IBM i
7.4

IBM i and related software
Installing, upgrading, or deleting IBM i
and related software

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 205.

Contents

Chapter 1. Installing, upgrading, or deleting IBM i and related software

This topic collection guides you through the concepts and procedures for installing, upgrading, or deleting IBM i software on your system.

Use this information to install the IBM i release, part of the IBM i release, or licensed programs related to IBM i. This information also describes how to change a primary language, install a secondary language, or delete software that is related to the IBM i operating system.

The Chapter 5, "Checklist: IBM i software upgrade or replacement readiness," on page 21, the "Checklist: IBM i software replacement " on page 87, or the Chapter 11, "Checklist: IBM i software installation readiness," on page 93, contain summaries of the major task categories that you need to do before you begin to upgrade or install your software.

Note: The display examples and procedures in this topic collection show the character-based interface. Many topics in the IBM Knowledge Center assume that you have the graphical user interface (IBM Navigator for i) running. Most IBM Navigator for i functions, however, have equivalent control language commands in the character-based interface that you can use.

If you are moving your data to another system with a different serial number, see Data migrations. If you are upgrading to a new system without changing the serial number, search for topic *Upgrading the system and data migration* in the IBM Systems Hardware Information Center.

Note: By using the code examples, you agree to the terms of the "Code license and disclaimer information" on page 209.

Chapter 2. What's new for IBM i 7.4

Read about new or changed information for the Installing, upgrading, or deleting IBM i and related software topic collection.

IBM i 7.4 supports POWER8® and later hardware
For more information on models and releases supported, see "Releases supported and system model information for IBM i upgrades" on page 15.

What's new for IBM i 7.2 to IBM i 7.4 upgrades

Requirements before you install IBM i 7.4 Licensed Internal Code

The IBM i 7.4 Licensed Internal Code requires more storage on the load-source disk unit than IBM i 7.2 Licensed Internal Code and IBM i 7.3. To upgrade to IBM i 7.4 Licensed Internal Code, all systems will require up to approximately 8 gigabytes of system ASP free space before IBM i 7.4 can be installed. Your upgrade will stop during the installation of Licensed Internal Code if you do not have this space.

Upgrading IBM i from prior releases
An IBM i 7.2 environment on a POWER8 or POWER9™ processor-based server or an IBM i 7.3 environment on a POWER8 or POWER9 processor-based server can be upgraded to IBM i 7.4.

How to see what's new or changed

To help you see where technical changes have been made, the information center uses:

• The » image to mark where new or changed information begins.
• The « image to mark where new or changed information ends.

In PDF files, you might see revision bars (|) in the margin of new and changed information.

To find other information about what's new or changed this release, see the Memo to users.

Chapter 3. Fast path for software installation, upgrade, and deletion tasks

Use this information as a shortcut to help you determine the group of tasks you need to perform for your particular IBM i installation or upgrade.

Proper planning for hardware is crucial for the successful installation or upgrade of the operating system. Go to the IBM Power Systems information (http://www.ibm.com/support/knowledgecenter/POWER8/p8hdx/POWER8welcome.htm) and review the installing, configuring, and managing consoles for your system.

If you requested electronic software delivery, refer to the Entitled Systems Support website (http://www.ibm.com/servers/eserver/ess/index.wss).

Task	Steps

Upgrading a release on a system or logical partition (either from IBM i 7.2 or IBM i 7.3 to IBM i 7.4)	1. Chapter 6, "Preparing to upgrade or replace IBM i software," on page 25
	2. Use one of the following methods to upgrade or replace an IBM i release:
	  • Chapter 7, "Upgrading or replacing software using automatic installation," on page 57
	  • Chapter 8, "Upgrading or replacing software using manual installation," on page 65
	3. "Installing additional licensed programs" on page 117
	4. "Installing a secondary language" on page 123
	5. Review Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83

Replacing Licensed Internal Code and IBM i of the same version and release to support new hardware.	Chapter 10, "Replacing Licensed Internal Code and IBM i of the same version and release," on page 87

Installing the IBM i release on a new system or logical partition	1. "Preparing to install the IBM i release" on page 95
	2. Perform the following based on your situation:
	  • "Installing Licensed Internal Code on a new logical partition" on page 98
	  • "Installing software on a new system or logical partition (without IBM i installed)" on page 104
	  • "Installing software on a new system (with IBM i installed)" on page 113
	3. "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118
	4. "Installing a secondary language" on page 123
	5. Review "Checklist: Completing the IBM i installation " on page 127

Installing licensed programs	1. "Installing additional licensed programs" on page 117 2. Review "Checklist: Completing the IBM i installation " on page 127 (certain steps apply)

Task	Steps
Installing a secondary language	1. Review "Globalization and IBM i software installation" on page 17 2. "Installing a secondary language" on page 123 3. Review "Checklist: Completing the IBM i installation " on page 127 (certain steps apply)
Changing the primary language using either primary or secondary language media on the same release.	1. Arrange your media in the order shown in "Media labels and their contents" on page 188 2. Chapter 13, "Changing the primary language of your system or logical partition," on page 131 3. Review "Checklist: Completing the IBM i installation " on page 127
Changing your primary language and upgrading a release using primary language media	1. Chapter 6, "Preparing to upgrade or replace IBM i software," on page 25 2. Use one of the following methods to upgrade or replace an IBM i release: • Chapter 7, "Upgrading or replacing software using automatic installation," on page 57 • Chapter 8, "Upgrading or replacing software using manual installation," on page 65 3. "Installing additional licensed programs" on page 117 4. "Installing a secondary language" on page 123 5. Review Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83
Selecting the primary language or changing your primary language and installing software on a new system	1. "Preparing to install the IBM i release" on page 95 2. Perform the following based on your situation: • "Installing Licensed Internal Code on a new logical partition" on page 98 • "Installing software on a new system or logical partition (without IBM i installed)" on page 104 • Chapter 13, "Changing the primary language of your system or logical partition," on page 131 3. "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118 4. "Installing a secondary language" on page 123 5. Review "Checklist: Completing the IBM i installation " on page 127
Adding a new disk unit to an existing system before upgrading or replacing a release	If you are currently using mirrored protection, device parity protection, or auxiliary storage pools, refer to these topics in the topic category Recovering your system in the IBM i Information Center before you begin these tasks. 1. Chapter 6, "Preparing to upgrade or replace IBM i software," on page 25 2. Chapter 8, "Upgrading or replacing software using manual installation," on page 65 3. "Installing additional licensed programs" on page 117 4. "Installing a secondary language" on page 123 5. Review Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83

Task	Steps
Installing a cumulative program temporary fix (PTF) package	1. Go to the Support for IBM i website (http://www.ibm.com/systems/support/i) for Internet downloads or PSP information. 2. Review the PTF Shipping Information Letter that you received for instructions on how to install a cumulative PTF package. 3. Optional: Review concept information about how to use and install fixes in the IBM i Information Center.
Installing a hardware upgrade	Go to the IBM Knowledge Center for POWER8 (www.ibm.com/support/knowledgecenter/POWER8/p8hdx/p8_cif_8247_21l.htm) or IBM Knowledge Center for POWER9 (http://www.ibm.com/support/knowledgecenter/8335-GTH/p9hdx/8335_gth_landing.htm) and review the installing and upgrading information for your system.
Deleting software	Use either of the following methods: • "Preselecting the licensed programs to install" on page 47. If you have licensed programs that are no longer supported, these can be deleted when you perform other upgrade preparation tasks in this topic. • Chapter 14, "Deleting software related to the IBM i operating system," on page 141.

Chapter 4. Concepts for software installation

You and IBM together manage the use, documentation, and transfer of IBM i licensed programs.

The following information is a conceptual look at IBM i software installation. This information describes the basics of installing IBM i software: your software order, what to do when you skip a release, software installation scenarios, the types of devices used to install, globalization considerations, and how some conversions could affect your installation time.

Software installation process

The IBM i software installation process involves three phases: preinstallation activities, the main installation, and postinstallation activities.

1. **Preinstallation activities:**

   To plan and prepare your system before you install your software, follow the appropriate planning and preparation topics to guide you through the activities that you need to do.

   - Upgrading to IBM i 7.4: Chapter 5, "Checklist: IBM i software upgrade or replacement readiness," on page 21
   - Replacing Licensed Internal Code and IBM i of the same version and release to support new hardware: "Checklist: IBM i software replacement " on page 87
   - Installing IBM i 7.4 on a new system or logical partition: Chapter 11, "Checklist: IBM i software installation readiness," on page 93

   These activities include verifying your order, checking the amount of available disk space, backing up your system, allocating additional LIC space, and cleaning your media device. In a software upgrade or replacement, some of the tasks are required. If you do not perform these required tasks, you will be forced to restart the installation.

2. **The installation process:**

   The installation process begins when you start performing the instructions in one of the procedural topics. For example, to upgrade to the new release, you might have chosen automatic installation. The automatic installation process installs the Licensed Internal Code, the IBM i operating system, and related licensed programs. In the automatic installation method of upgrading, you have minimal interaction with the system except to load the optical distribution media and to monitor the system.

   Your only installation activity might be changing the primary language or installing additional licensed programs. Or, perhaps you want to perform these activities after an automatic or manual installation.

3. **Postinstallation activities:**

   The last step of each procedure directs you to use a completion checklist. You might be directed to additional steps, such as saving your system and performing installation activities on workstations for IBM i Access Family products. Other activities could include customizing your system, or setting usage limits for user-based priced products. Before you begin production work on your system, be sure to adequately protect your system from unauthorized use.

The procedure that you use for software installation depends on what you plan to install.

Install software on a new system
: If you just received a new system, the operating system and other licensed programs might or might not be installed already.

Upgrade or replace existing software
: If you are upgrading or replacing your existing IBM i software, use either the automatic installation method or the manual installation method.

Automatic installation

This replaces your existing release with minimal user interaction. The automatic installation process keeps the current environment and system values. The process will add all nonconfigured disk units to the system auxiliary storage pool (ASP) and will retain the ASP configuration of previously configured disk units. The automatic installation process is recommended for use with most systems.

Manual installation

This interactively replaces your existing release by using the Work with Licensed Programs menu. Displays that require responses appear on the console. During a manual installation, you can change installation options. Use the manual installation process if you are doing any of the following installation procedures:

- Adding a disk device to a user auxiliary storage pool.
- Changing the environment (IBM i or System/36), system values, language feature code, or configuration values.
- Planning to use an alternate installation device when you upgrade.
- Creating logical partitions during the installation process.
- Using media created with the Save System (SAVSYS) command. (The SAVSYS command creates media that are meant for recovery.)

Add licensed programs

When you add additional licensed programs or optional parts of licensed programs, you use the method done through option 11 (Install licensed programs) of the Work with Licensed Programs (LICPGM) menu. Typically you use option 11 when you need to install a new licensed program or to replace a single licensed program.

Add or change globalization support

When you add a secondary language, you add additional language objects for the licensed programs that are installed on your system.

When you change the primary language, you replace the existing language objects. Depending on the procedure that you use, you can also replace program objects.

If a failure occurs during the installation process, Chapter 15, "Troubleshooting software installation problems," on page 145 contains information that can help you determine the problem and the necessary recovery steps.

Types of software installation devices

These devices can be used to install or upgrade an IBM i release on your system.

Optical devices

The software distribution media that is shipped to customers is optical media (DVD). This media can be used in DVD-ROM or DVD-RAM devices. Optical media can also be created from files that you download through electronic software delivery.

Optical resources from an IBM i logical partition can be used to perform a software upgrade, to install PTFs (fixes), or to install single licensed programs on another logical partition that is on the same system. Supported devices for sharing optical resources include CD-ROM devices, DVD devices, RMS devices, and virtual optical device types 632B-001 and 632B-003.

When an RDX drive is hosted to another partition, it reports as a 63B8-0D2 DVD drive. When a USB Flash drive is hosted to another partition, it reports as a 63BC-0D2 DVD drive. All other optical devices hosted to another partition, report as 632C-002 DVD drive. A 632C-002 drive has the capability to automatically change media if the hosting partition is capable (such as an IMGCLG), or it requires a manual media change (such as when the media is a physical DVD or the hosting partition is an IBM i Virtual I/O server).

This switching capability allows you to manually and programmatically switch media in a client virtual optical device without requiring authority to the serving partition. This is accomplished on the client partition with the following commands:

- WRKIMGCLGE(*DEV) DEV(*device_name*) This command allows you to list and mount volumes.
- LODIMGCLGE IMGCLG(*DEV) IMGCLGIDX (*x*) OPTION(*LOAD) DEV(*device_name*) This command allows you to mount and load volumes.

An application of this function is the use of image catalogs for unattended installations of client partitions.

Virtual optical devices
You can use an image catalog to perform a software upgrade, to install PTFs (fixes), or to install single licensed programs that you receive on media or create from files received through electronic software delivery. Installing with an image catalog has significant advantages when you want to do the following tasks:

- Validate your optical media before you install the release.
- Run the Prepare for install tasks against your virtual optical media and automate the media-handling portion.
- Eliminate the handling of individual media during the installation (unattended installations).
- Upgrade software from an installation image delivered from a network or generated from IBM-supplied optical media.

A special type of virtual optical device (632B; model 003) supports virtual image files on a remote system in a network. An image directory identifies a network path on the central system that contains the virtual image files that are prepared for use with a target system. This virtual optical device can be used to install licensed internal code, operating system, install additional licensed programs and PTFs. For further details, see IBM i Network Install using Network File System.

Another type of virtual optical device (632B model 011) supports virtual image files within a physical RDX or Flash drive that has been initialized as optical container media. Optical container media can be used to install from files that you download through electronic software delivery.

Tape devices
There could be times when tape media is used for installation. Examples include distribution media creation or certain backup and recovery scenarios.

Installing with an image catalog has significant advantages when you want to do the following tasks:

- Validate your tape media before you install the release.
- Eliminate the handling of individual media during the installation (unattended installations).
- Upgrade software from an installation image delivered from a network.

Virtual tape devices
You can use a tape image catalog and a virtual tape device to perform an IBM i software upgrade, install PTF fixes, or to install single licensed programs.

Removable Mass Storage (RMS)
There could be times when RMS devices can be used for installation. Examples include distribution media creation or certain backup and recovery scenarios. For further details about RMS devices, see Removable Mass Storage (RMS).

Alternate installation devices
You can perform installation and recovery procedures by using the primary installation device along with an alternate installation device that you define. The alternate installation device can be a tape device, an optical device, or a removable mass storage device. Some systems, typically those with faster devices attached, might see a performance improvement when using an alternate installation device.

The following table shows the naming conventions for a device that can be used for the alternate IPL (a Type D IPL). The optical drive is the installation device for software distribution media. Examples here use OPT01 for the optical device (optical media class). This is the IBM i normal naming convention. Your

system could be set up to use the System/36 naming convention. Use the following table to select the correct device name for your system's installation device or use the name that you have selected.

Table 1. Naming conventions for devices		
Media type	**System/36 names**	**IBM i normal names**
Optical media (CD, DVD, or virtual optical images)	OPTxx	OPTxx
Removable Mass Storage (RDX and Flash drives)	RMSxx	RMSxx
Cartridge	TC	TAPxx
Reel	T1	TAPxx
Media library device created through automatic configuration		TAPMLBxx

contains further information on what you need to do with your media before you install a release.

Contents of a software order

Your IBM i software order package includes software licensing documents, the optical media, and other product documentation as appropriate. The optical media can be either physical media or media that is created from files that are downloaded through electronic software delivery.

When you order software from IBM, you receive the optical media distribution set. The software license keys and software entitlements created for your licensed programs are available online.

Software licensing documents

The software licensing documents that you receive with your IBM i software release order can be either printed or online.

These documents contain important information related to the use, management, and transfer of licensed programs. The licensing documents for IBM licensed programs that you receive are either printed or online on the system. The Customer Notice that is included in your software order describes how to access the online documents.

To automatically install IBM licensed programs that have online software agreements, you need to accept the agreement through the Prepare for Install menu before you can install the programs. An upgrade of the Licensed Internal Code and the IBM i operating system stop if the agreements are not accepted. The topic describes how to accept the agreements.

Ensure that you read and understand all software license agreements and documents before you use the programs.

Store the printed agreements and documents in a secure location. Both printed and online agreements need to be passed to the new owner when you transfer a program.

Proof of Entitlement
> The Proof of Entitlement (PoE) is evidence of the owner's authorization to use the program and is the official record on entitlement. It is evidence of eligibility for any version or release updates under software subscription, warranty services, future upgrade program prices (if announced), and potential special or promotional opportunities. A PoE is created for new customer orders or when additional entitlement is purchased.

> An electronic PoE for IBM i software upgrade orders are replacing the printed PoE formerly included with your software products. For instructions on how to access your electronic PoEs and software license keys, refer to the Customer Notice that is included with your software order. Destroy the printed PoEs after you verify the existence and content of the web-based PoE.

The International Program License Agreement
> The International Program License Agreement (IPLA) provides a nonexclusive license to use a software product that has a warranty.

International License Agreement for Non-Warranted Programs
> This agreement is similar to the IPLA but is used for IBM licensed programs that have no warranty.

International License Agreement for Evaluation of Programs
> The Evaluation of Programs provides a nonexclusive, nontransferable license to use a program only for internal evaluation, testing, or demonstration purposes, on a trial or "try-and-buy" basis.

Licensed Information Document
> The Licensed Information Document (LID) contains specific license information and additional restrictions for a product.

Software license keys
> For each keyed IBM product or keyed IBM product option that you order, a software license key is created. This applies to both new and upgraded software. You can view, print, or download the software license keys from the Entitled software support (http://www.ibm.com/eserver/ess) website. You need to have your customer number and either your order number or system number that is listed on your software packing list available. For further instructions on how to access your online software license keys, refer to the Customer Notice that is included with your software order.
>
> The Entitled software support website also contains more information on managing IBM software license keys.

For a general description of how software license keys are used, see the topic Working with software agreements and licenses in the IBM i Information Center. For unique licensing applications that are regarding logical partitions, see Software licensing for IBM licensed programs on logical partitions in the IBM Systems Hardware Information Center.

Media distribution set

The software products that you receive in an IBM i release order are grouped into different media sets.

The licensed programs on the standard set and keyed set are packaged in one of three different language groups. If your secondary languages are not included in the same language group as your primary language, they are packaged on a second set of optical media.

Other licensed programs, which are in addition to the standard set and keyed set, come on their own separate media when ordered. In this case, all supported languages, not just one secondary language, come on this same media.

Standard set
> The standard set of products comes with every IBM i software or hardware upgrade order. It contains the hardware and software components to install on your system. This includes Licensed Internal Code (machine code), IBM i, its no-charge options, and no-charge licensed programs and options. The IBM i operating system has all the applications necessary for the basic operations of your system. In addition, it could contain more programs than you want. You can choose not to install some of these programs.

Keyed set
> The keyed set of products comes with the standard set. It contains keyed products and program options. You can evaluate these programs for a 70-day trial period. Within 70 days, you must apply license keys to keep the programs operational. Once you purchase the use of a licensed program and load the license key, the licensed program will remain in operation for continual use.

Single products (if ordered)
> When specifically ordered, licensed programs that are not part of the standard set and keyed set arrive on separate media with your software order. You might install these licensed programs using the automatic installation procedure. Some of these licensed programs might come with their own installation instructions, and some might have limited language support.

Secondary languages (if ordered)

Secondary languages may be contained on the same set of optical media as your primary language or they may be contained on a separate set of optical media. You specify the secondary language during the installation procedure.

Individual product documentation

Additional material that contains information unique to the installation of a certain product on your system might be sent with your IBM i software order.

You might have received additional letters to users for individual products. Such material could contain information unique for that product that could affect its installation. Be sure to check these additional sources. When you install a product for the first time, you might need to customize the product or complete additional actions before the product will work. Look for this type of information in your product order.

Skipping a release

If you plan to skip an IBM i release, such as performing an upgrade from IBM i 7.2 to IBM i 7.4 and skipping IBM i 7.3, you need to be aware of changes from the skipped version and release that could affect your programs and system operations.

If you are skipping a release level of IBM i, you should review the *Memo to Users* for the release that you are skipping. This will ensure that you are aware of software changes that occurred in the skipped release that could also affect your programs and system operations.

Performance data collection

With any software IBM i release, the support for new functions can cause an incremental change (increase or decrease) in performance for some workloads.

IBM makes a significant effort to minimize negative effects, and in most cases a change in performance is not observed. However, in a skip-release upgrade, there is a higher potential that the compound effect of incremental performance differences will be observed.

To understand the performance characteristics of an upgrade, collect performance data both before and after the upgrade is complete. Following are two recommended performance collections:

- Collect general performance data for one or more days by using Collection Services. "Gathering performance data for benchmark" on page 32 contains information on ways to start Collection Services.

- Collect specific profile data for approximately an hour by running the following program in a batch job during a period of high activity on the system. To call this program, enter the command CALL SYSPROF PARM(PEXDTAV*x*R*y*) where *x* and *y* indicate the IBM i version and release numbers.

Note: You cannot store PEX data from two different releases into the same library.

```
SYSPROF:  PGM PARM(&LIB)
DCL VAR(&LIB) TYPE(*CHAR) LEN(10)  /* Library to store the data */

/* Create a PEX definition to collect profile data.      */
ADDPEXDFN DFN(SYSPROF) TYPE(*TRACE) JOB((*ALL)) +
          TASK(*ALL) MAXSTG(1000000) INTERVAL(5) +
          TRCTYPE(*PRFDTA)

/* If the definition already exists, assume it is ok.    */
MONMSG MSGID(CPFAF10)

STRPEX SSNID(SYSPROFILE) DFN(SYSPROF)
DLYJOB 3600
ENDPEX SSNID(SYSPROFILE) DTALIB(&LIB)
ENDPGM
```

Save this data from both collections for future reference.

For additional information about determining how upgrades might affect your performance workloads, see the Performance management on IBM i.

Mixed-release environment

Licensed programs or their options do not always have the same release as the IBM i operating system.

In addition to licensed programs not always being at the same release, they can be packaged so that the product's options are not at the same release as its base. This is referred to as a mixed-release environment. For these reasons, your IBM i 7.4 media might contain licensed programs and options that are at different releases than IBM i 7.4. Products that do not have any new function for this release are not repackaged, and therefore could have a release previous to IBM i 7.4. "Licensed program releases and sizes" on page 167 contains information about the version, release, and modification level of the standard and keyed set products. You can also look at the product information to determine IBM i releases that are supported.

Software upgrade or replacement

Use this information to understand special considerations of the system and its software when you upgrade or replace an IBM i release.

Releases supported and system model information for IBM i upgrades

Upgrades to current releases require that you be at a certain level of software and hardware. This information shows the supported combinations for source and current target releases for software and also system model information in relation to IBM i.

To be able to upgrade to the IBM i 7.4 release, your current version of the operating system must be either at IBM i 7.4, IBM i 7.3, or IBM i 7.2.

If your target release is IBM i 7.2 or IBM i 7.3, use the IBM i software installation information for the version of IBM i that is your target release.

If you plan to use logical partitions and want to understand about supported releases on logical partitions, see Software licensing for IBM licensed programs on logical partitions in the IBM Systems Hardware Information Center.

Table 2 on page 15 shows the currently supported combinations for source and target releases. Some of the target releases shown in this table might not be available. If the currently installed release is earlier than those listed here, you must first upgrade the system to either IBM i 7.2 or IBM i 7.3 before you can upgrade to IBM i 7.4.

Table 2. Supported releases for IBM i upgrades

Currently installed (source) release	Valid target releases
IBM i 7.4	IBM i 7.4
IBM i 7.3	IBM i 7.3 or IBM i 7.4
IBM i 7.2	IBM i 7.2, IBM i 7.3, or IBM i 7.4

For information about the POWER® processor-based models that are available, see the IBM website Browse by processor (www.ibm.com/systems/power).

For information about models that are supported, see the IBM website Upgrade Planning (www.ibm.com/systems/support/i/planning/upgrade/osmapping.html).

For information about planning for system hardware upgrades, see Planning (http://www.ibm.com/systems/support/i/planning/). In particular, select **Migration & Upgrades** and then select **Upgrade planning information** to find information about the release cycle and IBM i release level mapping.

Installation and IBM-supplied objects

When you replace your software with a new IBM i release, by default the system keeps changes that you made to some IBM-supplied objects.

Certain job descriptions and subsystem descriptions are restored during the installation process. The installation process creates these libraries (if they do not already exist):

QINSYS
QINMEDIA
QINPRIOR

The system copies your current customized descriptions from library QSYS to library QINSYS. The descriptions are installed from the installation media into library QSYS. The system compares those values with the descriptions in QINSYS. If there are any differences, the system uses your customized value from QINSYS to update the QSYS version. If there are conflicts in certain values, the system uses the value from the installation media, and the conflicting value remains in QINSYS. QINMEDIA holds the description from the installation media. QINPRIOR holds the descriptions from the prior release level so that you can compare the current and previous release descriptions.

Use the PRTSYSINF command before you upgrade to have a copy of the IBM-supplied objects. After the upgrade you can change these objects back to the previous customization. For more information about PRTSYSINF, see Printing system information.

IBM-supplied objects that retain customized information

If you have made changes to any of the IBM-supplied descriptions shown in the following table, the default action of the system is to keep your changes.

Job descriptions	Subsystem descriptions
QCTL (Controlling subsystem job description)	**QBASE** (Basic controlling)
QCTLIJBD (Controlling subsystem ICG job description)	**QBATCH** (Batch)
QESAUTON (Automatic problem notification)	**QCMN** (Communications)
QFSIOPWK (File server I/O processor)	**QCTL** (Controlling subsystem)
QMSF (Used by QPGMF job)	**QINTER** (Interactive)
QPDAUTOPAR (Used for automatic problem analysis)	**QPGMR** (Programmer)
QQQTEMPS (Db2® for i job description used by QSYSWRK)	**QSNADS** (Systems Network Architecture (SNA) Distribution)
QSPLERROR (Spooling error)	**QSPL** (Spooling subsystem)
QSTRUPJD (Auto start)	**QSYSWRK** (System subsystem)
QSYSWRK (System subsystem job description)	**QUSRWRK** (User subsystem)
QTMSNMP (Simple Network Management Protocol (SNMP) job description)	
QZMFEJBD (QSYSWRK autostart job entry)	

Compressed objects and storage space

All of the licensed programs and some objects of the IBM i operating system ship in a compressed form. This requires less storage space on your system. The system decompresses objects according to certain criteria, which could affect the performance of the system.

System jobs (QDCPOBJ*x*, where x is a number) automatically decompress these objects during the installation process if your system has sufficient unused disk storage. If enough storage space is not available, the system decompresses the objects when you use them, which could affect the performance of the system.

The system decompresses objects according to the following criteria:

- Greater than 750 MB available storage

  The system submits jobs to decompress all system objects just installed.

- 250-750 MB available storage

  The system automatically decompresses only frequently used objects. Object-usage information (the number of days an object has been used and the last-used date) is used to identify frequently used objects. The system decompresses any object that was used within the last 14 days and which also has been used at least five times. The system leaves the remaining low-use objects in compressed form.

  – This does not include decompression of objects that are shipped in the operating system and in library QSYS. The system resets usage information for those objects during the installation process. For all other licensed programs, the object usage information is kept during the installation process.

  – A call to a system program does not update its usage information; the system does not automatically decompress programs in constrained storage mode. However, high-use programs ship in decompressed form and are not considered able to be compressed.

- Less than 250 MB available storage

  The system does not submit the decompression jobs and instead decompresses the objects as they are used.

Note: The QDCPOBJ*x* system jobs might run for some time after the installation process completes.

Files that the system deletes during installation

If you have created logical files over IBM-supplied physical files in QSYS, the logical files will be deleted during the IBM i installation process.

Globalization and IBM i software installation

This information introduces the basic concepts of installing and upgrading national languages on your system.

The **primary language** is the national language that is installed on the system as the default language used to display and print information. The primary language is also used to service the system.

If you are planning to change your primary language only and not upgrade at the same time, use the manual installation process. To determine which installation process will work best for your situation, compare reasons in "Software installation process" on page 9.

If the primary language is uppercase English (2938), you need to type uppercase characters when you respond to system messages.

Secondary languages are one or more additional national languages that can be installed on the system to display and print information.

The IBM i Information Center topic IBM i Globalization contains more information about planning for and using national languages on your system.

Feature codes for your primary or secondary languages are listed in the topic, "Feature codes for language version" on page 194.

Considerations for changing a primary language

This information describes the requirements for changing your IBM i primary language.

You can change the primary language of your system in these two ways:

- By using secondary language media to replace the language objects.
- While replacing a release using the manual installation process.

You cannot change your primary language to a language you currently have installed as a secondary language on your system. You must delete the secondary language before you can change it to your primary language. Use Option 22 from the Work with Licensed Programs menu to delete a secondary language.

If you perform the tasks in Chapter 13, "Changing the primary language of your system or logical partition," on page 131, the release and modification of your system must be the same as the release and modification of your secondary language media. You need both the media that contains IBM i (B_GROUPx_01) and the media that contains the secondary language.

When changing your primary language from a single-byte character set (SBCS) to a double-byte character set (DBCS) or from a DBCS to SBCS, refer to the topic IBM i globalization in the IBM i Information Center. If you change the character set of your primary language as part of a release upgrade, your installation time could be longer.

Make sure that you configure your console device to support the default code page of the primary language you are going to install. If you plan on using 5250 emulation on the Hardware Management Console, not all languages are supported. Change the console device to one that supports the code page of the new primary language before you install a new release.

Automatic installations or upgrades that are using IBM i 7.4 IBM supplied consolidated optical media and that are changing the primary language during the upgrade or installation, need to set the installation language using the QINSTLNG API. For information about the QINSTLNG API, see the Set Install National Language Version (NLV) (QINSTLNG) API.

Considerations for installing additional secondary languages

To be able to install an IBM i secondary language, several requirements must be met.

The process to add a secondary language installs only one secondary language at a time. If you need to add more than one secondary language, you need to perform the procedure to install a secondary language multiple times. "Installing a secondary language" on page 123 contains the following two procedures to install secondary languages:

- "Installing secondary languages for IBM licensed programs" on page 123 shows how to install secondary language objects for IBM i and installed licensed programs. Use this procedure when you are installing a secondary language after installing the new release or when you are adding additional secondary languages to the system.
- "Installing secondary languages for non-IBM licensed programs" on page 126 shows how to restore a secondary language for only one licensed program or optional part. Use this procedure when you want to restore a secondary language for only one licensed program and when you are installing secondary language objects for licensed programs that you installed using the RSTLICPGM command.

Only the secondary language objects for the installed licensed programs are installed. If you add a licensed program or an optional part after the secondary language is installed, you will not have the secondary language objects for licensed programs you add later. To get the new language objects, install the secondary language for the added licensed program.

When you plan to install a secondary language, consider the following:

- Installing secondary languages are only of value when the language being installed has been translated into a language that is different from the primary language. Installing secondary languages that match the primary language take up additional disk space and should either not be installed or deleted if already installed.

- To save storage space, delete secondary languages you no longer need. If you want to delete a secondary language for all of the licensed programs installed on your system, use option 22 on the Work with Licensed Program menu. If you want to delete a secondary language for only one licensed program, use the Delete Licensed Program (DLTLICPGM) command.
- The QSECOFR user profile cannot have a secondary language library at a previous release in its library list when you install a new release. If you have an initial program for the QSECOFR user profile, be sure it does not add a secondary language library to the system library list. (the task, Checking the QSECOFR user profile, ensures that you do this.)
- If you added a secondary language library (QSYS29xx) to the system values QSYSLIBL or QUSRLIBL, use the WRKSYSVAL command to remove the library from the library list before you install a new release. (Performing the steps in the topic, "Changing certain system values (QSYSLIBL, QUSRLIBL, QALWOBJRST, or QVFYOBJRST)" on page 28, ensures that you do this.) IBM i globalization also contains more information about secondary language libraries in user profiles.

Chapter 5. Checklist: IBM i software upgrade or replacement readiness

Use this checklist to help consolidate and verify that the preparation tasks for a software upgrade are completed.

If you plan to browse this checklist online, it might help to open this topic in a new window. This checklist summarizes the major tasks that you need to do before you begin to upgrade or replace your software.

Before you begin

1. Use the following website links to verify that your server model meets the requirements to support the new release.

   - The Upgrade planning website at https://www.ibm.com/support/pages/node/668131 provides information on Power systems running the IBM i operating system and products or features which may not be supported in future releases of IBM i.
   - The System to IBM i maps website at https://www.ibm.com/support/pages/node/6023368 has a table that indicates which releases of the operating system are supported by each of the server models.

2. Know your current strategy for connecting a console to your system or logical partition. Your current connection strategy influences your planning activities. For more information about managing IBM i consoles, search for a specific model from IBM i consoles in Knowledge Center.

3. Plan for extra time after the upgrade to IPL the server. This task is described in the Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83.

4. Understand system administration tasks (basic system operations). To perform software installation tasks, you need to be able to restart your system, sign on and off, use the command interface, install fixes, change the system operation mode and initial program load (IPL) source on the system unit control panel, and analyze system problems.

5. Understand the different "Types of software installation devices" on page 10. The installation tasks are different based on the device type and media type that you use.

Software preupgrade or replacement tasks

Follow the checklist tasks that are appropriate for your system. Required steps are noted. If you are viewing this document in printed copy, use this checklist as a guide for the steps on the pages that follow.

1. "Verifying the contents of your software order" on page 25

   a. "Identifying and reviewing information resources" on page 25
   b. "Verifying the correct optical distribution media" on page 26
   c. "Verifying license keys for keyed products" on page 26

2. "Preparing the system for IBM i software upgrade or replacement" on page 26

   a. "Reviewing software PTF (fix) requirements" on page 27

      i) "Finding the latest PSP information" on page 27
      ii) "Analyzing fixes you currently have on your system" on page 27
      iii) "Permanently applying program temporary fixes (PTFs)" on page 27
      iv) "Adding fix support for currently installed licensed programs" on page 27

   b. "Working with critical system values before you install software" on page 28

      i) "Recording and printing all system values before you install software" on page 28

5. "Optional: Running the IBM Pre-Upgrade Verification tool" on page 56

After you finish

After the tasks in the preceding checklist and your upgrade are completed, consider the following tasks.

1. Develop a strategy for managing and maintaining your software. For information about software fixes (or program temporary fixes, PTFs), and software licenses and license keys, go to the Maintaining and managing IBM i and related software topic.

2. For information about software distribution of supported products, go to the Distributing software topic.

Chapter 6. Preparing to upgrade or replace IBM i software

Perform these preparatory tasks, some of which are mandatory, before you schedule your installation.

Careful, complete, and early preparation saves a considerable amount of time and can help make your software release upgrade on your system run smoothly. To do the tasks in this topic, you will need to sign on as security officer (QSECOFR user profile). Allow ample time (several weeks before the installation) to complete these tasks before you perform the actual installation tasks.

If you are setting up logical partitions, you need to plan in advance of your installation and have a basic understanding of logical partitions plus your software and hardware requirements. Read the Planning for logical partitions topic in the IBM Systems Hardware Information Center.

The following topics pertain to the preparation tasks for software upgrades or replacement.

Verifying the contents of your software order

To save you time and avoid frustration, verify that the contents of your IBM i software order are correct before you start the installation.

Identifying and reviewing information resources

Use these documents to help plan your IBM i installation process.

Many of these resources are included with the distribution media in your software order. Read the material that applies to your system.

- **Memo to Users** (in the IBM Knowledge Center)

  The *Memo to Users* describes significant changes in the new release that can potentially affect your programs or system operations. Use the *Memo to Users* to prepare for changes on the release and to use the new release. Be sure to read each section that pertains to licensed programs that are currently installed or plan to be installed on your system.

  If you are skipping a release level of IBM i, you can also review the Memo to Users for the release that you are skipping. This information describes the changes that occurred in the skipped release that might affect your programs and system operations.

  In addition to the Memo to Users in the IBM Knowledge Center , you can access the Memo to Users from the Support website (http://www.ibm.com/support/home/) search for *IBM i Memo to Users*.

- **IBM i Access Client Solutions**

  A CD containing IBM i Access Client Solutions is included with every IBM i 7.4 order. Optional packages for IBM i Access Client Solutions are available on the Entitlement Software Support website.

- **PSP information**

  To keep informed of the latest information about conditions that might impede your software installation, you need the most recent edition of the preventive service planning information (PSP). For information on preventive service planning, see Preventive service planning information in the IBM Knowledge Center .

- **PTF shipping information letter**

  This letter contains the instructions for installing the cumulative PTF package. Order the cumulative PTF package a minimum of two weeks before your IBM i installation if you order by mail and then install the package as part of your completion tasks. For information about the most recent cumulative package, refer to the Ordering fixes topic in the IBM Knowledge Center).

Verifying the correct optical distribution media

If you are planning for a complete IBM i software release upgrade, ensure you have the correct media for your upcoming tasks.

1. Locate the software distribution media. Verify that the optical media for Licensed Internal Code and the operating system are for IBM i 7.4.

   When you receive software for a new release, you should receive optical media for at least Licensed Internal Code, the operating system, and licensed programs.

   You could also receive optical media for secondary languages and other types of software products, such as Programming Requests for Price Quotation (PRPQs) and licensed program offerings (LPOs).

   Refer to "Media labels and their contents" on page 188 to view the software product names and product identifiers.

2. Verify that the media you received contains the correct primary and secondary languages.

   "Feature codes for language version" on page 194 lists the feature codes of the primary or secondary languages.

Note: If the logical partitions on your system have different primary languages, make sure you have media for each primary language.

Verifying license keys for keyed products

For the keyed IBM products or keyed IBM product options that you have ordered, review the software license keys created online for your system.

Refer to the Customer Notice that is included with your software order for information on how to access your software license keys. The online access requires that you do the following:

- Register with IBM.
- Use the customer packing list from your software order to obtain the following numbers:
  - Customer number that was used for your order.
  - Software order number that was used to process your order.

After completing these steps, you can view, print, or download your software license keys to your system. If you have further questions, refer to the information about the Customer Notice for details on how to contact the IBM Software License Key Center.

For general information about licensed keys, refer to the topic Software license keys in the IBM i Information Center.

For a list of products, see "Licensed program releases and sizes" on page 167.

Preparing the system for IBM i software upgrade or replacement

To prepare the system for software installation, review and perform the preparation tasks that pertain to your system.

Reviewing software PTF (fix) requirements

Before you begin the IBM i installation process, make sure that your system is ready by reviewing your requirements for program temporary fixes (PTFs).

Finding the latest PSP information

Keep informed on the most recent information about conditions that might impede your IBM i software installation process.

To ensure that your system has the correct PTFs installed for upgrading to IBM i 7.4, review the *Updates and PTFs* section found in the IBM i and Related Software 🌐

If you are using image catalogs to upgrade, certain PTFs are required. If you are using an image catalog to install a more recent update of the same release of IBM i, for example, you might need to load and apply a certain PTF. These steps are found in "Preparing to upgrade or replace software using an image catalog" on page 34 Do these steps before you install the software to ensure that the installation media are ready to use.

For information about how to use preventive service planning, see Preventive service planning information in the IBM Knowledge Center .

Analyzing fixes you currently have on your system

A fix cross-reference summary list enables you to analyze the program temporary fixes (PTFs) and Licensed Internal Code fixes you currently have installed on your system.

With this information, you can determine which fixes you need to order to maintain the same or higher PTF and Licensed Internal Code fix level as you update to the new level of software. These summaries are updated each working day with the latest information as new PTFs and Licensed Internal Code fixes are released.

To find out how to order a cross-reference summary list, see the topic Fix cross-reference summary lists.

Permanently applying program temporary fixes (PTFs)

Temporarily applied PTFs require a considerable amount of disk storage space. Follow these procedures only for IBM i products and temporarily applied PTFs that you have verified on your system.

When a new release is installed, the installation process overwrites the PTFs applied to the previous release. The PTFs for the previous release are no longer applied, but there might be associated objects that remain on the system and take up disk storage space. When you use Operational Assistant and choose to clean up system journals and system logs, PTF save files from previous releases are deleted from your system. However, for systems that have the IBM System Manager for i licensed program installed, the PTF save files are not deleted.

Notes:

- For more information about applying PTFs, see Applying fixes in the IBM i Information Center which contains information about applying immediate PTFs temporarily or permanently.
- Do not permanently apply PTFs for those licensed programs that you do not plan to upgrade.
- If you have the IBM System Manager for i (57xx-SM1) licensed program installed on your system, use the instructions in the manual System Manager Use for managing PTFs on your system.

Adding fix support for currently installed licensed programs

IBM licensed programs that are installed on your system are not automatically supported after an IBM i upgrade to a new release.

If you want to keep the PTF save files for licensed programs that you have currently installed to continue after you upgrade, add the fix support for these licensed programs before you upgrade.

Working with critical system values before you install software

System values are IBM-supplied objects that can be modified from their shipped value to tailor certain aspects of the IBM i operating system to your environment. The software installation program will overlay these objects on your system with values that are supplied on the installation media.

If you have modified any of your system values, record and print these system values before you upgrade. Be sure to check the QSYSLIBL, QUSRLIBL, QALWOBJRST, and QVFYOBJRST system values.

If you are upgrading a system that observes a non-Gregorian calendar, IBM recommends that you set the Year offset value.

Recording and printing all system values before you install software

IBM recommends that you record or print your system values before the IBM i upgrade.

To do this, use the Work with System Value command. On the IBM i command line, type WRKSYSVAL OUTPUT(*PRINT). This helps to ensure that the upgrade process will not fail due to a previous modification of any system value. This will also help you reset the values after you complete the upgrade.

Changing certain system values (QSYSLIBL, QUSRLIBL, QALWOBJRST, or QVFYOBJRST)

To ensure that your IBM i installation runs smoothly, check the system library list (QSYSLIBL), user library list (QUSRLIBL), allow restore of security sensitive objects (QALWOBJRST), and verify object signatures during restore (QVFYOBJRST) system values.

Follow these steps:

1. Type the Work with System Values command, **WRKSYSVAL**, and press Enter. The Work with System Values display appears.
2. Type 2 (Change) in the *Option* column next to the system value you want and press Enter. The Change System Value display appears.
3. Check the system values as described in table that follows.
4. Write down the current values of QALWOBJRST and QVFYOBJRST plus any library names that are shown for QSYSLIBL and QUSRLIBL.

System value	Action to take
System library list (QSYSLIBL)[1] Current libraries: _____ _____ _____ _____ _____ User library list (QUSRLIBL)[1] Current libraries: _____ _____ _____ _____ _____	With the exception of QSYS, QSYS2, QUSRSYS, QTEMP, and QGPL, delete all other libraries from the library list.

System value	Action to take
Allow restore of security sensitive objects (QALWOBJRST)[2] Current value: _____	Change the value to *ALL before installing the operating system or licensed programs. If you have previously locked this system value, go to SST and unlock it before you upgrade. Locking and unlocking security-related system values in the IBM i Information Center describes how to do this.
Verify object signatures during restore (QVFYOBJRST)[3] Current value: _____	If this system value is set to either 4 or 5, change this value to 3 before you install the new release. If you have previously locked this system value, go to SST and unlock it before you upgrade. Locking and unlocking security-related system values in the IBM i Information Center describes how to do this.

Notes:

1. Having licensed program libraries or secondary language libraries in these library lists can cause errors when you install or delete software.

2. The Allow restore of security sensitive objects (QALWOBJRST) system value specifies whether objects with security-sensitive attributes can be restored. It is important to set the value to *ALL before performing the following system activities:

   - Installing a new release of the operating system.
   - Installing new licensed programs.
   - Applying program temporary fixes (PTFs).
   - Recovering your system.

   These activities can fail if the value of QALWOBJRST is not set to *ALL. To ensure system security, return the QALWOBJRST value to your normal setting after completing the system activity.

3. After you have upgraded the operating system and option 34 (Digital Certificate Manager), you can return the QVFYOBJRST system value to either 4 or 5.

Note that if you want the same values after the installation process is completed, you need to reset the system values. This step is included in the final checklist after you upgrade.

You can also use IBM Navigator for i to set your system values. For more information, see system values in the IBM Knowledge Center to find out how to use and access the system values from IBM Navigator for i.

Optionally changing the scan control system value

Consider specifying *NOPOSTRST for the scan control (QSCANFSCTL) system value.

This helps to minimize future scanning of some objects that are restored during the installation of licensed programs. For more information on scanning and the system value settings, see the topic Scanning support in the IBM i Information Center.

Setting the Year offset value

If you are upgrading a system that observes a non-Gregorian calendar, set the Year offset value before the system is upgraded.

IBM recommends that you set the Year offset value because your time zone can then be set correctly with this year offset as soon as the upgrade is complete. The IBM Knowledge Center topic Setting the Year offset value before upgrading the operating system includes the steps for creating a user-defined time zone object and creating the QWCYEAROFS data area in the QSYS library.

Verifying the integrity of user-modified system objects

When you replace your software with the new IBM i release, the system keeps changes you made to some IBM-supplied objects.

To ensure a successful installation of all licensed programs and to take advantage of certain new functions, perform these tasks that relate to system objects before you begin.

Verifying user profiles and checking cross-reference files

The IBM i installation process requires that the QSECOFR and QLPINSTALL user profiles exist in the system distribution directory. The process also requires that all database cross-reference files are not in error before the installation process begins.

The following procedure adds the QSECOFR and QLPINSTALL user profiles if you have deleted them from the system distribution directory. It also checks for errors in database cross-reference files on your system.

1. Type GO LICPGM at the IBM i command line and press Enter. The Work with Licensed Programs menu appears.
2. Type 5 (Prepare for Install) and press Enter. The Prepare for Install display appears.
3. Select the option to verify system objects and press Enter. The system verifies the system directory entries and adds the QSECOFR and QLPINSTALL user profiles if necessary. Database cross-reference files are checked for errors.
4. If the database cross-reference files are in error, you see message CPI3DA3. Follow the instructions of this message to resolve the errors before you continue.
5. If the database cross-reference files are not in error, you see a completion message. Press F3 (Exit) to return to the Work with Licensed Programs menu.

Checking the QSECOFR user profile

The QSECOFR user profile cannot have a secondary language library (QSYS29xx) at a previous release in its library list when you install a new IBM i release.

If you have an initial program for the QSECOFR user program, be sure that it does not add a secondary language library to the system library list.

Ensuring that the IBM-supplied product libraries are in the system ASP

If you have moved IBM-supplied product libraries to user auxiliary storage pools (user ASPs), the libraries will not be updated when you go through the IBM i installation procedures.

To prevent this problem, ensure that IBM-supplied product libraries are in the system ASP before you start the installation procedures. The product libraries should remain in the system ASP (*SYSBAS). PTFs are not applied to product libraries that are not in the system ASP.

If you have duplicate IBM-supplied product libraries, delete the duplicate libraries before you start the upgrade procedures. The upgrade process fails and the new release does not install until duplicate IBM-supplied libraries are deleted.

Use the Display Object Description (DSPOBJD) command to list the libraries and the ASP in which they reside to an output file. Then use SQL to query the results of the output file:

```
DSPOBJD OBJ(QSYS/Q*)
    OBJTYPE(*LIB)
    ASPDEV(*ALLAVL)
    OUTPUT(*OUTFILE)
    OUTFILE(QGPL/LIBS)
```

Note: SS1 Option 5 (System/36 Environment) has five libraries that do not begin with a Q. They are #CGULIB, #DFULIB, #DSULIB, #SDALIB, and #SEULIB.

Ensuring two-phase commit integrity

Complete or cancel all pending resynchronizations of commitment control definitions before you replace your IBM i software.

You need to perform this task only if both of the following are true:

- Your system is connected in a network.
- Your system runs applications that use two-phase commit support.

Two-phase commit support is used when an application updates database files on more than one system. Two-phase commit support ensures that the databases remained synchronized. If you are not sure whether your system uses two-phase commit support, perform steps "1" on page 31 and "2" on page 31. You might need to continue with the rest of the procedure.

Remember that any actions you take with respect to a pending resynchronization affect the other systems that are participating in the logical unit of work (transaction) with your system. Therefore, you or someone else will also need to handle pending resynchronizations on the connected systems before you begin your upgrade procedure.

If you perform this procedure 1 or 2 days before you install the new release, you should recheck for resynchronizations before starting the installation.

To work with pending resynchronizations on your source system, do the following:

1. To display all commitment definitions that might require resynchronization, type the following Work with Commitment Definitions (WRKCMTDFN) command:

   ```
   WRKCMTDFN JOB(*ALL) STATUS(*RESYNC)
   ```

2. If you see the message, No commitment definitions are active, you can skip the rest of this procedure.

3. On the Work with Commitment Definitions display, type 19 (Cancel Resync) in the Option column for each commitment definition. You see the Cancel Resync display.

4. If the value in the column *Resync Required* is Yes for any remote location listed, then do the following for that location:

   a) Attempt an action, such as restarting communications, and allow the resynchronization to complete.

   b) If you cannot allow the resynchronization to complete, specify option 1 (Select) to cancel resynchronization to that remote location.

      You could receive message CPF83E4, which indicates that the logical unit of work is in an undecided state. You will have to make an educated decision to force either a commit operation or a rollback operation before you can successfully cancel resynchronization. These options are available from the Work with Commitment Definitions display.

      By canceling resynchronization, you could cause the databases between the two systems to be in an inconsistent state. You must then take the responsibility for determining the action taken by all the other locations that participated in this Logical Unit of Work (LUW), and resynchronize the database changes.

5. Refresh the display periodically. When resynchronization for a commitment definition completes or cancels successfully, the value in the *Resync in Progress* column will be No.

   The resynchronization or a cancelation of resynchronization might not take place immediately. They are dependent on the state of the other systems that are participating in the logical unit of work.

For more information on commitment control and resynchronization, see the topic When to force commits and rollbacks and when to cancel resynchronization in the IBM i Information Center.

Minimizing software installation time

These actions can minimize the time required to install your IBM i software.

- Use the automatic installation process rather than performing a manual installation process. "Software installation process" on page 9 has information about both methods.
- If you are not using the automatic installation process, be sure to set the QSYSOPR message queue in *BREAK mode before you start the installation process.
- Perform the licensed program installation with all subsystems ended (ENDSBS *ALL). If you are performing an automatic installation, you are operating in the preferred environment. This environment provides maximum system resources to the installation process.
- If you have a large number of spooled files on your system, set the compress job tables IPL attribute to none. To do this, use the Change IPL Attributes command: CHGIPLA CPRJOBTBL(*NONE).

Gathering performance data for benchmark

Establish system benchmarks before you install a new version of the IBM i operating system or make a major system configuration change such as adding a new software application.

