



iSeries

iSeries Memorandum to Users

Version 5 Release 1

SC41-5015-00





@server

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SC41-5015-00

Note

Before using this information and the products it supports, be sure to read the information in Chapter 5, "Notices" on page 63.

First Edition (May 2001)

This edition applies to version 5, release 1, modification 0 of IBM Operating System/400[®] (Program 5722-SS1) and iSeries licensed programs. This edition applies only to reduced instruction set computer (RISC) systems.

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About iSeries Memorandum to Users

This information describes the changes in version 5 release 1 modification 0 (V5R1M0) that could affect your programs or system operations. Use the information in this memorandum to prepare for changes on your current release and to use the new release.

Who should read this memorandum

The Memorandum to Users contains information that is critical for several audiences. This memorandum has four chapters:

- **Read this first** provides information that should be considered prior to installing V5R1. This chapter is intended for system and application programmers and for the person responsible for system management.
- **OS/400® operating system** contains new release changes to basic operating system functions. This chapter includes changes to systems management functions, such as configuration and tailoring the system, as well as changes that could affect the way things operate or appear in the new release. This chapter is intended for all users of the iSeries servers.
- **Options** provides information about new release changes that affect specific program options of OS/400. This chapter is intended for all users of the iSeries servers.
- **Licensed programs** contains new release changes that may affect existing applications. These changes may also affect applications saved on a V5R1 system to be restored on a previous release system. This chapter is intended for application programmers and system programmers who use the iSeries server and its licensed programs, as well as for businesses with complex networks or application development businesses that have systems at different releases.

Additional incompatibility information

| After the publication of the Memorandum to Users, updates to this document will
| be available in the English Internet version of the iSeries Information Center at the
| following Web site:

| www.ibm.com/eserver/iseries/infocenter

| Technical changes to the text are indicated by a vertical line to the left of the
| change.

| For other incompatibility information that was not available when this
| memorandum was published, see Informational APAR II12556: Incompatibilities
| for V5R1M0 Memo to Users. You can find this APAR at the following Web site:

| www.as400service.ibm.com 

| Click **Technical Information and Databases** —> **Authorized Problem Analysis**
| **Reports APARs** —> **V5R1 Info APARs**.

What's new

The following revisions or additions have been made to the Memorandum to Users since the first V5R1 publication:

- November 2002 update
 - “Missing Telnet exit program entries” on page 2 was added.
 - “V5R1 requirements” on page 2 and “Memory requirements for installation of V5R1” on page 6 were revised.
 - “Database file conversions after upgrading to V5R1” on page 7 was revised.
 - “OS/400 user profile passwords change” on page 25 was revised.
- September 2002 update:
 - “DDM and DRDA connection limitations” on page 27 was added.
- August 2002 update:
 - “Migration considerations for current Operations Console users” on page 3 was revised.
- April 2002 update:
 - “Current customers only — before you install V5R1” on page 1. PSP identifier for information that pertains to server upgrades and data migrations was added.
- December 2001 updates:
 - “Discontinued support for certain software and hardware” on page ix was added.
 - “Current customers only — before you install V5R1” on page 1. An explanation of updates to the English Internet version of the Memo to Users was added.
 - “V5R1 requirements” on page 2 was added.
 - “Larger load-source disk unit required” on page 6 was revised.
 - “Database file conversions after upgrading to V5R1” on page 7 was added.
 - “DMPTRC authority requirements” on page 13 and “ADDPFTRG and RMVPFTRG commands” on page 13 were rearranged.
 - “TN3270 default screen size” on page 16 was revised.
 - “Authority requirements for QSYCHGDS” on page 19 and “CHGDSTPWD behavior” on page 19 were revised.
 - “Service tools user IDs extended to STRSST and Operations Navigator” on page 22 was revised.
 - “Save and restore operations for service tools user IDs” on page 25 and “OS/400 user profile passwords change” on page 25 were revised.
 - “Lotus[®] Domino[™] products for iSeries” on page 42 was revised.
 - “Pascal API support withdrawn” on page 46 was added.
 - “Service pack required for service” on page 50 was added to the topic, “Client Access Express” on page 50.

