



@server

iSeries

Basic System operations

*Version 5 Release 3*







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**Note**

Before using this information and the product it supports, be sure to read the information in "Notices," on page 35.

**Fifth Edition (August 2005)**

This edition applies to version 5, release 3, modification 0 of IBM Operating System/400 (5722-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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## Basic system operations

The iSeries<sup>(TM)</sup> server is a versatile, powerful, and easy-to-use system. However, many of the functions and features of this environment are specific to IBM<sup>(R)</sup> and the iSeries, and might not be familiar to people who are more familiar with a Windows<sup>(R)</sup> or UNIX<sup>(R)</sup>-based environment. This topic introduces some of the key concepts and tasks required for iSeries basic operations. Many of these topics provide an introduction and example, and then suggest further resources for more detailed or advanced information.

### **“What’s new for V5R3”**

Find a summary of the updates and changes to this information in V5R3.

### **“Print this topic”**

Access or print this document in PDF format.

### **“iSeries basic operations” on page 2**

Use this topic to find procedures and supporting information for common system tasks.

### **“Start and stop the server” on page 7**

Find information to help you start, stop, and schedule shutdowns and restarts.

### **“OS/400 concepts” on page 23**

Learn about the essential components of the iSeries server, including the basics of work management, how to interact with OS/400 , and system maintenance.

### **“Analyze and report system problems” on page 32**

Find information to help you solve some basic system problems, and references for getting additional help.

**Note:** Read the Code example disclaimer for important legal information.

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## What’s new for V5R3

The Basic systems operation topic has minor changes for version 5 release 3 (V5R3). The guide introduces basic iSeries<sup>(TM)</sup> information to a new iSeries operator and suggests further resource for more detailed instruction.

The storage and control panel information has been moved to the following locations:

- Storage solutions
- System control panel

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## Print this topic

To view or download the PDF version, select Basic system operations  (about 313 KB).

You can view or download these related topics:

- Storage solutions (177 KB) contains the following topics:
  - Objects
  - Disks
  - Tapes
  - Optical


- Storage area networks
- Control panel (335 KB) contains the following topics:
  - Control panel concepts
  - Set up your control panel
  - Access control panel functions
  - Instructions and descriptions for control panel functions
  - Use remote control panel APIs

### Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF in your browser (right-click the link above).
2. Click **Save Target As...** if you are using Internet Explorer. Click **Save Link As...** if you are using Netscape Communicator.
3. Navigate to the directory in which you need to save the PDF.
4. Click **Save**.

### Downloading Adobe Acrobat Reader

You need Adobe Acrobat Reader to view or print these PDFs. You can download a copy from the Adobe Web site ([www.adobe.com/products/acrobat/readstep.html](http://www.adobe.com/products/acrobat/readstep.html)) .

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## iSeries basic operations

The iSeries<sup>™</sup> server is built to require only minimal effort to keep it running reliably, and most of the routine operations are performed quickly and easily once you are familiar with them. Use the following topics to help you learn about some of the common system tasks.

#### **“Using iSeries interfaces” on page 3**

Depending on the type of connection to the iSeries server, and the task you need to perform, there are several options available for iSeries interfaces. Learn how to access and use iSeries Navigator, the character-based interface, and the wireless clients.

#### **“Work with devices” on page 4**

Most of the peripheral equipment attached to the iSeries server is considered a device. Use this information to set up and configure devices, and to learn about your system’s configuration.

#### **“Work with printer output” on page 5**

Many jobs on the iSeries server result in printer output. Learn how to find, track, and manage printer output across the iSeries server.

#### **» “Work with storage” on page 6**

The iSeries server offers many options for fixed and removable storage media. Use this topic to help you configure and maintain storage media like disks, disk pools, tape cartridges and CD-ROMs. «

#### **“Start and stop the server” on page 7**

The iSeries server is well known for rarely needing to be stopped or restarted. However, some maintenance items or system changes may require that the iSeries server stop processing and go through an initial program load (IPL). Stopping and starting the iSeries must be done carefully. Use this topic to review requirements and options for this process.

#### **» “Work with the control panel” on page 6**

The control panel is the initial interface on your iSeries server. The system control panel allows you



to determine processor activity, read error codes to help determine component failure analysis, power the system on and off, as well as change initial program load (IPL) characteristics. You can use the physical control panel on the system or set up a remote control panel to perform these operations.

**Note:** The information in this topic pertains only to IBM<sup>(R)</sup> 270 and 8xx model servers. If you have a different model server, see the eServer Information<sup>(TM)</sup> Center for more information. <<

## Using iSeries interfaces

There are two ways to access the iSeries<sup>(TM)</sup> server, from character based interfaces on an attached console or emulator session to the Windows<sup>(R)</sup>-style interface in iSeries Navigator. The interface you need to use depends on your connection type to the iSeries server and the task you need to perform. The following topics will help you understand the differences between these interface options, and provide some instructions for how to use them effectively.

### Connecting to the iSeries

There are many interfaces available for iSeries servers, and the interface you use depends on the type of connection and the functions you require. This topic includes instructions and requirements for using consoles, wireless interfaces, and iSeries Navigator.

### “Character-based interface”

The character-based interface, available from most emulator sessions or consoles, might seem unfamiliar to people without iSeries experience. This topic explains how to navigate the OS/400<sup>(R)</sup> menus and provides some suggestions for learning to use this interface.

## Character-based interface

The character-based interface is available from most consoles and emulator sessions connected to an iSeries<sup>(TM)</sup> server, and allows more functions than any other interface. While this type of interface may be unfamiliar at first, it includes several easy methods for helping new users, and a menu-based hierarchy of tasks to make finding specific functions simple.

The character-based interface includes three primary displays: navigational, input, and informational. The navigation display typically consists of a list of menu options and a command line. You can use this to find information or tasks on the iSeries server, and to enter “OS/400 commands” on page 24. Input displays are available when OS/400<sup>(R)</sup> requires information from you. Use this display to enter or change information. Informational displays convey server information and do not allow any interaction.

### Finding functions or tasks

All iSeries server tasks are organized into categories accessible through the main menu. You can enter menu selections to move through this hierarchy until you find the task you are looking for. Different users may have different menu options available to them, depending on the security strategy, restrictions set by the system administrator, and the active user profile. Once you have found a menu option you need to use, you can enter commands at the **Selection or Command** prompt located at the bottom of the display. Many menu displays have a name listed in the top-left corner of the display. This name allows you to access it using the **GO** command followed by the name of the menu. For example, **GO JOB** instructs OS/400 to display the job menu:



## Getting help

The character based interface provides several methods for assisting users. First, online help is available for many displays by pressing the **help** or **F1** key. You can often get help with a particular field or item by placing your cursor on it and then pressing the **help** or **F1** key. When you are entering data, you can also get help by entering a ? in a data field. Finally, the amount and type of information displayed on the display can be controlled by changing the assistance level. The assistance level determines what version of a display you see. Many system displays have two different versions:

- A **basic** assistance level version, which contains less information and does not use technical terminology.
- An **intermediate** assistance level version, which shows more information and uses technical terms.

Some fields or functions are available only on a particular version of a display. The instructions tell you which version to use. To change from one assistance level to another, use F21 (Select assistance level). F21 is not available from all displays.

## Work with devices

A device is a piece of equipment that is connected to your system. Most hardware, including internal processors, ports and adapters, drives, communications hardware, workstations, and printers are considered devices. To manage these devices, OS/400<sup>R</sup> organizes devices by their type, such as workstation or optical drive (CD-ROMs), and identifies specific devices by their resource name. For most internal devices, like processors, adapters and ports, OS/400 automatically assigns the resource name. For most external devices, and some internal storage devices, the iSeries<sup>TM</sup> server manages communication with the device through a device controller. Most devices managed through a controller have resource names defined by their device description. You can use the device type to learn its resource name, physical location, current status, and other information.

Every device in the system has a current status that describes whether it is turned on, and if it is currently communicating with the system. Before a device can function, both it and all devices connecting it to the iSeries<sup>TM</sup> server must be varied on (Operational) and functioning. For example, if a communication line or network adapter is varied off, any device attached to the iSeries server through those devices will not function.

Most devices have the following possible types of status:

Status	Description
Varied off	OS/400 has disabled the device, and it must be varied on again before communicating with the iSeries server
Varied on (Operational)	OS/400 has enabled communications with the device, and is waiting for communications.
Pending	OS/400 is attempting to enable communications with the device.
Active	The device is currently busy communicating with the iSeries server, and cannot be varied off.

Other types of status are possible for some specific device types, or to indicate a specific problem. For example, a workstation that is waiting for a user to sign on will have a status of Signon display, and a device that OS/400 is unable to locate will have a status of Resource not detected.

### View and manage devices

iSeries Navigator allows you to display the current status, physical location, and configuration information for devices. To work with devices in iSeries Navigator, expand **Configuration and Service** and select **Hardware**. You can display detailed information about the device, including its model, type and serial number, physical location in the iSeries server, and logical address by right-clicking on the device and selecting **Properties**. Additionally, iSeries Navigator provides many functions for managing tape devices, disk units, and pools. See the online help in iSeries Navigator for more information.

To change the status or properties of a device, you must use the character-based interface and type go device from any command line. For detailed information about configuring devices for the iSeries server,

see **Local Device Configuration**  .