Accurate system benchmarks allow you to compare system performance before and after the upgrade. A valid comparison allows you to accurately assess any performance improvement as well as isolate any changes to the system that can prevent optimal performance.

Collection Services can collect sample data for a wide range of system resources. Collection Services stores sample performance data in a collection object (*MGTCOL) on your system. Minimally, benchmarks should include data from current and representative collection objects. This can require that Collection Services run long enough to collect representative data. Representative data should include all periods of activity (both peak and off-peak hours), all applications, and all normal activities performed on a system. Additionally, you might require more detailed benchmark information to identify how critical applications, transactions, and jobs are affected by the system configuration change.

Several tools are available for collecting detailed information about application performance. However, these tools can require specialized skills and could adversely affect system performance. For details about collecting different types of performance data, refer to Researching a performance problem.

Gathering performance data with Collection Services

You can start Collection Services in any of these ways to analyze the IBM i operating environment.

- Use the Collection Services function that is available in IBM Navigator for i. Specific information about Collection Services is in the IBM i Information Center at **Systems management** > **Performance** > **Applications for performance management** > **Collection Services**.
- Use either the Start Collector (QYPSSTRC) API or the Start Performance Collection (STRPFRCOL) command.
  - Performance Management APIs in the IBM i Information Center. These APIs start, end, and cycle collections, and change and retrieve system parameters for the data collected.
  - Performance collection commands: STRPFRCOL, End Performance Collection (ENDPFRCOL), Configure Performance Collection (CFGPFRCOL), and Check Performance Collection (CHKPRFCOL). These commands start, end, and cycle collections for the data collected.

Ensure that Collection Services has been configured to collect the data you require, and that it runs long enough to accurately represent your operating environment.

The following example uses the Collector APIs.

1. Run Collection Services for at least one or two days, and make sure that peak and off-peak workloads are represented. Type this command:

```
CALL PGM(QYPSSTRC) PARM('*PFR      ' '*STANDARDP' X'00000000')
```

This command starts Collection Services and uses the **Standard plus protocol** for the collection profile. Once you start Collection Services with this command, it will collect performance data and store it in the collection object until you either explicitly stop it or restart the system. (If collection was run for more than one day, more than one collection object will be produced.) This profile collects all the data categories typically needed by the tools in IBM Performance Tools for i, including communications protocol data. The default configuration also starts a batch job CRTPFRDTA, which creates the performance database files.

2. Collection Services stores the data in an object type of *MGTCOL.

   You can convert this object into performance database files for later analysis. To retain the object for future use, you can save the objects to tape or to a save file using command

   ```
   SAVPFRCOL
   ```

   . Collection Services can delete collection objects from the system at any time after the retention period has expired. The default retention period is 24 hours. If you do not want Collection Services to delete your collection objects for you, change your retention period to permanent (set a retention period of *PERM) as shown in the example that follows.

   Note: The following command example shows the shipped default values with the exception of the retention period value. A retention period of *PERM requires a value of 0. Furthermore, you must make this change before or during the data collection. The change does not affect any collection objects that are already cycled.

   To change the retention period by using the Change Collection Services Attributes API, type the following command:

   Note: By using the following code example, you agree to the terms of the "Code license and disclaimer information" on page 209.

   ```
   CALL PGM(QYPSCSCA) PARM('*PFR      ' /* collection */
                           X'00000384'  /* interval 900 sec */
                           'QPFRDATA  ' /* library         */
                           X'00000000'  /* retention period is permanent  */
                           X'00000000'  /* cycle time  00:00:00 */
                           X'00000018'  /* cycle interval 24Hrs */
                           X'00000001'  /* start CRTPFRDTA */
                           '*STANDARDP' /* default profile */
                           X'00000000') /* return code  */
   ```

3. If you want to explicitly stop the collector after the data that you want is obtained, type this command:

   ```
   CALL PGM(QYPSENDC) PARM('*PFR      '  X'00000000')
   ```

Analyzing performance data

To analyze the IBM i Collection Services data, you must view the performance database files created from the Management Collection object files. This can be done by setting the configuration on the Collection Services (via IBM Navigator for i Configure Collection Services or CFGPFRCOL CL command).

For more information, refer to Creating database files from Collection Services data in the IBM i Information Center and also the step regarding converting the performance data in Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83.

There are several tools you can use to analyze the data from Collection Services.

For additional information on determining how upgrades might affect your performance workloads, see Managing System Performance.

Performing initial upgrade or replacement tasks

Complete these initial installation tasks, which include saving the system. Several of these initial tasks are required for a successful IBM i software upgrade.

Choosing a software installation method and device

If you are upgrading the IBM i operating system and your licensed programs to the new release, you need to decide which installation method (manual or automatic) and which kind of device you will use to install the new release.

For a general view of the installation methods, see "Software installation process" on page 9.

To help you determine which device you will use, refer to "Types of software installation devices" on page 10. "Installation devices and media" on page 180 contains more detailed information about the devices and media available.

Preparing for globalization

If appropriate, prepare to change the primary language on your system or install additional secondary languages.

If you plan to change the primary language on your system or install additional secondary languages, review the information in "Globalization and IBM i software installation" on page 17.

Preparing the upgrade device and media

You can prepare to install IBM i software from optical media, optical container media, an image catalog, tape devices or tape libraries, or alternate installation devices.

If you are not sure which installation device to use for your software upgrade, refer to "Types of software installation devices" on page 10. The topic "Installation devices and media" on page 180 contains more detailed information on the devices and media available.

Preparing to upgrade or replace software using an image catalog

You can use an image catalog to perform an IBM i software upgrade, to install PTFs (fixes), or to install single licensed programs that you receive on media.

When you use an image catalog, you preload all your media so that you do not need to handle the physical media when you perform the installation. You do this by copying the images from the physical optical media or from files received through electronic software delivery to a file in the integrated file system and then use these preloaded images to install. The topic Virtual storage in the IBM i Information Center describes further the concepts and uses of virtual tape and virtual optical media. "Image catalog for a virtual device" on page 181 describes the requirements for using image catalogs.

Determining storage requirements for image catalog installation
IBM i image catalog installation requires additional storage space to contain the installation images. The amount of system disk-unit storage that you need varies based on what you are installing.

To check and preallocate the storage space needed for the selected install media, do the following steps to run the **installcheckspace** tool.

1. Verify you have the required PTFs installed for upgrades.
2. From the command prompt, run the **STRSST** command and sign-in
3. Choose **(1) Start a service tool**
4. Choose **(4) Display/Alter/Dump**
5. Choose **(1) Display/Alter storage**
6. Choose **(2) Licensed Internal Code (LIC) data**

7. Choose **(14) Advanced analysis**
8. On the `Select Advanced Analysis Command` panel, type **1** in the Option column and type **installcheckspace** in the command field space and press **ENTER**.
9. On the `Specify Advanced Analysis Options` panel, press **ENTER** to run the tool.

- If the tool is successful, there is enough space and you will see output:

  `SUCCESSFUL! Space exists. Size = xxxxxxx bytes.`

- If the tool returns an error for not enough space, you will see output:

  `ERROR: Enough space does not exist. error code X.`

  There will be additional messages with an estimate of the current amount of space and the amount of space needed for the install.

When the tool is successful, you are done checking the space and can continue with the power down of your system to install/upgrade.

When the tool reports an ERROR, move user libraries and/or files to another disk or remove temporary and unused files to free space.

Freeing up space on the load-source disk unit for an image catalog

IBM i image catalog installation requires at least 2500 MB of free space on the load-source disk unit of your system.

If you are using an image catalog to install software, ensure that there is enough free space available on the load-source disk by following these steps.

1. Enter the Work with Disk Status (WRKDSKSTS) command to determine whether your load-source disk unit (unit 1) has at least 2500 MB of free space.

   If you have enough free space, you do not need to continue with this task.

   If you do not have enough free space, go to step .
2. Enter the Start ASP Balance (STRASPBAL) command to end the allocation for storage in the load-source disk unit:

   ```
   STRASPBAL TYPE(*ENDALC) UNIT(1)
   ```

3. Use the Check ASP Balance (CHKASPBAL) command to view the previous end allocations and see these messages:

   - `Unit 1 is selected for end allocation.`
   - `ASP balancing is not active for ASP 1.`
4. Enter the STRASPBAL command to move data from the load-source disk unit:

   ```
   STRASPBAL TYPE(*MOVDTA) TIMLMT(60)
   ```

5. Enter the WRKDSKSTS command to monitor when the disk unit has enough free space. If you do not have enough free space, use the CHKASPBAL command (step) to determine whether the move data function is still active.

After the upgrade is complete, enter the Start ASP Balance (STRASPBAL) command to resume the allocation of storage for the load-source disk unit. (This task is also included in Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83.)

```
STRASPBAL TYPE(*RSMALC) UNIT(1)
STRASPBAL TYPE(*CAPACITY) ASP(1) TIMLMT(*NOMAX)
```

Preparing an optical image catalog to install software

These steps show how you create an image catalog and an image catalog entry, add an image catalog entry, and load the image catalog in preparation of performing an IBM i software upgrade. The steps use

a virtual optical device in the example. The server setup requires an image catalog setup that will then be shared with the client partition.

Before you begin these steps, ensure that you review the *Updates and PTFs* section found in the IBM i and Related Software developerWorks® website (www.ibm.com/developerworks/ibmi/software).

1. **Create a virtual optical device.**

   To create a device description, enter the following:

   ```
   CRTDEVOPT DEVD(virtual-device-name) RSRCNAME(*VRT)+
     ONLINE(*YES) TEXT(text-description)
   ```

2. **Vary on the virtual optical device**

   Enter the following:

   ```
   VRYCFG CFGOBJ(virtual-device-name) CFGTYPE(*DEV) STATUS(*ON)
   ```

3. **Create an image catalog**

   Create an image catalog for the licensed programs that you want to install. The Create Image Catalog (CRTIMGCLG) command associates an image catalog with a target directory where the optical image files are loaded.

   ```
   CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path)
     CRTDIR(*YES) TEXT(text-description)
   ```

   If you have downloaded your images into an image catalog directory, there is a fast way to add all of the images at one time into your image catalog. There are two methods to do this.

   • Use the CRTIMGCLG command.

   ```
       CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path) ADDVRTVOL(*DIR)
         IMGTYPE(*ALL) TEXT(text-dscription)
   ```

   • Use the QVOIFIMG API when the image catalog already exists

   ```
       CALL PGM(QVOIFIMG) PARM('catalog-name' '*ALL' 0)
   ```

4. **Add an image catalog entry**

   Add an image catalog entry for each physical media or optical image file that you have. You need to repeat this step for each volume of media. You should add the physical media or optical image files in the same order as if you were going to install from them. Start with the first media in the list and continue until all the media are loaded.

   You can add the entries from either an optical device or from an existing optical image file. Select one of the following ways:

   From an image file:

   • (This is the fastest way.) To add an image entry to an image catalog from an integrated-file-system file that is already in the image catalog directory, enter the following:

   ```
   ADDIMGCLGE IMGCLG(catalog-name) FROMFILE(file-name)
     TOFILE(*fromfile) TEXT(text-description)
   ```

   • If you have multiple images to add, see the CRTIMGCLG command and the QVOIFIMG API to add all the images at the same time.

   • To add an image catalog entry to an image catalog from an existing integrated-file-system optical image file from a directory other than the image catalog directory, enter the following:

```
ADDIMGCLGE IMGCLG(catalog-name)
  FROMFILE(/directory-name/directory-name/file-name)
  TOFILE(file-name or *FROMFILE) TEXT(text-description)
```

From a physical device:

- To add an image catalog entry to an image catalog from a physical optical media using optical device named OPT01, enter the following:

```
ADDIMGCLGE IMGCLG(catalog-name) FROMDEV(OPT01)
  TOFILE(file-name or *GEN) TEXT(text-description)
```

Note: To generate a name for the TOFILE parameter, specify *GEN. To generate a text description from the media, specify *GEN.

5. **Load the image catalog**

   This step associates the virtual optical device to the image catalog. Only one image catalog at a time can be associated with a specific virtual optical device. To load the image catalog, type the following command:

```
LODIMGCLG IMGCLG(catalog-name)
  DEV(virtual-device-name) OPTION(*LOAD)
```

6. **Verify that the images are in the correct order**

   ⚠️ **Attention:** If you are here because you are performing the steps in "Preselecting the licensed programs to install" on page 47, do not perform this step at this time. You are directed to perform this step later.

   If you are preparing for an upgrade, you need to verify that the required media for an upgrade exist and are sorted in the correct sequence. You also need to verify that your software agreements have been accepted, and that you have enough reserved storage for the Licensed Internal Code. Refer to "Required: Allocating additional space for Licensed Internal Code" on page 53 for details.

   Enter the following command:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*UPGRADE) SORT(*YES)
```

   To verify that images are added, an additional method would be to enter the following:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

   Then press F7 to prompt for the VFYIMGCLG command. Enter *UPGRADE for the type and *YES for the sort field.

   The system puts the images in the correct order. (If you are not successful, refer to "Image catalog recovery" on page 146.) By default, the volume with the lowest index is mounted. Then all the other volumes are loaded. To see the order of the images, use the Work with Image Catalog Entries (WRKIMGCLGE) command:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

After completing these steps, your image catalog is ready for use.

Preparing a tape image catalog to install software

These steps show how you create an image catalog, add an image catalog entry, and load the image catalog in preparation of performing an IBM i software upgrade. The steps use a virtual tape device in the example.

1. **Create a virtual tape device.**

To create a device description, enter the following:

```
CRTDEVTAP DEVD(virtual-device-name) RSRCNAME(*VRT)+
  ONLINE(*YES) TEXT(text-description)
```

2. **Vary on the virtual tape device**

   Enter the following:

```
VRYCFG CFGOBJ(virtual-device-name) CFGTYPE(*DEV) STATUS(*ON)
```

3. **Create an image catalog**

   Create an image catalog for the licensed programs that you want to install. The Create Image Catalog (CRTIMGCLG) command associates an image catalog with a target directory where the optical image files are loaded.

```
CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path) TYPE(*TAP)
  CRTDIR(*YES) TEXT(text-description)
```

   If you have stored your tape images in an image catalog directory, there is a fast way to add all of the images at one time into your image catalog. There are two methods to do this.

   • Use the CRTIMGCLG command

```
    CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path) TYPE(*TAPE) ADDVRTVOL(*DIR)
IMGTYPE(*ALL)
    TEXT(text-dscription)
```

   • Use the QVOIFIMG API when the image catalog already exists

```
    CALL PGM(QVOIFIMG) PARM('catalog-name' '*ALL' 0)
```

4. **Add an image catalog entry**

   Add an image catalog entry for each tape image file that you have. You need to repeat this step for each image file. You should add the tape image files in the same order as if you were going to install from them.

   You can add the entries from an existing tape image file by using one of these ways:

   • (This is the fastest way.) To add an image entry to an image catalog from an integrated-file-system file that is already in the image catalog directory, enter the following:

```
ADDIMGCLGE IMGCLG(catalog-name) FROMFILE(file-name)
  TOFILE(*fromfile) TEXT(text-description)
```

   • If you have multiple images to add, see the [CRTIMGCLG command and the QVOIFIMG API](#) to add all the images at the same time.

   • To add an image catalog entry to an image catalog from an existing integrated-file-system tape image file from a directory other than the image catalog directory, enter the following:

```
ADDIMGCLGE IMGCLG(catalog-name)
  FROMFILE(/directory-name/directory-name/file-name)
  TOFILE(file-name or *FROMFILE) TEXT(text-description)
```

5. **Load the image catalog**

   This step associates the virtual tape device to the image catalog. Only one image catalog at a time can be associated with a specific virtual tape device. To load the image catalog, type the following command:

```
LODIMGCLG IMGCLG(catalog-name)
  DEV(virtual-device-name) OPTION(*LOAD)
```

6. **Verify that the images are in the correct order**

⚠️ **Attention:** If you are here because you are performing the steps in "Preselecting the licensed programs to install" on page 47, do not perform this step at this time. You are directed to perform this step later.

If you are preparing for an upgrade, you need to verify that the required media for an upgrade exist and are sorted in the correct sequence. You also need to verify that you have enough reserved storage for the Licensed Internal Code. Refer to "Required: Allocating additional space for Licensed Internal Code" on page 53 for details.

Enter the following command:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*UPGRADE) SORT(*YES)
```

To verify that images are added, an additional method would be to enter the following:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

Then press F7 to prompt for the VFYIMGCLG command. Enter *UPGRADE for the type and *YES for the sort field.

The system puts the images in the correct order. (If you are not successful, refer to "Image catalog recovery" on page 146.) By default, the volume with the lowest index is mounted. Then all the other volumes are loaded. To see the order of the images, use the Work with Image Catalog Entries (WRKIMGCLGE) command:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

After completing these steps, your image catalog is ready for use.

Preparing to upgrade or replace software using optical container media

You can use an optical container to perform an IBM i software upgrade, to install PTFs, or to install single licensed programs that you download through electronic software delivery.

To use a device as an optical container, it must be a USB 3.0 flash drive or an RDX drive. The flash or RDX media must have capacity of at least 5GB. To prepare the flash drive or RDX drive media to be used as a container, initialize the volume (INZOPT) with a type of *CONTAINER.

Create an optical container

1. Initialize the optical volume as type *CONTAINER

   - ```
     INZOPT VOL(*MOUNTED) NEWVOL(RDX1) DEV(RMS01) CHECK(*NO) TYPE(*CONTAINER)
     ```

2. Vary optical device RMS01 off/on to cause a child virtual device to be created and associated with the physical optical device.

   - ```
     VRYCFG CFGOBJ(RMS01) CFGTYPE(*DEV) STATUS(*OFF)
     ```

   - ```
     VRYCFG CFGOBJ(RMS01) CFGTYPE(*DEV) STATUS(*ON)
     ```

3. Use DSPHDWRSC to find the resource name of the child virtual device.

   - ```
     DSPHDWRSC *STG
     ```

For more information on preparing to use optical containers, review Preparing to use optical containers 🌐 from (https://www.ibm.com/support/pages/node/1111239).

Adding virtual volumes to optical containers for install

1. Plug the optical container media (USB 3.0 flash drive) into a USB port on a PC that is running Windows 7, Windows 10, or MAC OS 10.11 or newer, and has Java version 8 or newer installed.

2. Download the bootable image of the Licensed Code for IBM i (USB
   I_BASE01_Licensed_Machine_Code*.img) from ESS website to the PC.

3. Download the Utility for bootable Licensed Machine Code USB zip file from the ESS website to the PC.

4. Extract the Java based utility USBUtility-1.3.0.0.jar (or newer version) from the bootable LIC USB
   Utility for IBM i zip file.

5. Use the Java based utility to copy the Licensed Machine Code for IBM i to the USB 3.0 flash drive.

6. If desired, you can also download the Operating System and LPP ISO images from the ESS website,
   and PTFs from the Fix Central website. Drag and drop these files to the same USB 3.0 flash drive.

For more information on adding virtual volumes to optical containers, review Adding virtual volumes to
optical containers for install 🌐 (https://www.ibm.com/support/pages/node/1111239).

Preparing to upgrade or replace software with virtual optical storage using the Network File System

You can use virtual optical storage using the Network File System to perform an IBM i software upgrade,
to install PTFs (fixes), or to install single licensed programs that you receive on media.

When you use a virtual optical storage using the Network File System, you preload all your media so that
you do not need to handle the physical media when you perform the installation. This setup is done on
the server being used to serve the optical image files. You do this by copying the images from the physical
optical media or from files received through electronic software delivery to a directory in the integrated
file system and then use these preloaded images to install. The topic Virtual storage describes further the
concepts and uses of virtual optical media. An image catalog must be used on the image server. Image
catalog for a virtual device describes the requirements for using image catalogs. In the following steps the
reference to client system refers to the system being installed.

Requirements for virtual optical storage within a Network File System network
To share virtual optical images with the Network File System (NFS) network, you need to ensure that the
client and server meet specific requirements.

Review the *Updates and PTFs* from the IBM i and Related Software developerWorks website
(www.ibm.com/developerworks/ibmi/software).

Server requirements for sharing virtual optical images

To share virtual optical images through a network, the server must meet the following requirements:

- The image server must be a V6R1 environment or later if performing an install or upgrade.
- The server must be able to share virtual optical images using version 3 or later of the Network File
  System (NFS).
- A volume list (VOLUME_LIST) file containing the list of images to be loaded in the virtual optical device
  must exist in the image catalog directory. The VFYIMGCLG command is used to create the volume list
  file from the image catalog containing the images you want to share. For example:

```
VFYIMGCLG IMGCLG(INSTALL) TYPE(*UPGRADE) NFSSHR(*YES)
```

Note: The image catalog used must have an image catalog path name that is limited to 127 characters.
Path name characters are limited to A-Z, a-z, 0-9, and / (slash). Each image file name is limited to 127
characters.

If you choose to create your own volume list, it must have the following characteristics

- Must be called VOLUME_LIST
- Each line is either an image file name or a comment
- ASCII format
- All entries are ended by the end of a line

- All characters following the pound sign (#) are considered comments until the end of the line
- Comments can be added after the pound sign (#) and must be followed by a EOL character
- Provides the order that the image files are processed on the client system
- File names are limited to 127 characters
- Can be created with the Verify Image Catalog Entry (VFYIMGCLG) with the NFSSHR(*YES) parameter or manually by using an ASCII editor
- No tabs or line feeds can be used in the path name

Note: Changes to VOLUME_LIST file are not active until the next time the client device is varied off and on.

Client system requirements for sharing virtual optical images

To share virtual optical images through a network, the client system must meet the following requirements:

- The 632B-003 optical device is created by using the Create Device Description Optical (CRTDEVOPT) command.
- The system to be installed must have either a service tools server or a LAN console connection configured.

Setting up the server to share virtual optical image files with the client system for installation and upgrade

The following directions show how to set up the server to share virtual optical image files with the client system for installation and upgrade of IBM i.

You must have previously created an image catalog containing the images that you want to share. The images must contain Licensed Internal Code and base IBM i (which includes libraries QSYS, QGPL, and QUSRSYS). The image catalog used must have an image catalog path name of 127 characters or less. Path name characters are limited to A-Z, a-z, 0-9, and / (slash). Each image file name is limited to 127 characters.

These steps show how you create an image catalog and an image catalog entry, add an image catalog entry, and load the image catalog in preparation of performing an IBM i software upgrade. The steps use a virtual optical device in the example. The server setup requires an image catalog setup that will then be shared with the client partition.

Before you begin these steps, ensure that you review the *Updates and PTFs* section found in the IBM i and Related Software 🔄 developerWorks website (www.ibm.com/developerworks/ibmi/software).

1. **Create a virtual optical device.**

   To create a device description, enter the following:

   ```
   CRTDEVOPT DEVD(virtual-device-name) RSRCNAME(*VRT)+
    ONLINE(*YES) TEXT(text-description)
   ```

2. **Vary on the virtual optical device**

   Enter the following:

   ```
   VRYCFG CFGOBJ(virtual-device-name) CFGTYPE(*DEV) STATUS(*ON)
   ```

3. **Create an image catalog**

   Create an image catalog for the licensed programs that you want to install. The Create Image Catalog (CRTIMGCLG) command associates an image catalog with a target directory where the optical image files are loaded.

   ```
   CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path)
    CRTDIR(*YES) TEXT(text-description)
   ```

If you have downloaded your images into an image catalog directory, there is a fast way to add all of the images at one time into your image catalog. There are two methods to do this.

- Use the CRTIMGCLG command

```
CRTIMGCLG IMGCLG(catalog-name) DIR(catalog-path) ADDVRTVOL(*DIR)
 IMGTYPE(*ALL) TEXT(text-dscription)
```

- Use the QVOIFIMG API when the image catalog already exists

```
CALL PGM(QVOIFIMG) PARM('catalog-name' '*ALL' 0)
```

4. **Add an image catalog entry**

   Add an image catalog entry for each physical media or optical image file that you have. You need to repeat this step for each volume of media. You should add the physical media or optical image files in the same order as if you were going to install from them. Start with the first media in the list and continue until all the media are loaded.

   You can add the entries from either an optical device or from an existing optical image file. Select one of the following ways:

   From an image file:

   - (This is the fastest way.) To add an image entry to an image catalog from an integrated-file-system file that is already in the image catalog directory, enter the following:

   ```
   ADDIMGCLGE IMGCLG(catalog-name) FROMFILE(file-name)
    TOFILE(*fromfile) TEXT(text-description)
   ```

   - If you have multiple images to add, see the CRTIMGCLG command and the QVOIFIMG API to add all the images at the same time.

   - To add an image catalog entry to an image catalog from an existing integrated-file-system optical image file from a directory other than the image catalog directory, enter the following:

   ```
   ADDIMGCLGE IMGCLG(catalog-name)
    FROMFILE(/directory-name/directory-name/file-name)
    TOFILE(file-name or *FROMFILE) TEXT(text-description)
   ```

   From a physical device:

   - To add an image catalog entry to an image catalog from a physical optical media using optical device named OPT01, enter the following:

   ```
   ADDIMGCLGE IMGCLG(catalog-name) FROMDEV(OPT01)
    TOFILE(file-name or *GEN) TEXT(text-description)
   ```

   Note: To generate a name for the TOFILE parameter, specify *GEN. To generate a text description from the media, specify *GEN.

5. **Load the image catalog**

   This step associates the virtual optical device to the image catalog. Only one image catalog at a time can be associated with a specific virtual optical device. To load the image catalog, type the following command:

   ```
   LODIMGCLG IMGCLG(catalog-name)
    DEV(virtual-device-name) OPTION(*LOAD)
   ```

6. **Verify that the images are in the correct order**

   ⚠️ **Attention:** If you are here because you are performing the steps in "Preselecting the licensed programs to install" on page 47, do not perform this step at this time. You are directed to perform this step later.

If you are preparing for an upgrade, you need to verify that the required media for an upgrade exist and are sorted in the correct sequence. You also need to verify that your software agreements have been accepted, and that you have enough reserved storage for the Licensed Internal Code. Refer to for details.

Enter the following command:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*UPGRADE) SORT(*YES)
```

To verify that images are added, an additional method would be to enter the following:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

Then press PF7 to prompt for the VFYIMGCLG command. Enter *UPGRADE for the type and *YES for the sort field.

The system puts the images in the correct order. (If you are not successful, refer to .) By default, the volume with the lowest index is mounted. Then all the other volumes are loaded. To see the order of the images, use the Work with Image Catalog Entries (WRKIMGCLGE) command:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

After completing these steps, your image catalog is ready for use. The next steps show how to set up the server to share virtual optical image files with the client system for installation and upgrade of IBM i.

7. After the image catalog has been created and loaded, you need to verify the image catalog to create a volume list file (VOLUME_LIST) that will be used by the virtual optical device on the client system. The following command is an example of how to create the volume list file:

   • VFYIMGCLG IMGCLG(INSTALL) TYPE(*UPGRADE) NFSSHR(*YES)

   Note: The VFYIMGCLG command creates the volume list file and adds a new subdirectory called BOOTP in the image catalog directory. The subdirectory contains files required to perform the IBM i install.

   The volume list file can also be created by using an ASCII editor. There are specific guidelines that must be met when creating a volume. Refer to Requirements for virtual optical storage within a Network File System network for more information.

8. Ensure that the NFS file servers are running.

   Enter either one of the following Start Network File System Server (STRNFSSVR) commands:

   • Run all these commands on your servers:

     – STRNFSSVR *RPC
     – STRNFSSVR *SVR
     – STRNFSSVR *MNT

   • Or start all the servers with this command:

     STRNFSSVR *ALL

9. Export the image catalog directory.

   This example restricts access by all NFS clients because it is read-only. Ensure that the exported directory is in the public directory and that it is a subdirectory of the NFSROOT path.

   • CHGNFSEXP OPTIONS('-i -o ro') DIR('directory-name')

10. Specify the level of authority for the user id (UID), group id (GID), or *PUBLIC that owns or manages the image catalog directory and the image files. The minimum authority that is required is the following:

    • Execute (*X) data authority for the exported directory and any subdirectories

    • Read (*R) data authority for files in the exported directory and any subdirectories.

The following example is for the use of the authority *PUBLIC:

```
CHGAUT OBJ('/catalog_directory') USER(*PUBLIC) DTAAUT(*RX) SUBTREE(*ALL)
```

11. Add the /CATALOG_DIR/BOOTP directory as the Trivial File Transfer Protocol (TFTP) alternate source directory by using CHGTFTPA command:

   - CHGTFTPA AUTOSTART(*YES) ALTSRCDIR('/catalog_directory/BOOTP')

   TFTP is able to find the BOOTP images as long as they are somewhere within the subdirectory structure of the specified ALTSRCDIR directory. This makes it possible to serve up multiple install images at the same time without ending and restarting the TFTP server. For example, you could specify '/installimages' for ALTSRCDIR, and the following image catalog directories will be served up at the same time.

   '/installimages/catalog1/BOOTP'
   '/installimages/catalog2/BOOTP'
   .
   .
   '/installimages/catalogN/BOOTP'

   Note: Make sure your image catalog directory is specified as '/installimages/catalogN'.

12. Ensure QTFTP has *RX authority to all install files located in the TFTP alternate source directory:

   - CHGAUT OBJ('/catalog_directory/BOOTP') USER(QTFTP) DTAAUT(*RX) SUBTREE(*ALL)

13. Ensure that the TFTP servers are started and reflect the previous changes made by stopping/starting the servers:

   - ENDTCPSVR *TFTP
   - STRTCPSVR *TFTP

Note: The fully exported image catalog directory name is limited to 127 characters. The directory path name can only contain characters A-Z, a-z, 0-9, and / (slash).

Refer to the IBM i Network File System Support PDF for additional details.

Configure a service tools server for DST for the virtual optical device to use
The type of system and configuration determines what type of setup is required to configure the Service Tools Server.

If Operations Console with LAN Connectivity is configured, then there is no additional setup required. If Operations Console with LAN Connectivity is not configured, then a LAN adapter or IOP must be tagged, depending on the model of your system.

One way to help determine whether your client system has a service tools server for DST configured:

1. Log on to SST.
2. Select option 8, Work with service tools user IDs and Devices.
3. Press F5.

If a service tools server is configured, the following display is seen.

```
                    Display LAN Adapter Configuration On Dasd
                                                          System:    IBM
Resource name . . . . . . . . :    CMN03         VLAN ID    0 (0 is default)
Adapter type  . . . . . . . :      5706
Adapter serial number . . . :      xx-xxxxxxx

Host name for service tools :      xxxxxxx
Node  . . . . . . . . . . :         000000000000
Duplex  . . . . . . . . . :         HALF
Network speed . . . . . . . :      AUTO

IP version allowed  . . . . :      BOTH           IPV4, IPV6, BOTH
Internet address  . . . . . :      x.x.xxx.xxx
Gateway router address  . . :      x.x.xxx.x
Subnet mask . . . . . . . . :      xxx.xxx.xxx.x

IPV6 address  . . . . . . . :
IPV6 interface ID . . . . . :      0000000000000000
DHCP unique ID  . . . . . . :      00000000000000000000000000000000

F3=Exit                  F5=Display IP addresses
F6=Reset DHCP unique ID   F12=Cancel
```

Pressing F5 will display the various IP addresses.

```
                         Display of IP addresses
                                                   System:    IBM

IP ADDRESS . . . x.x.xxx.xxx
IP ADDRESS . . . XXXX::XXXX:XXXX:XXXX:XXXX
IP ADDRESS . . . XXXX:XXXX:XXXX:XXX:XXXX:XXXX:XXXX:XXXX




 F3=Exit   F12=Cancel
```

Note: If you do not see a valid IP address, then the service tools server is not configured. If you do see a valid IP address, this does not always indicate that the server is configured correctly.

Note: If you use the same port (for example, gigabit adapter) for the Service Tools Server that is used for TCP/IP, ensure that you end TCP/IP (ENDTCP) and vary off the TCP/IP line description before configuring the Service Tools Server (STS). Only gigabit adapters can be shared. To simplify the tagging process, PF13 allows selecting the resource and eliminates the need for having to temporarily configure Operations Console on the partition. The following steps allow you to select and configure the Service Tools Server (STS):

1. Start System Service Tools (STRSST).
2. Work with service tools user IDs and Devices (Option 8).
3. Select STS LAN adapter (F13) to see available adapters. If there are no available adapters that are listed and you plan to tag a gigabit adapter, press F21 to show all adapters.
4. Press Enter.
5. Enter the TCP/IP information. Have your network administrator provide you with a valid TCP/IP address when you enter this information.
6. Press F7 (Store).
7. Press F14 (Activate).

Setting up the virtual optical device on the client system for installing IBM i
After you set up the Network File System server to share images, proceed with these steps to set up a virtual optical device on the client.

To set up the virtual optical device type 632B-003 on the client, follow these steps.

1. If your system uses a LAN console, then proceed to step . To configure a service tools server for the virtual optical device to use, see .

2. Create a device description for the virtual optical device.
   For example:

```
CRTDEVOPT DEVD(virtual_device_name) RSRCNAME(*VRT) LCLINTNETA(*SRVLAN)
RMTINTNETA('X.X.XXX.XXX') NETIMGDIR('/catalog_directory')
```

   - The RMTINTNETA is the remote IP address of the Network File system (NFS) server where this virtual optical device looks for virtual image files.
   - The NETIMGDIR parameter specifies the network path on the Network File System (NFS) server containing the virtual image files that were prepared for use with this device. The path is limited to 127 characters. The character set is limited to A-Z, a-z, 0-9, and / (slash).

3. Vary on the virtual optical device. The virtual_device_name specified on the VRYCFG command is the same as the name specified for DEVD on the CRTDEVOPT command.
   For example:

```
VRYCFG CFGOBJ(virtual_device_name)  CFGTYPE(*DEV) STATUS(*ON)
```

To confirm that the device is working, use the following commands on the client system to allow you to work with image files.

- The Work with Optical Volumes (WRKOPTVOL) command shows a list of optical volumes that are known to the system. The WRKOPTVOL command shows the volume that is mounted in the device.
- The Work with Image Catalog Entries (WRKIMGCLGE) command is used to work with the entries for the specified virtual optical device. The WRKIMGCLGE command shows the mounted and loaded volumes. You must specify IMGCLG(*DEV) and the NFS backed optical device for the DEV parameter.
  For example:

```
WRKIMGCLGE IMGCLG(*DEV) DEV(target-device-description)
```

  The WRKIMGCLGE panel similar to the following is displayed:

```
          Work with Image Catalog Entries
                                                System:  IBM
Catalog  . . :    *RMTCLG              Device . . . : xxxxxxxxxx
Type . . . . :    Remote               Device Status: Active
Directory  . :    *REMOTE

Type options, press Enter.
  6=Mount    12=Work with volume

Opt    Index    Status      Volume                      Access
       *AVAIL
         1      Mounted     I_BASE_01                   *READONLY
         2      Loaded      B_GROUP1_01                 *READONLY
         3      Loaded      B_GROUP1_02                 *READONLY
         4      Loaded      B_GROUP1_03                 *READONLY
         5      Loaded      B_GROUP1_04                 *READONLY
         6      Loaded      B_GROUP1_05                 *READONLY


                                                       Bottom
 F3=Exit   F5=Refresh      F12=Cancel
```

- The TFTP command can be used to verify that the setup steps for TFTP processing were done correctly on the server. From a PC, AIX, or any client that supports TFTP commands, type the following.

```
tftp <server_system> get /catalog_dir/bootp/netipl
```

  A message similar to the following is displayed:

```
Transfer successful.  512 bytes in 1 second, 512 bytes/s
```

Required: Creating a custom list of software to install

Use this Prepare for install option to create a customized installation list and preselect the IBM i licensed programs (including Licensed Internal Code and the IBM i operating system) that you want to install. This step is required to ensure the software agreements for the licensed programs are restored and displayed on the Work with Software Agreements display, which occurs later in the process.

Note: This section is only applicable when working with media distributed by IBM. If you are using redistribution media, you can skip this section.

The Prepare for install option compares the programs that are installed on your system with the programs on the media. It then generates a list. This list contains preselected programs that are replaced during the installation. To customize this list, select or deselect programs from this installation list, depending on which programs you want to install or replace. You must verify that what you ordered can be replaced. You must verify that you have all of the necessary upgrades on your installation media to complete the automatic installation. You need to accept the software agreements for these licensed programs later in these preparation tasks.

Some single licensed programs might not appear on this installation list. If a previous release of these licensed programs are currently installed on the system, the new release of these licensed programs is installed during the upgrade. If these licensed programs are new (being installed for the first time), they cannot be added to this customized list. However, you can install them by using the method in "Installing additional licensed programs" on page 117 or by doing the following procedures.

Preselecting the licensed programs to install

Use these procedures to create and customize an installation list from your IBM i distribution media.

Media considerations before you begin

Media type	Special considerations for this task
Virtual optical storage using the Network File System or 632B-003	Ensure that you complete the steps in the topic "Preparing to upgrade or replace software with virtual optical storage using the Network File System" on page 40 before you follow the steps in this procedure. Ensure that the first entry is in mounted status by entering the command `LODIMGCLGE IMGCLG(*DEV) IMGCLGIDX(1) OPTION(*MOUNT) DEV(NETWORK_DEVICE)`.
Optical image catalog	Ensure that you complete steps "1" on page 36 through "5" on page 37 in the topic "Preparing an optical image catalog to install software" on page 35 before you follow the steps in this procedure. Ensure that the first entry is in mounted status by entering the command `LODIMGCLGE IMGCLG(MYCATALOG) IMGCLGIDX(1) OPTION(*MOUNT)`.
Physical optical media	A message might appear that instructs you to load the next media volume. • If you have more volumes to load, type G and press Enter. • If there are no more volumes to load or if you want to end the loading process, type X and press Enter. Continue to load the physical optical media in order (as described in step "2" on page 48) until the system has read all of the volumes. If the display contains the message, `Problem occurred loading volume into device`, or if it states that a product was not found on the media, one of these situations occurred: • You left the same media in the drive and the system read it again. • The system had problems reading in the new volume that you placed into the drive.

1. Sign on as security officer (QSECOFR user profile). If you are using image catalogs, go to step .
2. If you are using physical optical media, arrange the optical media for Licensed Internal Code, the operating system, and licensed programs in the order that is shown in the table . The order is important. More specifically, include only the operating system, IBM-supplied libraries, no charge options, no-charge licensed programs, and keyed products. Do not include any other optical media when creating the installation list at this time.
3. Type `CHGMSGQ QSYSOPR *BREAK SEV(95)` to put your message queue in the break mode.
4. A message display could appear. Press Enter.
5. Type `GO LICPGM` and press Enter.
6. Select option 5 (Prepare for install) from the Work with Licensed Programs (LICPGM) menu and press Enter. The Prepare for Install display appears.
7. Select the option to Work with Licensed Programs for Target Release and press Enter. The Work with Licensed Programs for Target Release display appears.
8. Do the following:
   a) If you are using physical optical media, load the first optical media in the optical device.
   b) Specify 1 (Distribution media), for the *Generate list from* prompt.
   c) Specify a value for the media device or virtual media device.
   d) Specify the target release for the IBM i release. (This is the release of the operating system, not the Licensed Internal Code).
   e) Press Enter.
9. The Work with Licensed Programs for Target Release display appears.

   The list you see contains the licensed programs that are on the optical distribution media. Preselected licensed programs indicate that the product on the distribution media can replace a product that is installed on the system. (Preselected means a **1** appears in the option column.) Although more than one version of Licensed Internal Code might appear on the display, only one can be selected.

   Verify that you received all of the licensed programs and priced features that you ordered.

   • Use the F11 key to see alternative views that display information about licensed programs in greater detail. Press F11 to toggle through these views:
      a. Display additional storage
      b. Display expected release
      c. Display expected action
      d. Display product option
   • Use option 5 (Display release-to-release mapping) to see what, if any, currently installed product will be replaced by the selected product.

      You might need to specify option 2 (Merge with additional distribution media) on the Work with Licensed Programs for Target Release display to merge your existing list with information about licensed programs on additional optical media. This task is described later. Continue with the next step.
10. Select additional licensed programs or optional parts of licensed programs to add to your customized list.

    Type a 1 in the *Option* column to select a licensed program to install. To remove a selected product from the list, blank out or remove the **1** in the *Option* column.

    Note: If you deselect an item, the licensed program still will be installed unless you also follow the steps in .

    When you complete your selections, press Enter. A message at the bottom of the display will prompt you to enter more changes, or press Enter to confirm the changes. The Confirm Target Release Licensed Programs display appears.

11. Press Enter to confirm the list. The Prepare for Install display appears.

12. Select the option to List Licensed Programs Not Found on Media and press Enter. The Licensed Programs Not Found On Media display appears.

13. If no products are listed, you have all the media needed to replace your existing software. Press Enter to return to the Work with Licensed Programs menu. Go to the next step (step "14" on page 49) to create a printed list of the licensed programs you selected. If there are any products listed, do the following:

    a) Delete the licensed programs that are no longer supported.

    b) You might need to obtain the others before you begin installing software. Do the following:

        i) Check to see whether you accidentally omitted an optical disk when you performed step "8" on page 48.

        ii) Compare your media labels to the product tables ("Media labels and their contents" on page 188 and "Licensed program releases and sizes" on page 167) to see if the product was shipped. If you did not receive a licensed program that you expected, contact your software provider.

        iii) When you receive the product or locate the media, use the distribution media and product tables ("Media labels and their contents" on page 188 and "Licensed program releases and sizes" on page 167) to add its contents to the installation list. Use the procedure "Adding additional licensed programs to the installation list" on page 49 to create a printed list of the programs that you selected to install.

        iv) If you want to modify the installation list, type 3 (Modify previously generated list) on the Work with Licensed Programs for Target Release display.

14. If you do not need to select any additional licensed programs, do this step now.

    Otherwise, skip this step and continue with "Adding additional licensed programs to the installation list" on page 49.

    a) From the Prepare for Install display, select the option to Display Licensed Programs for the Target Release and press Enter.

    b) Specify *PRINT for output on the Display Licensed Programs for Target Release display and press Enter. This creates a spooled file that you can print and use as a reference while performing the installation. You should see the message Task to prepare for install successfully completed appear at the bottom of the display.

    c) Press F3 to exit.

Adding additional licensed programs to the installation list

After you have created an IBM i installation list, add any additional licensed programs that you have to the list.

Perform this task only when you have already created a custom list of software to install and only when you have additional licensed programs to add to the list.

These additional programs could be a single product on media that came with your order or that were independently shipped. The order in which you load the additional optical media is not important.

Not all products will be included in this list. Among those are Programming Request for Price Quotations (PRPQs), licensed program offerings (LPOs), and single licensed programs. "Installing additional licensed programs" on page 117 describes how to install these products after you have completed your upgrade to the new release.

If you are using image catalogs, ensure that the image catalog entry is in mounted status by entering the following command:

```
LODIMGCLGE IMGCLG(MYCATALOG) IMGCLGIDX(index_number) OPTION(*MOUNT)
```

If you have more than one image, enter the following command:

```
LODIMGCLGE IMGCLG(MYCATALOG) IMGCLGIDX(index_number) OPTION(*LOAD)
```

To add licensed programs from additional optical media to the installation list, follow these steps.

Note: If you are using image catalogs, ignore the steps that refer to loading volumes.

1. Load the installation media that contains the additional licensed programs. Wait for the In Use indicator to go out.
2. Starting from the Work with Licensed Programs (LICPGM) menu, select option 5 (Prepare for install), and press Enter. The Prepare for Install display appears.
3. Select the option to Work with licensed programs for the target release, and press Enter. The Work with Licensed Programs for Target Release display appears.
4. Select option 2 (Merge with additional distribution media) for the **Generate list from** prompt so that optical media contents can be added to the list. The target release value of the existing list appears.
5. Specify a name for the optical device and press Enter.
6. When the Display Messages display appears, load the next media volume.

   Type G and press Enter.

   After you load each volume, type G and press Enter. If there are no more volumes to load or if you want to end the loading process, type X and press Enter. A list of licensed programs appears.
7. Type 1 next to the additional licensed programs or optional parts that you want to select, and press Enter. The Confirm Licensed Programs for Target Release display appears. Press Enter to confirm the list.
8. You see the Prepare for Install display. Select the option to Display Licensed Programs for the Target Release, and press Enter.
9. Specify *PRINT for output on the Display Licensed Programs for Target Release display, and press Enter. This creates a spooled file that you can print and use as a reference while performing the installation.

Required: Accepting software agreements

As a continuation of using the IBM i Prepare for install option, you must accept the software agreements for licensed programs before they can be installed.

Note: This section is only applicable when working with media distributed by IBM. If you are using redistribution media, you can skip this section.

If you are replacing the Licensed Internal Code and IBM i operating system of the same version and release, acceptance of the software agreements for Licensed Internal Code and IBM i is not required. You can skip this topic if you have no licensed programs to install.

Before you upgrade to the new release, it is a system requirement that you accept the online software agreements for the Licensed Internal Code and the IBM i operating system through the Prepare for Install menu. If these software agreements are not accepted, you will not be able to continue with the upgrade of Licensed Internal Code. Any other licensed programs that have software agreements must also be accepted before they are upgraded.

To accept the software agreements for the licensed programs that you plan to upgrade, follow these steps:

1. Ensure that you have performed the steps in the topic "Required: Creating a custom list of software to install" on page 47. To be able to upgrade, the custom list must include, at a minimum, the Licensed Internal Code and the IBM i operating system.
2. Type GO LICPGM and press Enter. The Work with Licensed Programs display appears.
3. From the Work with Licensed Programs (LICPGM) menu, select option 5 (Prepare for install) and press Enter. The Prepare for Install display appears.
4. Select the option to work with software agreements. Press Enter.

On the Work with Software Agreements display that appears, you see all IBM licensed programs that require software agreement acceptance and whether the agreement has been accepted. Only licensed programs that are not yet installed appear on this display.

> ⚠️ **Attention:** You must see at least products *MCHCOD and 5770SS1 *BASE on this list. If a message appears that no licensed programs need their software agreements to be accepted, do not continue. Ensure that you have completed all the previous steps in "Required: Creating a custom list of software to install" on page 47. If you completed these steps and no licensed programs appear on the list, do not continue. Contact IBM support.

If you have non-IBM licensed programs on optical media that were not inserted when you used the option to work with licensed programs for target release (step "7" on page 48 under "Preselecting the licensed programs to install" on page 47), press F22 (Restore software agreements) to add these licensed programs to the Work with Software Agreements display.

5. Select to display the software agreements for licensed programs that you want to accept and press Enter. Press F14 (Accept) to accept the terms of the software agreement. Press F15 (Accept all) to display a list of all licensed programs that share the same set of terms as the software agreement you are currently reading. Press Enter to accept the software agreements for all of the listed licensed programs.

Ensuring the system meets disk storage requirements for upgrades

You must ensure that you will have adequate disk storage before you start to install or replace IBM i software.

To make more efficient use of your storage, clear your system of items that you no longer require before you estimate how much storage you will need.

Determining storage space required for a software upgrade

Before you schedule a time to install the IBM i release, determine the available storage space and the storage space that is required.

Load-source disk unit requirements

To upgrade to IBM i 7.4, you must allocate additional space for Licensed Internal Code. See "Required: Allocating additional space for Licensed Internal Code" on page 53 for steps to allocate the additional space.

The procedures in this topic might not include all requirements for storage that you have on your system. If you are preparing to upgrade or replace software using an image catalog, ensure that you reveiw the topic, "Determining storage requirements for image catalog installation" on page 34.

To determine if you have enough storage space for the new release, perform the following steps:

1. Type GO LICPGM. The Work with Licensed Programs display appears.
2. Choose option 5 (Prepare for Install).
3. Type 1 next to Estimated storage requirements for system ASP. The Estimated Storage Requirements for System ASP display appears.

   Enter the total storage that is needed for additional applications. Include storage for single licensed programs that were not included on your customized installation list, and storage for Programming Request for Price Quotations (PRPQs), licensed program offerings (LPOs), or independent software.

   Round up to the nearest whole number. Refer to the product documentation to determine how much additional storage is required. The system uses this number to calculate the disk storage that is required to install the target release.

   Include independent software only when you intend to store it in the system ASP. Refer to Backup and recovery in the IBM i Information Center for more information about system ASPs.

4. Press Enter to continue to the next display. The second Estimated Storage Requirements for System ASP display appears.

This display shows you information that you will need to determine whether enough disk storage is available to complete the installation.

5. Compare the value for *Storage required to install target release* with the value for *Current supported system capacity*. If the value for *Current supported system capacity* is greater than the value for *Storage required to install target release*, you can continue with the installation process. If the system capacity is less than the storage required, you might need to add additional disk units or install fewer optional programs.

6. Press Enter to return to the Prepare for Install display.

Repeat this process whenever you make any changes to your system that affect the available disk storage space.

Cleaning up disk storage space

Cleaning up your system before you begin to install a new IBM i release makes more storage space available for the installation process.

To keep your system running smoothly, refer to the topic Basic system operations in the IBM i Information Center.

Consider the following tasks that you can do to clean up your system and make more disk space available:

- Use the automatic cleanup option in Operational Assistant to keep your system free of unnecessary clutter.
- Permanently apply program temporary fixes (PTFs) that are temporarily applied on your system if you have not already done so.
- Delete PTF save files and cover letters that are no longer needed. (Use the Delete PTF (DLTPTF) command to do this.)
- Delete any software applications that you installed from software sampler media.
- For licensed programs or optional parts that you no longer use, perform the steps in the topic Deleting licensed programs during cleanup. Read the topics on deleting licensed programs in Chapter 14, "Deleting software related to the IBM i operating system," on page 141 for additional information.
- Have each user perform the tasks in Cleaning up user profiles. Delete any user profiles that you no longer need.

Deleting licensed programs during cleanup

When you clean up your system before you install a new release of IBM i software, your tasks might include deleting products.

For example, you might no longer need some licensed programs, or you might plan to not replace them. Occasionally, the system can require that you delete an obsolete product before you install a new release. The Work with Licensed Programs (LICPGM) menu option, Prepare for install, provides an easy way for you to identify and delete licensed programs when you are preparing to install a new release of software. Do the following:

1. Select option 5 (Prepare for install) from the Work with Licensed Programs display and press Enter. The Prepare for Install display appears.

2. Ensure that you have a customized installation list of software. If you do not have one, go to "Required: Creating a custom list of software to install" on page 47; then return to this step.

   Select the option *Work with Licensed Programs to Delete* and press Enter. The Work with Licensed Programs to Delete display appears.

   The display shows a list of installed products that should be deleted from the system. Licensed programs can appear in this list for the following reasons:

   - The licensed program should not remain on the system because it is not supported in the target release.
   - The licensed program is installed, but no replacement product was found on the optical distribution media.

- A preselected licensed program was removed from the installation list so its associated installed product appears on this display. If the installed product remains on the system, it will be replaced by the licensed program that is on the distribution media.

  Press F11 (Display reasons), then press the Help key to display the reason each product is included in the list for deletion. Carefully review the reason for deletion before you take any action.
3. When you are sure of which products to delete, save a copy of the products, using option 1 (Save) in case you might need them again. Then use option 4 (Delete) to delete the products before you install the target release of software. Option 4 immediately deletes the product from your system.

Cleaning up user profiles

Before you upgrade to a new IBM i release, you should clean up user profiles and the objects that are owned by user profiles.

⚠️ **Attention:** Do not delete any IBM-supplied user profiles (profiles that start with the letter Q).

To clean up user profiles, have each user sign on and do the following:

1. On the IBM i command line, type WRKOBJOWN. The Work with Objects by Owner display is shown. It lists all of the objects that are owned by the user. Use option 4 (Delete) to delete objects that are no longer needed.
2. Type WRKSPLF to list all of the spooled files that are owned by the user. Delete spooled files that are no longer needed.

If users cannot do this, you can do clean up of the user profiles as follows:

1. Sign on as security officer (QSECOFR user profile).
2. From the Work with Licensed programs menu (type GO LICPGM), select option 5 (Prepare for install).
3. Select the option to work with user profiles from the Prepare for Install display. The Work with User Profiles display appears.
4. Use option 12 (Work with objects by owner) to display the objects that are owned by a user profile.

   First, use the F21 key (F21=Select Assistance level) to change your assistance level to Intermediate and then do the following:

   - For each user profile, delete objects that are no longer needed.
   - Use the WRKSPLF SELECT(*ALL) command to delete spooled files that are no longer needed.
5. Delete the user profiles that you no longer need.

Required: Allocating additional space for Licensed Internal Code

IBM i 7.4 Licensed Internal Code requires more storage than IBM i 7.2 and IBM i 7.3. If your system or logical partition does not have the additional space, the upgrade stops during the installation of the Licensed Internal Code.

For best results, use the Allocate Licensed Internal Code Space (QLPALCSP) API to find out whether enough reserved storage is available to allocate the additional space when necessary and to help determine and correct any possible errors. (The Prepare for install menu provides the same capabilities as the API if you choose to use that instead.)

⚠️ **Attention:** If your system requires the extra space to be allocated, an initial program load (IPL) is required to finish this task.

Enter the following text.