Installing V5R1 over V4R4

If you are currently using V4R4 and plan to install V5R1 (skipping over V4R5), see the following Internet web site for an overview of the enhancements for V4R5:

www.ibm.com/servers/eserver/series/software/v4r5a.htm 

You should also read both the *Read This First* and the *AS/400® Memorandum to Users - Version 4 Release 5*. These documents contain incompatibility-related information about the new functions and enhancements incorporated into V4R5. You can order these documents by typing the following command:

SNDPTFORD SF98056

Discontinued support for certain software and hardware

It is important that you as a customer review and understand all new software release considerations. This is especially true of discontinued support for selected software and hardware products or features. This information is contained within the iSeries announcement material. To get the most current information on discontinued products or features along with suggested replacements, go to the iSeries Planning Web site:

<http://www.ibm.com/servers/eserver/series/support/planning/>

Select the link for upgrade planning information.

Installation considerations

Information about the installation and installation-related tasks is included in the book *Software Installation*, SC41-5120-05. Information regarding planning and preparing for software installation along with conceptual licensed program information can be found in the iSeries Information Center at:

www.ibm.com/eserver/series/infocenter 

Click **System planning and installation** —> **Hardware and software** —> **Software and licensed programs** .

PTF numbers in this memorandum

Program temporary fix (PTF) numbers in this memorandum might have been superseded.

Memorandums for previous releases

In addition to ordering previous releases of the *Read this First* and the *AS/400 Memorandum to Users* using the SNDPTFORD command, you can also view these documents at the following Web site:

www.as400service.ibm.com 

Click **Technical Information and Databases**—> **Preventive Service Planning Information (PSP)**—> **All Preventive Service Planning Documents by Release**.

Prerequisite and related information

Use the iSeries Information Center as your starting point for looking up iSeries and AS/400e technical information. You can access the Information Center two ways:

- From the following Web site:

www.ibm.com/eserver/series/infocenter

- From CD-ROMs that ship with your Operating System/400 order:
iSeries Information Center, SK3T-4091-00. This package also includes the PDF versions of iSeries manuals, *iSeries Information Center: Supplemental Manuals*, SK3T-4092-00, which replaces the Softcopy Library CD-ROM.

The iSeries Information Center contains advisors and important topics such as CL commands, system application programming interfaces (APIs), logical partitions, clustering, Java™, TCP/IP, Web serving, and secured networks. It also includes links to related IBM® Redbooks and Internet links to other IBM Web sites such as the Technical Studio and the IBM home page.

With every new hardware order, you receive the following CD-ROM information:

- *iSeries 400 Installation and Service Library*, SK3T-4096-00. This CD-ROM contains PDF manuals needed for installation and system maintenance of an IBM @server iSeries 400 server.
- *iSeries 400 Setup and Operations CD-ROM*, SK3T-4098-00. This CD-ROM contains IBM iSeries Client Access Express for Windows and the EZ-Setup wizard. Client Access Express offers a powerful set of client and server capabilities for connecting PCs to iSeries servers. The EZ-Setup wizard automates many of the iSeries setup tasks.

Operations Navigator

IBM iSeries Operations Navigator is a powerful graphical interface for managing your iSeries and AS/400e servers. Operations Navigator functionality includes system navigation, configuration, planning capabilities, and online help to guide you through your tasks. Operations Navigator makes operation and administration of the server easier and more productive and provides a graphical user interface to the new, advanced features of the OS/400 operating system. It also includes Management Central for managing multiple servers from a central server.

For more information on Operations Navigator, see the iSeries Information Center.

How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this memorandum or any other iSeries documentation, fill out the readers' comment form at the back of this memorandum.

