

Session: C64



Operations Navigator - Advanced

IBM @server iSeries 400 and AS/400e

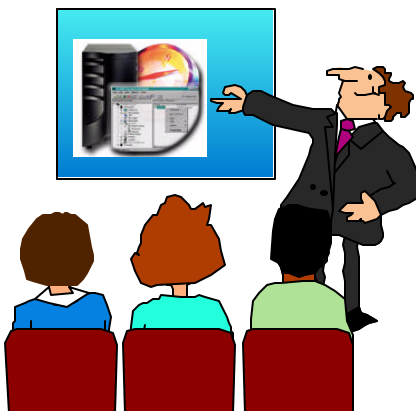
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Our goals

- Modernize the user interface
- Leverage the latest user interface technology
- Easy administration of systems in a network



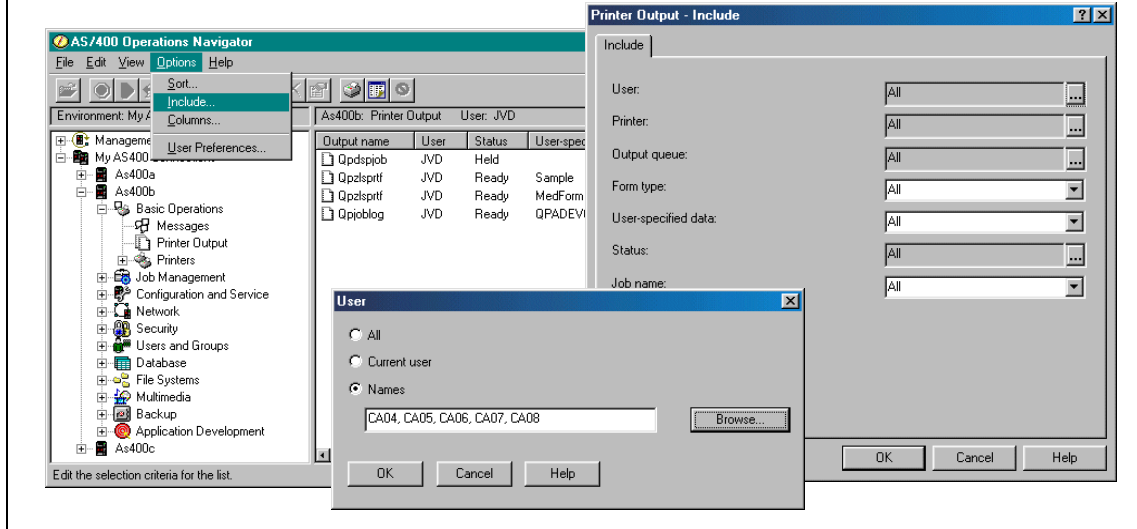
Visit the Operations Navigator web site!
ibm.com/eserver/iseries/oper_nav

Operations Navigator Adds Ease of Use

- Leverage your user's Windows skills
 - ▶ Explore view, properties sheets, context menus, drag and drop
- Reduce need to learn command interface
 - ▶ Easier to understand terminology / concepts
 - ▶ Graphics - not just icons
 - ▶ Wizards
 - ▶ High degree of function integration, not standalone utilities

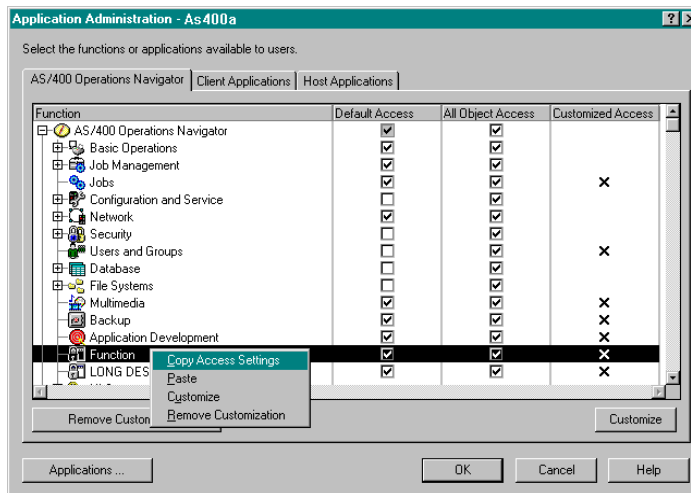
Operations Navigator Makes Users Productive

- Lists of objects give rich information
- Customized views (Include, Columns, Sort)
- Desktop shortcuts to frequently used functions
- AutoRefresh, list print, find in list, drag and drop capability
- Management Central—manage multiple systems as easy as one



Operations Navigator Is Easy to Control

- **Granular install / Selective Setup**
 - Capability to give users only what they need
- **Application Administration**
 - Provides runtime access restrictions to OpNav (and other) functions
- **Client Access Express policies**
 - Prevent install or running Operations Navigator



Plug-in Support

- Allows anyone to add their own applications to Operations Navigator
- Use Client Access Install to distribute your application
- Plug-ins can be written in Java, C++, or Visual Basic
- Documentation and sample application in the Client Access Express Toolkit



For more information visit:

ibm.com/eserver/iseries/oper_nav



Use Plug-in Support to add your application to Operations Navigator

Additional Information

- **Operations Navigator website:**
 - Visit our home page at www.iSeries.ibm.com/oper_nav
- **Redbooks (www.redbooks.ibm.com):**
 - Managing AS/400 V4R4 with Operations Navigator, SG24-5646-00
 - Management Central: A Smart Way to Manage AS/400 Systems, SG24-5407-00
 - AS/400 Client Access Express for Windows: Implementing V4R4M0, SG24-5191-00
- **iSeries Information Center**
 - Repository of iSeries and AS/400 documentation. Installed locally via the Information Center CD, or accessed on the Internet at www.iSeries.ibm.com/infocenter
- **Technical Studio for AS/400: Operations Navigator Workshop**
 - Technical Studio contains technical information on topics such as Client Access, Operations Navigator, Web Builder's Workshop, Domino for AS/400 and more. The information for Operations navigator can be accessed at: www.as400.ibm.com/tstudio/opsnav/guiframe.htm
- **INFO APARs**
 - Available at our web site, these will have information on known problems and PTFs required.
- **Client Access information**
 - Available at www.iSeries.ibm.com/clientaccess

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Getting Started

What Functions are Included

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V4R4 Enhancements

- **New Connections GUI**
- **NetServer Integration and Ease of Use**
 - Direct File and Printer share management
 - List of File Shares
- **File System**
 - Create/delete/rename folders and objects
 - Cut/copy/paste and drag/drop to AS/400s or PC
- **Database**
 - Create, save, run SQL Scripts
 - Complex object support (large objects, datalinks, user-defined functions)
 - SQL Performance monitor
- **TCP/IP**
 - Virtual Private Networking
 - More connectivity options for IP interfaces and PPP
- **View and Manage Server Jobs**
- **Support for Java and Visual Basic plug-ins**
- **Application Administration**
 - Plug-ins supported
 - Client Access Express functions



V4R4 Management Central Enhancements

- **New Look**

- Better integrated with the rest of Operations Navigator

- **New Functions**

- Remote Operations
- Inventory Collection
- Manage Software Fixes
- Package and Object Distribution
- Performance Collection Services
- Job Scheduler GUI

- **Base Functions**

- Multiple System Management
- Manage using System Groups
- Real-time Performance Monitors

- **Plug-Ins**

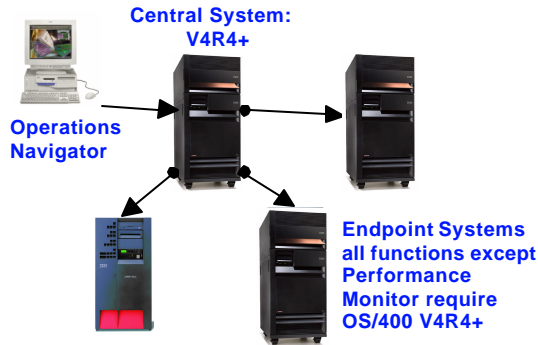
- IBM Advanced Job Scheduler

- **Operations Navigator**

- Performs one operation to one AS/400 system

- **Management Central**

- Performs one operation to multiple AS/400 systems
- Graphical client talks to central system, then central system fans out request to other systems



V4R5 Enhancements



- **Disk Unit Management**

- Add disk unit wizard
- Properties, status, capacity, location

- **Database enhancements**

- Visual Explain
- Table enhancements -- view locked rows, table description (DSPFD)
- View SQL for a job

- **Integrated Netfinity Server Management**

- View Windows servers, status, & properties

- **Management Central enhancements**

- New real-time monitoring metrics
- CPU Utilization (Interactive Feature)
- CPU Utilization (Database Capability)
- CPU Utilization (Secondary Workloads)

Attribute	Value
Table name, base table name, in...	
Name of Table Being Queried	QZG0000063
Library of Table Being Queried	QGPL
Estimated Processing Time	1
Estimated Rows Selected	2
Estimated Entries Using Key Positioning	3
Estimated processing time and ta...	
Estimated Processing Time	1
Estimated Cumulative Time	1
Total Rows in Table	75

General	Status	Capacity	Location
Tower			1
Disk unit position:			9A
Controller			1
IO processor:			1

Functions Available by OS/400 Release

With the latest version of Operations Navigator, available in Client Access Express, V4R5M0

Function	Description	V4R2	V4R3	V4R4	V4R5
Management Central	Manage groups of AS/400 systems		X	X	X
Performance Monitor	Monitor AS/400 performance		X	X	X
Commands	Run and save commands			X	X
Packages	Create, save, and distribute objects			X	X
Hardware / Software inventory	Collect and display inventory			X	X
Scheduling	Schedule Management Central tasks			X	X
Fixes Inventory	Manage software fixes (PTFs)			X	X
Collection Services	Collect performance data			X	X
Basic Operations		X	X	X	X
Messages	Work with AS/400 messages	X	X	X	X
Printer Output	Work with AS/400 printer output	X	X	X	X
Printers	Manage AS/400 printers	X	X	X	X
Job Management		X	X	X	X
Jobs	Work with AS/400 jobs	X	X	X	X
Server Jobs	Work with Server jobs			X	X
Configuration and Service		X	X	X	X
Hardware Inventory	Display the hardware on the AS/400 system	X	X	X	X
Disk Management	Display disk unit status and properties, add units, capacity balancing formatting			X	X
Disk unit status, capacity, add disk unit				X	X
Software Inventory	Display the software for the AS/400 system			X	X
Network		X	X	X	X
Internet applications	Access AS/400 Internet applications	X	X	X	X
Point-to-Point communication	Manage AS/400 point-to-point communication	X	X	X	X
TCP/IP Setup	Set up and manage AS/400 TCP/IP interfaces	X	X	X	X
Server Management, including DNS, DHCP, AS/400 NetServer, NFS, DCE, Directory server (LDAP)	Set up and monitor AS/400 server applications	X	X	X	X
IP Security	Setup and manage IP Security		X	X	X
VPN	Setup virtual private networking			X	X
Windows Server (Int. Netfinity Server)				X	X
Server Management	Start/stop Windows servers, status			X	X
Security, including Security Policies	Maintain AS/400 security and auditing policies	X	X	X	X
Security Configuration Wizard	Configure AS/400 security	X	X	X	X
Users and Groups	Manage AS/400 users and user groups	X	X	X	X
Database	DB2/400 Administration	X	X	X	X
Tables, views, journals, indexes, aliases	Manage DB2/400 objects	X	X	X	X
Run SQL Scripts	Create, save, and run SQL scripts	X	X	X	X
SQL Performance Monitors	Collect and view SQL performance data	X**	X**	X	X
Complex objects, procedures, functions	Work with DB2/400 complex objects			X	X
Visual Explain	Visual description of queries			X	X
File Systems		X	X	X	X
Integrated file system	Work with the AS/400 integrated file system	X	X	X	X
File Shares	List and work with AS/400 NetServer File Shares			X	X
Multimedia	Store and share multimedia data on the AS/400	X	X	X	X
Backup	Schedule backups of AS/400 data	X	X	X	X
Application Development	Work with AS/400 application development tools	X	X	X	X
Plug-in Support (C++)	Add new functions, enhance shipped functions	X	X	X	X
Support for Java, Visual Basic plug-ins	Create plug-ins in Java or VB	X	X	X	X
Application Administration	Control user's access to application functions.		X	X	X

* Requires a V4R4 central server
 ** With OS/400 PTF SF51676

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Getting Started

Packaging and Installation

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Packaging

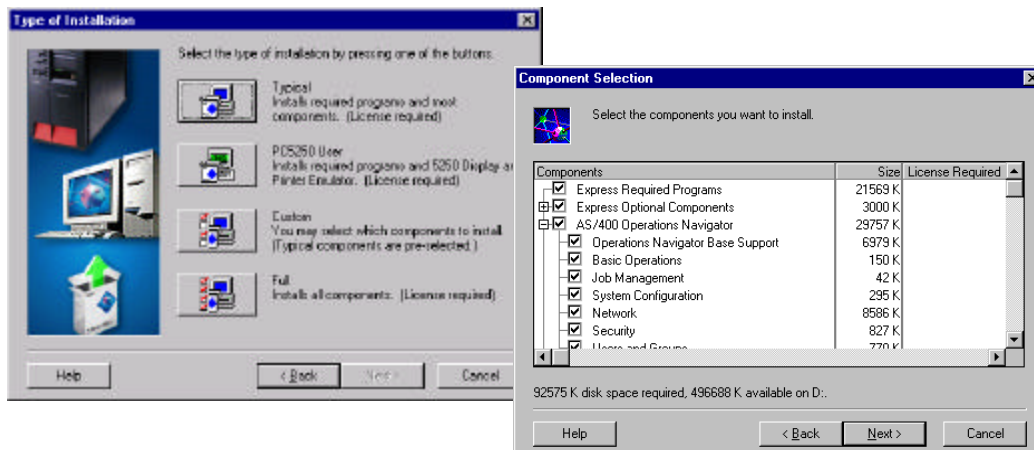
- **OS/400 releases and corresponding Client Access releases:**

OS/400 Version	Client Access Version	Client Access Product
V3R7	V3R1M2	5763-XD1
V4R2	V3R1M3	5763-XD1
V4R3	V3R2M0	5763-XD1
V4R4	V4R4M0 (Express)	5769-XE1
V4R5	V4R5M0 (Express)	5769-XE1

- **Operations Navigator is an optionally installed component of Client Access for Windows 95/NT and Client Access Express for Windows**
- **For V3R7-V4R3 systems, it's available by installing Client Access for Windows 95/NT (5763-XD1)**
 - Use the Client Access CD, the Operations Navigator CD, or for V4R2 and later install from the AS/400 using NetServer
- **For V4R4 and V4R5, Client Access Express for Windows is shipped with OS/400**
 - Install using the Client Access CD or NetServer
- **Does not require a Client Access license**
- **As of V4R4, enhancements to Operations Navigator are delivered in Client Access Express only**

Install Starting in V4R4

- **Operations Navigator components are selectively installable**
- **Basic Operations installed with Client Access Typical Install (Messages, Printer output, Printers)**
- **Additional components installed using Client Access Custom Install or Selective Setup after install**



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Important Functions

Management Central

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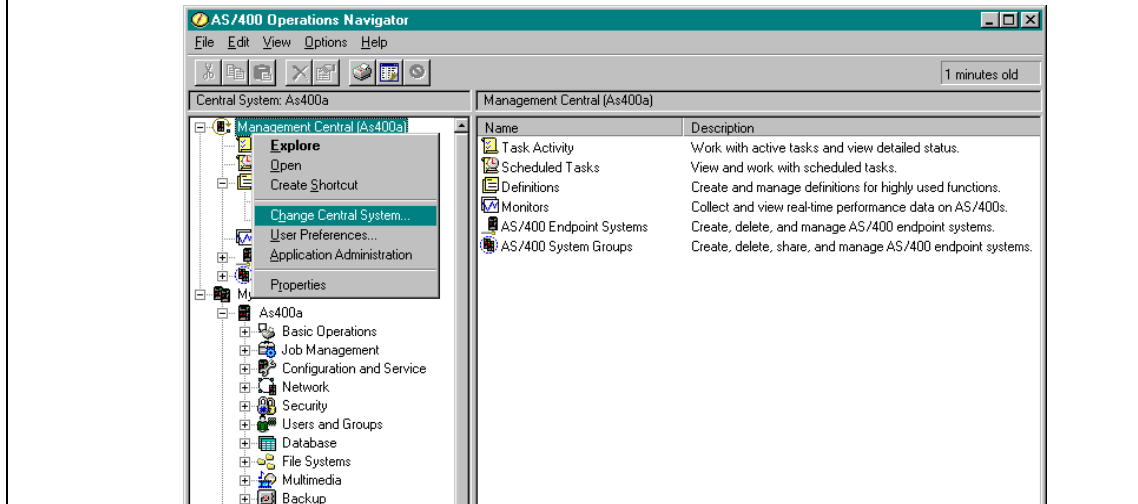
Management Central Basic Concepts

- **You can have one or more central systems in your AS/400 network; from within Operations Navigator you use one at a time**
- **AS/400s connected to the central system can be managed; these are referred to as Endpoints**
 - The central server gets a request from the Operations Navigator PC and fans it out to the targeted systems
 - Status and any results flow back from the endpoints to the central server
 - The Operations Navigator PC gets status and results from the central server
 - Tasks can be long-running or scheduled, PC is not required to wait for tasks to complete
- **Endpoints can be collected into System Groups for convenience**
 - Can operate against a group with one request
- **Functions available**
 - Real-time performance monitors (available in V4R3)
 - Remote Operations
 - Inventory Collection
 - Manage Software Fixes
 - Package and Object Distribution
 - Performance Collection Services
 - Job Scheduler GUI (integrated with the above)