```
CALL PGM(QLPALCSP) PARM('V7R4M0' 's')
```

The valid values for 's' (the **Start space allocation** parameter) are 0 or 1.

- For the value 0, an indicator is set for the Licensed Internal Code to allocate all of the additional space that is required for the specified release during the next IPL (not an installation IPL). This value also

causes the Licensed Internal Code to stop any space allocation requests due to a previous call to QLPALCSP with the Start space allocation parameter set to 1.

- For the value 1, preparation for the allocation is done immediately by moving data off the load-source disk unit to ensure that the space can be allocated more quickly during the next IPL. This option will minimize the length of time that the next IPL will take to finish the operation.

For either option (0 or 1), an IPL is needed to allocate the space.

Note: You do not need to IPL now, but you must IPL before you begin to upgrade. However, the sooner that an IPL can be done, the better, as the Load-source may be filled with data again, requiring it to be moved during IPL.

The QLPALCSP API also has an optional parameter (**IPL required**) so you know whether an IPL is needed. If you do not use the **IPL required** parameter of this API, review the job log after the API is called. If you see the following information message, you do not need to IPL as you already have the required space.

CPI3DBF - Allocating additional space is not necessary

If you receive message CPF3DF7, you are directed to upgrade your load-source disk unit with device parity protection. Options for upgrading the load-source disk unit, including the load-source disk unit with device parity protection, are available under the topic Disk management checklist in the IBM i Information Center. Otherwise, contact your authorized service provider for assistance. As the Load-source requirements did not change in IBM i 7.4, this message should not be seen.

For more information on the QLPALCSP API, refer to the Allocate Licensed Internal Code space (QLPALCSP) API topic in the IBM i Information Center.

Choosing disk configuration

If you are replacing the operating system and want to keep your current disk configuration, follow these steps.

1. Type GO LICPGM and press Enter.
2. From the Work with Licensed Programs (LICPGM) menu, select option 5 (Prepare for install) and press Enter. The Prepare for Install display appears.
3. Select the option to keep the disk configuration and press Enter. The Keep Disk Configuration display appears.
4. At the Keep Disk Configuration prompt, type *YES and Press Enter.

Estimating upgrade or replacement time

You might want to estimate the time that is needed for an IBM i upgrade or replacement of your software.

To calculate an estimate of this time, refer to "Estimates for IBM i software installation time" on page 173.

Preparing your console for software installation

Before you install a new IBM i software release, consider this information about consoles.

Supported hardware and console combinations include:

- Hardware Management Console (HMC)
- Operations Console (LAN)

If you are planning on migrating your Operations Console, do so either before or after you upgrade. If you are planning on migrating your Hardware Management Console (HMC), do so only after you have completely installed your system. For more information about using the HMC as your IBM i console, see Managing IBM i consoles in the IBM Systems Hardware Information Center.

Verify that the console type value is set correctly for your console. In addition, you can specify that an IBM i local area network (LAN) console or Hardware Management Console be taken over by another console in the event your console is disconnected. To verify the console type value, follow these steps:

1. Start and log on to System Service Tools (STRSST).
2. Select option 8, **Work with service tools user IDs and Devices**.
3. Select option 3, **Select console**.
4. Select **Console type**.

   The value of the current console mode is present in the input field. Verify that this is the correct setting. A value of zero means that the console mode has not been set and can interfere with the automatic installation process. The console mode value must be one of the following values.

Console mode	Description
3	Operations console (LAN)
4	Hardware management console (HMC)

   During an installation or upgrade, the console type specified by this value is used.

   The console mode display also includes the option to allow your 5250 console to be taken over by another console. When this option is turned on, the system does not stop with a console failure but continues to run uninterrupted. For more information, see the topic Console takeover and recovery in the IBM Systems Hardware Information Center.

If you use Operations Console, follow these instructions before you install IBM i on your system.

- Review the Console Advanced Topics topic in the IBM i Information Center.
- See the *GettingStarted* document in the `Documentation` directory of the CD. Section 9.9 *Establishing a Console Connection to IBM i* provides instructions on connecting a LAN console.
- When you receive the IBM i release upgrade, the shipped service tools user IDs (except 11111111) are expired. For all upgrades and installations, you need to establish a connection between the system and Operations Console PC by using 11111111 (eight 1's) for both the service tools user ID and the default password. This ensures a successful authentication of the subsequent connection of the client to the system. This is especially important for automatic installations.

Failure to comply with these actions can prevent the console from working correctly during the upgrade or installation.

Saving the system

Before you upgrade to a new IBM i release, you should have a current backup copy of your system.

You do not need to save your system when you have a current backup copy that can be used to recover if a failure occurs. Be sure to keep this backup copy until you save your entire system again. In the IBM Knowledge Center , the topic Backing up your system contains information about how to perform your save strategy and also the steps to automatically save your entire system.

1. Before you begin the process for saving the system for a recovery procedure, determine the optical or tape device for the alternate IPL.
2. Save your system by using the alternate IPL device.

   Tapes that are created with the Save System (SAVSYS) command cannot be used with the automatic installation process. These tapes also do not provide a complete backup.

Note: After you begin to upgrade the Licensed Internal Code to the next release, the upgrade process must be completed. If you do not complete the upgrade and you want to return to the previous release of the operating system, you need to initialize the disks and reload the system by using the backup tapes that were created by the GO SAVE command (Option 21) just before you began the upgrade.

Optional: Running the IBM Pre-Upgrade Verification tool

The IBM Pre-Upgrade Verification tool for IBM i runs on the Windows client and checks the IBM i data to ensure that all the necessary requirements are completed before beginning an upgrade. This tool verifies key pre-upgrade steps.

To use the Pre-Upgrade Verification tool, follow these steps:

1. Download and install the Pre-Upgrade Verification tool for IBM i . An IBM userid and password is needed to access the tool.
2. Run the Pre-Upgrade Verification tool to verify that your system is ready to begin the upgrade process.

Chapter 7. Upgrading or replacing software using automatic installation

To use the automatic installation method to replace the Licensed Internal Code, the IBM i operating system, and licensed programs currently installed on your system with the new release, follow these procedures.

Before you begin automatic installation

Before you upgrade to a new IBM i release by using the automatic installation method, verify these points.

1. Verify that this is the correct topic for you to use for your software upgrade. If you are not sure, refer to "Releases supported and system model information for IBM i upgrades" on page 15 to determine which releases are supported for upgrades to IBM i 7.4.

2. If you are changing a primary language, you must be aware of additional considerations before you begin the installation.

   - Be sure to read the topic "Globalization and IBM i software installation" on page 17. You cannot change your primary language to a language that is currently installed as a secondary language on your system. You must delete the secondary language before you can change it to your primary language.

   - When you perform an automatic installation using either physical or virtual media devices and IBM-supplied media, your service tools language will be the same as the service tools language that was previously installed. If you want a different service tools language, refer to Changing the service tools language on your system or logical partition in the IBM Knowledge Center .

   - When you perform an automatic installation using either physical or virtual media devices and IBM-supplied media, you now need to set the new language. The Set Install National Language Version (NLV) (QINSTLNG) API tells the installation program what language to install. This API is run before an automatic installation.

3. Review the *Updates and PTFs* from the IBM i and Related Software 🌐.

4. Perform the preparation tasks in Chapter 6, "Preparing to upgrade or replace IBM i software," on page 25, before you upgrade.

   - It is required that you use the Prepare for Install options to accept online software agreements for the Licensed Internal Code and the IBM i operating system for the upgrade to occur.

   - It is required that you allocate additional space for IBM i 7.4 Licensed Internal Code.

5. If you plan to use an image catalog (virtual optical device) to install, read the topic "Preparing to upgrade or replace software using an image catalog" on page 34 to create a device, an image catalog, and an image catalog entry. Perform the setup steps in "Preparing to upgrade or replace software using an image catalog" on page 34. Perform step "6" on page 37 at least a day before you do the actual installation. This ensures that your installation media are ready to use.

6. If you plan to use virtual optical storage using the Network File System to install, read the "Preparing to upgrade or replace software with virtual optical storage using the Network File System" on page 40 topic to understand how to configure an image server and client system for installation.

7. Verify that your console mode value is set correctly before you upgrade. Verify your console information in the topic "Preparing your console for software installation" on page 54.

8. If you plan to use or if you are using logical partitions, refer to these topics:

   - Planning for logical partitions. Read the topic Planning for logical partitions in the IBM Systems Hardware Information Center.

- Reference codes are viewable under the Hardware Management Console or the Integrated Virtualization manager. Refer to Reference codes list for customers in the IBM Systems Hardware Information Center for more information.
- Alternate IPL device within a logical partition. Refer to the I/O devices topic in the IBM Systems Hardware Information Center.

9. If you are using an alternate installation device, ensure that the alternate installation device is enabled. See Using an alternate installation device for information about setting up an alternate installation device. If you are not planning on using an alternate installation device and currently have one configured, you must clear the alternate installation device configuration information from the system before you install the new release.

Replacing software using the automatic installation method

The automatic installation process replaces Licensed Internal Code, the IBM i operating system, and all of the licensed programs that are currently installed and refreshed.

To add new products, either use the Work with Licensed Programs menu (type GO LICPGM) option 5 (Prepare for Install) before you perform these automatic installation procedures or use LICPGM menu option 11 (Install Licensed Programs) after the automatic installation. You might need to delete some products that you do not want after the installation is complete.

As you perform these steps, reference codes (also known as system reference codes or SRCs) appear on the data display of the control panel or virtual control panel of the Hardware Management Console (HMC) or Integrated Virtualization Manager. When the system attention light is on and a reference code that starts with A6 appears, the system is waiting for you respond to a message or make a device ready. When this information lists a reference code with xx (such as A6xx 6001), it means that any combination of characters can occur where the xx appears. The console can also display reference codes during the installation of Licensed Internal Code. For more information about reference codes, see "Reference codes for IBM i software installation" on page 163.

Before you upgrade, it is required that you use the Prepare for Install options to accept online software agreements for those licensed programs (including Licensed Internal Code and the IBM i operating system) that you plan to install. You must also allocate additional space for Licensed Internal Code. These tasks are described in "Required: Accepting software agreements" on page 50 and "Required: Allocating additional space for Licensed Internal Code" on page 53. If these steps are not completed, the upgrade will not complete.

If you are using image catalogs, then you must complete steps "1" on page 36 through "5" on page 37 in the topic "Preparing an optical image catalog to install software" on page 35. Then, return to this topic. Ignore the following steps that refer to loading volumes.

If you are using virtual optical storage that is accessing the Network File System, then you must complete the steps in the topic "Preparing to upgrade or replace software with virtual optical storage using the Network File System" on page 40. Then, return to this topic. In the following procedure, ignore the steps that refer to loading volumes.

1. If an IPL to allocate additional storage for IBM i 7.4 Licensed Internal Code or to change the disk configuration (optional) has not been done, IPL the system now.

   IPL the system before you power down the system or logical partition in step "8" on page 60.

   Note: If you are not sure that additional space for the Licensed Internal Code has been allocated, follow the steps in "Required: Allocating additional space for Licensed Internal Code" on page 53.

2. If you are using an image catalog (virtual media device) to upgrade, perform this step at least a day before you do the actual installation. If you are not using an image catalog, go to step "4" on page 59.

   To verify that the image catalog entries are sorted in the correct sequence and to validate that all your images are in loaded status, enter the following command:

   ```
   WRKIMGCLGE IMGCLG(catalog-name)
   ```

Ensure that your catalog is in ready status and that all image catalog entries are in loaded or mounted status. To sort and verify your image catalog for installation, press F7 to prompt for the VFYIMGCLG command. Enter *UPGRADE for the type and *YES for the sort field.

Another method to sort and verify that your image catalog is to enter the following command to put the images in the correct order. By default, the volume with the lowest index is mounted. Then, all the other volumes are loaded.

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*UPGRADE) SORT(*YES)
```

After you ensure that your images are in loaded status, continue with step .

3. If you are changing the primary language and you are using IBM supplied optical media, then type the following to set the install language.

```
CALL QINSTLNG ('29xx')
```

For more information, see the Set Install National Language Version (NLV) (QINSTLNG) API.

The value 29xx represents the language value. See "Feature codes for language version" on page 194 for information about language values. If the install language is not set, then the current system language is used.

4. If you are using physical media to upgrade, arrange the installation media that you plan to install in the following order (you might not have all of these). Verify that your media contains the correct primary language.

   a. Licensed Internal Code for IBM i.

   b. IBM i operating system, IBM-supplied libraries QGPL and QUSRSYS, and all IBM i no-charge options.

   c. No-charge licensed programs and keyed products.

   d. Single licensed programs.

   Keep the following installation media available for later use:

   a. Secondary Language Media

   b. Cumulative PTF Package (if ordered, Cydddvrm_01)

   For descriptions of the optical media, refer to "Media labels and their contents" on page 188.

5. On your console, ensure that you have a connection to the system. If you are working on a logical partition, ensure that power is on for the console of that logical partition.

6. If you are using physical media, load the first volume of installation media that contains Licensed Internal Code into the installation device that is defined for the system.

   Throughout these procedures, load the next volume when prompted by the system. Wait for the In Use indicator to go out. Also ensure that you remove other media from devices that are not involved in these procedures.

   a) If you are using a tape device instead of an optical device, verify that the tape unit is varied on and allocated to your system.

   b) If you are using a device that is enabled as an alternate installation device, load the Licensed Internal Code media in your primary device and your installation media in your alternate installation device. Your installation fails if both media do not contain the same release level of Licensed Internal Code. For more information, see Using an alternate installation device.

7. Use the control panel to set the mode to **Normal**.

For logical partitions only
Use the virtual control panel (partition status on systems with HMC or Integrated Virtualization Manager) to set the mode to **Normal**. Also, make sure that you select the alternate IPL device before the initial program load (IPL) in step "8" on page 60. **Notes:** a. If you have not already set up an alternate IPL device for a logical partition, refer to online help information in IBM System i® Navigator. b. If you are using another method to select an alternate IPL device in a logical partition, refer to the topic Alternate installation device: Overview.

8. Power down the system or logical partition to perform the upgrade.

   - Before you power down the system for upgrade, ensure that you review the *Updates and PTFs* section found in the IBM i and Related Software 🌐

     After loading and applying the appropriate PTFs, continue to the preferred installation method.

   - If you are using an image catalog to do the upgrade, ensure that you have loaded and applied the appropriate PTFs, then type the following command.

     ```
     PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(*IMGCLG)
       IMGCLG(catalog-name)
     ```

   - If you are using a virtual optical storage device that accesses the Network File System to do the upgrade, ensure that you have loaded and applied the appropriate PTFs, then type the following command.

     ```
     STRNETINS DEV(virtual-device-name) OPTION(*ALL) KEYLCKMOD(*NORMAL)
     ```

   - If you are performing any other upgrade, ensure that you have loaded and applied the appropriate PTFs, then type the following command.

     ```
     PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(D)
     ```

   Note: If you have nonconfigured disk units present, performing this step configures disk units automatically by default.

   Press Enter. Powering down could take approximately 15 minutes or more for this step. The data display area of the control panel continues to display reference codes.

9. If you did not do the required preparation tasks for accepting software agreements or allocating additional space for Licensed Internal Code, error messages are received. You must follow the instructions on the display and then begin the installation again.

10. If the system attention light appears and one of the reference codes listed in "Reference codes for IBM i software installation" on page 163 appears in the data display on the control panel, complete the instructions for that reference code. If you have logical partitions, the reference codes appear in the HMC or Integrated Virtualization Manager.

11. If the Alternate Installation Device Failed display appears, there is an alternate installation device on the system that is enabled. Either it was not disabled before starting the installation, or the device is otherwise not ready. Do one of the following:

    - To continue the installation with optical media, press Enter.

    - To use the alternate installation device, make a note of the message at the bottom of the display.

      Press F12 (Cancel). Reference code B608 1105 appears on the control panel. Use the "Common reference codes for IBM i software installation" on page 163 to determine how to continue.

12. If you are using optical media or tape for the upgrade, the Licensed Internal Code - Status display appears on your console. After 100% complete is reached, the console can appear blank for approximately 5 minutes and the IPL in Progress display might appear. You do not need to respond to these displays.

```
                    Install Licensed Internal Code - Status

   Install of the Licensed Internal Code in progress.

              +--------------------------------------------------------+
   Percent    |                          XX %                          |
   complete   +--------------------------------------------------------+


   Elapsed time in minutes  . . . . . . . . :      x.x



   Please wait.
```

If you are using an image catalog (virtual media device) for the upgrade, you will see status messages that indicate the progress of the Licensed Internal Code installation:

a. C6xx41DC is a status reference code that indicates the progress of the Licensed Internal Code decompression. The xx indicates the percent that is decompressed. No action is required.

b. C6xx41CC is a status reference code that indicates the progress of the Licensed Internal Code installation. The xx indicates the percent of the Licensed Internal Code that is installed. No action is required.

13. If you are using optical media or tape for the upgrade and an error occurs, you might see a display that requires a response. Perform the action necessary as prompted by the display.

After a period of time (when the installation process starts to install the operating system), some displays appear on the console. One of the displays is called Licensed Internal Code IPL in Progress. Some of the IPL steps could take a long time (up to two hours or longer), depending on how much data recovery is required for your system. The last message shown on the IPL in Progress display should be Start the Operating System.

14. Load the next volume in sequence when the system prompts you for another volume.

Note: If the system does not prompt you or if you receive a Media command failed message, remove the Licensed Machine Code volume and insert the first volume of the operating system. Select option 1 (Attempt to install the operating system again) to continue with the installation.

You might be prompted for the next volume several times during the installation process.

If you receive a message that refers to device QINDEV, first make the device ready. Then press Enter to continue.

15. Status displays appear during the installation process. The installation status display shown here indicates how much of the installation is complete and how many stages remain. You do not need to respond to this status screen. The display is blank for a time between stage 4 and stage 5 and also during stage 6.

```
Message ID . . : CPI2070                       IBM i Installation Status

          +----------------------------------------------------+
   Stage  6 |                       58%                          |
          +----------------------------------------------------+

 Installation                                              Objects
 Stage                                    Completed        Restored
    2 Restoring programs to library QSYS  . . . . . :   X            13637

    3 Restoring language objects to library QSYS  . :   X            01540

    4 Updating program table  . . . . . . . . . . :   X

    5 Installing database files . . . . . . . . . :   X

 >> 6 Installing base directory objects . . . . . :

    7 Completing installation . . . . . . . . . . :
```

16. Status displays might appear. These displays show the status of the licensed programs and language objects as they install on the system. You do not need to respond to these status displays.

```
                    Installing Licensed Programs
                                              System: XXXX

   Licensed programs processed . . . . . . . . . . :     0 of XXX

                 Licensed program install in progress
```

The following display is an example of the display that appears during the installation process.

```
                    Installing Licensed Programs
                                              System: XXXX
   Licensed programs processed  . . . . . . . . . :     X of XXX

   Licensed
   Program   Option   Description                          Type
   5770SS1     2      Online Information                   2924
```

This display shows which licensed programs and optional parts of licensed programs are being processed. After the *PGM objects and *LNG objects are processed, the display shows the total number of licensed programs processed.

17. The following message might appear when the system is ready for the next media volume that contains licensed programs. When you are installing from optical media, wait for the In Use indicator to go out before you respond to the message.

```
                         Display Messages
                                              System:   XXXX
 Queue  . . . . . :   QSYSOPR          Program . . . . :   *DSPMSG
   Library  . . . :     QSYS             Library . . . :
 Severity . . . . :   95                Delivery  . . . :   *BREAK

 Type reply (if required), press Enter.
   Load a valid volume containing licensed programs in optical device OPT01 (X G).
     Reply . . . . G
```

Load the next media volume that contains licensed programs and continue the installation. Occasionally, you will be prompted to load the next volume after a short time has passed. This event typically happens when the licensed programs on the media are at the same level as the licensed programs already installed on your machine.

Type G and press Enter. After you load each volume, type G and press Enter. If there are no more volumes to load that contain licensed programs, or if you want to end the loading process, type X and press Enter.

18. The media has been read, and now the licensed programs are going through the installation process. Even though it might take a long time, wait for the Sign On display to appear. When the installation is successfully completed, the Sign On display appears. (There is no message that indicates automatic installation completed successfully. The Sign On display acts as the confirmation.)

If you receive the message `Automatic installation not complete`, sign on using QSECOFR for your user ID and go to Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

Verifying completion of automatic installation

To verify that you have successfully completed an IBM i upgrade by using the automatic installation method, follow these steps.

1. The Sign On display appears on the console after the installation has completed.

```
                        Sign On
                                        System. . . . . . :   XXXX
                                        Subsystem . . . . :   XXXX
                                        Display . . . . . :   XXXXXXXX

            User. . . . . . . . . . . . . .   QSECOFR
            Password  . . . . . . . . . . .
            Program/procedure . . . . . . .   _____
            Menu  . . . . . . . . . . . . .   _____
            Current library . . . . . . . .   _____
```

Type the following and press Enter:

   User: QSECOFR
   Password: (Enter password, if required.)

2. The IBM i Main Menu (or the menu you chose as your initial menu) appears on the console.

Type GO LICPGM and press Enter.

3. The Work with Licensed Programs display appears. Use the page down or roll up key to see the third display of the Work with Licensed Programs menu.

The IBM i Main Menu (or the menu you chose as your initial menu) appears on your console Type 50 and press Enter.

4. The Display Install History display appears. The XX's indicate default values.

```
                    Display Install History

Type choices, press enter.

  Start date . . . . . .    XX/XX/XX    MM/DD/YY

  Start time . . . . . .    XX:XX:XX    HH:MM:SS

  Output . . . . . . . .    *_____    *, *PRINT
```

Press Enter.

5. Look at the messages that appear on the Display History Log Contents display.

  • If you had an installed licensed program that was not renewed by IBM, it might not be replaced. Refer to "Mixed-release environment" on page 15 for more information.

- If any of the messages on the display indicate a failure or a licensed program that is partially installed, go to Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

  Otherwise, press F3 (Exit).

6. Verify the installed status values of your licensed programs and check for compatibility. It is important to make sure all of your licensed programs are compatible with the operating system. You can determine a licensed program's compatibility by checking the installed status value.

   Use LICPGM menu option 10 (Display licensed programs) to see the release and installed status values of the installed licensed programs. If the installed status value of a licensed program is *COMPATIBLE, it is ready for use. If the installed status value of a licensed program is *BACKLEVEL, the licensed program is installed, but its version, release, and modification is not compatible with the currently installed level of the operating system.

   Check the topic "Licensed program releases and sizes" on page 167 to verify the current version, release, and modification of the licensed program. "Installed status values" on page 196 lists the possible installed status value descriptions.

You have completed this task.

1. Do you need to install additional licensed programs?

   - **No.** Go to the next step.
   - **Yes.** Go to "Installing additional licensed programs" on page 117 and complete the instructions.

2. Do you need to install a secondary language?

   - **No.** Go to the next step.
   - **Yes.** Go to "Installing a secondary language" on page 123 and complete the instructions.

3. You must complete the installation process before you put your system into operation. Go to Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83 and complete the instructions.

Chapter 8. Upgrading or replacing software using manual installation

Follow these instructions to use the manual installation method to replace the Licensed Internal Code, IBM i operating system, and licensed programs currently installed on your system with the IBM i 7.4 release.

Before you begin manual installation

Verify these points before you upgrade to a new IBM i release using the manual installation method.

1. Verify that this is the correct topic for you to use for your software upgrade. Refer to "Releases supported and system model information for IBM i upgrades" on page 15 to determine which releases are supported for upgrades to IBM i 7.4. Be familiar with the sequence of the steps you use to upgrade or replace a release on a system or logical partition.

2. If you are changing a primary language, you must be aware of additional considerations before you begin the installation.

   - Be sure to read the topic "Globalization and IBM i software installation" on page 17. You cannot change your primary language to a language that is currently installed as a secondary language on your system. You must delete the secondary language before you can change it to your primary language.

   - Your primary language and service tools language can be installed separately. When you perform a manual installation using an optical device and IBM-supplied media, the installation steps include the installation of the service tools language.

   - If you are using Save System (SAVSYS) media to upgrade, your primary language and service tools language will be the same language as what was on the SAVSYS media when the upgrade completes.

   - If a virtual media device is used for the upgrade, you might need to update your service tools language after the upgrade. For instructions, see Changing the service tools language on your system or logical partition in the IBM i Information Center.

3. Review the *Updates and PTFs* from the IBM i and Related Software 🌐.

4. Perform the preparation tasks in Chapter 6, "Preparing to upgrade or replace IBM i software," on page 25, before you upgrade.

   - It is required that you use the Prepare for Install options to accept online software agreements for the Licensed Internal Code and the IBM i operating system for the upgrade to occur.

   - It is required that you allocate additional space for IBM i 7.4 Licensed Internal Code if upgrading from IBM i 7.1.

5. If you plan to use an image catalog (virtual optical device) to install, read the topic "Preparing to upgrade or replace software using an image catalog" on page 34 to create a device, an image catalog, and an image catalog entry. Perform the setup steps in "Preparing to upgrade or replace software using an image catalog" on page 34. Perform step "6" on page 37 at least a day before you do the actual installation. This ensures that your installation media are ready to use.

6. If you plan to use virtual optical storage using the Network File System to install, read the "Preparing to upgrade or replace software with virtual optical storage using the Network File System" on page 40 topic to understand how to configure an image server and client system for installation.

7. Verify that your console mode value is set correctly before you upgrade. Verify your console information in the topic "Preparing your console for software installation" on page 54.

8. If you plan to use or if you are using logical partitions, refer to these topics:

- Planning for logical partitions. Read the topic Planning for logical partitions in the IBM Systems Hardware Information Center.
- Reference codes are viewable under the Hardware Management Console. Refer to Reference codes list for customers in the IBM Systems Hardware Information Center for more information.
- Alternate IPL device within a logical partition. Refer to the I/O devices topic in the IBM Systems Hardware Information Center.

9. If you are using an alternate installation device, ensure that the alternate installation device is enabled. See Using an alternate installation device for information about setting up an alternate installation device. If you are not planning on using an alternate installation device and currently have one configured, you must clear the alternate installation device configuration information from the system before you install the new release.

Replacing the Licensed Internal Code

Follow these steps to replace the Licensed Internal Code by using the manual installation method.

As you perform these steps, reference codes appear on the data display of the control panel or the virtual control panel of the Hardware Management Console (HMC) or Integrated Virtualization Manager. When the system attention light is on and a reference code starting with A6 appears, the system is waiting for you to respond to a message or make a device ready. When this information lists a reference code with xx (such as A6xx 6001), it means that any combination of characters can occur where the xx appears. The console can also display reference codes during the installation of Licensed Internal Code. For more information about reference codes, see "Reference codes for IBM i software installation" on page 163.

If you are using image catalogs, then you must complete steps "1" on page 36 through step "5" on page 37 in the topic "Preparing to upgrade or replace software using an image catalog" on page 34. Then, return to this topic. In the following procedures, ignore the steps that refer to loading volumes.

If you are using virtual optical storage that is accessing the Network File System, then you must complete the steps in the topic "Preparing to upgrade or replace software with virtual optical storage using the Network File System" on page 40. Then, return to this topic. In the following procedure, ignore the steps that refer to loading volumes.

1. If an IPL to allocate additional storage for IBM i 7.4 Licensed Internal Code or to change the disk configuration (optional) has not been done, IPL the system now.

   IPL the system before you power down the system or logical partition in step "8" on page 60.

   Note: If you are not sure that additional space for the Licensed Internal Code has been allocated, follow the steps in "Required: Allocating additional space for Licensed Internal Code" on page 53.

2. If you are using an image catalog (virtual media device) to upgrade, perform this step at least a day before you do the actual installation. If you are not using an image catalog, go to step "3" on page 67.

   To verify the image catalog entries are sorted in the correct sequence and to validate that all your images are in loaded status, enter the following command:

   ```
   WRKIMGCLGE IMGCLG(catalog-name)
   ```

   Ensure that your catalog is in ready status and that all image catalog entries are in loaded or mounted status. To sort and verify your image catalog for installation, press F7 to prompt for the VFYIMGCLG command. Enter *UPGRADE for the type and *YES for the sort field.

   Another method to sort and verify your image catalog is to enter the following command to put the images in the correct order. By default, the volume with the lowest index is mounted. Then all the other volumes are loaded.

   ```
   VFYIMGCLG IMGCLG(catalog-name) TYPE(*UPGRADE) SORT(*YES)
   ```

   After you ensure that your images are in loaded status, continue with step "4" on page 67.

3. If you are using physical media to upgrade, arrange the installation media that you plan to install in the following order (you might not have all of these). Verify that your media contains the correct primary language.

   a. Licensed Internal Code for IBM i.
   b. IBM i operating system, IBM-supplied libraries QGPL and QUSRSYS, and all IBM i no-charge options.
   c. No-charge licensed programs and keyed products.
   d. Single licensed programs.

   Keep the following installation media available for later use:

   a. Secondary Language Media
   b. Cumulative PTF Package (if ordered, Cydddvrm_01)

   For descriptions of the optical media, refer to "Media labels and their contents" on page 188.

4. On your console, ensure that you have a connection to the system. If you are working on a logical partition, ensure that power is on for the console of that logical partition.

5. If you are upgrading a logical partition, verify that this partition has an alternate initial program load (IPL) resource assigned. For most cases, this is the optical device that supports the optical media class.

   For more information about locating and selecting the alternate IPL resource, see the I/O devices topic in the IBM Systems Hardware Information Center.

6. If you are using physical media, load the first volume of installation media that contains Licensed Internal Code into the installation device that is defined for the system.

   Throughout these procedures, load the next volume when prompted by the system. Wait for the In Use indicator to go out. Also ensure that you have removed other media from devices that are not involved in these procedures.

   a) If you are using a tape device instead of an optical device, verify that the tape unit is varied on and allocated to your system.
   b) If you are using a device that is enabled as an alternate installation device, you need to load the Licensed Internal Code media in your primary device and your installation media in your alternate installation device. Your installation will fail if both media do not contain the same release level of Licensed Internal Code. For more information, see Using an alternate installation device.

7. Use the control panel to set the mode selection to **Manual**. If you are upgrading a logical partition, use the virtual control panel function of your HMC or Integrated Virtualization Manager. Also make sure that you have already selected the alternate IPL device before you perform the initial program load (IPL) in the next step.

8. Power down the system or logical partition:

   • Before you power down the system for upgrade, ensure that you review the *Updates and PTFs* section found in the IBM i and Related Software 🔗 developerWorks website (www.ibm.com/developerworks/ibmi/software).

   After loading and applying the appropriate PTFs, continue to the preferred installation method.

   • If you are using an image catalog to do the upgrade, ensure that you have loaded and applied the appropriate PTFs, then type the following command.

```
PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(*IMGCLG)
  IMGCLG(catalog-name)
```

   • If you are using a virtual optical storage device that accesses the Network File System to do the upgrade, ensure that you have loaded and applied the appropriate PTFs, then type the following command.

```
STRNETINS DEV(virtual-device-name) OPTION(*ALL) KEYLCKMOD(*MANUAL)
```

- If you are performing any other upgrade, ensure that you have loaded and applied the appropriate PTFs, then type the following command.

```
PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(D)
```

Powering down could take approximately 15 minutes or more for this step. The data display area of the control panel continues to display reference codes.

9. If the system attention light appears and a reference code listed in the topic "Reference codes for IBM i software installation" on page 163 appears in the data display on the control panel, complete the instructions for that reference code.

If you are upgrading a logical partition, the system attention light will not appear. You must monitor the logical partition reference codes from the HMC or Integrated Virtualization Manager. When the State changes to `Failed`, that is the equivalent of having the attention light on for the logical partition.

10. If you are using an image catalog (virtual media device) to upgrade, go to step "17" on page 70.

11. The Select a Language Group display shows the service tools language that is currently installed on the system.

   Note: The installation media for Licensed Internal Code is language-independent. It is important that you complete this step carefully.

```
            Select a Language Group


    The language feature shown is the service tools
    language feature installed on the system.

    Attention: To keep the same language, ensure that the
    media you use for installing the operating system
    matches the language feature shown.  If the operating
    system media does not match what is shown, the
    installation process will attempt to install the
    operating system in a different language feature than
    Licensed Internal Code.


    Type choice, press Enter.

      Language feature . . . . . . . . . . . . . .   2924
```

   To keep the same service tools language, verify that the displayed language feature matches the service tools language that you want.

   Note: The language you select and the language of the operating system typically should match. If they do not match, your service tools language will be different than your primary language.

   To change the service tools language to match the primary language, type the language feature of your primary language. Press Enter.

   Refer to "Feature codes for language version" on page 194 for a list of the language feature codes.

12. After you enter the language feature, the Confirm Language Group display appears.

```
            Confirm Language Group


    Language feature  . . . . . . . . . . . . . :   2924

    Press Enter to confirm your choice for language feature.
    Press F12 to change your choice for language feature.
```

   Press Enter.

13. The Install Licensed Internal Code display appears.

```
                    Install Licensed Internal Code
                                                  System: XXXX
 Select one of the following:

       1. Install Licensed Internal Code
       2. Work with Dedicated Service Tools (DST)
       3. Define alternate installation device
```

Either select the option to install Licensed Internal Code or the option to define an alternate installation device:

- If you are not using an alternate installation device, type 1 (Install Licensed Internal Code). (The alternate installation device function supports installation from optical or tape media that you have created. The topic Using an alternate installation device describes when you can use an alternate installation device.) If you are not using an alternate installation device, continue with step .
- If you have an alternate installation device attached to the system, type 3 to verify its address and determine whether it is enabled or disabled. Continue with the Verifying Alternate Installation Device Subtask in step . If you have an alternate installation device configured and do not want to use it, type 3 to clear the alternate installation device configuration information.

Press Enter.

14. **Verifying and selecting alternate installation device subtask:** The Select Alternate Installation Device Bus display appears.

```
                 Select Alternate Installation Device Bus
                                                  System: XXXX
Type Option, press Enter.
   1=Select

Option      Bus Number          Selected
  _            1
  _            2
  1            3                     *
  _            4
  _            10
  _            11
  _            12
  _            13




                                                  More.....
F2=Deselect Device  F3=Exit      F12=Cancel
```

a. Verify that the selected device is on the correct system bus. Type 1 in the Options field next to the selected bus, and press Enter to view information about the device that is attached to the bus. This might take several minutes. If you see the message No alternate installation device configured, wait one minute and refresh the display.

b. When the Select Media Type display appears, select 1 for tape or 2 for optical media. Press Enter.

c. The Select Alternate Installation Device display appears. Use this display to verify the resource name, type, model, and serial number for the device. The following display shows an example of a tape device.

```
                Select Alternate Installation Device
                                                System:    SYSTEMA

Additional devices may be available for use.  Press F5 to see
if any additional devices have been detected.

Type option, press Enter.
  1=Select   5=Display details

         Bus        Resource                     Serial
  Option  Number    Name          Type   Model   Number           Selected
    _        1      TAP08         6386    001     00-11111
    _        3      TAP19         3570    B11     13-22222            *



F2=Deselect device     F3=Exit     F5=Refresh    F12=Cancel
```

    d. Type 1 and press Enter to select the device to use or press F2 to deselect the currently selected device.

    e. The message `Alternate installation device selected` appears. Press F3 to return to the Install Licensed Internal Code display.

    f. Type 1 and press Enter to install the Licensed Internal Code.

This completes the subtask for verifying and selecting alternate installation device.

15. If there is an alternate installation device defined and enabled, the Confirm Alternate Installation Device display appears. Perform one of these tasks.

- To install from the alternate installation device, press Enter.

- If you do not want to install from the alternate installation device and want to continue using the primary media, press F12 to Cancel. You see the Licensed Internal Code display. Perform step "13" on page 69 and select option 3 (Define alternate installation device). Perform step "14" on page 69 and deselect the alternate installation device.

16. The Install Licensed Internal Code (LIC) display appears on your console.

```
                Install Licensed Internal Code (LIC)

Disk selected to write the Licensed Internal Code to:
    Serial Number      Type      Model     I/O Bus       Controller      Device
    xx-xxxxxxx         xxxx      xxx       x             x               x

Select one of the following:

    1. Restore Licensed Internal Code
    2. Install Licensed Internal Code and Initialize system
    3. Install Licensed Internal Code and Recover Configuration
    4. Install Licensed Internal Code and Restore Disk Unit Data
    5. Install Licensed Internal Code and Upgrade Load Source
```

Attention: Be sure to select option 1. Some options on this display remove all data from your system.

Type 1 (Restore Licensed Internal Code) and press Enter.

If you did not previously accept the software agreement for the Licensed Internal Code or did not allocate additional space for the Licensed Internal Code, error messages are shown. Follow the instructions in the error messages. More information is in the topic"Required: Accepting software agreements" on page 50 and "Required: Allocating additional space for Licensed Internal Code" on page 53.

17. The Install Licensed Internal Code - Status display appears on your console. You do not need to respond to this display. It remains on your console for up to 30 minutes.

```
                 Install Licensed Internal Code - Status

  Install of the Licensed Internal Code in progress.

            +--------------------------------------------------------+
  Percent   |                          XX %                          |
  complete  +--------------------------------------------------------+


  Elapsed time in minutes  . . . . . . . . :     x.x



  Please wait.
```

If you are using an image catalog (virtual media device) for the upgrade, you will see status messages that indicate the progress of the Licensed Internal Code installation:

a. C6xx41DC is a status reference code that indicates the progress of the Licensed Internal Code decompression. The xx indicates the percent that is decompressed. No action is required.

b. C6xx41CC is a status reference code that indicates the progress of the Licensed Internal Code installation. The xx indicates the percent of the Licensed Internal Code that is installed. No action is required.

18. If you are using optical media or tape for the upgrade and an error occurs, you might see a display that requires a response. Perform the action necessary as prompted by the display. If you are using an image catalog for the upgrade and an error occurs, see for the recovery actions.

19. The Disk Configuration Attention Report display might appear. If it does, display the detailed report for each problem shown on the display. Press the Help key from the Disk Configuration Attention Report display for more information about your choices. You can also refer to the topic .

```
                    Disk Configuration Attention Report

  Type option, press Enter.
     5=Display Detailed Report

  Press F10 to accept all the problems and continue the IPL.
  The system will attempt to correct them.

  OPT  Warning
   _    XXXXXXXX XXXX XXXXXXXXX XXXXX XX XXXXX XXXXXXXX
   _    XXXXX_XX_XXXXX XXXXXX_ XXXXXXXX XXXXXXX XXXXXXXXXX_____
   _    --------------------------------------------------------
   _    --------------------------------------------------------
   _    --------------------------------------------------------
   _    --------------------------------------------------------
   _    --------------------------------------------------------
   _    --------------------------------------------------------
   _    --------------------------------------------------------
   _    --------------------------------------------------------
                                                                   More...

  F3=Exit    F10=Accept the problems and continue    F12=Cancel
  --------------------------------------------------------------------------------
```

If the problem `Disk unit not formatted for optimal performance` appears on this display, do the following:

- Type 5, and press Enter to display the detailed report.
- Write down the information displayed. After the upgrade is completed, you will need this information to format these disk units to gain optimal performance.
- Press F12 to cancel and return to the Disk Unit Attention Report.
- Press F10 to accept the problems and continue the IPL.

20. If the console mode value is zero, the Accept Console display appears. If this display appears, follow these steps:

   a. Press F10 to accept the current console type. The Accept and Set New Console Type on this IPL display appears. The old value (zero) and the new value to be set (your current console type) are shown.

   b. Press Enter to set the new value and continue with these instructions.

21. If your system processor configuration has changed, you could see other displays at this point. After you supply the requested information, the installation continues and the IPL or Install the System display appears. Refer to "System password" on page 195 for more information.

22. After approximately 10 minutes, the IPL or Install the System display appears. The Licensed Internal Code is now installed. Do not remove the distribution media at this time.

23. If the partition is not HMC managed and you want to change the console type, or you want to enable Console takeover and recovery follow these steps.

   For more information about console takeover and recovery, see the topic Console takeover and recovery in the IBM Systems Hardware Information Center.

   a. At the IPL or Install the system display, select option 3 to access Dedicated Service Tools (DST).

   b. Sign on as security officer (QSECOFR user profile / QSECOFR password). When prompted, change the password to what you want to use for this partition.

   c. Select option 5 (Work with DST environment).

   d. Select option 2 (System devices).

   e. Select option 6 (Console mode).

   f. Select the valid console that you have for this partition.

      Note: If you are using Operations Console (LAN) as your console type, press Enter on the verify window. You can also press F11 to review your network configuration.

   g. Select 1 (Yes) or 2 (No) for the option to allow the console to be taken over by another console in the event of a 5250 console failure. When this option is turned on, the system does not stop with a failure but continues to run uninterrupted.

      Press Enter and then press F3 to return to the DST main menu.

   h. Press F3 to exit DST and return to the IPL or Install the System display.

Replacing the IBM i operating system

Follow these steps to replace the IBM i operating system by using the manual installation method.

1. The IPL or Install the System menu appears on your console.

```
                         IPL or Install the System
                                                      System: XXXX
   Select one of the following:

       1. Perform an IPL
       2. Install the operating system
       3. Use Dedicated Service Tools (DST)
       4. Perform automatic installation of the operating system
       5. Save Licensed Internal Code
```

   Load the first volume of installation media that contains the operating system. Throughout these procedures, load the next volume when prompted by the system. When you are installing from optical media, wait until the In Use indicator goes out before you continue.

   Ensure that the installation media that contains the Licensed Internal Code is in the installation device that is defined for the system.

Ensure that you have removed other media from devices that are not involved in this upgrade.

After you install the new release over your previous release, passwords for all service tools user profiles that still use the default password expire automatically. When you try to log on or access service tools using those profiles, you receive a message that the password has expired and must be changed. Follow the prompts or press the appropriate key (F9) to change the password for that user profile.

2. Type 2 (Install the operating system) and press Enter. The Install Device Type Selection display appears.

```
                    Install Device Type Selection
                                                System: XXXX
 Select the installation device type:

      1. Tape
      2. Optical
      3. Virtual device - preselected image catalog
      4. Current alternate selected device          None
      5. Network device
```

Type the number that corresponds to your device type and press Enter.

3. If you Select option 5, the Network Device – Configuration display appears.

```
     Network Device - Configuration
                           System: xxxxx

 Status        : Currently selected
 Server IP     : x.x.x.x
 Path Name     : /catalog_direcory
 Bus           :    13
 Board         :     0
 Card          :    36
 Port          :     0
 Local IP      : x.x.xxx.xxx
 Subnet Mask   : xxx.xxx.xxx.x
 Gateway IP    : x.x.xxx.x
 MTU Size      :  1500
```

Confirm the Image server IP address and path name. Press F10 to continue.

4. The Confirm Install of the Operating System display is shown on your console.

   Press Enter.

5. The Select a Language Group display appears, which shows the primary language currently installed on the system. The installation media must contain the primary language. To find the appropriate feature code for your language, refer to "Feature codes for language version" on page 194.

```
                    Select a Language Group
                                                System: XXXX
 Note:  The language feature shown is the language feature
 installed on the system.

 Type choice, press Enter.

   Language feature . . . . . . . . . . . . . . .   2924
```

If you need to change the feature, type the numbers of the feature code for the language you want.

   Press Enter.

6. Either the Confirm Language Feature Selection display or the Confirm Service Tools Language display is shown on your console. Press Enter.

7. If the Add All Disk Units to the System menu does not appear, go to step "9" on page 76.

8. **Adding disk units subtask:**

a. If any nonconfigured disk units that are capable of being protected by device parity are currently unprotected, the Add All Disk Units to the System display is shown. If the following display is not shown, continue with step .

```
                  Add All Disk Units to the System
                                                    System: XXXX

Non-configured device parity capable disk units are attached
to the system.  Disk units cannot be added automatically.
It is more efficient to device parity protect these
units before adding them to the system.
These disk units may be parity enabled and added at SST.
Configured disk units must have parity enabled at DST.

Select one of the following:

     1. Perform any disk configuration at SST
     2. Perform disk configuration using DST
```

It is much faster to start device parity protection on the disk units at DST before the disk units are added to the auxiliary storage pool configuration.

To start device parity on the eligible disk units, do the following tasks from the Add All Disk Units to the System display:

   i) Select option 2 to perform disk configuration at DST.

   ii) Sign on at the Dedicated Service Tools Sign-on prompt and return to the Use Dedicated Service Tools (DST) menu.

   iii) Select the option Work with disk units.

   iv) Select the option Work with disk configuration.

   v) Select the option Work with device parity protection.

   vi) Select the appropriate option for starting device parity protection.

   vii) A list of parity sets that are capable of running device parity protection are shown. Type 1 on each option line for each parity set.

   viii) You might see a Confirm Continuation display that indicates that the system must perform a directory recovery. Press Enter to continue.

   ix) The Confirm Starting Device Parity Protection display is shown. This shows the list of disk units that will have device parity protection. Press Enter to continue.

   x) An in-progress display that indicates the status of the function is shown.

   xi) Return to the IPL or Install the System display.

b. If the Add All Disk Units to the System menu appears, it could look like the following example.

```
                  Add All Disk Units to the System
                                                    System: XXXX

Select one of the following:

     1. Keep the current disk configuration
     2. Perform disk configuration using DST
     3. Add all disk units to the system auxiliary storage pool
     4. Add all disk units to the system ASP and balance data
```

If you do not want device parity protection, mirrored protection, or user ASPs, select option 3 (Add all disk units to the system auxiliary storage pool). By adding disk units before you install the operating system, you improve your overall system performance because the operating system is distributed across all of your disk units.

For logical partitions only

If you will be creating logical partitions later, you do not want to configure all units now. Refer to the validated output from the IBM System Planning Tool (SPT) supplied by IBM for the configuration selection. To access the tool, go to the IBM System Planning Tool website (http://www.ibm.com/systems/support/tools/systemplanningtool/).

Note: If either the Disk Configuration Error Report display or the Disk Configuration Warning Report display appears, go to "Disk configuration warning and error messages" on page 161 to determine the appropriate action.

c. You could see the following display if your disk configuration has changed. Type 5 next to the problem and press Enter to display the detailed report.

```
                       Problem Report

Note: Some action for the problems listed below may need to
be taken.  Please select a problem to display more detailed
information about the problem and to see what possible
action may be taken to correct the problem.

Type option, press Enter.
  5=Display Detailed Report

OPT  Problem

  -    ------------------------------------------------------------
  -    ------------------------------------------------------------
```

d. If the following display appears, a disk unit that you selected to add to your disk configuration could already have data on it. If you choose to continue, any data that is on the disk units listed will be removed.

Be certain that you want to configure the disk before you continue. Follow the instructions on the display.

Press Enter to return to the Problem Report display. Press F10 to continue the Add Disk Unit subtask.

```
                  Possibly Configured Units

 Problem: These non-configured units appear to be
 configured units of some other disk configuration and
 may contain valid data.  This option will clear the
 data from these units and destroy the other disk
 configuration.

 Press Enter to continue
 Press F12=Cancel to return and change your choices.

  Serial                     Resource      Other System
  Number      Type  Model  Name          Serial Number
  ----------  ----  ---    ----------      ----------
  ----------  ----  ---    ----------      ----------
  ----------  ----  ---    ----------      ----------
  ----------  ----  ---    ----------      ----------
  ----------  ----  ---    ----------      ----------
  ----------  ----  ---    ----------      ----------
  ----------  ----  ---    ----------      ----------
                                                         More..

  F3=Exit         F12=Cancel
```

e. The following display shows the percentage of disk units added. This display does not require a response.

```
                          Function Status

   You selected to add units.


                          ___ % Complete
```

f. When the process completes, continue the manual installation process with the next step.

This completes the subtask for adding disk units.

9. Status displays are displayed on the console. You do not need to respond to these status displays. Some of the IPL steps might take a long time. The time varies depending on how much data recovery is required for your system.