### Work with printer output

Many jobs generate output that requires printing. OS/400<sup>(R)</sup> handles this by creating spooled files that contain the document data and processing instructions for the print job. Once created, OS/400 sends the spooled files to an output queue. Similar to a job queue, output queues hold many spooled files until a printer becomes available. The output queue that OS/400 sends the spooled file to varies, according to the job attributes, user profile, and workstation settings. Before any of the spooled files can be printed, a printer device must be varied on, and a print writer started. The print writer is an OS/400 function that runs for each active printer on the system. When started, the print writer will watch the specified output queue (or queues) and send the spooled files to its printer.

### Work with printer output

iSeries<sup>(TM)</sup> Navigator allows you to find and manage printer output from two locations: Basic operations and Work management.

- To see a list of spooled files waiting specifically for printing, expand **Basic Operations**, and then click **Printer Output**. This displays all spooled files associated with the current user. You can work with other print jobs by selecting **View** → **Customize this view** → **Include** from the iSeries<sup>(TM)</sup> Navigator menu. Right-click a spooled file to hold, release, move, or delete the print job, or convert it to a PDF. Additionally, you can select **Properties** to change many of the spooled file attributes.
- To see a list of all output queues, expand **Work Management**, and then click **Output queues**. This will display all output queues for all users. An output queue is an object that contains a list of spooled files to be written to an output device, such as a printer. Select any output queue to display the list of spooled files for that queue.

### Starting printers

Before you start the printer, verify the following:

- The printer is turned on and ready
- The printer or print method has been configured in OS/400.

To start an iSeries printer from the command line interface, perform the following steps:

1. Vary on the printer:
  - a. Enter WRKCFGSTS \*DEV \*PRT command. The Work with Configuration Status display shows a list of devices.
  - b. Enter a 1 next to the printer device description to vary on the printer.
2. Use the Start Print Writer (STRPRTWTR) command to start the print writer, and specify the printer and output queue (or queues) that the writer will service.

To start an iSeries printer from iSeries Navigator, do the following:

1. In iSeries Navigator, select your server, expand **Basic Operations**, and select **Printers**.
2. If the status of the printer (shown in the right pane) is **Unavailable**, right-click the printer and select **Make Available**.
3. Right-click the printer and select **Start**.

### Related information

Configuring and managing iSeries printing can be a complex task. Refer to the following resources in the iSeries Information Center for additional information:

#### Printing

Use this information to learn about iSeries printing solutions and how to configure them.

#### Printer Device Programming

Find detailed procedures for working with printers and print functions in OS/400.

#### Printing Redbook

Learn about the printing capabilities of the iSeries server, and find practical configuration recommendations.

## Work with storage

» The iSeries<sup>(TM)</sup> servers offer a wide variety of options for storing system data. Internally, the iSeries server includes disk units that can be distributed across several expansion units (or towers). As a system operator, you might need to work with these disk units and track their usage across your business. Additionally, there are many options for working with removable media like tapes and optical devices (CD-ROMs or DVDs). These storage devices are frequently used for backing up the system and archiving data.

For more information, see the Storage solutions topic. «

## Work with the control panel

» The control panel is your initial interface to your iSeries<sup>(TM)</sup> server. From the control panel, you can process system functions such as the following:

- Determine processor activity
- Display and get attributes or error codes to analyze problems
- Turn on or off the system
- Set initial program load (IPL) characteristics

You can use the physical control panel on the system or set up a remote control panel to perform these operations. See the Control panel topic for more information. It will help you set up the virtual control panel or the remote control panel, access control panel functions, and use APIs to operate your remote control panel with a user-written program.

**Note:** The information in this topic pertains only to IBM<sup>(R)</sup> 270 and 8xx model servers. If you have a different model server, see the eServer<sup>(TM)</sup> Information Center for more information. <<

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## Start and stop the server

**Note:** The procedures for starting and stopping the server depend on whether you have a partitioned system. The following instructions are relevant only for an iSeries<sup>(TM)</sup> server without partitions. If you have a partitioned system (without the hardware management console for eServer<sup>(TM)</sup>), see Restart and power down a system with logical partitions within the Logical Partitions topic. If you have a partitioned system (with the hardware management console for eServer), see Logical partitions with Hardware Management Console for eServer.

Regardless of how your iSeries server is configured, starting and stopping the server requires careful planning in order to prevent data loss and to protect system integrity. The iSeries server provides several methods for starting the system to allow for various amounts of interaction with the user. See the following procedures for help starting up the system or safely shutting it down.

### **“Start the server”**

Use this topic to select a method for starting your server and handling problems with the initial program load (IPL).

### **“Sign on to the server” on page 16**

Use this topic to access functions on the iSeries after startup.

### **“Stop the server” on page 18**

Use this topic to safely shut down the server and plan for controlled server restarts.

Several system values determine the available options for starting and stopping the iSeries. For more information, see “System values that control IPL” on page 20.

## Start the server

Some changes to the system settings or hardware configuration require the iSeries<sup>(TM)</sup> server to go through a startup sequence called an initial program load (IPL). During an IPL, system programs load from the designated load source device in the system auxiliary storage. The system hardware is also checked. The iSeries<sup>(TM)</sup> server control panel displays a series of system reference codes that indicate its current status and warn you of any problems. When the IPL is finished, the character-based interface presents the sign-on display, and users will be able to sign on with iSeries Navigator.

There are several options for starting an iSeries server. See the following topics for procedures and recommendations for performing an IPL.

### **“Start the system without making configuration changes (unattended IPL)” on page 8**

This is the most common way to start the iSeries server. See this topic for instruction on how to start your system during normal operation.

### **“Change the system during IPL (attended IPL)” on page 9**

Some situations may require you to enter information or change system values during an IPL. See this topic for instructions for performing a manual IPL.

### **“Change your system IPL from the control panel” on page 11**

You can specify the type of IPL you need to perform from the system control panel. See this topic for instructions.

### **“Change the IPL start-up program” on page 11**

You can create a startup program that will change the system resources, and the resources and attributes assigned to them, that are started during an IPL. Typically, subsystems, writers, and the Operational Assistant are launched by this program.

**Note:** Read the Code example disclaimer for important legal information.

### **“Schedule a system shutdown and restart” on page 14**

You can set up a schedule that automatically powers your system on and off. You can determine the time of day you want the system powered on and off. You can also specify special circumstances that change the normal daily schedule, such as a holiday or special closing.

During the IPL, the control panel displays a series of system resource codes (SRCs) indicating the current system activity. For more information see the IPL system reference code (SRC) finder.

If you encounter general problems during an IPL, see “Causes of abnormal IPLs” on page 15 for help with troubleshooting.

## **Start the system without making configuration changes (unattended IPL)**

Unattended IPLs reset system storage and recognize any configuration changes automatically. The amount of time required for any IPL depends on the size and complexity of the system, ranging from a few minutes to several hours. When the unattended IPL is complete, the Sign On display appears on the display station.

**Note:** If you are working on a system that has logical partitions, see the documentation on Restart and power down a system with logical partitions.

### **Before you start**

This procedure assumes the iSeries<sup>(TM)</sup> server is running, and requires that several additional conditions be met before you begin an IPL. While most of these settings are the default values, you must verify them if you are unsure.

- The IPL mode for the iSeries server must be set to **Normal** (unattended IPL).
- The Type of restart (QIPLTYPE) system value must be set to unattended (0). See “System values that control IPL” on page 20 for information about how to set this system value.
- Turn on any devices, such as display stations, printers, tape devices, and controllers you or others may want to use.

### **To perform an unattended IPL**

1. Type **ENDSYS** or **ENDSBS \*ALL** on any command line and press **Enter**.

**Note:** For more options on these commands (for example, to set delay time), see ENDSYS (End System) Command Description and ENDSBS (End Subsystem) Command Description.

2. Type **WRKSBS** to verify that the controlling subsystem have ended and are in the restricted state. The subsystem status must be RSTD.
3. Type **PWRDWSYS \*IMMED RESTART(\*YES)** on any command line and press **Enter**.

When the unattended IPL is done, the sign on display appears on the display station. To schedule an unattended IPL, see “Schedule a system shutdown and restart” on page 14.

## Change the system during IPL (attended IPL)

If you want to change initial program load (IPL) options, install the operating system, use dedicated service tools, work with logical partitions, or recover from a system failure, you need to perform an attended IPL. This IPL mode requires that you respond to several prompts during the startup sequence.

### Before you start

This procedure assumes the iSeries<sup>(TM)</sup> server is running, and requires that several additional conditions be met before you begin an IPL. Most of these settings are the default values, but you must verify them if you are unsure of the current setting.

- The IPL mode for the iSeries<sup>(TM)</sup> server must be set to **Manual** (attended IPL).
- The Type of restart (QIPLTYPE) system value must be set to attended (1). See “System values that control IPL” on page 20 for information about how to set this system value.
- Turn on any devices, such as display stations, printers, tape devices, and controllers that you or others may want to use.

### To perform an attended IPL

1. Type **ENDSYS** or **ENDSBS \*ALL** on any command line and press **Enter**.  
**Note:** For more options on these commands (for example, to set delay time), see **ENDSYS** (End System) Command Description and **ENDSBS** (End Subsystem) Command Description.
2. Type **WRKSBS** to verify that the controlling subsystem has ended and is in the restricted state. The subsystem status must be **RSTD**.
3. Type **PWRDWSYS \*IMMED RESTART(\*YES)** on any command line and press **Enter**.