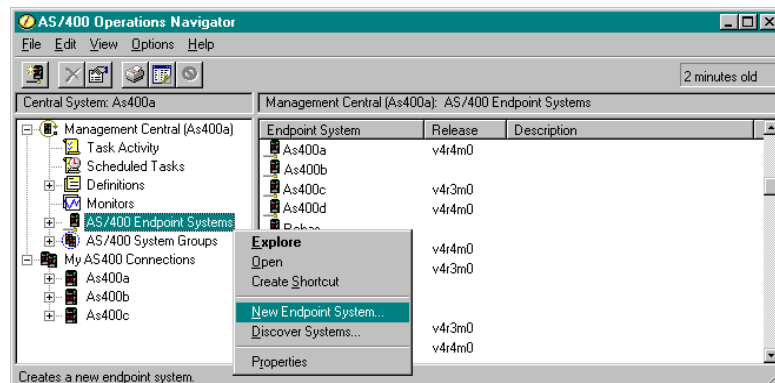
Integration with Main Window

- **Management central was launched into a separate window in V4R3**
 - It included only real-time performance monitors
- **Now all MC functions are available in the main window; functions are available under the Management Central folder and in the rest of the tree where appropriate**



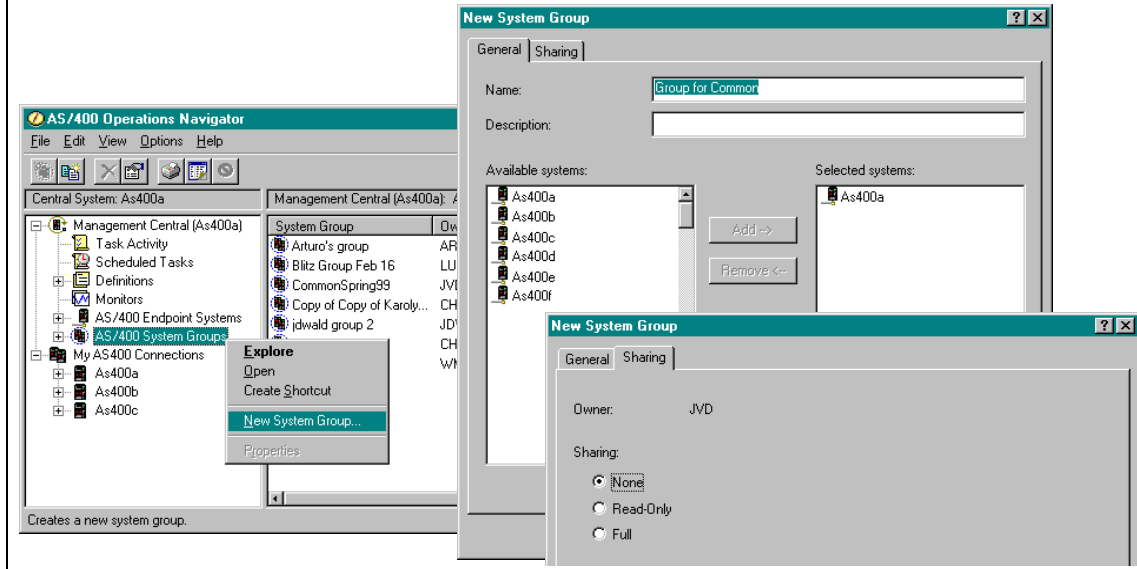
Defining Endpoints

- **Endpoints can be discovered with TCP/IP or entered manually**
- **Available to all Management Central users**



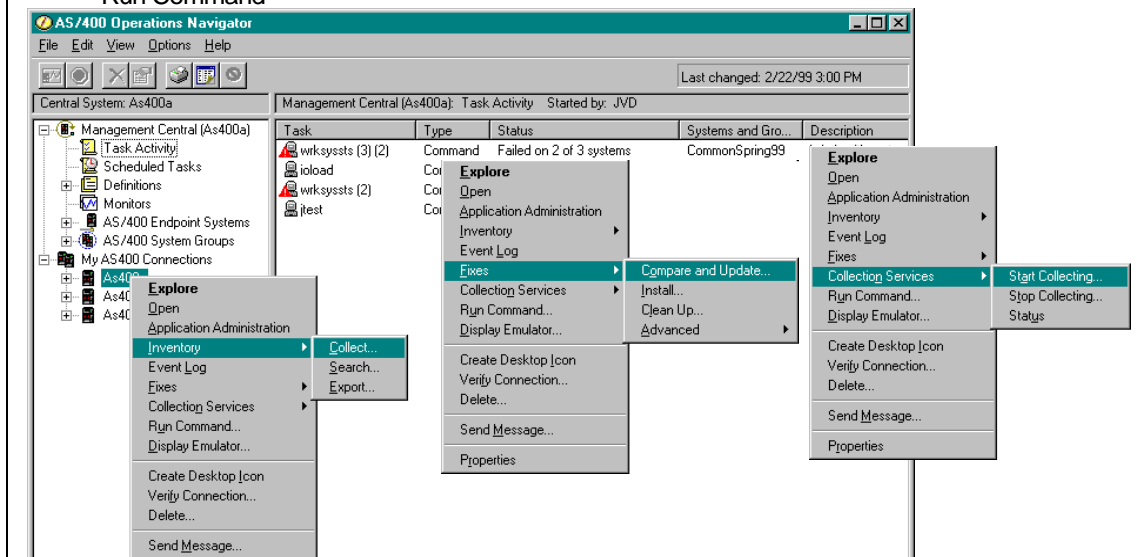
System Groups

- Groups can be created out of Endpoints to contain any subset of endpoints you desire
- Groups can be shared with other users, but are not shared by default



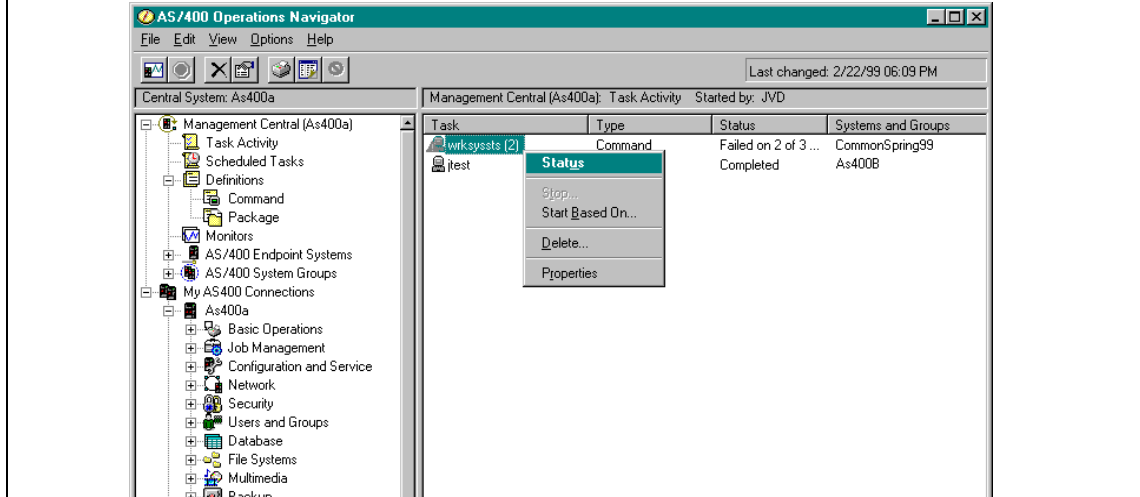
System/Endpoint Menus

- Systems and Endpoints all support the following menu options:
 - Inventory
 - Event Log
 - Fixes
 - Collection Services
 - Run Command



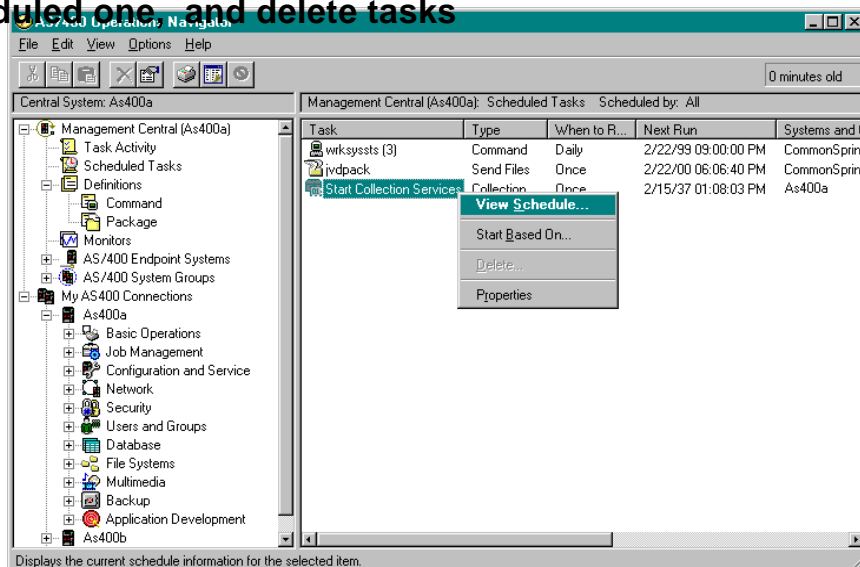
Main Folders: Task Activity

- **Task Activity folder keeps a record of long-running tasks**
 - While running and completed
- **Can see detailed status of the request by system, start new tasks based on a task, or delete the task**
- **Include dialog can be used to include by user, type, or status**
- **Columns dialog can be used to add/remove and reorder columns in the display**



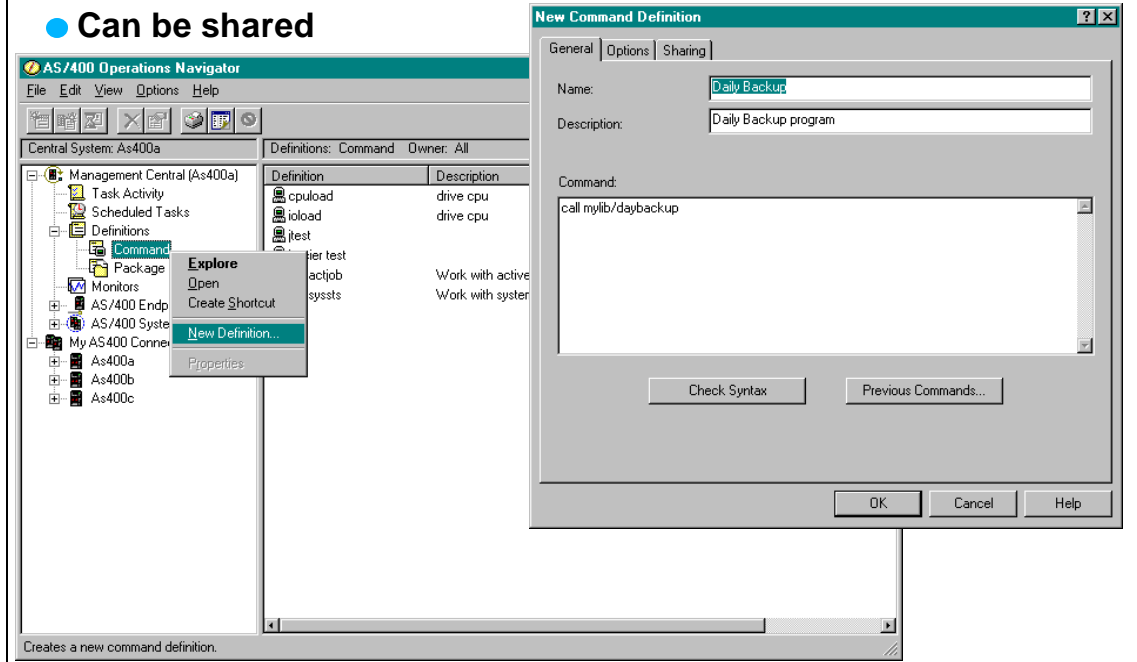
Main Folders: Scheduled Tasks

- **Scheduled tasks keeps track of tasks that have been scheduled**
- **Can view the schedule, create a new task based on a scheduled one, and delete tasks**



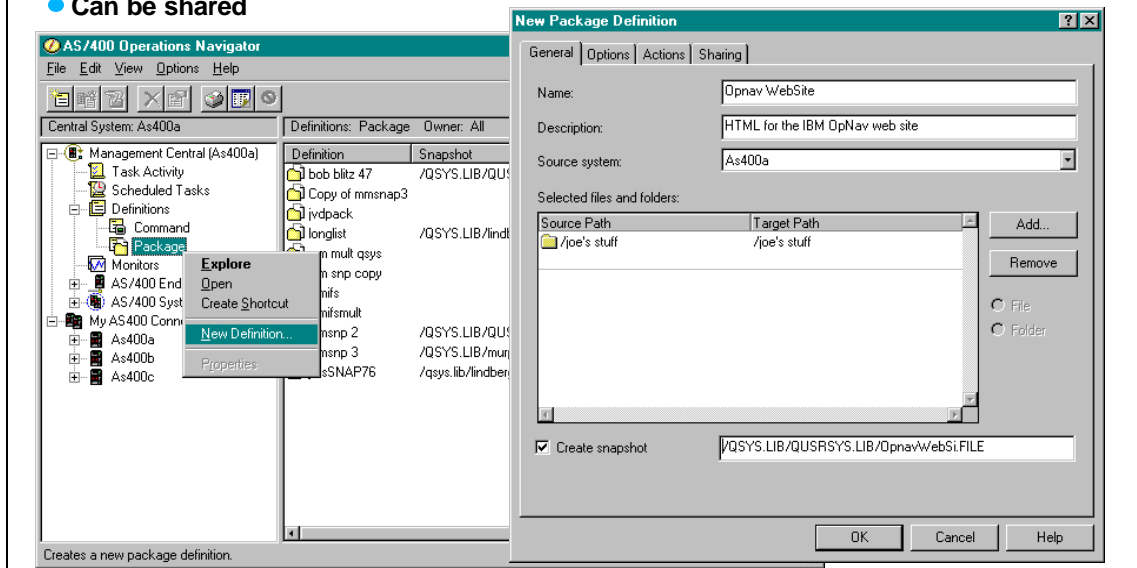
Main Folders: Command Definitions

- Commands that you want to execute repeatedly on systems in the network
- Can be shared



Main Folders: Package Definitions

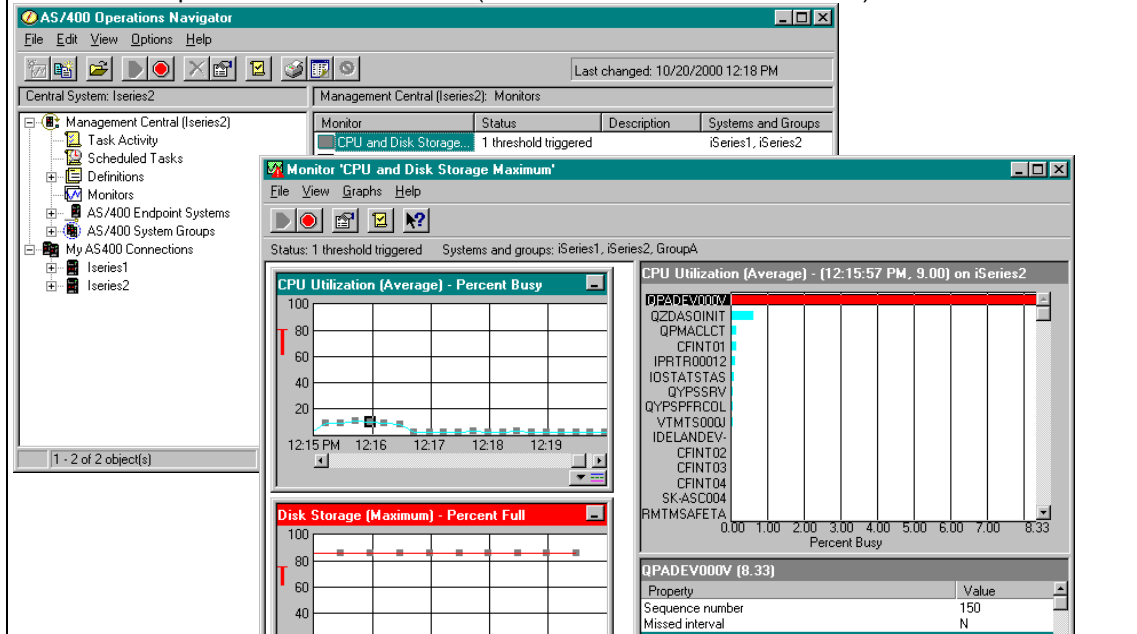
- Packages of objects that you want to send systems in your network repeatedly
- Can be "snapshots" (captures and packages the objects when the definition is created)
- Can be logical packages (the current versions are always distributed)
- Objects from QSYS.LIB can not be mixed with other integrated file system objects
- Can be shared



Main Folders: Monitors

- **Real-time performance monitors**

- Can set thresholds and specify automated responses
- Automation can be triggered when metrics go above threshold or below reset points
- Save up to 24 hours worth of data (PC does not need to be connected)