- If you prefer to send comments by mail, use the readers' comment form with the address that is printed on the back. If you are mailing a readers' comment form from a country other than the United States, you can give the form to the local IBM branch office or IBM representative for postage-paid mailing.
- If you prefer to send comments by FAX, use either of the following numbers:
 - United States, Canada, and Puerto Rico: 1-800-937-3430
 - Other countries: 1-507-253-5192
- If you prefer to send comments electronically, use one of these e-mail addresses:
 - Comments on books:
RCHCLERK@us.ibm.com
 - Comments on the iSeries Information Center:
RCHINFOC@us.ibm.com

Be sure to include the following:

- The name of the book or iSeries Information Center topic.

- The publication number of a book.
- The page number or topic of a book to which your comment applies.

Chapter 1. Read this first

Current customers only — before you install V5R1

Each of the following publications contains additional information you should read and understand before you install V5R1. All of the sources referenced in this list are located either on the *iSeries Information Center CD-ROM*, SK3T-4091 or on the Internet at the following Web site:

www.ibm.com/eserver/series/infocenter

Note: After the release of the Information Center, updates will be available in the English Internet version. To review these updates, click **New and changed information** on the Information Center home page.

Access the Internet version or place the CD in the CD-ROM drive of your PC to view its contents. The instructions refer you to several sources:

- The *Software Installation* book, SC41-5120, provides key planning information that is needed before installing V5R1.
- The iSeries Information Center contains planning information on topics that include globalization, physical planning for new systems, and planning for logical partitions.
- The Preventative Service Planning (PSP) Information provides information about software problems you may encounter as you install V5R1. You can download PSP by using Electronic Customer Support (ECS) from the iSeries Service Internet site:

www.as400service.ibm.com/supporthome.nsf/Document/10000031

Alternatively, you can obtain PSP from your software service provider.

The following items are included in PSP:

- The PSP identifier for information that pertains to server upgrades and data migrations is SF98165. Information within this PSP describes known high-impact and pervasive problems. Review this PSP information before you upgrade your server model or migrate your data between servers. To receive this PSP information by using ECS, type the following command on an iSeries command line:

```
SNDPTFORD SF98165
```

- The PSP identifier for information that pertains to installing V5R1 is SF98060. Information within the PSP is grouped by product area. To receive this PSP information by using ECS, type the following command on an iSeries command line:

```
SNDPTFORD SF98060
```

- The PSP identifier for information that pertains to problems discovered since the availability of the current cumulative PTF package is SF98510. Information within this PSP describes all PTFs released since the current cumulative PTF package began shipping. It also contains information on all known high-impact and pervasive problems that are not included in the latest

cumulative PTF package. To receive this PSP information by using ECS, type this command on an iSeries command line:

```
SNDPTFORD SF98510
```

- PSP information for installing V5R1 hardware. Review this PSP information before you install either new iSeries 400 systems or hardware devices. To receive this PSP information by using ECS, use this command:

```
SNDPTFORD MF98510
```

- The iSeries PTF maintenance strategy. A PTF maintenance strategy is recommended for all iSeries customers. This may reduce the impact to iSeries system operations that result from unplanned outages or program failures. For more information on the iSeries maintenance strategy, do the following:
 1. Go to: www.as400service.ibm.com.
 2. On the navigation bar, click **Fixes and Downloads**.
 3. On the main Fixes and Downloads page, select **PTF Maintenance Strategy**.
- The iSeries Operations Console overview. Operations Console support is available on V4R3 and later releases of the OS/400 operating system.

Notice

In V5R1, the only type of PC console that iSeries Models 270, 820, 830, and 840 support is Operations Console.