10. You might see the following display.

```
                              Message

   Message ID  . . . . . . :   CPA2055      Type . . . . . . . :    Inquiry
   From program  . . . . . :   ITLOADFO     Severity . . . . . :   99

   Message . . . . . . :    The next volume in the sequence is needed to
     continue the installation process.

   Cause . . . . . . :    The end of the volume has been reached.

   Recovery   . . . . :    Load the next volume on the installation device.




   Type choice, press Enter.

     Reply . . . . .   1          1=Continue, 2=End installing
```

If you see this display, load the first volume of installation media that contains the operating system. Throughout the remainder of these procedures, load the next volume when prompted by the system. When you are installing from optical media, wait until the In Use indicator goes out before you continue.

11. The Install the Operating System display appears when the IPL for the Licensed Internal Code completes. The XX's in the following display indicate default date and time values.

```
                       Install the Operating System

   Type options, press Enter.

      Install
        option . . . . . . 1            1=Take defaults (No other
                                          options are displayed)
                                        2=Change install options

   Date:
     Year . . . . . . XX          00-99
     Month  . . . . . XX          01-12
     Day  . . . . . . XX          01-31

   Time:
     Hour . . . . . . XX          00-23
     Minute . . . . . XX          00-59
     Second . . . . . XX          00-59
```

Type the following and press Enter:

Install option 1

Date: (Use the current year, month, and day.)

Time: (Use the current time, 24-hour clock.)

12. Status messages are displayed during the installation process. You do not need to respond to these displays. The following is an example of a status display. This display might be present for 2 hours or more. The display is blank for a time between stage 4 and stage 5.

```
Message ID . . : CPI2070                   IBM i Installation Status

            +-----------------------------------------------------+
   Stage  6 |                    58%                              |
            +-----------------------------------------------------+

   Installation                                           Objects
   Stage                                     Completed     Restored
      2 Restoring programs to library QSYS . . . . . :   X          13637

      3 Restoring language objects to library QSYS  . :   X          01540

      4 Updating program table  . . . . . . . . . . :   X

      5 Installing database files . . . . . . . . . :   X

   >> 6 Installing base directory objects . . . . . :

      7 Completing installation . . . . . . . . . . :
```

13. The Sign On display appears on your console.

```
                        Sign On
                                      System. . . . . . :   XXXX
                                      Subsystem . . . . :   XXXX
                                      Display . . . . . :   XXXXXXXX

         User. . . . . . . . . . . . .     QSECOFR
         Password  . . . . . . . . . . .
         Program/procedure . . . . . . . .   _____
         Menu  . . . . . . . . . . . . .     _____
         Current library . . . . . . . . .   _____
```

Type the following and press Enter:

    User: QSECOFR

    Password: (Enter password, if required.)

14. The IPL Options display appears.

```
                        IPL Options

   Type choices, press Enter.

      System date . . . . . . . . . . . . . . .  XX / XX / XX     MM / DD / YY
      System time . . . . . . . . . . . . . . .  XX : XX : XX     HH : MM : SS
      System time zone  . . . . . . . . . . . .  Q0000UTC         F4 for list
      Clear job queues. . . . . . . . . . . . .  N                Y=Yes, N=No
      Clear output queues . . . . . . . . . . .  N                Y=Yes, N=No
      Clear incomplete job logs . . . . . . . .  N                Y=Yes, N=No
      Start print writers . . . . . . . . . . .  Y                Y=Yes, N=No
      Start system to restricted state  . . . .  N                Y=Yes, N=No


      Set major system options. . . . . . . . .  N                Y=Yes, N=No
      Define or change system at IPL. . . . . .  N                Y=Yes, N=No
```

Notes: If you need to change system values, you can do so now. One example of a system value that you might change is the value for the security level (QSECURITY) system value.

Another example is the scan control (QSCANFSCTL) system value. If you have not already done so, consider specifying *NOPOSTRST for the QSCANFSCTL system value to minimize future scanning of some objects that are restored during the installation of licensed programs in the following steps. For more information on scanning and the system value settings, see the topic Scanning support in the IBM i Information Center.

Type Y for the *Define or change the system at IPL* prompt. Follow the instructions on the displays.

Type the following and press Enter:

- System date: (Use the current date.)
- System time: (Use the current time, 24-hour clock.)
- System time zone: (Verify that it is correct or press F4 to select a time zone.)
- Set major system options: N

15. The Edit Rebuild of Access Paths display could be shown. If it is, press Enter to continue.
16. You see the Status display again.

```
Message ID . . : CPI2070                   IBM i Installation Status

          +----------------------------------------------------+
   Stage  6  |                        58%                       |
          +----------------------------------------------------+

 Installation                                          Objects
 Stage                                     Completed   Restored
    2 Restoring programs to library QSYS  . . . . . . :   X        13637

    3 Restoring language objects to library QSYS  . :   X        01540

    4 Updating program table  . . . . . . . . . . . :   X

    5 Installing database files . . . . . . . . . . :   X

 >> 6 Installing base directory objects . . . . . . :

    7 Completing installation . . . . . . . . . . . :
```

17. Additional display messages could be shown.

   Press Enter after each message to continue.
18. The IBM i Main Menu (or the menu you chose as an initial menu) appears on your console.

You have completed the installation of the IBM i operating system.

Replacing the licensed programs

Follow these steps to replace licensed programs related to IBM i by using the manual installation method.

1. Begin this task at the IBM i Main Menu (or the menu you chose as an initial menu).
   a. Type CHGMSGQ QSYSOPR *BREAK SEV(60) and press Enter.
   b. A message display could appear. Press Enter.
   c. Type ENDSBS *ALL *IMMED and press Enter.
   d. When the following message appears, press Enter to continue:

```
ENDSBS SBS(*ALL) command being processed
```

   e. The message System ended to restricted condition appears. Press Enter to continue.

   f. Type CHGMSGQ QSYSOPR SEV(95) and press Enter.

   g. A message display could appear. Press Enter.

2. The IBM i Main Menu (or the menu you chose as an initial menu) appears on your console.

   Type GO LICPGM and press Enter.

3. The Work with Licensed Programs display appears.

```
LICPGM                    Work with Licensed Programs
                                                         System:    XXXX
Select one of the following:

  Manual Install
     1. Install all
```

   Type 1, and press Enter.

4. The Manual Install display appears.

```
                          Manual Install
                                                    System:    XXXX
Type choices, press Enter.

  Install option . . .   1           1=Installed products
                                     2=All products
                                     3=New products


  Installation device    OPT01       Name

  Replace if current      N          Y=Yes
                                     N=No

  Nonaccepted agreement  2           1=Do not install licensed program
                                     2=Display software agreement

  Automatic IPL  . . .    N          Y=Yes
                                     N=No
```

Type the following and press Enter:

- Install option: 1
- Installation device: OPT01 (See notes that follow.)
- Replace if current: N (See note that follows.)
- Nonaccepted agreement: 2 (See note that follows.)
- Automatic IPL: N

Notes:

- If you created a customized installation list, select install option 4 (Installed and additionally selected products). This option appears only if you followed the instructions to add an additional licensed program, which is described in step "10" on page 48 in "Preselecting the licensed programs to install" on page 47.
- In this example, the installation device is OPT01. If you are using a different naming convention, use the name you have assigned to the installation device.
- If you are using your own distribution media, select 2 for the *Install option* field. For the *Replace if current* field, type Y.
- If you are migrating data from one system to another system using documented backup and recovery procedures, type Y for the *Replace if current* field.

- If you have not previously accepted software agreements for licensed programs that you plan to install, option 2 displays the software agreements for acceptance as each licensed program is installed. This will increase the length of your installation time. If you want to accept the software agreements now, complete step "6" on page 118 and then return here.

5. Status displays might appear. These displays show the status of the licensed programs and language objects as they install on the system. You do not need to respond to these status displays.

```
                    Installing Licensed Programs
                                                    System: XXXX


    Licensed programs processed . . . . . . . . . . :     0 of XXX

                      Licensed program install in progress
```

The following display is an example of the display that appears during the installation process.

```
                  Installing Licensed Programs
                                                    System: XXXX
    Licensed programs processed  . . . . . . . . . :    X of XXX

    Licensed
    Program   Option   Description                             Type
    5770SS1     2       Online Information                      2924
```

This display shows which licensed programs and optional parts of licensed programs are being processed. After the *PGM objects and *LNG objects are processed, the display shows the total number of licensed programs processed.

6. If a message similar to the following appears, load the next media volume that contains licensed program products, and continue the installation. When you are installing from optical media, wait for the In Use indicator to go out before you respond to the message.

```
                        Display Messages
                                                System:    XXXX
    Queue  . . . . . :    QSYSOPR            Program . . . . :    *DSPMSG
      Library  . . . :      QSYS               Library . . . :
    Severity . . . . :    95                  Delivery  . . . :    *BREAK

    Type reply (if required), press Enter.
      Load the next volume in optical device OPT01 (X G)
        Reply . . . . G
```

Type G and press Enter.

After you load each volume, type G and press Enter. If there are no more volumes to load that contain licensed programs, or if you want to end the loading process, type X and press Enter.

7. If a licensed program requires acceptance of a software agreement, the Software Agreements display appears. Do either of the following:

- Press F14 to accept the agreement and allow the licensed program to continue installing.

- Press F16 to decline the agreement and end the installation of that licensed program.

8. The Work with Licensed Programs display appears on your console when the installation process is completed. One of the following messages appears on the bottom of the Work with Licensed Programs display:

- `Work with licensed programs function has completed.`

- `Work with licensed programs function not complete.`

Verifying completion of manual installation

Follow these steps to verify that you have successfully completed the IBM i upgrade by using the manual installation method.

1. The Work with Licensed Programs display appears. Use the page down or roll up key to see the third display of the Work with Licensed Programs menu.

   Type 50 and press Enter.

2. The Display Install History display appears. The XX's indicate default values.

```
                    Display Install History

Type choices, press enter.

  Start date . . . . . .    XX/XX/XX   MM/DD/YY

  Start time . . . . . .    XX:XX:XX   HH:MM:SS

  Output . . . . . . . .    *_____   *, *PRINT
```

   Press Enter.

3. Look at the messages that appear on the Display History Log Contents display.

   • If you had an installed licensed program that was not renewed by IBM, it might not be replaced. Refer to "Mixed-release environment" on page 15 for more information.

   • If any of the messages on the display indicate a failure or a licensed program that is partially installed, go to Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

   Otherwise, press F3 (Exit).

4. Verify the installed status values of your licensed programs and check for compatibility. It is important to make sure that all of your licensed programs are compatible with the operating system.

   Use LICPGM menu option 10 (Display licensed programs) to see the release and installed status values of the installed licensed programs. If the installed status value of a licensed program is *COMPATIBLE, it is ready for use. If the installed status value of a licensed program is *BACKLEVEL, the licensed program is installed, but its version, release, and modification is not compatible with the currently installed level of the operating system. Check the topic "Licensed program releases and sizes" on page 167 to verify the current version, release, and modification of the licensed program. "Installed status values" on page 196 lists the possible installed status value descriptions.

You have completed this task.

1. Do you need to install additional licensed programs?

   • **No.** Go to the next step.

   • **Yes.** Go to "Installing additional licensed programs" on page 117 and complete the instructions.

2. Do you need to install a secondary language?

   • **No.** Go to the next step.

   • **Yes.** Go to "Installing a secondary language" on page 123 and complete the instructions.

3. You must complete the installation process before you put your system into operation. Go to Chapter 9, "Checklist: Completing the IBM i upgrade or replacement," on page 83 and complete the instructions.

Chapter 9. Checklist: Completing the IBM i upgrade or replacement

Use this checklist to complete the IBM i upgrade or replacement processes.

1. If you still have default passwords for your service tools user IDs, change them now. For information about service tools user IDs, see Changing service tools user IDs and passwords in the IBM i Information Center.

2. Remove the media volume when the installation is complete. If your media is tape, wait for the tape to rewind completely.

3. If you have any IBM or non-IBM products with special installation instructions, install these products now. Check the product's documentation, and follow any special instructions.

4. Install the most current cumulative PTF package. (This package should have been ordered a week or two before your installation.)

   Use the instructions in the *PTF Shipping Information Letter*. Then return here and continue with the next step.

   Note: If you do not install the cumulative PTF package now, you need to perform an IPL and let the Initialize System (INZSYS) process complete. Before you do, set the IPL type to **B** (or the IPL type you use for everyday operation) and then set the mode selection to **Normal**. "Initialize System (INZSYS) recovery" on page 160 has more information on INZSYS.

5. Apply any PTF groups that you have ordered. For more information on PTF groups, refer to Fix groups. To apply PTF groups, refer to the cover letter and instructions for the program temporary fix (PTF). For general information on applying PTFs, go to Installing fixes in the IBM i Information Center.

6. If your system is operating as a service partition and your system is not being managed by a Hardware Management Console, you might be required to perform a server IPL. A *server IPL* is an IPL whereby all logical partitions on the system are shut down at the same time. This allows, for example, a new level of the server firmware to be activated on the system.

   You might be required to perform a server IPL after you apply or remove a PTF on the service partition if that PTF affects the server firmware.

   - To find out if you need to do a server IPL, type DSPFMWSTS on the IBM i control language (CL) command line and press Enter. If a server IPL is required, the **Server IPL required** field is set to Yes.

   - To find out if your system is operating as a service partition, type DSPFMWSTS on the CL command line and press Enter. If your system is operating as a service partition, the **Service partition** field is set to Yes.

   Note: When shutting down your service partition, reference codes D6xx430B or D6xx430A could be displayed for an extended amount of time. The xx should increment periodically and is a normal part of processing when server firmware code is being updated. Allow the system to complete the processing. Do not interrupt this process.

7. Look for messages in the install history log that indicate the status of the Initialize System (INZSYS) process.

   a) Type GO LICPGM and press Enter.

   b) Type 50 (Display log) on the Work with Licensed Programs display, and press Enter.

   c) The Display Install History display appears. Press Enter.

   The Display History Log Contents display appears. If you do not see either of the following messages on the display, wait a few minutes and select option 50 again. Find the message Initialize System (INZSYS) started. After this message appears, wait for a period of time and look for the Initialize System (INZSYS) processing completed successfully message

(CPC37A9). If you do not see message CPC37A9 on the display, go to "Initialize System (INZSYS) recovery" on page 160 to determine the problem.

8. If you see the message An unexpected error occurred during an IPsec request in the QSYSOPR message queue, the Internet Protocol filtering rules might have failed to load.

    To help you determine why the loading of filtering rules failed, review the messages in the QTCPWRK system job log and search for TCP9535 (Failed to apply filtering rules). You will need to load your filter rules again.

9. If you used an image catalog to perform your upgrade, you might want to remove all installation images from your system.

    To delete the catalog and all the optical images (image files), type the following:

    ```
    DLTIMGCLG IMGCLG(mycatalog) KEEP(*NO)
    ```

10. If you used an image catalog to perform your installation and you used the Start ASP Balance (STRASPBAL) command to end the allocation for storage in the load-source disk unit before you upgraded, enter the Start ASP Balance (STRASPBAL) command to resume the allocation of storage for the load-source disk unit.

    ```
    STRASPBAL TYPE(*RSMALC) UNIT(1)
    STRASPBAL TYPE(*CAPACITY) ASP(1) TIMLMT(*NOMAX)
    ```

11. If your service tools language is different than your primary language, you might want to verify that the service tools language is the one that you want on the system or logical partition.

    For details, refer to Changing the service tools language on your system or logical partition in the IBM i Information Center.

12. Install software license keys for your IBM i and keyed products. Use the Work with License Information (WRKLICINF) command to display the installed keyed products to add license key data. For specific instructions, go to Adding license key information in the IBM i Information Center.

    After updating the license key information, return here and continue with the next step.

13. After you complete the installation process and before you make a system or partition available to all users, set the usage limit for the software-license managed products. These products are listed on the Proof of Entitlement (POE), invoice, or other documents that you have received with your software order. For products that have a usage limit, you set the usage limit with the Work with License Information (WRKLICINF) command.

    To set your usage limit, do the following:

    a. Type WRKLICINF and press Enter.

    b. On the Work with License Information display, press F11 (Display Usage Information). The usage limit number on each product that is listed on the POE, invoice, or other documents must match the usage limit number on the Work with License Information display for the associated product.

    c. If the usage limit is to be updated, move the cursor to the line that contains the product name whose usage limit is to be updated.

    d. Type 2 (Change) and press Enter.

    e. When the Change License Information display is shown, update the usage limit prompt with the usage limit shown on the POE. In addition, update the threshold prompt with either *CALC or *USGLMT. Do not leave the threshold set to zero.

       Note: If message CPA9E1B [Usage limit increase must be authorized. Press help before replying (C G).] is sent, respond by typing G.

    f. If the POE lists more products than the Work with License Information display, set the usage limits after you install those products.

14. If you deleted any licensed program libraries or secondary language libraries from either of the library list system values [system library list (QSYSLIBL) or user library list (QUSRLIBL)], change system values QSYSLIBL or QUSRLIBL to add the libraries back in the library list now.

15. If you changed the verify object signatures during restore (QVFYOBJRST) system value from 4 or 5 to 3 or had unlocked it before your upgrade, change this back to its normal setting. If you have additional software applications, however, that were included in the upgrade, keep them at 3 until after you restore them. If you changed the allow restore of security sensitive objects (QALWOBJRST) system value to *ALL or had unlocked it before the upgrade, return the value to its normal locked setting.

16. If you changed the scan control (QSCANFSCTL) system value to minimize future scanning of some objects that are restored before you installed your licensed programs, you can now remove the *NOPOSTRST specification from this system value.

17. If you changed any other system value such as security level (QSECURITY) during your upgrade, change it back now.

18. Some of the tasks in this topic require that you change the QSYSOPR severity code filter to 95. If you do not want to continue with this level or you want to change the delivery notification, type CHGMSGQ QSYSOPR DLVRY(xx) SEV(yy) where *xx* indicates the delivery notification and *yy* indicates the severity code that you want to use. The system defaults are DLVRY(*HOLD) SEV(0).

19. If you have not already verified the compatibility of your licensed programs with the IBM i operating system, do this now. Use LICPGM menu option 10, Display installed licensed programs. If *COMPATIBLE is not listed next to a licensed program, then go to "Installed status values" on page 196 and determine how to proceed.

20. Depending on your strategy for object conversion, consider running the Start Object Conversion (STROBJCVN) command to either convert user objects or check which objects still require conversion.

21. Save your system using your normal save procedures. Refer to the instructions in the Backing up your system topic in the IBM i Information Center. Make sure that the Initialize System (INZSYS) process is complete before you save your system.

    Note: Before you start a save operation, use the Work with Active Jobs (WRKACTJOB) command to check the status of QDCPOBJx jobs. These jobs decompress objects. There could be more than one QDCPOBJx job. You can start your save operation if these jobs are in an inactive state. If you put the system in a restricted state by ending subsystems, the QDCPOBJx jobs become inactive. The jobs will restart when the system is not in a restricted state. For more information about decompressing objects, see "Compressed objects and storage space" on page 17.

22. If you have installed IBM i Access Family products, you might have other tasks that you need to complete.

    You can find further information about IBM i Access Family products at IBM i Access website ⬇️ (http://www.ibm.com/systems/i/software/access).

23. You might have installed licensed programs that require additional installation steps on PCs, or you might have programs that should be installed on PCs through an IBM i Access Family function. If you have products such as these, complete your PC installation by using the instructions for the product.

24. If you installed 5770-TC1, TCP/IP Utilities, go to the topic TCP/IP setup in the IBM i Information Center for advanced configuration and setup information.

25. If you have customized an IBM-supplied program (for example, QSTRUP in library QSYS) in a previous release, make sure that you re-create this program to run correctly in the new release.

26. If you have duplicated any IBM-supplied objects, you might want to make new duplicates after you install the release. This enables you to take advantage of functions added in the new release. Examples of objects that you might duplicate include the following:

    • Message text descriptions

    • Commands

    • Command defaults

27. If you use the IBM Performance Management for Power Systems function, the Collection Services tool, or the Performance Tools licensed program and you collected data before installing your new release, you need to perform an action to enable the collecting of performance data to continue.

You have the following choices regarding how to handle your performance data from the prior release:

- Automatic data collection support. When Collection Services is started at IPL, a performance library for the prior release files is created. Collection Service database files are moved to that library. This action allows new files to be created and preserves the existing data files from the previous release. You should be aware of the following items:
  - The library name that is created is QPFRDvrmnn, where vrm is the current version, release, and modification and nn is a unique sequence number starting with 01, for example, QPFRD52001.
  - The library is created with *EXCLUDE public authority. The library is owned by the QSYS user profile, and the owner of the original library is given *ALL authority.
  - All QAPMxxxx files are moved.
  - If you do not want to keep the data from the previous release, you can delete the QPFRDvrmnn library with the Delete Library (DLTLIB) command (DLTLIB qpfrdvrmnn)
- Convert the data.

  Use the Convert Performance Collection (CVTPFRCOL) command to convert the data in the collection library. This command supports data conversion for Collection Services, PEX, Job Watcher, and Disk Watcher file collections.

You have completed upgrading to the new release on your system.

Chapter 10. Replacing Licensed Internal Code and IBM i of the same version and release

Use this procedure to install a new modification of Licensed Internal Code and a more recent update (resave) of the IBM i operating system to support new hardware.

This is not a backup and recovery procedure. If you have ordered resave media, follow these tasks to replace the Licensed Internal Code and the operating system.

Checklist: IBM i software replacement

Use this checklist to complete all the tasks for a software replacement of the same IBM i release.

If you plan to navigate through this checklist online, it might help to right-click this topic in the navigation tree to open a new window. The information in this checklist summarizes the major tasks that you need to do before you begin to replace your software.

Before you begin

1. Use the following website links to verify that your server model meets the requirements to support the new release.

   - The IBM Prerequisite website at http://www-912.ibm.com/e_dir/eServerPrereq.nsf has the operating system compatibility information for hardware features.
   - The Upgrade planning website at http://www.ibm.com/systems/support/i/planning/upgrade/osmapping.html has a table that indicates which releases of the operating system are supported by each of the server models.

2. Know your current strategy for connecting a console to your system or logical partition. Your current connection strategy influences your planning activities. For more information about consoles, see Managing IBM i consoles in the IBM Systems Hardware Information Center.

3. Plan for extra time after the upgrade to perform a server IPL. This is one of the tasks described in the "Checklist: Completing the replacement of the same IBM i release" on page 90.

4. Understand system administration tasks (basic system operations). To perform software installation tasks, you need to be able to restart your system, sign on and off, use the command interface, install fixes, change the system operation mode and initial program load (IPL) source on the system unit control panel, and analyze system problems.

5. Understand the different "Types of software installation devices" on page 10. The installation tasks are different based on the device type and media type that you use.

6. Check with your software vendor to ensure product compatibility with IBM i versions. Existing software products installed may need to be upgraded to be compatible with the IBM i target release.

From the following checklist, perform the tasks that are appropriate for your system. Required steps are noted. If you are viewing this in printed copy, use this checklist as a guide for the steps on the pages that follow.

Software replacement tasks

1. Verify the contents of your software order. For more information about the optical media you received with your order, see "Media labels and their contents" on page 188.
2. "Reviewing software PTF (fix) requirements" on page 27
   a. "Finding the latest PSP information" on page 27
   b. "Analyzing fixes you currently have on your system" on page 27
   c. "Obtaining a record of PTFs applied" on page 88

After you finish

After the replacement tasks in this checklist have been completed, consider these tasks.

1. Develop a strategy for managing and maintaining your software. For information about software fixes (or program temporary fixes, PTFs), and software licenses and license keys, go to the topic Maintaining and managing IBM i and related software in the IBM i Information Center.

2. For information about software distribution of supported products, go to the topic Distributing software in the IBM i Information Center.

Obtaining a record of PTFs applied

Obtain a record of the PTFs applied to your system for comparison later to ensure that any corrective fixes you have applied are still present after performing the IBM i upgrade procedures.

If you display the PTFs to an output file (*OUTFILE), the query functions can be used later rather than looking through all the listings to verify that all the current PTFs are applied after the installation of Licensed Internal Code and IBM i.

To determine what PTFs have been applied to Licensed Internal Code, enter the following on the IBM i control language (CL) command line:

```
DSPPTF LICPGM(5770999) to *PRINT or *OUTFILE
```

To determine what PTFs have been applied to the IBM i operating system, enter the following on the CL command line:

```
DSPPTF LICPGM(5770SS1) to *PRINT or *OUTFILE
```

Permanently applying LIC PTFs for a replacement of the same release

Permanently apply Licensed Internal Code PTFs by using the following command before installation (the delay option is chosen so you can schedule the IPL).

```
APYPTF LICPGM(5770999) SELECT(*ALL) APY(*PERM) DELAYED(*YES) IPLAPY(*YES)
```

Perform an IPL:

```
PWRDWNSYS RESTART(*YES)
```

Note: The default action for the Power Down System (PWRDWNSYS) command is to display a confirmation. This can be changed by specifying *NO for the Confirm (CONFIRM) parameter: `CONFIRM(*NO)`.

Determining storage space required for a replacement of the same release

Before you schedule a time to install this release, determine the available storage space and the storage space that is required.

The procedures in this topic might not include all requirements for storage that you have on your system. If you are preparing to upgrade or replace software using an image catalog, ensure that you have reviewed the topic, "Determining storage requirements for image catalog installation" on page 34.

Replacing software of the same release using manual installation

Use the manual installation method to upgrade or replace your software of the same IBM i release.

Complete the tasks in "Replacing the Licensed Internal Code" on page 66 and "Replacing the IBM i operating system" on page 72. After performing these tasks, go to "Installing PTFs for the Licensed Internal Code and the operating system" on page 89 .

Installing PTFs for the Licensed Internal Code and the operating system

Install PTFs (cumulative, HIPER, group, or individual PTFs) only for the Licensed Internal Code and the IBM i operating system.

1. Mount the PTF media.
2. Type GO PTF. On option 7, select 5770999 and 5770SS1.
3. After all the media is processed, perform an IPL.

To determine if all the Licensed Internal Code PTFs and the IBM i PTFs that were applied to the partition before the installation exist on the partition now, enter the following on an IBM i control language (CL) command line:

```
DSPPTF LICPGM(5770999) to *PRINT or *OUTFILE
DSPPTF LICPGM(5770SS1) to *PRINT or *OUTFILE
```

1. Compare the output from the DSPPTF command that you obtained before the upgrade to determine if any PTFs you previously had on your system are missing.
2. Install PTFs that are missing after you upgrade.

Checklist: Completing the replacement of the same IBM i release

Use this checklist to complete any of the IBM i 7.4-to-IBM i 7.4 replacement processes.

1. If you still have default passwords for your service tools user IDs, change them now. For information on service tools user IDs, see Changing service tools user IDs and passwords in the IBM i Information Center.

2. If your system is operating as a service partition and your system is not being managed by a Hardware Management Console, you might be required to perform a server IPL. A *server IPL* is an IPL whereby all logical partitions on the system are shut down at the same time. This allows, for example, a new level of the server firmware to be activated on the system.

    You might be required to perform a server IPL after you apply or remove a PTF on the service partition if that PTF affects the server firmware.

    - To find out if you need to do a server IPL, type DSPFMWSTS on the IBM i control language (CL) command line and press Enter. If a server IPL is required, the **Server IPL required** field is set to Yes.

    - To find out if your system is operating as a service partition, type DSPFMWSTS on the CL command line and press Enter. If your system is operating as a service partition, the **Service partition** field is set to Yes.

    Note: When shutting down your service partition, reference codes D6xx430B or D6xx430A could be displayed for an extended amount of time. The xx should increment periodically and is a normal part of processing when server firmware code is being updated. Allow the system to complete the processing. Do not interrupt this process.

3. If you used an image catalog to perform your installation, you might want to remove all installation images from your system.

    To delete the catalog and all the optical images (image files), type the following:

    ```
    DLTIMGCLG IMGCLG(mycatalog) KEEP(*NO)
    ```

4. If you used an image catalog to perform your installation and you used the Start ASP Balance (STRASPBAL) command to end the allocation for storage in the load-source disk unit before you upgraded, enter the Start ASP Balance (STRASPBAL) command to resume the allocation of storage for the load-source disk unit.

    ```
    STRASPBAL TYPE(*RSMALC) UNIT(1)
    STRASPBAL TYPE(*CAPACITY) ASP(1) TIMLMT(*NOMAX)
    ```

5. If your service tools language is different than your primary language, you might want to verify that the service tools language is the one that you want on the system or logical partition.

    For details, refer to Changing the service tools language on your system or logical partition in the IBM i Information Center.

6. After you complete the installation process and before you make a system or partition available to all users, set the usage limit for the software-license managed products. These products are listed on the Proof of Entitlement (POE), invoice, or other documents that you have received with your software order. For products that have a usage limit, you set the usage limit with the Work with License Information (WRKLICINF) command.

    To set your usage limit, do the following:

    a. Type WRKLICINF and press Enter.

    b. On the Work with License Information display, press F11 (Display Usage Information). The usage limit number on each product that is listed on the POE, invoice, or other documents must match the usage limit number on the Work with License Information display for the associated product.

    c. If the usage limit is to be updated, move the cursor to the line that contains the product name whose usage limit is to be updated.

    d. Type 2 (Change) and press Enter.

e. When the Change License Information display is shown, update the usage limit prompt with the usage limit shown on the POE. In addition, update the threshold prompt with either *CALC or *USGLMT. Do not leave the threshold set to zero.

   Note: If message CPA9E1B [`Usage limit increase must be authorized. Press help before replying (C G).`] is sent, respond by typing G.

f. If the POE lists more products than the Work with License Information display, set the usage limits after you install those products.

7. If you changed the allow restore of security sensitive objects (QALWOBJRST) system value to *ALL or had unlocked it before the upgrade, return the value to its normal locked setting.

8. If you changed any other system value such as security level (QSECURITY) during your upgrade, change it back now.

9. If you changed the scan control (QSCANFSCTL) system value to minimize future scanning of some objects that are restored before you installed your licensed programs, remove the *NOPOSTRST specification from this system value.

10. Some of the tasks in this topic require that you change the QSYSOPR severity code filter to 95. If you do not want to continue with this level or you want to change the delivery notification, type `CHGMSGQ QSYSOPR DLVRY(xx) SEV(yy)` where *xx* indicates the delivery notification and *yy* indicates the severity code that you want to use. The system defaults are DLVRY(*HOLD) SEV(0).

11. Save your system using your normal save procedures. Refer to the instructions in the Backing up your system topic in the IBM i Information Center.

   Note: Before you start a save operation, use the Work with Active Jobs (WRKACTJOB) command to check the status of QDCPOBJx jobs. These jobs decompress objects. There could be more than one QDCPOBJx job. You can start your save operation if these jobs are in an inactive state. If you put the system in a restricted state by ending subsystems, the QDCPOBJx jobs become inactive. The jobs will restart when the system is not in a restricted state. For more information about decompressing objects, see "Compressed objects and storage space" on page 17.

12. If you have a IBM i integration with BladeCenter and System x that you stopped before you began the installation process, restart it now.

   a. Type `GO NWSADM` on a CL command line. The Network Server Administration display appears.

   b. Select option 2 (Start a network server).

13. If you have customized an IBM-supplied program (for example, QSTRUP in library QSYS) in a previous release, make sure that you re-create this program to run correctly in the new release.

14. If you have duplicated any IBM-supplied objects, you might want to make new duplicates after you install the release. This enables you to take advantage of functions added in the new release. Examples of objects that you might duplicate include the following:

   • Message text descriptions
   • Commands
   • Command defaults

You have completed the replacement of the same release on your system.

Chapter 11. Checklist: IBM i software installation readiness

Use this checklist to help consolidate and verify that you complete all the preparation tasks for a new IBM i software installation.

If you plan to navigate through this checklist online, it might help to right-click this topic in the navigation tree to open a new window. This information summarizes the major tasks that you need to do before you begin to install your software.

Before you begin

1. Use the following websites to verify that your server model meets the requirements to support the new release.

   • The IBM Prerequisite website at http://www14.software.ibm.com/support/customercare/iprt/home has the operating system compatibility information for hardware features.

   • The Upgrade planning website at http://www.ibm.com/systems/support/i/planning/upgrade/osmapping.html has a table that indicates which releases of the operating system are supported by each of the server models.

2. Know your current strategy for connecting a console to your system or logical partition. Your current connection strategy influences your planning activities. For more information about consoles, see Managing IBM i consoles in the IBM Systems Hardware Information Center.

3. Understand system administration tasks (basic system operations). To perform software installation tasks, you need to be able to restart your system, sign on and off, use the command interface, install fixes, change the system operation mode and initial program load (IPL) source on the system unit control panel, and analyze system problems.

4. Understand the different "Types of software installation devices" on page 10. The installation tasks are different based on the optical media that you use.

Software preinstallation tasks

Perform the following tasks that are appropriate for your system.

1. "Verifying the contents of your software order" on page 95

   a. "Identifying and reviewing information resources" on page 95
   b. "Verifying the correct optical distribution media" on page 96
   c. "Verifying license keys for keyed products" on page 26

2. "Performing initial installation tasks" on page 96

   a. "Ensuring you have the latest information" on page 96
   b. "Determining disk storage space required for a new installation" on page 96
   c. "Estimating installation time" on page 97
   d. "Preparing your console for software installation" on page 54
   e. "Preparing the installation device and media" on page 98

After you finish

After the tasks in the preceding checklist and your installation have been completed, consider the following tasks.

1. Develop a strategy for managing and maintaining your software. For information about software fixes (also known as program temporary fixes or PTFs), software licenses, and license keys, go to the topic Maintaining and managing IBM i and related software in the IBM i Information Center .
2. For information about software distribution of supported products, go to the Distributing software in the IBM i Information Center topic.

Chapter 12. Installing IBM i and related software on a new system or logical partition

Follow these procedures to plan and prepare to install the IBM i release, install software on a new system or logical partition, install additional licensed programs, install a secondary language, and complete the final checklist.

This software installation process includes installing the Licensed Internal Code, the IBM i operating system, and other software for the first time.

If you are upgrading software that you currently have installed, go to Chapter 6, "Preparing to upgrade or replace IBM i software," on page 25. If want to install a new primary language from either a secondary language media set or a primary language media set, go to Chapter 13, "Changing the primary language of your system or logical partition," on page 131.

Important: ou cannot use image catalogs to install IBM i on a new system, because image catalogs require a working system. However, you can use any other media (DVD or tape, for example) to install IBM i on a new system.

Preparing to install the IBM i release

Perform these preparatory tasks before you schedule your IBM i software installation. Allow ample time (a few weeks or days before the installation) to complete these tasks before you perform the actual installation tasks.

Careful, complete, and early preparation saves a considerable amount of time and can help make your software installation on your new system or logical partition run smoothly.

If you are setting up logical partitions, ensure that you plan in advance of your installation and have a basic understanding of logical partitions, your software requirements, and your hardware requirements. See the Planning for logical partitions topic in the IBM Systems Hardware Information Center.

Verifying the contents of your software order

To save you time and avoid frustration, verify that the contents of your IBM i software order are correct before you start the installation.

Identifying and reviewing information resources

Become familiar with the important resources pertaining to the installation of your new IBM i software. Use these documents to plan your installation process.

Many of these resources are shipped with the distribution media in your software order. Read the material that applies to your system

IBM i Access Client Solutions
A CD containing IBM i Access Client Solutions is included with every IBM i 7.4 order.

PSP information
To keep informed of the latest information about conditions that could impede your software installation, you need the most recent edition of the preventive service planning information (PSP). For information about preventive service planning, see Preventive service planning information in the IBM i Information Center.

PTF shipping information letter
This letter contains the instructions for installing the cumulative program temporary fix (PTF) package. The letter comes with the package. IBM highly recommends that you order the cumulative PTF package a minimum of 2 weeks before your IBM i installation if you order by mail and then install the

package as part of your completion tasks. For information about the most recent cumulative package, refer to the Ordering fixes topic in the IBM i Information Center.

Verifying the correct optical distribution media

Ensure that you have the correct media for your upcoming IBM i installation tasks.

1. Verify that the optical media for Licensed Internal Code and the operating system are for IBM i 7.3.
2. Verify that the media you received are in the correct primary and secondary languages.

Verifying license keys for keyed products

For the keyed IBM products or keyed IBM product options that you have ordered, review the software license keys created online for your system.

Refer to the Customer Notice that is included with your software order for information on how to access your software license keys. The online access requires that you do the following:

- Register with IBM.
- Use the customer packing list from your software order to obtain the following numbers:
  - Customer number that was used for your order.
  - Software order number that was used to process your order.

After completing these steps, you can view, print, or download your software license keys to your system. If you have further questions, refer to the information about the Customer Notice for details on how to contact the IBM Software License Key Center.

For general information about licensed keys, refer to the topic Software license keys in the IBM i Information Center.

For a list of products, see "Licensed program releases and sizes" on page 167.

Performing initial installation tasks

Before you install new software on your system, complete these initial installation tasks.

Ensuring you have the latest information

Make sure that your system is ready by ensuring you have the latest information regarding the IBM i installation.

- **Find the latest available PSP information** Keep informed on the most recent information about conditions that might impede your software installation process. Review the most recent edition of the preventive service planning information in the IBM i Information Center.
- **Order current cumulative PTF packages and required group fixes** The cumulative PTF package does not come with your software order. Before your installation, order the most recent cumulative PTF package and also order PTF groups that pertain to your environment. Allow a minimum of 2 weeks by mail. If you do not have much time, order them electronically.

Determining disk storage space required for a new installation

Before you schedule a time to install the new IBM i release, you need to know the storage space that is required.

Load-source disk unit requirements: The minimum load source requirements for external, virtual load source LUNs, and Native-attached SAS drives are listed. For more details, see the IBM i and Related Software developerWorks website (www.ibm.com/developerworks/ibmi/software).

- Minimum of 35 GB for 520-byte sectors (DS8000, virtual disk with VIOS as server)
- Minimum of 40 GB (to get 35 GB useable space) for 512-byte sectors (SVC, Storwize, virtual disks with VIOS VSCSI or IBM i as server)
- Minimum of 70 GB for Native-attached SAS/SCSI (Both 520-byte or 4K sectors)

Options for upgrading the load-source disk unit are available under the topic Disk management checklist. Otherwise contact your authorized service provider for assistance.

Estimating installation time

As part of the installation preparation steps, you might want to estimate the time that will be needed to install the IBM i release of software on your system.

If you want to estimate the time it will take to install software on your new system or logical partition, see the information in "Estimates for IBM i software installation time" on page 173. Ignore the tasks that refer to upgrades.

Preparing your console for software installation

Before you install a new IBM i software release, consider this information about consoles.

Supported hardware and console combinations include:

- Hardware Management Console (HMC)
- Operations Console (LAN)

If you are planning on migrating your Operations Console, do so either before or after you upgrade. If you are planning on migrating your Hardware Management Console (HMC), do so only after you have completely installed your system. For more information about using the HMC as your IBM i console, see Managing IBM i consoles in the IBM Systems Hardware Information Center.

Verify that the console type value is set correctly for your console. In addition, you can specify that an IBM i local area network (LAN) console or Hardware Management Console be taken over by another console in the event your console is disconnected. To verify the console type value, follow these steps:

1. Start and log on to System Service Tools (STRSST).
2. Select option 8, **Work with service tools user IDs and Devices**.
3. Select option 3, **Select console**.
4. Select **Console type**.

   The value of the current console mode is present in the input field. Verify that this is the correct setting. A value of zero means that the console mode has not been set and can interfere with the automatic installation process. The console mode value must be one of the following values.

Console mode	Description
3	Operations console (LAN)
4	Hardware management console (HMC)

   During an installation or upgrade, the console type specified by this value is used.

   The console mode display also includes the option to allow your 5250 console to be taken over by another console. When this option is turned on, the system does not stop with a console failure but continues to run uninterrupted. For more information, see the topic Console takeover and recovery in the IBM Systems Hardware Information Center.

If you use Operations Console, follow these instructions before you install IBM i on your system.

- Review the Console Advanced Topics topic in the IBM i Information Center.
- See the *GettingStarted* document in the `Documentation` directory of the CD. Section 9.9 *Establishing a Console Connection to IBM i* provides instructions on connecting a LAN console.

- When you receive the IBM i release upgrade, the shipped service tools user IDs (except 11111111) are expired. For all upgrades and installations, you need to establish a connection between the system and Operations Console PC by using 11111111 (eight 1's) for both the service tools user ID and the default password. This ensures a successful authentication of the subsequent connection of the client to the system. This is especially important for automatic installations.

Failure to comply with these actions can prevent the console from working correctly during the upgrade or installation.

Preparing the installation device and media

Prepare to install IBM i software from optical media, tape devices or tape libraries, or alternate installation devices.

If you are not sure which installation device to use, refer to "Types of software installation devices" on page 10. "Installation devices and media" on page 180 contains more detailed information about the devices and media available.

Installing the IBM i release

Install the IBM i release (the Licensed Internal Code, the operating system, or licensed programs) on a new system or logical partition or perform an IPL for the first time.

Installing Licensed Internal Code on a new logical partition

Perform these tasks to install Licensed Internal Code on a new IBM i logical partition with Operations Console installed.

After you perform the instructions in this topic, follow the instructions in "Installing software on a new system or logical partition (without IBM i installed)" on page 104 to install the IBM i operating system and licensed programs.

Before you begin to install Licensed Internal Code on a logical partition

Verify these points before you install the Licensed Internal Code on an IBM i logical partition.

1. Ensure you have completed the preparation tasks in the IBM i Information Center topic "Preparing to install the IBM i release" on page 95.
2. Verify your console information in the topic "Preparing your console for software installation" on page 54.
3. If you have not already done so, review the information about planning for logical partitions. Read the Planning for logical partitions topic in the IBM Systems Hardware Information Center.

⚠️ **Attention:** This procedure causes existing data on the disk units assigned to this logical partition to be lost. Make sure you really want to perform this procedure.

Reference codes are viewable under the Hardware Management Console (HMC) or the Integrated Virtualization Manager. When a reference code appears with the characters xx (such as B2xx xxxx), xx pertains to the partition identifier and xxxx pertains to a variety of other characters.

The term *system* refers to the logical partition on which you are performing the installation.

When installing on logical partitions, the *control panel* can be found either on the HMC or the Integrated Virtualization Manager.

Until you have completed the installation of the Licensed Internal Code, the information shown about the configuration of logical partitions will be incorrect. Devices attached to the buses of logical partitions are not listed until the installation is complete. Therefore, if you have logical partitions and look at your configuration from the HMC or Integrated Virtualization Manager before you complete the installation, you might see only buses and IOPs, but not the IOA and device details.

Installing Licensed Internal Code on the new logical partition

To install the Licensed Internal Code, follow these procedures.

1. If you are using physical media, load the first volume of installation media that contains the Licensed Internal Code into the installation device that is defined for the system. Throughout these procedures, load the next volume when prompted by the system. Wait for the In Use indicator to go out. Also ensure that you have removed other media from devices that are not involved in the upgrade.

   Note: The optical media that you will need later for the operating system and other licensed programs are listed in step "2" on page 105 .

2. Make sure you can access either the Hardware Management Console (HMC) or the Integrated Virtualization Manager to control your new logical partition.

   If power is not on, go to Logical partitioning in the IBM Systems Hardware Information Center for more information and return here when done.

3. Ensure the following for the new logical partition:

   • If you are using Operations Console, see the *GettingStarted* document in the Documentation directory of the IBM i Access Client Solutions CD. Section 9.9 *Establishing a Console Connection to IBM i* provides instruction on connecting a LAN console.

4. Verify that this logical partition has an alternate IPL resource (the resource for loading) assigned. For more information about alternate IPL resources, see the I/O devices topic in the IBM Systems Hardware Information Center.

5. Load the installation media volume that contains the Licensed Internal Code into the installation resource defined for this logical partition. Before you go to the next step, be sure that no conditions exist that require your attention.

   Note: If you are using a tape device instead of the optical device that is optimized for optical media, verify that the tape unit is loaded and that the tape drive is ready.

6. Use the control panel to verify or to set the mode selection to **Manual** and the IPL source to **D**. These settings indicate that you are controlling the logical partition from the HMC, but the installation is done on the logical partition.

7. Use the control panel to power on or activate this logical partition.

8. Wait for the display to appear that has the language feature to select. (This could take several minutes, but you can monitor the status.)

   If you are using Operations Console and it is not detected, review Troubleshooting Operations Console connection in the IBM i Information Center or contact your service provider.

   Note: If you are using Operations Console and receive a **Service Device Sign-On** window when doing this step, sign on by using the appropriate data. It is strongly recommended that you use the userid/password of 11111111/11111111 for this connection. If you do not receive the **Service Device Sign-On** window, the data is supplied by the personal computer from previously entered data.

   The installation media for Licensed Internal Code is language-independent. It is important that you complete this step carefully.

   The languages on your media for the Licensed Internal Code and the operating system must match. The language that is entered on this display must match the language that is on the media. If they do not match, do not continue with the installation. Stop and call your software provider. Get the correct language feature before continuing.

   Refer to "Feature codes for language version" on page 194 to locate the appropriate feature code for your language.

```
   LANGUAGE FEATURE ===>    2924
```

The language feature 2924 (English) is the default for this display. If you are installing a language other than 2924, type the correct primary language feature code in place of 2924.

Press Enter.

9. After you enter the language feature, the Confirm Language Group display appears.

```
                Confirm Language Group


   Language feature  . . . . . . . . . . . . . . :     2924

   Press Enter to confirm your choice for language feature.
   Press F12 to change your choice for language feature.
```

Press Enter.

10. The Install Licensed Internal Code display appears.

```
                   Install Licensed Internal Code
                                                  System: XXXX
   Select one of the following:

        1. Install Licensed Internal Code
        2. Work with Dedicated Service Tools (DST)
        3. Define alternate installation device
```

Attention:

If you use an alternate installation device, you need to ensure that you set up the device and that you enable the device. You also need to have the optical media or tape media that contains the Licensed Internal Code and your save media.

Either select the option to install Licensed Internal Code or the option to define an alternate installation device:

* Type 1 (Install Licensed Internal Code) if you are not using an alternate installation device. (The alternate installation device function supports installation from tape media that you have created. Alternate installation device: Overview describes when you can use an alternate installation device.) If you are not using an alternate installation device, go on to step .
* If you have an alternate installation device attached to the system, type 3 to verify its address and determine whether it is enabled or disabled. Continue with the Verifying Alternate Installation Device Subtask in step . If you have an alternate installation device configured and do not want to use it, type 3 to clear the alternate installation device configuration information.

Press Enter. This step could take some time.

11. **Verifying and selecting alternate installation device subtask:**

The Select Alternate Installation Device Bus display appears.

```
                    Select Alternate Installation Device Bus
                                                           System: XXXX
Type Option, press Enter.
   1=Select

Option      Bus Number          Selected
   _            1
   _            2
   1            3                    *
   _            4
   _           10
   _           11
   _           12
   _           13




                                                    More.....
F2=Deselect Device  F3=Exit       F12=Cancel
```

a. Verify that the selected device is on the correct system bus. Type 1 in the Options field next to the selected bus and press Enter to view information about the device that is attached to the bus. This might take several minutes. If you see the message `No alternate installation device configured`, wait one minute and refresh the display.

b. When the Select Media Type display appears, select 1 for tape or 2 for optical media. Press Enter.

c. The Select Alternate Installation Device display appears. Use this display to verify the resource name, type, model, and serial number for the device. The following display shows an example of a tape device.

```
                    Select Alternate Installation Device
                                                    System:   SYSTEMA

Additional devices may be available for use.  Press F5 to see
if any additional devices have been detected.

Type option, press Enter.
   1=Select    5=Display details

        Bus       Resource              Serial
 Option Number    Name       Type  Model Number          Selected
   _        1     TAP08       6386  001   00-11111
   _        3     TAP19       3570  B11   13-22222            *


F2=Deselect device    F3=Exit     F5=Refresh    F12=Cancel
```

d. Type 1 and press Enter to select the device to use or press F2 to deselect the currently selected device.

e. The message `Alternate installation device selected` appears. Press F3 to return to the Install Licensed Internal Code display.

f. Type 1 and press Enter to install the Licensed Internal Code.

End of verifying and selecting alternate installation device subtask.

12. If the system cannot find a load-source disk unit but can find candidate disk units to become the load-source disk unit, the following is an example of the information display that is shown.

```
                 Select Load Source Device

Type 1 to select, press Enter.

Option  Serial Number    Type    Model    Bus    Card  Adapter  Bus   Ctl   Dev
        21-8DFFC         4326     050      128     0       1      0     0     6
        02-84921         6718     050      128     0       2      0     0     5
        02-73054         6718     050      218     0       1      1     0     0
        21-150197        433B     074       42     0       0      2     0     7
```

To select the correct load-source disk unit, type 1 next to the appropriate device and press Enter. You cannot continue until a current valid load-source device is identified.

13. If there is an alternate installation device defined and enabled, the Confirm Alternate Installation Device display appears. Perform one of these tasks.

   - To install from the alternate installation device, press Enter.

   - If you do not want to install from the alternate installation device and want to continue using the primary media, press F12 to Cancel. You see the Licensed Internal Code display. Perform step and select option 3 (Define alternate installation device). Perform step and deselect the alternate installation device.

14. The Install Licensed Internal Code (LIC) display appears on your console.

```
               Install Licensed Internal Code (LIC)

Disk selected to write the Licensed Internal Code to:
    Serial Number    Type     Model    I/O Bus      Controller      Device
    xx-xxxxxxx       xxxx     xxx        x              x             x

Select one of the following:

    1. Restore Licensed Internal Code
    2. Install Licensed Internal Code and Initialize system
    3. Install Licensed Internal Code and Recover Configuration
    4. Install Licensed Internal Code and Restore Disk Unit Data
    5. Install Licensed Internal Code and Upgrade Load Source
```

Type 2 (Install Licensed Internal Code and Initialize system) and press Enter.

15. Read the attention notice and reply to the Confirmation display.

   Attention: This procedure causes existing data on the disk units assigned to this logical partition to be lost! Make sure you really want to perform this procedure.

   The Initialize the Disk - Status display appears while the load source for the logical partition is being initialized.

16. The Install Licensed Internal Code - Status display appears on your console. You do not need to respond to this display. It will remain on your console for approximately 20 minutes. If you are using Operations Console, your display might disappear. To complete the Licensed Internal Code installation, the logical partition is automatically restarted at this time (a manual-mode IPL).

```
               Install Licensed Internal Code - Status

 Install of the Licensed Internal Code in progress.

          +--------------------------------------------------------+
 Percent  |                         XX %                           |
 complete +--------------------------------------------------------+


 Elapsed time in minutes  . . . . . . . . :     x.x



 Please wait.
```

17. If an error occurs, you might see a display that requires a response. Perform the action necessary as prompted by the display. Otherwise, continue with step .