After you begin the attended IPL, the system displays the IPL options display, and allows you to choose which options to work with during the IPL. During the IPL, the system displays any options that you selected, or that are required due to system changes. For more information, see “Attended IPL displays.”

**Attended IPL displays:** During an attended IPL, your display station or console displays any required or selected displays.

The following displays will appear during the IPL if you select them on the IPL options display.

#### “Set major system options”

Set major system options allows you to configure and name new devices and to specify options for the operating environment.

#### “Define or change the system at IPL” on page 10

Define or change the system allows you to change system values and other system attributes during the IPL.

The following displays appear if system changes require them.

#### “Edit access paths during attended IPL” on page 10

Applications use access paths to determine the order of records in a database file. If the access paths have changed, use this display to reconstruct them.

#### “Edit check pending constraints during attended IPL” on page 11

Some physical files may have restrictions placed on them that need to be verified during an IPL. This display allows you to verify the status of these physical files.

*Set major system options:* The Set Major System Options display allows you to select automatic configuration, the type of device configuration naming, and the special environment in which you want to run.

1. Using the following information, type the new values over the existing values in the following fields:
  - Enable automatic configuration
    - **Y** (Yes) automatically configures local devices.
    - **N** (No) indicates no automatic configuration.
  - Device configuration naming
    - **\*NORMAL** uses a naming convention unique to the iSeries<sup>(TM)</sup> server, for example, DSP01 and PRT01 for displays and printers, TAP01 and OPT01 for tape and CD-ROM devices.
    - **\*DEVADR** uses a naming convention which is obtained from the device resource name, for example, DSP010203 for a display station, PRT010203 for a printer, TAP01 and OPT01 for tape and CD-ROM devices.
  - Default special environment
    - **\*NONE** indicates there is no special environment.
2. Press **Enter** .

*Define or change the system at IPL:* On the Define or Change the System at IPL display, you can change the system configuration, system values, network attributes, user profiles, and object or file attributes. This display is shown when you type Y (Yes) in the Define or change the system at IPL field on the IPL Options display.

1. Select any of the following options:
  - To change the way the system starts, select option 3 (System value commands). See Changing System Values During IPL for more information.
  - To change any of the other options, select them before exiting and continuing the IPL.
2. When you are finished using the options on this display, press **F3** (Exit and continue IPL) to continue the IPL.

*Edit access paths during attended IPL:* Access paths define the order that records in a database file are organized for processing by a program. If there are access paths to rebuild, the Edit Rebuild of Access Paths display is shown after the IPL Options display.

**Tip:** Use the online help information about this display to get more information about each column and field.

A message notifies you that a journal needs to perform an access path recovery. A journal is a system object. It is used to record entries in a journal receiver when a change is made to an object associated with the journal. Any access path that is recoverable (because it was recorded) is not shown on this display. The IPL threshold indicates that access paths with a sequence less than or equal to the number specified will be rebuilt at IPL time. It is a value from 1 through 99 that you can set (the default is 50). If the IPL threshold changes, all access paths with a status of IPL and AFTIPL changes to reflect the new status of the IPL threshold.

- To change the sequence of access paths that are rebuilt:
  - Make any changes to the Seq column.
  - Press **Enter** .
- If you do not want to change the sequence, press **Enter** and the Display Access Path Status display is shown if there are access paths left to be rebuilt.

**Tip:** Press **Enter** to continue with the IPL from the Edit Rebuild of Access Paths display.

If no access paths need to be rebuilt, the IPL continues.

If you press **F3** (Exit and continue IPL) the access paths are rebuilt while the IPL continues. If you press **F12** (Cancel), you return to the Edit Rebuild of Access Paths display.



Every 5 seconds, the display is updated with the current run time. After all the access paths have been rebuilt (access paths with a sequence less than or equal to the IPL threshold), the IPL continues.

*Edit check pending constraints during attended IPL:* During an attended IPL, the Edit Check Pending Constraints display is shown if there are constraints to be verified. A constraint is an attribute that places a restriction or limitation on a physical file.

**Tip:** Use the online help information about this display to get more information about each column and field.

On the Edit Check Pending Constraints display, you can change the sequence (1 through 99) of the constraints to be verified. If the constraint has a sequence less than or equal to the IPL threshold, it is verified during the IPL. If a constraint has a sequence greater than the IPL threshold, it is verified after IPL. The sequence \*HLD indicates that the constraint is not verified until it is changed to a number from 1 through 99. When the IPL threshold changes, all constraints with a status of IPL or AFTIPL are changed to reflect the new status of the IPL threshold.

- To change the sequence of check pending constraints:
  1. Make any changes to the Seq column
  2. Press **Enter**.
- If you do not want to change the sequence, press **Enter**. The Display Constraint Status display is shown if there are constraints left to be verified.

If you press **F3** (Exit and continue IPL) the constraints are verified while the IPL continues. Every five seconds, the display is updated with the current run time. After all constraints with IPL status have been verified, the IPL continues. If you press **F12** (Cancel), you return to the Edit Check Pending Constraints display.

## Change your system IPL from the control panel

The Increment/Decrement buttons are used to change the initial program load (IPL) type and mode on servers without a mode button. Use Function 02 to select the IPL type (A, B, or D) and Mode (Normal, Manual). To select IPL type and mode, from the control panel, do the following:

1. Use the Increment/Decrement buttons to select Function 02, and press the Enter pushbutton.
2. Use the Increment/Decrement buttons to select the IPL type and mode you want, and then press the Enter pushbutton to save.
3. You can also specify a fast or slow IPL that can only be set one time at the console panel when the server is powered off. Select Function 02 and press **Enter** twice. Then, use the Increment/Decrement buttons to select F(Fast), S(Slow), or V(Value from IPL attributes).

The Hardware diagnostics IPL attribute determines the type of subsequent IPLs. \*MIN is the recommended setting, however, if you anticipate any hardware problems, specify \*ALL on the Hardware diagnostics parameter. Use the Change IPL Attributes (CHGIPLA) command to change the IPL attribute.

See Control panel for related information. If you have a partitioned system, see Restart and power down a system with logical partitions.

## Change the IPL start-up program

The autostart job in the controlling subsystem transfers control to the program that is specified in the start-up program to set up system (QSTRUPPGM) system value. You can tailor this program.

You can create your own program and change the Start-up program to set up system (QSTRUPPGM) system value to that program name. Or, you can use the shipped program QSTRUP in QSYS as a base to create your own program. To do this:

1. Retrieve the source of the shipped program by using the RTVCLSRC command (for example, **RTVCLSRC PGM(QSYS/QSTRUP) SRCFILE(YOURLIB/YOURFILE)**).

2. Change the program.
3. Create the program by using the CRTCLPGM command, putting it into your own library.
4. Test the program to ensure that it works.
5. Change the Start-up program to set up system (QSTRUPPGM) system value to the program name and library you specified on the CRTCLPGM command.

### **Code example disclaimer**

IBM<sup>(R)</sup> grants you a nonexclusive copyright license to use all programming code examples from which you can generate similar function tailored to your own specific needs.

All sample code is provided by IBM for illustrative purposes only. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

All programs contained herein are provided to you "AS IS" without any warranties of any kind. The implied warranties of non-infringement, merchantability and fitness for a particular purpose are expressly disclaimed.

## Source for CL Start-up Program

Object	Command	CL Program Source
QSTRUP	CRTCLPGM	<pre> PGM DCL VAR(&amp;STRWTRS) TYPE(*CHAR) LEN(1) DCL VAR(&amp;CTLSBSD) TYPE(*CHAR) LEN(20) DCL VAR(&amp;CPYR) TYPE(*CHAR) LEN(90) VALUE('+ 5722-SS1 (C) COPYRIGHT IBM CORP 1980, 2000. + LICENSED MATERIAL - PROGRAM PROPERTY OF IBM')  QSYS/STRSBS SBSDB(QSERVER) MONMSG MSGID(CPF0000)  QSYS/STRSBS SBSDB(QUSRWRK) MONMSG MSGID(CPF0000)  QSYS/RLSJOBQ JOBQ(QGPL/QS36MRT) MONMSG MSGID(CPF0000)  QSYS/RLSJOBQ JOBQ(QGPL/QS36EVOKE) MONMSG MSGID(CPF0000)  QSYS/STRCLNUP MONMSG MSGID(CPF0000)  QSYS/RTVSYSVAL SYSVAL(QCTLSBSD) RTNVAR(&amp;CTLSBSD) IF ((&amp;CTLSBSD *NE 'QCTL QSYS ') + *AND (&amp;CTLSBSD *NE 'QCTL QGPL ')) GOTO DONE  QSYS/STRSBS SBSDB(QINTER) MONMSG MSGID(CPF0000)  QSYS/STRSBS SBSDB(QBATCH) MONMSG MSGID(CPF0000)  QSYS/STRSBS SBSDB(QCMN) MONMSG MSGID(CPF0000)  DONE:  QSYS/STRSBS SBSDB(QSPL) MONMSG MSGID(CPF0000)  QSYS/RTVSYSVAL SYSVAL(QSTRPRTWTR) RTNVAR(&amp;STRWTRS) IF (&amp;STRWTRS = '0') GOTO NOWTRS  CALL PGM(QSYS/QWCSWTRS) MONMSG MSGID(CPF0000)  NOWTRS:  RETURN CHGVAR VAR(&amp;CPYR) VALUE(&amp;CPYR) ENDPGM </pre>

### Start-up program to set up system (QSTRUPPGM) system value

Start-up program to set up system (QSTRUPPGM) is the start-up program. This value specifies the name of the program that is called from an autostart job when the controlling subsystem is started. This program performs setup functions, such as starting subsystems and printers. This system value can only be changed by the security officer or by someone with security officer authority. A change to this system value takes effect the next time an IPL is performed. QSTRUPPGM can have the values:

- 'QSTRUP QSYS': The program that is specified is run as a result of a transfer of control to it from the autostart job in the controlling subsystem.
- '\*NONE': The autostart job ends normally without calling a program.

