 cover letters 123
 install 102
 remove 119
 save file 99, 107
 save files 123
 sort 103
FTP 51

G

graph line colors 79
Greenwich mean time 14

I

IBM Performance Investigator PRPQ 16, 75
IFS 52
inquiry messages 40
Install at next restart 124, 126
 status of fix 126
Install permanently at next restart 124, 126
 status of fix 126
Installed 126
 status of fix 126
Installed - action pending 126
Installed permanently 126
 status of fix 126
Installed permanently - action pending 126

- Installed Products 93
- Internet 180, 183
- intranet CA 191
- inventory
 - Export 90
 - Search 90
- inventory collection 1, 3, 87
 - Configuration and Service 97
 - export 87
 - last collection date 88
 - Operations Navigator 97
 - refresh 88

J

- job log 21
 - Management Central 21
 - task 35
- job stream 48, 59

L

- LDAP 178
 - Publish 179
- learning mode 201
- LODPTF 100

M

- Managed System Services for AS/400 8
- Management Central 1, 205
 - installing 11
 - overview 1
 - primary objectives of 1
- metrics 63
 - Collection interval 68
 - Display time 69
 - Maximum graphing value 69
 - Retention period 68
- model system 2, 3, 112, 113
- monitor 63
 - creating 63
 - status 74

O

- On order 127

P

- package definition 51
- packaging and sending objects 1, 51
- performance 129
- performance data 129
- Performance Tools for AS/400 129
- PM/400 159
- point-to-point protocol (PPP) 180
- port number 174
- PPP 180, 215
- prerequisite 109
- PTF 4, 99

Q

- QIBM_OS400_QYPS_MGTCTRL_SVR 191, 194
- QPMACLCT 173
- QPMASERV 173
- QSTGLOWACN 83
- QSTGLOWLMT 83
- QSTRUPPGM 146
- QSYS.LIB 52
- QTIME 59, 150
- QUTCOFFSET 14, 45, 59, 150
- QYIVPUBAGT 173
- QYPSAPI 173
- QYPSBDTSVR 173
- QYPSDISCOV 173
- QYPSGETINV 173
- QYPSPFRCOL 173
- QYPSPMCMD 173
- QYSPRC 173
- QYPSPTF 173
- QYPSRMTCM 173
- QYPSRV 19, 173
- QYPSSTRC 146
- QYPSSTRS 13, 75
- QYPSVLDL 188

R

- reset 66
- running commands 1, 39

S

- scheduler 4
- Secure Sockets Layer 175, 187
- Selective Setup 12
- Server authentication 188
- server mapper 174
- snapshot 51, 53, 54
- software fix management 1
- source system 2, 3
- SSL 175, 187
- STRPFRMON 129
- STRTCPSVR 173
- Superseded 127
 - status of fix 127
- Supported only 127
 - status of fix 127
- Supported Products 93
- system group 3, 17
- System Manager for AS/400 8

T

- target path 52
- task 27
 - activities 35
 - collecting inventory 87
 - job log 35
 - status 35
- threshold 63, 66
- threshold commands 69

- threshold indicator 79
- time zone 15, 150
- Tivoli Enterprise 9
- Tivoli IT Director 9
- trace 162
- TRCINT 162
- trigger 66
- Trusted Group 188

U

- Under DN 180
- Uninstall at next restart 124, 127
 - status of fix 127
- Uninstall permanently at next restart 124, 127
 - status of fix 127
- Uninstalled - action pending 127
 - status of fix 127
- Uninstalled permanently - action pending 127
 - status of fix 127

V

- V4R3 16, 75, 209
- V4R4 16
- validation list 188, 205

W

- WAN 180
- wizard 99
- WRKJOBSCDE 31

ITSO redbook evaluation

Management Central: A Smart Way to Manage AS/400 Systems
SG24-5407-00

Your feedback is very important to help us maintain the quality of ITSO redbooks. **Please complete this questionnaire and return it using one of the following methods:**

- Use the online evaluation form found at <http://www.redbooks.ibm.com/>
- Fax this form to: USA International Access Code + 1 914 432 8264
- Send your comments in an Internet note to redbook@us.ibm.com

Which of the following best describes you?

☐ **Customer** ☐ **Business Partner** ☐ **Solution Developer** ☐ **IBM employee**
☐ **None of the above**

Please rate your overall satisfaction with this book using the scale:
(1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor)

Overall Satisfaction _____

Please answer the following questions:

Was this redbook published in time for your needs? Yes___ No___

If no, please explain:

What other redbooks would you like to see published?

Comments/Suggestions: (THANK YOU FOR YOUR FEEDBACK!)

SG24-5407-00

Printed in the U.S.A.