18. The Disk Configuration Attention Report display might appear. If it does, display the detailed report for each attention notice shown on the display. Press the Help key from the Disk Configuration Attention Report display for more information about your choices. You can also refer to the topic, "Disk configuration warning and error messages" on page 161 for more information.

```
                    Disk Configuration Attention Report

 Type option, press Enter.
    5=Display Detailed Report

 Press F10 to accept all the following problems and continue.
 The system will attempt to correct them.

 Opt  Problem
  _    XXXXXXXX XXXX XXXXXXXXX XXXXX XX XXXXX XXXXXXXX
  _    XXXXX_XX_XXXXX XXXXXX_ XXXXXXXX XXXXXXX XXXXXXXXXX_____
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
  -    ----------------------------------------------------------
                                                              More...

 F3=Exit   F10=Accept the problems and continue   F12=Cancel
```

Note: If the attention notice `Disk unit not formatted for optimal performance` appears on this display, do the following:

a. Type a 5 and press Enter to display the detailed report.

b. Write down the information displayed. After the upgrade is completed, you will need this information to format these disk units to gain optimal performance.

c. Press F12 to cancel and return to the Disk Unit Attention Report.

d. Press F10 to accept the warnings and continue the IPL.

The Disk Configuration Attention Report display might also appear if a new disk configuration has been found. Press F10 to accept this new configuration.

19. If the console mode value is zero, the Accept Console display appears. If this display appears, follow these steps:

a. Press F10 to accept the current console type. The Accept and Set New Console Type on this IPL display appears. The old value (zero) and the new value to be set (your current console type) is shown.

b. Press Enter to set the new value and continue with these instructions.

20. After approximately 10 minutes, the IPL or Install the System display appears. The Licensed Internal Code is now installed. Do not remove the distribution media at this time.

21. If the Accept Console display in step "19" on page 103 did not appear and your system is not HMC managed, set the console mode for this partition:

a. At the IPL or Install the system display, select option 3 to access Dedicated Service Tools (DST).

b. Sign on as security officer (QSECOFR *user profile* / QSECOFR *password*). When prompted, change the password to what you want to use for this partition.

c. Select option 5 (Work with DST environment).

d. Select option 2 (System devices).

e. Select option 6 (Console mode).

f. Select the valid console that you have for this logical partition.

Note: If you are using Operations Console (LAN) as your console type, press Enter on the verify window. You can also press F11 to review your network configuration.

g. Select 1 (Yes) or 2 (No) for the option to allow the console to be taken over by another console in the event of a 5250 console failure. When this option is turned on, the system does not stop with a failure but continues to run uninterrupted. For more information, see the topic Console takeover and recovery in the IBM Systems Hardware Information Center.

Press Enter and then press F3 to return to the DST main menu.

h. Press F3 to exit DST and return to the IPL or Install the System display.

You have completed the installation of Licensed Internal Code on a new logical partition.

You are now ready to install the operating system. The "Installing IBM i on a new system or logical partition" on page 104 procedure will direct you to optionally add disk units or enable disk protection before the operating system is installed.

The optical media that you will need for the operating system and other licensed programs are listed in step "2" on page 105 of "Installing IBM i on a new system or logical partition" on page 104. Continue with step "10" on page 106.

Installing software on a new system or logical partition (without IBM i installed)

Follow these instructions to install the IBM i operating system and licensed programs on your new system or logical partition or to change the primary language when you are installing the operating system.

Refer to the IBM i globalization topic for any special considerations about other languages.

Note:

- If you are installing software on a system, these instructions assume that the IBM i 7.4 release of the Licensed Internal Code is installed and the system is powered off. If you do not know what level of Licensed Internal Code is on your system, sign on to DST. Select option 7 (Start a Service Tool) and then select option 4 (Hardware Service Manager). The release at the top of the display should state V7R4M0.

- If you are installing software on a new logical partition, you need to complete the steps in "Installing Licensed Internal Code on a new logical partition" on page 98 first and then continue with step "10" on page 106 in this topic.

Before you begin to install software on a new system or logical partition

Verify these points before you install IBM i software on a new system or logical partition.

If you have not already done so, complete the tasks in the IBM i Information Center topic "Preparing to install the IBM i release" on page 95.

Do you plan to use logical partitions? Read the Planning for logical partitions topic in the IBM Systems Hardware Information Center.

For logical partitions only
If you perform these actions on a system with logical partitions, the instructions pertain only to that partition.

Installing IBM i on a new system or logical partition

Follow these steps to install the IBM i operating system on a new system or logical partition. You can optionally add disk units or enable disk protection before the operating system is installed.

1. Ensure that the system is powered off before you begin.

2. If you are using physical media, arrange the installation media that you plan to install in the following order (you might not have all of these). Verify that the media contains the correct primary language. See "Feature codes for language version" on page 194 for a description of the language version feature codes.

   a. Licensed Machine Code.

   b. IBM i operating system, IBM-supplied libraries QGPL and QUSRSYS, and all IBM i no-charge options.

   c. No-charge licensed programs and keyed products.

   d. Single licensed programs.

   Keep the following installation media available for later use:

   a. Secondary Language Media (if ordered)

   b. Cumulative PTF Package (Cydddvrm_01, if ordered)

   For descriptions of the optical media, see "Media labels and their contents" on page 188.

3. Ensure the following for the system:

   • If you are using Operations Console, see the *GettingStarted* document in the `Documentation` directory of the IBM i Access Client Solutions CD. Section 9.9 *Establishing a Console Connection to IBM i* provides instruction on connecting a LAN console.

4. If the installation device has a separate power switch, set it to the On position.

5. Use the control panel to set the IPL type to **A** and set the mode to **Manual**.

6. Press the Enter button on the control panel.

7. Turn the power on for the system by pressing the power button.

   Note: If either the Disk Configuration Error Report display or the Disk Configuration Warning Report display appears, go to "Disk configuration warning and error messages" on page 161 to determine the appropriate action.

8. The IPL or Install the System menu appears on your console.

```
                        IPL or Install the System
                                                    System: XXXX
 Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Use Dedicated Service Tools (DST)
     4. Perform automatic installation of the operating system
     5. Save Licensed Internal Code
```

   If you have not already set the console mode and your system is not HMC managed, set the console mode now.

   a. At the IPL or Install the system display, select option 3 to access Dedicated Service Tools (DST).

   b. Sign on as security officer (QSECOFR *user profile* / QSECOFR *password*). When prompted, change the password to what you want to use for this partition.

   c. Select option 5 (Work with DST environment).

   d. Select option 2 (System devices).

   e. Select option 6 (Console mode).

   f. Select the valid console that you have for this partition.

   Note: If you are using Operations Console (LAN) as your console type, press Enter on the verify window. You can also press F11 to review your network configuration.

   g. Select 1 (Yes) or 2 (No) for the option to allow the console to be taken over by another console in the event of a 5250 console failure. When this option is turned on, the system does not stop with

a failure but continues to run uninterrupted. For more information, see the topic Console takeover and recovery in the IBM Systems Hardware Information Center.

Press Enter and then press F3 to return to the DST main menu.

h. Press F3 to exit DST and return to the IPL or Install the System display.

```
                        IPL or Install the System
                                                    System: XXXX
  Select one of the following:

       1. Perform an IPL
       2. Install the operating system
       3. Use Dedicated Service Tools (DST)
       4. Perform automatic installation of the operating system
       5. Save Licensed Internal Code
```

9. If you are using physical media, load the first volume of installation media that contains the operating system. Throughout these procedures, load the next volume when prompted by the system. When you are installing from optical media, wait until the In Use indicator goes out before you continue. Also ensure that you have removed other media from devices that are not involved in the upgrade.

10. On the IPL or Install the System display, type 2 and press Enter. The Install Device Type Selection display appears.

```
                       Install Device Type Selection
                                                    System: XXXX
  Select the installation device type:

       1. Tape
       2. Optical
       3. Virtual device - preselected image catalog
       4. Current alternate selected device          None
       5. Network device
```

Type the number that corresponds to the correct device type and press Enter.

11. The Confirm Install of the Operating System display is shown on your console. Press Enter.

12. The Select a Language Group display, which shows the primary language currently on the system, appears. This language must be available on the installation media. Refer to "Feature codes for language version" on page 194 for a list of language feature codes.

```
                        Select a Language Group
                                                    System: XXXX
  Note:  The language feature shown is the language feature
  installed on the system.

  Type choice, press Enter.

    Language feature . . . . . . . . . . . . . .  2924
```

Verify that the displayed value is correct, or type the numbers of the feature code for the language you want. Press Enter.

13. After you enter the language feature, the Confirm Language Feature Selection display appears on your console. Press Enter.

14. If the Add All Disk Units to the System menu is not shown, go to the IPL Step in Progress display in step "16" on page 109.

    Note: If you are installing on a single disk unit, ensure that you have enough storage. The minimum requirements for each system or logical partition are listed in "Determining disk storage space required for a new installation" on page 96.

15. Adding disk units subtask:

a. If any nonconfigured disk units that are capable of being protected by device parity are currently unprotected, the Add All Disk Units to the System display is shown. If the following display is not shown, go to step "15.b" on page 107.

```
                  Add All Disk Units to the System
                                                    System: XXXX

 Non-configured device parity capable disk units are attached
 to the system.  Disk units cannot be added automatically.
 It is more efficient to device parity protect these
 units before adding them to the system.
 These disk units may be parity enabled and added at SST.
 Configured disk units must have parity enabled at DST.

 Select one of the following:

      1. Perform any disk configuration at SST
      2. Perform disk configuration using DST
```

It is much faster to start device parity protection on the disk units at DST before the disk units are added to the auxiliary storage pool configuration.

To start device parity on the eligible disk units, do the following tasks from the Add All Disk Units to the System display:

i) Select option 2 to perform disk configuration at DST.

ii) Sign on at the Dedicated Service Tools Sign-on prompt and return to the Use Dedicated Service Tools (DST) menu.

iii) Select the option, Work with disk units.

iv) Select the option, Work with disk configuration.

v) Section the option, Work with device parity protection.

vi) Select the option, Start device parity protection.

vii) A list of parity sets that are capable of running device parity protection are shown. Type 1 on each option line for each parity set.

viii) You might see a Confirm Continuation display that indicates that the system must perform a directory recovery. Press Enter to continue.

ix) The Confirm Starting Device Parity Protection display is shown. This shows the list of disk units that will have device parity protection. Press Enter to continue. An in-progress display that indicates the status of the function is shown.

x) Return to the IPL or Install the System display.

b. If you see the following display, continue with this step.

```
                  Add All Disk Units to the System
                                                    System: XXXX

 Select one of the following:

      1. Keep the current disk configuration
      2. Perform disk configuration using DST
      3. Add all disk units to the system auxiliary storage pool
      4. Add all disk units to the system ASP and balance data
```

If you do not want device parity protection, mirrored protection, or user ASPs, select option 3 (Add all disk units to the system auxiliary storage pool). By adding disk units before you install the operating system, you improve your overall system performance because the operating system is distributed across all of your disk units.

⚠️ **Attention: (For logical partitions only)** Before you add disk units to this partition, ensure you have the correct I/O resources assigned. You might not want to configure all disk units now. Refer to the validated output from the System Planning Tool supplied by IBM for the

configuration selection. To access the tool, go to the System Planning Tool 🔄 website (http://www.ibm.com/systems/support/tools/systemplanningtool/).

Type 3 and press Enter.

Note: If either the Disk Configuration Error Report display or the Disk Configuration Warning Report display appears, go to "Disk configuration warning and error messages" on page 161 to determine the appropriate action.

c. You could see the following display if your disk configuration has changed. Type 5 next to the problem and press Enter to display the detailed report.

```
                        Problem Report

Note: Some action for the problems listed below may need to
be taken.  Please select a problem to display more detailed
information about the problem and to see what possible
action may be taken to correct the problem.

Type option, press Enter.
  5=Display Detailed Report

OPT  Problem

  _    ----------------------------------------------------------
  _    ----------------------------------------------------------
```

d. If the following display appears, a disk unit that you selected to add to your disk configuration could already have data on it. If you choose to continue, any data that is on the disk units listed will be removed.

Be certain that you want to configure the disk before you continue. Follow the instructions on the display.

Press Enter to return to the Problem Report display. Press F10 to continue the Add Disk Unit subtask.

```
                   Possibly Configured Units

 Problem: These non-configured units appear to be
 configured units of some other disk configuration and
 may contain valid data.  This option will clear the
 data from these units and destroy the other disk
 configuration.

 Press Enter to continue
 Press F12=Cancel to return and change your choices.

  Serial                    Resource        Other System
  Number      Type  Model   Name            Serial Number
  ----------  ----  ---     ----------      ----------
  ----------  ----  ---     ----------      ----------
  ----------  ----  ---     ----------      ----------
  ----------  ----  ---     ----------      ----------
  ----------  ----  ---     ----------      ----------
  ----------  ----  ---     ----------      ----------
  ----------  ----  ---     ----------      ----------
                                                          More..

 F3=Exit        F12=Cancel
```

e. The following display shows the percentage of disk units added. This display does not require a response.

```
                      Function Status

   You selected to add units.


                        ___ % Complete
```

    f. When the process is completed, continue the software installation process with the next step.

    This completes the subtask for adding disk units.

16. Status displays appear on the console. You do not need to respond to any of these displays. The following is an example of a status display:

```
                Licensed Internal Code IPL in Progress

  IPL:
     Type  . . . . . . . . . :           Attended
     Start date and time . . :           xx/xx/xx          xx:xx:xx
     Previous system end . . :           Normal
     Current step/total. . . :    1           16
     Reference code detail . :    C6004050
  IPL step . . . . . . :    Storage Management Recovery
```

The following list shows some of the IPL steps that are shown on the IPL Step in Progress display.

    Authority Recovery
    Journal Recovery
    Database Recovery
    Journal Synchronization
    Start the Operating System

17. The Install the Operating System display appears.

```
                   Install the Operating System

  Type options, press Enter.

     Install
        option . . . . . . 1           1=Take defaults (No other
                                          options are displayed)
                                       2=Change install options

  Date:
     Year . . . . . .  XX           00-99
     Month  . . . . .  XX           01-12
     Day  . . . . . .  XX           01-31

  Time:
     Hour . . . . . .  XX           00-23
     Minute . . . . .  XX           00-59
     Second . . . . .  XX           00-59
```

Type the following and press Enter:

Install option: 1
Date (Use the current year, month, and day.)
Time (Use the current time, 24-hour clock.)

18. Status messages appear during the installation process. You do not need to respond to any of these status displays. The following is an example of a status display. The display is blank for a time between stage 4 and stage 5.

```
Message ID . . : CPI2070        IBM i Installation Status

           +----------------------------------------------------+
  Stage 2  |                      33%                           |
           +----------------------------------------------------+

Installation Objects
Stage Completed Restored
1 Creating needed profiles and libraries . . . . . : X

>> 2 Restoring programs to library QSYS . . . . . . : 04548

3 Restoring language objects to library QSYS . . :

4 Updating program table . . . . . . . . . . . . :

5 Installing database files . . . . . . . . . . :

6 Installing base directory objects. . . . . . . :
```

19. Messages similar to the following might appear:

```
                         Display Messages
                                            System:   XXXX
 Queue  . . . . . :   QSYSOPR          Program . . . . :   *DSPMSG
   Library  . . . :     QSYS             Library . . . :
 Severity . . . . :   10               Delivery  . . . :   *BREAK

 Press Enter to continue.
   System operator message queue QSYSOPR created again.
   Console values lost.
```

Press Enter.
20. The Sign On display is shown.

```
                     Sign On
                                   System. . . . :  XXX
                                   Subsystem . . :  XXXXX
                                   Display . . . :  XXXXXXXX

       User. . . . . . . . . . . . QSECOFR
       Program/procedure . . . . . . . _____
       Menu. . . . . . . . . . . . . . _____
       Current library . . . . . . . . _____
```

Type QSECOFR for the *User* prompt. Press Enter.
21. The IPL Options display appears.

```
                         IPL Options

Type choices, press Enter.

System date . . . . . . . . . . . . . . . .   XX / XX / XX      MM / DD / YY
System time . . . . . . . . . . . . . . . .   XX : XX : XX      HH : MM : SS
System time zone  . . . . . . . . . . . .     Q0000UTC          F4 for list
Clear job queues. . . . . . . . . . . . .     N                 Y=Yes, N=No
Clear output queues . . . . . . . . . . .     N                 Y=Yes, N=No
Clear incomplete job logs . . . . . . . .     N                 Y=Yes, N=No
Start print writers . . . . . . . . . . .     Y                 Y=Yes, N=No
Start system to restricted state  . . . .     N                 Y=Yes, N=No


Set major system options. . . . . . . . .     Y                 Y=Yes, N=No
Define or change system at IPL. . . . . .     N                 Y=Yes, N=No




Last power-down operation was ABNORMAL
```

Notes:

- Ignore the last power-down operation message on the IPL Options display.

- If you need to change system values, you can do so now. One example of a system value that you might change is the value for the security level (QSECURITY) system value.

  Another example is the scan control (QSCANFSCTL) system value. If you have not already done so, consider specifying *NOPOSTRST for the QSCANFSCTL system value to minimize future scanning of some objects that are restored during the installation of licensed programs in the following steps. For more information on scanning and the system value settings, see the topic Scanning support in the IBM i Information Center.

  Type Y for the *Define or change the system at IPL* prompt. Follow the instructions on the displays.

  Type the following and press Enter.

      System date (Use the current date.)
      System time (Use the current time, 24-hour clock.)
      System time zone (Verify that it is correct or press F4 to select a time zone.)
      Start system to restricted state Y
      Set major system options Y

22. The Set Major System Options display appears.

```
                    Set Major System Options

Type choices, press Enter.

Enable automatic configuration . . . . . . Y            Y=Yes, N=No
Device configuration naming  . . . . . . . *NORMAL      *NORMAL, *S36,
                                                        *DEVADR
Default special environment. . . . . . . . *NONE        *NONE, *S36
```

Respond to the prompts on the Set Major System Options display.

- Enable automatic configuration

  The value Y (Yes) automatically configures local devices. N (No) indicates no automatic configuration.

- Device configuration naming

Specify *NORMAL to use a naming convention unique to the IBM i operating system. The value *S36 uses a naming convention similar to System/36. Refer to the book, Local Device Configuration, SC41-5121-00, for information about device configuration naming and *DEVADR.

- Default special environment

  The default value *NONE indicates no special environment. *S36 sets up the System/36 environment. Refer to the book, System/36 Environment Programming, SC41-4730, for more information about working in the System/36 environment.

  Press Enter.

23. Several Display Messages displays could be shown. Press Enter for each message display to continue.

    The following display is an example of a message that could be shown:

```
                              Display Messages
                                              System:   XXXX
Queue  . . . . . :    QSYSOPR         Program . . . . :   *DSPMSG
  Library  . . . :      QSYS            Library . . . :
Severity . . . . :   60                Delivery  . . . :   *BREAK

Press Enter to continue.
   System object QWCSCPF created again during IPL.
```

24. The Edit Rebuild of Access Paths display could be shown. If it is, press Enter to continue.
25. You see the Status display again.

```
Message ID . . : CPI2070               IBM i Installation Status

        +----------------------------------------------------+
  Stage  6  |                       58%                        |
        +----------------------------------------------------+


 Installation                                           Objects
 Stage                                      Completed    Restored
    2 Restoring programs to library QSYS  . . . . . :   X          13637

    3 Restoring language objects to library QSYS  . :   X          01540

    4 Updating program table  . . . . . . . . . . . :   X

    5 Installing database files . . . . . . . . . . :   X

 >> 6 Installing base directory objects . . . . . . :

    7 Completing installation . . . . . . . . . . . :
```

26. The Sign On display appears on the console after the installation has completed.

```
                        Sign On
                                      System. . . . . . :   XXXX
                                      Subsystem . . . . :   XXXX
                                      Display . . . . . :   XXXXXXXX


        User. . . . . . . . . . . . . . .    QSECOFR
        Password  . . . . . . . . . . . .
        Program/procedure . . . . . . . .    _____
        Menu  . . . . . . . . . . . . . .    _____
        Current library . . . . . . . . .    _____
```

Type the following and press Enter:

  User: QSECOFR
  Password: (Enter password, if required.)

27. A message `Your password has expired` might appear. Press Enter. The Change Password display appears. Change the password from QSECOFR to your own choice. First enter the old password, QSECOFR. Then enter the new password of your choice. Enter the new password again as verification.

28. Several Display Messages displays are shown. To continue, press Enter for each message display.

    The following display is an example of a message that could be shown:

```
                               Display Messages
                                             System:   XXXX
Queue  . . . . . :     QSYSOPR            Program . . . . :    *DSPMSG
  Library  . . . :       QSYS               Library . . . :
Severity . . . . :    10                  Delivery  . . . :    *BREAK

Press Enter to continue.
Library QHLPSYS in SYSVAL QSYSLIBL not found.
```

29. The Work with Software Agreements display appears. Select to display the software agreements for *MCHCOD (which includes Licensed Internal Code) and the IBM i operating system (5770SS1). Read and accept these agreements. If the software agreements are declined, you are given the choice to either power down the system or return and accept the agreements. Press Enter.

30. When the IBM i Main Menu appears on your console, you have completed the task of installing the operating system.

You have completed this task.

To install additional licensed programs, continue with the tasks in .

Installing software on a new system (with IBM i installed)

Use these procedures if you already have the IBM i operating system on your new system and want to install other licensed programs.

The following instructions assume that IBM i 7.4 Licensed Internal Code and the operating system are installed, the primary language is correct, the console mode value is correct, and the system is powered off.

If you are not sure whether the operating system is already installed, contact your authorized service provider.

Before you begin to install software on a new system

Verify these points before you install licensed programs that are related to the IBM i operating system on a new system.

If you have not already done so, complete the tasks in the IBM i Information Center topic .

Note: If you have added a new disk unit to your system, you should load the operating system again to use that disk unit. This will improve the performance of your system by distributing the operating system across all of your disk units. Complete if you are adding disk units. If you are planning to use device parity protection, auxiliary storage pools, or mirrored protection, refer to the topics under Recovering your system in the IBM i Information Center before you begin.

If you plan to use logical partitions, read the Planning for logical partitions topic in the IBM Systems Hardware Information Center. Additionally, refer to the Logical Partitioning website (www.ibm.com/eserver/iseries/lpar).

For logical partitions only
If you perform these actions on a system with logical partitions, the instructions pertain only to that partition.

Performing the initial program load (IPL)

To prepare the system for IBM i user operations, follow this procedure.

Note: If you already have the IBM i Main Menu on your console, go to "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118 to install additional licensed programs.

1. Ensure that the system is powered off before you begin.
2. On your console, establish a connection to the system
3. If the installation device has separate on and off switches, verify that the switch is in the On position.
4. Set the IPL type to **A** and to set the mode to **Manual**.
5. Press the Enter button on the control panel.
6. Turn the system power on by pressing the power button.
7. After some time, the IPL or Install the System display appears.

```
                    IPL or Install the System
                                             System: XXXX
 Select one of the following:

     1. Perform an IPL
     2. Install the operating system
     3. Use Dedicated Service Tools (DST)
     4. Perform automatic installation of the operating system
     5. Save Licensed Internal Code
```

Type 1 and press Enter.

8. Status displays are shown on the console. You do not need to respond to any of these displays. The following is an example of a status display:

```
                 Licensed Internal Code IPL in Progress

 IPL:
    Type  . . . . . . . . . :          Attended
    Start date and time . . :          xx/xx/xx        xx:xx:xx
    Previous system end . . :          Normal
    Current step/total. . . :     1         16
    Reference code detail . :    C6004050
 IPL step . . . . . . :    Storage Management Recovery
```

The following list shows some of the IPL steps that are shown on the IPL Step in Progress display.

Authority Recovery
Journal Recovery
Database Recovery
Journal Synchronization
Start the Operating System

Some of the IPL steps could take a long time.

9. Several messages might appear on the console. The following is an example of a message that might appear:

```
                          Display Messages
                                  System. . . . . :     XXXX
Queue  . . . . . :   QSYSOPR          Program . . . . :    *DSPMSG
  Library  . . . :     QSYS             Library . . . :
Severity . . . . :   10              Delivery  . . . :    *BREAK

Press Enter to continue.
   System object xxxxx created again during IPL.
```

To continue, press Enter after each message that you receive.

10. The Sign On display appears.

    Note: If you need to change the password for the QSECOFR user profile, record the new password now. Store it in a safe location.

11. The IBM i IPL in Progress display appears.

12. If the Select Products to Work with PTFs display appears, press F3 (Exit).

13. The IPL Options display appears.

```
                          IPL Options

Type choices, press Enter.

System date . . . . . . . . . . . . . .  XX / XX / XX     MM / DD / YY
System time . . . . . . . . . . . . . .  XX : XX : XX     HH : MM : SS
System time zone  . . . . . . . . . . .  Q0000UTC         F4 for list
Clear job queues. . . . . . . . . . . .  N                Y=Yes, N=No
Clear output queues . . . . . . . . . .  N                Y=Yes, N=No
Clear incomplete job logs . . . . . . .  N                Y=Yes, N=No
Start print writers . . . . . . . . . .  Y                Y=Yes, N=No
Start system to restricted state  . . . .  Y              Y=Yes, N=No


Set major system options. . . . . . . .  Y                Y=Yes, N=No
Define or change system at IPL. . . . . .  N              Y=Yes, N=No






Last power-down operation was ABNORMAL
```

Notes:

- Ignore the last power-down operation message on the IPL Options display.

- If you need to change system values, you can do so now. One example of a system value that you might change is the value for the security level (QSECURITY) system value.

  Another example is the scan control (QSCANFSCTL) system value. If you have not already done so, consider specifying *NOPOSTRST for the QSCANFSCTL system value to minimize future scanning of some objects that are restored during the installation of licensed programs in the following steps. For more information on scanning and the system value settings, see the topic Scanning support in the IBM i Information Center.

  Type Y for the *Define or change the system at IPL* prompt. Follow the instructions on the displays.

  Type the following and press Enter.

      System date (Use the current date.)
      System time (Use the current time, 24-hour clock.)
      System time zone (Verify that it is correct or press F4 to select a time zone.)
      Start system to restricted state Y
      Set major system options Y

14. Additional display messages could be shown.

Press Enter after each message to continue.

15. The Set Major System Options display appears.

```
                        Set Major System Options

Type choices, press Enter.

Enable automatic configuration . . . . . . Y           Y=Yes, N=No
Device configuration naming  . . . . . . . *NORMAL     *NORMAL, *S36,
                                                       *DEVADR
Default special environment. . . . . . . . *NONE       *NONE, *S36
```

Respond to the prompts on the Set Major System Options display.

- Enable automatic configuration

  The value Y (Yes) automatically configures local devices. N (No) indicates no automatic configuration.

- Device configuration naming

  Specify *NORMAL to use a naming convention unique to the IBM i operating system. The value *S36 uses a naming convention similar to System/36. Refer to the book, Local Device Configuration, SC41-5121-00🔄, for information about device configuration naming and *DEVADR.

- Default special environment

  The default value *NONE indicates no special environment. *S36 sets up the System/36 environment. Refer to the book, System/36 Environment Programming, SC41-4730🔄, for more information about working in the System/36 environment.

  Press Enter.

16. The Edit Rebuild of Access Paths display could be shown. If it is, press Enter to continue.

17. The Work with Software Agreements display appears. Select to display the software agreements for *MCHCOD (which includes Licensed Internal Code) and the IBM i operating system (5770SS1). Read and accept these agreements. If the software agreements are declined, you are given the choice to either power down the system or return and accept the agreements.

18. Several blank displays and Display Messages displays appear. To continue, press Enter for each message display. Do not respond to blank displays.

    The following display is an example of a message that appears:

```
                          Display Messages
                                      System. . . . . :    XXXX
 Queue  . . . . . :    QSYSOPR        Program . . . . :    *DSPMSG
   Library  . . . :      QSYS           Library . . . :
 Severity . . . . :    10             Delivery  . . . :    *BREAK

 Press Enter to continue.
   All jobs in system lost.  Job and output queues cleared.
```

19. The IBM i Main Menu appears on your console.

You have completed this task.

To install additional licensed programs, continue with the tasks in "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118.

Installing additional licensed programs

To install additional licensed programs or optional parts of licensed programs on your system or IBM i logical partition, follow these procedures. (Separately ordered features are installed as a licensed program.)

You can use these procedures to install most software products. However, if you received any other special installation instructions with your order, make sure that you verify these instructions before you install the software product.

Before you begin to install additional licensed programs

Use this information to add additional licensed programs either as part of an IBM i software release upgrade or independently of one.

If you have not already done so, complete the tasks in "Preparing to install the IBM i release" on page 95.

If you install an additional licensed program independently of a software release upgrade, check the following:

- Ensure that you have a recent copy of the cumulative PTF package. When you order the cumulative PTF package, you also get the latest PTF HIPER Group CD-ROM and the Database Group CD-ROM.
- Use the preventive service planning (PSP) information to determine if any prerequisite PTFs will need to be installed or if any special instructions are included for installing the licensed program.

The PTFs for licensed programs are on a separate media. Use the *PTF Shipping Information Letter* to install the cumulative PTF package after adding additional licensed programs.

If you add additional licensed programs and you have a secondary language installed on your system, you must install the secondary language after you install the licensed programs. Otherwise, the added licensed program will not have secondary language support.

Note: Restricted state required. The system must be in a restricted state to install the following libraries and options of the operating system.

- IBM i libraries QGPL and QUSRSYS
- IBM i option 1 - Extended Base Support
- IBM i option 3 - Extended Base Directory Support
- IBM i option 12 - Host Servers

Some licensed programs and libraries require a restricted state, while others only require a partially restricted system. Other licensed programs might require special actions before saving, restoring, or installing a new copy of the product. However, to avoid installation failures and to get the best performance during your upgrade, put the system in a restricted state.

If you want to install other licensed programs while the system is not in a restricted state, you can skip steps 3a through 3e of "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118.

Do you plan to use or are you using logical partitions? Read the Planning for logical partitions topic in the IBM Systems Hardware Information Center.

Do you plan to use an image catalog (virtual media device) to install? Read the topic "Preparing to upgrade or replace software using an image catalog" on page 34 to create a device, image catalog, and an image catalog entry.

Using the Work with Licensed Programs menu to install IBM licensed programs

If you have logical partitions, you must perform this procedure on each IBM i logical partition to which you want to install the IBM licensed programs.

1. If you are not already signed on to the system as the security officer (QSECOFR user profile), do so now.

   Note: The IBM i Main Menu (or the menu you chose as your initial menu) appears on the console.

2. If you are installing from an image catalog (virtual media device), the setup instructions are in the topic "Preparing to upgrade or replace software using an image catalog" on page 34.

   If you are installing from optical media, insert the volume of the licensed program that you want to install into the installation device. If this is a new installation, insert the first volume containing the operating system. For more information about the optical media you received with your order, see "Media labels and their contents" on page 188. Wait until the In Use indicator goes out before you continue.

3. If you are installing from virtual optical storage using the Network File System, the setup instructions are in the topic "Preparing to upgrade or replace software with virtual optical storage using the Network File System" on page 40.

4. Do the following to put the system in a restricted state and filter the messages that appear.

   a. Type CHGMSGQ QSYSOPR *BREAK SEV(60) and press Enter.

   b. A message display could appear. Press Enter.

   c. Type ENDSBS *ALL *IMMED and press Enter.

   d. When the following message appears, press Enter to continue:

   ```
   ENDSBS SBS(*ALL) command being processed
   ```

   e. The message System ended to restricted condition appears. Press Enter to continue.

   f. Type CHGMSGQ QSYSOPR SEV(95) and press Enter.

   g. A message display could appear. Press Enter.

5. Type GO LICPGM and press Enter.

6. The Work with Licensed Programs display appears.

   ```
   LICPGM               Work with Licensed Programs
                                                   System:   XXXX
   Select one of the following:

     Manual Install
        1. Install all

     Preparation
        5. Prepare for install

     Licensed Programs
       10. Display installed licensed programs
       11. Install licensed programs
       12. Delete licensed programs
       13. Save licensed programs
   ```

   If you were referred here from step "4" on page 79, complete this step and then return to step "5" on page 80. If you are following the tasks in this topic and want to accept software agreements for your licensed programs individually, continue with step "7" on page 119.

   If you have many licensed programs to install, accepting them together is faster than accepting them individually through manual installation. If you want to preaccept your licensed program agreements all at one time, select option 5 (Prepare for install).

a. Select the option to work with software agreements. If a licensed program that you want to install does not appear on the Work with Software Agreements display, use F22 (Restore software agreements). Otherwise, continue with the next step.

b. Type a 5 to display the software agreements for the licensed programs that you want to install and press Enter. Press F14 to accept the software agreements and then return to the Work with Licensed Programs display.

7. On the Work with Licensed Programs display, either type 1 (`Install all`) or type 11 (`Install licensed programs`). Read the following note to help you decide.

Note: If you want to install all licensed programs that are on the distribution media, use Manual Install option 1, `Install all`. This will save time for the installation. If you want most of the licensed programs on the media, then Manual Install option 1 is also the preferred choice. You will have to delete the extra unwanted licensed programs. The `Manual Install` display appears after selecting Manual Install option 1.

Type the following on this display:

- Install option: 2 (2=all products)
- Installation device: OPT01
- Replace if current: N
- Nonaccepted agreement: 2 (2=Display software agreement)
- Automatic IPL: N

In this example, OPT01 is used for the installation device. If you use a different naming convention, type the name that you have assigned to the installation device.

For more information about using option 1, refer to "Manual installation Option 1. Install all" on page 198.

Press Enter. If you typed 1, continue with step of these instructions.

8. If you typed 11, the Install Licensed Programs display appears.

Page through the display to find the licensed programs you want. Type a 1 in the Option column next to the licensed programs to be installed.

```
                     Install Licensed Programs
                                                    System: XXXX
  Type options, press Enter.
    1=Install

         Licensed  Product
  Option  Program   Option       Description
    _     ────────  ───────
    _     5770SS1                Library QGPL
    _     5770SS1                Library QUSRSYS
    _     5770SS1   1            Extended Base Support
    _     5770SS1   2            Online Information
    _     5770SS1   3            Extended Base Directory Support
    _     5770SS1   5            System/36 Environment
    _     5770SS1   6            System/38 Environment
    _     5770SS1   7            Example Tools Library
    _     5770SS1   8            AFP Compatibility Fonts
    _     5770SS1   9            *PRV CL Compiler Support
    _     5770SS1   12           Host Servers
    _     5770SS1   13           System Openness Includes
                                                       More...
  F3=Exit   F11=Display status/release   F12=Cancel   F19=Display trademarks
```

Notes:

- The following items are preselected if you are installing licensed programs as part of a new system installation.
  - 5770-SS1 Library QGPL

- 5770-SS1 Library QUSRSYS
- 5770-SS1 option 1, Extended Base Support
- 5770-SS1 option 3, Extended Base Directory Support
- 5770-SS1 option 30, QSHELL
- 5770-SS1 option 33, Portable App Solutions Environment
- 5770-DG1, IBM HTTP Server for i
- 5770-JV1, IBM Developer Kit for Java™
- 5770-JV1 option 17, Java SE 8 64 bit

If you are adding additional (new) licensed programs or optional parts, these items would be preselected only if they are in an error state.

- A licensed program you want to install might not be listed on the Install Licensed Programs display. If a licensed program is not listed, it can be added to the list by entering information into the blank fields at the top of the list. After you press Enter, this product then appears on the list with the other products.

  - Type 1 in the Option column.
  - Type the product identifier in the Licensed Program column.
  - Type the product option value in the Product Option column.
  - Press Enter.

  When you are typing the product option, the system accepts only the following three values: *BASE, option number, or *ALL.

  - A value of *BASE installs only the base product of the associated product identifier.
  - The product option number installs only the particular option of the associated product identifier. To be able to install options, you must install the base product (*BASE).
  - A value of *ALL installs the base product and all options of the associated product identifier that are found on the media.

  Keep in mind that licensed programs that you add will appear on the list with only the product identifier and will not give a descriptive name of the product. Also, you should check the documentation that came with the product to see whether there are any special instructions.

  If you get a message that the product already appears in the list, scroll down to the product. Make sure that there is a 1 in the Option column. Make sure that it is selected for installation.

  Press Enter.

9. The Confirm Install of Licensed Programs display appears on the console.

   Press Enter to confirm your choices.

10. The Install Options display appears.

```
                          Install Options
                                                 System:    XXXX
 Type choices, press Enter.

   Installation device  . . .   OPT01       Name

   Objects to install . . . .   1           1=Programs and language objects
                                            2=Programs
                                            3=Language objects

   Nonaccepted agreement. . .   2           1=Do not install licensed program
                                            2=Display software agreement

   Automatic IPL  . . . . . .   N           Y=Yes
                                            N=No
```

Type the following on this display:

- Installation device: OPT01 (In this example, OPT01 is used for the installation device. If you use a different naming convention, type the name that you have assigned to the installation device.)
- Objects to install: 1
- Nonaccepted agreement: 2
- Automatic IPL: N

11. One or both of the following displays show the status of the licensed programs and language objects as they are being installed on the system. You do not need to respond to these status displays.

```
                    Installing Licensed Programs
                                                  System: XXXX


  Licensed programs processed . . . . . . . . . . :     0 of XXX

                    Licensed program install in progress
```

The following display is an example of the display that appears during the installation process.

```
                    Installing Licensed Programs
                                                  System: XXXX

  Licensed programs processed  . . . . . . . . . . . . . . . :    X of XXX

  Licensed
  Program   Option  Description                           Type
  5770SS1    12      Host Servers                  2924
```

Note: This display shows which licensed programs and optional parts of licensed programs are being installed. After the *PGM objects and *LNG objects for each licensed program or optional part have been installed, the licensed program identifier disappears from the display and the number in the licensed programs processed field changes to show how many are processed.

12. You might see the Display Messages display. If you have another media volume that contains licensed programs to load, you can load it at this time. If you are installing from optical media, wait for the In Use indicator to go out before responding to the message.

```
                          Display Messages
                                              System:   XXXX
  Queue  . . . . . :    QSYSOPR            Program . . . . :   *DSPMSG
    Library  . . . :      QSYS               Library . . . :
  Severity . . . . :       95              Delivery  . . . :   *BREAK

  Type reply (if required), press Enter.
    Load the next volume in optical device OPT01 (X G)
      Reply . . . . G
```

Type G and press Enter. After you load each volume, type G and press Enter. If there are no more volumes to load that contain licensed programs, or if you want to end the loading process, type X and press Enter.

13. If a licensed program requires acceptance of a software agreement, the Software Agreements display appears. Do either of the following:

- Press F14 to accept the agreement and allow the licensed program to continue installing.
- Press F16 to decline the agreement and end the installation of that licensed program.

14. The Work with Licensed Programs display appears on your console when the installation process is completed. One of the following messages appears on the bottom of the Work with Licensed Programs display.

Work with licensed programs function not complete. Go to the topic Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

`Work with licensed programs function has completed.` Continue with the next step.

15. Verify the installed status values of your licensed programs and check for compatibility. It is important to make sure all of your licensed programs are compatible with the operating system.

    Use LICPGM menu option 10 (Display licensed programs) to see the release and installed status values of the installed licensed programs. If the installed status value of a licensed program is *COMPATIBLE, it is ready for use. If the installed status value of a licensed program is *BACKLEVEL, the licensed program is installed, but its version, release, and modification is not compatible with the currently installed level of the operating system. Check the topic, "Licensed program releases and sizes" on page 167, to verify the current version, release, and modification of the licensed program. "Installed status values" on page 196 lists the possible installed status value descriptions.

You have completed this task.

1. Do you have more licensed programs or optional parts to install, but they did not appear in the list displayed in step "8" on page 119 (or could not be added to the list)?

    - **No.** Go to the next step (step "2" on page 122).
    - **Yes.** Go to "Using the Restore Licensed Programs command to install IBM or non-IBM licensed programs" on page 122 to install these licensed programs or optional parts.

2. Do you need to install a secondary language?

    - **No.** Go to the next step (step "3" on page 122).
    - **Yes.** Go to "Installing a secondary language" on page 123 and complete the instructions.

3. You must complete the installation process before you put your system into operation. Go to "Checklist: Completing the IBM i installation " on page 127 and complete the instructions.

Using the Restore Licensed Programs command to install IBM or non-IBM licensed programs

To use the IBM i Restore Licensed Programs (RSTLICPGM) command to install licensed programs on a system, follow these procedures.

You might be instructed to use the RSTLICPGM command to install non-IBM licensed programs. All IBM-supplied licensed programs, including Programming Request for Price Quotations (PRPQs), licensed program offerings (LPOs), and single-set licensed programs, should have been installed already by using the LICPGM menu options 1 or 11, or during automatic installation.

Note: If you do not have non-IBM licensed programs, you can skip this task. If you need to install a secondary language, go to "Installing a secondary language" on page 123 and complete the instructions. Otherwise, you must complete the installation process and then go to "Checklist: Completing the IBM i installation " on page 127 and complete the instructions.

1. You might have received special installation instructions with these products. If you did, you should use those instructions.
2. Load the media containing the licensed program or optional part in the installation device.
3. If you have non-IBM software agreements to accept, you can either accept all your licensed program agreements at one time, such as when you install products in a batch process, or you can accept them individually later. To accept all your software agreements now, type GO LICPGM. Select option 5 (Prepare for install).

    a. Select the option to work with software agreements. On the Work with Software Agreements display, use F22 (Restore software agreements).

    b. Type a 5 to display the software agreements for the licensed programs that you want to install and press Enter. Press F14 to accept the software agreements and then return to the Work with Licensed Programs display.

4. In the following steps, OPT01 is used for the installation device. If you are using a different naming convention, use the name you have assigned to the installation device.

    To install a new licensed program, type the command:

```
RSTLICPGM LICPGM(xxxxxxx) DEV(OPT01) OPTION(*BASE)
```

where *xxxxxxx* is the product identifier for the licensed program you are installing.

Press Enter. You might see an online software agreement. If you accept the software agreement, you can continue to install and use the program.

5. To install a new optional part, type the command:

```
RSTLICPGM LICPGM(xxxxxxx) DEV(OPT01) OPTION(n)
```

where *xxxxxxx* is the product identifier for the licensed program you are installing and *n* is the option number.

Press Enter. You might see an online software agreement. If you accept the software agreement, you can continue to install and use the option.

6. Repeat steps "4" on page 122 and "5" on page 123 until you have installed all of the new licensed programs and optional parts that could not be installed in "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118.

You have completed this task.

1. Do you need to install other licensed programs such as WebSphere®?

   - **No.** Go to the next step.
   - **Yes.** Go to the IBM i Information Center e-business and Web serving category.

2. Do you need to install a secondary language?

   - **No.** Go to the next step.
   - **Yes.** Go to "Installing a secondary language" on page 123 and complete the instructions.

3. You must complete the installation process before you put your system into operation. Go to "Checklist: Completing the IBM i installation " on page 127 and complete the instructions.

Installing a secondary language

Follow these instructions to install a new IBM i secondary language on a system or logical partition.

Before you begin to install a secondary language

Verify the following tasks before you install a secondary language for the IBM i operating system.

Complete the tasks in the IBM i Information Center topic: "Preparing to install the IBM i release" on page 95. Pay particular attention to the "Globalization and IBM i software installation" on page 17 topic for more information about installing and using secondary languages.

Installing secondary languages for IBM licensed programs

Follow these steps to install an IBM i secondary language for IBM licensed programs.

1. You must sign on to the system as QSECOFR. If you are not, sign off and then sign on again using QSECOFR.

2. Write down the national language version identifier of the secondary language media. You will need this in step "8" on page 124. _____

   To find the appropriate feature code for your language, refer to "Feature codes for language version" on page 194.

3. Load the secondary language media volume in the installation device.

4. Type the following command on any IBM i control language (CL) command line and press Enter:

```
CHGMSGQ QSYSOPR *BREAK SEV(95)
```

5. A message display could appear. Press F3 (Exit).

   Note: Ignore the messages that are shown.

6. Type GO LICPGM on any CL command line and press Enter:

7. The Work with Licensed Programs menu appears. Use the page down or rollup key to see the second display of the Work with Licensed Programs menu.

```
 LICPGM                      Work with Licensed Programs
                                                        System: XXXX
  Select one of the following:

    Secondary Languages
       20. Display installed secondary languages
       21. Install secondary languages
       22. Delete secondary languages
```

Type 21 and press Enter.

8. The Install Secondary Languages display appears.

```
                    Install Secondary Languages
                                                  System:   XXXX
 Primary language . . . . . . :    2924
 Description  . . . . . . . . :    English

 Type options, press Enter.
   1=Install

                                                   Installed
 Option  Language  Description                Library   Release
    _       2902    Estonian                  QSYS2902
    _       2903    Lithuanian                QSYS2903
    _       2904    Latvian                   QSYS2904
    _       2905    Vietnamese                QSYS2905
    _       2906    Lao                       QSYS2906
    _       2909    Belgian English           QSYS2909
    1       2911    Slovenian                 QSYS2911
    _       2912    Croatian                  QSYS2912
```

Use the Page Down key until you see the language that you want to install. Type 1 in the option column next to the language you want to install. You can install only one language at a time. Press Enter.

9. After the language feature is entered, the Confirm Install of Secondary Languages display is shown.

```
              Confirm Install of Secondary Languages
                                             System:   XXX
  Press Enter to confirm your choices for 1=Install.
  Press F12 to return to change your choices.

                                                 Installed
  Option  Language  Description              Library   Release
    1       2911    Slovenian                QSYS2911
```

Press Enter.

10. The Install Option for Secondary Languages appears.

```
                Install Option for Secondary Languages
                                                        System:    XXX
   Type choice, press Enter.

      Installation device  . . .    OPT01          Name
      Replace if Current . . . .    N              Y=Yes
                                                   N=No
```

Type the following and press Enter:

Installation device: OPT01 (See note.)
Replace if Current: N

Note: OPT01 is used for the installation device in this example. If you are using a different naming convention, type the name you have assigned to the installation device.

One or both of the following displays show the status of the language objects as they are installed on the system.

```
                Installing Licensed Programs
                                                        System: XXXX


   Licensed programs processed . . . . . . . . . . . :      0 of XXX

                   Licensed program install in progress
```

The following display is an example of the display that appears during the installation process.

```
                Installing Licensed Programs
                                                        System: XXXX
       Licensed programs processed  . . . . . . . . . . :     X of XXX

Licensed
Program   Option   Description                                Type
5770WDS    *BASE   Rational Development Studio                2911
```

11. If you see the following message, load the next volume of the secondary language media and continue the installation.

    Note: Be certain that the label on the next volume is for the same secondary language.

```
                          Display Messages
                                                        System:    XXXX
   Queue  . . . . . :     QSYSOPR           Program . . . . :   *DSPMSG
     Library  . . . :     QSYS                 Library . . . :
   Severity . . . . :       95              Delivery  . . . :   *BREAK

   Type reply (if required), press Enter.
     Load the next volume in optical device OPT01 (X G)
       Reply . . . . G
```

Type G and press Enter. After you load each volume, type G and press Enter. If there are no more volumes to load that contain licensed programs, or if you want to end the loading process, type X and press Enter.

12. The Work with Licensed Programs display appears on your console when the installation process is completed. One of the following messages appears on the bottom of the Work with Licensed Programs display.

    Work with licensed programs function not complete. Go to the topic Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

```
      Work with licensed programs function has completed. Continue with the next step.
```

Note: Some licensed program options do not have language objects or are not supported for secondary languages. For example, options 6, 7, and 9 of the operating system are not supported. Option 8 of the operating system does not have any language objects. You can use LICPGM menu option 20 to see the products that have secondary languages installed.

You have completed this task.

1. Do you have more secondary languages to install?

   - **No.** Go to the next step.
   - **Yes.** Go back to step at the beginning of this topic.

2. Do you need to install secondary languages for licensed programs that are not shown in the list using option 11 of the Work with Licensed Programs menu?

   - **No.** Go to the next step.
   - **Yes.** Go to to install secondary languages for these licensed programs.

3. You must complete the installation process before you put your system into operation. Go to and complete the instructions.

Installing secondary languages for non-IBM licensed programs

To install a secondary language for non-IBM licensed programs, follow these steps.

You might be instructed to use the IBM i Restore Licensed Program (RSTLICPGM) command to install secondary languages for non-IBM licensed programs. All IBM-supplied licensed programs, including Programming Request for Price Quotations (PRPQs), licensed program offerings (LPOs), and single-set licensed programs, should have had secondary languages installed already by using the LICPGM menu option 21.

Note: If you do not have non-IBM licensed programs, you can skip this task. However, you must complete the installation process. Go to and complete the instructions.

1. You might have received special installation instructions with independently shipped licensed programs (those that are not on the same media as the software release). If you did, you should use those instructions.

2. Load the media volume containing the secondary language that you want to install.

   In the following steps, OPT01 is used for the installation device. If you are using a different naming convention, use the name you have assigned to the installation device.

3. To install a secondary language for a licensed program, type this command and press Enter:

   ```
   RSTLICPGM LICPGM(xxxxxxx) DEV(OPT01)
     OPTION(*BASE) RSTOBJ(*LNG) LNG(29xx)
   ```

   where *xxxxxxx* is the product identifier for the licensed program and 29*xx* is the national language version feature code.

4. To install secondary language for an optional part of a licensed program, type this command and press Enter:

   ```
   RSTLICPGM LICPGM(xxxxxxx) DEV(OPT01)
     OPTION(n) RSTOBJ(*LNG) LNG(29xx)
   ```

   where *xxxxxxx* is the product identifier for the licensed program, *n* is the option number, and 29*xx* is the national language version feature code.

5. Repeat steps and until you have installed all of the secondary languages for the licensed programs and optional parts that were independently installed.

You have completed this task.

You must complete the installation process before you put your system into operation. Go to "Checklist: Completing the IBM i installation " on page 127 and complete the instructions.

Checklist: Completing the IBM i installation

Use this checklist to complete the IBM i installation processes.

1. If you still have default passwords for your service tools user IDs, change them now.

   For information about service tools user IDs, see Change service tools user IDs and passwords in the IBM i Information Center.

2. Remove the media volume when the installation is complete. If your media is tape, wait for the tape to rewind completely.

3. If you have any IBM or non-IBM products with special installation instructions, install these products now.

   Check the product's documentation, and follow any special instructions.

4. Install the most current cumulative PTF package and PTF groups that you have ordered. (This package should have been ordered a week or two before your installation.)

   Use the instructions in the *PTF Shipping Information Letter*.

   For more information about PTF groups, refer to "Ensuring you have the latest information" on page 96. To apply PTF groups, refer to the cover letter and instructions for the program temporary fix (PTF). For general information about applying PTFs, go to Install fixes in the IBM i Information Center.