The default start up program QSYS/QSTRUP does the following:

- Starts the QSPL subsystem for spooled work
- Starts the QSERVER subsystem for file server work
- Starts the QUSRWRK subsystem for user work
- Releases the QS36MRT and QS36EVOKE job queues if they were held (these are used by the System/36<sup>(TM)</sup> environment)
- Starts Operational Assistant cleanup, if allowed
- Starts all printer writers unless user specified not to on the IPL Options display
- If the controlling subsystem is QCTL, it starts the QINTER, QBATCH, and QCMN subsystems

Type	Length	Shipped Value CL
Character	20	'QSTRUP QSYS'

See the Start-up program to set up system (QSTRUPPGM) system value for more detailed information.

### Schedule a system shutdown and restart

For some systems, you may want to regularly schedule routine shutdowns and startups. The iSeries<sup>(TM)</sup> server supports this function by allowing you to define a schedule that alerts users to an upcoming shutdown, and then waits a predefined amount of time to allow users to finish their work and sign off. For example, you can define a schedule that must shut down your system Friday night and start it again Monday morning. The schedule also allows you to define a message sent to any signed-on users, and to specify how long to wait between sending the message and beginning the shutdown sequence.

To work with a schedule, type go power at any command line. The following topics provide procedures for working with shutdown and startup schedules:

#### **"Display the power on and off schedule"**

Display the current settings for your power schedule.

#### **"Change power on and off schedule defaults" on page 15**

Change the current settings for your power schedule.

#### **"Change the power-on and power-off schedule for a single event" on page 15**

Create a one time scheduled shutdown and startup, without adjusting the default schedule.

#### **"Solve problems with the automatic power schedule" on page 15**

Avoid potential problems with the power OFF/ON schedule.

**Display the power on and off schedule:** The power on and off schedule ensures that the system is powered on and off at specific times during the day or night. To view this schedule:

1. On any command line, type go power and press **Enter**.
2. Select option 1 (Display power on and off schedule) on the Power On and Off Tasks menu.

The power on and off schedule shows the date, day, and time (using the 24-hour clock) that the system will be powered on and off. The Description column includes comments about those days that have been changed from the system's regular schedule. Any user can display this schedule.

**Change power on and off schedule defaults:** To set up your own power on and off schedule, select option 2 (Change power on and off schedule) on the Power On and Off Tasks (POWER) menu. On the Change Power On/Off Schedule display, press **F10** (Change power on/off defaults).

On this display, you can change the first day of the week by typing a number in the First day of week field. Also, the system automatically sends users a message telling them when the system will be powered off. You can indicate how many minutes before power off you want the system to send this message in the Minutes before power off to send field.

When the system sends the power off message, you can delay the scheduled time for powering off from 30 minutes to 3 hours when you reply to the message. Then the system will wait the time specified before powering off. You do not have another chance to delay the time.

For example, if you want the system powered on Mondays at 5:30 a.m. and off on Fridays at 11:00 p.m., and on Saturdays and Sundays you want the system powered on at 7:30 a.m. and off at 8:00 p.m., type the new times in the Default Power On and Default Power Off columns next to Saturday and Sunday. When you press **Enter**, your changes are shown on the Display Power On/Off Schedule and the Change Power On/Off Schedule displays.

**Change the power-on and power-off schedule for a single event:** The Change Power On/Off Schedule display allows you to change the power-on and power-off schedule for a single day.

For example, to change the power on and off time for the plant's company picnic on Wednesday, May 3:

1. Type 14:30 in the Power Off column to power the system off at 2:30 p.m. so the employees can attend the picnic.
2. Type the reason for the change, Closing - Company picnic, in the Description column across from the date and time and press **Enter** .
3. Type the start time 5:30 in the Power On column to power the system back on Thursday, May 4.

To display the schedule starting on a different date, type the date you want to start with in the Start list at field and press **Enter** . The information that is displayed begins with the date you specify.

**Solve problems with the automatic power schedule:** If the power schedule is not working:

- Make sure that the Start Cleanup (STRCLNUP) command is part of your startup program.
- The automatic power scheduler uses a job called QSYSSCD to process the requests for schedule changes. The Start Cleanup (STRCLNUP) command must be run to start the QSYSSCD job. The IBM<sup>(R)</sup>-supplied startup program includes the Start Cleanup (STRCLNUP) command. If you have your own startup program from a previous release, it may not contain the Start Cleanup (STRCLNUP) command.
- Make sure that you specify Yes on the Change Cleanup (CHGCLNUP) command to allow automatic cleanup. The QSYSSCD job will not start if you do not allow automatic cleanup.
- Make sure that the Start Cleanup (STRCLNUP) command submits the QSYSSCD job to the job queue specified in the Change Cleanup (CHGCLNUP) command.
- Check to see if the QSYSSCD job is running; it could be on a held job queue.
- Make sure that the job queue, that the Start Cleanup (STRCLNUP) command is submitted to, has the maximum jobs parameter set to \*NOMAX or a number greater than 1. Because the QSYSSCD job always runs, the other jobs that perform automatic cleanup and power off functions are not able to start if the maximum jobs parameter is set to 1. To change the maximum jobs parameter on the job queue entry, use the Change Job Queue Entry (CHGJOBQE) command.
- Make sure the mode is set to Normal or Auto.

## Causes of abnormal IPLs

An abnormal IPL (initial program load) can be caused by any of the following:

- Using the End Job Abnormal (ENDJOBABN) command. To see if this command has been used, look for message CPC1124 in the job log.
- Using option 7 (Start a service tool), then option 7 (Operator panel function) on the Dedicated Service Tool (DST) menu.
- Using the Power pushbutton (on the control panel) instead of the PWRDWNSYS command.
- A power failure occurring before all data is written from main storage to disk.
- Any B900 xxxx system reference code (where xxxx is any number or letter) during the start of the operating system phase of the IPL.
- A Power Down System (PWRDWNSYS) command that did not complete, ending with a system reference code of B900 3F10.
- Any function check in the controlling subsystem causing the system to end.
- Issuing a PWRDWNSYS command in the primary partition without first powering down secondary partitions.
- The system going down when database recovery has not completed during the IPL.

Note: If the End Job Abnormal (ENDJOBABN) command was issued, message CPI0990 will be in QHST. For all other reasons, message CPI091D will be in QHST stating why the IPL was abnormal.

For more troubleshooting assistance, see Service, support, and troubleshooting.

## Sign on to the server

The iSeries<sup>(TM)</sup> server requires users to sign-on to the system before gaining access to any system functions. This provides both an important measure of security and allows for each user's session to be customized. In addition to checking the password, OS/400<sup>(R)</sup> uses the sign-on operation to access the specified user profile. OS/400 uses this profile to customize the displays, providing consideration for the user's language and available functions.

To sign on to the server using iSeries<sup>(TM)</sup> Navigator:

1. Select a server.
2. At the Signon to iSeries prompt, enter your user ID and password.

To sign on to the server using the character-based interface:

1. Type your user ID, your password (if security is active), and fill in any of the optional entry fields you want to use. Use the Tab key to move the cursor from field to field on the display.

Notes:

- The Password field is displayed only if password security is active on the system.
- The top right corner of the Sign On displays the name of the system you are using, the subsystem the system is using, and the display station identifier (ID).

2. Press **Enter**.

If this is an unattended IPL (initial program load), one or more of the following occurs, depending on what options you select on this display or what is defined in your user profile:

- The Main Menu is displayed.
- Another menu is displayed.
- A program or procedure is run.
- A current library is inserted into your library list.

If you specify a program or procedure to run and a menu to be displayed, the program or procedure is run first and then the menu is shown.

After signing on, you may "Change the system password" on page 17.

Now that your system is up and running be aware that:

- The Operational Assistant displays are now the default.
- The system cleanup functions are automatically started with default values.
- The Attention key program defaults to display the Operational Assistant (ASSIST) menu.

## Change the system password

When you install the OS/400<sup>(R)</sup> licensed program, the licensed program runs a check to detect system model changes, certain service conditions, and ownership changes. If the licensed program detects these changes or conditions, you are prompted to enter the system password before the IPL (initial program load) can continue. If no changes or conditions are recognized, the IPL continues without a request for the system password.

You must enter the correct system password to complete the IPL. If the system password is not available, you or your service representative may temporarily bypass entering the system password for a limited time. When the bypass period starts, immediately contact your IBM<sup>(R)</sup> service representative or Business Partner to send you the correct system password.

### To change the system password

- If you have just installed new hardware, you may need to change the system password during the first IPL. To do this:
  1. Select option 1 (Change the system password) on the Verification of System Password Failed display.
  2. The following system information about the Change the System Password display is shown:
    - System serial number
    - System type number
    - System model number
    - System password version
    - Processor card serial number
 If you do not know the system password, use F12 (Cancel) and select option 2 (Bypass the system password) on the Verification of System Password Failed display.
  3. Type the password in the blank field and press **Enter**.
- To change the system password when your system is operational:
  1. Perform an “Change the system during IPL (attended IPL)” on page 9.
  2. Select option 1 (Change the system password) on the Verification of System Password Failed display.
  3. Type the password in the blank field and press **Enter**.