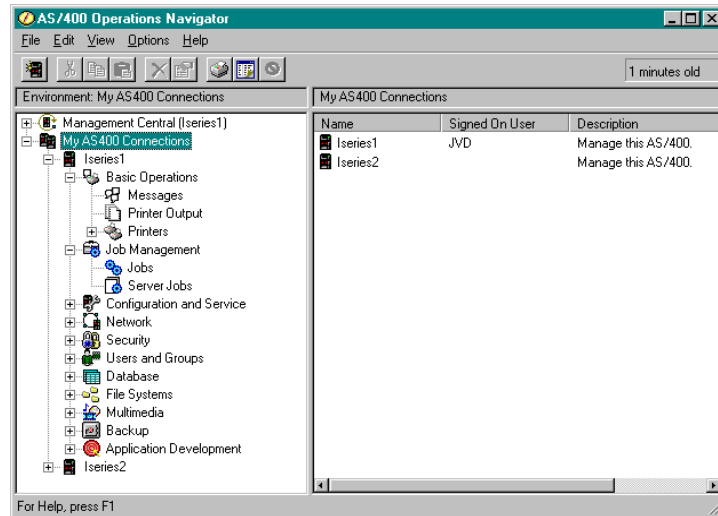
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Basic Operations & Job Management

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Basic Operations and Job Management

- Covered in the Operations Navigator overview session
- **Basic Operations**
 - System Messages
 - Printer Output
 - Printer
- **Job Management**
 - Jobs
 - Server Jobs



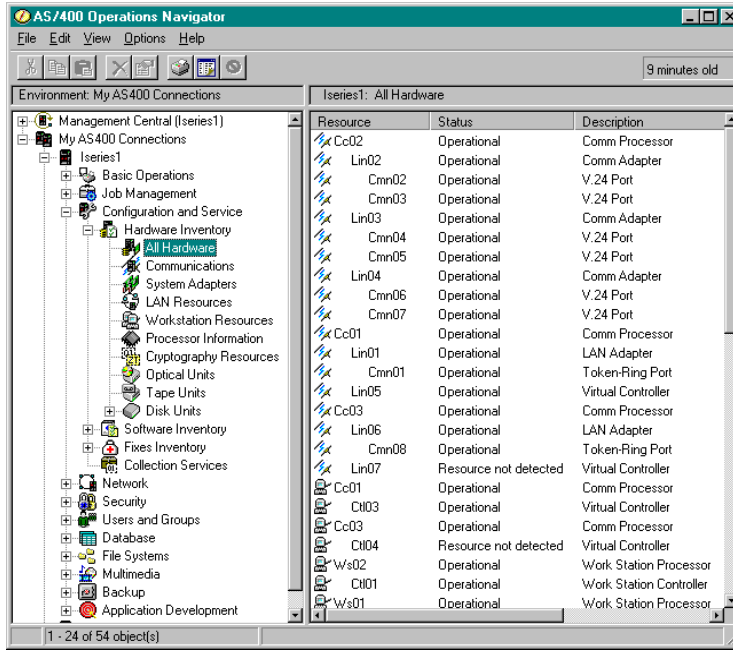
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Configuration and Service

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Hardware Inventory

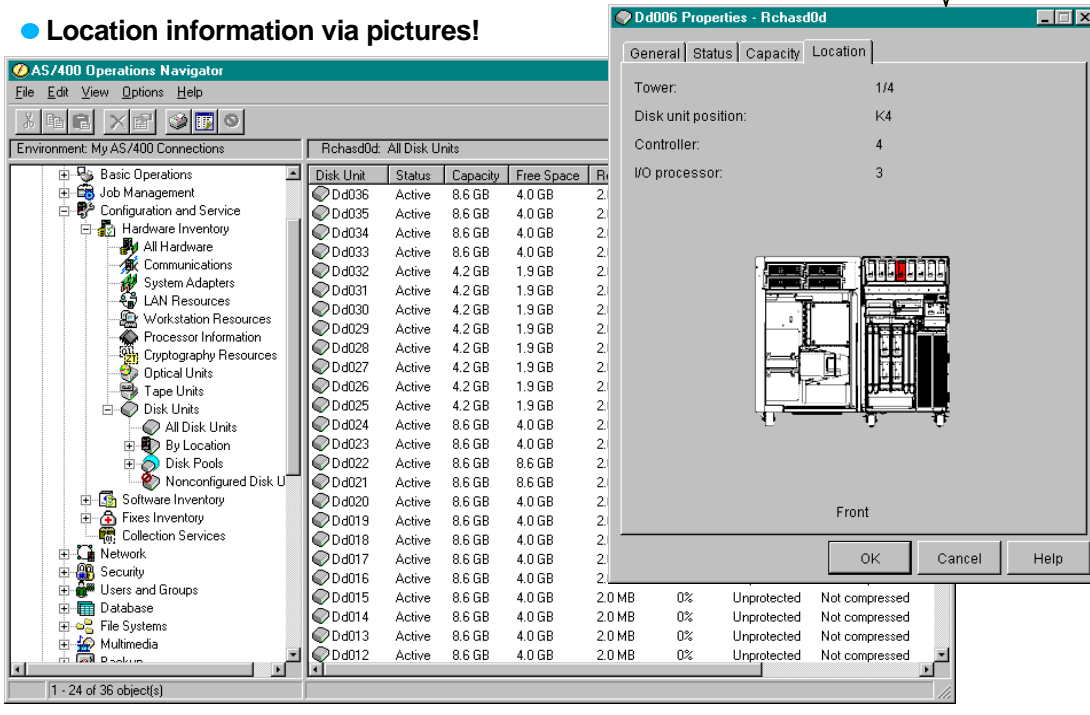
- **Hardware Inventory**
 - Comparable to the Display Hardware Resource (DSPHDWRSC) command
 - View hardware and its properties



Disk Unit Management



- **One place for all DASD info and tasks**
- **Location information via pictures!**



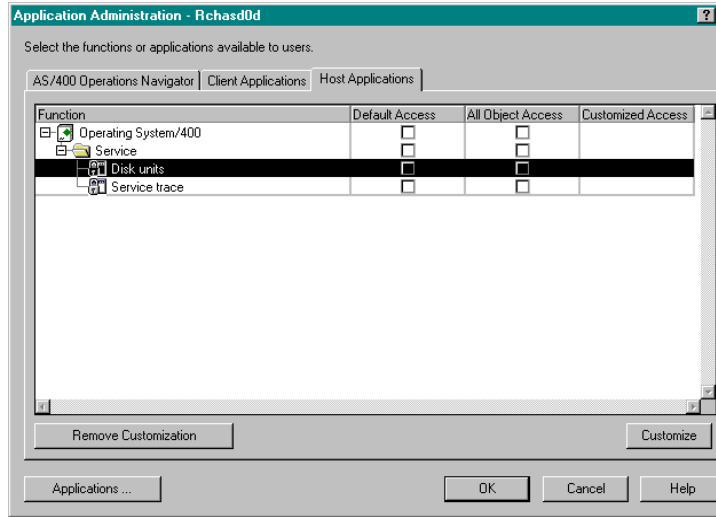
Disk Unit Management

● **Disk Management GUI supports:**

- View of all disk units, or units by tower, disk pools, or all non-configured units
- Add Disk Unit via wizard
- Format non-configured disk units
- Scan surface
- View properties of a disk unit: Status, capacity and location

● **Note: To see the Disk Units folder in Operations Navigator, a security administrator must allow it to be used**

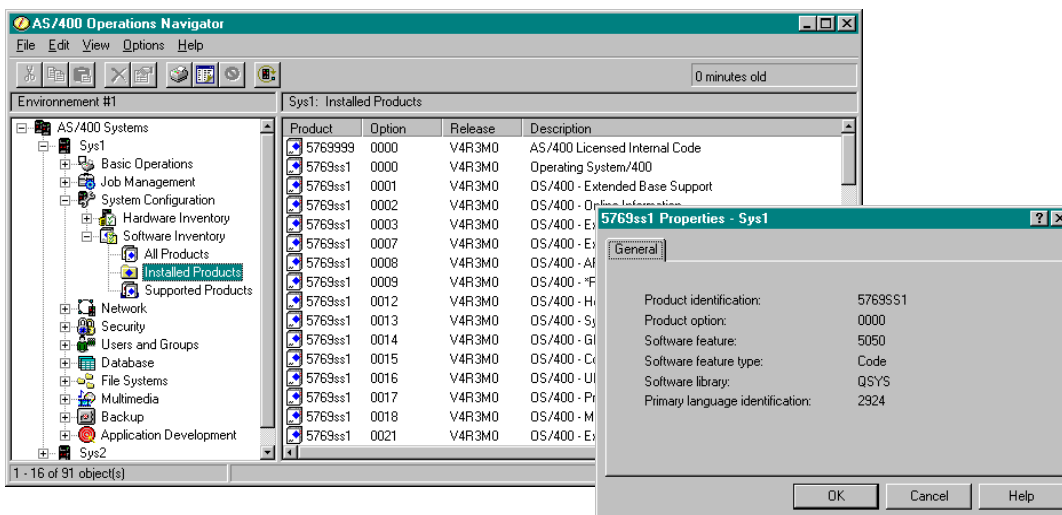
- The Host Applications tab in Application administration is where specific users or groups, or profiles which have all object privilege can be granted access to the disk unit functions



Software Inventory

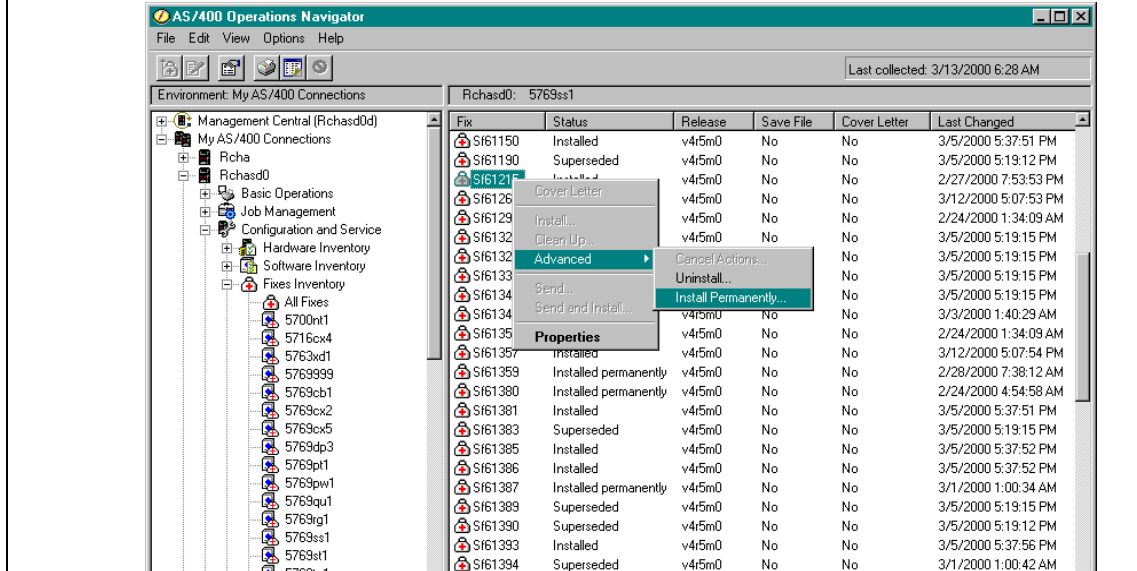
● **Displays the AS/400 software inventory**

- Equivalent information to Display Software Resources (DSPSFWRSC) command
- Supported Products folder contains products supported on other systems in your network



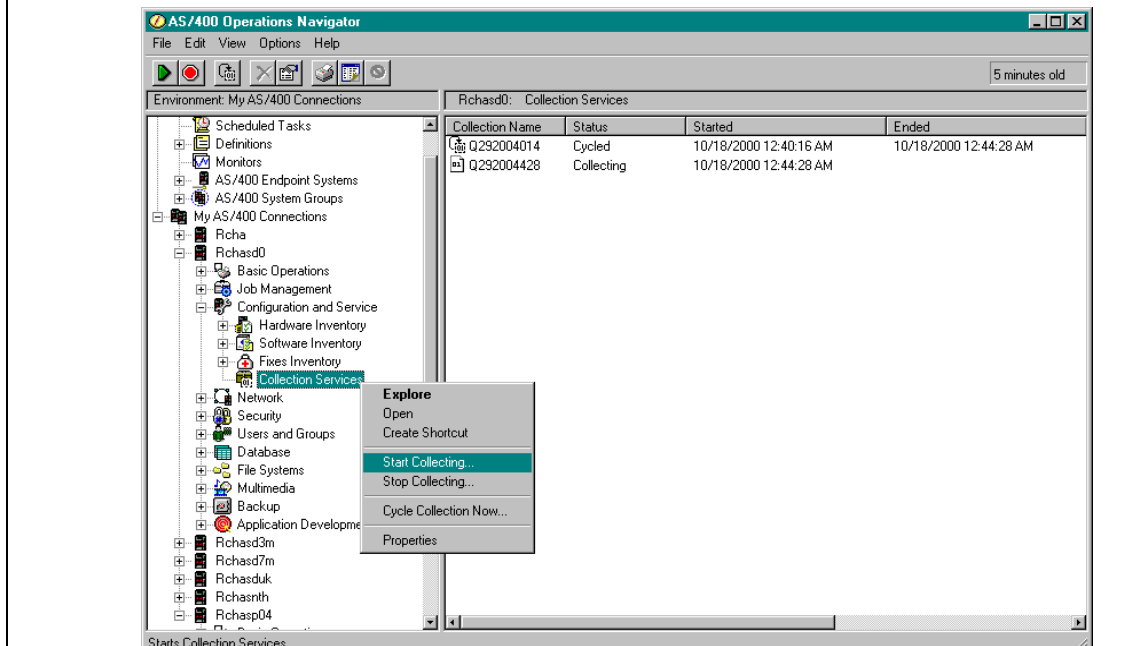
Fixes Inventory

- **Allows you to see and manage fixes on this server**
 - Install, install permanently, Uninstall, Clean up (delete save files and cover letters)
 - Not real time data; Fix inventory needs to be collected periodically
 - Use the Inventory menu option on a system to collect or schedule collection of fixes
 - Fix tasks are also on the System, System Group, or Endpoint popup menu



Collection Services

- **Collect performance data for later detailed analysis**
 - Set start/schedule/stop collection, set collection options, move data into database files
 - Data can be analyzed by Performance Tools/400 licensed program



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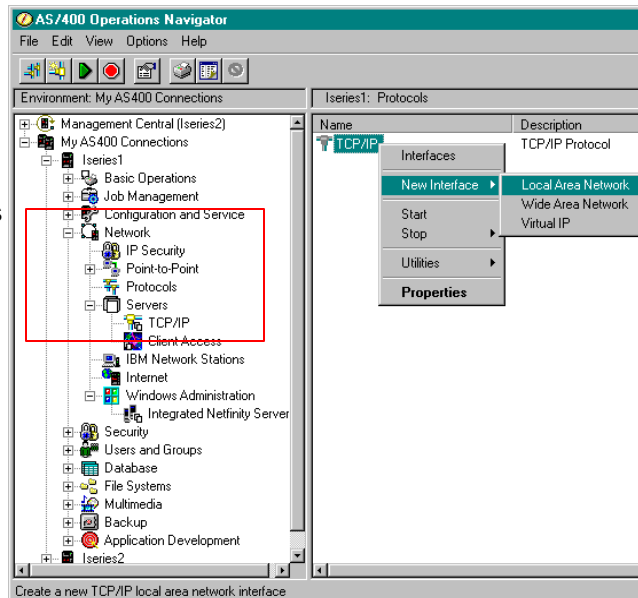
Network

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TCP/IP Configuration

- **Network contains support for configuring and managing TCP/IP**

- IP Security, including VPN, packet filtering, and network address translation
- Point-to-point communications
- Start/stop TCP/IP, TCP/IP properties
 - ▶ Host domain, host table, port restrictions, TCP/IP servers to start when TCP starts
- Create/delete, start/stop TCP/IP interfaces
- Software Servers: Start/stop, properties/configuration, server jobs
 - ▶ TCP/IP
 - ▶ Client Access
 - ▶ Domino (with Domino GUI plug-in)

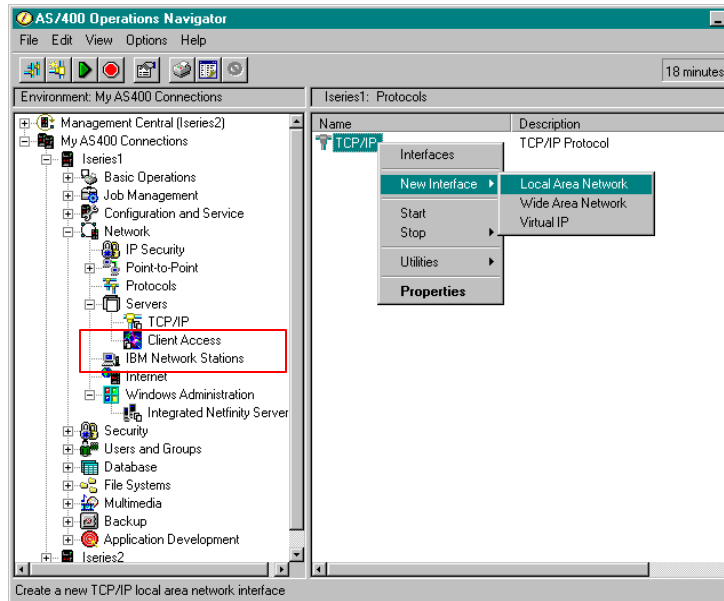


Create a new TCP/IP local area network interface

Web-based Configuration Tools

- **Network also contains support for Network Stations, Web-based Applications for configuring the AS/400 on the Internet**

