



IBM System i5™

V5R4 iSeries Navigator tasks on the Web (iSeries Navigator URL Advisor)

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why "i"? it's simple.

Acknowledgements

- This presentation was developed by Will Witten of IBM US.
- Key IBM Rochester development support is appreciated from Tim Kramer.
- Much of the function explanations are based upon V5R4 iSeries Information Center content.
- See Information Center for many examples of setting up and using iSeries Navigator Web.

Topics

- **Evolution of iSeries Navigator**
- **Installation & Setup**
- **V5R4 iSeries Navigator Tasks on the Web**
- **Security**

Requirements

- **Browser-based System Management**
- **Management Functions available from a Single Management Console -- iSeries Navigator**
- **Allow pieces of our GUI to plug into third party applications**

The *Evolution* of iSeries Navigator

Windows Client/Server Application

The screenshot displays the iSeries Navigator interface. The main window is titled "iSeries Navigator" and has a menu bar (File, Edit, View, Help) and a toolbar. The status bar indicates "0 minutes old".

The interface is divided into several panes:

- Environment: My Connections:** A tree view showing the hierarchy of Rchasats, including Basic Operations, Work Management, Server Jobs, Job Queues, Output Queues, Subsystems, Active Subsystems, Memory Pools, Configuration and Service, and Network.
- Rchasats: Active Subsystems:** A table listing active subsystems with their status and active jobs.
- My Tasks - Rchasats:** A task pane showing available actions for the selected subsystems.

Subsystem	Status	Active Jobs	Description
Qase5	Active	1	APPLICATION SERVER - EXPRESS SUB...
Qbatch	Active	0	Batch Subsystem
Qcmn	Active	7	Communications Subsystem
Qctl	Active	1	Controlling Subsystem
Qhttpsvr	Active	9	HTTP SERVER SUBSYSTEM
Qinter	Active	0	Interactive Subsystem
Qserver	Active	18	File Server Subsystem
Qspl	Active	0	Spooling Subsystem
Qsyswrk	Active	94	System Subsystem
Qusrwrk	Active	26	User Subsystem

My Tasks - Rchasats:

- Add a connection
- Install additional components
- Monitor system performance
- View system status
- Monitor jobs
- View system values
- Help for related tasks

1 - 10 of 10 objects

Notes

Originally, iSeries Navigator was originally a Windows client application that interfaced with code on the iSeries server to display systems management data. It had to be installed on each PC that wanted access to such information.

iSeries Navigator (Window operating systems) has over 5 years of function enrichment and continues to be enhanced in V5R4.

We now describe the V5R4 level of the browser-based version of iSeries Navigator, termed *iSeries Navigator tasks on the Web* in Information Center.

This has a broad range of capabilities in V5R4 focused on the iSeries Navigator functions not included under Management Central.

It runs as servlets managed by the i5/OS supplied WAS 6.0 instance systinst/admin. WAS 6.0 with Express licensing is shipped with V5R4 i5/OS.

Many functions available through iSeries Navigator tasks on the Web are similar to functions available through iSeries Access for the Web product 5722-XH2. 5722-XH2 is focused on user-oriented tasks, whereas iSeries Navigator tasks on the Web is focused on administrator-oriented tasks.

This presentation and the Application Development presentation contain information about WAS 6.0.

iSeries Navigator Web: Java Servlet Application

System name: Rchasats Task: Active Subsystems

Refresh

Select	Subsystem	Status	Active Jobs	Description
<input type="checkbox"/>	QASE5	Active	1	APPLICATION SERVER - EXPRESS SUBSYSTEM
<input type="checkbox"/>	QBATCH	Active	0	Batch Subsystem
<input type="checkbox"/>	QCMN	Active	7	Communications Subsystem
<input type="checkbox"/>	QCTL	Active	1	Controlling Subsystem
<input type="checkbox"/>	QHTTPSVR	Active	9	HTTP SERVER SUBSYSTEM
<input type="checkbox"/>	QINTER	Active	0	Interactive Subsystem
<input type="checkbox"/>	QSERVER	Active	16	File Server Subsystem
<input type="checkbox"/>	QSPL	Active	0	Spooling Subsystem
<input type="checkbox"/>	QSYSWRK	Active	94	System Subsystem
<input type="checkbox"/>	QUSRWRK	Active	20	User Subsystem

Page 1 of 1 Total: 10 Filtered: 10 Displayed: 10 Selected: 0

Notes

Now with iSeries Navigator for the Web, it is a java servlet application that resides on an iSeries system and is accessed with a web browser. A user can now access almost all iSeries Navigator data from any web browser on any system or Internet-capable device instead of being limited to just the PC that had the client application installed.

iSeries Navigator tasks on the Web

- **Basic Operations: Messages, User Jobs, Printers, Printer Output, and more**
- **Work Management: Active Jobs, Server Jobs, Output Queues, Subsystems, and more**
- **Network: TCP/IP Servers**
- **Configuration and Service: System Values, Time Management, Disk Status, History Log, and Change Password**
- **Database: Access to and management of many Database objects**

Notes

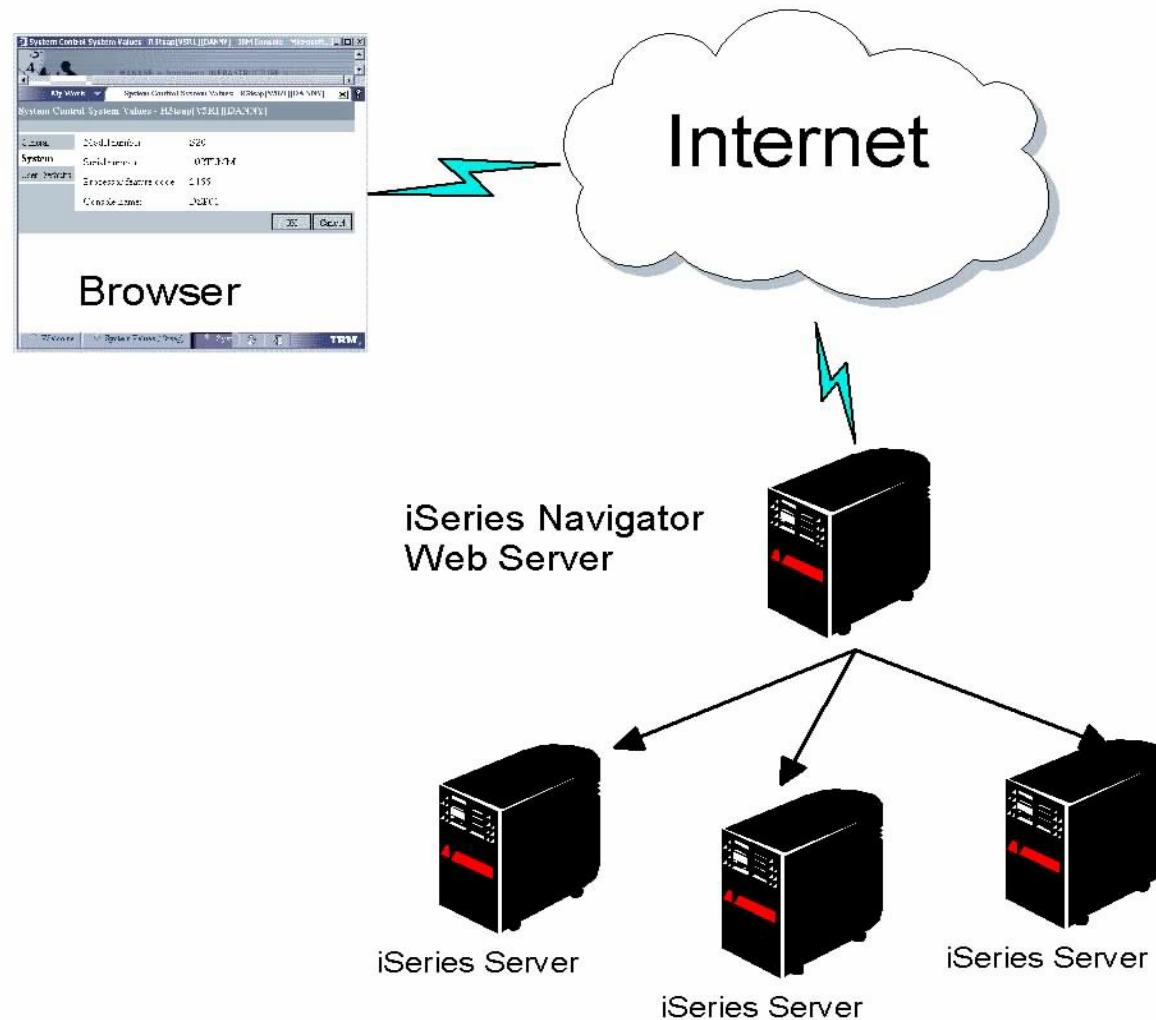
iSeries Navigator tasks on the Web takes a major set of iSeries Navigator for Windows functions and provides a browser-based access to them. This means there is no “application maintenance” required on the client workstation and you still got a lot of interfaces to i5/OS-based functions.

Originally introduce with V5R3 there is a major increase in iSeries Navigator for Windows functions ported to V5R4 iSeries Navigator tasks on the Web. This includes customizing the Browser user’s view and access to functions.

In general, V5R4 iSeries Navigator tasks on the Web functions are management (administration) functions, where as iSeries Access for the Web, another Java servlet-based implementation functions are oriented for the end users.

To view printer output contents on the web, you will need to download the IBM® AFP™ Viewer browser plug-in to your PC. The AFP Viewer plug-in lets you view AFP and SCS output from your web browser. You can download this plug-in by going to the following web site: <http://www-1.ibm.com/support/docview.wss?rs=203&q=afp+plugin&uid=psd1P4000233>

Manage Multiple Systems from a single instance



Notes

Customers can access data from multiple iSeries systems in their network through a single iSeries Navigator web server system. The browser interfaces with the web server system to display data from multiple systems. Only the web server system needs to be at V5R4. Other systems can be at different release levels (N-2 V5R3 or V5R2).

Deliverables

Technology independent iSeries Navigator infrastructure, packaged in 3 flavors:

- iSeries Navigator (PC application)
- iSeries Navigator Tasks for the Web (Servlet)
 - URL addressability
- ISC/Portal application (Virtualization Engine Console)
 - Continue to work requirements/dependencies

Notes

Now iSeries Navigator function runs in three different environments. The important thing to note is that all three environments are using the same code. Only the packaging is different.

The key functions of iSeries Navigator for Windows that are not available to iSeries Navigator for the Web are the Management Central functions.

Exactly where both iSeries Access for Web and iSeries Navigator for the Web, and IBM Director for i5/OS go in the future has not yet been determined. Certainly IBM Director has many cross-platform management functions, but it will take a while for IBM Director to gain all the iSeries Navigator and Management Central functions.

iSeries Navigator for the Web functions can be installed as a plug-in to other applications such as the IBM Virtualization Engine Console.

It is beyond the scope of this presentation to compare all possible "console software" products.

Installation & Setup

- Installed as part of **SS1 Option 3 (ss03)**

- Setup via **HTTP Admin GUI**

- Access via **:2001 port**

- Link on **iSeries Tasks Page**

The screenshot displays the 'HTTP Server Administration on S400LD - Microsoft Internet Explorer' window. The address bar shows 'http://s400ld:2001/HTTPAdmin'. The main content area is titled 'IBM Web Administration for iSeries' and shows the 'General Server Configuration' page for the 'ADMIN - Apache' server. A yellow callout box with the text 'Set both of these to "Yes"' points to two 'Yes' dropdown menus: 'Start the system application server instance when the 'Admin' server is started:' and 'Stop the system application server instance when the 'Admin' server is stopped:'. The interface also shows a left-hand navigation menu with categories like 'Common Tasks and Wizards', 'HTTP Tasks and Wizards', 'Server Properties', and 'Security'. The bottom of the window shows 'OK', 'Apply', and 'Cancel' buttons, and a 'Preview' button.