   Then return here and continue with the next step.

   Note: If you do not install the cumulative PTF package now, you need to perform an IPL and let the Initialize System (INZSYS) process complete. Before you do, set the IPL type to **B** (or the IPL type you use for everyday operation) and then set the mode selection to **Normal**. "Initialize System (INZSYS) recovery" on page 160 has more information about INZSYS.

5. If your system is operating as a service partition and your system is not being managed by a Hardware Management Console, you might be required to perform a server IPL.

   A *server IPL* is an IPL whereby all logical partitions on the system are shut down at the same time. This allows, for example, a new level of the server firmware to be activated on the system.

   You might be required to perform a server IPL after you apply or remove a server firmware PTF on the service partition.

   - To find out if you need to do a server IPL, type DSPFMWSTS on the IBM i control language (CL) command line and press Enter. If a server IPL is required, the **Server IPL required** field is set to Yes.

   - To find out if your system is operating as a service partition, type DSPMWSTS on the CL command line and press Enter. If your system is operating as a service partition, the **Service partition** field is set to Yes.

   Note: When shutting down your service partition, reference codes D6xx430B or D6xx430A could be displayed for an extended amount of time. The xx should increment periodically and is a normal part of processing when server firmware code is being updated. Allow the system to complete the processing. Do not interrupt this process.

6. Look for messages in the install history log that indicate the status of the Initialize System (INZSYS) process:

   a) Type GO LICPGM and press Enter.

   b) Type 50 (Display log) on the Work with Licensed Programs display, and press Enter.

   c) The Display Install History display appears. Press Enter.

   The Display History Log Contents display appears. If you do not see either of the following messages on the display, wait a few minutes and select option 50 again. Find the message `Initialize System (INZSYS) started`. After this message appears, wait for a period of time and look for the `Initialize System (INZSYS) processing completed successfully` message

(CPC37A9). If you do not see message CPC37A9 on the display, go to "Initialize System (INZSYS) recovery" on page 160 to determine the problem.

7. If you used an image catalog to perform your installation, you might want to remove all installation images from your system.

   To delete the catalog and all the optical images (image files), type the following:

   ```
   DLTIMGCLG IMGCLG(mycatalog) KEEP(*NO)
   ```

8. If you used an image catalog to perform your installation and you used the Start ASP Balance (STRASPBAL) command to end the allocation for storage in the load-source disk unit before you upgraded, enter the Start ASP Balance (STRASPBAL) command to resume the allocation of storage for the load-source disk unit.

   ```
   STRASPBAL TYPE(*RSMALC) UNIT(1)
   STRASPBAL TYPE(*CAPACITY) ASP(1) TIMLMT(*NOMAX)
   ```

9. Install software license keys for your operating system and keyed products.

   Use the Work with License Information (WRKLICINF) command to display the installed keyed products to add license key data. For specific instructions, go to Add license key information in the IBM i Information Center.

   After updating the license key information, return here and continue with the next step.

10. After you complete the installation process and before you make the system available to all users, set the usage limit for the software-license managed products.

    These products are listed on the Proof of Entitlement (POE), invoice, or other documents that you have received with your software order. For products that have a usage limit, you set the usage limit with the Work with License Information (WRKLICINF) command.

    To set your usage limit, do the following:

    a. Type WRKLICINF and press Enter.

    b. On the Work with License Information display, press F11 (Display Usage Information). The usage limit number on each product that is listed on the POE, invoice, or other documents must match the usage limit number on the Work with License Information display for the associated product.

    c. Move the cursor to the line that contains the product name whose usage limit is to be updated.

    d. Type 2 (Change) and press Enter.

    e. When the Change License Information display is shown, update the usage limit prompt with the usage limit shown on the POE. In addition, update the threshold prompt with either *CALC or *USGLMT. Do not leave the threshold set to zero.

       Note: If message CPA9E1B [Usage limit increase must be authorized. Press help before replying (C G).] is sent, respond by typing G.

    f. If the POE lists more products than the Work with License Information display, set the usage limits after you install those products.

11. If you have not already verified the compatibility of your licensed programs with the operating system, do this now.

    Use LICPGM menu option 10, Display installed licensed programs. If *COMPATIBLE is not listed next to a licensed program, then go to "Installed status values" on page 196 and determine how to proceed.

12. If you changed any other system value such as for example security level (QSECURITY) during your installation, change it back now.

13. If you changed the scan control (QSCANFSCTL) system value to minimize future scanning of some objects that are restored before you installed your licensed programs, remove the *NOPOSTRST specification from this system value.

14. Some of the tasks in this topic require that you change the QSYSOPR severity code filter to 95.

If you do not want to continue with this level or you want to change the delivery notification, type CHGMSGQ QSYSOPR DLVRY(xx) SEV(yy) where *xx* indicates the delivery notification and *yy* indicates the severity code that you want to use. The system defaults are DLVRY(*HOLD) SEV(0).

15. Save your system using your normal save procedures.

Refer to the instructions in the Backing up your system topic in the IBM i Information Center. Make sure that the Initialize System (INZSYS) process is complete before you save your system.

Note: Before you start a save operation, use the Work with Active Jobs (WRKACTJOB) command to check the status of QDCPOBJx jobs. These jobs decompress objects. There could be more than one QDCPOBJx job. You can start your save operation if these jobs are in an inactive state. If you put the system in a restricted state by ending subsystems, the QDCPOBJx jobs become inactive. The jobs will restart when the system is not in a restricted state. For more information about decompressing objects, see "Compressed objects and storage space" on page 17.

16. If you have installed IBM i Access Family products, you might have other tasks that you need to complete.

You can find further information about IBM i Access Family products at IBM i Access website (http://www.ibm.com/systems/i/software/access).

17. You might have installed licensed programs that require additional installation steps on PCs, or you might have programs that install on PCs through an IBM i Access Family function.

If you have products such as this, complete your PC installation by using the instructions for the product.

18. If you have a IBM i integration with BladeCenter and System x that you stopped before you began the installation process, restart it now.

 a) Type GO NWSADM on the CL command line. The Network Server Administration display appears.

 b) Select option 2, Start a network server.

19. If you installed 5770-TC1, TCP/IP Utilities, go to the topic TCP/IP setup in the IBM i Information Center for advanced configuration and setup information.

20. If you have customized an IBM-supplied program (for example, QSTRUP in library QSYS) in a previous release, make sure that you re-create this program to run correctly in the new release.

21. If you have duplicated any IBM-supplied objects, you might want to make new duplicates after you install the release.

This allows you to take advantage of functions added in the new release. Examples of objects that you might duplicate include the following:

• Message text descriptions
• Commands
• Command defaults

You have completed your installation.

Chapter 13. Changing the primary language of your system or logical partition

Use this procedure to install a primary language from either a secondary language media set or a primary language media set.

Follow the directions closely because you use different options based on the type of media.

Note:

- If you have logical partitions, you must perform these instructions for each partition to which you change the primary language.
- These procedures support the use of optical image catalogs with primary language media. Use of optical image catalogs with secondary language media is NOT supported by these procedures.

Before you begin to change the primary language

Consider this information before you change the primary language on your system or IBM i logical partition.

Before you begin to change the primary language, read the topic, "Globalization and IBM i software installation" on page 17.

Obtain either of the following media:

- A complete set of the primary language media, which includes the Licensed Internal Code media and the IBM i (5770-SS1) media. Use either the steps in this topic collection ("Changing the primary language" on page 131) or, if you want to change your primary language as part of a release upgrade, then refer to Chapter 7, "Upgrading or replacing software using automatic installation," on page 57 or Chapter 8, "Upgrading or replacing software using manual installation," on page 65.
- Secondary language media.You need to ensure that the media contains the secondary language. Follow the instructions for using secondary language media in "Changing the primary language" on page 131.

The release and modification of your system must be the same as the release and modification of your secondary language media.

If you have not already done so, complete the tasks in "Preparing to install the IBM i release" on page 95.

Changing the primary language

Follow these steps to change the primary language on the system or IBM i logical partition.

Attention:

- You cannot change your primary language to a language you currently have installed as a secondary language on your system. You must delete the secondary language first before you can change it to your primary language. Go to "Option 22. Delete secondary languages" on page 203 for more information about deleting secondary languages.
- If the primary language and the service tools language do not match, you might need to go to dedicated service tools (DST) and reinstall the correct service tools language. For instructions, see Changing the service tools language on your system or logical partition in the IBM i Information Center.

If you have secondary logical partitions, you must perform these instructions for each partition to which you change the primary language.

Are you using an image catalog?

If you are using an image catalog (virtual media device) to upgrade, perform this step at least a day before you do the actual installation. Refer to "Preparing an optical image catalog to install software" on page 35

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for information on how to set up your image catalog and virtual optical device in preparation of installing a primary language.

The media added to your image catalog needs to be arranged in the following order. You might not have all of these media. Verify that your media contains the correct primary language.

- Licensed Internal Code for IBM i.
- IBM i operating system, IBM supplied libraries QGPL and QUSRSYS, and all IBM i no-charge options.
- No-charge licensed programs and keyed products.
- Single licensed programs.

For descriptions of the optical media, refer to "Media labels and their contents" on page 188.

To verify that the image catalog entries are sorted in the correct sequence and to validate that all of your images are in loaded status, enter the following command:

```
WRKIMGCLGE IMGCLG(catalog-name)
```

Ensure that your catalog is in ready status and that all image catalog entries are in loaded or mounted status. Use the panel option to arrange the catalog entries in the order described. When the catalog entries are in the correct order, use F7 to prompt for the VFYIMGCLG command. Enter *LNG for the **TYPE** field and *YES for the **SORT** field to prepare the catalog for installing a primary language. An alternative method for preparing the catalog would be to run the following command after the catalog entries are in the correct order:

```
VFYIMGCLG IMGCLG(catalog-name) TYPE(*LNG) SORT(*YES)
```

Attention: If the primary language and the service tools language do not match, you might need to go to dedicated service tools (DST) and reinstall the correct service tools language. You can install the service tools language now or wait until the primary language is installed in step 12. Use the WRKIMGCLGE command to ensure media Licensed Internal Code for IBM i (media labeled as I_BASE_01) is mounted in the virtual optical device. For instructions, see Changing the service tools language on your system or logical partition.

Steps for changing the primary language

1. Begin at the IBM i Main Menu (or the menu you chose as your initial menu).

   Load the first volume of the media that contains the Licensed Internal Code. Have the operating system (5770-SS1) media available. Remove other media from devices that are not involved in these procedures.

   Note: Do not load your secondary language media at this time.

2. Use the control panel to switch the mode to **Manual**.

3. Type PWRDWNSYS OPTION(*IMMED) RESTART(*YES) and press Enter.

   Note: The default value for the Power Down System (PWRDWNSYS) command is to display a confirmation. The default can be changed by specifying *NO for the **CONFIRM** parameter: CONFIRM(*NO).

4. Wait for the IPL or Install the System panel to appear on your console.

```
                        IPL or Install the System
                                                System: XXXX
 Select one of the following:

      1. Perform an IPL
      2. Install the operating system
      3. Use Dedicated Service Tools (DST)
      4. Perform automatic installation of the operating system
      5. Save Licensed Internal Code
```

Type 2 (Install the operating system) and press Enter.

```
                            Install Device Type Selection
                                                   System: XXXX
 Select the installation device type:

      1. Tape
      2. Optical
      3. Virtual device - preselected image catalog
      4. Current alternate selected device          None
      5. Network device
```

Type 2 (Optical) and press Enter.

Note: If you are using an image catalog, you would select option 3 (Virtual device - preselected image catalog) instead of option 2.

5. The Confirm Install of the Operating System display is shown on your console. Press Enter.
6. The Select a Language Group panel shows the primary language currently installed on the system. Change the primary language of your system by specifying the language feature code of the secondary language media on this display.

   For example, assume the primary language is English (2924) and you are using secondary language media to change it to Portuguese (2922). This display would appear showing 2924. You would type 2922.

```
                          Select a Language Group
                                                   System: XXXX
 Note:  The language feature shown is the language feature
 installed on the system.

 Type choice, press Enter.

   Language feature . . . . . . . . . . . . . .   2924
```

   Type the numbers of the feature code for the language you want and press Enter.
7. After the language feature code is entered, either the Confirm Language Feature Selection display or the Confirm Service Tools Language display appears on your console.

   Changing the service tools language and the primary language.

```
Confirm Service Tools Language

Language feature . . . . . . . . . . . . . : 2922

The IBM Licensed Internal Code (I.BASE.01) V7R3M0
media is required.


Press Enter to confirm your choice to install the service
tools language.

Press F5 to bypass installing the service tools language
and continue installing the operating system.


Press F12 to return to change your choice.
```

Confirm Language Feature Selection display when changing the primary language.

```
               Confirm Language Feature Selection
                                                    System:    SYSTEM1
Language feature  . . . . . . . . . . . . . :    2922

Press Enter to confirm your choice for language feature.
  Installing the system will continue.
Press F12 to return to change your choice for
  language feature.




F3=Exit   F12=Cancel
```

Press Enter.

8. Some status displays appear on the console. You do not need to respond to any of these status displays. The following is an example of a status display:

```
               Licensed Internal Code IPL in Progress

IPL:
   Type  . . . . . . . . . :          Attended
   Start date and time . . :          xx/xx/xx        xx:xx:xx
   Previous system end . . :          Normal
   Current step/total. . . :     1          16
   Reference code detail . :     C6004050
IPL step . . . . . . :    Storage Management Recovery
```

The following list shows some of the IPL steps that are shown on the IPL Step in Progress display.

Authority Recovery
Journal Recovery
Database Recovery
Journal Synchronization
Start the Operating System

Some of the IPL steps could take a long time.

9. You see the following display.

```
                          Message

Message ID  . . . . . :    CPA2055      Type . . . . . . . :    Inquiry
From program  . . . . . :    ITLOADFO     Severity . . . . . :    99

Message . . . . . :   The next volume in the sequence is needed to
  continue the installation process.

Cause . . . . . . :   The end of the volume has been reached.

Recovery  . . . . :   Load the next volume on the installation device.




Type choice, press Enter.

  Reply . . . . .    1          1=Continue, 2=End installing
```

Load the first volume of the IBM supplied installation media that contains the operating system.
10. The Install the Operating System display appears when the IPL is complete.

```
                    Install the Operating System

 Type options, press Enter.

   Install
     option . . . . .   2            1=Take defaults (No other
                                        options are displayed)
                                     2=Change install options

   Date:
     Year . . . . . .  __            00-99
     Month  . . . . .  __            01-12
     Day  . . . . . .  __            01-31

   Time:
     Hour . . . . . .  __            00-23
     Minute . . . . .  __            00-59
     Second . . . . .  __            00-59
```

Type the following and press Enter.

> Install option: 2
> Date (Use the current year, month, and day.)
> Time (Use the current time, 24-hour clock.)

11. The Installation Status display appears. You do not need to respond to this display.
12. The Specify Install Options display appears.

```
                     Specify Install Options

 Type options, press Enter.

   Restore option . . . . . 4        1=Restore programs and language objects
                                        from the current media set
                                     2=Do not restore programs or
                                        language objects
                                     3=Restore only language objects
                                        from current media set
                                     4=Restore only language objects
                                        from a different media set using the
                                        current install device.


   Job and output
     queues option . . . . 2         1=Clear, 2=Keep

   Distribute IBM i on
     available disk units . . . 2    1=Yes, 2=No
```

a. Type either of the following for the restore option:

    i) 3 (Restore only language objects from current media set) if you are installing from the primary
       language media.

    ii) 4 (Restore only language objects from a different media set using the current install device) if
        you are installing from the secondary language media.

b. Type 2 for the Job and output queues option and press Enter.

13. Based on the type of media you are using, perform either of the following steps:

- If you are using secondary language media, the Installation Status display appears. You do not
  need to respond to this display. When the following message appears, load the volume that
  contains secondary language media.

```
                          Message

Message ID  . . . . . . :  CPA2057      Type . . . . . . :    Inquiry
From program  . . . . . :  XXXXXXX      Severity . . . . :    99

Language ID . . . . . . :  2922

Message . . . . . . :    The installation media containing language objects
  for the system language is needed to continue the installation
  process.

Recovery  . . . . . :    Load the installation media containing language objects
  for the specified language.




Type choice, press Enter.

    Reply . . . . .   1            1=Continue, 2=End installing
```

Type 1 and press Enter.

The system searches through the media and loads the necessary language information. The Installation Status display appears, indicating that the language is being changed (in stage 3). The installation continues through the remaining stages. This display does not require a response.

- If you are using primary language media, insert the correct media when you are prompted.

14. After the base part of the operating system is changed to the new primary language, the Sign On display appears on your console. Continue with the steps to change the language objects for the licensed programs in "Installing the licensed programs after changing the primary language" on page 136.

Installing the licensed programs after changing the primary language

Follow these steps to install the licensed programs after you have changed the IBM i primary language.

If you have secondary logical partitions, you must perform this procedure on each partition to which you want to install the licensed programs.

1. Begin at the Sign On display.

```
                      Sign On
                                 System. . . . :  XXX
                                 Subsystem . . :  XXXXX
                                 Display . . . :  XXXXXXXX

        User. . . . . . . . . . . . . QSECOFR
        Password. . . . . . . . . .
        Program/procedure . . . . . . . _____
        Menu. . . . . . . . . . . . . _____
        Current library . . . . . . . _____
```

Type QSECOFR for the *User* prompt, and type your password, if required. Press Enter.

2. Several display messages appear. To continue, press Enter on each display. The following is an example of a message that might appear:

```
                        Display Messages
                                           System:    XXXX

Queue   . . . . . :    QSYSOPR            Program . . . . :    *DSPMSG
   Library  . . . :     QSYS                 Library . . . :
Severity . . . . :    10                   Delivery  . . . :    *BREAK

 Press enter to continue.
    System object QWCSCPF created again during IPL.
```

3. The IPL Options display appears.

```
                          IPL Options

Type choices, press Enter.

System date . . . . . . . . . . . . . . .  XX / XX / XX      MM / DD / YY
System time . . . . . . . . . . . . . . .  XX : XX : XX      HH : MM : SS
System time zone  . . . . . . . . . . .  Q0000UTC          F4 for list
Clear job queues. . . . . . . . . . . .  N                  Y=Yes, N=No
Clear output queues . . . . . . . . . .  N                  Y=Yes, N=No
Clear incomplete job logs . . . . . . .  N                  Y=Yes, N=No
Start print writers . . . . . . . . . .  Y                  Y=Yes, N=No
Start system to restricted state  . . . .  Y                  Y=Yes, N=No


Set major system options. . . . . . . .  Y                  Y=Yes, N=No
Define or change system at IPL. . . . . .  N                  Y=Yes, N=No




Last power-down operation was ABNORMAL
```

Note: Ignore the last power-down operation message on the IPL Options display.

Type the following and press Enter.

- System date (Use the current date.)
- System time (Use the current time, 24-hour clock.)
- System time zone (Verify that it is correct or press F4 to select a time zone.)
- Start system to restricted state Y
- Set major system options N

4. Additional display messages could be shown.

   Press Enter after each message to continue.

5. The IBM i Main Menu (or the menu you chose as your initial menu) appears on your console.

   Type CHGMSGQ QSYSOPR *BREAK SEV(95) and press Enter.

6. A message display could appear. Press Enter.

7. The IBM i Main Menu (or the menu you chose as your initial menu) appears again.

   Type GO LICPGM and press Enter.

8. The Work with Licensed Programs display appears.

```
LICPGM                     Work with Licensed Programs
                                                   System:    XXXX
 Select one of the following:

   Manual Install
      1. Install all

   Preparation
      5. Prepare for install

   Licensed Programs
     10. Display installed licensed programs
     11. Install licensed programs
     12. Delete licensed programs
     13. Save licensed programs
```

If you are using primary language media, type 11, press Enter, and go to step "9" on page 138.

If you are using secondary language media, type 1, press Enter and go to step "12" on page 138.

9. The Install Licensed Programs display appears. Type 1 in the option column next to the IBM products and options that have *NOPRIMARY as the installed status value and which exist on the media you will use for the installation. Press Enter.

10. The Confirm Install of Licensed Programs display appears. Press Enter to confirm your choices or press F12 to return to the Install Licensed Programs display and change your choices.

11. The Install Options display appears.

```
                          Install Options
                                                   System:    XXXX
 Type choices, press Enter.

   Installation device  . . .   OPT01        Name

   Objects to install . . . .   3            1=Programs and language objects
                                             2=Programs
                                             3=Language objects

   Nonaccepted agreement. . .   2            1=Do not install licensed program
                                             2=Display software agreement

   Automatic IPL  . . . . . .   N            Y=Yes
                                             N=No
```

Type the following on this display:

• Installation device: OPT01 (In this example, OPT01 is used for the installation device. If you use a different naming convention, type the name that you have assigned to the installation device.)

• Objects to install: 3

• Nonaccepted agreement: 2

Press Enter and go to step"13" on page 139.

12. The Manual Install display appears.

```
                          Manual Install
                                                System:   XXXX
     Type choices, press Enter.

       Install option . . .   1             1=Installed products
                                            2=All products
                                            3=New products


       Installation device    OPT01         Name

       Replace if current     N             Y=Yes
                                            N=No

       Nonaccepted agreement  2             1=Do not install licensed program
                                            2=Display software agreement

       Automatic IPL  . . .   N             Y=Yes
                                            N=No
```

Type the following and press Enter:

- Install option: 1
- Installation device: OPT01
- Replace if current: N
- Nonaccepted agreement: 2
- Automatic IPL: N

13. One or both of the following displays show the status of the licensed programs and language objects as they are being installed on the system. You do not need to respond to these status displays.

```
                    Installing Licensed Programs
                                                    System: XXXX

     Licensed programs processed . . . . . . . . . :    0 of XXX

                    Licensed program install in progress
```

The following display is an example of the display that appears during the installation process.

```
                    Installing Licensed Programs
                                                    System: XXXX
     Licensed programs processed  . . . . . . . . . :     X

     Licensed
     Program    Option   Description                               Type
     5770SS1             IBM i - Library QUSRSYS                    2922
```

14. If you see the following message, load the next volume of the language media and continue the installation Be certain that the next volume is for the same language.

```
                          Display Messages
                                                 System:   XXXX
     Queue  . . . . . :    QSYSOPR             Program . . . . :    *DSPMSG
       Library  . . . :     QSYS                 Library . . . :
     Severity . . . . :       95               Delivery  . . . :    *BREAK

     Type reply (if required), press Enter.
       Load the next volume in optical device OPT01 (X G)
         Reply . . . . G
```

Type G and press Enter. After you load each volume, type G and press Enter. If there are no more volumes to load that contain licensed programs, or if you want to end the loading process, type X and press Enter.

15. The Work with Licensed Programs display appears on your console when the language objects for all of the licensed programs are installed. One of the following messages appears on the Work with Licensed Programs display:

`Work with licensed programs function has completed.` Press F3 (Exit) to return to the IBM i Main Menu.

`Work with licensed programs function not complete.` Go to Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

You have completed this task.

To complete your installation, go to "Checklist: Completing the IBM i installation " on page 127 and follow the instructions there.

Chapter 14. Deleting software related to the IBM i operating system

Use this information to help you determine if you need to delete an unwanted part of a licensed program. These requirements are not always apparent. You can also use the procedures in this topic to delete the parts of licensed programs you no longer need.

Determining what unused parts of products to delete

You might be able to delete some optional parts of IBM i licensed programs to give you more storage.

Depending on your business needs, you might be able to delete some of the optional parts of the licensed programs that are shown in Table 3 on page 141. (Table 3 on page 141 shows IBM i 7.4 product identifiers, but the information in the table applies to deleting unwanted parts either before or after installing the new release of software.) For example, you can delete the licensed programs for any IBM i Access Family clients that you do not use. Deleting unwanted licensed programs or optional parts will give you more storage for your business needs.

Before you delete anything, read the following:

- If you do not have the original or a current copy of IBM i software distribution media, make sure that you first save the affected licensed program. Type GO LICPGM on the IBM i control language (CL) command line and select option 13 (Save licensed programs). You will need extra tapes for this save operation. To save these licensed programs to tape can take several hours. At a later time, if you need any of the licensed programs or deleted optional parts, you can install them from these tapes. To install them, use GO LICPGM and select option 11 (Install licensed programs).

- System backup tapes come with some systems. These backup tapes are not the same as software distribution media. While you can use software distribution media to reinstall individual licensed programs or optional parts, you cannot use system backup tapes. If you cannot locate or your system did not come with the original installation media, you must save the licensed programs and optional parts before you delete them. You will need the saved copy, if you need to restore the licensed programs or optional parts at a future time.

Use the information in "Installation notes about the IBM i release" on page 187 and Table 3 on page 141 to help you determine which programs or optional parts you might want to delete.

Table 3. Deleting unwanted licensed programs and optional parts after the installation is complete		
Licensed program or optionally installable product part	**Product option**	**Deletion information**
5770-SS1 IBM i		You cannot delete the entire operating system. You can delete optional parts, but you cannot delete IBM i option 1 or option 3.
Extended Base Support	1	You cannot delete the entire operating system. You can delete optional parts, but you cannot delete IBM i option 1 or option 3.
Online Information (Online help information)	2	If you delete this optional part, you must first remove QHLPSYS from the system library list. Refer to "Considerations for deleting licensed programs" on page 142 for more information.

Table 3. Deleting unwanted licensed programs and optional parts after the installation is complete (continued)

Licensed program or optionally installable product part	Product option	Deletion information
Extended Base Directory Support	3	You cannot delete the entire operating system. You can delete optional parts, but you cannot delete IBM i option 1 or option 3.
System/36 Environment and System/38 Environment	5 and 6	Delete this optional part if you are running only IBM i applications.
Example Tools Library	7	This optional part is needed only by software developers.
AFP Compatibility Fonts	8	Do not delete this optional part if you are using the Print Services Facility
*PRV CL Compiler Support	9	Delete this part if you do not need to compile CL programs for a previous release.
Host Servers	12	IBM recommends that you do not delete this part. Do not delete if you are using IBM i Access Family products.
System Openness Includes	13	This optional part is needed only by software developers.
GDDM	14	You can delete this if you are not using it.
IBM i optional parts 21, 22, 31, 34, 35, 43, 44, 45, 47, and 48.	21 - 48	You can delete these if you are not using them.
IBM i optional part 30 (Qshell)	30	This option should not be deleted as it is sometimes used by other licensed programs.
IBM i optional part 33 (Portable App Solutions Environment)	33	This option should not be deleted as it is sometimes used by other licensed programs.
International Components for Unicode	39	This optional part is needed if you use Unicode applications.

Considerations for deleting licensed programs

Review these notes to determine unique situations that can occur when deleting some licensed programs that are related to the IBM i operating system.

Do not attempt to use the Delete Library (DLTLIB) command to remove a licensed program or optional part of a licensed program from the system. Some licensed programs copy objects into other libraries; the DLTLIB command will not delete the duplicated objects. Using the DLTLIB command to delete a licensed program or optional part could leave the licensed program in a partially installed condition.

If you are unable to delete a licensed program, it might be because the library for the licensed program exists in one of the library lists. Do the following:

1. Use the WRKSYSVAL command to check both the system library and the user library lists.

2. When the Work with System Values display appears, type a 5 next to the QSYSLIBL and QUSRLIBL system values to display the associated libraries.

3. If the library for the licensed program is listed on this display, press Enter to return to the Work with System Values display.

4. Type a 2 to change the system value.

5. When the Change System Value display appears, use the spacebar to remove that licensed program library from the library list.

You will be able to delete your licensed program after your next IPL.

Deleting licensed programs

Follow these instructions to delete a licensed program that is related to the IBM i operating system.

1. Type GO LICPGM and press Enter. The Work with Licensed Programs menu appears.
2. Select option 12 (Delete licensed programs). The Delete Licensed Programs display appears.
3. Type 4 (Delete) in the Option column in front of each licensed program that you want to delete. Page down to display additional licensed programs.
4. Press Enter. You are shown the Confirm Delete of Licensed Programs display.
5. Press Enter if your selections are correct. Press F12 to make corrections.
6. You receive confirmation messages from the system when the licensed programs are deleted.
7. Press F12 to return to the Work with Licensed Programs menu.

If you have difficulty deleting a licensed program following these steps, type ENDSBS *IMMED and press Enter. Then proceed with step again.

Chapter 15. Troubleshooting software installation problems

This information describes common problem scenarios, recovery methods, and ways to get help if you encounter a problem during IBM i software installation.

Error messages and reference codes (also known as system reference codes or SRCs) let you know that an error occurred during the installation process. Use the error messages or reference codes to determine which part of the process failed.

Where to begin recovery

When you determine that you have an IBM i software installation error, first you need to determine what your first step to recovery should be.

Type of installation failure	
When failure occurred	**What to do**
Saving the system before installation	If a problem occurs while you are saving the system, review your job log to determine what caused the failure. Correct the error and complete your system save procedure. Do not continue to replace the new release until you have a complete backup copy of your system. If you cannot complete installing the new release, you will need this backup copy to restore the system to the previous release.
Installing new release or licensed program	Use the next table on this page to direct you to the recovery information that you need to find the problem, determine what caused it, correct the problem, and then complete installing this release.
Power failure during an installation process	If you have a power failure anytime during the installation process, go to the next table on this page to determine where to start the installation again. You should be able to start with the task where you were when the failure occurred. For example, if you had completed installing the operating system when the power failed, and are now installing licensed programs, start with the task to install licensed programs. If you are using the automatic process, start at the beginning. The system can determine which tasks have not been completed and will resume at the appropriate task.

If the installation process fails and you cannot continue the current installation, refer to Recovering your system in the IBM i Information Center and your system's backup copy to restore the previous release.

In the farthest left column of the following table, locate the installation section you were using when the failure occurred. In the second column, locate which task you were performing in that section. Locate the first task that failed during your installation and then use the information in the last column to determine your recovery starting point.

Where to start recovery		
Installation procedure in use	**Task number in use at time of failure**	**Where to start**
Using image catalogs to install		"Image catalog recovery" on page 146
Using Operations Console during installation		"Operations Console recovery" on page 147

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Where to start recovery		
Installation procedure in use	**Task number in use at time of failure**	**Where to start**
Replacing a release using automatic installation	Task 1. Using automatic installation	"Starting point for automatic installation recovery" on page 150
Replacing a release using manual installation	Task 1. Replacing the Licensed Internal Code	"Licensed Internal Code recovery" on page 150
	Task 2. Replacing the operating system	"Operating system recovery" on page 152
	Task 3. Replacing the licensed programs	"Licensed programs, PTFs, and secondary language recovery" on page 154
Installing software on a new system (with the operating system already installed)	Task 1. Doing the initial program load (IPL)	"Operating system recovery" on page 152
Installing software on a new system (without the operating system installed)	Task 1. Installing the operating system	"Operating system recovery" on page 152
Changing your primary language	Task 1. Changing the primary language	"Operating system recovery" on page 152
	Task 2. Installing the licensed programs	"Licensed programs, PTFs, and secondary language recovery" on page 154
Installing additional licensed programs	Task 1. Installing IBM licensed programs	"Licensed programs, PTFs, and secondary language recovery" on page 154
	Task 2. Installing non-IBM licensed programs	Look at the messages for the command
Installing a secondary language	Task 1. Using the Work with Licensed Programs Menu	"Licensed programs, PTFs, and secondary language recovery" on page 154
	Task 2. Using the Restore Licensed Program command	Look at the messages for the command

Image catalog recovery

If you used an image catalog to install IBM i software, follow these procedures to determine where the failure occurred and the appropriate recovery action.

The following table lists the error messages that could occur if you are using an image catalog to install.

Table 4. Image Catalog Verification Recovery	
Message	**Description**
CPF9897 CPDBC1E	**Cause (Reason code 01):** The load-source disk unit must have at least 2000 MB of free storage space to be able to install from an image catalog (virtual media device). **Recovery:** 1. To determine if you have enough free space available, see "Freeing up space on the load-source disk unit for an image catalog" on page 35. 2. Perform the procedure for freeing up space on the load-source disk unit and try your request again. The topic, "Cleaning up disk storage space" on page 52, contains the procedure. **Cause (Reason code 02):** Installation of the release requires additional allocation of space for License Internal Code. **Recovery:** Follow the directions in the error message. More information is in the topic, "Required: Allocating additional space for Licensed Internal Code" on page 53. **Cause (Reason code 03):** The Licensed Internal Code media is not supported for installation over the current version, release, and modification that is installed or for your system model. **Recovery:** Try your request again with a supported release.
CPF3DE5	**Cause:** The Licensed Internal Code and IBM i software agreements have not been accepted. **Recovery:** Perform the steps "Required: Accepting software agreements" on page 50.
CPD4F23	**Cause:** The release is not supported on this server model. **Recovery:** Specify a supported release or server model. Then try the request again.
CPD4F1C	**Cause:** One or more PTFs on the system are delayed PTFs and require an IPL action. An installation from virtual media cannot be done when delayed PTFs exist. **Recovery:** Perform an unattended IPL, then retry your request

Operations Console recovery

Following are common problems that can occur when using Operations Console during an IBM i installation or upgrade.

Symptom: No connection between the system and Operations Console PC.

Action: When you receive the release upgrade, the shipped service tools user IDs (except 11111111) are expired. For all upgrades and installations, you need to establish a connection between the system and Operations Console PC by using 11111111 (eight 1's) for both the service tools user ID and the default password. This ensures a successful authentication of the subsequent connection of the client to the system. This is especially important for automatic installations.

Symptom: Reference code A6005008

Use this table if you received reference code A6005008. If an IPL did not find a console and if the console type is set to anything except a 1, the system displays code A6005008.

- If you are attempting to use Operations Console, select the appropriate section in the following table based on this information:
  - Local console on a network uses words 13, 14, and 15.
  - Local console directly attached to the server uses words 17, 18, and 19.

Note: If you just replaced the LAN adapter associated with Operations Console (LAN), you need to wait at least 35 minutes for the system to find and use the new LAN adapter card. Once the system is satisfied, it starts using the new adapter, the console should start, and the reference code disappears.

Table 5. Reference code A6005008: LAN					
LAN					
If Word 13 value is:	**Failure**	**Word 14 means:**	**Word 15 means:**	**Word 18 means:**	**Word 19 means:**
01	No supported hardware detected or hardware detected is not expected (for example, you replaced the LAN IOA and the serial number is different)		In some cases the serial number of the expected adapter may be shown.		
02	LAN IOA failed to report				
03	Hardware error	Common error codes: 53001A80, 53002AC0 Network, cable, or the LAN adapter may not be operational. Error code 00000000 indicates the adapter reported but has not been initialized yet. This is not considered an error at this time. The adapter should be activated shortly. For other error codes, contact your service provider.	Card position or serial number of adapter		

Table 5. Reference code A6005008: LAN (continued)					
LAN					
If Word 13 value is:	**Failure**	**Word 14 means:**	**Word 15 means:**	**Word 18 means:**	**Word 19 means:**
04	BOOTP status: If the number of attempts are zero, BOOTP is ready when called. If attempts have a value, the PC did not respond	Attempts	Adapter position or serial number of adapter		
05	Server's LAN connection is active but the PC failed to connect. Are the PC and server on the same network? Are they using the same protocol? Can the PC ping the server? (ping serverhostname)	IP address	Adapter position or serial number of adapter		
06	LAN is active but IPv6 auto-configuration has failed	IPv4	IPv6 Status	Upper IPv6 interface ID	Lower IPv6 interface ID
07	LAN is active but no IPv4 address has been obtained through BOOTP and IPv6 auto-configuration has failed	ssss bbbb ssss = IPv6 status bbbb = Bootp attempts	Card position or serial number of adapter	Upper IPv6 interface ID	Lower IPv6 interface ID

Common IPv6 status codes:

• 9043 - Duplicate IPv6 address

• 9046 - Duplicate auto-configured, link-local IPv6 address

Table 6. Word 16 reference code. The console type value is represented by the last 4 characters in the form xxxx xxxx.	
Word 16 value:	**Indicates the type of console**
0	Not defined by user (old default value)
3	Operations Console (LAN)
4	Hardware Management Console (HMC)

Table 7. Reference code A6005008: Cable

Cable			
If Word 17 value is:	**Failure**	**Word 18 means:**	**Word 19 means:**
1	Asynchronous adapter not detected		
2	No cables detected	Adapter position	Adapter type
3	Wrong cable detected	Adapter position	Cable ID
4	Port in use	Adapter position	Adapter type
FA	Not configured for direct cable		

Starting point for automatic installation recovery

If you used the automatic installation process (replacing an IBM i release using automatic installation), use the following information to determine where the failure occurred and the appropriate recovery action.

After you have the problem corrected, go to "Starting the automatic installation process again" on page 158.

- To use automatic installation recovery, you must use the same version, release, and modification distribution media that caused the failure.
- If you have a failure during the automatic installation process and sign on to do problem analysis, your system will be running under the QSYSSBSD controlling subsystem. When your system completes an IPL after the installation has completed successfully, your controlling subsystem is active again.

Finding the problem (symptom)	Where to start
Reference code B608 1105	"Licensed Internal Code recovery" on page 150
Reference codes other than B900 xxxx	"Licensed Internal Code recovery" on page 150
Reference codes starting with B900 3xxx	"Operating system recovery" on page 152
Messages starting with CPZ20xx	"Operating system recovery" on page 152
Message that indicates the Licensed Internal Code and operating system software agreements have not been accepted.	"Licensed Internal Code recovery" on page 150
Message that indicates automatic installation is not complete.	"Licensed programs, PTFs, and secondary language recovery" on page 154

Licensed Internal Code recovery

Use this procedure if an error occurred when you installed the Licensed Internal Code.

1. Use the following table to determine the action to take if the Install Licensed Internal Code - Error display shows the following message: An unrecoverable error occurred. The error reason code is listed below. This install cannot be completed. Give the reason code to your authorized service provider. Do not re-IPL the system until your authorized service provider can retrieve any needed information.

Reason code	Action
51 52 53 54	If you are using optical media, clean the media. If you are using tape, clean the tape device. Then retry the installation.
All others	Retry the installation. If the installation fails again with the same reason code, retry the installation with another set of media. If the same failure occurs, contact your authorized service provider.

2. If you received a message that indicates the load source disk unit needs additional space for Licensed Internal Code, follow the directions in the error message. Ensure that you have adequate disk storage before you allocate the additional space for the Licensed Internal Code. The tasks for this are described in the topic "Ensuring the system meets disk storage requirements for upgrades" on page 51.The tasks for allocating additional space are in the topic, "Required: Allocating additional space for Licensed Internal Code" on page 53.

3. If you received a message that indicates the Licensed Internal Code and operating system software agreements have not been accepted, perform the steps "Required: Accepting software agreements" on page 50.

4. Find the reference code that is shown on the control panel display and take the appropriate recovery action. If the reference code indicates that you have a media error, thoroughly clean the installation device. If you are using optical media, clean the media. If you are using tape, clean the tape head and tape path thoroughly. Then continue with the next step. If you receive another error message that indicates a media error on the same media, get another set of media to complete the installation process.

   For a complete list of Licensed Internal Code reference codes, go to Analyzing and handling problems in the IBM i Information Center and follow the instructions.

5. You are trying to do one of the following:

   - Install from optical media when an alternate installation device is enabled.
   - Use an alternate installation device which is not enabled.

   Go to Setting up an alternate installation device or Disabling an alternate installation device and perform the appropriate procedure.

   If you cannot find the address information or the configuration has changed and the address is wrong, you must determine the address by physical inspection. This inspection can be difficult and could vary depending on your system model and the specific configuration of your IO buses. For this reason, IBM recommends that you call your next support level for help in determining the addresses for the alternate installation device. A service agreement might be required for this type of assistance.

6. Start the installation process again.

   If you were using the automatic installation process, go to "Starting the automatic installation process again" on page 158 to start the installation process again. You must load the first volume in the installation device to start the automatic recovery installation process.

   If you were using the manual installation process, go to "Starting the manual installation process again" on page 159 to start the installation process again.

The following table lists error messages that could occur during the installation of Licensed Internal Code when using image catalogs.

Message	Description
B60041FD	**Cause:** This reference code occurs when the decompression of Licensed Internal Code fails when performing an installation using image catalogs. A main storage dump occurs. This should be copied to the auxiliary storage pool (ASP) or media. Words 12 and 13 of the reference code contain reason codes that indicate why the failure occurred. If you plan to contact your authorized service provider, write down the 8 numbers from word 13. **Recovery:** No Licensed Internal Code has been installed yet. You can either restart the system by using the currently installed Licensed Internal Code (perform a B-side IPL) or by using the physical media to install.
B60041FC	**Cause:** This reference code occurs when the Licensed Internal Code installation fails when performing an installation using image catalogs. Words 12 and 13 of the reference code contain reason codes that indicate why the failure occurred. If you plan to contact your authorized service provider, write down the 8 numbers from word 13. **Recovery:** Use physical media to perform the installation.

Operating system recovery

Use this procedure if an error occurred when you installed the IBM i operating system.

1. If a problem occurs when you are replacing or installing the operating system, a reference code appears on the control panel display, or an error message appears on the console. Use the following tables to determine the cause of the problem and take the action indicated. Then continue with the next step in this list.

2. If you were using the automatic installation process, start the process again using the instructions in .

3. Start the manual installation again using the following steps.

   a. Load the first volume into the installation device for the alternate IPL. Prepare the device.

   b. Use the control panel to set the mode to **Manual** and select function **03**. Press Enter on the control panel.

   c. Return to the task that failed and start the task again at the step where the IPL or Install the System display appears on the console.

   d. After you respond to the Confirm Install of the Operating System display, you should see the Select a Language Group display. Verify that the language feature that is displayed matches the language feature for the IBM i installation media that you are using.

Table 8. Operating system problems	
Symptom	**Action**
B900 3000 through B900 308F	The reference codes in this range are displayed by the installation of the operating system process. Review the information in Analyzing and handling problems in the IBM i Information Center. Take the appropriate recovery action. Then start the installation process again.
B900 3100 through B900 37FF	The reference codes in this range are displayed by the start operating system process. Go to Analyzing and handling problems in the IBM i Information Center. Take the appropriate recovery action.

Table 8. Operating system problems (continued)

Symptom	Action
Other reference codes not listed in this table.	If the reference code is not in the range of reference codes listed in this table, go to Analyzing and handling problems in the IBM i Information Center.

The following table contains some of the error messages that could occur during the installation of the operating system.

Table 9. Error messages

Message	Description
CPA3DE6	**Cause:** Software agreements were not found on the volume loaded in the alternate IPL device. **Recovery:** Read the instructions for the message that is displayed on the console. Perform the recovery action described in the message to correct the problem.

CPZ2003 CPZ2004 CPZ2005 CPZ2010 CPZ2011	**Cause:** The installation process received a tape or optical media error code.
	
	Note: If you are performing a network installation of the operating system, there is a network problem or slow network performance.
	
	Recovery for Error Code Ex10 0019 or Ex10 001A:
	
	1. Check the media
	
	    • If you are using a physical device, ensure the device is properly connected and the device contains the proper media. Clean the media if necessary.
	    • If you are using a network device, ensure the device has been properly setup and configured.
	
	2. Try the installation process again.
	
	    • If you were using the automatic installation process, go to "Starting the automatic installation process again" on page 158.
	    • If you were using the manual installation process, go to step 3 in "Licensed Internal Code recovery" on page 150 to start the installation process again.
	
	If you receive another error message indicating a media error on the same installation media, contact your software provider to get another set of installation media to complete the installation process.
	
	Recovery for all other error codes: Contact your authorized service provider.

CPZ2022	**Cause:** The restore options read from the installation profile are not valid. **Note:** If you create distribution media and specify *NONE for the installation profile name, the media will contain an empty installation profile. These media cannot be used to perform an automatic installation. **Recovery:** Record the recovery information for the error message. Try to install the operating system again using the manual installation process. You can also try to use the automatic installation process with a different set of media. If the problem occurs again during an automatic installation process, contact your next level of service.

Table 9. Error messages (continued)	
Message	**Description**
CPZ2023	**Cause:** The installation options read from the installation profile are not compatible with the current state of the system. The installation requested by the options read from the installation profile cannot be performed. For example, this condition can occur when an installation is requested that does not load program objects and that results in the QSYS library being damaged. **Recovery:** Try to install the operating system again using the manual installation process.
CPZ20xx	**Cause:** These termination messages are displayed by the installation of the operating system process. Print the display if possible; otherwise, copy all of the information. **Recovery:** Read the instructions for the messages that are displayed on the console. Perform the recovery action described in the message to correct the problem and then try the installation process again. **Note:** A short time after you press Enter, a B900 xxxx reference code is displayed. Analyzing and handling problems in the IBM i Information Center contains additional information.

Licensed programs, PTFs, and secondary language recovery

Use this procedure if an error occurred when you installed an IBM i licensed program, PTF, or secondary language.

1. Type GO LICPGM on an IBM i control language (CL) command line.
2. On the Work with Licensed Programs menu, type 50 (Display log for messages). Press Enter.
3. The Display Install History display appears. Press Enter.
4. The Display History Log Contents display appears. Look at the messages to determine the installation status of the licensed programs and PTFs. The messages show what part of the licensed program installation function has failed. Areas where the failure could have occurred include the following:

   - Installing the IBM-supplied libraries
   - Installing the licensed programs
   - Installing PTFs
   - Installing a secondary language
   - Initialization process

   If a problem such as a power failure occurs during a process in the preceding list, you could see a message that the process has started. An example of such a message is Licensed program installation process started. However, the failed or completed status message might not be displayed.

5. There should be one or more messages that indicate which IBM-supplied library or licensed program failed. Be sure to look at all of the messages. Use F10 (Display all) to see all messages.
6. To see the online help information, move the cursor to the message and press the Help key. Look at the online help information for the error message to get the message identifier and more information about the cause and recovery for the failure. Go to the error messages table in this topic to review the list of possible messages that you could see.
7. A copy of the job log has been spooled to an output queue.

To locate and display the job log, enter one of the following Work with Spool File (WRKSPLF) commands:

- For automatic installation, type the following command and press Enter: `WRKSPLF SELECT(QLPAUTO) ASTLVL(*INTERMED)`
- For manual installation, type the following command and press Enter: `WRKSPLF SELECT(QSECOFR) ASTLVL(*INTERMED)`
- For the PTF process, type the following command and press Enter: `WRKJOB JOB(000000/QSYS/ SCPF)` then select option 10 to view the job log.

If the bottom of the display shows More..., page down (Roll up) until Bottom... appears. Select option 5 (5=Display) on the last entry.

Note: Ignore any error messages listed in the nnnnnn/QSYS/QLPINSTALL job log. These messages are not installation error messages.

Scan the job log for error messages. Determine the cause and recovery for each error message in the job log. Go to the error messages table in this topic for a list of possible messages that you might see. Be sure to scan the entire job log. There could be more than one failure. Scan the job log by using the message ID. Remember that the message ID is case-sensitive.

8. Select option 10 (Display installed licensed programs) on the Work with Licensed Programs display. The Installed Status column indicates which licensed programs and optional parts are installed. The Installed Status column also indicates whether each licensed program installed successfully and whether it is compatible with the installed operating system. Refer to "Installed status values" on page 196 for a description of the installed status values.

You can press the F11 key to see a view of the display that shows the Installed Release column. The version, release, and modification value appears for licensed programs that are either installed compatibly or are installed at a back level. Page down (Roll up) through all of the displays to see the status of your licensed programs.

Check to see if the licensed program that you are installing had a different language feature code than your primary language feature code. If it does, the licensed program either is flagged as *ERROR or the column is blank. The language objects for the licensed program are installed in a secondary language library. Obtain distribution media with the correct primary language feature code. Press the F3 key to return to the Work with Licensed Programs menu.

9. After you determine the cause of the error and complete the recommended recovery action, resume the installation process. If you were using automatic installation, go to "Starting the automatic installation process again" on page 158. If you were using the manual installation process, go to "Starting the manual installation process again" on page 159.

The following table contains some of the error messages with possible causes of the errors. Look at the messages on your system to determine the exact cause and recovery.

Message	Description
CPA3DD2 CPA3DD3	**Cause:** The system could not identify the last volume loaded in the device. **Recovery:** Open the device door, verify that correct volume is loaded, and close the device door.

Message	Description
CPA3DDD CPA3DDF	**Cause:** The installation process is expecting more licensed programs to be loaded. **Recovery:** If you have more media that contains licensed programs, load the volume and type G to continue the installation process. If you do not have any more volumes that contain licensed programs, type X to indicate that there is no more media to load. When the installation process is completed, use option 50 of the LICPGM menu to verify messages in the installation history log.
CPA3DE1	**Cause:** The volume that is loaded does not contain licensed programs that are supported through the Work with Licensed Programs (LICPGM) menu. **Recovery:** Load the optical media that contains licensed programs.
CPDB6DA	**Cause:** During a manual installation, the software agreement for a licensed program was not accepted and cannot be installed. **Recovery:** Follow the instructions in "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118 to accept the software agreement and retry the installation.
CPDB6DB	**Cause:** During an automatic installation, the software agreement for a licensed program was not accepted and cannot be installed. **Recovery:** Follow the instructions in "Using the Work with Licensed Programs menu to install IBM licensed programs" on page 118 to accept the software agreement and retry the installation.
CPD4F39	**Cause:** The volumes located in a network optical device are not in the correct sort order for the program temporary fix (PTF) package application. **Recovery:** Follow these steps: 1. Find the catalog that owns the images loaded in the device. 2. Use the Verify Image Catalog (VFYIMGCLG) command to sort the volume list for the type Program Temporary Fix. 3. Use the Vary Configuration (VFYCFG) command to vary off and vary on the device.
CPF3DC1	**Cause:** Directory objects for product 5770SS1 option *BASE release V7R1M0 failed to install. The system will not install library QGPL and will not allow licensed programs to be installed until the directory objects have been installed. **Recovery:** See previous messages in the job log to determine the cause of the failure. Correct the errors
CPF3DC2	**Cause:** Required user library cannot be installed. The system will not install library QGPL and will not allow licensed programs to be installed because the operating system directory installation was not successful. **Recovery:**Examine the history log for errors that occurred while operating system directories were being installed. Correct the errors.