### Bypassing the system password

Use the Verification of System Password Failed display to bypass the system password when:

- You do not know or cannot find the system password.
- You guess the system password and get a message stating that the password you entered is incorrect.
 

**Note:** If you type the password incorrectly five times, you must do the IPL again.

To bypass the system password during the first IPL:

1. Select option 2 (Bypass the system password) on the Verification of System Password Failed display.
2. Read the information about the Bypass the System Password display. Remember to contact your marketing representative immediately to obtain the system password before the bypass period runs out.
3. Press **F9** (Bypass) to continue the IPL.

When the IPL has finished, you will receive hourly messages that tell how much time is left in the bypass period.

When you receive the password, you can enter it by doing the following:

- Perform an “Change the system during IPL (attended IPL)” on page 9 and select option 1 (Change the system password) on the Verification of System Password Failed display.
- Perform an “Change the system during IPL (attended IPL)” on page 9 and select option 1 (Change the system password) on the Bypass Period has Ended display.

## Stop the server

Turning off your system takes careful attention. If you turn off the system without completing the tasks below, you may cause damage to data or cause the system to behave in unpredictable ways. The iSeries<sup>(TM)</sup> server provides several ways to safely power down your system.

- Use the PWRDWNSYS command to either perform a controlled power down operation or “Powering off the system immediately” on page 19. For more information about a controlled power down, see the PWRDWNSYS command.
- You can stop the system using the Power On and Off Tasks (POWER) menu. To get to the Power On and Off Tasks (POWER) menu, type **go power** on any command line and press **Enter**.
- You can set up a “Schedule a system shutdown and restart” on page 14 that automatically powers your system on and off. You can determine the time of day you want the system powered on and off. You can also specify special circumstances that change the normal daily schedule, such as a holiday or special closing.
- In emergencies you can stop the system by “Use the power pushbutton” on page 20. However, using the Power pushbutton may cause errors with your data files and other objects on the system.

Before you power down your system, you must complete the following tasks:

### Make sure all batch jobs are finished and users are signed off the system:

1. Send a message that interrupts all users signed on the system telling them to sign off.
  - a. Type **G0 MANAGESYS** and press **Enter**.
  - b. Select option 12 (Work with signed-on users) on the Manage Your System, Users, and Devices (MANAGESYS) menu.  
**Note:** if the Work with User Jobs display is shown, you need to switch to basic assistance level using **F21**.
  - c. Press **F10** (Send message to all) on the Work with Signed-On Users display.
  - d. Type the message in the Message text field on the Send a Message display and press **F10** (Send).
2. Wait for the users to sign off.
3. Check to make sure all users have signed off by pressing **F5** (Refresh) on the Work with Signed-On Users display. When everyone is signed off the system, the display will show only your job. To sign someone off the system, use option 4 (Sign off).  
**Note:** if you have separate interactive subsystems, other than the controlling subsystem, you may want to stop the interactive subsystems once the users have signed off. This prevents them from signing on again before you have stopped the system. See “Subsystems, job queues, and memory pools” on page 31 for information about how to end a subsystem.

### Check the status of any batch jobs that might be affected if the system is powered down:

1. On any command line, type **G0 MANAGESYS** and press **Enter**.
2. Select option 11 (Work with jobs) on the Manage Your System, Users, and Devices (MANAGESYS) menu.  
**Note:** if the Work with User Jobs display is shown, you need to switch to basic assistance level using **F21**.



3. Press **F14** (Select other jobs) on the Work with Jobs display.
4. Type **\*all** in the User field.
5. Type an **N** in every field except the Message waiting, Running, and Running job held fields. The Work with Jobs display is shown again with the batch jobs listed.
6. If any job queues have jobs waiting to run, press **F22** (Work with job queues) to see the Work with Job Queues display.
7. Hold any job queues that have jobs waiting to run on the Work with Job Queues display. Release these job queues when you start the system again.
8. Press **F12** (Cancel) to return to the Work with Jobs display.
9. Press **F5** (Refresh) every few minutes until all batch jobs have completed processing.

#### **Check for removable media**

1. Check to see if there are any tapes in any tape units or CD-ROMs in any optical units.
2. Remove any tapes or CD-ROM currently in the unit.

For more information about shutting down an iSeries server, including using Uninterruptable Power Supplies and other emergency shutdown methods, see Controlled shutdown concepts.

#### **Powering off the system immediately**

You can stop the system by using the Power Down System (PWRDWNSYS) command on any command line when the system is in any mode. Type **PWRDWNSYS** and press **F4** to view the power down options. You must have QSYSOPR authority to use the Power Down System (PWRDWNSYS) command. If this command does not work on your system, use the following methods.

##### **To power off the system immediately:**

1. Type **go power** on any command line to display the Power on and Off Tasks (POWER) menu.
2. Select option 3 (Power off the system immediately) if you want to keep the power off until the next time the system is scheduled to power on.
3. Press **F16** (Confirm) to confirm your choice to power off the system immediately. An immediate power down occurs that causes the subsystems to end all active jobs.

##### **To power off the system and restart immediately:**

1. Select option 4 (Power off the system immediately and then power on) on the Power On and Off Tasks (POWER) menu.
2. Press **F16** (Confirm) to confirm your choice. The system stops running and then starts again automatically.

**Note:** Do not turn the modem on or off when the system is turned off and is made ready for remote IPL (initial program load). Otherwise, the system may start unexpectedly, although it turns itself off in a few minutes.

**Note:** If you stop the system using the automatic power schedule or one of the options on the Power On and Off Tasks (POWER) menu, the IPL date and time system value (QIPLDATTIM) is checked and, if necessary, reset to the next scheduled power-on time. This checking does not occur if you power off in another way, so the system may not power on automatically. To force the power schedule to update the Date and time (QIPLDATTIM) system value, enter the following command on any command line:  
**CHGPWRSCDE DAY(\*TODAY) PWRONTIME(\*SAME) PWROFFTIME(\*SAME)**

## Use the power pushbutton

If you cannot use option 3 (Power off the system immediately) or option 4 (Power off the system immediately and then power on) on the Power On and Off Tasks (POWER) menu to stop the system, you can turn the power off using the Power pushbutton to turn off the system when the mode is set to Manual.

**Note:** Using the power pushbutton to turn off the system may cause results that cannot be predicted in your data files, and the next IPL (initial program load) will take longer to complete. Using the Power pushbutton to turn off the system will power down all partitions.

Make sure that there are no tapes in the tape units or diskettes in the diskette units, and that the mode is set to Manual.

Do not turn the modem on or off when the system is turned off and is made ready for remote IPL. Otherwise, the system may start unexpectedly, although it turns itself off in a few minutes.

To turn the power off using the Power Pushbutton, do the following:

1. On the control panel, press the Power pushbutton. The Function/Data display blinks with 0 (the international power off symbol).
2. Press the Power pushbutton again. The Power On light blinks as the system is being powered off. When power off is complete, the light goes off.

If the system does not turn the power off within 30 minutes, wait for the System Attention light to come on. When the System Attention light comes on, go to Service, support, and troubleshooting and follow the steps necessary to solve the problem.

## System values that control IPL

» The system values listed below let you control the type of (initial program load) IPL and the way the system does an IPL. You can now work with all system values in iSeries<sup>(TM)</sup> Navigator. To work with system values in iSeries Navigator, select your system —> **Configuration and Service** —> **System Values**. If you do not have an iSeries Navigator connection, you can still use these system values through the character-based interface. From the character-based interface, change or display these values using the Work with System Values (WRKSYSVAL) command.

### Allow scheduled restart (QIPLDATTIM)

**Allow scheduled restart**, also known as **QIPLDATTIM**, sets the date and time for a scheduled restart. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Restart** —> **General**. For more complete information, see Allow scheduled restart in the System Values topic.

To set the date and time format, see the Date and time (QDATFMT, QDATSEP, QTIMSEP) system value.

### Previous restart type (QIPLSTS)

The Previous restart type system value displays the way the system did the last IPL. You cannot change this system value. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Restart** —> **Previous**. When needed, use the help associated to the panel.

<b>Operator panel restart (0)</b>	The restart occurred when requested from the operator panel or from Dedicated Service Tools (DST) for a secondary partition.
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<b>Automatic restart after power restored (1)</b>	The restart occurred automatically when power was restored after a power failure. You can specify this type of restart in the <b>Restart options</b> on the <b>General</b> page.
<b>Restart (2)</b>	The restart occurred when a user requested to power down the system and restart it.
<b>Time-of-day restart (3)</b>	The restart occurred automatically on the date and time specified for <b>Scheduled restart</b> on the <b>General</b> page.
<b>Remote restart (4)</b>	A remote restart occurred. You can specify this type of restart in the <b>Restart options</b> on the <b>General</b> page.

See the Previous restart type system value for more detailed information.

### Type of restart (QIPLTYPE)

The Type of restart system value defines the type of IPL the system does from the control panel. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Restart** —> **General**. When needed, use the help associated to the panel.