Notes

No installation is required! iSeries Navigator Tasks for the Web is part of the operating system (option 3). It does, however, need to be setup via the HTTP Admin GUI.

- **Go to the iSeries Tasks page (<http://<web-server-system>:2001>) and select the IBM Web Administration for i5/OS link.**
- **From the top set of tabs, select Manage.**
- **From the set of tabs that appears below those, select HTTP Servers.**
- **From the Server drop down, select ADMIN – Apache.**
- **From the left-hand list of tasks select General Server Configuration under Server Properties.**
- **On the General Settings tab, specify Yes for both Start the system application server instance when the 'Admin' server is started and Stop the system application server instance when the 'Admin' server is stopped.**
- **Press the OK button.**

iSeries Navigator Tasks for the Web runs in the WAS V6 system instance – SYSINST/ADMIN. This setup ensures the system instance is started. You must stop and restart the HTTP admin server.

- **To stop the server, use the command `ENDTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)`.**
 - **To start the server, use the command `STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)`.**
- See the next slide for an example showing SYSINST/ADMIN instance up and running.

Viewing the SYSINST/ADMIN instance

IBM Web Administration for i5/OS

Setup **Manage** Advanced | Related Links

All Servers HTTP Servers | Application Servers | ASF Tomcat Servers

Common Tasks and Wizards

- Create HTTP Server
- Create Application Server
- Migrate Original to Apache
- Create WebSphere Portal
- Create IBM Workplace

Manage All Servers ?

All HTTP Servers All Application Servers All ASF Tomcat Servers

Data current as of Aug 18, 2006 8:21:52 AM.

	Server ▲	Version	Status	Address:Port	Descript
<input type="radio"/>	default/server1	5.0 Base	Stopped	*:2809,8880,9043,9080,9090	
<input type="radio"/>	default/server1	5.1 Base	Stopped	*:2809,8880,9043,9080,9090,9443	
<input type="radio"/>	default/server1	6.0.2.3	Stopped	*:2809,8880,9043,9060,9080,9443	
<input type="radio"/>	default/server1	6.0 ND	Stopped	*:2809,8880,9043,9060,9080,9443	
<input type="radio"/>	iwa60sso/iwa60sso	6.0.2.3	Stopped	*:41044,41045,41046,41047,41048,41049	WAS 6.0 created by CAS wi
<input checked="" type="radio"/>	SYSINST/ADMIN	6.0.2.3	Running	*:4621,4625,4629,4630,4631,4632	

Refresh Start Stop Restart

Manage Details Delete Rename

HTTP ADMIN GUI

- Application Server – SYSINST/ADMIN

System Instance requirements

The following products are required for System Instance:

- **5722-SS1 *BASE V5R4**
- **5722-SS1 option 3**
- **5722DG1: IBM HTTP Server for iSeries**
- **5722SS1: (option 0012): OS/400 Host Servers**
- **5722SS1: (option 0030): OS/400 Qshell**
- **5722JV1: IBM Developer Kit for Java**
- **5722JV1: (option 6): Java Developer Kit 1.4**
- **One of the following:**
 - 5733W60: WebSphere Application Server V6 ("Base")
 - 5733W60: WebSphere Application Server V6 Express

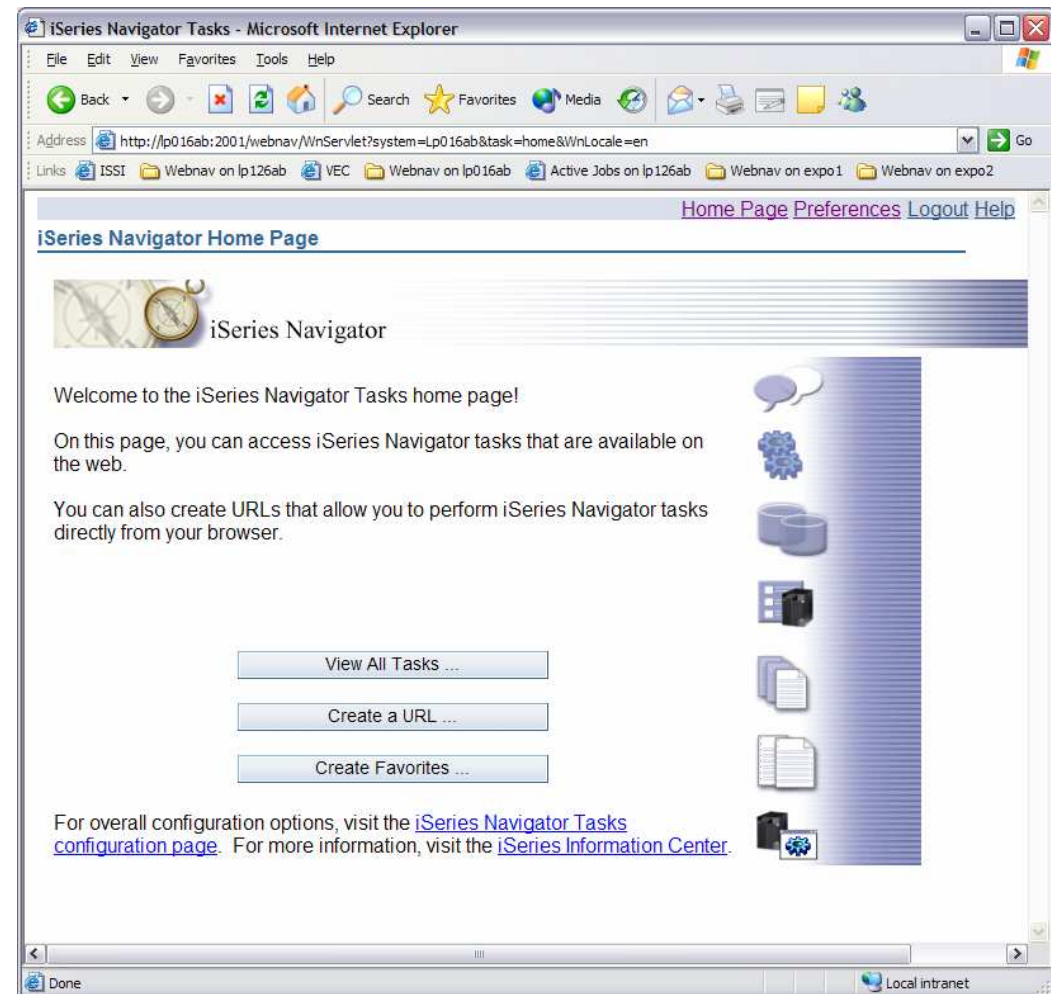
The following products are recommended:

- **5722-SS1 option 34: Digital Certificate Manager (required for SSL)**
- **5722-ACx: Cryptographic Access Provider (required for SSL)**
- **AFP Browser Plug-in (allows viewing spool files from a browser. Look at notes p.10)**

V5R4 iSeries Navigator Tasks on the Web

iSeries Navigator Home Page

- iSeries Navigator home page provides a good starting point for those new to iSeries Navigator Tasks for the Web.
- Can get to the home page from iSeries Tasks Page (<http://<web-server>:2001>) or via URL (task=home)
- Links to list of all iSeries Navigator tasks
- Wizard-like interface for generating customized URLs to tasks
- Creates browser favorites for all iSeries Navigator tasks



Notes

URL to home page is: `http://<web-server-system>:2001/webnav/WnServlet?system=<system>&task=home`

The system specified with the system parameter is the system that is to be managed by webnav. If it is the same as the web server system, it does not have to be specified.

The links at the bottom of the page connect to the configuration task (task=config) where iSeries Navigator Tasks for the Web can be configured and to iSeries Information Center which contains detailed information about webnav.

Accessing one or multiple systems

http://rchasm27:2001/webnav/WnServlet?WnRendererContainer=3&WnProxy=empty&WnRenderer: Go

Search New! 28 blocked Check AutoLink AutoFill

[Home Page](#) [Preferences](#) [Logout](#) [Help](#)

iSeries Navigator Tasks

System

Specify the iSeries system where the tasks are to be performed.

Target system: Go

Optionally specify a user ID to use on the target system (if different than current user ID).

User ID:

Database

Specify the database and schema to be used for the database tasks.

Database: Browse...

Schema: Browse...

OK Cancel

Local intranet

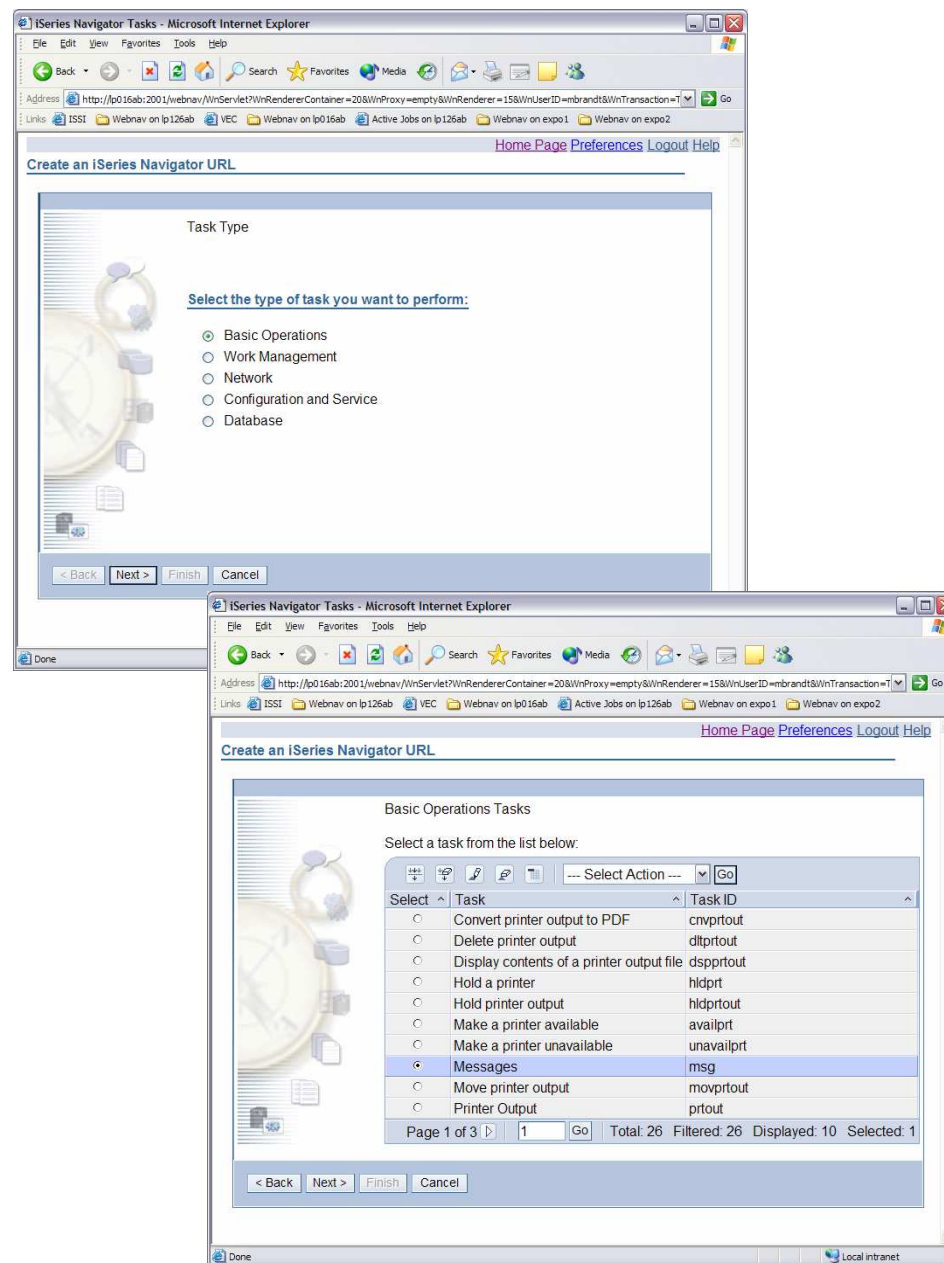
Notes

This is the base, general connection page where you specify the system on which the iSeries Navigator for Web functions will run.