V5R1 requirements

Successful installation of OS/400 V5R1 requires the following for each server or logical partition:

- A load-source disk unit of 2 gigabytes or larger must be installed. This unit is disk unit number 1 in auxiliary storage pool (ASP) number 1.
- A minimum memory size of 128 megabytes. Systems with less than this minimum memory fail the installation process for Licensed Internal Code. Memory requirements for partitions are dependent on partition configuration, I/O resources assigned, and applications used. The primary partition needs a minimum of 256 megabytes of memory. Depending on configuration values used, a primary partition may require more than 256 megabytes. Secondary partitions running V4R4 and V4R5 require a minimum value of 64 megabytes. Secondary partitions running V5R1 require a minimum of 128 megabytes of memory. Also depending on configuration values used, a secondary partition may require more than 128 megabytes. For more information on memory requirements for logical partitions, see the Logical partition concept: memory topic in the iSeries Information Center. Installations that either restore the load-source disk unit or initialize it fail without this minimum memory size.

Missing Telnet exit program entries

During the installation of the OS/400 operating system, any exit program entries that were added for exit points QIBM_QTG_DEVINIT (format INIT0100) and QIBM_QTG_DEVTERM (format TERM0100) will be inadvertently removed. Each exit point allows for a maximum of one exit program entry to be added. If you previously added exit program entries to these exit points, you will need to add these again once the installation completes. To add the exit program entries, you can use either the Work with Registration Information (WRKREGINF) command

(specify option 8, then option 1 for the exit point), the Add Exit Program (ADDEXITPGM) command, or the QUSADDEP/QusAddExitProgram API.

Client Access Async Console not supported

Client Access Async Console is no longer supported beginning with V5R1. In terms of cabling, the Client Access Async Console is similar to the Operations Console direct cable connection. You must order a new connectivity cable if you choose to use Operations Console through a direct cable attachment. If you choose to use LAN connectivity, you must use a standard LAN cable to attach the Operations Console PC workstation.

Refer to the PC and iSeries system requirements chapters in the iSeries Operations Console Setup (SC41-5508-2) documentation to determine which hardware features you need.

Migration considerations for current Operations Console users

Prerequisite information for existing Operations Console users

You must comply with the following before upgrading your software (OS/400, Licensed Internal Code, and so on) to V5R1:

1. It is highly recommended that you upgrade Client Access Express on your Operations Console systems to V5R1 by using the Operations Console CD-ROM, SK3T-4114. Then, check for the latest Client Access Express service pack from:

www.ibm.com/eserver/series/clientaccess/casp.htm

2. If you are upgrading to V5R1 and you are currently using Operations Console at V4R5 on an iSeries Model 270, 820, 830, or 840 with a 2745 card and a 2771 card installed in the system unit, comply with the following (To check for the location of the 2771 card, look for it in the same proximity, vertically or horizontally, as the 2745 card, where the console is currently plugged in.): Power down the iSeries server and move the Operations Console cable from the 2745 card to the 2771 card, and then continue with Step 3.
3. If you are upgrading from a pre-V5R1 version of OS/400 to V5R1 and you are currently using Operations Console at a previous release, there is no mechanism to change the password on the iSeries server. Therefore, after Licensed Internal Code (LIC) installation, the character-based interface (5250 emulation) goes away and does not return unless you do one of the following before performing the software upgrade:
 - Establish a connection between the iSeries server and Operations Console PC using the user ID of 11111111 (there are eight 1s).
 - Update Client Access Express to V5R1.

If you experience any difficulties re-connecting Operations Console after upgrading to V5R1, please refer to APAR MA23328.

Chapter 2. OS/400 operating system

This chapter describes changes to the OS/400 operating system and its functions. Changes to systems management functions, such as configuring and tailoring the system, are also included.

APAR and PTF prefix changes

In V5R1, the prefixes used for some APARs and PTFs have changed. Software APARs that had a prefix of SA now have a prefix of SE. Software PTFs that had a prefix of SF now have a prefix of SI.

MA APAR prefixes and MF PTF prefixes do not change. Also, special PTF numbers such as SF99XXX, SF98XXX, SF97XXX, SF96XXX, SF95XXX do not change.