<b>Unattended (0)</b>	An “Start the system without making configuration changes (unattended IPL)” on page 8. No displays requiring user interaction are shown during the restart. The normal signon display is shown when the restart is complete. If the system is in manual mode, an attended IPL is performed instead.
<b>Attended (1)</b>	An “Change the system during IPL (attended IPL)” on page 9. Start the system with an operator. All dedicated service tools functions are available along with the full set of restart displays. An unattended IPL is done if it is done remotely, by date and time, or after power failure.
<b>Attended, console in debug mode (2)</b>	An attended IPL in debug mode. Restarts the system and leaves the controller QCTL and device QCONSOLE varied on. Select this only for problem analysis, as it prevents other devices on the workstation controller from being used.

See the Type of restart system value for more detailed information.

### Automatically restart after power failure (QPWRRSTIPL)

The Automatically restart after power failure system value allows you to specify whether to allow auto-restart when a power failure occurs. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Restart** —> **General**. When needed, use the help associated to the panel.

<b>Not selected (0)</b>	Does not do an automatic restart after a power failure.
<b>Selected (1)</b>	Does an automatic restart after a power failure.

See the Automatically restart after power failure system value for more detailed information.

### Allow remote power-on and restart (QRMTIPL)

The Allow remote power-on and restart system value allows you to start the remote system by using your telephone and a modem or the SPCN signal. This means that any telephone call causes the system to restart. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Restart** —> **General**. When needed, use the help associated to the panel.

<b>Not selected (0)</b>	Does not allow a remote restart.
<b>Selected (1)</b>	Allows a remote restart.

See the Allow remote power-on and restart system value for more detailed information.

### When power failure occurs (QUPSDLYTIM)

The When power failure occurs system value controls the length of time the system will wait, before saving main storage and power down the system. If utility power is restored before the time ends, the system ends the timer. If the timer ends first, the system begins to save main storage or goes into CPM. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Power Control** —> **General**. When needed, use the help associated to the panel.

There are five choices for the QUPSDLYTIM value.

<b>Automatically power down the entire system (0)</b>	The system automatically powers down when system utility power fails.
<b>Power down system after time interval (1-99999)</b>	Specifies the delay time in seconds before the utility power fails.
<b>Power down system, retain power on main tower (*BASIC)</b>	Powers down only the processor, I/O processor cards, and load source storage. The appropriate wait time, in seconds, is calculated. (This must be used only if you have the battery power unit or an uninterruptable power supply without every rack being connected.)
<b>Power down system, system calculates delay time (*CALC)</b>	The appropriate wait time (in seconds) is calculated. This value must be used only if you have a 9402 or 9404 system with a battery power unit.
<b>Do not automatically power down system (*NOMAX)</b>	*NOMAX is used when a user supplied program is controlling the power down of the system or a generator is providing unlimited power. The system does not start any action on its own.

See the When power failure occurs system value for more detailed information.

### Message queue and library (QUPSMMSGQ)

The Message queue and library system value allows you to specify where you want your messages sent when the power to the system is interrupted. The default values are Message queue - QSYSOPR; Library - QSYS. In iSeries Navigator, select your system, —> **Configuration and Service** —> **System Values** —> **Power Control** —> **General**. When needed, use the help associated to the panel.

This sends the messages to the system operator's message queue when power to the system is interrupted.

<b>message queue</b>	Specifies another message queue (in addition to the system operator's message queue) where messages are sent when power to the system is interrupted.
<b>library</b>	Specifies the library where the other message queue is located.

See the Message queue and library system value for more detailed information. <<

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## OS/400 concepts

OS/400<sup>(R)</sup> is the operating system for the iSeries<sup>(TM)</sup> servers. It manages hardware and software resources, and provides an interface that allows you to work with the iSeries server. To best use OS/400, you need to be familiar with the following system concepts.

### Operation concepts

#### **"Messages" on page 24**

Messages are communications sent from another user, OS/400, or an application. Learn about the different kinds of messages and how to interpret and respond to them.

#### **"OS/400 commands" on page 24**

OS/400 uses Control Language (CL) commands to interpret instructions from users. Learn the basic rules for using CL, and how to get detailed help for any CL command.

#### **"Security and user authority" on page 25**

OS/400 determines which resources a user may access based on information in their user profile and the security strategy implemented for this system. Learn about security settings and how to manage user authorities efficiently.

#### **"Files and file systems" on page 28**

Files and file systems presents information about database file management, spooled files, tape files, and the integrated file system capabilities of the IBM<sup>(R)</sup> iSeries server.

#### **"OS/400 restricted state" on page 29**

At times, it is required to place the operating system in restricted state. This is a concept unique to OS/400 and must only be performed when necessary. Learn about restricted state and when it needs to be performed.

### Basic work management

#### **"Jobs" on page 30**

All work done by the iSeries server is divided into units called jobs. Learn about the types of jobs, and how to find, monitor, and work with them on the iSeries server.

#### **"Subsystems, job queues, and memory pools" on page 31**

Control work on the iSeries servers by working with the resources used to process jobs.

#### **"Objects" on page 31**

Everything on the system that can be worked with is considered an object. Objects provide a common interface for working with system components. Learn about the different kinds of objects and how to work with them.

### System maintenance

### “Logs and journals” on page 32

Record keeping is an important way for the iSeries to protect data and track system problems. Learn what logs and journals are for and how to use them.

### “Software fixes” on page 32

Recent versions of iSeries software add functions and solve known problems. Learn how to install and manage software and software updates.

Additional reference information can be found in the IBM glossary.

## Messages

Messages are communications that are sent from a person, program, or the iSeries<sup>(TM)</sup> server to a message queue. Every user profile and workstation has a message queue associated with it. All message queues are named after the user or workstation they are associated with, and get created automatically when the user signs onto the system for the first time, or when the workstation is first defined. The message queue for the QSYSOPR profile is particularly important, because the iSeries server sends many messages about job completion and system status there. For more information, see Message queues.

### Work with messages

iSeries Navigator allows you to display, reply to, and send messages. To work with messages, expand **Basic Operations**, and click **Messages**. iSeries Navigator displays all the messages for either your message queue, or a specified message queue. To reply to, delete, or view the properties for a specific message, right click the message and select the desired action. To send a message, right-click **Messages** in the iSeries Navigator hierarchy, and select **Send a message**.

Also, your system administrator can set up a message monitor in iSeries Navigator to watch for and handle messages. For an example, see Scenario: Message monitor.

## OS/400 commands

OS/400<sup>(R)</sup> control language (CL) provides a powerful and flexible means of entering commands on the iSeries<sup>(TM)</sup> server. You can use CL to control most of the iSeries functions by entering them from the character-based interface, including them in programs, or by sending commands in iSeries Navigator. While the iSeries menu system and CL commands may be unfamiliar at first, they follow an easy-to-use syntax, and OS/400 includes many features to help you use them successfully. The CL topic includes a complete CL reference and a CL finder to look up specific CL commands.

### CL command syntax

CL commands consist of a verb, an “Objects” on page 31, and sometimes an adjective.

For example: **WRKACTJOB**

Verb	Adjective	Object
WRK	ACT	JOB
Work	Active	Job

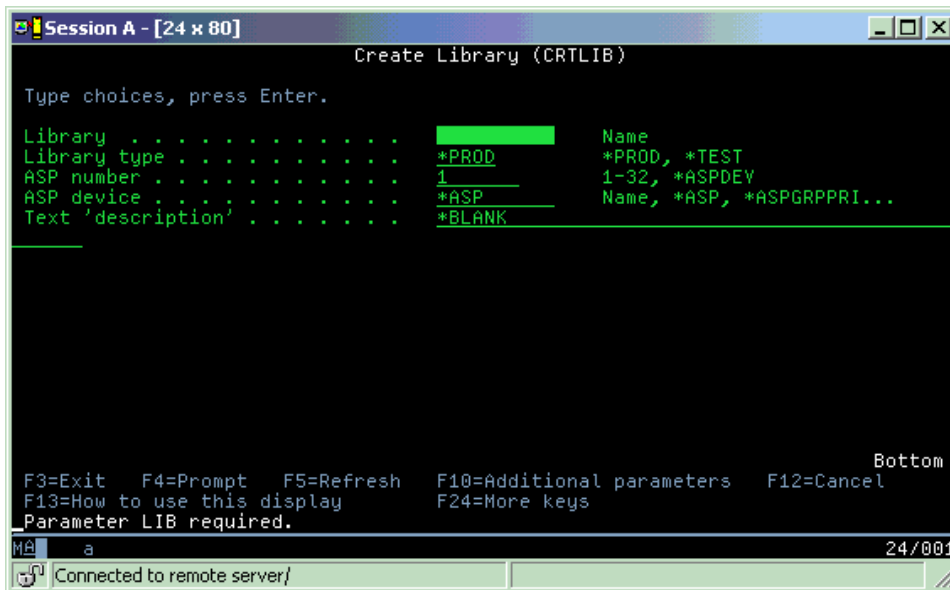
One of the important features of CL syntax is that it is consistent. For example, regardless of the object or command you want to work with, using the verb **WRK** in the command will start a menu allowing you to perform the available actions on the specified object. See Commands operating on OS/400 objects for a reference of common commands.

### Entering CL commands

You can enter CL commands from iSeries Navigator by selecting **Run a command** from the task pad. Alternatively you can enter CL commands from any command line and most displays on the iSeries character-based interface. See “Character-based interface” on page 3 for more information about working with this interface and the OS/400 menu structure.