You also see the default database schema to be used by any of the iSeries Navigator for Web database functions.

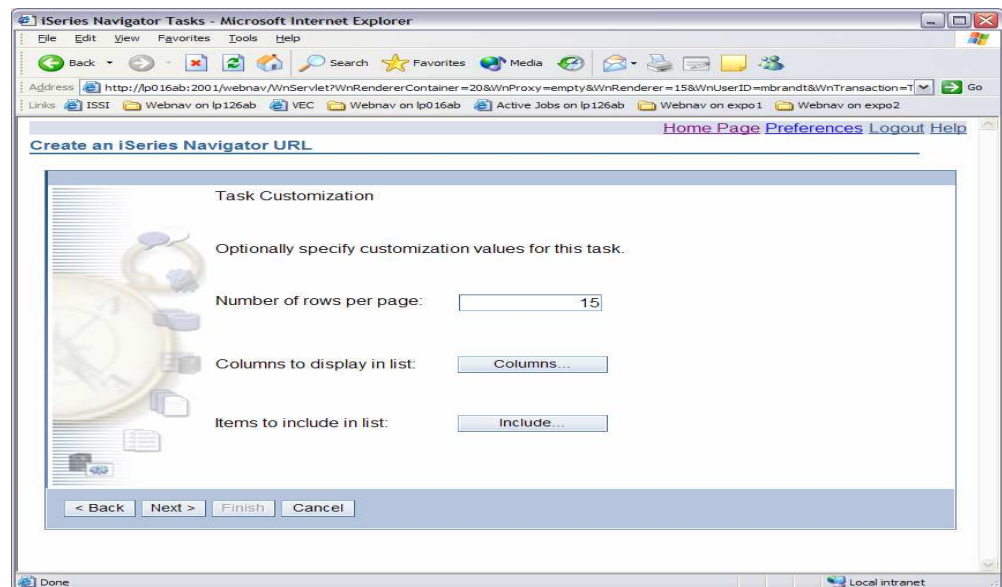
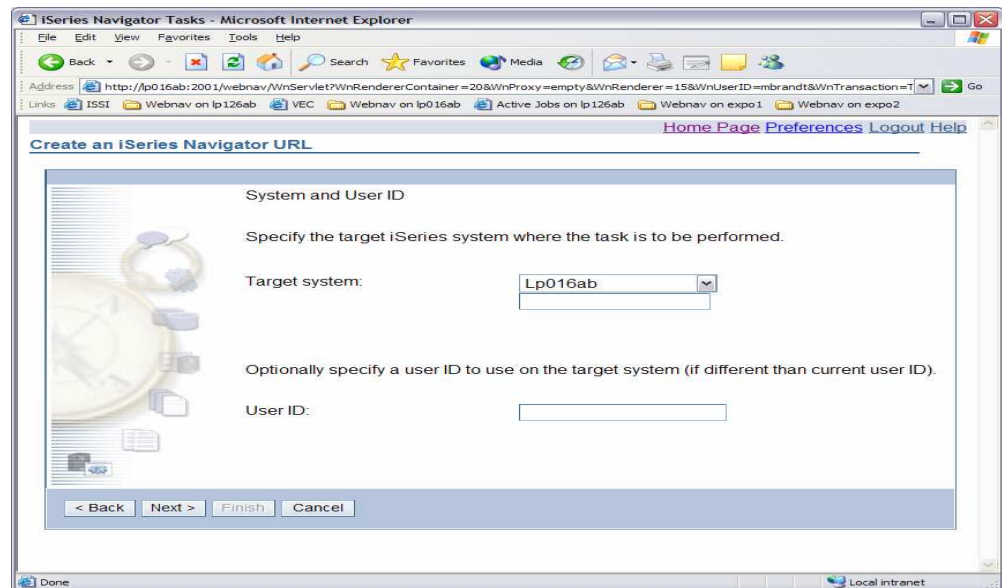
URL Wizard

- **URL wizard guides user through creating a customized URL to an iSeries Navigator task**
- **First, user is asked to select the type of task to perform**
- **The type of task determines the list of tasks presented in the next page**
- **Next, the user selects the specific task to perform**



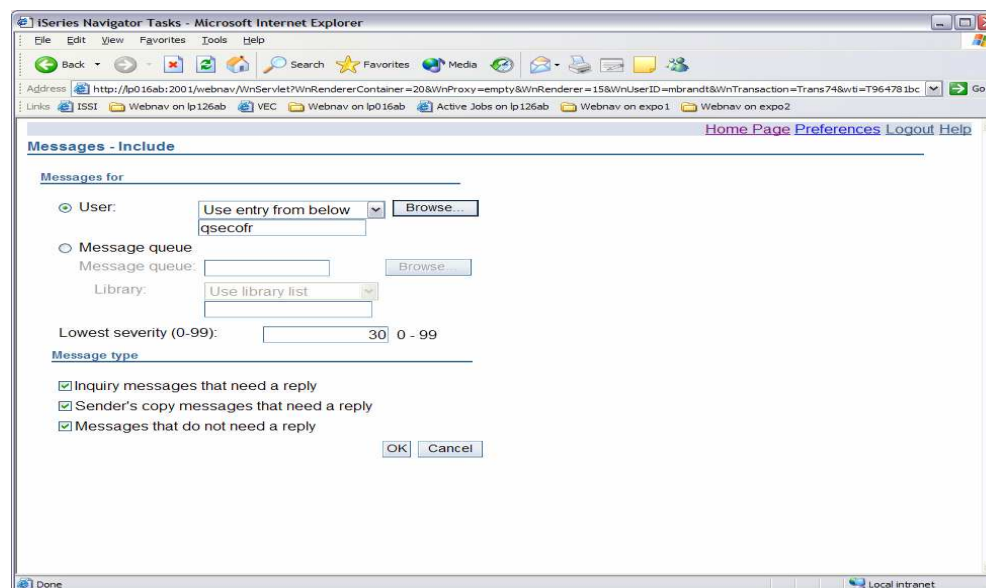
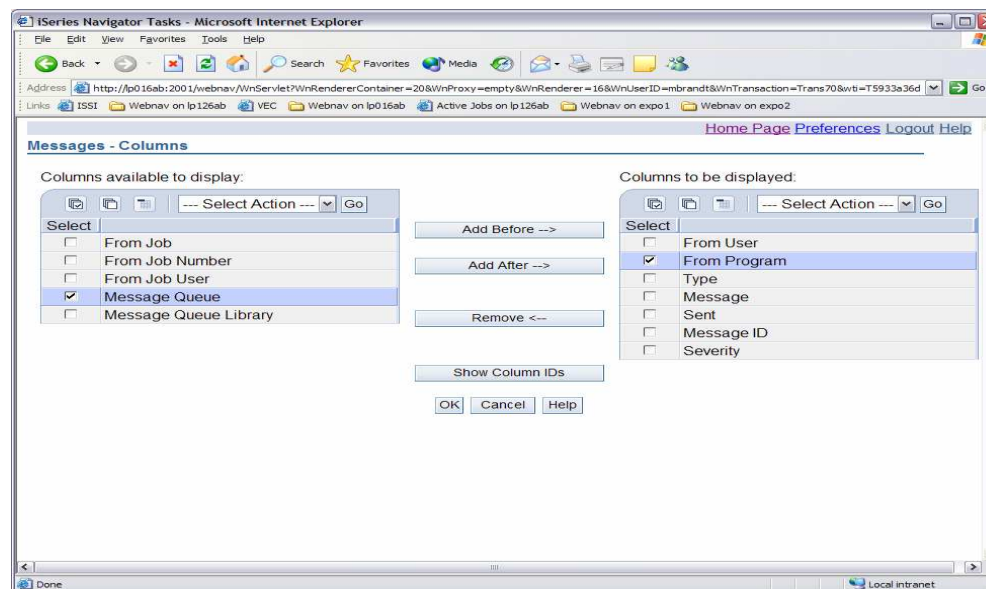
URL Wizard continued

- **User specifies what system where the task is to be performed and the user ID to use on that system (if different than current signed-on user)**
- **If task will result in a list of data, the user can customize how that data appears**
 - Number of items to be shown per page
 - Which columns of data to show and in what order
 - What data to include in the list



URL Wizard continued

- **Columns and Include buttons are similar to specifying Columns and Include actions from an iSeries Navigator list**
- **However, the Columns and Include data specified here is just used in the URL**
- **It is not persistent as it is when specified from an iSeries Navigator list**
- **Columns and Include data specified in the URL overrides any persistent Columns and Include data**



Notes

This slide depicts columns and include data customizations for handling messages.

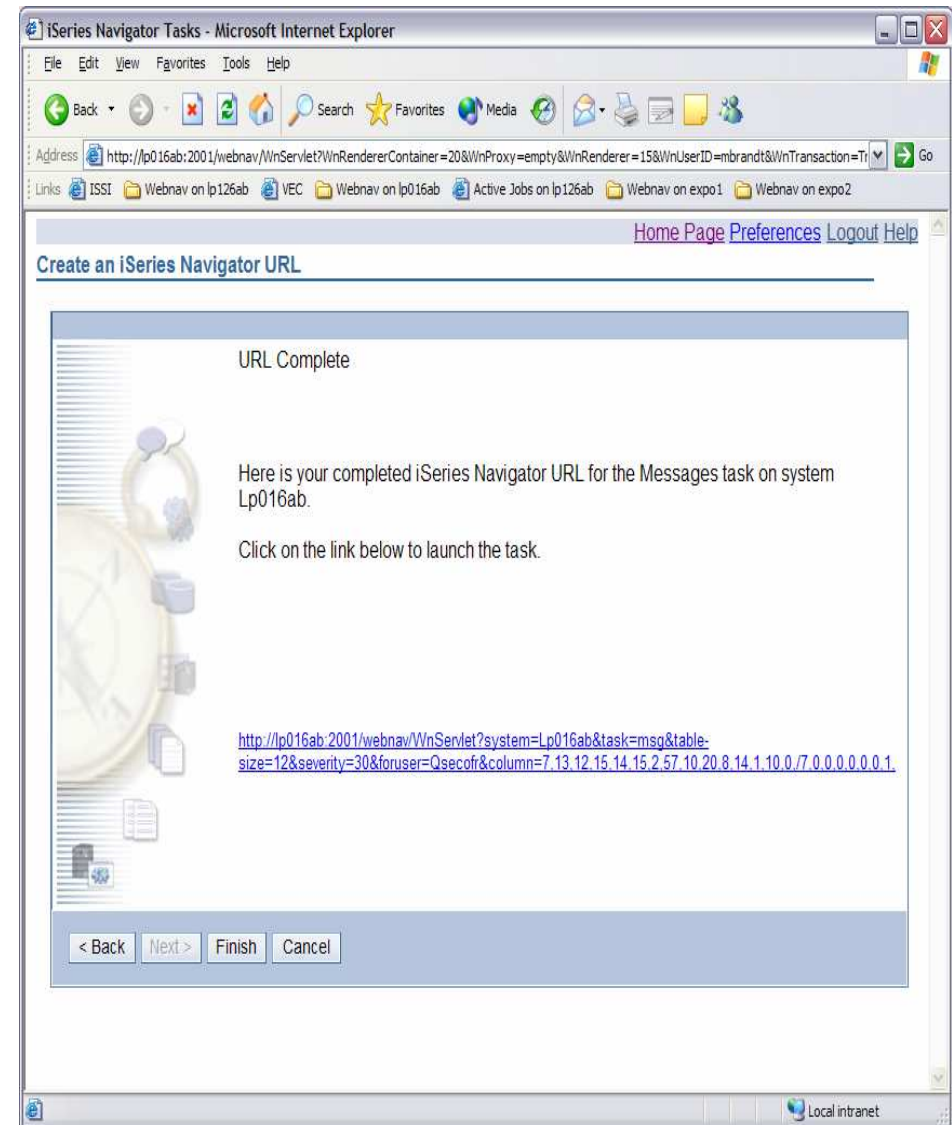
The Columns and Include data which is specified from an iSeries Navigator list (from either the context menu or View -> Customize this view menu item on the iSeries Navigator client application or from the actions drop down for a list rendered on the web) is persistent meaning that the data will be used every time the list is brought up by the user until the user changes it.