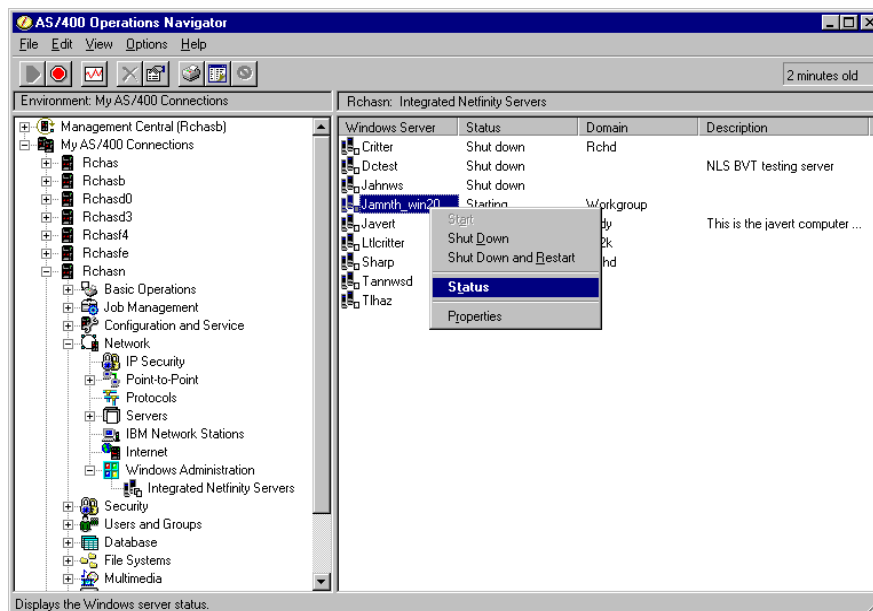
- Network Station Manager (launched into a browser)
- Web-based configuration applications
 - e.g., HTTP Configuration, Digital Certificate Manager



Integrated Netfinity Servers



- **Manage Windows servers (NT, Windows 2000)**
 - Start/stop, status, and properties



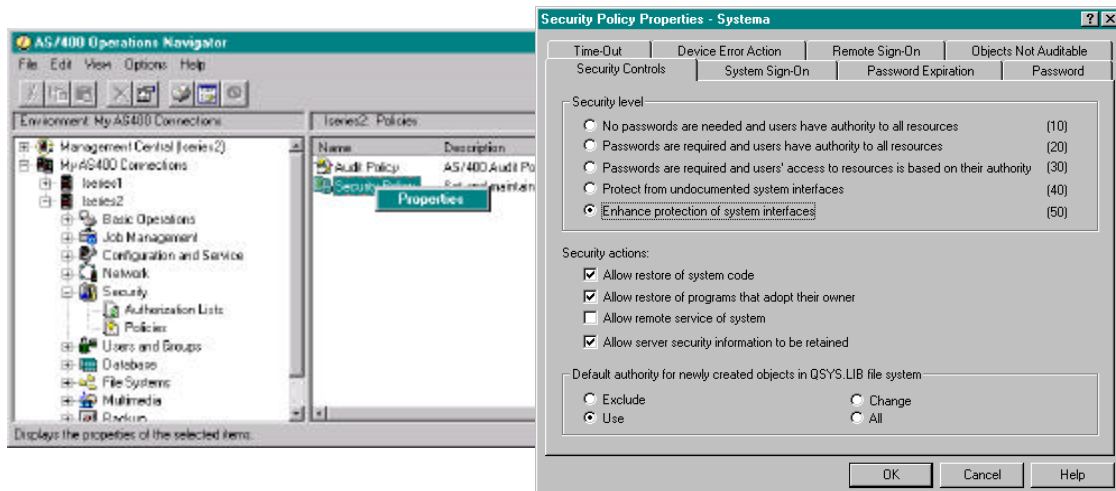
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Security

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Authorization Lists and Security Policies

- Authorizations lists
- Security policies
 - A GUI for managing security and auditing system values



Configure System Security

Security Wizard

- Advises how to set security system values based on how you use your system
- Available from the "Configure" option on the Security folder

The screenshot shows the AS/400 Operations Navigator interface on the left and two overlapping windows of the AS/400 Security Wizard on the right.

AS/400 Operations Navigator: The main window shows a tree view of system components. Under 'Security', the 'Configure' option is highlighted. A context menu is open over 'Configure', showing options like 'Explore', 'Open', 'Create Shortcut', and 'Properties'.

AS/400 Security Wizard - Sys2 (Top Window): This window asks, "Is your AS/400 directly connected to the Internet or in a network that is connected to the Internet?". It has radio buttons for 'Yes' (selected) and 'No'. A note below states: "Note: If you are not sure whether your system is connected to the Internet or if you intend to connect to the Internet in the future, select Yes."

AS/400 Security Wizard - Sys2 (Bottom Window): This window displays a welcome message: "Welcome to the AS/400 Security Wizard! Use the wizard to: Create a set of security recommendations for your AS/400. Create reports explaining the security recommendations. Apply the recommendations to your AS/400 (optional). You can cancel at any time by clicking the Cancel button." It features a graphic of a server rack and a key, and includes 'Back', 'Next', and 'Cancel' buttons.

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Users and Groups

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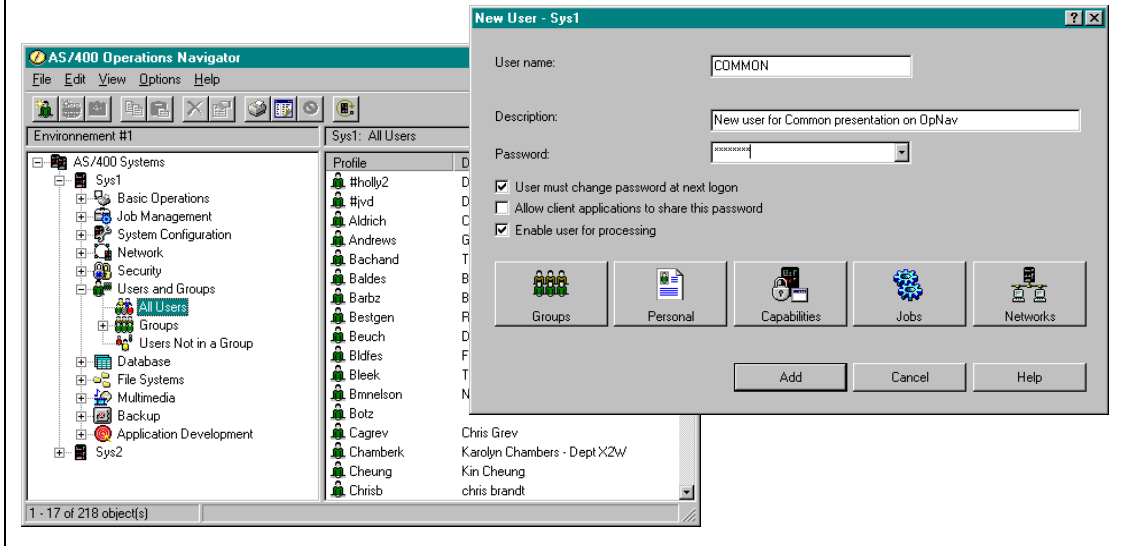
Users and Groups

- **Users and Groups Functions**

- Create, Change, Delete, Copy Users
- Create, Change, Delete, Copy Groups
- Add Users to Groups

- **User includes:**

- All user profile information
- System distribution directory entry
- Domino enrollment (if Domino GUI plug-in installed)



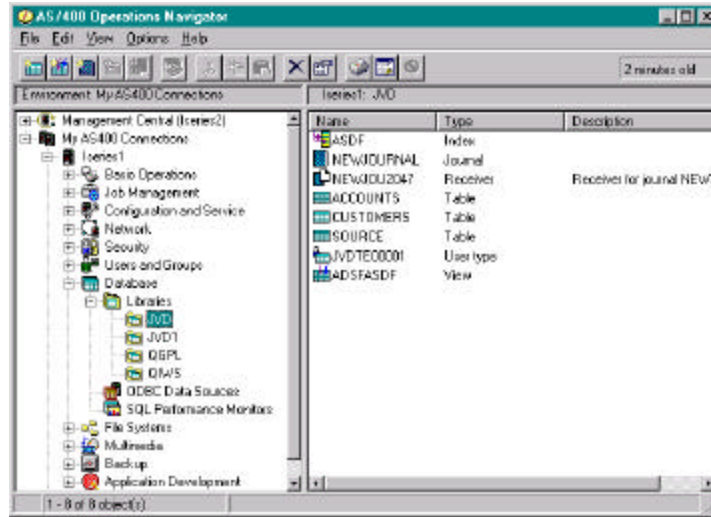
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Database

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Database

- **GUI for managing DB2/400 objects and performance**
 - Create tables, views, aliases, indexes, functions, procedures, journals, data types
 - Quickview/edit tables
 - Collect SQL performance data
 - Manage permissions (authorities) on database objects



Database: SQL Scripts

- **Create, save, run SQL Scripts**
 - Document editor interface associated to files of .SQL
 - Run all, selected, or single statements
 - SQL examples can be inserted and modified

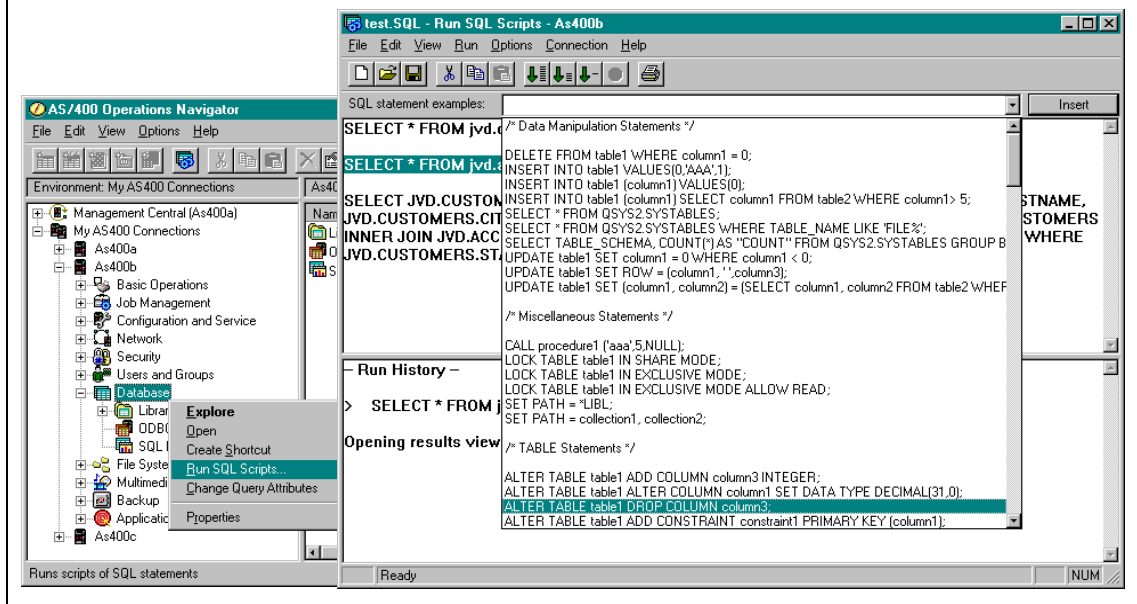
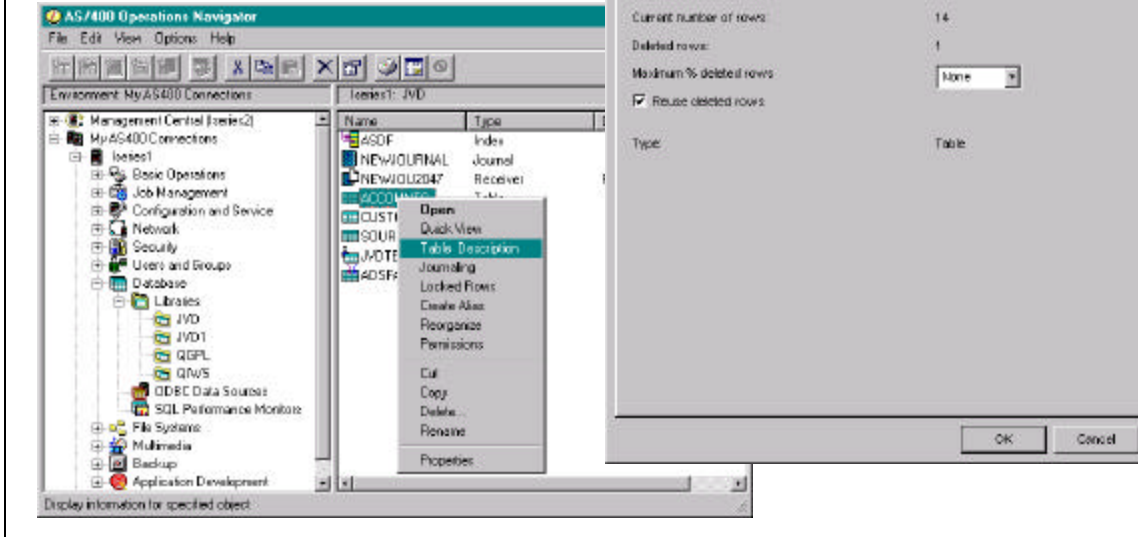


Table Enhancements



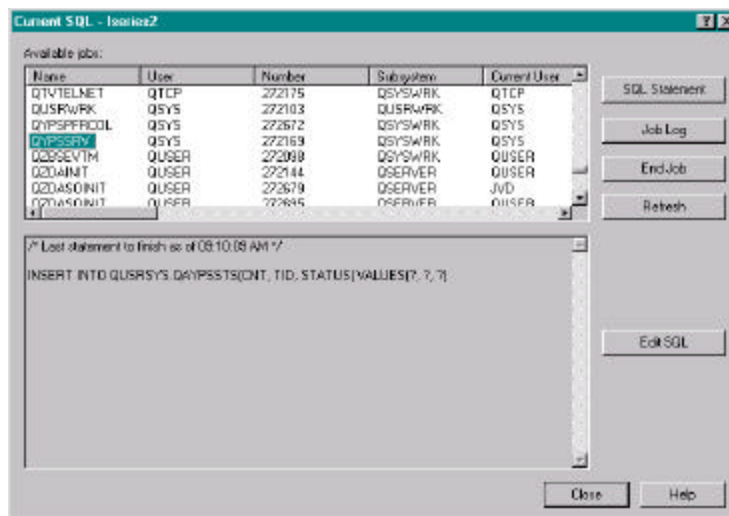
- **Table Description**
 - Equivalent to Display File Description (DSPFD) command
- **Locked rows**
 - Shows locked rows, the locking job and its job log



View Executing SQL



- **Current SQL for a Job**
 - List of active jobs from which you can see SQL statements being executed
 - Some job control too (joblog, end job)
 - Ability to take the SQL statement into the SQL editor

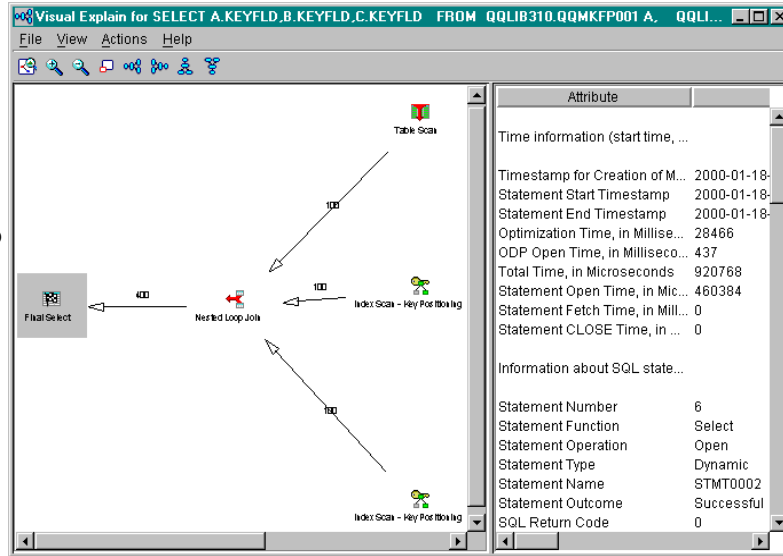


Visual Explain



- Pictorial view of query execution
- Allows query developer to understand execution flow, do performance tuning

- Mouse over an icon to get brief info about that step
- Icons represent steps during SQL execution
- Details pane on the right provides detailed info for a selected step