Every command has a set of required and optional parameters. For example, **CRTLIB** (Create Library) requires, at a minimum, that you specify the name of the library you need to create. The syntax for more complex CL commands is: command name parameter, value. For example, **CRTLIB LIB(FRED)** enters the verb “create,” on the object type “library,” and specifies that the required parameter **LIB**, the library name, must have the value “FRED.” This command causes OS/400 to create a library called FRED.

If you are not already familiar with the parameters associated with a CL command, you can enter the command with the parameters you already know, place the cursor on the command, and press **F4**. OS/400 then displays the available options for the command. Entering a command without any parameters also causes the system to prompt you for any required fields, making field-level help available. For example, entering **CRTLIB** causes OS/400 to display the following display:



Entering a ? in any field brings up detailed help for that parameter.

### Getting help with CL commands

OS/400 provides several methods for helping users access and enter CL commands. The Command Entry program provides a useful interface and additional help. You can start this program by entering **CALL QCMD** from a command line. The CL finder in the Information Center can also help you find a specific command. Most importantly, remember that entering a command without any parameters, or pressing **F4** (Prompt) while your cursor is over the command, displays a menu with detailed help for all associated parameters.

## Security and user authority

Security is a critical piece of iSeries<sup>(TM)</sup> operations. It is built into OS/400<sup>(R)</sup>, and impacts nearly every function on the system. The iSeries security environment determines the commands and functions available to users, and the objects they may access.

Typically the security strategy restricts the objects a user can access. For systems with object-level security, there are several ways to provide “Authority to access objects” on page 26. Often, user profiles will explicitly grant types of access to specific objects. To simplify the task of managing all these permissions,

authorization lists can specify groups of objects, and users can be given access to these lists. Accessing these lists then provides access to all of the objects the list specifies.

The level of iSeries server security, and other more detailed security practices, often affect system operations. The following concepts are important for understanding user requirements in various security environments.

#### “Security levels”

OS/400 operates in one of several predefined levels of security. The security level currently in effect determines the level of detail user profiles must provide in order to grant appropriate access to system resources. This level of detail may range from simple password management to explicitly providing a level of access to each object a user may read or change.

#### Security system values

Many more detailed aspects of system security are set by iSeries system values. These system values set the iSeries security level, and grant or restrict options like adopted authority.

#### “User profiles” on page 27

The iSeries user profile contains most of the authorizations and preferences for individual users or groups. iSeries Navigator allows you to create and manage users and groups across the iSeries server.

#### “Authorization lists” on page 28

Granting each user authority to every separate object they need access to can be time-consuming and complex. You can simplify this process by creating authorization lists that specify groups of objects. Users and groups can then be authorized to this list, granting them authority to everything that list contains.

For more information about iSeries security, see Basic system security and planning. Also, security settings regarding policies and authorization lists are available in iSeries Navigator under **Security**.

### Authority to access objects

Depending on the security level and other security settings, users may be given several levels of access to objects on the server.

Access	Description
All Object	Grants unrestricted access to every object on the server.
Object	Grants access to specified objects.
Object data	Grants access to the data contained in specified objects.
public	Grants default access to public objects

For example, a user needs authorization to add, change and delete data in a database, but does not need to delete tables or the database itself. He or she can be granted **object data** level authority, rather than **object level** authority.

#### Note:

Adopted authority will grant users access to objects called by an object they are working with. Administrators can allow or restrict adopted authority with security system values.

### Security levels

Security on your system is arranged in a series of levels or classes, each offering a greater degree of security and protection of your data than the previous. Select the level that best meets the needs of your organization.



You can use iSeries<sup>(TM)</sup> Navigator to change these settings on a single system or across multiple systems.

### **Level 20**

This level is referred to as password security. That is, users must have a password and user ID that is recognized by your system in order to gain access to the system. Both the user ID and initial password are created for users by the system administrator.

This level of security offers all users on the system total authority to do anything they want. That means they can access all data, files, objects, and so on, on your system. This might be appropriate for small businesses where internal security is a low priority, but will likely be inappropriate for larger businesses that do not want every employee to be able to access confidential payroll files, for example.

### **Level 30**

This level is referred to as resource security. That is, users must have a valid user ID and password defined for them by the system administrator, and no longer have automatic access to everything on the system. User access is limited by the security policies of the business.



### **Level 40**

This level is referred to as system integrity security. That is, at this level, the system itself is protected against users. User-written programs cannot directly access the internal control blocks through pointer manipulation.

Level 40 is the default security level for every new installation.

### **Level 50**

This level is referred to as enhanced system integrity security. Level 50 is the recommended level of security for most businesses, because it offers the highest level of security currently possible. Not only is the system protected against user-written programs, but it ensures that users only have access to data on the system, rather than information about the system itself. This offers greater security against anyone attempting to learn about your system.

For more information about system security settings, see the security Tips and Tools  manual, and the Security Reference  guide.

## **User profiles**

User profiles contain the information the iSeries<sup>(TM)</sup> server requires to allow users to sign on to a system, to access their own customized session, including their own message and output queue, and to access functions and objects to which they have been granted authority.

A user profile includes:

- A system user profile name
- The user's privileges and limitations
- A list of objects the user owns or is authorized to use
- A reference to a message queue
- A reference to an output queue
- Information about which groups the user is a member of (up to 16)
- Information about the user's last sign on
- Job attributes, such as description and priority, the initial program to call, and the initial library list
- National language settings
- Other attributes, such as the user id (UID), group ID (GID), and home directory

User profiles may be included in group profiles. In this way, all group members share attributes, share access to specific objects, and share ownership of objects. Group profiles can simplify many user administration tasks by allowing you to apply a single change to many users.

iSeries Navigator's user administration function provides convenient ways to manage users and groups across the iSeries server. For specific security recommendations on creating profiles, see Planning user profiles and Planning user groups.

### **Working with user profiles**

iSeries Navigator allows you to create and manage user profiles and groups if your own profile has the required authority. Expand **Users and groups** to create and manage user profiles. Additionally, this function allows you to perform some common actions on a selected user, such as sending a message, and working with their jobs and objects.

### **Authorization lists**

Providing each user with explicit access to every object they need to work with might create a great deal of duplicated effort, since many users need to access the same group of objects. A much easier way to provide this access is to create authorization lists. Authorization lists consist of a list of users or groups, the type of authority (use, change, and exclude) for each user or group, and a list of objects that this list provides access to.

To work with authorization lists, open **Security** in iSeries<sup>(TM)</sup> Navigator and select **Authorization lists**.

For example, an authorization list can be created to contain a list of objects related to an inventory database. A user responsible for ordering new inventory items can be granted authority to see the contents of the database objects. Additionally, a user group in shipping and receiving needs to update this database as parts come in and out of stock. This group can have authority to change the contents of the objects.

## **Files and file systems**

Files and file systems presents information about database file management, spooled files, tape files, and the integrated file system capabilities of the IBM(R)iSeries(TM)server. For more information see Files and File Systems.

### **Integrated file system**

Files in OS/400<sup>(R)</sup> are significantly different from their counterparts in UNIX<sup>(R)</sup> or Windows<sup>(R)</sup>. In OS/400, a file is another kind of "Objects" on page 31 on your system. Each file has a description that describes its characteristics and how the data associated with the file is organized. Whenever OS/400 processes a file, it uses this description.

In addition to differences in handling files, OS/400 also uses unique structures to store the files and other objects on the system. However, the integrated file system in iSeries Navigator will look familiar to people who are used to a Windows-based hierarchy. UNIX users will recognize some elements of this hierarchy, as well as the presence of file pointers.

You can access the integrated file system in iSeries Navigator. The integrated file system will allow you to find, change, and copy files and libraries on your system by navigating through a hierarchy that is similar to Windows Explorer. You can use the integrated file system to copy data files onto your client PC.

### **Database file management**

Learn about traditional file management functions that your application uses in creating and accessing data on the iSeries server and in ensuring the integrity of the data. File management is the part of the operating system that controls the storing and accessing of traditional file objects (\*FILE objects in the QSYS.LIB library) on the iSeries server.

### **Spooled files**

Spooling is a system function that saves data in a database file for later processing or printing. Spooled files allow you to manage your data files on attached devices such as a diskette or printer. The spooled files topic contains the basic concepts behind this system function.

### **Tape files**

Tape files are device files that provide access to attached Tape devices. This topic describes the characteristics and use of tape and device files for application programs. Learn information from this topic such as storing and accessing data from a tape device. Conceptual information about tape, tape data files and tape device files can also be found under this section.

## **OS/400 restricted state**

Restricted state is a concept unique to OS/400<sup>(R)</sup>. It is a condition that occurs when all subsystems are ended, either manually or automatically by the system. When the operating system is in restricted state, most jobs cannot be active and users cannot connect to the server. You need to ensure that information is saved and other servers, such as a Windows<sup>(R)</sup> server, are properly powered down before putting the operating system in restricted state. If not, there is a high risk that you will lose data.

The following examples show the most common tasks that require or highly recommend restricted state status:

#### **Performing a full system backup**

When a full system backup is performed, the operating system is automatically placed in restricted state. Restricted status is required because the server requires sole access to everything it is backing up.

#### **Saving multiple items**

It is recommended that you put the operating system in a restricted state when backing up multiple items such as libraries, documents, directories, and storage. As previously stated, the system requires sole access to each object it is backing up. If the system is not in restricted state and someone is using a library when the system tries to back it up, the save operation will not complete successfully.

#### **Software installation and upgrade**

At various points during a software installation or upgrade, the operating system is required to be in a restricted state. During these procedures, you are given instructions on how to do this.