In the URL wizard, the Columns and Include data specified is dynamic, meaning that it will be appended to the URL generated and will only be used for invocations of that URL. That Columns and Include data will also override any persistent Columns and Include data previously specified for the list. When Columns and Include data is specified on the URL, that data is used to determine the columns and list data shown.

This dynamic Columns and Include data allows the user to customize the list without making it their default for the list.

URL Wizard continued

- **The generated URL is displayed and can be invoked from this page**
- **Once invoked, the user can save it to their favorites**
- **The URL contains parameters with data from the wizard**
 - Task to be invoked (task)
 - System to run task for (system)
 - User ID to use for the task (user)
 - Any customizations (table-size, columns, any include parameters)



Notes

Parameters are only included in the URL if the user specified a value for them. The only parameter that is required is *task*. The others are all optional.

The include parameters will vary from task to task. In the above example, foruser and severity are Include parameters.

The URL can be deciphered as follows:

- `task=msg` – The Messages list will be displayed
- `system=lp016ab` – The messages on system lp016ab will be shown
- `table-size=12` – There will be 12 messages shown per page in the list of messages
- `severity=30` – Only messages of severity 30 or higher will be shown
- `foruser=Qsecofr` – Only messages for Qsecofr will be shown
- `columns=7,13,12,15,14,15,2,57,10,20,8,14,1,10,0/7,0,0,0,0,0,0,1` – Specifies the columns that should be shown along with their width and alignment information. The columns are identified by column ID number which are unique for each task.

The user parameter was not specified, so the currently signed-on user will be used.

Lists on the Web

- **iSeries Navigator lists are rendered differently on the web, yet provide the same functionality**
- **Actions that affect the entire list as well as actions specific to selected items in the list are available from the actions drop down**
- **Context menu for a specific item in the list available by clicking on arrow after item name**

The screenshot shows a web browser window titled "iSeries Navigator Tasks - Microsoft Internet Explorer". The address bar shows a URL starting with "http://lp016ab:2001/webnav/". The page content is titled "Active Jobs - Lp016ab" and displays a table of active jobs. The table has columns for "Select", "Job Name", "Details", "CPU...", "Run...", and "Thread...". A context menu is open over the "Qbatch" job, showing various actions such as "Reset Statistics", "Printer Output", "Job Log", "Details > Call Stack", "Details > Library List", "Details > Locked Objects", "Details > Open Files > Library Objects", "Details > Open Files > File System Objects", "Details > Threads", "Details > Elapsed Performance Statistics", "Properties", "Columns...", "Sort...", "Include...", "Reset Statistics", "Show find toolbar", and "Table Actions". The "Table Actions" menu is also open, showing options like "Select All", "Deselect All", "Show Filter Row", "Clear All Filters", "Edit Sort", "Clear All Sorts", and "Collapse Table".

Select	Job Name	Details	CPU...	Run...	Thread...
<input checked="" type="checkbox"/>	Qbatch	Wait req	0	0	2
<input type="checkbox"/>	Qcmn	Wait req	0	0	2
<input type="checkbox"/>	Qacsotp	Wait req	0	20	1
<input type="checkbox"/>	Qlzpssvr	Wait req	0	20	1
<input type="checkbox"/>	Qnmapingd	Wait req	0	25	1
<input type="checkbox"/>	Qnmarexecd	Wait req	0	25	1
<input type="checkbox"/>	Qnpssvr	Wait req	0	20	1
<input type="checkbox"/>	Qzrcsvr	Wait req	0	20	1
<input type="checkbox"/>	Qzscsvr	Wait req	0	20	1
<input type="checkbox"/>	Qcti	Wait req	0	0	2

Page 1 of 18 | 1 | Go | tted: 1

The information in this list is 5 minutes old. Press the Refresh button to update.

Close

Notes

Lists are rendered in a manner consistent with how a web-user would expect to see them. The functionality is the same. Only the “look” is different.

The drop down menu provides actions that affect the entire list (i.e. Columns, Include) as well as actions specific to the currently selected items (i.e. Printer Output, Job Log).

After selecting an action from the drop down menu, the Go button must be pressed to invoke it. Clicking on the arrow icon next to an individual item brings up the context menu for the item. This menu includes only those actions valid for that item.

Additional List Features

- **Button to refresh list data**
- **Tool bar to manipulate data**
 - Sort on multiple columns
 - Filter list data
 - Select / deselect all
- **Navigation area**
 - Page forward or backward
 - Go directly to a specific page
- **List status information**
 - Number of items in list
 - Number of items filtered
 - Number of items displayed
 - Number of items selected
- **List “freshness indicator”**
 - Indicates how recently the data was retrieved from the iSeries

The screenshot shows the 'Active Jobs - Lp016ab' page in a Microsoft Internet Explorer browser. The page displays a table of active jobs with columns for 'Select', 'Job Name', 'Detailed St...', 'Current ...', 'Type', 'CPU...', 'Run ...', and 'Thread ...'. The first job, 'Qbatch', is selected. A toolbar above the table includes a 'Refresh' button (circled in red), a 'Select Action' dropdown, and a 'Go' button. Below the table, a status bar shows 'Page 1 of 18', '1' in a search box, 'Go', 'Total: 179', 'Filtered: 179', 'Displayed: 10', and 'Selected: 1'. A message at the bottom states: 'The information in this list is 5 minutes old. Press the Refresh button to update.' (circled in red). A 'Close' button is also visible.

Select	Job Name	Detailed St...	Current ...	Type	CPU...	Run ...	Thread ...
<input checked="" type="checkbox"/>	Qbatch	Waiting for dequeue	Qsys	Subsystem	0	0	2
<input type="checkbox"/>	Qcmn	Waiting for dequeue	Qsys	Subsystem	0	0	2
<input type="checkbox"/>	Qacsotp	Waiting for request	Quser	Prestart communications	0	20	1
<input type="checkbox"/>	Qlzpssrv	Waiting for request	Quser	Prestart communications	0	20	1
<input type="checkbox"/>	Qnmapingd	Waiting for request	Quser	Prestart communications	0	25	1
<input type="checkbox"/>	Qnmarexecd	Waiting for request	Quser	Prestart communications	0	25	1
<input type="checkbox"/>	Qnpservr	Waiting for request	Quser	Prestart communications	0	20	1
<input type="checkbox"/>	Qzrcsvr	Waiting for request	Quser	Prestart communications	0	20	1
<input type="checkbox"/>	Qzscsvr	Waiting for request	Quser	Prestart communications	0	20	1
<input type="checkbox"/>	Qcti	Waiting for dequeue	Qsys	Subsystem	0	0	2

Notes

The tool bar icons from left to right are as follows:

Select all – Selects all items in the list

Deselect all – Deselect all items in the list

Show filter row – Shows an additional row underneath the column headings that indicate whether a filter is set for particular column. A filter limits the amount of data shown in the list. A filter can be set by clicking on the filter indicator for the column you want to filter on. Once set, the filter row will indicate a filter is set for that column. If filter row is already showing, this tool button becomes Hide filter row which will make the filter row disappear. It should be noted that filters are not related to Include in the actions drop down.

Clear all filters – Clears all filters set for the list. All data in the list will be shown.

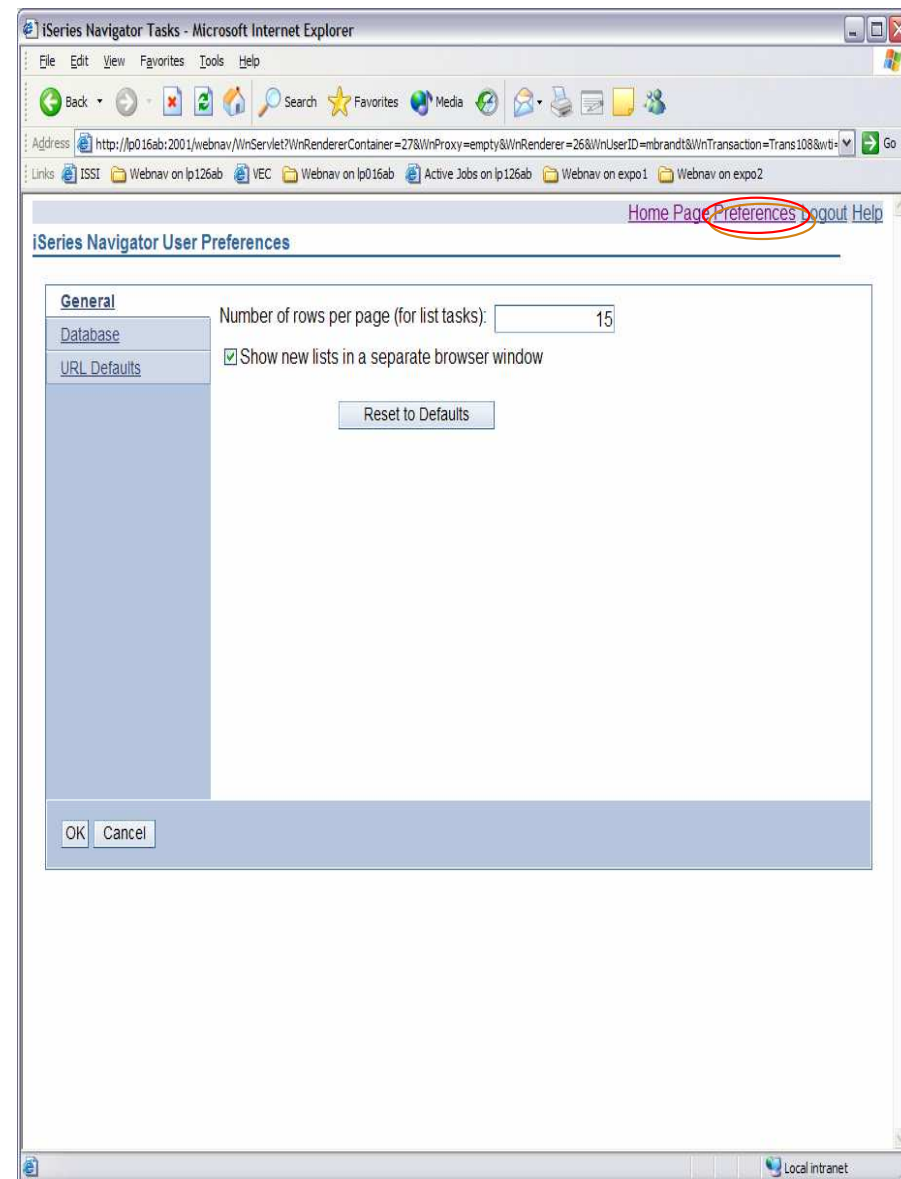
Edit sort – Brings up a sort section in the list. From this section, the user can specify up to three columns to sort on and how to sort them (ascending or descending). Once sort criteria is specified and the OK button is pressed, the sort section will disappear and sort indicators will appear for those sorted columns. The indicators show the priority of the sorts (1, 2, 3) and what order (up arrow is ascending and down arrow is descending)

Clear all sorts – Clears all sorts from the list. The data in the list appears in its original order

Collapse table – Collapses the table so no list data can be seen. Once collapsed, this tool buttons becomes Expand table and will show the list data once again.

iSeries Navigator Preferences

- Preferences for webnav can be set through the preferences task (task=pref)
- Also a link at the top of any iSeries Navigator web page
- **General Preferences**
 - Number of list items shown per page
 - Indicate if new lists are shown in separate window
- **Database Preferences**
 - Naming option
- **URL Parameter Defaults**
 - Target system
 - User ID
 - Database
 - Schema



Notes

These properties are stored in the Java registry and can only be changed through this interface. They are user-specific, meaning changes made by a user only affect that user.