Programming considerations

Output file changes

Changes made to output files for the V5R1 release may affect your applications. When fields are added to the end of the previous record format, you should specify no level checking (LVLCHK(*NO)) so your applications run the same as they did previously.

Security audit record changes

Changes made to security auditing for this release may affect applications that read those audit records. Actions that were not audited in previous releases may now be audited. Existing audit records may have been changed by the addition of new fields in a reserved area of the audit record or at the end of the audit record. Existing fields may contain new values. Applications that read the audit records should be changed to tolerate these types of changes.

Programs that use customized versions of IBM-supplied commands

Some OS/400 functions that use IBM-supplied CL commands that are not library-qualified in V5R1 may be changed in a future release to specify a specific library, *NLVLIBL or *SYSTEM, for the library qualifier. Applications that depend on using their own version of commands instead of the IBM-supplied commands might not work as they had on earlier releases. These applications should be changed to use the new retrieve command exit point (QIBM_QCA_RTV_COMMAND) or the change command exit point (QIBM_QCA_CHG_COMMAND) command that allow your exit program to get control and possibly change the command that is used.

Saving and restoring journal receivers to a previous release

For V5R1, to exchange journal receivers in a network between a V5R1 server and servers that are running earlier releases, you must apply the following PTFs to the earlier release systems:

- VRM440 SF64684
- VRM450 SF64276

The same PTFs are also required if you intend to employ remote journal support between a V5R1 server and a server that is running an earlier release.

Larger load-source disk unit required

OS/400 V5R1 requires that a load-source disk unit of 2 gigabytes or larger be installed on the iSeries server. This unit is disk unit number 1 in ASP number 1.

If a system does not currently have a load-source disk unit of 2 gigabytes or larger, you must save nonsystem data, then replace the existing load-source disk unit with a unit of 2 gigabytes or larger. When you have installed the load-source disk, install V5R1 and restore all nonsystem data.

To successfully install V5R1 on a system with logical partitions, each logical partition requires a load-source disk unit that is 2 gigabytes or larger.

Memory requirements for installation of V5R1

Successful installation of V5R1 requires a minimum memory size of 128 MB. Systems with less than this minimum memory fail the install process for Licensed Internal Code. Installations that either restore the load-source disk unit or initialize it fail without this minimum memory size.

Memory requirements for partitions are dependent on partition configuration, I/O resources assigned, and applications used. The primary partition needs a minimum of 256 megabytes of memory.

Depending on the number of secondary partitions you plan to create, the primary partition's memory requirements may increase. If you have allocated minimum memory resources to your primary partition for its maximum memory configuration, you must add 8 megabytes of memory to the minimum memory size of the primary partition before you create secondary partitions on your server.

During a hardware or software upgrade, you may receive system reference code (SRC) 1 B600 5390. This error indicates that you may need to adjust the memory values for the primary partition or the secondary partition.

V5R1 installation time affected by automatic object conversion

To enable V5R1 enhancements, several types of objects are automatically converted during the V5R1 installation process. The installation and first IPL of V5R1 on your iSeries server could take several hours longer than a typical release-to-release upgrade. The length of installation time depends on the number of objects of the types listed below that you have on your system.

The major object conversions that are automatically performed are:

- User profiles
- Spooled files (See "QMAXSPLF and WRKSPLF changes" on page 13 for more details.)
- Files in directories (See "CCSID data conversion and Unicode support" on page 10 for more details.)
- Database cross-reference files

Database file conversions after upgrading to V5R1

If you are upgrading to V5R1 on the same system, be aware that database files and members are converted at first use. This conversion updates the change date of the object. If you want to force conversion during the upgrade, review information APAR II13446 on the IBM [eserver iSeries Support Web site](mailto:eserver@series.ibm.com):

www.ibm.com/eserver/iseries/support 

Click on SEARCH Technical Databases.