Message	Description
CPD32B0 reason code 7 CPF327E reason code 3	**Cause:** 5770SS1 option 1, Extended Base Support, failed to install. **Recovery:** Use the Reclaim Storage (RCLSTG) command and try to install option 1 again.
CPD3713	**Cause:** The licensed program is currently installed on your system and was not found on the distribution media. **Recovery:** Get another set of distribution media that contains the licensed program. Either install the licensed program again from "Installing additional licensed programs" on page 117 or delete the licensed program from your systemif you no longer want it.
CPD3D82 CPF3D8F	**Cause:** These messages could be shown if you did not end all of the subsystems before you started the installation process. **Recovery:** End all subsystems and start installing the licensed programs again.
CPF371C CPF3731	**Cause:** Look at the messages previously listed in the job log to determine the failure. **Recovery:** Take the recommended recovery action. If you received one of these messages, the installation process ended before you completed installing the licensed programs.
CPF371D CPF371E	**Cause:** These messages could be shown if the wrong volume is loaded. The online information of the message can help determine the cause. **Recovery:** Load the correct volume and start the process again.
CPF3D96	**Cause:** Errors occurred during the restoring process for a licensed program. **Recovery:** Take the recommended recovery action explained in the online help information. If you received these messages, the installation continued with the other licensed programs if the problem was not too severe. However, problems with the tape or system storage level would have caused the installation to end.
CPF3D81 CPF3D84 CPF3D8B CPF3D8C CPF3D90 CPF3D91	**Cause:** Errors occurred when restoring a licensed program or PTFs. **Recovery:** Use the Display Job (DSPJOB) command. Enter DSPJOB nnnnnn/QLPINSTALL/QBCHINST or DSPJOB nnnnnn/QLPINSTALL/QLPINSTALL where nnnnnn is the job number of the job log in the message help of the error message. Select option 4 on the Display Job display to display spooled files. Select option 5 on the Display Job Spooled Files display to determine the cause of the failure. Correct the error and start the installation process again. Ignore error messages in the nnnnnn/QSYS/QLPINSTALL job log. These messages are not installation error messages.

Message	Description
CPF3D82 CPF3D83	**Cause:** There is not enough auxiliary storage to install the licensed programs that you selected. **Recovery:** Go to "Licensed program releases and sizes" on page 167 to determine the space requirements for each licensed program that you want to install. Obtain additional auxiliary storage and start the installation process again.
CPF3D85 CPF3D86 CPF3D8E	**Cause:** An object or PTF is not installed because it requires successful installation of a licensed program. That licensed program might not be installed or might be installed at the wrong release. **Recovery:** See the previous messages in the job log to determine if the licensed program is installed successfully. Correct any errors or install the required licensed program and start the installation process again.
CPF3DD3	**Cause:** The device description could not be found or could not be used. **Recovery:** Create a device description for the installation device (optical or tape). Use the CRTOPTDEV command to create a device description for the optical device that supports the optical media class. Use the CRTDEVTAP command to create a device description for the tape device. Then start the process again.
CPI3D82 CPI3D84 CPI3D85	**Cause:** A licensed program that is included on the distribution media was not currently installed on the system. **Recovery:** Use the online information of the message for recovery help. Use the topic "Installing additional licensed programs" on page 117 to install the licensed program.
Media error messages	**Cause:** A media error occurred during the installation process. **Recovery:** If you are using optical media, clean the disc, and then follow the recovery actions that are indicated for this message. If you are using tape, clean the tape head and tape path thoroughly. If you receive another error message that indicates a media error on the same tape, get another set of tapes to complete the installation.

Starting the automatic installation process again

If you want to start the IBM i automatic installation process again after recovering from an error, use one of these methods.

Method	Instructions
Method 1: Licensed Internal Code	**When to use:** This method should be used if the Licensed Internal Code needs to be installed again. If you are sure the Licensed Internal Code has been successfully installed, you do not need to use this method. No message indicates that the Licensed Internal Code has been installed successfully; however, messages do indicate that the operating system has been installed successfully. If the operating system has been installed successfully, so has the Licensed Internal Code. **How to use:** To start an installation process again, use the instructions in Chapter 7, "Upgrading or replacing software using automatic installation," on page 57.

Method	Instructions
Method 2: Operating System	**When to use:** If you are sure the Licensed Internal Code has been installed successfully, use Method 2 to install the operating system again. Method 2 is faster than using Method 1 because the Licensed Internal Code does not need to be installed again. No message indicates that the Licensed Internal Code has been installed successfully; however, messages do indicate that the operating system has been installed successfully. If the operating system has been installed successfully, so has the Licensed Internal Code. **How to use:** 1. Use the control panel to set the mode selector to **Manual**. The function selected should be **03** (Start IPL). If you are upgrading a logical partition, use the virtual control panel function of your HMC. 2. Start the IPL. 3. Load the first volume in the installation device. 4. When the IPL or Install the System display is shown, set the mode selector to **Normal**. 5. Select option 4 (Perform an automatic install of the operating system) on the IPL or Install the System display. 6. When the Install Device Type Selection display is shown, set the installation device type. 7. Continue with step "14" on page 61 in the "Replacing software using the automatic installation method" on page 58 topic.
Method 3: Licensed Programs	**When to use:** Use the Work with Licensed Programs display to install only the licensed programs that failed to install. Make sure the Licensed Internal Code and the operating system are successfully installed. **How to use:** Determine which products failed to install. Use option 11 (Install licensed programs) on the Work with Licensed Programs display. To install the licensed programs from a list, refer to "Installing additional licensed programs" on page 117.

Starting the manual installation process again

If you want to start the IBM i manual installation process again after recovering from an error, use one of these methods.

Method	Instructions
Method 1: Licensed Internal Code	**When to use:** This method should be used if the Licensed Internal Code needs to be installed again. If you are sure the Licensed Internal Code has been successfully installed, you do not need to use this method. No message indicates that the Licensed Internal Code has been installed successfully; however, messages do indicate that the operating system has been installed successfully. If the operating system has been installed successfully, so has the Licensed Internal Code. **How to use:** To start an installation process again, use the instructions in Chapter 8, "Upgrading or replacing software using manual installation," on page 65.

Method	Instructions
Method 2: Operating System	**When to use:** If you are sure the Licensed Internal Code has been installed successfully, use Method 2 to install the operating system again. Method 2 is faster than using Method 1 because the Licensed Internal Code does not need to be installed again. No message indicates that the Licensed Internal Code has been installed successfully; however, messages do indicate that the operating system has been installed successfully. If the operating system has been installed successfully, so has the Licensed Internal Code. **How to use:** 1. Use the control panel to set the mode selector to **Manual**. The function selected should be **03** (Start IPL). If you are upgrading a logical partition, use the virtual control panel function of your HMC. 2. Start the IPL. 3. Continue with the "Replacing the IBM i operating system" on page 72 topic.
Method 3: Licensed Programs	**When to use:** This method should be used if several licensed programs are not installed. **How to use:** To start an installation process again using method 3, use option 1 (Install all) on the Work with Licensed Programs display. Refer to "Manual installation Option 1. Install all" on page 198.
Method 4: Licensed Programs	**When to use:** This method should be used if one or more licensed programs are not installed and you want to install only those licensed programs or optional parts that failed. **How to use:** To start the installation of only those licensed programs or optional parts that failed, use the instructions in "Installing additional licensed programs" on page 117. Complete all of the instructions in that part.
Method 5: PTFs	**When to use:** This method can be used if only one or two licensed programs had PTFs that failed to install. Consider installing PTFs for only those licensed programs that failed. **How to use:** To install PTFs for selected licensed programs, use the **GO PTF** menu and select option 7 (Install a program temporary fix from a list).
Method 6: PTFs	**When to use:** This method should be used if several licensed programs had PTFs that failed to install. Consider installing the entire cumulative PTF package again. **How to use:** To install the cumulative PTF package, use the instructions in the *System PTF Shipping Information Letter*.

Initialize System (INZSYS) recovery

In an IBM i software upgrade, the installation is complete when the licensed program portion of the installation process and the INZSYS process is completed successfully. If the INZSYS process did not complete, follow these procedures.

The installation process must end before the INZSYS process is automatically started. This process is initiated during each IPL after you install the QUSRSYS library until the INZSYS process has successfully completed. The INZSYS process will not be initiated during the IPL if the system is in the restricted state. If the INZSYS process is initiated during the IPL, it runs in the SCPF system job.

Note: If you perform an IPL before installing a cumulative PTF package, make sure that the INZSYS process has completed before you start to install the PTF package. Using any PTF commands before the INZSYS process is completed causes the INZSYS to fail.

The completion time for INZSYS varies. Allow sufficient time for this process to complete.

When you select option 50 (Display log for messages) on the Work with Licensed Programs menu, you should see the message `Initialize System (INZSYS) started`. Later, you should see the message `Initialize System (INZSYS) processing completed successfully (CPC37A9)`. If you do not see the completed message, or if the message `Initialize System (INZSYS) failed` appears, look at the job log to determine the problem. Use the information in the job log to correct the problem. Then start the conversion process again.

To start the conversion process yourself, you can either use a batch job or enter INZSYS on the IBM i control language (CL) command line. If you use a batch job, you can use your workstation while the process is running, but the system cannot be in a restricted state. Batch jobs do not run when the system is in a restricted state. If you enter INZSYS from a CL command line, IBM recommends that the system be in a restricted state. Setting the system to a restricted state reduces the time that is needed for the INZSYS process to complete. Before you use the INZSYS command, set the mode selection to **Normal** and set the IPL type to **B** (or the IPL type that you use for everyday operation).

To set the system to restricted state, do the following:

1. Type `CHGMSGQ QSYSOPR *BREAK SEV(60)` and press Enter.
2. A message display could be shown. Press Enter. (Ignore the messages that are shown.)
3. Type the End Subsystem (ENDSBS) command: `ENDSBS *ALL *IMMED`.

   The message `System ended to restricted condition` appears.

   Press Enter to continue.

To start the conversion process again, do the following:

1. Type `INZSYS` and press Enter.
2. Use option 50 (Display log for messages) on the Work with Licensed Programs menu to make sure that the process is completed successfully.

Do not attempt to save your system until the INZSYS process has completed successfully.

Disk configuration warning and error messages

You see a disk configuration warning or an error report on a display when your system detects errors or warning conditions in your disk configuration. You might see this display immediately after the hardware upgrade procedure or while you are installing the IBM i operating system.

Perform the actions necessary if you see a disk configuration warning or an error report. The action you take for each message depends on the upgrade method that you are using. The following table lists the messages that you might see on the display and the actions that you should take. For each message, you can select option 5 (Display Detailed Report) to see more information about why the message occurred and what possible actions are available.

Attention: Are you using Option 1? When you are installing the Licensed Internal Code by using option 1 from the Install the Licensed Internal Code (LIC) menu, disk configuration warning messages might mean that the system will not be able to recover its ability to access the data on your disk units. **Important:** Do not ignore these messages or attempt to resolve them without consulting the table. An incorrect response will probably require you to reload your data.

Warning messages	Your action: Option 1 (Restore Licensed Internal Code)
Disk unit not formatted for optimal performance	Do the following: 1. Type a 5 (Display Detailed Report). 2. Write down the disk units that should be reformatted. 3. Press F12 to return to the warning report display. 4. Press F10 to accept the warning and continue. You cannot reformat the disk units during the upgrade procedure.
Unit possibly configured for PowerPC® AS	Contact software support before you proceed.
Unit possibly configured for IMPI	Contact software support before you proceed.
Missing disk configuration	Contact hardware support before you proceed.
Unknown load source status	Contact hardware support before you proceed.
Load source failure	Contact hardware support before you proceed.
Restore load source	Contact software support before you proceed.
Missing disk units in the configuration	Contact hardware support before you proceed.
Restore in progress	View the online information and take the appropriate recovery action.
Device parity protected units in exposed mode	You have a failed unit in a parity set. You can ignore this message and continue the upgrade procedure. However, you should contact hardware support immediately after the upgrade procedure.
No alternatives available	Contact software support before you proceed.
New disk configuration	Contact software support before you proceed.
Incorrect Licensed Internal Code installed	Contact hardware support before you proceed. The load-source disk unit and its mirrored pair might be configured incorrectly.
Change load source location	Contact hardware support before you proceed. Your load-source disk unit might be configured incorrectly.
Bad load source configuration	Contact hardware support before you proceed. Your load-source disk unit might be configured incorrectly.
Overflowed ASPs	Wait to correct the problem until after the upgrade process is completed. For further instructions, refer to Resetting an overflowed user auxiliary storage pool (ASP) during an initial program load (IPL)in the IBM i Information Center.

Warning messages	Your action: Option 1 (Restore Licensed Internal Code)
Lower level of protection	Ignore during the installation procedure. However, you should analyze your mirrored configuration after the installation procedure.
Unit is missing connection.	Contact hardware support before you proceed.

Starting from a power-off condition

If your system must be powered on, perform these steps.

1. Use the control panel to set the IPL type to **B** and to either one of these modes:
    - **Normal**. On some models, this will appear as **BN**.
    - **Manual**. On some models, this will appear as **BM**
2. Press Enter on the control panel.
3. On your console, ensure that you have a connection to the system.

Reference codes for IBM i software installation

If a reference code appeared during the automatic or manual installation, use these procedures.

This information gives a brief explanation of the common reference codes (also known as system reference codes or SRCs) that you might see while upgrading or replacing a release.

Common reference codes for IBM i software installation

This table identifies the most common reference codes related to an IBM i software installation or upgrade.

Table 10. Common reference codes	
Symptom	**Action**
A1xx 19xx A12x 19xx (x is any character)	These reference codes appear if the installation device for an alternate IPL is not ready. Check the following: • Is the correct media volume loaded? • Is the device ready? • Is the device being used for a different purpose than the device was used for during the previous IPL? • Is the installation media loaded in the alternate IPL or alternate installation device allocated for that partition? Any of these situations can cause these reference codes to appear. In the first two examples, ensure that the media volume is loaded correctly and that the device is ready. In the last example, you need to wait while the system finds the new installation device. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
A600 1103	This reference code appears when Licensed Internal Code is damaged. Use the control panel or virtual control panel (Work with Partition Status display) to set the IPL type to **D** and to set the mode to **Manual**. Then use the instructions for Chapter 8, "Upgrading or replacing software using manual installation," on page 65.

Table 10. Common reference codes (continued)	
Symptom	**Action**
A600 1104	This reference code appears if the installation media is not readable. Either the media is dirty or damaged, or there is an error with the optical device. Clean the media or acquire a new set of media. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
B1xx 4504 B1xx 1933	This reference code appears when the system cannot locate the device used for the alternate IPL. Check that the installation media is loaded in correct device and, if necessary, make the device ready. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
B1xx 4505	These reference codes appear if the installation media is dirty or if the wrong media was loaded. Verify that the correct media is loaded. If the problem still remains, clean the optical disk. If you are using tape, clean the tape head and tape path. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
B1xx 4507	These reference codes appear if the tape device for the alternate IPL was not found or was not ready. Make sure the tape device is powered on and the correct tape is loaded and ready. To make tape devices ready, you might need to open and close the tape device door. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
B2pp 1310 (pp is the partition ID)	No alternate IPL device IOP was selected. The IPL will attempt to continue, but there might not be enough information to find the correct alternate IPL load source. Configure an alternate IPL device IOP for the logical partition. Then, retry the partition IPL. If it continues to fail, contact your service provider. See Logical partitioning in the IBM Systems Hardware Information Center.
B2pp 1320 (pp is the partition ID)	No default load source IOP was selected for a type A or type B IPL. The IPL will attempt to continue, but there might not be enough information to find the correct load source. Configure a load source IOP for the logical partition. Then retry the partition IPL. If it continues to fail, contact your service provider. See Logical partitioning in the IBM Systems Hardware Information Center.
B2pp 3110 (pp is the partition ID)	The power-on operation for the logical partition failed. Scan the reference code history list of the logical partition for previous B2ppxxxx failure reference codes. Resolve each problem found, and then retry the partition IPL. If it continues to fail, contact your service provider.

Table 10. Common reference codes (continued)

Symptom	Action
B2pp 3200 (pp is the partition ID)	The logical partition failed to initialize a program load. 1. If you performed a power-on operation from IPL type D, remove the installation media (optical or tape media), clean the device and clean the media if possible. Insert the media again and attempt to power on using IPL type D. 2. Verify that the device is addressed correctly. 3. Verify that the media is in the correct device. 4. Verify that the media in the device is compatible. 5. Verify that the IOP selected as the IPL resource is correct. 6. Retry the partition IPL.
B2pp 4158 (pp is the partition ID)	A failure occurred during a search for the load source. Scan the reference code history list of the logical partition for previous B2ppxxxx failure reference codes. Resolve each problem found, and then retry the partition IPL. If it continues to fail, contact your service provider.
B2xx xxxx	All other reference codes: If you performed a D-mode IPL, clean the device and media, and then retry the same type of power-on operation.
B608 1105	This reference code occurs when you exit from the automatic installation because an alternate installation device that is attached to the system has one of the following problems: • The device is enabled, but it is not ready because the tape is not loaded. • The device is not enabled as an alternate installation device. • The device itself has a problem. To use the alternate installation device, do the following: 1. Power off the system. 2. If necessary, fix the device. 3. Power on the system. 4. Verify that the alternate installation device is enabled as an alternate installation device. 5. Load the tape media in the alternate installation device and start the installation procedure again.
B900 3121	This reference code occurs when an IPL is attempted after an installation failure. You need to reinstall some or all of the operating system. Start with the media volume containing the base operating system. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
2644 3136	This reference code appears if the tape device is assigned to another system or partition. Go to the other system or partition and vary off this tape device. Make sure the correct tape is loaded. Then perform the appropriate procedure under "IBM i installation recovery after using reference codes" on page 166.
Any other reference code	Go to Chapter 15, "Troubleshooting software installation problems," on page 145, and follow the instructions there.

IBM i installation recovery after using reference codes

After taking the corrective action for a reference code, perform one of these procedures to continue the IBM i installation or upgrade. Use the procedure that is appropriate for the installation process that was in use when the reference code appeared.

If you used automatic installation:

1. Set the mode selector or toggle on the control panel to **Manual**.
2. Press the power switch to delayed off, press it again, and wait for the entire system to power off.
3. Set the mode selector or toggle on the control panel to **Normal**.
4. Press the power switch on and make the installation device ready. If the system attention light appears and the same reference code appears again, go to "Licensed Internal Code recovery" on page 150. Otherwise, continue with step "12" on page 60.

If you used manual installation:

1. Make sure that the media is loaded in the installation device for the alternate IPL.
2. Press the power switch to delayed off, press it again, and wait for the entire system to power off.
3. Press the power switch on and make the installation device ready. If the system attention light appears and the same reference code appears again, go to "Licensed Internal Code recovery" on page 150. Otherwise, continue with step "11" on page 68.

Chapter 16. IBM i software reference

This topic contains a collection of supporting information about the concepts and tasks related to upgrading or installing IBM i software.

Licensed program releases and sizes

The following licensed programs are available this release and are compatible with the IBM i operating system.

To help you plan for installing your new release, use this information to find the release and current size of the licensed programs that are listed.

Product	Option	Description	Version	Status	Storage (MB)
5770-999		Licensed Internal Code	V7R4M0	Refreshed	8192.0
5770-SS1	Base (QGPL, QUSRSYS, QSYS)	IBM i	V7R4M0	Refreshed	2012.1
5770-SS1	1	Extended Base Support	V7R4M0	Refreshed	231.2
5770-SS1	2	Online Information	V7R4M0	Refreshed	46.0
5770-SS1	3	Extended Base Directory Support	V7R4M0	Refreshed	2541.7
5770-SS1	5	System/36 Environment	V7R4M0	Refreshed	29.7
5770-SS1	6	System/38 Environment	V7R4M0	Refreshed	11.1
5770-SS1	7	Example Tools Library	V7R4M0	Refreshed	10.4
5770-SS1	8	AFP Compatibility Fonts	V7R4M0	Refreshed	19.8
5770-SS1	9	*PRV CL Compiler Support	V7R4M0	Refreshed	94.7
5770-SS1	12	Host Servers	V7R4M0	Refreshed	16.2
5770-SS1	13	System Openness Includes	V7R4M0	Refreshed	579.6
5770-SS1	14	GDDM	V7R4M0	Refreshed	16.6
5770-SS1	18	Media and Storage Extensions	V7R4M0	Refreshed	2.9
5770-SS1	21	Extended NLS Support	V7R4M0	Refreshed	122.6
5770-SS1	22	ObjectConnect	V7R4M0	Refreshed	1.7
5770-SS1	23	OptiConnect	V7R4M0	Refreshed	6.9
5770-SS1	26	DB2® Symmetric Multiprocessing	V7R4M0	Refreshed	2.5
5770-SS1	27	Db2 Multisystem	V7R4M0	Refreshed	1.0
5770-SS1	30	Qshell	V7R4M0	Refreshed	12.7
5770-SS1	31	Domain Name System and Dynamic Host Configuration	V7R4M0	Refreshed	111.5
5770-SS1	33	Portable App Solutions Environment	V7R4M0	Refreshed	574.5

Product	Option	Description	Version	Status	Storage (MB)
5770-SS1	34	Digital Certificate Manager	V7R4M0	Refreshed	32.8
5770-SS1	35	CCA Cryptographic Service Provider	V7R4M0	Refreshed	11.0
5770-SS1	36	PSF for IBM i 1-55 IPM Printer Support	V7R4M0	Refreshed	1.6
5770-SS1	37	PSF for IBM i 1-100 IPM Printer Support	V7R4M0	Refreshed	0.8
5770-SS1	38	PSF for IBM i Any Speed Printer Support	V7R4M0	Refreshed	1.1
5770-SS1	39	International Components for Unicode	V7R4M0	Refreshed	742.8
5770-SS1	41	HA Switchable Resources	V7R4M0	Refreshed	1.0
5770-SS1	42	HA Journal Performance	V7R4M0	Refreshed	4.2
5770-SS1	43	Additional Fonts	V7R4M0	Refreshed	1768.3
5770-SS1	44	Encrypted Backup Enablement	V7R4M0	Refreshed	0.1
5770-SS1	45	Encrypted ASP Enablement	V7R4M0	Refreshed	2.8
5770-SS1	47	IBM Advanced Data Security for i	V7R4M0	Refreshed	0.5
5770-SS1	48	Db2 Data Mirroring	V7R4M0	New	0.3
5761-AP1	base	IBM Advanced DBCS Printer Support for iSeries	V6R1M0	Ship level	15.9
5761-AP1	1	Adv DBCS Printer Support - IPDS	V6R1M0	Ship level	2.0
5733-ARE	base	IBM Application Runtime Expert for i	V1R1M0	Ship level	95.4
5770-BR1	base	IBM Backup, Recovery and Media Services for i	V7R4M0	Refreshed	325.7
5770-BR1	1	BRMS - Network Feature	V7R4M0	Refreshed	2.7
5770-BR1	2	BRMS - Advanced Feature	V7R4M0	Refreshed	2.0
5761-CM1	base	IBM Communications Utilities for System i	V6R1M0	Ship level	14.4
5733-CY3	base	IBM Cryptographic Device Manager for i	V7R4M0	Refreshed	74.6
5761-DB1	base	IBM System/38 Utilities for System i	V6R1M0	Ship level	82.5
5770-DBM	base	IBM Db2 Mirror for i	V7R4M0	New	13.0
5770-DBM	1	Db2 Mirror Enablement	V7R4M0	New	1.2

Product	Option	Description	Version	Status	Storage (MB)
5770-DFH	base	IBM CICS® Transaction Server for i	V7R2M0	Ship level	51.1
5770-DFH	1	CICS - Sample Applications	V7R2M0	Ship level	8.4
5770-DG1	base	IBM HTTP Server for i	V7R4M0	Refreshed	137.3
5761-DS2	base	IBM Business Graphics Utility for System i	V6R1M0	Ship level	8.7
5798-FAX	base	IBM Facsimile Support for i	V5R8M0	Ship level	56.0
5769-FN1	base	IBM Advanced Function Printing DBCS Fonts for AS/400	V4R2M0	Ship level	0.2
5769-FN1	1	AFP DBCS Fonts - Japanese	V4R2M0	Ship level	76.6
5769-FN1	2	AFP DBCS Fonts - Korean	V4R2M0	Ship level	25.4
5769-FN1	3	AFP DBCS Fonts - Traditional Chinese	V4R2M0	Ship level	14.1
5769-FN1	4	AFP DBCS Fonts - Simplified Chinese	V4R2M0	Ship level	8.3
5769-FN1	5	AFP DBCS Fonts - Thai	V4R2M0	Ship level	3.5
5769-FNT	base	IBM Advanced Function Printing Fonts for AS/400	V4R2M0	Ship level	0.2
5769-FNT	1	AFP Fonts - Sonoran Serif	V4R2M0	Ship level	5.0
5769-FNT	2	AFP Fonts - Sonoran Serif Headliner	V4R2M0	Ship level	5.1
5769-FNT	3	AFP Fonts - Sonoran Sans Serif	V4R2M0	Ship level	4.8
5769-FNT	4	AFP Fonts - Sonoran Sans Serif Headliner	V4R2M0	Ship level	5.0
5769-FNT	5	AFP Fonts - Sonoran Sans Serif Condensed	V4R2M0	Ship level	3.5
5769-FNT	6	AFP Fonts - Sonoran Sans Serif Expanded	V4R2M0	Ship level	2.8
5769-FNT	7	AFP Fonts - Monotype Garamond	V4R2M0	Ship level	3.7
5769-FNT	8	AFP Fonts - Century Schoolbook	V4R2M0	Ship level	4.0
5769-FNT	9	AFP Fonts - Pi and Specials	V4R2M0	Ship level	0.9
5769-FNT	10	AFP Fonts - ITC Souvenir	V4R2M0	Ship level	4.0
5769-FNT	11	AFP Fonts - ITC Avant Garde Gothic	V4R2M0	Ship level	3.8
5769-FNT	12	AFP Fonts - Math and Science	V4R2M0	Ship level	3.2

Product	Option	Description	Version	Status	Storage (MB)
5769-FNT	13	AFP Fonts - DATA1	V4R2M0	Ship level	0.3
5769-FNT	14	AFP Fonts - APL2®	V4R2M0	Ship level	0.8
5769-FNT	15	AFP Fonts - OCR A and OCR B	V4R2M0	Ship level	0.2
5770-HAS	base	IBM PowerHA® SystemMirror® for i	V7R4M0	Refreshed	97.0
5770-HAS	1	IBM PowerHA for i Enterprise Edition	V7R4M0	Refreshed	1.6
5770-HAS	2	IBM PowerHA for i Standard Edition	V7R4M0	Refreshed	1.6
5770-HAS	3	IBM PowerHA for i Express® Edition	V7R4M0	Refreshed	1.6
5770-HAS	4	Reserved	V7R4M0	Refreshed	0.5
5770-HAS	5	Reserved	V7R4M0	Refreshed	0.5
5722-IP1	base	IBM Infoprint Server for iSeries	V5R3M0	Ship level	85.8
5722-IP1	1	PS to AFP Transform	V5R3M0	Ship level	1.0
5770-JS1	base	IBM Advanced Job Scheduler for i	V7R2M0	Ship level	120.2
5770-JV1	base	IBM Developer Kit for Java	V7R4M0	Refreshed	4.2
5770-JV1	16	Java SE 8 32 bit	V7R4M0	Refreshed	431.3
5770-JV1	17	Java SE 8 64 bit	V7R4M0	Refreshed	544.1
5770-MG1	base	IBM Managed System Services for i	V7R4M0	Refreshed	39.0
5770-NAE	base	IBM Network Authentication Enablement for i	V7R4M0	Refreshed	76.2
5733-OMF	base	OmniFind Text Search Server for Db2 for i	V1R5M0	Refreshed	364.7
5770-PT1	base	IBM Performance Tools for i	V7R4M0	Refreshed	13.7
5770-PT1	1	Performance Tools - Manager Feature	V7R4M0	Refreshed	15.9
5770-PT1	2	Performance Tools - Agent Feature	V7R4M0	Refreshed	2.0
5770-PT1	3	Performance Tools - Job Watcher	V7R4M0	Refreshed	0.2
5770-PT1	4	Performance Tools - Reserved	V7R4M0	Refreshed	0.2
5770-PT1	5	Performance Tools - Reserved	V7R4M0	Refreshed	0.1
5770-QU1	base	IBM Query for i	V7R4M0	Refreshed	7.0

Product	Option	Description	Version	Status	Storage (MB)
5770-RD1	base	IBM Content Manager OnDemand for i	V7R4M0	Refreshed	443.45
5770-RD1	12	OnDemand PDF Indexer	V7R4M0	Refreshed	84.3
5770-RD1	14	OnDemand Enhanced Retention Management	V7R4M0	Refreshed	0.8
5770-RD1	15	OnDemand Distribution Facility	V7R4M0	Refreshed	0.3
5733-SC1	base	IBM Portable Utilities for i	V7R2M0	Ship level	5.2
5733-SC1	1	OpenSSH, OpenSSL, zlib functions	V7R2M0	Ship level	118.6
5770-SM1	base	IBM System Manager for i	V7R4M0	Refreshed	20.0
5770-ST1	base	IBM Db2 Query Manager and SQL Development Kit for i	V7R4M0	Refreshed	22.4
5770-TC1	base	IBM TCP/IP Connectivity Utilities for i	V7R4M0	Refreshed	53.1
5770-TS1	base	IBM Transform Services for i	V7R4M0	Refreshed	4.1
5770-TS1	1	Transforms - AFP to PDF Transform	V7R4M0	Refreshed	44.6
5770-UME	base	IBM Universal Manageability Enablement for i	V1R4M0	Ship level	264.0
5770-WDS	base	IBM Rational® Development Studio for i	V7R4M0	Refreshed	39.7
5770-WDS	21	Application Development ToolSet	V7R4M0	Refreshed	36.7
5770-WDS	31	ILE RPG	V7R4M0	Refreshed	14.8
5770-WDS	32	System/36 Compatible RPG II	V7R4M0	Refreshed	4.6
5770-WDS	33	System/38 Compatible RPG III	V7R4M0	Refreshed	6.1
5770-WDS	34	RPG/400®	V7R4M0	Refreshed	9.5
5770-WDS	35	ILE RPG *PRV Compiler	V7R4M0	Refreshed	30.0
5770-WDS	41	ILE COBOL	V7R4M0	Refreshed	33.0
5770-WDS	42	System/36 Compatible COBOL	V7R4M0	Refreshed	9.3
5770-WDS	43	System/38 Compatible COBOL	V7R4M0	Refreshed	8.4
5770-WDS	44	OPM COBOL	V7R4M0	Refreshed	14.2

Product	Option	Description	Version	Status	Storage (MB)
5770-WDS	45	ILE COBOL *PRV Compiler	V7R4M0	Refreshed	55.1
5770-WDS	51	ILE C	V7R4M0	Refreshed	11.0
5770-WDS	52	ILE C++	V7R4M0	Refreshed	89.2
5770-WDS	56	IXLC for C/C++	V7R4M0	Refreshed	2.1
5770-WDS	60	Workstation Tools - Base	V7R4M0	Refreshed	7.1
5733-WQX	base	IBM DB2 Web Query for i	V2R2M1	Refreshed	4696.2
5733-WQX	1	Express Edition	V2R2M1	Refreshed	0.2
5733-WQX	2	Standard Edition	V2R2M1	Refreshed	2.2
5733-WQX	3	Reserved - option 3	V2R2M1	Refreshed	0.2
5733-WQX	4	Developer Users	V2R2M1	Refreshed	0.2
5733-WQX	5	Developer Workbench Users	V2R2M1	Refreshed	0.2
5733-WQX	6	Runtime Enablement Groups	V2R2M1	Refreshed	0.7
5733-WQX	7	JDE Adapter	V2R2M1	Refreshed	0.2
5733-WQX	8	DataMigrator for i	V2R2M1	Refreshed	0.3
5733-WQX	9	Reserved - option 9	V2R2M1	Refreshed	0.2
5733-WQX	10	Reserved - option 10	V2R2M1	Refreshed	0.2
5733-WQX	11	Reserved - option 11	V2R2M1	Refreshed	0.2
5733-WQX	12	Reserved - option 12	V2R2M1	Refreshed	0.2
5733-WQX	13	Reserved - option 13	V2R2M1	Refreshed	0.2
5733-WQX	14	Reserved - option 14	V2R2M1	Refreshed	0.2
5733-WQX	15	Reserved - option 15	V2R2M1	Refreshed	0.2

Product	Option	Description	Version	Status	Storage (MB)
5770-XH2	base	IBM i Access for Web	V7R2M0	Ship level	131.0
5770-XW1	base	IBM i Access Family	V7R4M0	Refreshed	0.3
5770-XW1	1	IBM i Access Enablement Support	V7R4M0	Refreshed	0.2

Estimates for IBM i software installation time

It is difficult to accurately estimate the amount of time needed to install a new release of software. Many variables combine to create a unique set of circumstances for each system. Use this information to help you estimate the time it will take to install your new IBM i release.

can help you make the best use of the time you spend on software installation.

Common methods of estimating IBM i installation time

The most common ways to estimate your total installation time for an upgrade are described in this list. This time includes analyzing your system and other preparation steps before the installation, the actual installation and possible down times, and postinstallation procedures.

- Base your estimate on the installation time of a previous release. If the system configuration and load remain similar, you can use the installation time of a previous release on this system *as the start* of your estimate. If you rely on only the installation time of the previous release, your estimate might not be accurate.
- Base your estimate on the installation time for a similar system. If your enterprise has multiple systems, you can record the actual time to install the new release on one system. You can use this to estimate the time that is needed to install the new release on a system with a similar configuration and load. Of course, you cannot use this method until you complete the installation on the first system.
- Estimate time using a formula. You can use the information in the following sections to estimate how long it will take to install this release on your system. Keep in mind that the number at which you arrive will vary from your actual installation time because of the variables that affect installation time.
- Combine one or more of the methods that are listed.

Conditions that affect IBM i installation time

Several major factors can affect installation performance.

The amount of time it takes to install the licensed programs depends on your system configuration and the licensed programs you are installing. That is, the larger models with more system capacity have a shorter installation time than smaller models loading the same licensed programs. The major factors that affect installation performance are:

- Installation device
- Number and type of disk unit I/O processors
- Processing unit capacity
- Disk unit space available
- Main storage available in base pool
- Human interaction
- Licensed programs to be installed
- Number of object conversions and how the conversions are done

IBM i installation processes

The system determines the type of installation process it uses based on available system resources and the types of products being installed.

A *single-process installation* is when licensed programs are installed one at a time (sequentially). A *multiprocess installation* is when the system starts multiple jobs to perform the installation of two or more licensed programs at the same time.

Licensed Internal Code and the base part of the operating system are always installed using single-process installation. Licensed programs (including libraries QGPL and QUSRSYS and optional parts of the operating system) can be installed using either single-process or multiprocess installation.

If you are installing only one licensed program, the system uses single-process installation. If you are installing more than one licensed program, multiprocess installation is used if system resources are available. If system resources are not available, single-process installation is used. A single-process installation is used when a system's main storage or auxiliary storage is limited and when a licensed program exceeds the requirements for multiprocess installation. For any set of licensed programs, if the system must use single-process installation, the installation takes longer.

Multiprocess installation

The operating system determines if your system configuration has enough system capacity to use multiprocess installation to install licensed programs. If your system has the required resources, the licensed programs are installed concurrently by doing the following tasks:

- Loading the licensed program installation files from the media to temporary save files.
- Using multiple batch jobs to concurrently install licensed programs from the save files. The save files are deleted during the installation process when they are no longer needed.

During installation, a status panel indicates the licensed programs that are currently being installed from save files. The display lists the licensed programs and the type of item being installed for each, as follows:

*PGM
Program objects

*LNG
Language objects

If your system does not have the required resources for a multiprocess installation, the licensed programs are installed sequentially from the installation media (single-process). In single-process installation, the status panel indicates the licensed program that is currently being installed from the media.

Checklist: Estimating IBM i installation time

Follow these directions to help you estimate the approximate installation time of this release.

This information is provided to assist you in estimating the approximate preparation, installation, and postinstallation time of this release on your system. Use the following checklist as a guide. The checklist refers you to other information or work sheets to obtain values.

The checklist assumes that you are not changing the primary language of your system. The estimate you arrive at by using this checklist is based on the assumption that your system must perform a single-process installation. If your system is able to use multiprocess installation, your time will be less.

The checklist and supporting work sheets do not include the amount of time that is spent on loading the next volumes, media errors, or recovery procedures. User data is not included. The time needed for INZSYS to complete is also not included.

To estimate your total installation time, follow these steps:

1. Estimate the amount of time you need to save your system before you install the new release. Time for saving the system depends on how much storage you have and what percentage of the storage you are using. Use the amount of time from the last backup of your system.

Time: _____

2. Estimate the amount of time to replace Licensed Internal Code. Allow 30 minutes for smaller servers. The average time for larger servers is about 15 minutes.

   Time: _____

3. Add the estimated amount of time to replace the operating system, which is approximately the same for all systems.

   Note: This installation time is based on using optical installation media. If you install from tape, network, or a USB device, times will vary.

   Time: __80 minutes__

4. Use "Times for installing licensed programs" on page 175 to estimate this time. Be sure to include all the licensed programs and optional parts that you intend to install.

   Time: _____

5. If your system uses mirroring or an implementation of a RAID 5 or RAID 6 technique on the disk units in the system ASP, add extra time as described in "Data protection mechanisms" on page 180.

   Time: _____

6. Consider the time required for your system to perform an IPL. If your system takes more than 20 minutes to perform an IPL, include the amount of time that exceeds 20 minutes. For example, if your system takes 45 minutes to perform an IPL, enter the difference of 25 minutes for the time (45 - 20 = 25).

   Time: _____

7. Add time for saving your system after the installation. Be aware that data conversions can occur during the save operation that could increase the time needed for saving your system.

   Time: _____

8. Determine the amount of time required to install the cumulative PTF package. Use the timing information in the *PTF Shipping Information Letter*.

   Time: _____

9. Add time for any extra clean-up work and to re-customize your system.

   Time: _____

The total of these steps is your estimated time for installing your new release.

Estimated time: _____

If you have data protection mechanisms, add the value you obtained from the information in "Data protection mechanisms" on page 180): _____

Total estimated time: _____

Times for installing licensed programs

This information can be used to determine the estimated maximum value (in minutes) for installing your licensed programs that are related to the IBM i operating system.

The following table includes data that was available at the time of publication. Use this data to complete step "4" on page 175.

The estimated values are for individual process times for each licensed program to install. Expect some variation in the values. These values are not accurate if you install from tape, such as for distribution tapes created by a central site.

If you are viewing the following table online, use the information in Interactive calculation of total licensed program installation time to calculate the installation time for your licensed programs.

Note:

1. The values were created by using images that were preloaded into an image catalog.
2. A hyphen indicates that no value can be calculated.

Table 11. Licensed program time information				
Product	**Option**	**Description**	**Value for replacing licensed program (in minutes)**	**Value for adding licensed program (in minutes)**
5770-SS1	1	Extended Base Support	5.2	3.3
5770-SS1	2	Online Information	0.1	0.1
5770-SS1	3	Extended Base Directory Support	11.6	9.7
5770-SS1	5	System/36 Environment	0.3	0.2
5770-SS1	6	System/38 Environment	0.1	0.1
5770-SS1	7	Example Tools Library	0.1	0.1
5770-SS1	8	AFP Compatibility Fonts	0.1	0.1
5770-SS1	9	*PRV CL Compiler Support	1.5	0.5
5770-SS1	12	Host Servers	0.3	0.2
5770-SS1	13	System Openness Includes	3.7	2.8
5770-SS1	14	GDDM	0.2	0.1
5770-SS1	18	Media and Storage Extensions	0.1	0.1
5770-SS1	21	Extended G11N Support	0.2	0.2
5770-SS1	22	ObjectConnect	0.1	0.1
5770-SS1	23	OptiConnect	0.1	0.1
5770-SS1	26	DB2 Symmetric Multiprocessing	0.1	0.1
5770-SS1	27	DB2 Multisystem	0.1	0.3
5770-SS1	30	Qshell	0.2	0.2
5770-SS1	31	Domain Name System	0.5	1.6
5770-SS1	33	Portable App Solutions Environment	2.4	2.5
5770-SS1	34	Digital Certificate Manager	0.3	0.5
5770-SS1	35	CCA Cryptographic Service Provider	0.4	0.3
5770-SS1	36	PSF for IBM i 1-55 IPM Printer Support	0.1	0.1
5770-SS1	37	PSF for IBM i 1-100 IPM Printer Support	0.1	0.1
5770-SS1	38	PSF for IBM i Any Speed Printer Support	0.1	0.1
5770-SS1	39	International Components for Unicode	1.2	1.1
5770-SS1	41	HA Switchable Resources	0.1	0.1
5770-SS1	42	HA Journal Performance	0.1	0.1
5770-SS1	43	Additional Fonts	4.9	5.4
5770-SS1	44	Encrypted Backup Enablement	0.1	0.1

Product	Option	Description	Value for replacing licensed program (in minutes)	Value for adding licensed program (in minutes)
5770-SS1	45	Encrypted ASP Enablement	0.1	0.1
5770-SS1	47	IBM Advanced Data Security for i	0.1	0.1
5770-SS1	48	IBM Db2 Data Mirroring	0.1	0.1
5761-AP1	Base	IBM Advanced DBCS Printer Support for iSeries	0.2	0.2
5761-AP1	1	Adv DBCS Printer Support - IPDS	0.1	0.1
5733-ARE	Base	IBM Application Runtime Expert for i	1.0	0.7
5770-BR1	base	IBM Backup, Recovery and Media Services for i	2.7	2.1
5770-BR1	1	BRMS - Network Feature	0.1	0.1
5770-BR1	2	BRMS - Advanced Feature	0.1	0.1
5761-CM1	base	IBM Communications Utilities for System i	0.2	0.2
5761-DB1	base	IBM System/38 Utilities for System i	0.4	0.3
5770-DBM	Base	IBM Db2 Mirror for i	0.3	0.3
5770-DBM	1	IBM Db2 Mirror Enablement	0.1	0.1
5770-DFH	base	IBM CICS Transaction Server for i	0.4	0.3
5770-DFH	1	CICS - Sample Applications	0.1	0.1
5770-DG1	base	IBM HTTP Server for i	2.1	1.8
5761-DP4	base	IBM Db2 DataPropagator for iSeries, V8.1	0.5	0.5
5761-DS2	base	IBM Business Graphics Utility for System i	0.1	0.1
5769-FN1	base	IBM Advanced Function Printing DBCS Fonts for AS/400	0.1	0.1
5769-FN1	1	AFP DBCS Fonts - Japanese	0.6	0.6
5769-FN1	2	AFP DBCS Fonts - Korean	0.3	0.3
5769-FN1	3	AFP DBCS Fonts - Traditional Chinese	0.1	0.1
5769-FN1	4	AFP DBCS Fonts - Simplified Chinese	0.1	0.1
5769-FN1	5	AFP DBCS Fonts - Thai	0.1	0.1
5769-FNT	base	IBM Advanced Function Printing Fonts for AS/400	0.1	0.1
5769-FNT	1	AFP Fonts - Sonoran Serif	0.1	0.1
5769-FNT	2	AFP Fonts - Sonoran Serif Headliner	0.1	0.1
5769-FNT	3	AFP Fonts - Sonoran Sans Serif	0.1	0.1
5769-FNT	4	AFP Fonts - Sonoran Sans Serif Headliner	0.1	0.1
5769-FNT	5	AFP Fonts - Sonoran Sans Serif Condensed	0.1	0.1

Table 11. Licensed program time information (continued)

Table 11. Licensed program time information (continued)				
Product	**Option**	**Description**	**Value for replacing licensed program (in minutes)**	**Value for adding licensed program (in minutes)**
5769-FNT	6	AFP Fonts - Sonoran Sans Serif Expanded	0.1	0.1
5769-FNT	7	AFP Fonts - Monotype Garamond	0.1	0.1
5769-FNT	8	AFP Fonts - Century Schoolbook	0.1	0.1
5769-FNT	9	AFP Fonts - Pi and Specials	0.1	0.1
5769-FNT	10	AFP Fonts - ITC Souvenir	0.1	0.1
5769-FNT	11	AFP Fonts - ITC Avant Garde Gothic	0.1	0.1
5769-FNT	12	AFP Fonts - Math and Science	0.1	0.1
5769-FNT	13	AFP Fonts - DATA1	0.1	0.1
5769-FNT	14	AFP Fonts - APL2	0.1	0.1
5769-FNT	15	AFP Fonts - OCR A and OCR B	0.1	0.1
5770-HAS	base	IBM PowerHA SystemMirror for i	0.8	0.6
5770-HAS	1	IBM PowerHA for i Enterprise Edition	0.1	0.1
5770-HAS	2	IBM PowerHA for i Standard Edition	0.1	0.1
5770-HAS	3	IBM PowerHA for i Express Edition	0.1	0.1
5770-HAS	4	Reserved	0.1	0.1
5770-HAS	5	Reserved	0.1	0.1
5722-IP1	base	IBM Infoprint Server for iSeries	1.3	1.3
5722-IP1	1	PS to AFP Transform	0.3	0.3
5770-JS1	base	IBM Advanced Job Scheduler for i	4.2	1.0
5770-JV1	base	IBM Developer Kit for Java	0.2	0.2
5770-JV1	16	Java SE 8 32 bit	1.0	1.0
5770-JV1	17	Java SE 8 64 bit	1.2	1.2
5770-MG1	base	IBM Managed System Services for i	0.3	0.3
5770-NAE	base	IBM Network Authentication Enablement for i	2.5	2.5
5733-OMF	base	OmniFind Text Search Server for Db2 for i	2.2	2.2
5770-PT1	base	IBM Performance Tools for i	0.2	0.2
5770-PT1	1	Performance Tools - Manager Feature	0.2	0.2
5770-PT1	2	Performance Tools - Agent Feature	0.1	0.1
5770-PT1	3	Performance Tools - Job Watcher	0.1	0.1
5770-PT1	4	Performance Tools - Reserved	0.1	0.1
5770-PT1	5	Performance Tools - Reserved	0.1	0.1
5770-QU1	base	IBM Query for i	0.1	0.1

Table 11. Licensed program time information (continued)				
Product	Option	Description	Value for replacing licensed program (in minutes)	Value for adding licensed program (in minutes)
5770-RD1	base	IBM Content Manager OnDemand for i	2.5	2.4
5770-RD1	12	OnDemand PDF Indexer	0.4	0.4
5770-RD1	14	OnDemand Enhanced Retention Management	0.1	0.1
5770-RD1	15	OnDemand Distribution Facility	0.1	0.1
5733-SC1	base	IBM Portable Utilities for i	0.1	0.1
5733-SC1	1	OpenSSH, OpenSSL, zlib functions	1.3	1.2
5770-SM1	base	IBM System Manager for i	0.3	0.2
5770-ST1	base	IBM Db2 Query Manager and SQL Development Kit for i	0.2	0.2
5770-TC1	base	IBM TCP/IP Connectivity Utilities for i	0.4	0.4
5770-TS1	base	IBM Transform Services for i	0.2	0.2
5770-TS1	1	Transforms - AFP to PDF Transform	0.3	0.3
5770-UME	base	IBM Universal Manageability Enablement for i	2.0	2.9
5770-WDS	base	IBM Rational Development Studio for i	0.4	1.0
5770-WDS	21	Application Development ToolSet	0.4	1.0
5770-WDS	31	ILE RPG	0.2	1.1
5770-WDS	32	System/36 Compatible RPG II	0.2	1.1
5770-WDS	33	System/38 Compatible RPG III	0.3	1.3
5770-WDS	34	RPG/400	0.2	1.3
5770-WDS	35	ILE RPG *PRV Compiler	0.2	1.0
5770-WDS	41	ILE COBOL	0.3	1.3
5770-WDS	42	System/36 Compatible COBOL	0.2	1.2
5770-WDS	43	System/38 Compatible COBOL	0.2	1.0
5770-WDS	44	OPM COBOL	0.2	1.2
5770-WDS	45	ILE COBOL *PRV Compiler	0.3	1.1
5770-WDS	51	ILE C	0.3	1.0
5770-WDS	52	ILE C++	0.5	1.0
5770-WDS	56	IXLC for C/C++	0.2	1.2
5770-WDS	60	Workstation Tools - Base	0.2	0.4
5733-WQX	base	IBM Db2 Web Query for i	19.6	18.9
5733-WQX	1	Express Edition	0.1	0.1
5733-WQX	2	Standard Edition	0.1	0.1

Table 11. Licensed program time information (continued)				
Product	Option	Description	Value for replacing licensed program (in minutes)	Value for adding licensed program (in minutes)
5733-WQX	4	Developer Users	0.1	0.1
5733-WQX	5	Developer Workbench Users	0.1	0.1
5733-WQX	6	Runtime Enablement Groups	0.1	0.1
5733-WQX	7	JDE Adapter	0.1	0.1
5733-WQX	8	DataMigrator for i	0.1	0.1
5770-XH2	base	IBM i Access for Web	1.6	1.5
5770-XW1	base	IBM i Access Family	0.1	0.1
5770-XW1	1	IBM i Access Enablement Support	0.1	0.1

Total licensed program installation time: _____

Data protection mechanisms

If your system uses mirroring or an implementation of a RAID 5 or RAID 6 technique on the disk units in the system ASP, your IBM i installation time can be longer.

This amount of time will vary depending on your configuration, but if the disk units are protected with RAID 5 or RAID 6, the total installation time (for Licensed Internal Code, the IBM i operating system, and licensed programs) will be approximately 15 percent longer. If the disk units are mirror protected, the total installation time will be approximately 10 percent longer. Mirroring and implementations of the RAID 5 or RAID 6 techniques do not affect the duration of save operations.

Using the percents given, include a time estimate for your system in .

Installation devices and media

These devices can be used to install the IBM i release.

provides an overview of the devices available and their naming conventions.

Optical media

This topic includes tips for using optical devices and optical media to install an IBM i release, install PTFs (fixes), or install single licensed programs.

The optical device used with the optical media class is considered the alternate IPL device.

Keep optical media in its protective case when not in use. When handling optical media, do not touch the surface. If the media has dust or fingerprints on it, it can be cleaned with a lint free cloth (the tape cleaning cloth can be used). Gently wipe the media from the center to the outside of the disc.

When you install from optical media, it is important to know what each media volume contains so that you do not exit the installation process prematurely. The process of creating a master installation list will help you become familiar with what software is contained on each media volume.

The system must be powered on before you can load optical media in the media drawer. describes how to start the system when power is off.

If you are using DVD, verify that you insert the media in the correct media drive.

Tape or tape libraries

This topic includes IBM i requirements for tape devices or tape libraries.