V5R4 Tasks on the web

(**Tasks in Blue were added in V5R4)

Basic operations

- Messages (msg)
- System Operator Messages (sysoprmsg)
- **QSYSMSG messages (qsysmsg)
- Send a Message (sndmsg)
- Printer Output (prtout)
- ** Display Printer Output (dspprtout)
- ** Reply to a Message for Printer Output (rpyprtout)
- ** Release Printer Output (rlsprtout)
- ** Move Printer Output (movprtout)
- ** Delete Printer Output (dltprtout)
- ** Convert Printer Output to PDF (cnvprtout)
- ** Printer Output Properties (prtoutprop)
- User Jobs (usrjob)
- ** Printers (prt)
- ** Reply to a message for a Printer (rpyprt)
- ** Hold a Printer (hldprt)
- ** Release a Printer (rlsprt)
- ** Start a Printer (startprt)
- ** Stop a Printer (stopprt)
- ** Restart a Printer (restartprt)
- ** Printer Properties (prtprop)
- ** Make a Printer Available (availprt)
- ** Make a Printer Unavailable (unavailprt)

Work Management

- Active Jobs (actjob)
- Server Jobs (svrjob)
- Active Subsystems (sbs)
- Output Queues (outq)
- ** Clear and Output Queue (clroutq)
- ** Hold an Output Queue (hldoutq)
- ** Release and Output Queue (rlsoutq)
- Delete a Job (dltjob)
- Hold a Job (hldjob)
- Release a Job (rlsjob)
- Move a Job (movjob)
- Work with a Job (wrkjob)
- Job Properties (jobprop)
- Display Joblog for a Job (joblog)
- Display Locked Objects for a Job (lockobj)
- Display Call Stack for a Job (callstack)
- Display Open Files for a Job (openfiles)
- Display Library List for a Job (liblist)
- Display Performance Statistics for a Job (perfstats)
- Display Threads for a job (threads)
- ** All Job Queues (alljobq)
- ** Active Job Queue (actjobq)
- ** Hold a Job Queue (hldjobq)
- ** Release a Job Queue (rlsjobq)
- ** Clear a Job Queue (clrjobq)
- ** Active Memory Pools (actpool)
- ** Shared Memory Pools (shrpool)
- ** System Status (syssts)

V5R4 Tasks on the Web - Continued

■ Database

- All Objects (db.allobj)
- Aliases (db.alias)
- Create an Alias (db.crtalias)
- Constraints (db.cst)
- Indexes (db.idx)
- Create an Index (db.crtidx)
- Sequences (db.seq)
- Create a Sequence (db.crtseq)
- Tables (db.tbl)
- Create a Table (db.crttbl)
- Distinct Types (db.typ)
- Create a Distinct Type (db.crttyp)
- Journals (db.jrn)
- Journal Receivers (db.jrnrcv)
- SQL Procedures (db.proc)
- SQL Packages (db.pkg)
- Create a Schema (db.crtschema)
- Select Schema (db.selschema)
- Triggers (db.trg)
- Views (db.view)
- Functions (db.func)
- ** Table Partitions (db.tblpart)
- ** Schemas (db.schema)
- ** Databases (db.database)
- ** Table Indexes (db.tblidx)
- ** Performance Monitors (db.perfmon)
- ** Create Performance Monitor (db.crtmon)
- ** Import Data (db.import)
- ** Export Data (db.export)
- ** Index Advisor (db.idxadv)

■ Configuration and Service

- Work with System Values (sysval)
- Time Management (timemgmt)
- ** Disk Status (dsksts)
- ** Change Password (chgpwd)
- ** History Log (dsplog)

■ Network

- ** TCP/IP Servers (tcpsvr)
- ** Universal Connection Wizard (ucw)

■ General iSeries Navigator Tasks

- iSeries Navigator Tasks Home Page (home)
- ** View All Tasks (list)
- ** Trace Levels (trace)
- ** User Preferences (pref)
- ** Configuration Options (config)
- ** Command Prompter (runcmd)
- ** Work with Jobs (wrkjobs)
- ** Work with Messages (wrkmsgs)
- ** Work with Printer Output (wrkprtout)

Notes

This slide and the previous slide list all of the iSeries Navigator tasks that are available on the web. Those tasks that appear in blue were added to the web in V5R4. In the parenthesis after each task name is the task value used in the URL (task=).

Using the i5/OS-provided HTTP *ADMIN server you can start the i5/OS-supplied WAS V6.0 instance known as sysinst/admin, which is where the iSeries Navigator tasks on the Web java servlets are installed the first time you start sysinst/admin. Thereafter you can customize the look of the window shown to you and which functions (Java servlets – URL (tasks) you can generate URLs for.

The next set of slides show some simple examples of the basic iSeries Navigator for the Web functional categories.

You could use the URL Advisor to build URLs that can link directly to these and customized versions of these example windows. Note the list and actions shown on the different examples. Many more examples than those shown are available.

Basic Operations, no customization example

[Home Page](#) [Preferences](#) [Logout](#) [Help](#)

iSeries Navigator Tasks - Localhost

Basic Operations	Lists	Actions	
Work Management	Printer Output	Hold printer output	Start a printer
Network	Printers	Display contents of a printer output file	Stop a printer
Configuration and Service	Messages	Printer output properties	Restart a printer
Database	System operator messages	Release printer output	Printer properties
	QSYSMSG messages	Move printer output	Make a printer available
	User Jobs	Delete printer output	Printer output for a printer
		Convert printer output to PDF	Make a printer unavailable
		Reply to a message for printer output	Send a message
		Hold a printer	Run Command
		Release a printer	

Work Management, no customization example

Home Page Preferences Logout Help

iSeries Navigator Tasks - Localhost

	Lists	Actions	
Basic Operations			
Work Management	Output Queues	Clear an output queue	Display the library list for a job
Network	Active Jobs	Hold an output queue	Display the locked objects for a job
Configuration and Service	Server Jobs	Release an output queue	Display the open files for a job
Database	Active Subsystems	System Status	Display the threads for a job
	Active Job Queues	Hold a job	Display the performance statistics for a job
	All Job Queues	Release a job	Work with a job
	Active Memory Pools	Delete a job	Hold a job queue
	Shared Memory Pools	Display job properties	Release a job queue
		Move a job	Clear a job queue
		Display the job log for a job	
		Display the call stack for a job	

Network - servers, no customization example

[Home Page](#) [Preferences](#) [Logout](#) [Help](#)

TCP/IP Servers - Rchasm27

Refresh

--- Select Action --- Go

Select ^	Name ^	Status ^	Description ^
<input type="checkbox"/>	ASFTomcat	Started	ASFTomcat Basic Servlet and JSP Engine for the Apache Web Server
<input type="checkbox"/>	BootP	Stopped	BootP Server
<input type="checkbox"/>	BootP DHCP Relay Agent	Stopped	BootP DHCP Relay Agent
<input type="checkbox"/>	CIMOM	Stopped	CIM Object Manager
<input type="checkbox"/>	DDM	Started	DRDA DDM Server TCP/IP
<input type="checkbox"/>	DHCP	Stopped	Dynamic Host Configuration Protocol
<input type="checkbox"/>	DLFM	Stopped	Datalink File Manager
<input type="checkbox"/>	EDRSQL	Stopped	Extended Dynamic Remote SQL
<input type="checkbox"/>	FTP	Started	File Transfer Protocol
<input type="checkbox"/>	HTTP Administration	Started	HTTP Server
<input type="checkbox"/>	IBM Directory Server	Started	IBM Directory Server for iSeries (LDAP)
<input type="checkbox"/>	INETD	Stopped	Internet Daemon (INETD) Super Server
<input type="checkbox"/>	iSeries Netserver	Started	iSeries Support for Windows Network Neighborhood
<input type="checkbox"/>	LPD	Started	Line Printer Daemon
<input type="checkbox"/>	Management central	Started	Management central

Configuration and Service, no customization example

Home Page Preferences Logout Help

iSeries Navigator Tasks - Localhost

Basic Operations	Lists	Actions
Work Management		
Network	System Values	Change Password
Configuration and Service	Time Management	
Database	History Log	
	Disk Status	

Database, no customization example

[Home Page](#) [Preferences](#) [Logout](#) [Hel](#)

iSeries Navigator Tasks - Localhost

	Lists		Actions	
Basic Operations	Aliases	Sequences	Create Alias	Health Center
Work Management	All Objects	Tables	Create Index	Import Data
Network	Constraints	Triggers	Create Schema	Export Data
Configuration and Service	Functions	Distinct Types	Create Sequence	Table Indexes
Database	Indexes	Views	Create Table	Table Partitions
	Journals	Schemas	Create Distinct Type	Table Partitions
	Journal Receivers	Databases	Select Schema	null
	SQL Packages	Performance Monitors	Create Performance Monitor	Index Advisor
	SQL Procedures			

Database – schema actions, no customization example

Home Page Preferences Logout Help

Database - Schemas - Rchasm27

Refresh

Select	Name
<input type="checkbox"/>	CASETUP
<input type="checkbox"/>	JOON
<input type="checkbox"/>	JOON1
<input checked="" type="checkbox"/>	ONLABZZ
<input type="checkbox"/>	PFREXP
<input type="checkbox"/>	QGPL
<input type="checkbox"/>	QTEMP
<input type="checkbox"/>	QUSRSYS
<input type="checkbox"/>	QUSRSYS

Page 1 of 1 Total: 9

The information in this list is 31 minutes old

Close

--- Select Action ---

- Select Action ---
- Change Description...
- Generate SQL...
- Index Advisor > Index Advisor
- Index Advisor > Clear All Advised Indexes
- Index Advisor > Prune Advised Indexes
- Remove from List
- Delete...
- Rename...
- New > New > Alias
- New > New > Distinct Type
- New > New > Function > External
- New > New > Function > SQL
- New > New > Function > Sourced
- New > New > Index
- New > New > Journal
- New > New > Procedure > External
- New > New > Procedure > SQL
- New > New > Sequence
- New > New > Table > Table
- New > New > Table > Materialized Query Table
- New > New > Trigger > External
- New > New > Trigger > SQL
- New > New > View