To avoid problems with first-use conversion, make sure you upgrade with V5R1 cumulative tape C2036510 or later, Database Group PTF (SF99501) version 7 or higher, and PTF SI02872. With these PTFs applied, forcing conversion is not required.

Integrated file system

Functional changes

New object renaming change

Beginning in V5R1, the operating system creates a new object with path name `/dev/null` and object type `*CHRSE`. If an existing object already has that name but is an object type other than `*CHRSE`, the existing object is renamed `/dev/null.prv`. The new `/dev/null` object is then created.

However, if an existing `/dev/null.prv` object already exists, the original `/dev/null` object is renamed to `/dev/null.prv.nnn`, where `nnn` is a value between 001 and 999. If objects already exist using all of the `/dev/null.prv.nnn` values, the rename function fails and the new `/dev/null` file is not created. When the rename function is successful, informational message CP1B41D is issued to the job log displaying the new object name for the original `/dev/null` object.

CPY commands copy attached Java programs

Beginning in V5R1, when using Operations Navigator or the Copy (CPY) command to copy files within the root, `/QOpenSys`, or user-defined file systems, digital signatures and attached Java objects or programs are copied. In releases prior to V5R1, you could copy stream files to remove an attached Java program using the CPY command.

Copying the additional parts of the source objects causes the target of the copy to take up more space on the disk and causes the copy operation to take longer. In addition, if you want to remove the Java program, your operational procedures might need to be changed to call the Delete Java Program (DLTJVAPGM) command for the copied stream file.

Structure change in the I/O vector in the uio.h header file

Prior to V5R1, the QSYSINC header file in the UIO library contained the following structure:

```
/* I/O vector structure definition */
struct iovec {
    void      *iov_base;
    ssize_t   iov_len;
};
```

In V5R1, the structure is changing to the following:

```

/*****
/* I/O vector structure definition */
/*****
struct iovec {
    void      *iov_base;
    size_t    iov_len;
};

```

The `iov_len` field has changed from a signed integer (`ssize_t`) to an unsigned integer (`size_t`). You might have a compiling problem if you pass a pointer to the `iov_len` field to a function. For example, the C code below would fail to compile on a V5R1 system because the `foo` function takes an `ssize_t` instead of a `size_t`.

```

foo(ssize_t *s)
{ /* do something */ }

bar()
{
    struct iovec  myvec;
    foo(&myvec.iov_len);
}

```

utime() API changes

Beginning with V5R1, write authority (*W) to an object is no longer sufficient to allow the effective user ID to set the access or modification times to a specified value. The current authorization requirements of the `utime()` API are shown in the following tables:

Table 1. Authorization requirements for `utime()`

Authorization Required for <code>utime()</code> (excluding QDLS)		
Object referred to	Authority required	ERRNO
Each directory in the path name preceding the object	*X	EACCES
Object when changing the time to a specified value	Owner ¹	EPERM
Object when changing the time to the current time	Owner or *W ¹	EACCES

1. You do not need the listed authority if you have *ALLOBJ special authority.

Table 2. Authorization required for `utime()` in the QDLS file system

Authorization Required for <code>utime()</code> in the QDLS File System		
Object referred to	Authority required	ERRNO
Each directory in the path name preceding the object	*X	EACCES
Object when changing the time to a specified value	*W	EPERM
Object when changing the time to the current time	*W	EACCES

Object names in the security audit journal

In V5R1, the strategy for logging integrated file system object names in the security audit journal now includes the path name of the object in the audit record. IBM provides model output files for every security audit record type. The file names are

QASYxxJ4, where xx is replaced with the 2-character security audit entry type. Below is a table that shows the old and new fields for referencing integrated file system object names.

In existing QASYxxJ4 files that reference integrated file system object names, no fields are removed.