There are many more situations where certain tasks require that you perform this operation. The individual tasks will include specific requirements and instructions. When required, you can place the operating system in restricted state by entering the following command at a command line, type ENDSBS SBS(\*ALL) OPTION(\*CNTRLD) DELAY(600) and press Enter.

#### **Notes:**

- For the delay parameter, specify a number of seconds that allows your server time to bring most jobs to a normal end. On a large, busy server, you might need a longer delay. For more information, use the on-line command help.
- The End System command (ENDSYS) will also put the system into restricted state.

The server sends messages to the QSYSOPR message queue. These messages indicate that the subsystems ended, and the server is in a restricted state.

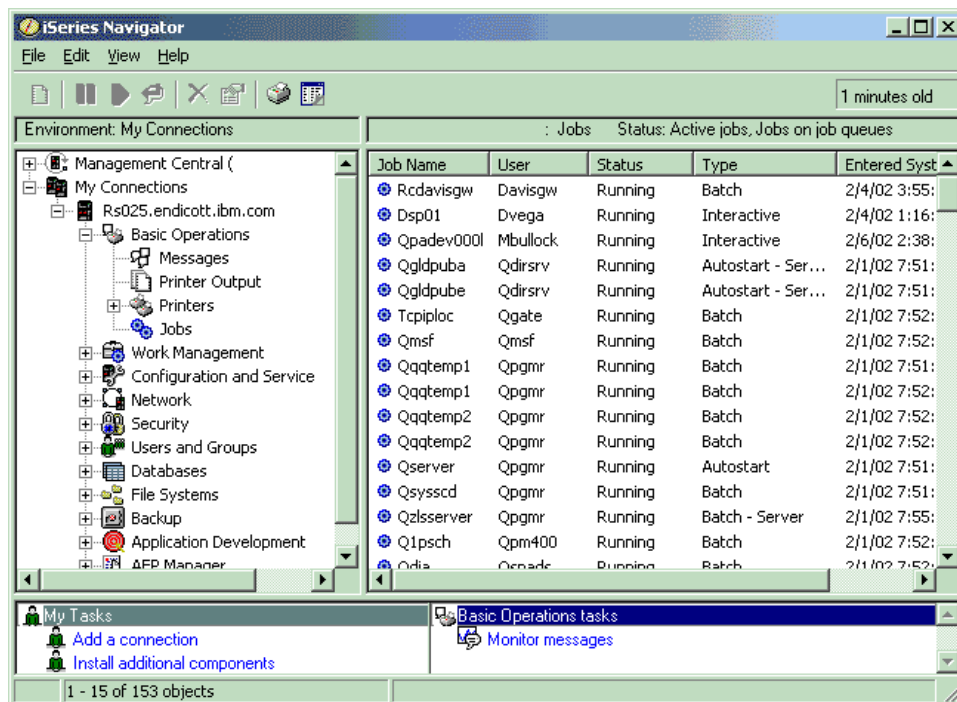
## Jobs

Jobs are how OS/400<sup>(R)</sup> organizes, tracks and processes work. A job typically includes all of the information the system requires to complete a specific task. This information may include data files, programs, and instructions for processing and tracking the job throughout its processing. Jobs vary greatly in their complexity, ranging from simple tasks like printing a specified document to complex procedures like generating reports based on information spread throughout the iSeries<sup>(TM)</sup> server. Tracking and managing jobs on the iSeries is an important part of normal system operation.

Jobs are an essential part of iSeries work management. To learn more about how jobs are processed, including working with subsystems and job queues, see *Structure of your system*. For an example of how jobs move through the iSeries<sup>(TM)</sup> server, see *A job's life*.

### Work with jobs

You can work with jobs in iSeries Navigator. **Jobs** under **Basic Operations** displays all the jobs associated to the current user. To display other jobs, right-click the jobs container, and select **Customize this view** —>**Include**. The Server Jobs - Include dialog box allows you to limit the list of server jobs displayed in the iSeries Navigator window to those that meet the criteria you specify. Alternately, you can see the jobs submitted by the iSeries server by clicking **Work Management** —>**Server jobs**, or view the jobs currently being processed by clicking **Work Management** —>**Active jobs**. The following display shows the jobs display in iSeries Navigator.



After finding the jobs you want to work with, you can display their attributes or change their queue, priority, messages, and other features by right-clicking on the job and selecting **properties**. For more information about working with the jobs on your system, see *Managing jobs*. Additionally, your system administrator may decide to set up a job monitor to work with some jobs. For more information, see *Create a job monitor*.

## Subsystems, job queues, and memory pools

Subsystems, job queues, and memory pools are the basic pieces of iSeries<sup>(TM)</sup> work management. Working with subsystems and job queues to manage specific jobs or to adjust the system's work flow are important system operations.

To efficiently use system resources, different types of jobs require different processing instructions and system resources. To meet this need, OS/400<sup>(R)</sup> creates unique operating environments called subsystems. Each subsystem has a set of system resources, especially a memory pool, that determine how quickly it can process jobs. Subsystems also have unique processing instructions and, in many cases, at least one associated job queue. The job queues hold incoming jobs from the users or applications until an associated subsystem has available resources. The job then moves from its queue into the subsystem where it is processed based on the instructions and resources available to that subsystem. Finally, any output that results from job processing gets handled and routed by the instructions in the job description. For a description of how work moves through the iSeries server, see *Structure of your system*. For an example of how jobs move through the iSeries server, see *A job's life*.

During this process, you may want to monitor a job's progress or adjust its priority. Also, if the iSeries server is having trouble processing certain types of jobs, you may need to adjust the subsystems resources.

### Work with subsystems, job queues and memory pools

iSeries Navigator allows you to view subsystem properties, view job queues that are in use by an active subsystem, start and stop a subsystem, and adjust memory pools. These functions are available under **Work Management** in iSeries Navigator. However, some subsystem commands are only available from the character-based interface.

For a detailed description of subsystems or memory pools on the iSeries server, see *Subsystems or Memory pools* in the *Work Management* topic. For more information about working with subsystems or memory pools, see *Manage subsystems* or *Manage memory pools*.

## Objects

One of the differences between iSeries<sup>(TM)</sup> servers and other platforms is the concept of objects. Anything that you can change in OS/400<sup>(R)</sup> is a type of object. For example, data files, programs, libraries, queues, user profiles, and device descriptions are all types of objects. By treating everything as an object OS/400 can provide all of these items with an interface that defines what actions users may perform, and how OS/400 needs to treat the encapsulated data. Additionally, this interface allows for standardized commands across very different system elements; the commands for working with user profiles and data files are similar.

One important type of object is a library. Libraries are essentially containers, or organizational structures for other objects, and you can use them to reference other objects on your system. Libraries may contain many objects, and may be associated with a specific user profile or application. The only library that may contain other libraries is called QSYS. It contains all other libraries on the system.

There are many different types of objects in OS/400. Finding objects and performing actions on them are basic functions of system operations. For a more detailed description of object types and their default locations, see *OS/400 objects*. For a description of the commands used to work with objects, see *Commands operating on OS/400 objects*.

## Logs and journals

Protecting the data and resources on the iSeries<sup>(TM)</sup> server is a critical part of OS/400<sup>(R)</sup>. One important way the iSeries servers accomplish that goal is to keep detailed records of any changes to system resources. These records, called logs or journals, can help solve system problems or recover damaged data.

### Logs

A log is a database file that contains the history of backup, archive, recovery, and media management operations that may be displayed online or printed for future reference. Logs are used in backup and recovery situations. Logs can also contain information about jobs and problems.


For more information about logs, see:

Log	Description
Job logs	Track the description, status, and action of jobs performed by the system.
History logs	Get general system information, like device changes, operator messages, job completion and other activities.
Problem logs	Retrieve records of system problems that occurred on an iSeries system.

### Journals

A journal is a system object that contains information about changes made to another system object. The journal can be used to recover database files, data areas, data queues, and integrated file systems objects. Regular journaling speeds up management tasks such as save operations.


For more information about journaling, see the following references:

- Journal Management
- Backup and Recovery 

## Software fixes

The operating system for the iSeries<sup>(TM)</sup> server is OS/400<sup>(R)</sup>. IBM<sup>(R)</sup> supports several different releases of OS/400, and businesses may have several iSeries servers running different versions. This may cause some system operations to be more complex; different versions of OS/400 may contain new or changed functions and features. Moreover, IBM provides updates to the operating system and other programs between releases in sets of program temporary fixes (PTFs). The PTFs that have been applied to an iSeries server may also affect system operations. Fortunately, iSeries Navigator provides ways to manage the software and fixes across a business.

For more information, including finding and applying fixes, see the following references:

- iSeries software and licensed programs
- Fix maintenance strategy 

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## Analyze and report system problems

iSeries<sup>(TM)</sup> server problems are carefully tracked and managed in OS/400<sup>(R)</sup>. Familiarity with this process, and the ability to perform basic troubleshooting and problem handling procedures, are a basic part of iSeries server operations. For an overview of iSeries problem management, see How your server manages problems.

Once OS/400 detects a problem, it will generate a problem record and send a message to the system operator message queue, QSYSOPR. For help with analyzing, resolving and reporting these problems, or ones you've identified yourself see:

- Analyze server and system problems
- Report problems detected by the system

For more information how to contact and to work with with IBM<sup>(R)</sup> service, see Service and support. For more information about troubleshooting problems with your system, see the Troubleshooting topic.





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