Select Schemas to Display

New > Schema

Show find toolbar

--- **Table Actions** ---

V5R4 iSeries Navigator tasks on the Web Security

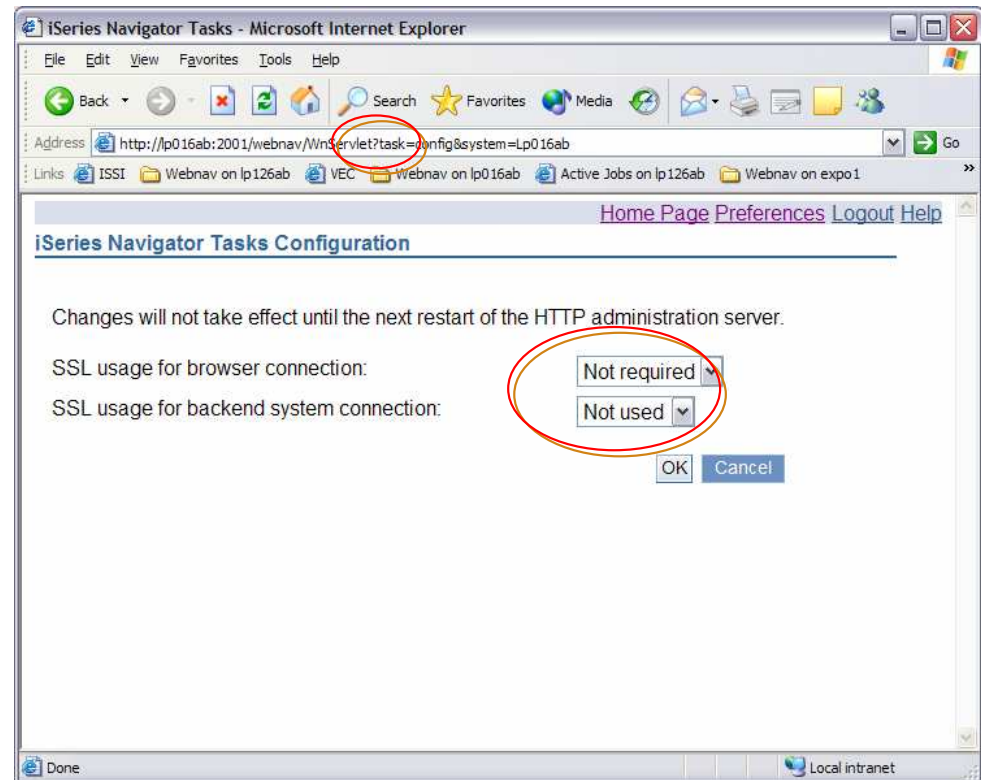


SSL

- **There are two kinds of Secure Socket Layer (SSL) connections that you need to consider configuring in order to run iSeries Navigator tasks on the Web securely:**
- **The first type of SSL connection is used in a connection between a Web browser and the iSeries system that is hosting iSeries Navigator tasks on the Web.**
- **The second type of SSL connection is used by the iSeries Navigator tasks on the Web interface to retrieve data from the local iSeries and any managed secondary systems.**

Authentication Filter & SSL Warning

- By default, customers receive a **WARNING MESSAGE** when first connecting to webnav.
- If the iSeries machine is safely behind a firewall, this can be switched off.
- Controlled by parameters in webnav.properties, or by using the Configuration task (task=config)
- Recommended reading:
<http://publib.boulder.ibm.com/infocenter/iseries/v5r4/index.jsp?topic=/rzatg/rzatgsecurity.htm> (setup security)



Notes

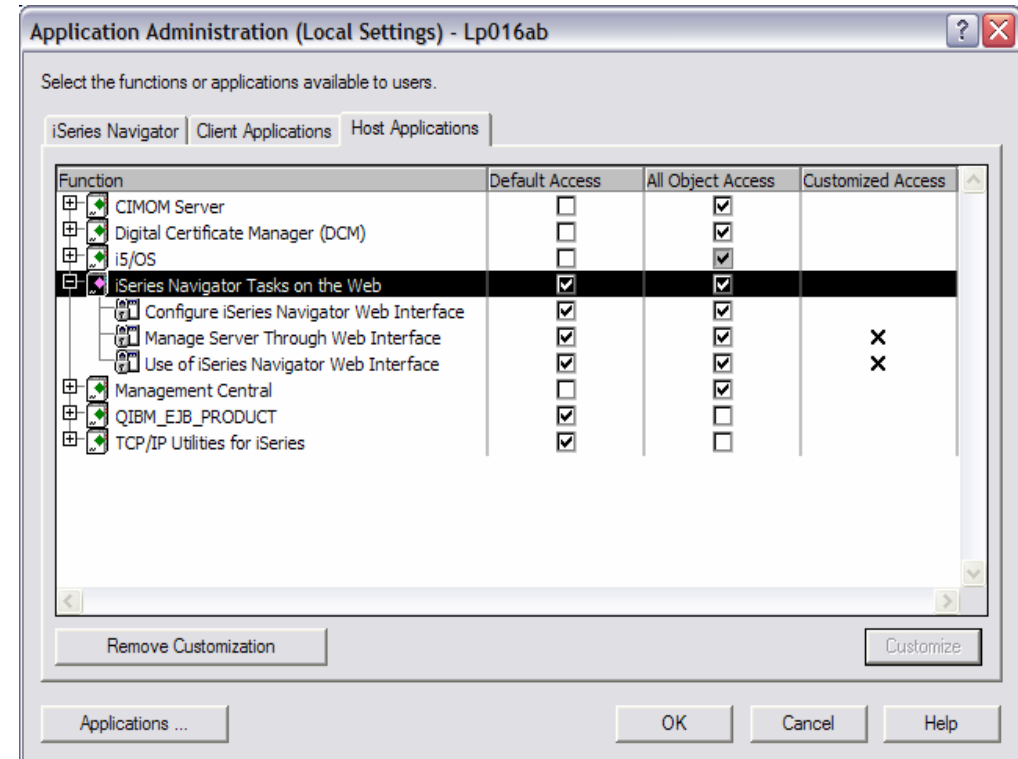
To turn off SSL warning, set SSL usage for browser connection to Not required and SSL usage for backend system connection to Not used. Changes to these settings apply to all users.

To change it within the webnav.properties file:

- **edit file /QIBM/UserData/OS400/iSeries Navigator/config/webnav.properties.**
- **Add or change properties httpSSL=notrequired and SocketConnectionSSL=notused.**

Controlling Access to iSeries Navigator Tasks for the Web

- **User access to iSeries Navigator Tasks for the Web is controlled by Application Administration**
 - Whether the user can configure webnav on the server
 - Whether the user can manage the server using webnav
 - Whether the user can use webnav from this server
- **Initially set to All Object access level**
- **Access to individual webnav tasks also controlled by AppAdmin settings**
- **AppAdmin is configured using the PC Client version of iSeries Navigator**



Notes

To get to webnav settings in AppAdmin, in iSeries Navigator, right-click on the system to configure and select Application Administration. Click on the Host Applications tab and expand iSeries Navigator Tasks for the Web. The default setting is All Object Access which means that only users with all object access have authority to use webnav. If a customer wants other users to have access to webnav, these settings will have to be either customized for specific users or access given to all users (Default Access).

Access to iSeries Navigator functions as specified in AppAdmin are used by webnav. For example, if a user was denied access to Active Jobs through AppAdmin, that user will not have access to Active Jobs (task=actjob) on the web.

Any changes made to AppAdmin settings will require the iSeries Navigator web application to be restarted due to caching of access values. To do this, go to the HTTP Administration web page (<http://<system-name>:2001/HTTPAdmin>). Click on the Manage tab and then click on the Application Servers tab. Select SYSINST/ADMIN – V6 from the Server drop down. Click on Manage Installed Applications in the left-hand pane. From the list of applications, select iSeries Navigator and press the Stop button. Once stopped, press the Start button to restart the application. This can also be accomplished by restarting the HTTP Admin server. However, be aware that other applications may be using it.

iSeries Nav Tasks on the Web



THANKS

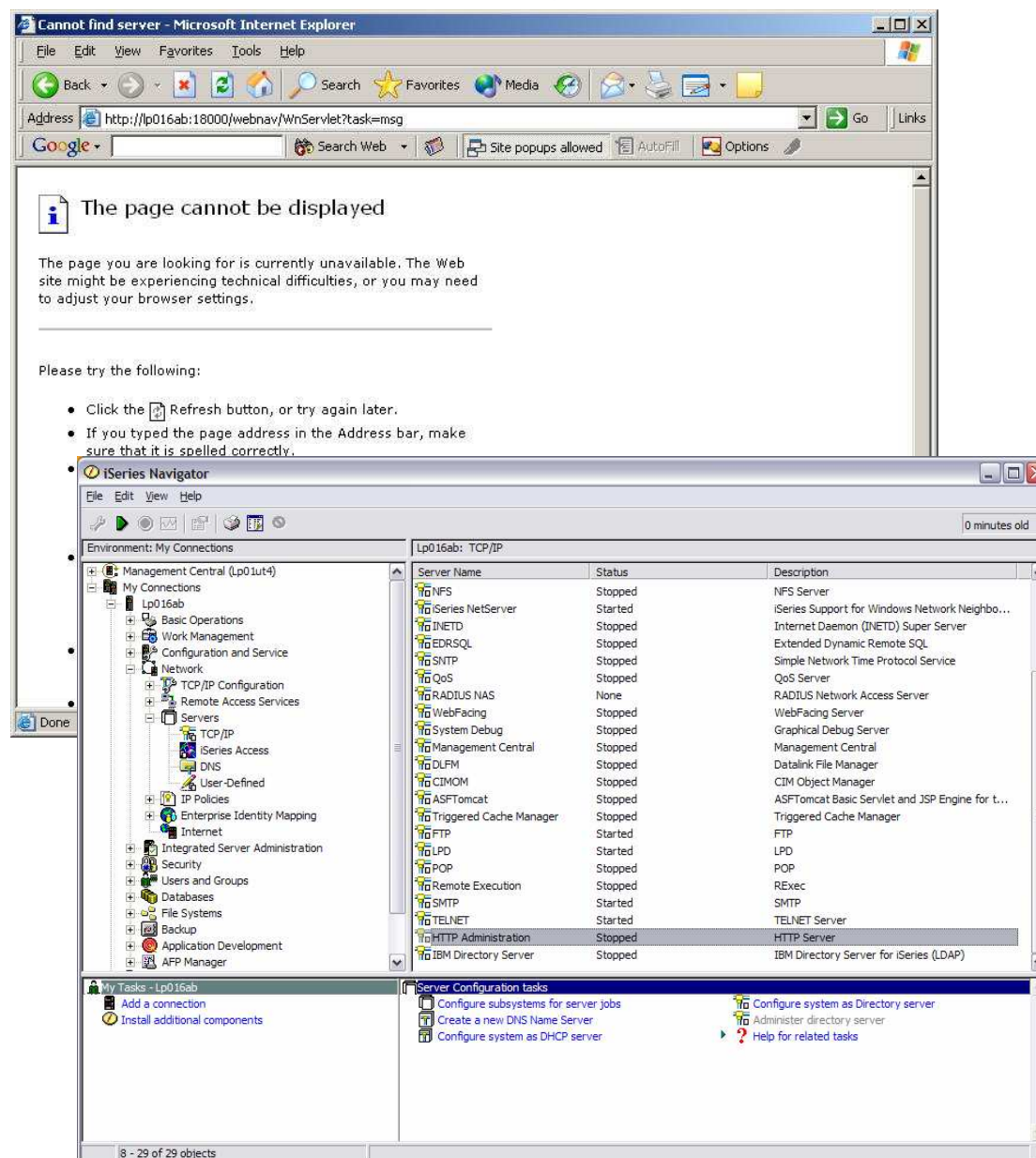
Appendix – Problem Determination

Problem Determination

- **Since iSeries Access for Web functions require use of the HTTP ADMIN server and the i5/OS-supplied WAS instances – sysinst/admin we provide some problem determination information regarding the initial setup to run this interface**
- **For other problems, consult the WebSphere or iSeries Navigator logs for more information.**
- **WAS System Instance (sysinst/admin) must be up and running**
- **System instance provided by i5/OS is required by the following, starting with V5R3:**
 - iSeries Navigator URL Advisor (browser graphical interface)
 - IBM Directory Server for i5/OS (browser graphical interface)
 - This is the graphical interface to LDAP information and capabilities

Problem #1 – HTTP Admin Server is not running

- Will result in “The page cannot be displayed” error message when accessing iSeries Navigator tasks
- HTTP Admin Server will show up as not running in iSeries Navigator
- Start the server via iSeries Navigator or STRTCPSVR command



Notes

Viewing the status of the HTTP Admin server through iSeries Navigator must be done on the client. In the left-hand navigation tree, under the system you are trying to use the Admin server on, expand Networks -> Servers. Click on TCP/IP and the TCP/IP servers will appear in the right-hand pane. Find HTTP Administration in the list. If it is not running, right click on it and select Start.