Old fields in QASYxxJ4 file			New fields in QASYxxJ4 file		
Field Name	Length	Description	Field Name	Length	Description
xxOLEN ¹	Short int	Length of the 512 object name	xxOFID	Char 16	Object file ID
xxCCID ¹	Int	CCSID of the 512 object name	xxASP	Char 10	ASP name
xxCNTY ¹	Char 2	Country code of the 512 object name	xxASPN	Char 5	ASP number
xxLANG ¹	Char 3	Language ID of the 512 object name	xxPCCI	Int	Path name CCSID
xxPFID ¹	Char 16	Parent file ID	xxPCNT	Char 2	Path name country ID
xxOFID	Char 16	Object file ID	xxPLAN	Char 3	Path name language code
xxOBJN ¹	Char 512	Object name	xxPNLN	Short int	Path name length
			xxAPIN ²	Char 1	Absolute path name indicator
			xxRPFI ³	Char 16	Relative path file ID
			xxPNM ⁴	Char 5000	Path name
<ol style="list-style-type: none"> 1. These fields are not included in any new QASYxxJ4 files that were generated in V5R1 or later. 2. Y (YES): Path name is an absolute name. N (NO): Path name is not an absolute name. 3. This value is only filled in if the absolute name indicator is set to N. 4. Variable length field with fixed length 5000. If the name is larger than 5000, the last 5000 characters are put in the field. 					

Beginning in V5R1, some security audit records do not have any data in the fields that were used to describe the integrated file system object name using the old method. The following list of fields from the existing QASYxxJ4 files are not contained in any new QASYxxJ4 files:

- xxOLEN
- xxCNTY
- xxCCID
- xxLANG

- xxPFID
- xxOBJN

CCSID data conversion and Unicode support

CCSIDs for files

V5R1 files are now tagged with a coded character set identifier (CCSID). However, you can still retrieve a code page value in most circumstances. Previously, integrated file system files were tagged with a single code page.

The **stat()** API and its equivalents return code page information (such as the `st_codepage` field). However, when more than one code page is associated with the object CCSID, the returned code page value is 0. Objects that were previously tagged with code page 1200 are automatically tagged with CCSID 13488. APIs that return code page information return a value of 1200 for objects tagged with CCSID 13488.

If you use the file server exit point, be aware that file names are now passed to the exit point programs in CCSID 13488, not 61952.

Changes to the **spawn()** function

The behavior of the **spawn()** function has changed. When a parent process has a file open for text conversion and the child process inherits the descriptor associated with that file, text conversion is active for the descriptor in the child process. In prior releases, the descriptor was opened in the child process, but text conversion was not active.

Integrated file system objects and path names

Prior to V5R1, integrated file system objects could be created and tagged with the single-byte code page associated with a mixed-byte job CCSID. However, the file was not usable through some integrated file system interfaces. In V5R1, files and directories are now tagged with the CCSID associated with the job, even if the default job CCSID is a mixed-byte CCSID. However, if the files are restored to a previous release, restrictions associated with that release are encountered. For example, a file restored to a previous release cannot be opened for text conversion or copied with data conversion.

Prior to V5R1, when running in a job whose job CCSID was a mixed-byte CCSID, *FILE type objects created in the /QSYS.LIB file system using one of the create directory interfaces (CRTDIR, MKDIR, and MD commands and the **mkdir()** API) were tagged with the single-byte CCSID associated with the single-byte code page of the job CCSID. However, in V5R1 that create operation results in the *FILE object being tagged with the mixed-byte CCSID. This could affect operations that are reading from or writing to database file members within these *FILE objects.

Path names in integrated file systems are converted from CCSID 61952 to 13488. The contents of symbolic links, the path names stored in the user profile, and the QLOCALE system value are also converted.