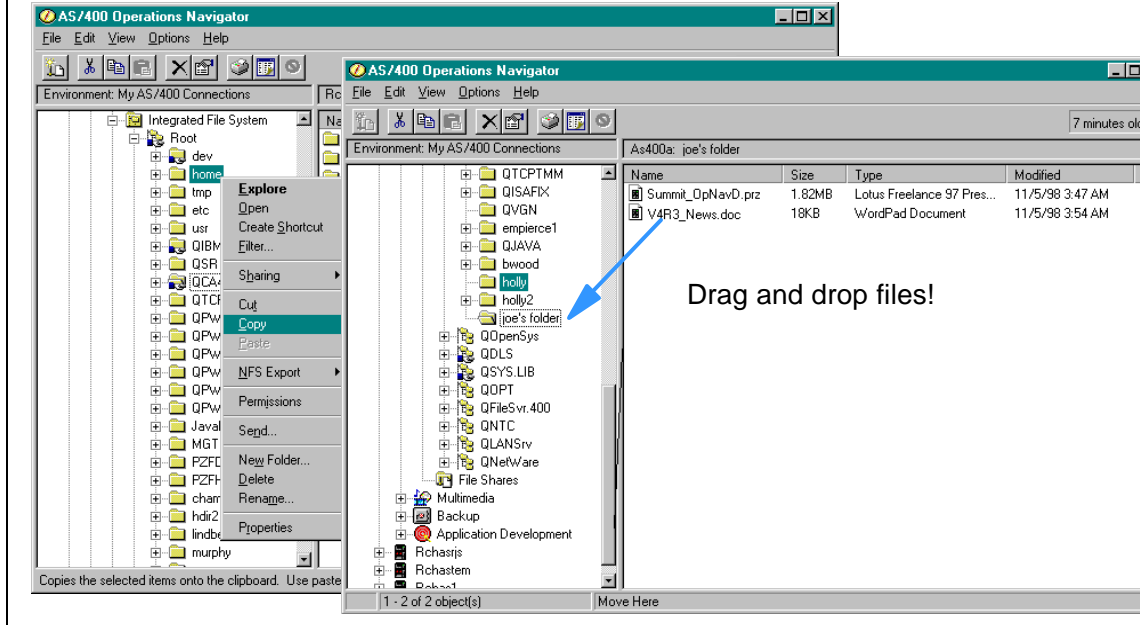
IBM *@server* iSeries 400 and AS/400e

File Systems

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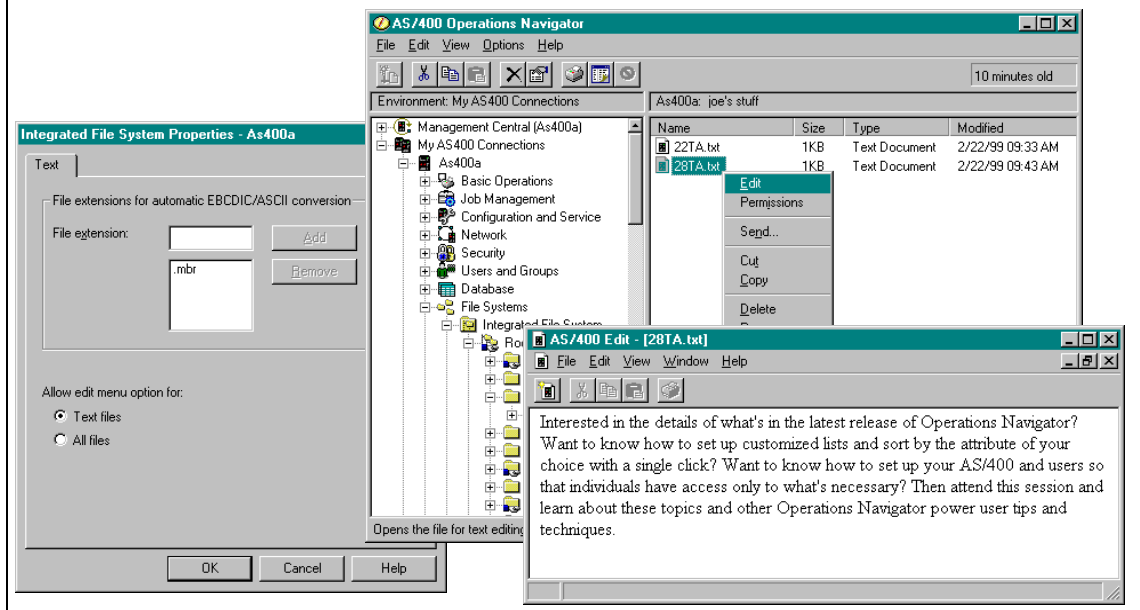
File Systems

- **Cut, copy, and paste, drag/drop folders and files**
 - Within and between servers and the PC desktop (not including objects in QSYS.LIB)
- **Create, rename, delete folders and objects**



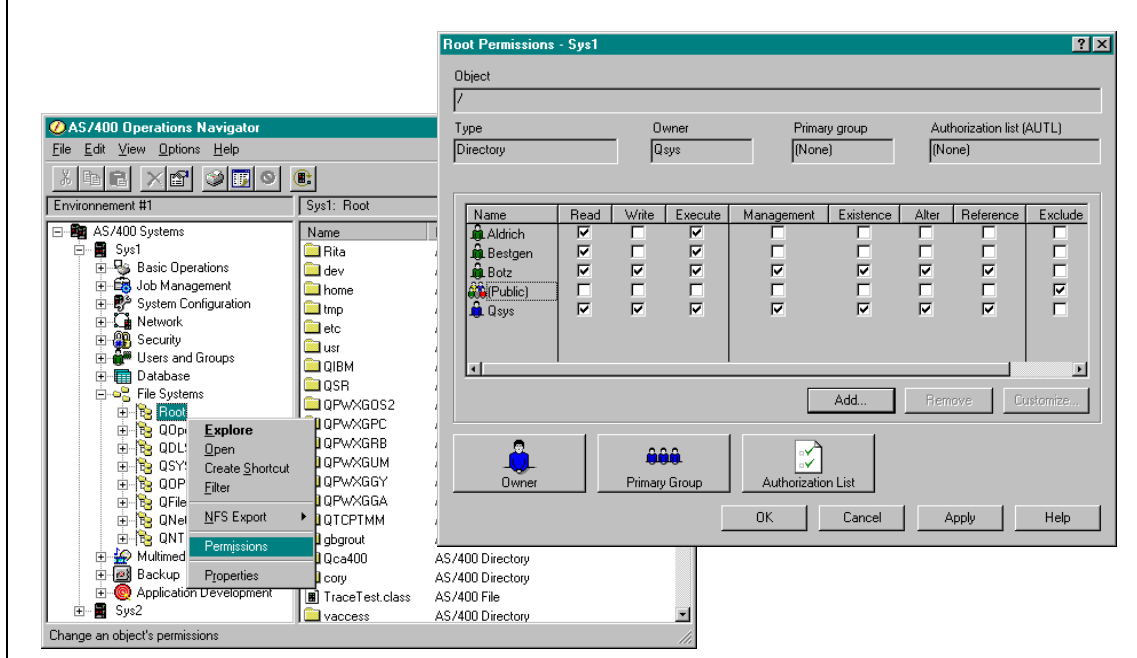
File Systems (cont.)

- **Integrated file system Editor**
 - Turn on the edit menu for all files that contain text (e.g., HTML, etc.) using the Integrated File System folder properties



Permissions


- **Graphical version of edit object authority**
 - Includes assignment of an authorization list, management of object ownership, and primary group



Note: File Systems

It's easier to manage the AS/400 integrated file system with latest Operations Navigator. In addition to allowing security administrators to manage object authorities ("Permissions") you can also now add, rename, and delete directories and objects in the file system. Except for objects in QSYS.LIB, you can also cut/copy/paste and drag and drop objects within and between AS/400s and the PC desktop.

Operations Navigator also supplies an editor for text files in the integrated file system; the Edit option appears by default on files known to contain text (file types registered to use Notepad on the desktop) but you can turn Edit on for all files. Then files that aren't associated with Notepad (e.g., .HTML) can be edited as well.

IBM server iSeries 400 and AS/400e

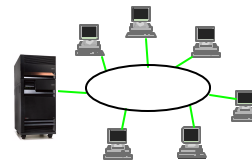
Important Functions

NetServer

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NetServer

Yes, we know the name
"AS/400 Support for Windows
Network Neighborhood"
is a little long



- **What:** File and print serving
- **Who:** Windows NT, Windows 98, Windows 95, Windows for Workgroups, Windows NT Server 4.0 TSE, Windows 2000
 - With PTFs for some releases: Windows 2000, Windows NT Server 4.0 Terminal Server Edition (TSE)
- **Where:** NetServer is part of the base OS/400 Operating System
- **When:** Available in V4R2 and later
- **How:** NetServer uses TCP/IP
- **Why:** Clients do not need additional software such as Client Access to access AS/400 files and printers

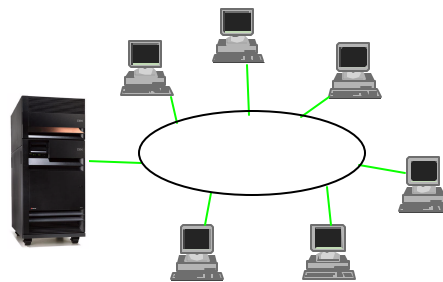
NetServer Vs. Client Access

● NetServer

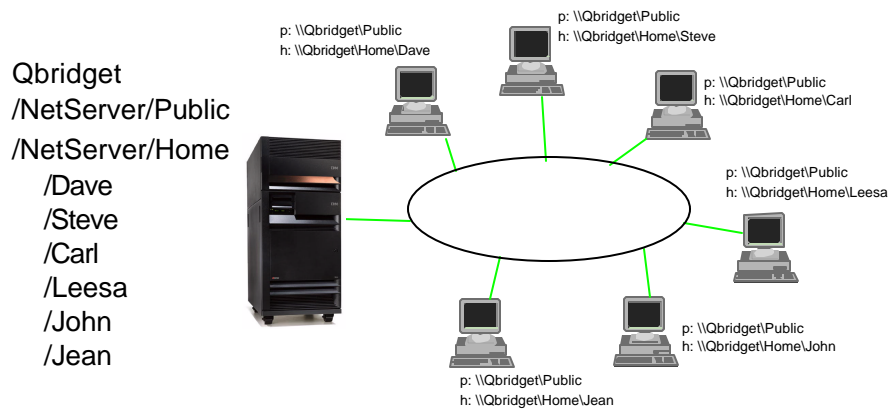
- Doesn't require proprietary client software (part of Windows clients)
- Can share directories with read only access
- Can share individual directories, better AS/400 security control
- NetServer can be hidden from the Windows Network Neighborhood by setting the browse interval property parameter to zero
- NetServer can hide shares from the network by ending them with a \$

● Client Access

- Has many functions not available in Windows, such as 5250, ODBC, data transfer, etc.
- No concept of "shares", makes all of AS/400 IFS available
- Background jobs running on PC



File Sharing Examples

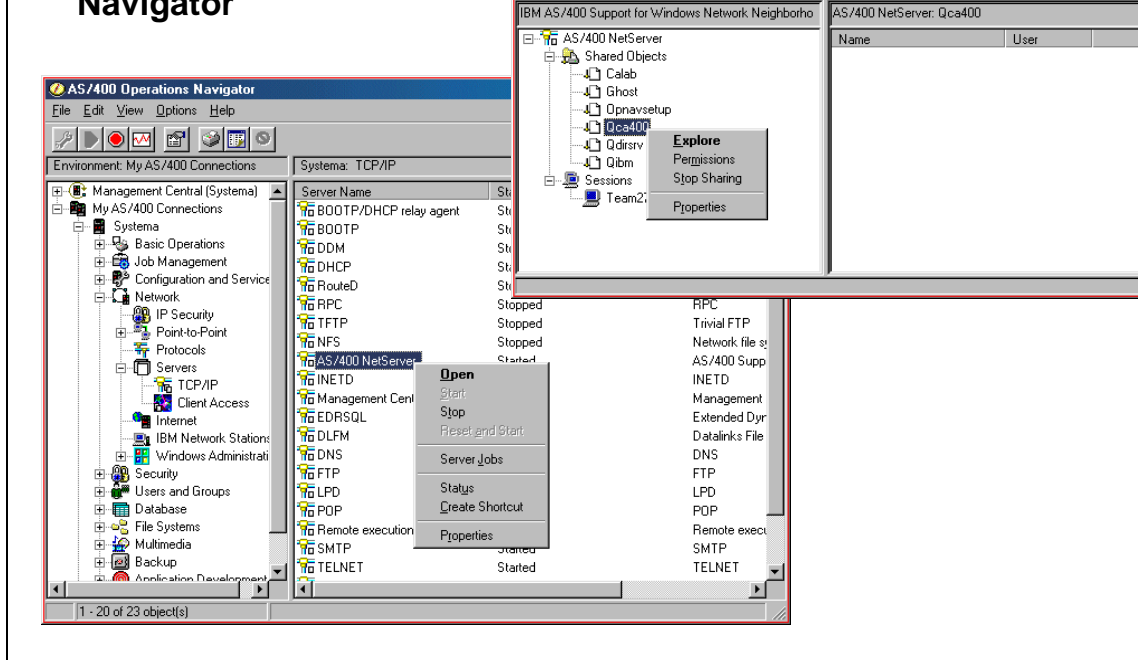


**Need everyone to run the same BAT file but only want to update it in one place instead of on every PC?
Put it in a NetServer file share that everyone can access.**

**Need to share an install image?
Put it in a NetServer file share that everyone can access.**

NetServer

- **Configure and manage through Operations Navigator**



Notes: NetServer

NetServer (AS/400 Support for Windows Network Neighborhood) was a new server application on the AS/400 for V4R2. The AS/400 can now be a file and printer server compatible with Windows NT and OS/2 LAN Servers. From Windows 95, Windows NT, and OS/2 Warp, your clients can now do file and printer serving from the AS/400 without requiring any software to be loaded on the client other than the operating system itself. From Operations Navigator, you can manage the NetServer using the following capabilities:

Start or Stop NetServer.

View the NetServer Properties to view the status of the server and change such attributes as:

Server name, Domain name, Guest user profile, WINS Server configuration, etc.

Open the NetServer configuration for an AS/400 to:

Create a New File Share or view the Properties for an existing file share

Create a New Print Share or view the Properties for an existing print share

Monitor all of the current sessions using NetServer and view the session's Properties

The significant differences between NetServer and Client Access are the following:

The operating system of the PC client contains all of the software that is required to access the NetServer.

NetServer does not provide any data translation services.

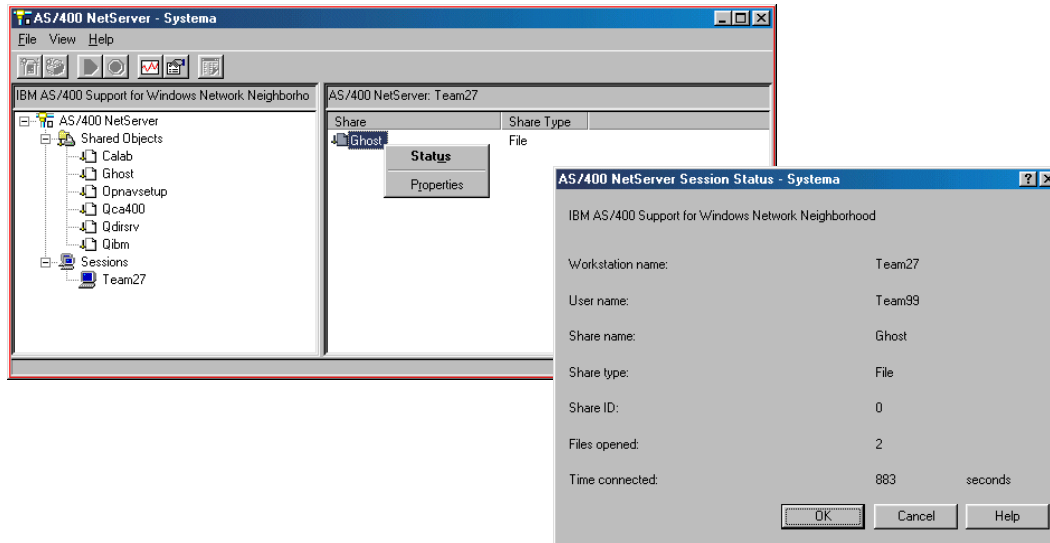
NetServer does not provide support for handling clients that use different code pages in the network.

NetServer does not share the entire integrated file system tree by default.

NetServer has changed location from the previous release. It is now located with the TCP/IP servers. It has its own configuration window and some new functions. It's possible to get status information on NetServer connections.

NetServer

- View users connected to shares
- View sessions using NetServer and the shares they currently use
- Get status of each share connection



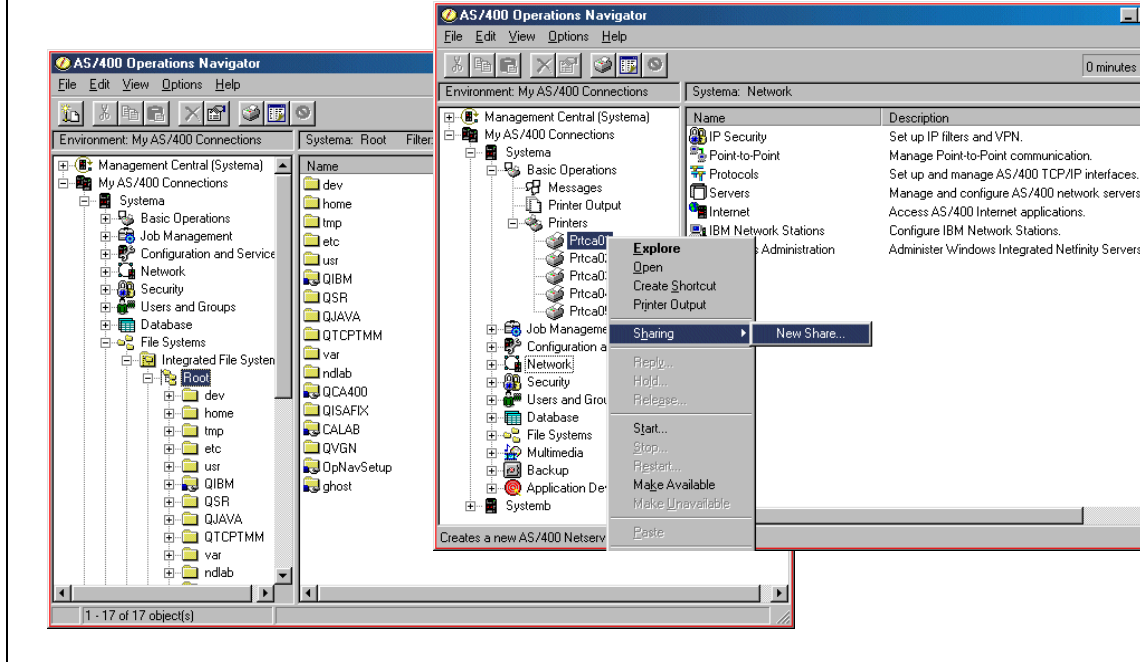
Notes: AS/400 NetServer

Operations Navigator has added a number of enhancements designed to make it easier to manage AS/400 NetServer. AS/400 NetServer is a native file and print server which appeared in V4R2 of OS/400. Windows clients can make use of AS/400 print and file resources without any additional software on the client beyond the Windows operating system. **With the Express client, AS/400 NetServer is the only way to use AS/400 network drives and printers.** For more information on AS/400 NetServer, including set up information, go to www.iSeries.ibm.com/netserver.