To view from the green screen, do Work with Active Jobs (WRKACTJOB) command and look for ADMIN jobs under QHTTPSVR subsystem. If none appear, the Admin server must not be running. To start it, use the command `STRTCPSVR SERVER(*HTTP) HTTPSVR(*ADMIN)`.

Problem #2 – System Instance is not running

- **System instance provided by i5/OS is required by**
 - iSeries Navigator URL Advisor (browser))
 - **IBM Directory Server for i5/OS** browser graphical interface
- **Will result in “Internal Server Error” message when trying to access iSeries Navigator tasks**
- **System Instance will show up as not running in HTTP Admin GUI**
- **Ensure HTTP Admin configuration was completed**
- **Start the System Instance via the HTTP Admin GUI**

The screenshot shows two overlapping browser windows. The top window displays an "Internal Server Error" message from Microsoft Internet Explorer, stating: "The server encountered an internal error or misconfiguration and was unable to complete your request. Please contact the server administrator, [no address given] and inform them of the time the error occurred, and anything you..." The bottom window shows the "IBM Web Administration for i5/OS" GUI. The "Server" dropdown is set to "SYSINST/ADMIN - V6.0.2.1" and is marked as "Stopped". The "Manage WebSphere Application Server - V6.0.2.1" page is visible, showing a "Profile: SYSINST Server: ADMIN" and a "Current Configuration" table.

Current Configuration Profile: "SYSINST" Server: "ADMIN"		
Manage Virtual Hosts	Manage Installed Applications	Manage Data Sources
<ul style="list-style-type: none"> default_host admin_host 	<ul style="list-style-type: none"> IDSWebApp iSeriesNavigator query 	<ul style="list-style-type: none"> DefaultEJBTimerDataSource

Notes

To view the application servers via the GUI,

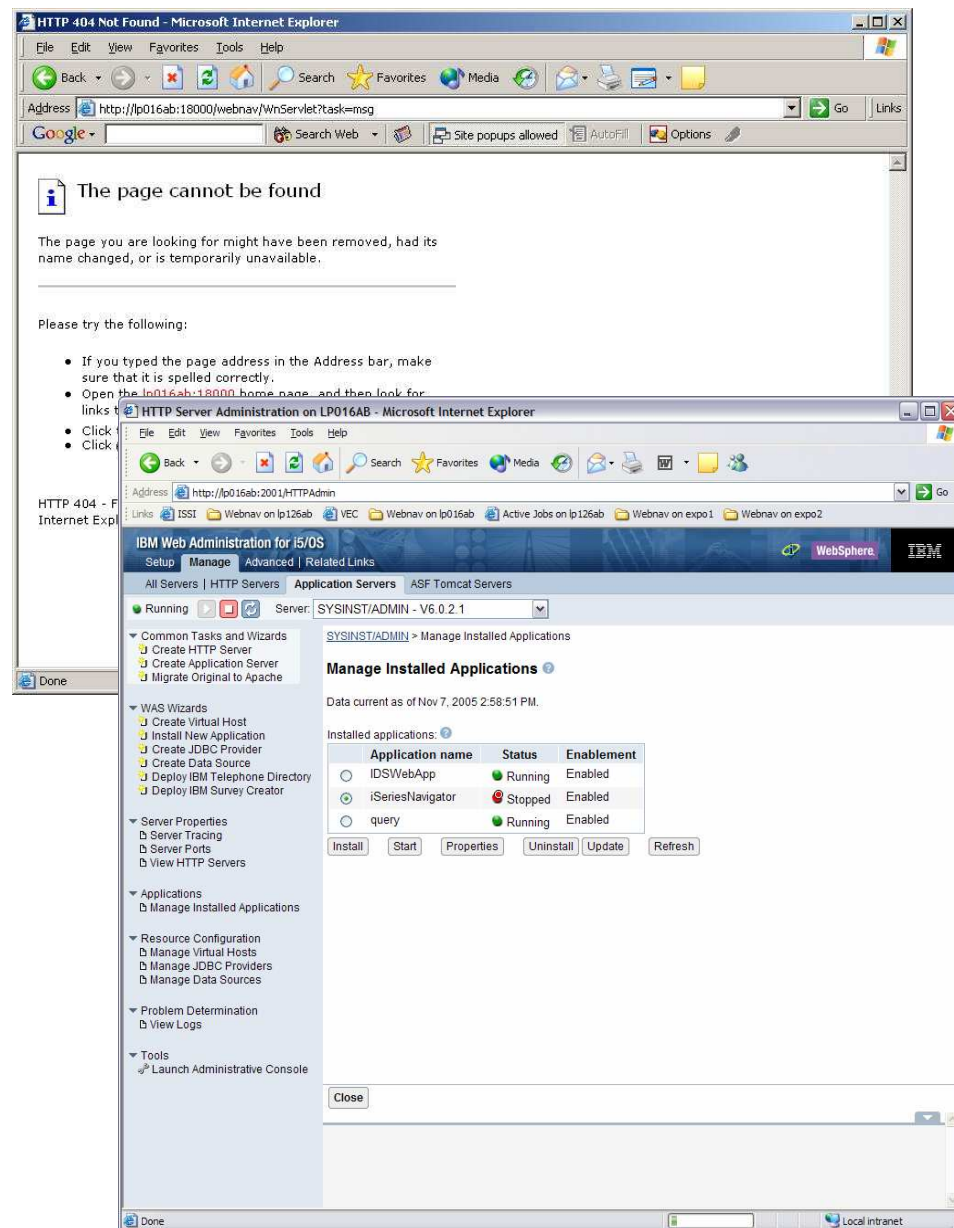
- go to the iSeries Tasks page (<http://<web-server-system>:2001>)
- select the IBM Web Administration for i5/OS link.
- From the top set of tabs, select Manage.
- From the set of tabs that appears below those, select Application Servers.
- From the Server drop down, select SYSINST/ADMIN – V6.

The status of the server is in the upper left-hand corner.

To start the system instance, press the Start button to the right of the status.

Problem #3 – iSeries Navigator application has been stopped

- The iSeries Navigator application has been stopped on the Websphere Application Server
- Will result in “The page cannot be found” error message
- From Application Servers tab, can see that iSeries Navigator application is not running.
- Start the application



Notes

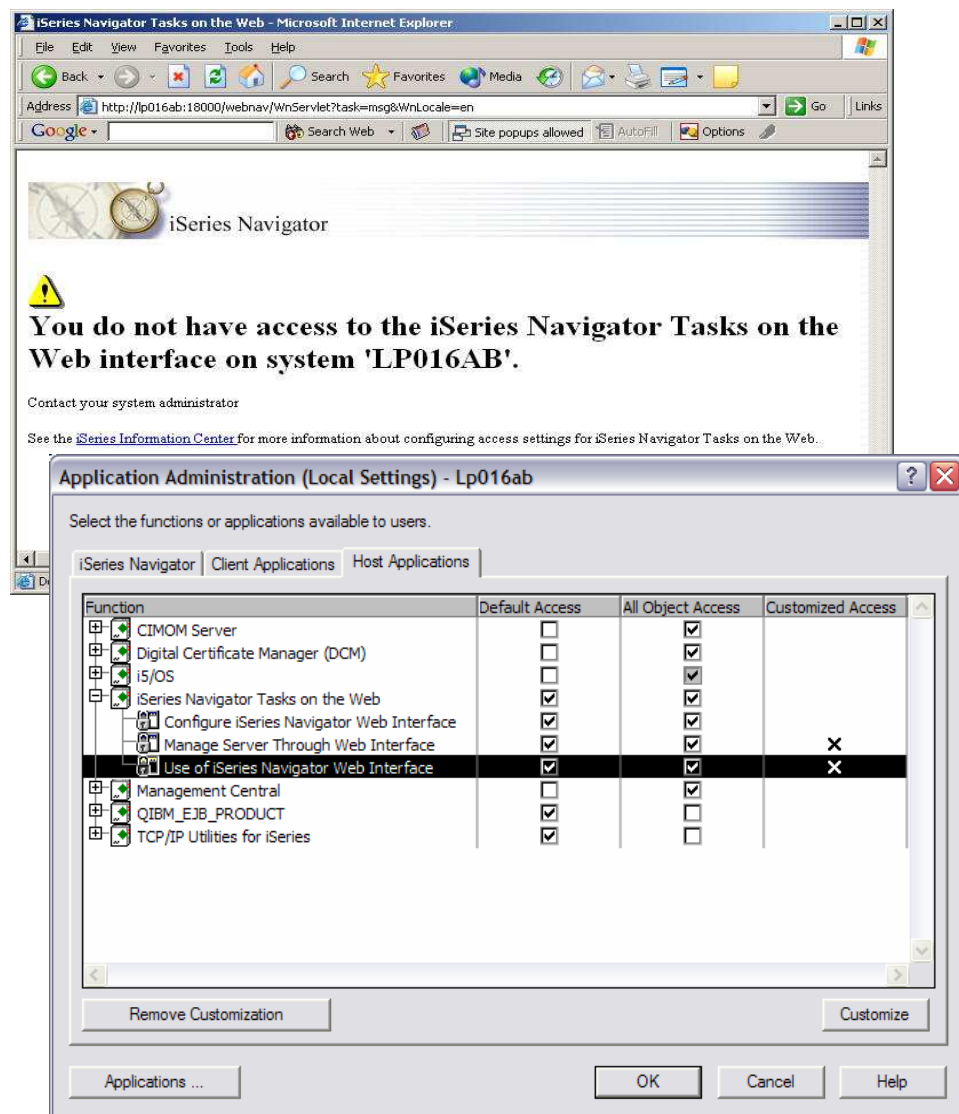
To view the application servers via the GUI

- go to the iSeries Tasks page (<http://<web-server-system>:2001>)
- select the IBM Web Administration for i5/OS link.
- From the top set of tabs, select Manage.
- From the set of tabs that appears below those, select Application Servers.
- From the Server drop down, select SYSINST/ADMIN – V6.0.2.1.
- Under Current Configuration at the bottom of the main panel, select Manage Installed Applications.

If iSeries Navigator is not running, select it and press Start.

Problem #4 – User not authorized to use iSeries Navigator Tasks on the Web

- **User is not authorized to use iSeries Navigator Tasks on the Web on the iSeries the code is being run on**
- **Will result in “You do not have access to the iSeries Navigator Tasks on the Web interface on system <system-name>” error message**
- **Need to adjust settings for Use of iSeries Navigator Web Interface in Application Administration**
- **Recycle iSeries Navigator web application after making changes**



Notes

By default, only "All Object Access" is checked for Use of iSeries Navigator Web Interface. This means only users with all object access will be allowed to use this system as the iSeries Navigator web server.