If you use tape for your installation, you need to determine which tape unit to use for the alternate IPL. The tape unit for the alternate IPL can be an internal or an external tape unit. For systems managed by the Hardware Management Console (HMC), or the Integrated Virtualization Manager, the adapter to use for alternate IPL is defined by the partition properties. It is not possible to select a specific device to use for the installation, so there must be install media in only one of the tape units attached to the adapter. If you do not know which tape unit to use, contact your marketing representative or authorized service provider.

Note: You can use a tape image catalog and a virtual tape device to install PTF fixes, to install single licensed programs, or to install or upgrade an IBM i release.

To help prevent media errors, be sure to clean the heads on your alternate IPL tape drive before you begin the installation process. Refer to your tape drive reference guide if you need more information on how to clean the heads. If you receive a media error message during your installation process, see Chapter 15, "Troubleshooting software installation problems," on page 145 for recovery information.

If you have an alternate installation tape device that you are sharing, make sure other users do not assign or try to use the tape drive during the installation because the installation process might fail.

When you install a release using a tape library device you must make sure that the install media is already mounted in one of the tape devices within the tape library before starting the installation.

Non-IBM tape device

This topic provides recommendations for non-IBM tape device use during an IBM i upgrade.

If you are using a non-IBM tape device, read informational APAR II09685 for more details on installing a release. This informational APAR states that it is for V3R2, V3R6, and V3R7. The instructions, however, are also valid for this release.

If your tape device emulates an IBM tape device, you might experience problems during the IBM i installation process, and receive message CPF5401. If this occurs, contact your vendor to confirm whether your tape drive is compatible with IBM i 7.4.

Virtual optical storage using the Network File System

The virtual optical device support of IBM i provides a method for using virtual optical images from a single image source that can be shared with other systems in a network.

A client with a virtual optical device type 632B model 003 can access images located on a server using the Network File System. In previous releases, it existed in a local system integrated file system directory. This device can be used to install licensed internal code, IBM i, licensed programs, PTFs, and restore user data.

Image catalog for a virtual device

You can use either an optical image catalog or a tape image catalog to perform an IBM i software upgrade, install PTFs (fixes), or install single licensed programs.

An *image catalog* is an object on the system that contains optical images. Each catalog is associated with one user-specified integrated file system directory. The system-recognized identifier for the object type is *IMGCLG.

Image catalog requirements:

- An image catalog upgrade works like a D-mode IPL without a console during the installation of Licensed Internal Code. Reference codes are used to display the status.

- Installations done by using image catalogs require an IBM i control language (CL) command line to initiate the installation.
- An installation cannot be performed if an independent auxiliary storage pool (ASP) is accessible. Image files cannot reside in an independent ASP.
- Virtual media devices do not support the LODRUN command using multiple media. This refers to the OS support of LODRUN only. The customer written program (QINSTAPP) can make use of image catalog commands to manipulate volumes. The only time OS support would handle multiple volumes is if a restore operation spanned the volumes.
- To perform an installation using image catalogs, you must have at least 1536 MB of free storage on the load-source disk unit. "Preparing to upgrade or replace software using an image catalog" on page 34 describes how to calculate storage requirements and free up space in the load-source disk unit for an image catalog. "Cleaning up disk storage space" on page 52 describes other general considerations on how to free up space in the load-source disk unit.

Using an alternate installation device

You can learn how to set up, disable, verify, and select an alternate installation device.

Alternate installation device: Overview

You can perform installation and recovery procedures by using the primary installation device along with an alternate installation device that you define.

The alternate installation device can be a tape device or an optical device. Some systems, typically with faster devices attached, might see a performance improvement when using an alternate installation device. You can use the alternate installation device for any installation or recovery that requires replacing Licensed Internal Code. Some models might require that you set up an alternate installation device.

When you use an alternate installation device, the system might use the primary installation device to load a small portion of the Licensed Internal Code during an IPL-type D and then continues the installation by using the media in the alternate installation device. The media in the alternate installation device can be SAVSYS media or distribution media created by a central site.

Notes:

- If you use an alternate installation device, you need to ensure that you set up the device and that you enable the device. You also need to have the optical media or tape media that contains the Licensed Internal Code and your save media.

Setting up an alternate installation device

Before you use an alternate installation device, you need to ensure that you define it on a bus, and you must enable the device.

You need to record and keep the logical address of the system bus and system card at which the alternate installation device is attached. If you have the device set up on a different bus and you do not have this information available, you will not be able to complete installations or recoveries.

It is helpful to record the tape or optical drive's serial number that you plan to use as the alternate installation device.

If you change the configuration of your system, you need to ensure that this information is correct before you start to use the alternate installation device.

To set the addresses and enable the alternate installation device, perform the following steps:

Note: You need to know the password for dedicated service tools (DST) to perform this procedure.

1. Place the media that contains the current release Licensed Internal Code into the primary installation device.
2. Set the system mode to Manual.

   Then perform an initial program load (IPL) using this command:

```
PWRDWNSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(B)
```

Note: The default value for the Power Down System (PWRDWNSYS) command is to display a confirmation. This can be changed by specifying *NO for the Confirm (CONFIRM) parameter: CONFIRM(*NO).

Alternative: An alternative to this step is to select function 21 (Dedicated service tools). If you use this alternative, the next step is step 4. You will not need to perform step 12.

Logical partition users:

- If you are using Hardware Management Console (HMC), see the Managing the Hardware Management Console (HMC) topic.

3. When the IPL or Install the System display appears, select option 3 (Use dedicated service tools (DST)) and press the Enter key.

4. The Dedicated Service Tools (DST) Sign On display appears.

```
                    Dedicated Service Tools (DST) Sign On
                                                      System:    SYSTEMA
 Type choices, press Enter.
    Service tools user . . . . . . . . . . . .  QSECOFR
    Service tools password . . . . . . . . . .  _____
```

Sign on using the QSECOFR user profile.

Note: Do not sign on with a profile other than QSECOFR.

5. The Use Dedicated Service Tools (DST) menu appears.

From the Use Dedicated Service Tools (DST) menu, perform the following tasks:

a. Select option 5 (Work with DST environment).

b. Select option 2 (System devices) on the Work with DST Environment display.

c. Select option 5 (Alternate installation device) on the Work with System Devices display.

d. Select your device type on the Select Media Type display.

6. The Select Alternate Installation Device display lists available devices.

```
                 Select Alternate Installation Device
                                                   System:    SYSTEMA

 Additional devices may be available for use.  Press F5 to see
 if any additional devices have been detected.

 Type option, press Enter.
   1=Select   5=Display details

         Bus       Resource                    Serial
 Option  Number    Name         Type   Model   Number          Selected
         16        TAP22        3592   01A     13-1300283
         16        TAP23        3592   E05     13-1350492
         16        TAP24        3592   01A     13-1300291
         16        TAP25        3592   E05     13-1350477
         16        TAP26        3580   002     00-0110666
         16        TAP27        3590   E1A     13-C1610
         16        TAP28        3590   E1A     13-C1599
         16        TAP29        3590   01A     13-AB733
         16        TAP30        3590   01A     13-AB388
         16        TAP31        3580   003     00-19944
                                                              More...
  F2=Deselect device   F3=Exit   F5=Refresh   F12=Cancel
```

From this display, type a 5 (Display details) next to the resource you want to view details and press the Enter key.

7. The Display Device Details display appears.

```
                        Display Device Details
                                                System:    SYSTEMA
     Resource                          Serial
     Name          Type       Model    Number
     TAP23         63A0       001      13-1355555

     Location    . . . . . . . . . . . . :    UTMP3.C01.01B7A4G-DB3-D41


     Logical address:
      Bus:
       System bus  . . . . . . . . :       16
       System board . . . . . . . :        0
       System card . . . . . . . . :       32

      Storage:
       I/O bus number  . . . . . . :        0
       Controller  . . . . . . . . :       14
       Device address  . . . . . . :        0



     F3=Exit    F12=Cancel
```

You need to have a record of the addresses assigned to the alternate installation device selected for installing a system. Record the following information:

- Type/Model: _____
- System bus: _____
- System card: _____
- Serial number: _____

Notes:

- You might want to repeat this process to record the addresses for all alternate installation devices that appear in step 6. You should store this information in a safe place, such as the location where your recovery information and recovery media are stored.
- If more than one alternate installation device is defined, only one can be enabled.
- You should ensure that only one device contains valid installation media. This prevents you from loading the wrong version of the Licensed Internal Code.

Press the Enter key.

8. The Select Alternate Installation Device display appears.

   Type 1 (Select) next to the resource you want and press the Enter key.
9. You should see the following message at the bottom of the display:

   `Alternate installation device selected`
10. Press F3 (Exit) to return to the Use Dedicated Service Tools (DST) display.
11. Press F3 (Exit) again.

    The Exit Dedicated Service Tools (DST) display appears.

```
                    Exit Dedicated Service Tools (DST)
                                                System:    SYSTEMA
     Select one of the following:

         1. Exit DST
         2. Resume dedicated service tools
```

Type 1 (Exit Dedicated Service Tools (DST)) and press the Enter key.
12. The next display you see is the IPL or Install the System display.

    Type 1 (Perform an IPL) and press the Enter key to complete the procedure.

Disabling an alternate installation device

If you need to disable an alternate installation device, follow these steps.

You might need to disable an alternate installation device for one of the following reasons:

- To continue with an installation using the primary installation device.
- To enable a different device as an alternate installation device.
- To correct the logical address if hardware has been moved or changed.

1. Use the system or logical partition control panel to set the mode to `Manual`.

   Then perform an attended initial program load (IPL) using the command: PWRDWNSYS
   OPTION(*IMMED) RESTART(*YES) IPLSRC(B).

   Note: Beginning in V6R1, the default value for the Power Down System (PWRDWNSYS) command is to
   display a confirmation. This can be changed by specifying *NO for the Confirm (CONFIRM) parameter:
   `CONFIRM(*NO)`.

   Alternative: An alternative to this step is to select function 21 (Dedicated service tools). If you use this
   alternative, skip steps "2" on page 185 and "9" on page 185.

   Logical partition users: If you are using Hardware Management Console (HMC), see the Managing the
   Hardware Management Console (HMC) topic.

2. When the IPL or Install the System display appears, select option 3 (Use dedicated service tools (DST))
   and press the Enter key.

3. The Dedicated Service Tools (DST) Sign On display appears. Sign on using the QSECOFR user profile.

4. The Use Dedicated Service Tools (DST) menu appears.

   From the Use Dedicated Service Tools (DST) menu, perform the following tasks:

   a. Select option 5 (Work with DST Environment).
   b. Select option 2 (System devices) on the Work with DST Environment display.
   c. Select option 5 (Alternate installation device) on the Work with System Devices display.

5. At the Select Alternate Installation Device display, press F2 (Deselect device).

6. You should see the following message at the bottom of the display:

   ```
   Alternate installation device deselected
   ```

7. Press F3 (Exit) to return to the Use Dedicated Service Tools (DST) display.

8. Press F3 (Exit) again. The Exit Dedicated Service Tools (DST) display appears.

   Type 1 (Exit DST) and press the Enter key.

9. The next display you see is the IPL or Install the System display.

   Type 1 (Perform an IPL) and press the Enter key to complete the procedure.

Verifying and selecting an alternate installation device during a manual installation

To verify and select an alternate installation device during a manual installation, follow these steps.

1. The Install Licensed Internal Code display appears.

```
                    Install Licensed Internal Code

Select one of the following:

        1. Install Licensed Internal Code
        2. Work with Dedicated Service Tools (DST)
        3. Define alternate installation device
```

   Type 3, and press Enter. This option provides the ability to define an alternative installation device as
   the install source for the Licensed Internal Code.

2. Verifying and selecting alternate installation device: The Select Alternate Installation Device Bus display appears.

```
                    Select Alternate Installation Device Bus
                                                               System: XXXX
Type Option, press Enter.
   1=Select

Option       Bus Number        Selected
   _              1
   _              2
   1              3
   _              4
   _              5
   _              6
   _              7
   _              8
   _              9
   _              A
   _              B
   _              C
   _              D
                                                        More.....
F2=Deselect Device  F3=Exit  F5=Refresh    F12=Cancel
F13=Bypass bus select
```

a. Verify that the selected device is on the correct system bus. Type 1 in the **Options** field next to the selected bus, and press Enter.

b. Select the media type on the Select Media Type display and press Enter.

```
                    Select Media Type
                                                               System: XXXX
   Select one of the following:

     1. Tape
     2. Optical
```

This might take several minutes. If you see the message

```
No alternate installation device configured
```

, wait one minute and refresh the display.

c. The Select Alternate Installation Device display appears. Use this display to verify the resource name, type, model, and serial number for the device.

```
                    Select Alternate Installation Device
                                                     System:   SYSTEMA

   Additional devices might be available for use.  Press F5 to see
   if any additional devices have been detected.

   Type option, press Enter.
     1=Select    5=Display details

           Bus       Resource                    Serial
   Option  Number    Name        Type   Model    Number            Selected
     _        1      TAP01        6384   001      00-0270004
     _        3      TAP19        3570   B11      13-22222



   F2=Deselect device    F3=Exit    F5=Refresh     F12=Cancel
```

d. Type 1 to select the device.

e. The message

```
Alternate installation device selected
```

appears. Press F3 to return to the Install Licensed Internal Code display.

f. Type 1 and press Enter to install the Licensed Internal Code.

End of verifying and selecting alternate installation device.

If you are using an Hardware Management Console (HMC) to perform an IPL of the system from alternate media, complete the steps in Task 3: Preparing to start the system from an alternate IPL device.

IBM i release interoperability

A system interoperates with another system when you exchange data or when you save and restore objects. Review the supported combinations of IBM i releases.

Interoperability is the ability of one system to exchange data or objects with another system. The exchange can be performed electronically or by physical media (such as tape). Either system can initiate the exchange.

A system also interoperates with another system when it saves and restores objects.

If you have several systems in a network, they must be at compatible releases. This is necessary if objects and data are to be interchanged between systems. You can use option 10 (Display licensed programs) on the Work with Licensed Programs menu (type GO LICPGM) to see the installed release of your licensed programs.

The source system (the system that sends the information) and the target system (the system that receives the information) must be within the supported releases.

To be interoperable, objects must be saved by specifying either a specific release or *PRV for the value of the target release (TGTRLS) parameter.

You can save and restore licensed programs just like other objects as long as the release is compatible with the operating system release. "Licensed program releases and sizes" on page 167 contains more information about compatible releases of licensed programs.

For more information about supported combinations of IBM i releases or saving objects to a system that is running a previous release, see the Release-to-release support topic in the IBM i Information Center.

Installation notes about the IBM i release

This information describes miscellaneous requirements or changes to the IBM i release.

Note: The system must be in a restricted state to install the QGPL and QUSRSYS libraries, and to install Option 12 (Host Servers).

5770-SS1, IBM i Option 1 Extended Base Support

This option installs automatically when you install the new release of the operating system. You cannot delete this option.

5770-SS1, IBM i Option 3 Extended Base Directory Support

This option installs automatically when you install the new release of the operating system. This option contains integrated file system directories. You cannot delete this option.

To find other information about what's new or changed this release, see the Memo to Users in the information center. For more information about products or features that might not be supported in future releases of the operating system or on future models, on Product Previews, and on Statements of Directions, see IBM i Support Planning (http://www.ibm.com/systems/support/i/planning/).

Media labels and their contents

This information lists the optical media that you receive with your IBM i order.

Additional products may have been added to the media since this document was published. For the latest version of the media labels and their contents document, refer to the Customer Notices and information website (www.ibm.com/systems/support/planning/notices.html). Select the tab labeled IBM i 7.4 for release specific information.

Your media for installation must be arranged in the order that is listed in the **Media labels and their contents** document.

Release identifier for i 7.4

Distribution media labels indicate the release and modification level in a format that is different from what appears on displays during installation.

Media type identifiers

Labels on the distribution media that are used for installation have unique identifiers. Media type identifiers are located on the center of the label. These identifiers help you determine when to use each media volume.

When you are ready to install your new software, arrange the media in this order:

1. Licensed Machine Code - I_BASE_01

   This language independent Licensed Machine Code (Licensed Internal Code) supports all language versions. The Licensed Machine Code is part of the standard set of media.

2. Multiple language version media - B_GROUP*x_nn*

   This media contains the multiple language versions of the operating system, IBM-supplied libraries, no charge options, no-charge licensed programs, and keyed products. For the media identifier string B_GROUP*x_nn*, *x* indicates the language group and *nn* indicates a sequence number. See "Feature codes for language version" on page 194 for a list of languages that are in each group.

3. F_MULTI_NLV

   This media contains some additional programs, products, single licensed programs, or options.

4. N29*xx*_01 Secondary Language Media

   This media contains only language objects for the indicated secondary language. For secondary language media, the value for 29*xx* is the feature code of the secondary language as used for installation.

Notes:

1. Keep all of your distribution media. You might need them for recovery procedures.

2. You might receive additional media volumes that do not conform to these descriptions. Examples include media that contain PRPQs or media for IBM i Access Family products that are installed on workstations. Also, IBM Business Partners might label the media differently.

3. Julian dates are shown in the form *yddd*. The *y* is the last digit of the year (0 through 9), and *ddd* is the day of the year (0 through 366). For example, the Julian date for 6 April 2018 would be shown as 4096 because 06 April is the 96th day of the year 2018.

I_BASE_01 (LCD8-2576-0x) *Entitled Software Support* (ESS Only)			
Product	**Option**	**Description**	**Requires a software license key**
5770-999	9999	USB Licensed Machine Code	No

I_BASE_01 (LCD8-2320-0x) *Entitled Software Support* (ESS Only)			
Product	**Option**	**Description**	**Requires a software license key**
5770-999	9999	Utility for bootable Licensed Machine Code	No

I_BASE_01 (LCD8-2553-0x)			
Product	**Option**	**Description**	**Requires a software license key**
5770-999	9999	Licensed Machine Code	No

B_GROUPx_01 (LCD8-2554-0x B_GROUP1_01) (LCD8-2563-0x B_GROUP2_01) (LCD8-2568-0x B_GROUP3_01)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-SS1	Base (QGPL, QUSRSYS, QSYS)	5050	IBM i	Yes

B_GROUPx_02 (LCD8-2555-0x B_GROUP1_02) (LCD8-2564-0x B_GROUP2_02) (LCD8-2569-0x B_GROUP3_02)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-SS1	1	5050	Extended Base Support	No
5770-SS1	2	5050	Online Information	No
5770-SS1	3	5050	Extended Base Directory Support	No
5770-SS1	5	5050	System/36 Environment	No
5770-SS1	6	5050	System/38 Environment	No
5770-SS1	7	5050	Example Tools Library	No
5770-SS1	8	5050	AFP Compatibility Fonts	No
5770-SS1	9	5050	*PRV CL Compiler Support	No
5770-SS1	12	5050	Host Servers	No
5770-SS1	13	5050	System Openness Includes	No
5770-SS1	14	5050	GDDM	No
5770-SS1	18	5103	Media and Storage Extensions	Yes
5770-SS1	21	5050	Extended G11N Support	No
5770-SS1	22	5050	ObjectConnect	No
5770-SS1	30	5050	Qshell	No

B_GROUPx_02 (LCD8-2555-0x B_GROUP1_02) (LCD8-2564-0x B_GROUP2_02) (LCD8-2569-0x B_GROUP3_02) (continued)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-SS1	31	5050	Domain Name System and Dynamic Host Configuration	No
5770-SS1	34	5050	Digital Certificate Manager	No
5770-SS1	35	5050	CCA Cryptographic Service Provider	No
5770-SS1	36	5112	PSF for IBM i 1-55 IPM Printer Support	Yes
5770-SS1	37	5113	PSF for IBM i 1-100 IPM Printer Support	Yes
5770-SS1	38	5114	PSF for IBM i Any Speed Printer Support	Yes
5770-SS1	39	5050	International Components for Unicode	No

B_GROUPx_03 (LCD8-2559-0x B_GROUP1_03) (LCD8-2565-0x B_GROUP2_03) (LCD8-2570_0x B_GROUP3_03)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-SS1	23	5105	OptiConnect	No
5770-SS1	33	5111	Portable App Solutions Environment	No
5770-SS1	44	5050	Encrypted Backup Enablement	No
5770-SS1	45	5050	Encrypted ASP Enablement	No
5770-MG1	base	5050	Managed System Services	No
5770-SM1	base	5050	System Manager	No
5733-ARE	base	5050	Application Runtime Expert	No
5770-DFH	base	5050	CICS	No
5770-DFH	1	5050	CICS - Sample Applications	No
5798-FAX	base	5050	Facsimile Support	No

B_GROUPx_04 (LCD8-2561-0x B_GROUP1_04) (LCD8-2566-0x B_GROUP2_04) (LCD8-2571-0x B_GROUP3_04)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5761-AP1	base	5050	IBM Advanced DBCS Printer Support for iSeries **(B_GROUP3_04 only)**	Yes
5761-AP1	1	5101	Adv DBCS Printer Support - IPDS **(B_GROUP3_04 only)**	Yes
5770-BR1	base	5050	IBM Backup, Recovery and Media Services for i	Yes
5770-BR1	1	5101	BRMS - Network Feature	Yes
5770-BR1	2	5102	BRMS - Advanced Feature	Yes

Product	Option	Code Load ID	Description	Requires a software license key
B_GROUPx_04 (LCD8-2561-0x B_GROUP1_04) (LCD8-2566-0x B_GROUP2_04) (LCD8-2571-0x B_GROUP3_04) *(continued)*				
5761-CM1	base	5050	IBM Communications Utilities for System i	Yes
5770-DG1	base	5050	IBM HTTP Server for i	No
5770-HAS	base	5050	IBM PowerHA SystemMirror for i Standard Edition	No
5770-HAS	1	5051	PowerHA for i Enterprise Edition	Yes
5770-HAS	2	5052	PowerHA for i Standard Edition	Yes
5770-HAS	3	5053	PowerHA for i Express Edition	Yes
5770-HAS	4	5054	PowerHA	Yes
5770-HAS	5	5055	PowerHA	Yes
5722-IP1	base	5050	IBM Infoprint Server for iSeries	Yes
5770-JS1	base	5050	IBM Advanced Job Scheduler for i	Yes
5770-NAE	base	5050	IBM Network Authentication Enablement for i	No
5770-PT1	base	5050	IBM Performance Tools for i	Yes
5770-PT1	1	5101	Performance Tools - Manager Feature	Yes
5770-PT1	2	5102	Performance Tools - Agent Feature	Yes
5770-PT1	3	5103	Performance Tools - Job Watcher	Yes
5770-PT1	4	5104	Performance Tools - Reserved	Yes
5770-PT1	5	5105	Performance Tools - Reserved	Yes
5770-QU1	base	5050	IBM Query for i	Yes
5733-SC1	base	5050	IBM Portable Utilities for i	No
5733-SC1	1	5050	OpenSSH, OpenSSL, zlib functions	No
5770-SS1	41	5116	HA Switchable Resources	Yes
5770-SS1	42	5117	HA Journal Performance	Yes
5770-SS1	43	5050	Additional Fonts	No
5770-SS1	47	5050	IBM Advanced Data Security for i	No
5770-SS1	48	5120	Db2 Data Mirroring	No
5770-ST1	base	5050	IBM Db2 Query Manager and SQL Development Kit for i	Yes
5770-TC1	base	5050	IBM TCP/IP Connectivity Utilities for i	No
5770-TS1	base	5050	IBM Transform Services for i	No
5770-TS1	1	5050	Transforms - AFP to PDF Transform	No
5770-UME	base	5050	IBM Universal Manageability Enablement for i	No
5770-XH2	base	5050	IBM i Access for Web	No

B_GROUPx_04 (LCD8-2561-0x B_GROUP1_04) (LCD8-2566-0x B_GROUP2_04) (LCD8-2571-0x B_GROUP3_04) (continued)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-XW1	base	5050	IBM i Access Family	Yes
5770-XW1	1	5101	IBM i Access Enablement Support	Yes

B_GROUPx_05 (LCD8-2562-0x B_GROUP1_05) (LCD8-2567-0x B_GROUP2_05) (LCD8-2572-0x B_GROUP3_05)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-DBM	base	5050	Db2 Mirror for i	No
5770-DBM	1	5101	Db2 Mirror Enablement	Yes
5770-DBM	2	5102	Reserved - Option 2	Yes
5770-DBM	3	5103	Reserved - Option 3	Yes
5770-DBM	4	5104	Reserved - Option 4	Yes
5770-DBM	5	5105	Reserved - Option 5	Yes
5770-JV1	base	5050	IBM Developer Kit for Java	No
5770-JV1	16	5116	Developer Kit for Java 8 32 bit	No
5770-JV1	17	5117	Developer Kit for Java 8 64 bit	No
5770-WDS	base	5050	IBM Rational Development Studio for i	No
5770-WDS	21 - Appl Dev Toolset	5103	Application Development ToolSet	Yes
5770-WDS	31 - ILE Compilers	5101	ILE RPG	Yes
5770-WDS	32 - Heritage Compilers	5102	System/36 Compatible RPG II	Yes
5770-WDS	33 - Heritage Compilers	5102	System/38 Compatible RPG III	Yes
5770-WDS	34 - Heritage Compilers	5102	RPG/400	Yes
5770-WDS	35 - ILE Compilers	5101	ILE RPG *PRV Compiler	Yes
5770-WDS	41 - ILE Compilers	5101	ILE COBOL	Yes
5770-WDS	42 - Heritage Compilers	5102	System/36 Compatible COBOL	Yes
5770-WDS	43 - Heritage Compilers	5102	System/38 Compatible COBOL	Yes
5770-WDS	44 - Heritage Compilers	5102	OPM COBOL	Yes

B_GROUPx_05 (LCD8-2562-0x B_GROUP1_05) (LCD8-2567-0x B_GROUP2_05) (LCD8-2572-0x B_GROUP3_05) (continued)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5770-WDS	45 - ILE Compilers	5101	ILE COBOL *PRV Compiler	Yes
5770-WDS	51 - ILE Compilers	5101	ILE C	Yes
5770-WDS	52 - ILE Compilers	5101	ILE C++	Yes
5770-WDS	56 - ILE Compilers	5101	IXLC for C/C++	Yes
5770-WDS	60 - base	5050	Workstation Tools - Base	No

F_MULTI_NLV (LCD8-1900-0x F_MULTI_NLV DB2 Web Query for i)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5733-WQX	base	5050	IBM DB2 Web Query for i	Yes
5733-WQX	1	5101	Express Edition	Yes
5733-WQX	2	5102	Standard Edition	Yes
5733-WQX	4	5104	Developer Users	Yes
5733-WQX	5	5105	Developer Workbench Users	Yes
5733-WQX	6	5106	Runtime Enablement Groups	Yes
5733-WQX	7	5107	JDE Adapter	Yes
5733-WQX	8	5108	DataMigrator for i	Yes

IBM i Access Client Solutions (LCD8-2009-0x)	
Product	**Description**
5733-XJ1	IBM i Access Client Solutions

IBM i Access Client Solutions Entitled Software Support (ESS Only)	
Product	**Description**
5733-XJ1	IBM i Access Client Solutions (LCD8-2010-0x)
5733-XJ1	IBM i Access Client Solutions for Windows (LCD8-2011-0x)
5733-XJ1	IBM i Access Client Solutions for Linux (LCD8-2012-0x)

(LCD8-2390-0x IBM Cloud Storage Solutions for i) *Entitled Software Support* (ESS Only)				
Product	**Option**	**Code Load ID**	**Description**	**Requires a software license key**
5733-ICC	base	5050	IBM Cloud Storage Solutions for i	No
5733-ICC	1	5101	Cloud Storage	Yes

(LCD8-2429-0x ARCAD RPG Converter for IBM i) *Entitled Software Support* (ESS Only)			
Product	**Option**	**Description**	**Requires a software license key**
5733-AC1	base	ARCAD RPG Converter for IBM i	No

(LCD8-2430-0x ARCAD Observer for IBM i) *Entitled Software Support* (ESS Only)			
Product	**Option**	**Description**	**Requires a software license key**
5733-AO1	base	ARCAD Observer for IBM i	No

Notes:

1. Refer to the Entitled Software Support (ESS) web site (www.ibm.com/servers/eserver/ess/OpenServlet.wss) to access, download, and manage your software programs. Please visit this web site, and under the IBM i Evaluation, Try & Buy and NLV download tab, you can find your trial use software for this product.

2. You might receive other media that contains a single licensed program or option and also has the volume ID of F_MULTI_NLV. The media label lists the licensed program or option contained on the media.

Feature codes for language version

Use this table to locate the appropriate IBM i feature code for your primary or secondary language.

Note: When you install the operating system, the system prompts for the primary language in the form 29*xx*. When you install the secondary language, you select a feature code, in the form 29*xx*, from a list of national language feature code identifiers.

For example, if you ordered French for your primary language and Arabic as your secondary language, you would specify 2928 as your primary language when installing the operating system and select 2954 from the list of feature codes when you install the secondary language.

Table 12. Feature codes for language version		
Group 1 languages (5837)	**Group 2 languages (5838)**	**Group 3 languages (5839)**
2924 English 2963 Belgian Dutch MNCS 2909 Belgian English 2966 Belgian French MNCS 2980 Brazilian Portuguese 2981 Canadian French MNCS 2926 Danish 2923 Dutch Netherlands 2925 Finnish 2928 French 2940 French MNCS 2929 German 2939 German MNCS 2958 Icelandic 2932 Italian 2942 Italian MNCS 2933 Norwegian 2922 Portuguese 2996 Portuguese MNCS 2931 Spanish 2937 Swedish	2924 English 2995 Albanian 2954 Arabic 2974 Bulgarian 2912 Croatian 2975 Czech 2902 Estonian 2998 Farsi 2957 Greek 2961 Hebrew 2976 Hungarian 2904 Latvian 2903 Lithuanian 2913 Macedonian 2978 Polish 2992 Romanian 2979 Russian 2914 Serbian 2994 Slovakian 2911 Slovenian 2956 Turkish	2924 English 2938 English DBCS Uppercase 2984 English DBCS Uppercase and Lowercase 2930 Japanese Universal 2962 Japanese Katakana 2986 Korean 2906 Laotian 2989 Simplified Chinese 2987 Traditional Chinese 2972 Thai 2905 Vietnamese

Blank displays

During an IBM i installation, you will see blank displays at times.

If the blank displays are predictable, instructions give an approximate amount of time when there appears to be no installation activity. Other blank displays are less predictable because of unique situations on your system. If the processor light is blinking or reference codes are changing, the installation process is active. If the processor light goes out, the attention light turns on, and a reference code appears on the control panel, go to Chapter 15, "Troubleshooting software installation problems," on page 145 and follow the instructions.

System password

The system password identifies all model changes to help maintain the quality and integrity of the system. The system password also ensures the protection of IBM's intellectual property, including IBM Licensed Internal Code and licensed programs.

Support exists to detect processor model changes on all systems through the use of a 16-character system password. New systems from the factory come with the correct system password already installed. A new system password is required for each model change or for conditions that indicate probable change of ownership. If you do not have the system password at the first IPL, contact your marketing representative to place a system password RPQ (Request for Price Quotation) order. IBM manufacturing receives the RPQ order and sends the system password to you for installation. If the correct system password is not entered, you can select a system-password bypass period to allow you to obtain the correct system password from your marketing representative. If the correct password is not available and the bypass period expires, the system will not complete the next IPL unless the correct password is installed. While in bypass mode, the system uses operator messages to indicate the time that remains until the bypass period expires.

Installed status values

Use these values to determine whether you can use a software product or whether you need to upgrade a licensed program.

Following is a description of the installed status values you might see on the LICPGM displays. You can use these values to determine whether you can use a product or whether you need to upgrade a licensed program. If you do not see a value of *COMPATIBLE, you can check the other installed status values for how to proceed.

*COMPATIBLE
The product is installed. Its version, release, and modification is compatible with the installed level of the operating system. You can use this program with the installed level of the operating system.

*INSTALLED
The product is installed, but might or might not be compatible with the installed level of the operating system.

Note: Licensed programs that are part of the single set will be listed on the display panel as *INSTALLED. You will need to verify that the release level of the licensed program is compatible with the release level of the operating system. For IBM products, either check the current release levels for licensed programs in the topic, "Licensed program releases and sizes" on page 167, or check with your software supplier before you use the licensed program.

*ERROR
Either the product has not installed successfully or the product is only partially installed. For example, a language or a language object for the product is not installed. Use the Check Product Option (CHKPRDOPT) command to determine the cause of the failure. To determine the cause of a missing object, enter GO LICPGM and select options 10 and 50.

Note: The product lists now show many products, such as Programming Request for Price Quotations (PRPQ), licensed program offerings (LPO), and non-IBM products. This *ERROR status might have existed before the upgrade to the current operating system release, but was not detected. Use the CHKPRDOPT command to find out why the product shows an *ERROR, and contact your software provider if you need help correcting the problem.

*BACKLEVEL
The product is installed. Its version, release, and modification is not compatible with the currently installed level of the operating system. To correct this problem, install a current release of this product. And if you have secondary languages, install a new release of these languages as well, using LICPGM menu option 21.

Note: If you use a licensed program that is listed as *BACKLEVEL, you run the risk of having an information mix up between release levels, or some portions of the licensed program might not work properly. An installed status value of *COMPATIBLE is desired.

*BKLVLOPT
The product is installed. Its version, release, and modification is not compatible with the currently installed level of the base product that is associated with the option. To correct this problem, install a current release of this option.

*BKLVLBASE
The product is installed, but its associated base product is not compatible with this option. To correct this problem, install a current release of the base product.

Blank (on LICPGM menu, option 11)
If no value is shown, a blank in the installed status column means that the product is not installed.

*NOPRIMARY
The product is installed, but the language for the product is not the same as the primary language of the operating system. To correct this problem, install the primary language for the product by using the Restore Licensed Program (RSTLICPGM) command or from the LICPGM menu.

Note: If this product is an LPO, PRPQ or non-IBM product, it is possible that the licensed program (from the manufacturer) is not available in the primary language of the operating system.

Options on the Prepare for Install menu

Use this information to understand the different IBM i functions on the Prepare for Install menu.

Highlights of this function include the following:

- Customizing an installation list. Preselecting licensed programs or options to be installed during the automatic installation process.
- Verifying the contents of the media before starting an installation.
- Determining additional storage requirements for the licensed programs that you plan to install.

This function appears as option 5 (Prepare for Install) on the Work with Licensed Programs menu. The Prepare for Install display appears when you select this option.

```
                      Prepare for Install
                                                   System:    XXXXXXXX
 Type option, press Enter.
   1=Select

 Opt     Description
   _     Work with licensed programs for target release
   _     Work with licensed programs to delete
   _     List licensed programs not found on media
   _     Display licensed programs for target release
   _     Work with software agreements
   _     Work with user profiles
   _     Verify system objects
   _     Estimate storage requirements for system ASP
   _     Allocate additional space for LIC
   _     Keep disk configuration



                                                              Bottom
 F3=Exit   F9=Command line   F10=Display job log   F12=Cancel
```

For the instructions to use Option 5, Prepare for install, see "Required: Creating a custom list of software to install" on page 47.

With the **Work with licensed programs for target release** option, you can work with a list of the licensed programs for the target release. Use this option to verify the contents of the installation media and to create a customized list of licensed programs to install for the target release. The system can use the list you create to allow the installation processes that replace a release of software to also install the selected additional licensed programs. For more information, refer to "Verifying the contents of your software order" on page 25.

Note: This list does not include all products. Among those are programming request for price quotations (PRPQ), licensed program offerings (LPO), and licensed programs on the single set. If you want to install these products for the first time, use the `GO  LICPGM` menu, options 1 or 11.

With the **Work with licensed programs to delete** option, you can work with a list of installed licensed programs that should not remain on the system because either they are no longer supported or you chose not to replace them. This list also includes products for which no replacement was found on the distribution media. The display indicates the reason why a licensed program is included in this list, as well as provides options to save and delete any of the products listed. For more information, refer to "Cleaning up disk storage space" on page 52.

With the **List licensed programs not found on media** option, you can display a list of licensed programs that could replace existing products but that were not found on the optical distribution media. For more information on licensed program availability, refer to Chapter 16, "IBM i software reference," on page 167.

With the **Display licensed programs for target release** option, you can display the list of licensed programs that will be installed when you install the target release. For each licensed program in the list,

you can display information such as the expected action during the installation process and whether a product option must be separately ordered. Use this option to verify your installation plans.

With the **Work with software agreements** option, you can review and accept software agreements prior to the installation of the target release. The agreements can be printed or displayed in different languages provided by the software provider. Any software agreement not accepted or specifically declined will result in the licensed program not being installed during the upgrade to the target release. If the Machine Code and IBM i software agreements are not accepted, the upgrade to the target release is not allowed.

With the **Work with user profiles** option, you can work with a list of user profiles on the system and work with the objects owned by each user profile. Use this option to clean up user profiles that are no longer needed on the system before you install the target release. For more information, refer to "Cleaning up disk storage space" on page 52.

With the **Verify system objects** option, the system verifies that the system directory entries include the user profiles needed by the installation process. The system also checks database cross reference files for errors. If necessary, the QSECOFR and QLPINSTALL user profiles are added to the system distribution directory. For more information, refer to "Verifying user profiles and checking cross-reference files" on page 30.

With the **Estimate storage requirements for system ASP** option, you can determine whether additional storage is needed before you begin the installation process. This option helps you plan for growth in licensed programs that are listed on the Work with Licensed Programs for Target Release display. This option does not consider licensed programs that are not in the standard set or keyed set, Programming Request for Price Quotations (PRPQs), licensed program offerings (LPOs), or system conversion growth such as spooled files. The option also does not consider storage required for temporarily applied program temporary fixes (PTFs).

The **Allocate additional space for LIC** option is one method that can be used to allocate additional space that is needed before upgrading the release.

With the **Keep disk configuration** option, you can change your disk configuration before you upgrade or replace a release.

Options on Work with Licensed Programs menu

Use this information to determine when and how you can use these options.

Use API (QLPINSLP) to install licensed programs within a program instead of manually using GO LICPGM option 1 or 11. For information about the QLPINSLP API, see Install Licensed Programs (QLPINSLP) API.

For each display, you can use the Help key for more information about the display.

Manual installation Option 1. Install all

Use Option 1 (Install all) on the Work with Licensed Programs menu to install all of the licensed programs and optional parts of the licensed programs from distribution media.

Secondary languages on distribution media can also be installed with this option.

```
 LICPGM                    Work with Licensed Programs
                                                      System:   XXXXXXXX
 Select one of the following:

   Manual Install
      1. Install all
```

```
                         Manual Install
                                              System:    XXXXXXXX
  Type choices, press Enter.

    Install option . . . . . .    _            1=Installed products
                                               2=All products
                                               3=New products

    Installation device  . . .    _____     Name

    Replace if current . . . .    _            Y=Yes
                                               N=No

    Nonaccepted agreement  . .    _            1=Do not install licensed program
                                               2=Display software agreement

    Automatic IPL  . . . . . .    _            Y=Yes
                                               N=No
```

The Manual Install display allows you to make choices for the prompts in the following list. Use the Help key for more information about each prompt.

1. Install option

   This option determines what types of licensed programs and optional parts are installed from the distribution media. You can choose to install only new releases of products that already exist on your system, install all products, install only new products, or install new releases of products that exist on your system plus additionally selected products.

   Note:

   a. The *Install option* does not apply to the QGPL and QUSRSYS libraries. QGPL and QUSRSYS libraries are always installed if they are found on the media. For all *Install option* choices, only new objects are installed in the QGPL and QUSRSYS libraries.

   b. To complete the installation successfully, the installation media must contain all renewed products that are currently installed on your system. The installation media might contain products whose version, release, and modification is earlier than that of the new operating system release. (The products did not renew at the same time as the operating system.)

2. Installation device

   The examples in this topic use OPT01 for the name of the installation device. For more information about the installation device naming convention, see "Types of software installation devices" on page 10.

3. Replace if current

   By specifying *NO, the licensed programs that are currently installed and that are at the same release level on the installation media will not be replaced during an upgrade. You can change the *Replace if Current* parameter to *YES if you want to replace licensed programs that are already installed, including products installed at the same release level as on the installation media. By choosing *YES, you might have to reapply PTFs to some licensed programs that were replaced from the media.

4. Nonaccepted agreement

   During the installation of licensed programs, if the software agreement has not been previously accepted, the nonaccepted agreement option determines if you will be prompted to accept or decline the software agreement, or if the installation will continue without installing the licensed program. A value of 1 indicates that you do not want to install the licensed program. A value of 2 indicates that you want to display the licensed program and accept the software agreement.

5. Automatic IPL

   This option determines whether the system will automatically IPL when the installation process has completed successfully.

   If you are using the Hardware Management Console, refer to Managing your server using the Hardware Management Console in the IBM Systems Hardware Information Center.

Automatic installation options

The IBM i Prepare for Install option helps you to create an installation list and select the programs that you want to install during the automatic installation process.

The Prepare for Install option also helps you verify the contents of the installation media and determine the storage requirements, among other necessary tasks in preparation for automatic installation. "Options on the Prepare for Install menu" on page 197 describes Option 5 (Prepare for Install) in more detail.

Option 5. Prepare for Install

"Required: Creating a custom list of software to install" on page 47 provides the instructions for using Option 5 (Prepare for Install).

Options for displaying, installing, deleting, and saving from a list

Licensed programs can be displayed, installed, deleted, or saved from a list through the Work with Licensed Programs menu.

Option 10. Display installed licensed programs

After an IBM i installation process has completed, it is often necessary to determine if a licensed program is installed successfully on your system. To do this, select option 10 (Display installed licensed programs) on the Work with Licensed Programs menu.

The Display Installed Licensed Programs display shows the licensed programs, optional parts, and IBM-supplied user libraries that are installed on your system.

The Installed Status column indicates whether the licensed program is successfully installed. Refer to "Installed status values" on page 196 for a description of the installed status values.

If a licensed program did not install successfully, use the recovery procedures in Chapter 15, "Troubleshooting software installation problems," on page 145 to install the licensed program again.

You can use the F11 key to view the Installed Release column. This column shows the release and modification of each installed licensed program. The F11 key has a third view, also, that shows the product option number of each licensed program.

Option 11. Install licensed programs

Option 11 (Install licensed programs) on the Work with Licensed Programs display shows a list of licensed programs and optional parts of licensed programs that were supported by the LICPGM installation processes at the time your currently installed IBM i operating system became available.

Note: Before you install any licensed programs, be sure to check the product documentation in the IBM i Information Center and also the documentation that comes with the product for any special instructions.

You can use this list to select licensed programs and optional parts to be installed on your system. You can also use this list to install a licensed program that did not successfully install during a previous installation process.

To install one or more licensed programs from the list, type a 1 in the Option column next to the licensed programs and any optional parts that you want to install. For a list of the licensed programs that are on the media, refer to "Licensed program releases and sizes" on page 167.

A licensed program you want to install might not be listed on the Install Licensed Programs display. If a licensed program is not listed, it can be added to the list by entering information into the blank fields at the top of the list. After you press Enter, this product then appears on the list with the other products.

1. Type 1 in the Option column
2. Type the product identifier in the Licensed Program column
3. Type the product option value in the Product Option column

4. Press Enter

When you are typing the product option, the system accepts only the following three values: *BASE, option number, or *ALL.

- A value of *BASE installs only the base product of the associated product identifier.
- The product option number installs only the particular option of the associated product identifier. To be able to install options, you must install the base product (*BASE).
- A value of *ALL installs the base product and all options of the associated product identifier that are found on the media.

Keep in mind that licensed programs that you add will appear on the list with only the product identifier and will not give a descriptive name of the product.

The Confirm Install of Licensed Programs display shows which licensed programs you selected to install. If you do not need to make any changes, press Enter to confirm your choices.

Fill in the following choices on the Install Options display. Use the Help key for more information about each prompt on this display.

1. Installation Device

   The examples in this topic use OPT01 for the name of the installation device. For more information about the installation device naming convention, see "Types of software installation devices" on page 10.

2. Objects to install

   This option allows you to choose to install both programs and language objects, only programs, or only language objects.

3. Automatic IPL

   This option determines if the system automatically IPLs after the installation process has completed successfully.

When the licensed programs are installed, the Work with Licensed Programs menu or the Sign On display appears again. To verify that all of the licensed programs are installed successfully, use option 50 (Display log for messages). (More information about that option is available in "Completion status" on page 203.) If an error occurs, you will see the message `Work with licensed program function not complete`, on the bottom of the Work with Licensed Programs display. Go to Chapter 15, "Troubleshooting software installation problems," on page 145 to determine the problem.

If you install a licensed program or optional part again, you must also install the PTFs for that licensed program again.

Option 12. Delete licensed programs

Option 12 on the Work with Licensed Programs menu is used to delete a licensed program or optional part of a licensed program that is installed on a system.

Note: Before you delete a licensed program, review "Considerations for deleting licensed programs" on page 142 and then return here.

When you select this option, the Delete Licensed Programs display appears. The list shows the licensed programs and optional parts that are installed on your system. Use this list to select licensed programs or optional parts to delete.

If you delete a (*BASE) licensed program that has optional parts, the system deletes all of the optional parts for that licensed program. If you delete only an optional part, the base program and other optional parts remain on your system. This option deletes all objects that are associated with the licensed program or optional part you select.

Type a 4 in the Option column next to the licensed program or optional part of a licensed program that you want to delete from your system.

The Confirm Delete of Licensed Programs display shows you which licensed programs or optional parts you selected to delete. Press Enter to delete the licensed programs or optional parts.

Option 13. Save licensed programs

Option 13 on the Work with Licensed Programs menu is used to save one or more licensed programs for redistribution.

The Save Licensed Programs display lists the licensed programs and optional parts that are installed on your system. Use this list to select licensed programs or optional parts to save. Type a 1 in the option column on the Save Licensed Programs display next to the licensed programs that you want to save.

Fill in the information on the Save Options display by using the following information.

Use the Help key for more information for each of the prompts on the display.

1. **Device**

   The examples in this topic use TAP01 for the name of the tape device. For more information about the tape device naming convention, see "Types of software installation devices" on page 10.

2. **Sequence number**

   Use *Default, or enter your choice for the sequence number to be used for the save process.

3. **End of media option**

   Tape: Determines the automatic positioning operation that is done on the tape volume when the save operation is completed. In the case of a multiple-volume save operation, this parameter applies to the last volume only. All other volumes rewind and unload if the tape reaches its end. You can specify these values:

   - *REWIND: The tape automatically rewinds after the operation ends, but it does not unload the tape.
   - *LEAVE: The tape does not rewind or unload after the operation ends. It remains at the current position on the tape drive.
   - *UNLOAD: The tape automatically rewinds and unloads after the operation ends.

   Optical: Specifies the operation that is automatically performed on the optical volume after the save operation ends. Optical devices only support the special value *UNLOAD. They ignore *REWIND and *LEAVE. Some optical devices will eject the volume after the operation ends.

Notes:

1. Licensed programs and optional parts that are shipped independently of an operating system release or modification are not displayed. Use the Save Licensed Program (SAVLICPGM) command to save independently shipped IBM licensed programs and optional parts.

2. This option should not be used for backup and recovery. It is only for redistribution. More information about redistribution is available in the Distributing software topic in the IBM i Information Center. For information about saving your system, refer to the Backing up your system topic in the IBM i Information Center.

Options for secondary languages

Secondary languages on IBM i can be displayed, installed, or deleted.

Option 20. Display secondary languages

After an IBM i installation process has completed, it is often necessary to determine if a secondary language is installed successfully on your system. To do this, select option 20 on the Work with Licensed Programs menu.

The Display Installed Secondary Languages display shows the primary and any secondary languages that are installed on your system.

Type 5 in the Option column next to a secondary language, and press Enter to see the licensed programs that are installed with the particular secondary language. This information is shown on the subsequent display, Display Installed Secondary Language Licensed Programs. By pressing the F11 key a few times, you will see this display change information. This display shows the secondary language library, product release, installed status value, or product option.

For a description of the installed status values, refer to "Installed status values" on page 196.

Option 21. Install secondary languages

Option 21 on the Work with Licensed Programs display is used to selectively install a secondary language for the licensed programs that are installed on a system.

Type 1 by the language you want to install, and press Enter. Only one secondary language can be installed at a time. The Confirm Install of Secondary Language display shows the following:

- The language you selected to install
- The library where it will be installed
- The release level of the language

On the Install Option for Secondary Languages display, select your installation device and specify yes or no for the Replace if current parameter.

The examples in this topic use OPT01 for the name of the installation device. "Types of software installation devices" on page 10 contains more information about the installation device naming convention. By specifying *NO to the Replace if current parameter, the secondary languages that are currently installed and at the same release as on the installation media are not be replaced during an upgrade. You can change the Replace if current parameter to *YES if you want to replace secondary languages that are already installed, including secondary languages installed at the same release as on the installation media.

Option 22. Delete secondary languages

Option 22 on the Work with Licensed Programs display is used to delete secondary languages that you no longer want installed on your system.

On the Delete Secondary Languages display, type 4 to select the secondary language that you want to delete. Press Enter. Press Enter again at the confirmation display.

More information about secondary language libraries in user profiles is available in the IBM i Globalization topic in the IBM i Information Center.

Completion status

When you install licensed programs, a secondary language, or PTFs, make sure that the IBM i installation process has successfully completed to avoid problems when you begin using the system.

Option 50. Display log for messages

Selecting option 50 shows the Display Install History display. Press Enter to view the installation start and completion messages on the Display History Log Contents display. This option displays specific messages that are shown in the history log.

Each part of the installation process (such as licensed programs, PTFs, Initialize System (INZSYS)) should have a completion message. If you do not see the message on the display, wait a few minutes and select option 50 again. If you still do not see a completion message, use the recovery procedures in Chapter 15, "Troubleshooting software installation problems," on page 145 to install any licensed programs or PTFs that were not successfully installed.

Commands related to the Work with Licensed Programs menu

Options 70, 71, and 72 display menus of additional IBM i commands that you can use.

Option 70 shows the Save and Restore Commands display. This display shows a list of related command menus you can use.

Option 71 shows the Program Temporary Fix Commands display. You can use these commands to work with one or more individual PTFs. For ore information about fixes, see Using software fixes in the IBM i Information Center.

Option 72 shows the Licensed Commands display.

More information about the following commands for IBM System Manager for i (5770-SM1) is available in the topic Control language (CL) in the IBM i Information Center.

- Copy PTF to Save File (CPYPTFSAVF)
- Create Program Temporary Fix (CRTPTF)
- Create PTF Package (CRTPTFPKG)
- Hold Program Temporary Fix (HLDPTF)
- Order Supported Product PTFs (ORDSPTPTF)
- Release Program Temporary Fix (RLSPTF)
- Send Program Temporary Fix (SNDPTF)

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