Printer and file sharing is indicated visually through the use of the "shared" icon. You can start sharing a printer or directory by using the Sharing menu option available on the popup menu for printers and directories. Since the file system is quite large, Operations Navigator includes a new folder, File Shares, which shows all shared directories in one place. From this folder the individual shares can be explored and opened using NetServer; you can also map a network drive to a file share from Operations Navigator. NetServer configuration is available under Network-Servers-TCP/IP; take the Open option for the AS/400 NetServer server. For convenience we've provided the same function with the new Open AS/400 NetServer Configuration menu option on the File Shares folder.

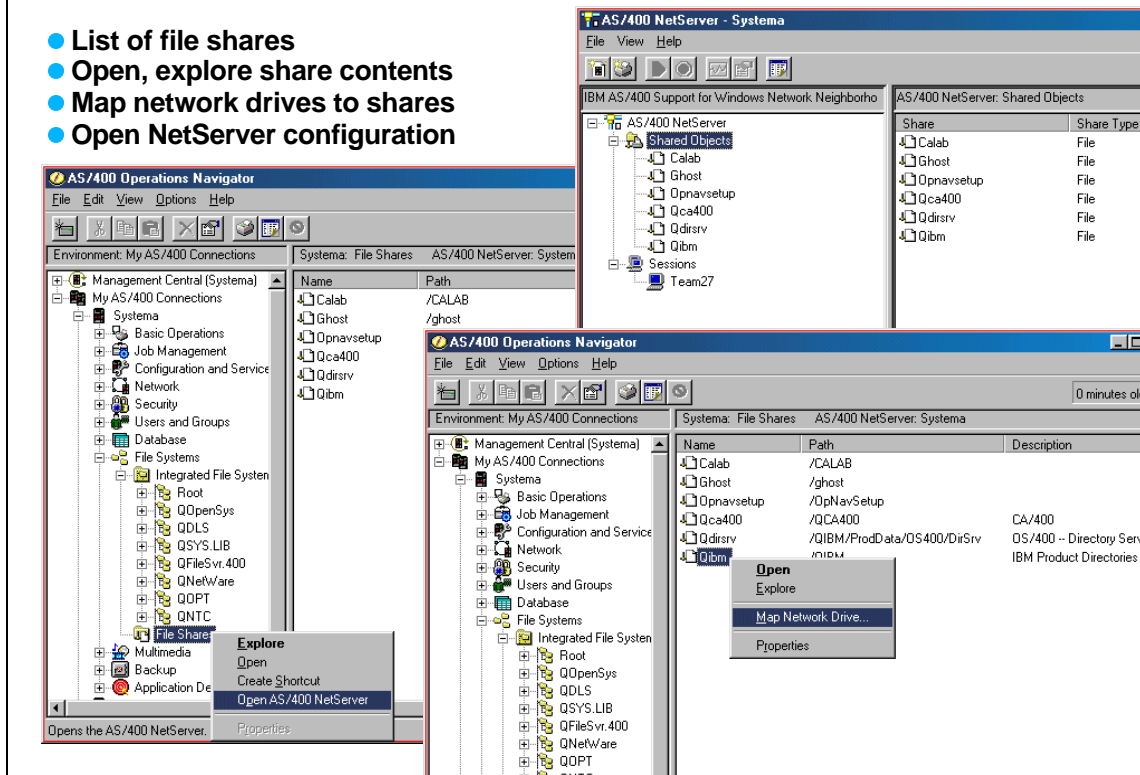
NetServer Integration

- See which folders and printers are being shared
- Create new shares



NetServer Integration

- List of file shares
- Open, explore share contents
- Map network drives to shares
- Open NetServer configuration



IBM *@*server iSeries 400 and AS/400e

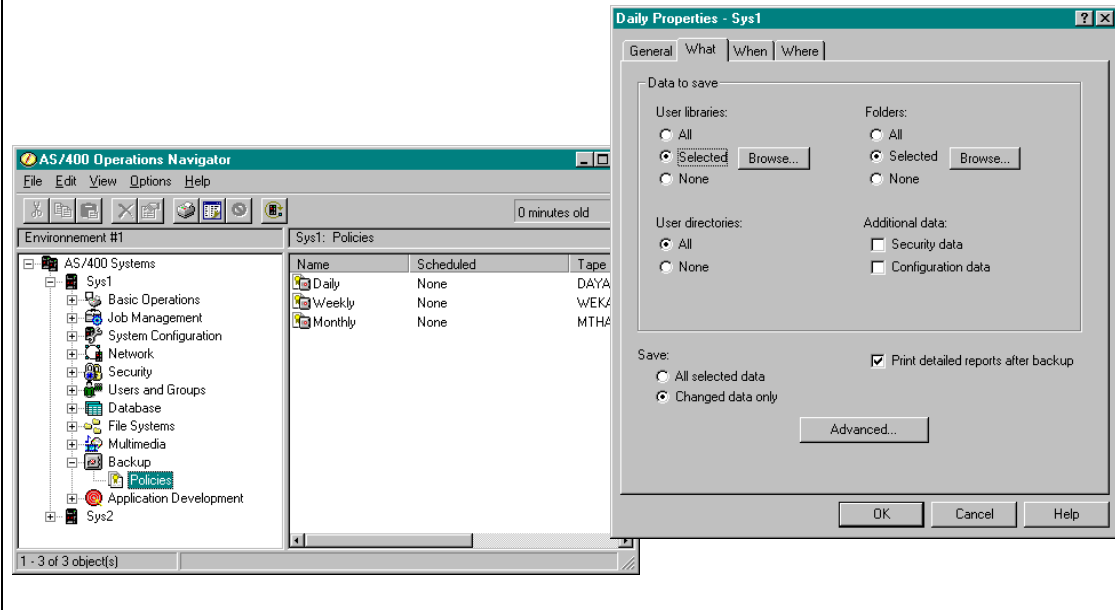
Backup

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Backup

- **Graphical interface to Operational Assistant backup functions**

- Display information for the three IBM-supplied system backup sets (Daily, Weekly, and Monthly).
- Change the properties of each backup set



Notes: Backup

Information about the IBM-supplied system backup sets is shown in the backup policies list view. It includes information about the last backup run and the next scheduled backup to be run for each type.

The target user of the Backup function of Operations Navigator are customers that typically today are using Operational Assistant Backup, the SAVE and RESTORE menus, or the OS/400 save and restore commands. It is not intended for customers that have Backup Recovery Media Services (BRMS/400) or a similar product installed. It is also not intended for customers that use other complex save strategies.

There is no option to backup the entire system. This is because it requires a restricted system (all subsystems have to be ended), which would also bring down the PC that tries to initiate the backup.

IFS saves can be included in the IBM-supplied system backup sets. The user can decide to backup ALL or NONE IFS data. This new function is also available via a checkbox in Operations Navigator.

The tape drive is the only device supported for the backup function.

Current settings for the IBM-supplied system backup sets (monthly, weekly, daily) can be displayed/changed by double-clicking on the corresponding icon or by displaying its properties page.

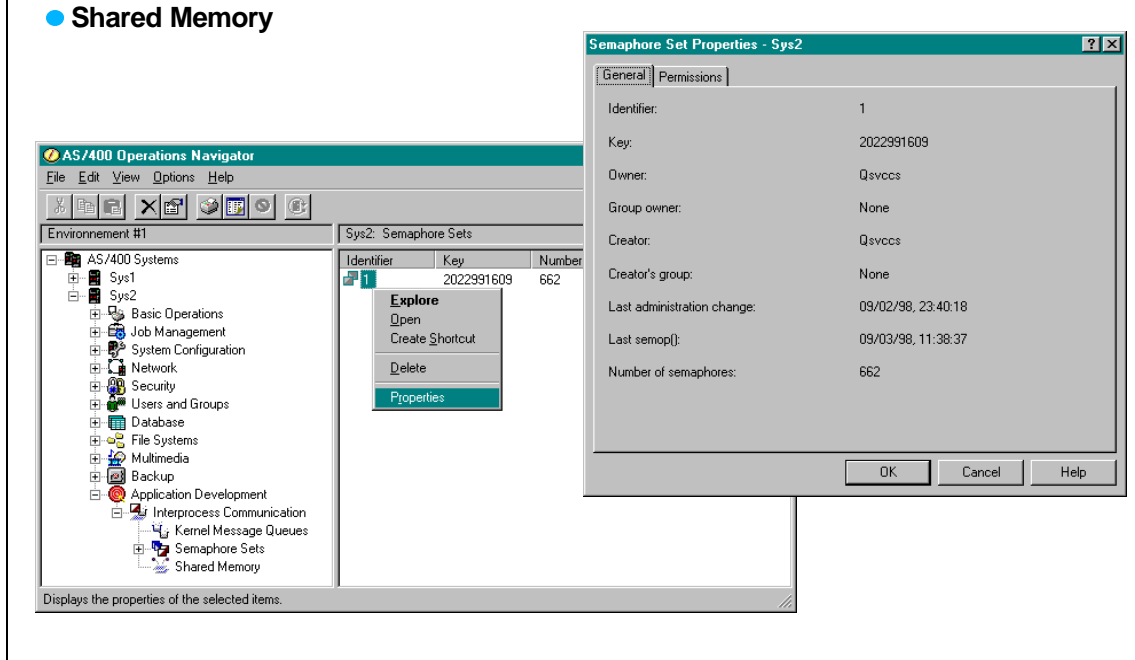
IBM @server iSeries 400 and AS/400e

Application Development

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Interprocess Communication

- Kernel Message Queues
- Semaphores and Semaphore Sets
- Shared Memory



Notes: Application Development

Interprocess Communication (IPC) is a tool for the AS/400 Application Developer who writes C or C++ programs. It allows you to manage the following IPC objects:

Message Queues -- This is not the traditional AS/400 message queue. These are based on the UNIX System V Message Queues. One process or thread will usually put a message on the queue, and another process will get that message off of the queue.

Semaphore Set -- a grouping of one or more semaphores.

Semaphore -- an integer value that can be incremented or decremented. It is used to synchronize two or more processes. A process will usually wait until a semaphore reaches a certain value before performing an operation.

Shared Memory -- a piece of storage that is shared between two or more processes. The processes can read or write whatever they want inside of the shared memory.

These IPC objects are not created through Operations Navigator. A C or C++ program is what creates these objects on the AS/400. If a program fails to cleanup the Interprocess Communication objects, you can use Delete on the context menu of each object to clean it up. In addition, you can view the status of these IPC objects.

IBM @server iSeries 400 and AS/400e

Safely Using Operations Navigator

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Safely Using Operations Navigator

● Controlling the Client

- Function Availability
- What is Installed/Updated
- Microsoft Policies
- Application Administration
- Passwords

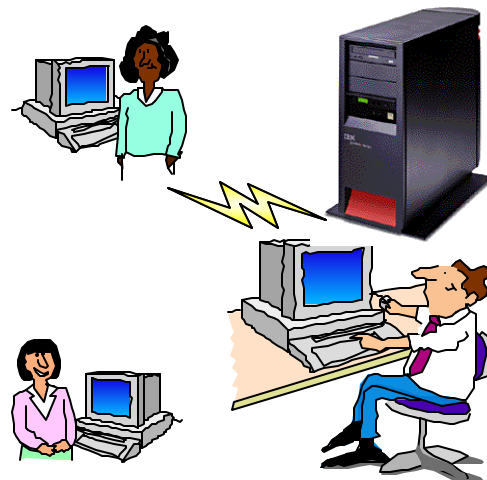
● Controlling the Connection


- Secured Sockets Layer (SSL)

● Controlling the AS/400

- Security Wizard
- Security Policies (system values)
- Audit Policies
- Users and Groups
- Resource Security

If you can't do the function on green-screen then you can't do it through Operations Navigator!



IBM  server iSeries 400 and AS/400e

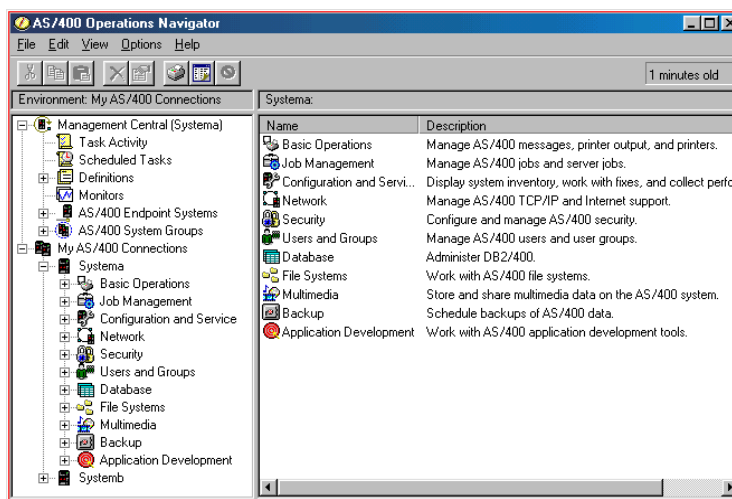
Safely Using Operations Navigator

Function Availability

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What's Available?

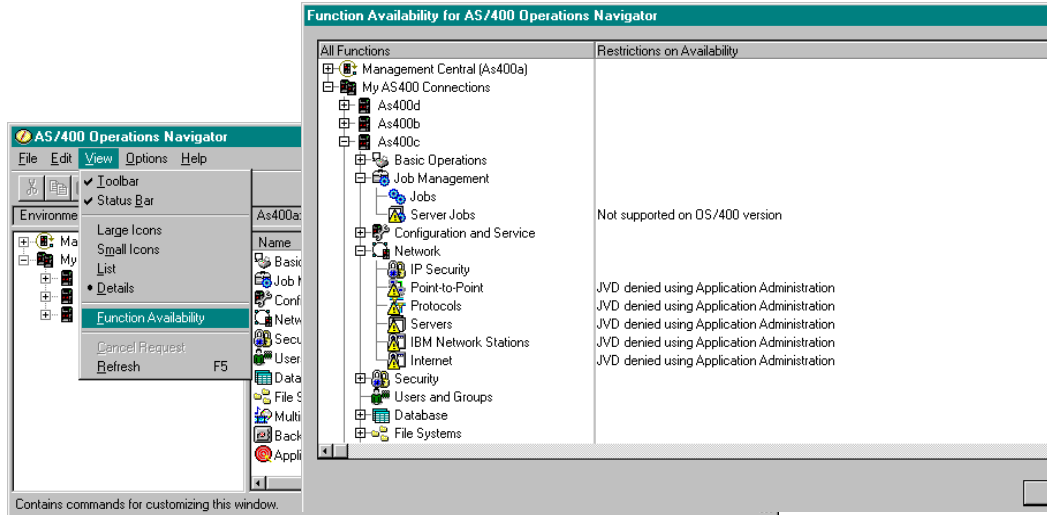
- Tailored view for each iSeries 400 or AS/400e in the network
- Based on available functions for
 - OS/400 level
 - Installed subcomponents
 - Application administration settings
- **Function Availability** shows why items are not in the function tree




Function Availability

- Shows why functions don't appear in the function tree


- Not installed?
- Not supported by the OS/400 release on this system?
- User denied access by Application Administration settings?
- Function not supported over SSL?



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Safely Using Operations Navigator

Install

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Restricting Install

- **Limit access to functions by limiting what is installed**
- **If users can access the "full" install image, they can install undesired components.**
 - Users can run Selective Setup
- **For multi-user PCs it may be desirable to allow some users to use a given function, but not to allow others to do so.**
 - This is especially true in a Windows Terminal Server scenario.
- **Control access to file share QIBM**
 - NetServer ships with QIBM as a file share that everyone can use
 - Can create a new file share for the Client Access path

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Safely Using Operations Navigator

Policies

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Client Access Policies

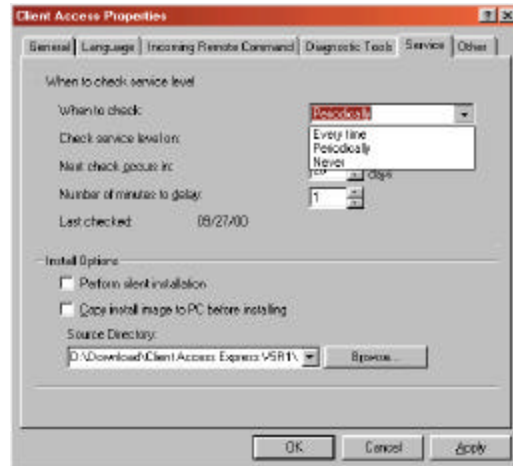
- **Microsoft System Policies can restrict installation/removal of Client Access components and subcomponents**
- **Policies can also be used to control which install related functions can be run.**

- **Install**

- Can restrict Setup, Selective Setup, upgrades, etc.
- Can restrict individual install options
- Can restrict Operations Navigator and Operations Navigator subcomponents.
- Can restrict Operations Navigator plug-ins.