To allow others access, either check "Default Access" which will allow all users except those specifically denied access or customize the setting to allow the specific user access. After making changes to this setting, you will need to recycle (stop, start) the iSeries Navigator web application as all this access information is cached.

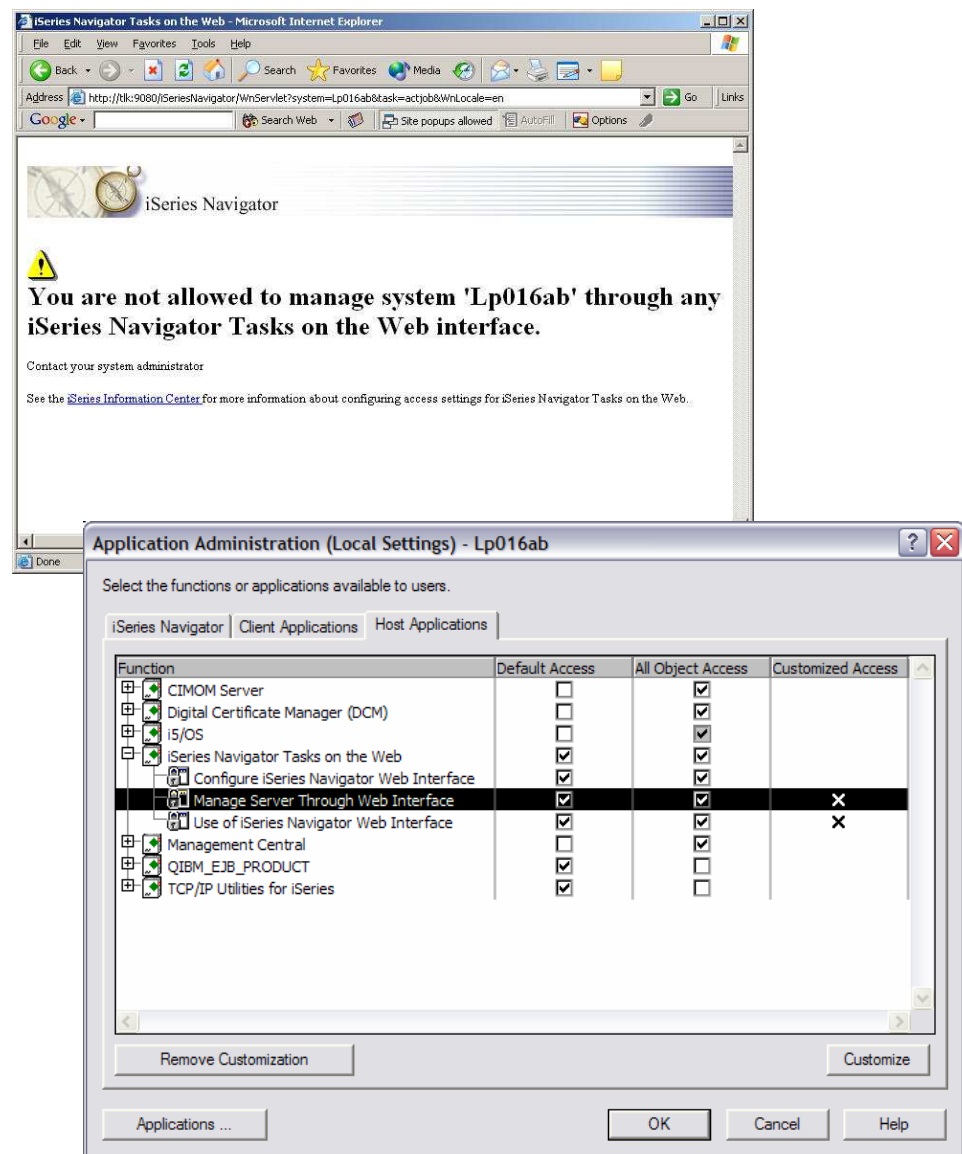
To do this

- **go to the HTTP Administration web page (<http://<system-name>:2001/HTTPAdmin>).**
- **Click on the Manage tab and then click on the Application Servers tab.**
- **Select SYSINST/ADMIN – V6 from the Server drop down.**
- **Click on Manage Installed Applications in the left-hand pane.**
- **From the list of applications, select iSeries Navigator and press the Stop button.**
- **Once stopped, press the Start button to restart the application.**

This can also be accomplished by restarting the HTTP Admin server. However, be aware that other applications may be using it.

Problem #5 – User not authorized to manage the system

- User is not authorized to manage the specified system (system=xxxx) using iSeries Navigator Tasks on the Web
- Will result in “You are not allowed to manage system <system-name> through any iSeries Navigator Tasks on the Web interface”
- Need to adjust settings for Manage Server Through Web Interface in Application Administration
- Recycle iSeries Navigator web application after making changes



Notes

By default, only "All Object Access" is checked for Manage Server Through Web Interface. This means only users with all object access will be allowed to view data for this system through iSeries Navigator Tasks on the Web.

To allow others access, either check "Default Access" which will allow all users except those specifically denied access or customize the setting to allow the specific user access.

After making changes to this setting, you will need to recycle (stop, start) the iSeries Navigator web application as all this access information is cached.

To do this,

- go to the HTTP Administration web page (<http://<system-name>:2001/HTTPAdmin>).
- Click on the Manage tab and then click on the Application Servers tab.
- Select SYSINST/ADMIN – V6 from the Server drop down.
- Click on Manage Installed Applications in the left-hand pane.
- From the list of applications, select iSeries Navigator and press the Stop button.
- Once stopped, press the Start button to restart the application.

This can also be accomplished by restarting the HTTP Admin server. However, be aware that other applications may be using it.

Problem #6 – User not authorized to specific iSeries Navigator task

- User is not allowed to access a specific iSeries Navigator task in Application Administration
- Will result in “User <user> is not authorized to task <task> on system <system-name>” error message
- Need to adjust the setting for that task in Application Administration
- Recycle iSeries Navigator application after making changes

The image shows two screenshots from an iSeries Navigator environment. The top screenshot is a Microsoft Internet Explorer window displaying an error message: "Message: User TLK1 is not authorized to task msg on system LP126AB." Below the message, it provides a cause ("The user does not have enough authority to view this task.") and a recovery procedure with four steps: 1) Verify user authority in iSeries Navigator, 2) Check authority in the "iSeries Navigator" tab, 3) Check authority in the "Host Applications" tab, and 4) Verify authority in the "Use of iSeries Navigator Web Interface" option. The bottom screenshot is the "Application Administration - Lp126ab" dialog box. It shows a tree view of functions under "Lp126ab in My Connections". The "Messages" function is highlighted, and its "Customized Access" column shows an 'X', indicating that the user does not have the necessary permissions for that task.

Function	Default Access	All Object Access	Customized Access
Lp126ab in My Connections	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Basic Operations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Messages	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Printer Output	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Printers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Jobs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Work Management	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Active Jobs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Server Jobs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Job Queues	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Output Queues	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Subsystems	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Memory Pools	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Configuration and Service	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
System Values and Time Management	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

Notes

To access a function in webnav, the user must be able to access the same function in iSeries Navigator for the client.

This access is controlled by Application Administration in iSeries Navigator on the client.

- If All Object Access is checked, then any user with all object will be able to access the function regardless of any customize settings.
- If Default Access is checked then all users except those denied access in the customize setting will have access.

Customize lets you specifically grant or deny access to a specific user or user group.

After making changes to app admin settings, you will need to recycle (stop, start) the iSeries Navigator web application as all this access information is cached.

To do this,

- go to the HTTP Administration web page (<http://<system-name>:2001/HTTPAdmin>).
- Click on the Manage tab and then click on the Application Servers tab.
- Select SYSINST/ADMIN – V6 from the Server drop down.
- Click on Manage Installed Applications in the left-hand pane.
- From the list of applications, select iSeries Navigator and press the Stop button.
- Once stopped, press **the Start button to restart the application.**

This can also be accomplished by restarting the HTTP Admin server. However, be aware that other applications may be using it.

Problem #7 – Websphere 6.0 or Express not installed

- Will result in “You are not authorized to view this page” error message.
- See if Websphere 6.0 Base or Express 5733-W60 is installed on the iSeries being used as the web server

HTTP 403 (Forbidden) - Microsoft Internet Explorer

You are not authorized to view this page

You might not have permission to view this directory or page using the credentials you supplied.

If you believe you should be able to view this directory or page, please try to contact the Web site by using any e-mail address or phone number that may be listed on the [tv01p06:2001](#) home page.

You can click [Search](#) to look for information on the Internet.

HTTP Error 403 - Forbidden
Internet Explorer

iSeries Navigator

Environment: My Connections

My Connections

- Management Central (Lp01ut4)
- My Connections
 - Lp016ab
 - Basic Operations
 - Work Management
 - Configuration and Service
 - System Values
 - History Log
 - Time Management
 - Hardware
 - Software
 - All Products
 - Installed Products
 - Supported Products
 - Fixes Inventory
 - Collection Services
 - Logical Partitions
 - Network
 - Integrated Server Administration
 - Security
 - Users and Groups
 - Databases
 - File Systems
 - Backup
 - Application Development

0 minutes old

Product	Option	Release	Description
5733w51	0002	V5R1M0	WAS V5.1 Application server runtime
5733w51	0003	V5R1M0	WAS V5.1 Samples
5733w51	0004	V5R1M0	WebSphere Application Server Extensions
5733w51	0005	V5R1M0	WAS V5.1 Network Deployment
5733w51	0006	V5R1M0	WebSphere Application Server Extensions
5733w51	0007	V5R1M0	WebSphere Application Server Extensions
5733w51	0008	V5R1M0	WebSphere Application Server Extensions
5733w51	0009	V5R1M0	WebSphere Application Server Extensions
5733w51	0010	V5R1M0	WAS V5.1 Enterprise Enablement
5733w51	0011	V5R1M0	WAS V5.1 Enterprise Enablement for ND
5733w51	0012	V5R1M0	WebSphere Application Server Extensions
5733w51	0013	V5R1M0	WebSphere Application Server Extensions
5733w51	0014	V5R1M0	WebSphere Application Server Extensions
5733w51	0015	V5R1M0	WebSphere Application Server Extensions
5733w51	0016	V5R1M0	WebSphere Application Server Extensions
5733w51	0017	V5R1M0	WebSphere Application Server Extensions
5733w51	0018	V5R1M0	WebSphere Application Server Extensions
5733w51	0019	V5R1M0	WebSphere Application Server Extensions
5733w51	0020	V5R1M0	WebSphere Application Server Extensions
5733w60	0000	V6R0M0	WebSphere Application Server for OS/400 V6
5733w60	0002	V6R0M0	WebSphere Application Server V6 ("Base")
5733w60	0003	V6R0M0	WebSphere Application Server V6 Network Deploy

My Tasks - Lp016ab

- Add a connection
- Install additional components

Software and Fixes tasks

- Collect Inventory
- Compare and update software fixes
- Install software fixes
- Help for related tasks

77 - 98 of 98 objects

Notes

To check if Websphere 6.0 Base or Express is installed, you can use iSeries Navigator on the client.

- In the left-hand pane, expand the system you are trying to use as the iSeries Navigator web server. Then expand Configuration and Service -> Software.
- Click on Installed Products and all products installed on the system will appear in the right-hand pane.
- Check the list for 5722W60.

To check from the green screen, run the command Display Software Resource (DSPSFWRSC).

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DB2 Universal Database	IBM System i	xSeries*
Domino	IBM System i5	z/OS*
Enterprise Storage Server*	IBM System p5	z/VM*
eServer	Lotus*	zSeries*
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GDPS*	POWER5	

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Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput or performance improvements equivalent to the ratios stated here.

Photographs shown are of engineering prototypes. Changes may be incorporated in production models.