- **Service**

- Can mandate service pack level checking values in the CA Properties panels.
- Can mandate location of selective setup and install service pack
- Can prevent SP installs and SP level checking
 - Not recommended!



Policy Files

- **Created by the administrator**
- **Stored on a file server accessible to the clients to be administered such as:**
 - AS/400 NetServer
 - Instructions for creating a share for policy downloading are in the Setup guide.
 - NT IPCS
 - Comes with a 'Netlogon' share already configured. PC's will download policies automatically from this share.
 - NT Server
 - Also comes with a 'Netlogon' share.
- **Can be applied to users or computers in a network**
- **Are binary files which can only be manipulated using the System Policy Editor from Microsoft**
 - Note: The binary formats differ between Windows 95/98 and Windows NT
- **Policy templates determine what the administrator sees when editing a policy file**
- **How policies work:**
 - Client PCs download a policy file from a file server at Windows login time
 - Policies from downloaded file are set in the PC registry
 - PC program examines and uses these registry values if present

Policy Templates

- **The policy editor uses policy templates to present the administrator with a GUI interface for editing policy files.**
 - Templates are shipped by Microsoft with Windows 95, 98, and NT for controlling many PC operating system functions.
 - Office 97 also ships policy templates.
 - Policy templates ship with the V3R2M0 Client Access for Windows 95/NT product.
 - One template for Windows 95/98 (ibmcap95.adm)
 - One template for Windows NT (ibmcapnt.adm)

Examples of Client Access Policies

- **Install**
 - Restrict Setup, Selective Setup, upgrades, etc..
 - Restrict individual install options
 - Restrict Operations Navigator and Operations Navigator sub-components
 - Restrict Operations Navigator plug-ins
- **Passwords**
 - Prevent changing of AS/400 passwords
 - Prevent caching of AS/400 passwords (95/98 only)
 - Set password expiration warning values
- **Data Transfer**
 - Prevent uploads or downloads
 - Prevent a user from creating a new file but allow the user to append data to an existing file.
 - Restrict a user to running only configured requests. The user would be permitted to click on a desktop icon to initiate a preconfigured transfer request, but would not be able to change the request or to create a new one.
 - More effectively 'control' which can be used, such as the ability to run batch uploads/downloads, GUI uploads/downloads, autostart uploads/downloads, use Excel add-ins, etc..
 - Restrict which AS/400 a request may be run against.
 - Prevent RTOPCBs or RFROMPCBs
- **PC5250**
 - Limit the number of PC5250 sessions a user can have active to a given AS/400.
- **Middleware**
 - Restrict AS/400 ODBC driver or OLE DB usage on a per-AS/400 basis.
 - Control use of Remote Command functions
- **Connections**
 - Preconfigure AS/400 system connectivity; then when a user starts a Client Access function only the preconfigured system would be available for use
- **SSL**
 - Define policies by connection environment. For example, when a user is connecting from the 'home' environment, SSL is required, however when using an 'office' environment SSL is not needed.
- **Directory Update**
 - Prevent usage of update
- **Service**
 - Mandate service pack level checking values which show up in the Client Access Properties panels.
 - Mandate location of where selective setup and install service pack come from.
 - Prevent SP installs and SP level checking
 - ◆ Not recommended!
- **Operations Navigator and much more...**

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Safely Using Operations Navigator
Application Administration

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Application Administration

● What does it do?

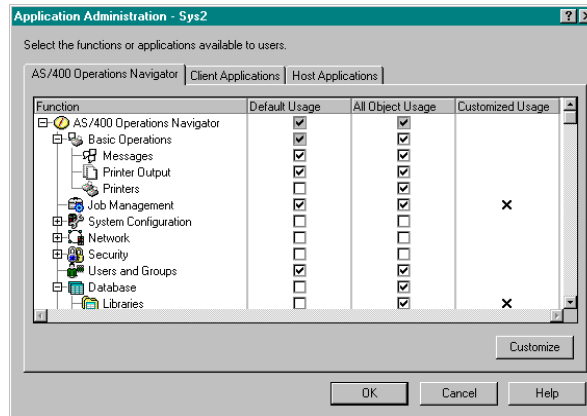
- Controls access to Operations Navigator functions
- Similar to limited capability for PC5250 interfaces

● When do you use it?

- When you want to control what functions users see in Operations Navigator

● How do you use it?

- Operations Navigator interface for system defaults and individual users



Notes: Application Administration

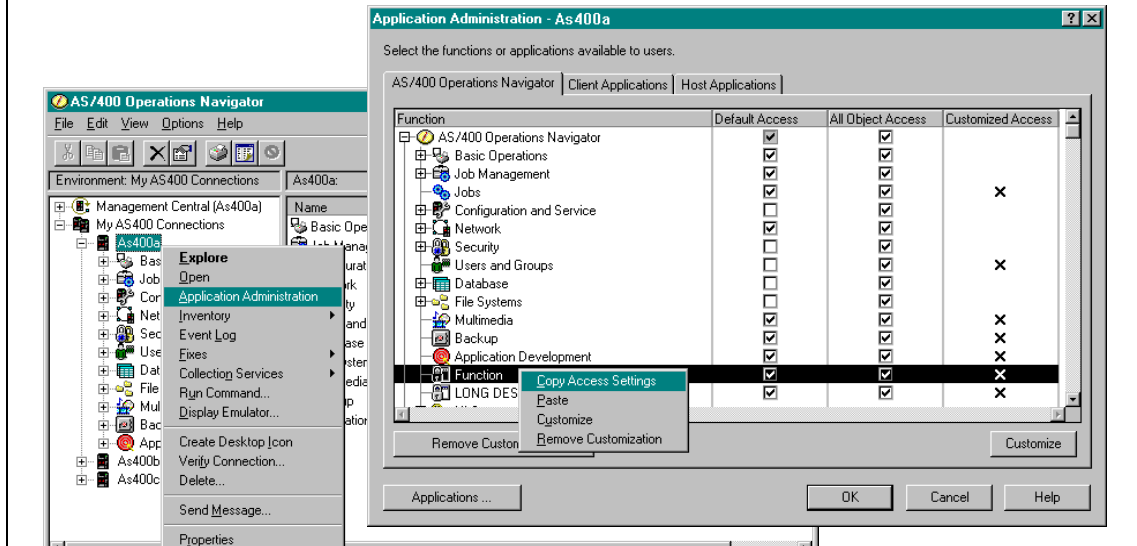
Operations Navigator gives you two ways to control which functions users can use. The first is by controlling which Operations Navigator functions are installed. The second is Operations Navigator's Application Administration function which does run time checking to determine whether the user is allowed to use Operations Navigator and some Client Access functions. It is similar to the ability to remove the command line from users' screens on the green screen user interface in that it removes the functions from the GUI.

Application administration can be set up and managed centrally by the security administrator from one workstation. By default all functions are accessible to users unless you use Application Administration (that is, users can try all functions; their requests may later be denied at the AS/400 due to insufficient privilege or insufficient object authority). To remove functions from Operations Navigator, you can set up a default access scheme for Operations Navigator users. For example, one possibility is that by default users only get the basic operations folder. Operators and administrators who need more functions can be given them by adjusting application capabilities in the appropriate user or group properties. All application administration information is stored on the server and is checked as soon as the user expands an icon and signs on to that system. This means that users can "roam" from PC to PC and their application administration settings will follow them.

Note: Application administration is not security!! It is access control for users of Operations Navigator and Client Access only. You must employ the standard security functions to fully protect your system.

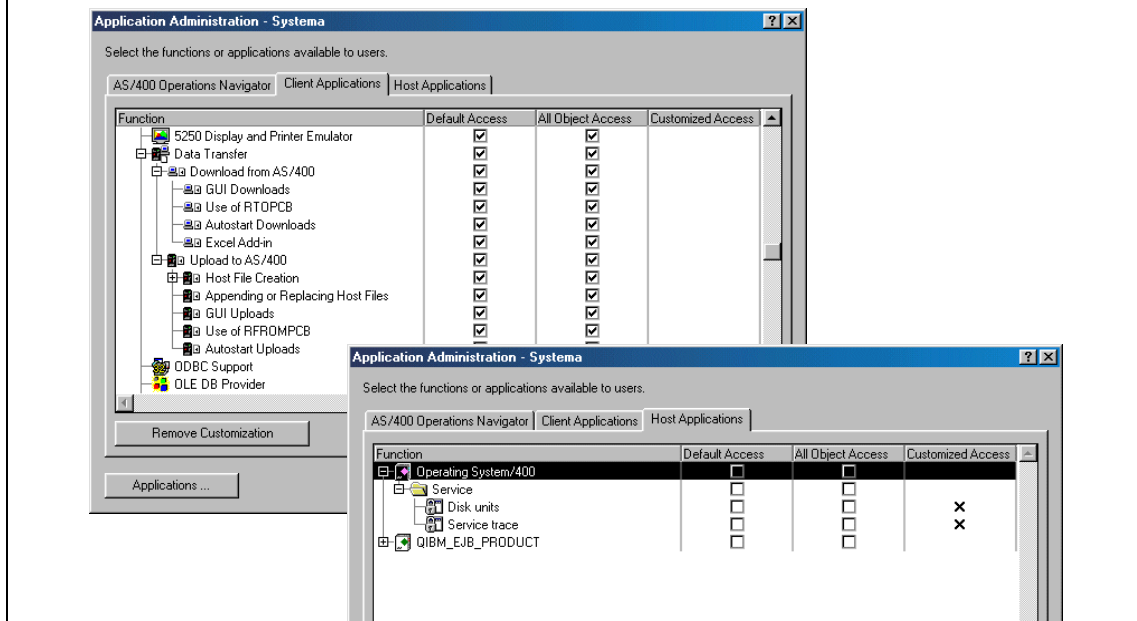
Application Administration - By System

- Centrally control access to Operations Navigator functions
- Can be set up differently for each AS/400 you manage
- Information stored on the AS/400; users get the same access no matter which PC they use (stored with their user profile)
- Can set up a default access scheme for each system (use it to remove functions)
- Control general users and users with All Object authority separately
- Copy access settings from function to function



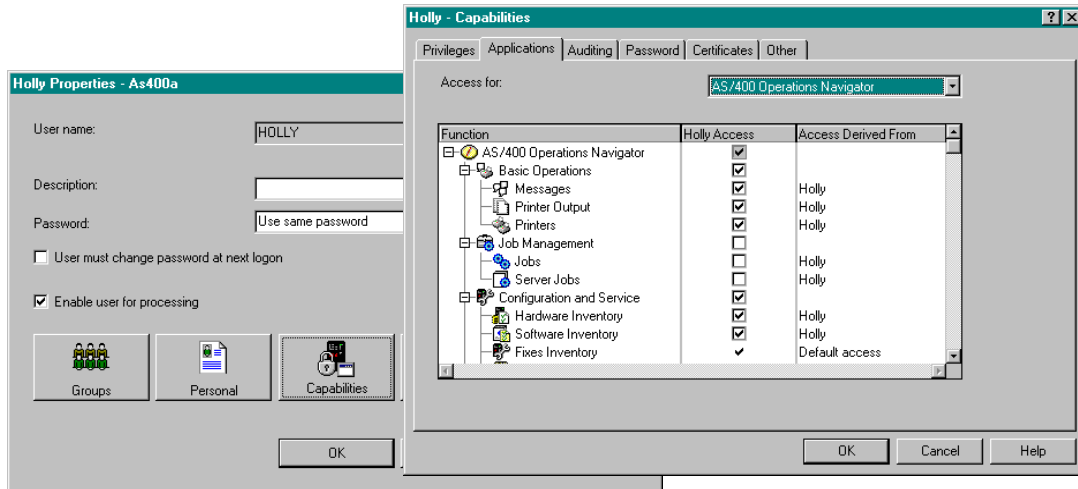
Application Administration - By System

- Control access to server and client applications that want to make use of Application Administration
- Disk management is not available by default



Application Administration - By User

- **Individual users and groups can be given more or less access**
 - Use user or group properties, Capabilities button, Applications tab
- **All Application Administration information is stored on the server and roams with users when they use Operations Navigator on a different PC**



Notes: Application Administration

Default Access. The Application Administration menu option available on each AS/400 system allows you to set up the default access scheme for Operations Navigator and any other host or client applications which make use of Application Administration. You can explicitly give or take away access to the default user; you can also take away access to all but those users with *ALLOBJ (all object) privilege.

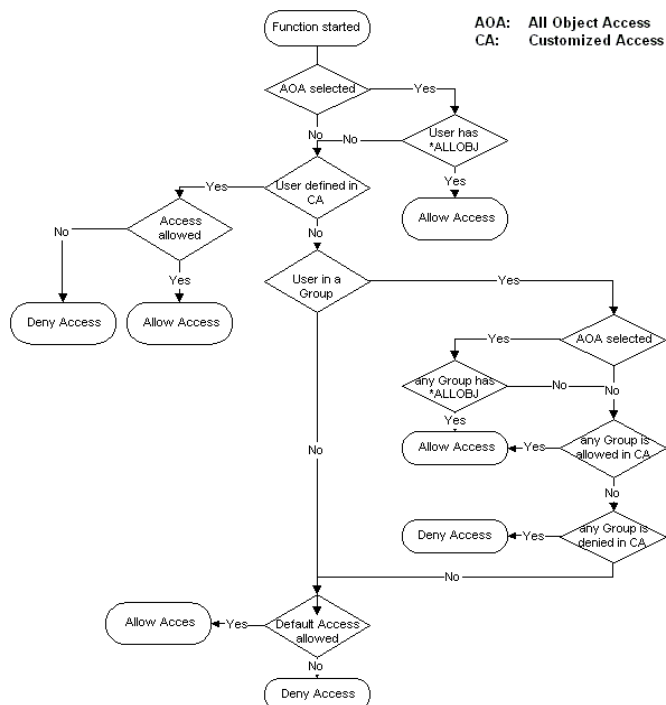
Individual Access. An individual user can then be given more or less access. View the individual's user properties under "Users and Groups," push the "Capabilities" push button (this was called "Security" in previous releases), and click on the "Applications" tab in the Capabilities dialog. This dialog shows you if the user currently has access to each subcomponent of Operations Navigator, and from where the usage is derived--the default access scheme, *ALLOBJ privilege, membership in a group that has explicit access, or explicit user access.

How Application Administration works

- Application Administration settings are stored on the AS/400 and associated with the user profile.
- PC software calls AppAdmin APIs to determine if it can perform a particular function or not.
- AppAdmin API downloads the AppAdmin data from the AS/400 as needed.
- The data is cached on the PC, and updated when the AppAdmin data on the AS/400 changes.
- No special PC configuration is required. Application Administration is built into Client Access.

Notes: Application Administration

Using Application Administration
 This chart shows whether, for a particular user, access to a function is allowed or denied. It shows the interaction between the customized application administration settings, whether the user has All Object privilege, group membership, etc. "AOA selected" means that users with All Object privilege are allowed to access the function according to the default access scheme for the system. "User defined in CA" means that the user's application settings have been changed to either explicitly allow or deny access.



Comparing Policies and Application Administration

Policy Administration

- Based on Microsoft System Policy support
- Uses Microsoft System Policy Editor and Client Access Policy templates
- Can restrict access to specific functions on a per-AS/400 basis or globally
- PC driven -- not dependent on specific OS/400 release
- Can set policies on a specific PC as well as users and groups
- Can be used to 'configure' as well as restrict functions

The Microsoft Way...

- Preferred method for those familiar or already using Microsoft System Policies

Applications Administration

- Based on AS/400 user profiles
- Easy-to-use Operations Navigator GUI
- User profile can roam with user (from any PC)
- A user can have different profiles for different AS/400s
- Requires OS/400 V4R3 or later
- Can restrict usage of particular Operations Navigator functions
- APIs available for use by other plug-ins

The AS/400 Way...

- Preferred method for those who want to control access via AS/400 user profiles

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Safely Using Operations Navigator

Controlling the Connection

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Secure Sockets Layer (SSL)

- **Secure communications sessions between PC and AS/400**
 - Session encrypted
 - Not subject to eavesdropping
- **Can choose which Express applications are encrypted**
 - PC5250
 - Data Transfer
 - Operations Navigator
 - Others
- **Can assure connection is to AS/400 system you expect**
 - Diminishes spoofing possibilities
- **Requires installation and configuration of both the client and server**
 - Software
 - Digital Certificates



Requires OS/400 V4R4



Notes: SSL Vs VPN

Originally created by Netscape, the Secure Sockets Layer (SSL) is the industry standard for session encryption between clients and servers. Data exchanged between the clients and the servers is encrypted and, therefore, not subject to eavesdropping. SSL uses asymmetric, or public key, encryption to encrypt the session between a server and client (user). The client and server negotiate this session key during an exchange of digital certificates. The key expires automatically after 24 hours, and a different key is created for each client and server connection. Consequently, even if unauthorized users intercept and decrypt a session key (which is unlikely), they cannot use it to eavesdrop on later sessions.

Additionally, the Express client uses the AS/400 Server Authentication support so users can be assured that the system they are connecting to is the AS/400 system they intended to connect to. This capability diminishes the possibility of spoofing in an Internet environment.

Q. What are the security distinctions between a client using an Secure Sockets Layer (SSL) connection and a client using a Virtual Private Network (VPN) connection, such as Layer 2 Tunneling Protocol (L2TP)? Are these connections mutually exclusive? When should you use one instead of the other?

A. SSL connections and L2TP connections are not mutually exclusive; for example, you could have an SSL connection inside an L2TP tunnel. However, you would normally use one or the other as performance would likely be impacted by their simultaneous use.

- SSL is an application level of security; and thus requires your networking application (such as Client Access) to support SSL. Client Access Express for Windows fully supports SSL. If you have some data that needs to be encrypted and other data that does not, the Express client makes it easy to set up only some of its applications (for example, PC5250 and Data Transfer) to use SSL. Because SSL is usually easier and quicker to configure than L2TP, it is probably a simpler alternative if your users connect to the Internet only periodically. The Client Access Express for Windows client includes full SSL support when connecting to AS/400 systems at OS/400 V4R4 or later.
- You should use VPN, which is based on industry standards such as L2TP, when you want to create a continuous, long-term connection between a client and a server. Because VPN offers many security features (such as data encapsulation, encryption, and authentication), it is a good choice for connection between servers or for virtual LANs between two networks. You can also use L2TP connection to create a secure VPN between a dial-in client and your home system via a local Internet Service Provider (ISP) instead of dialing long distance or using dedicated lines. OS/400 V4R4 supports L2TP for remote VPN connections.

Q. Does Client Access support VPN (L2TP) connections?

A. VPN connections are handled by the underlying operating systems and are actually transparent to Client Access, which simply uses TCP/IP to make connections. Client Access currently cannot run over a direct VPN connection to an AS/400 system because OS/400 supports only L2TP, and Microsoft Windows 95, 98, and NT 4.0 support only Point-to-Point Tunneling Protocol (PPTP). With the release of Windows 2000, Microsoft indicates it plans to broaden its VPN support to include L2TP (see white paper "Virtual Private Networking (VPN) Security" on the Microsoft web page at www.microsoft.com). If other companies make L2TP client products available for Windows 95, 98, and NT 4.0, the Express client would attempt to test these VPN connectivity options.

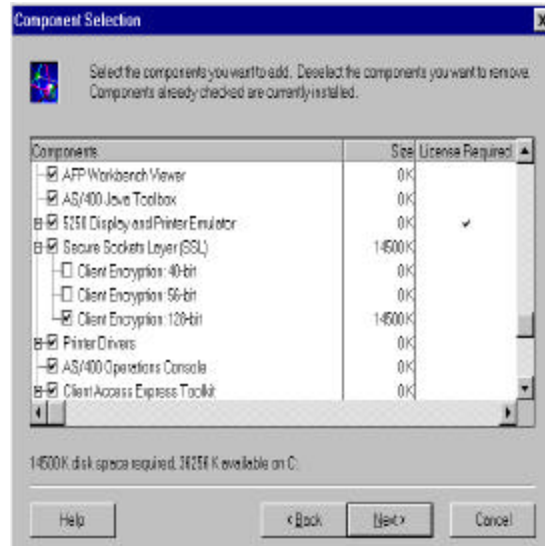
Setting Up Secure Sockets Layer (SSL)

● On AS/400

- Install Cryptographic Access Provider LPP (5769-ACx)
 - ▶ AC1 = 40-bit
 - ▶ AC2 = 56-bit
 - ▶ AC3 = 128-bit
- Install Client Encryption LPP (5769-CEx)
 - ▶ CE1,2,3
- Authorize users to SSLxxx directory

● On PC

- Install client encryption (5769-CEx)
 - ▶ CE1 = 40-bit
 - ▶ CE2 = 56-bit
 - ▶ CE3 = 128-bit



Notes: SSL Pre-reqs

To use the Client Access Express SSL capability, you must connect to AS/400 systems running OS/400 V4R4, and the following licensed program products (LPPs) and options installed on the AS/400:

- 5769-SS1 Option 34 - Digital Certificate Manager (DCM). You need DCM to create your digital authority and to maintain your digital certificates.
- 5769-TC1 - TCP/IP Connectivity Utilities for AS/400
- 5769-DG1 - IBM HTTP Server for AS/400. This product is required to access DCM browser-based interface.
- 5769-ACx - Cryptographic Access Provider. The value x determines the maximum key length permitted by cryptographic algorithms. These cryptographic products create certificate keys. Only 1 is allowed per AS/400 system.
 - 5769-AC1 - 40-bit key length, 5769-AC2 - 56-bit key length, 5769-AC3 - 128-bit key length
- You now need the client counterpart for encryption. You need to install one or more the following no-charge LPPs on an AS/400. These LPPs are best installed on the same AS/400 as you are using to install the Express client code (i.e., the AS/400 system identified as containing the source directories for Client Access 'Check Service Level' to look for updates).
- 5769-CEx - Client Encryption. The value x determines the maximum key length permitted by cryptographic algorithms. This client code can then be downloaded to user PCs running the Express client. You can install the 3 Client Encryption products on one AS/400, but you can only install one product on a PC.
 - 5769-CE1 - Client Encryption (40-bit), 5769-CE2 - Client Encryption (56-bit), 5769-CE3 - Client Encryption (128-bit)

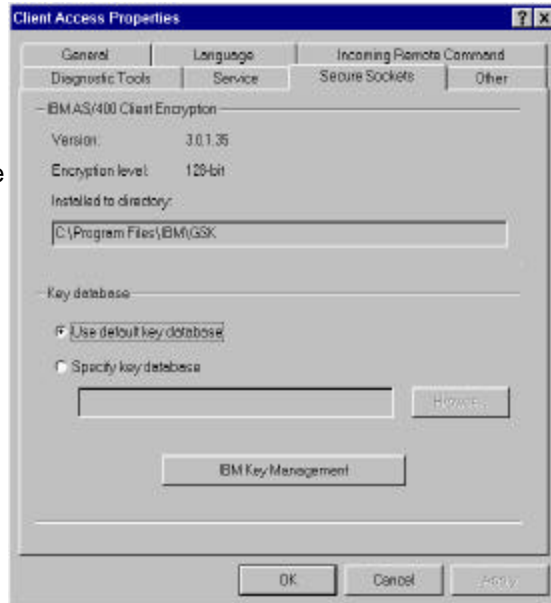
Because of export regulations for products containing encryption technology, the 5769-CEx products are installed on the AS/400 with authority set to 'PUBLIC EXCLUDE'. So before users can install any of these products on their PC, they need to be granted authority to 1 or more of the above Client Encryption products.

- For example to grant user CAROLE authority to use the 128-bit client encryption, the AS/400 administrator would need to run the following command: `CHGAUT OBJ('QIBM/ProdData/CA400/Express/SSL/SSL128') USER(CAROLE) DTAAUT(*RX)`

• If you wanted to grant all users authority to install the 128-bit encryption support on their PCs, you could run the following AS/400 command: `CHGAUT OBJ('QIBM/ProdData/CA400/Express/SSL/SSL128') USER(*PUBLIC) DTAAUT(*RX)`
 Now Express users can click on the 'Selective Setup' icon in the Client Access folder and select one of the above Client Encryption products to be installed. (Note: if you are allowing the Express client 'Check Service Level' function to be used, Client Access will periodically download any updates that get applied to the Client Encryption products on the AS/400.) A new icon IBM Key Management is added to the Express client folder, and a new Secure Sockets tab is added to the Client Access Properties panel.

Certificate Management

- **IBM Key Management utility included as part of CE1,2, or 3.**
- **Obtain Certificate**
 - Recommend using a well-known Certificate Authorities (CA) such as Verisign®
 - ▶ A number of well-known CAs are already stored in the client key database.
 - Using any other type of certificate requires adding a CA to the client.
 - ▶ Express provides **CWBCOSSL** tool that automates getting CA information onto PC



Notes: Digital Certificates

You need to decide what type of digital certificates you are going to use. You could choose to have an Internet Certificate Authority (CA) to issue certificates, or create your own CA and issue private certificates for your Intranet, or use a combination of Internet CAs and your own CA. Detailed information about SSL, digital certificates and network security can be obtained at these web sites:

- AS/400 Information Center web site: <http://www.as400.ibm.com/infocenter/>, select Internet and Secure Networks.
- IBM Vault Registry Software Web site: www.internet.ibm.com/commercepoint/registry/ provides more information about security and trust on the Internet.
- Internet Engineering Task Force: <http://www.ietf.org/> provides information on updates to the standards for certificates.
- VeriSign Information Desk: http://digitalid.verisign.com/info_ctr.htm provides more information about using digital certificates on the Internet.

If you use a well-known Certificate Authority (i.e. Verisign, Thawte, ...) to create and sign your server certificates, there is no additional setup required as the well-known Certificate Authorities certificates are already shipped in the default Client Access Express key database. However, if you are using your AS/400 as a Certificate Authority to create and sign server certificates for any of the Client Access Express servers, then you must perform the following steps for every AS/400 that your PC will use SSL when it communicates:

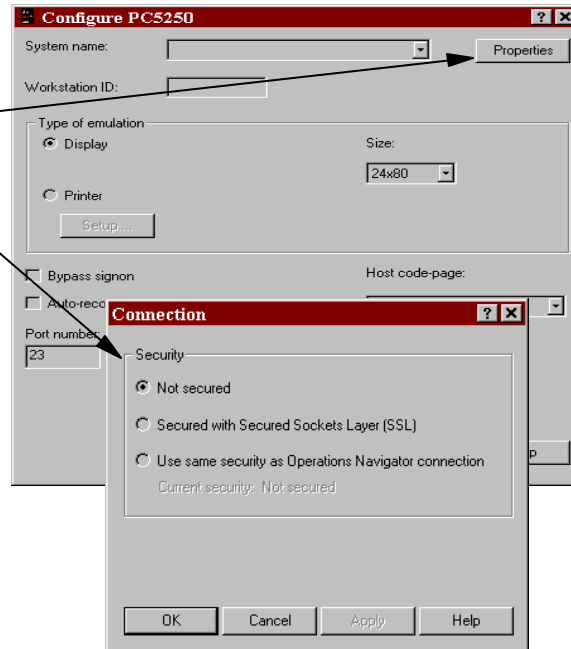
- Add the CA certificate to the default Client Access Express Key database
- Copy the CA to your PC or shared directory (which you are making available for all PC users who are enabled for SSL).

Client Access provides a tool (called CWBCOSSL) that automates the whole process of adding the unknown (i.e., when you are not trusted versions) of CA certificates to the default Client Access Express Key database and copying the CA to the PC or shared directory. This tool is available on the Client Access web page at <http://www.as400.ibm.com/clientaccess/cadownload.htm>. Simply download the self-extracting zip file, called `cwbcossz.exe`. To use this utility you must have Client Access Express Service Pack SF55256 or later installed on your PC. This tool not only sets up all the CA certificates needed by Express, but also handles AS/400 Toolbox for Java, any Java plug-ins, and the Virtual Private Networking (VPN) configuration.

Configure Secured Sockets Layer (SSL)

Security Properties

- Specify if SSL is to be used. This option will be greyed out if CE1/2/3 not installed on PC
- Can override value at connection time
- Policy can require SSL



Notes: Configuring SSL on the client

The Express client uses the TCP/IP Secure Sockets Layer (SSL) Version 3.0 for encryption. The Express client offers the flexibility to not only encrypt the userID and password but to choose what functions of Express (i.e., Operations Navigator, PC5250 emulation, Data Transfer, ODBC) to encrypt. For example, you may wish to encrypt data being transmitted via Data Transfer but find it unnecessary to encrypt data being sent to your PC printer via PC5250 printer emulation. With SSL support, these applications are now able to establish secure communications sessions with their corresponding services.

Enabling SSL on the PC

You have the ability to select from the following options: Do Not Use SSL, Use SSL, or Use Same Security as Operations Navigator Connection (default option). The advantage of using the same security as is enabled for Operations Navigator is that you can enable all functions for a system at one time and have a totally secured environment. However, you must consider that encryption methods do degrade performance (perhaps as much as 20-30%); thus, it may be more advantageous to only use a secured connection for a few specific functions.

- To enable SSL for Operations Navigator, start the Operations Navigator and right-click on the AS/400 you want to enable for SSL, select Properties, then the Connection tab, and check Use Secure Sockets Layer (SSL). A padlock will be added to that AS/400 name to reflect that SSL is being used for that connection.
- If you have not enabled Operations Navigator for SSL, or if you want to enable or disable the other Express client applications differently than Operations Navigator you can do this.
 - For PC5250 sessions, open the session, and from the menu bar click Communication, select Configure, then Properties, then select the SSL option.
 - For Data Transfer sessions, you can selectively set each Data Transfer you define. Start the Data Transfer, and from the menu bar click File, select Properties, then the Connection tab, and select the appropriate SSL option.
 - For ODBC SSL is defined at the data source level so you have the flexibility to secure ODBC requests with different data sources. To set up SSL, start the ODBC Administration task, double-click on the user Data Source you want to work with in the User DSN tab, then select Connection Options, and then you select the SSL setting you wish to use.

You can also use the Express client Policy Editor templates to set up SSL for desktop users. For example, you can define policies for users (or groups of users) by connection environment. For example, when a user is connecting from the 'home' environment, SSL is required; however when using an 'office' environment SSL is not needed.

IBM *@server* iSeries 400 and AS/400e

Safely Using Operations Navigator Security

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Security Wizard

- Configure security using the Security Wizard
- Advises on security system values based on how you use your system

The screenshot displays the AS/400 Security Wizard interface. On the left, the AS/400 Operations Navigator shows a tree view of system components, with 'Security' selected under 'Sys2'. The main window shows the 'AS/400 Security Wizard - Sys2' dialog. The top panel asks, 'Is your AS/400 directly connected to the Internet or in a network that is connected to the Internet?' with radio buttons for 'Yes' (selected) and 'No'. A note below states: 'Note: If you are not sure whether your system is connected to the Internet or if you intend to connect to the Internet in the future, select Yes.' The bottom panel shows a 'Welcome to the AS/400 Security Wizard!' message and instructions: 'Use the wizard to: Create a set of security recommendations for your AS/400. Create reports explaining the security recommendations. Apply the recommendations to your AS/400 (optional). You can cancel at any time by clicking the Cancel button.' Navigation buttons include '< Back', 'Next >', and 'Cancel'.

Permissions

- Set up resource security
- Permissions menu choice available on server objects such as directories, files, and printers

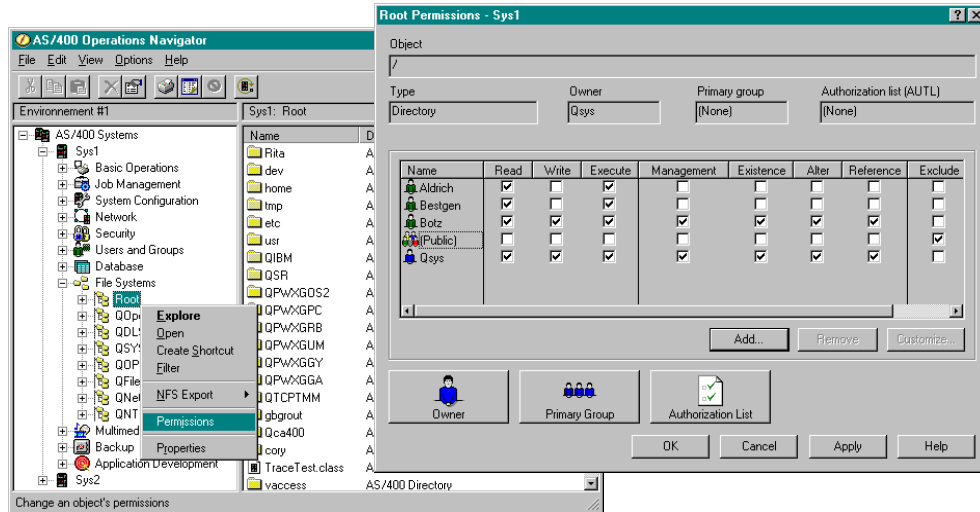
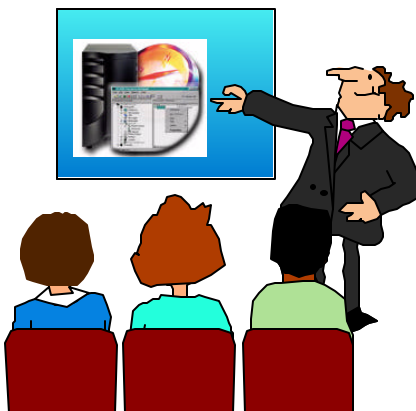


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Summary

- **Operations Navigator continues to grow**
- **In the future it will have huge growth in OS/400 coverage**
- **There is an increasing focus on ease of use and productivity**
 - Additional function delivered via Management Central's distributed system technology
 - Functions that don't just stand alone, but are integrated and cooperate to provide a powerful but easy user interface
 - Wizards, taskpads, help facilities
 - More graphical presentations
 - More integration

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