Commands with additional parameters

Commands for the integrated file system that have additional parameters for V5R1 have retained the original parameters from prior releases. There are no V4R5-to-V5R1 impacts for integrated file system programs written using the original commands and parameters. However, the Change NFS Export

(CHGNFSEXP and EXPORTFS) commands and parameters have changed from code page to CCSID because they are elements of the HOSTOPT parameter and not separate parameters themselves.

The new CCSID parameters for the commands should be used, however, because the previous parameters might be removed in a future release. In V5R1, press F10 while prompting the command to see the code page parameters.

Connecting to systems at previous releases

The following PTFs need to be installed on OS/400 V4R4 systems in order for an iSeries server or a PC with V5R1 to connect correctly:

- 5769999100 VRM440 MF23743
- 5769SS100 VRM440 SF61207
- 5769SS100 VRM440 SF61185

Object save size

When saving objects or displaying media containing saved objects, the object size is now shown in kilobytes instead of bytes. When saving objects to a V4R5 or earlier release, the maximum value presented for an object's offline size is 2 GB minus 1 (2 147 483 647 bytes).

New fields have been added to the Display Object Description (DSPOBJD) output file, QADSPOBJ, to contain an object's saved size. The new ODSSZU and ODSBPU fields always contain the object's saved size in units and the number of bytes per unit. The existing field ODSSZE contains the saved object size up to a maximum of 9 999 999 999 bytes.

The Retrieve Object Description (QUSROBJD) API added new fields for the **Save size** in units and the **Save size multiplier** to the existing format OBJD0400. The existing **Save size** field in format OBJD0300 contains the object's saved size up to a maximum of 2 GB. If the save size is actually greater than 2 GB, -1 is returned in this field, and the new fields must be used to determine the object's saved size.

Auxiliary I/O request field and Processing unit time field changes

The **Number of auxiliary I/O requests** field and the **Processing unit time** field on the Retrieve Job Information (QUSRJOB) and the List Job (QUSLJOB) APIs returns -1 when the values reach 2 147 483 647. The new **Number of auxiliary I/O requests** and the **Processing unit time** fields should be used to retrieve larger counts.

Tape library improvements

To provide the opportunity to add and remove cartridges to a tape library, a CPA401D inquiry message is issued in response to a door-open error, instead of the CPF414E, CPF471C, and CPF451C escape messages. CPA401D is sent to the message queue that is configured for the media library device. The default reply to CPA401D is C, for Cancel. If C is chosen or the default is used, escape message CPF4110, CPF5104, or CPF4502 is sent.

Also, the volume identifier in the tape library inventory data is no longer reset to *UNKNOWN for existing cartridges when a physical re-inventory is performed.

Increase library list of an active job

In V5R1, OS/400 allows a maximum of 250 entries in the user part of the library search list. Up until now, the maximum for the user part of a library search list was 25 library names. The full library search list, including system part, product libraries, current library, and user part, had room for 43 names. The full list now holds up to 268 names. The limit for the system value QUSRLIBL remains at 25 libraries. Job descriptions can list up to 250 libraries.

Commands, prompts, APIs, help text, messages, panels, etcetera, have all been updated to support 250 libraries. The existence of data area QLILMTLIBL, in the QUSRSYS library, limits the number of libraries in the user part of the library search list to 25 for all jobs on the system. This is an execution time enforcement, so it does not affect compilation or command prompting. This is a customer switch for the sole purpose of providing the customer with a temporary safety net to guard against unanticipated application interaction. IBM may remove support for the QLILMTLIBL data area in a future release.

Users of the Retrieve Job Attributes (RTVJOBA) command might get error CPF098A when using the User library list (USRLIBL) parameter to retrieve the user part of the library list. If there are more than 25 libraries in the user part of the library list and you have only enough space to retrieve 25 libraries (275 characters), error message CPF098A is sent. Because the new maximum size for the user portion of the library list is 250 libraries, the user should provide 2750 bytes of space.

There are several APIs that return the user part of the library list. Source code that calls the following APIs to return library list information should be changed to increase the size of the receiver variable. Unless the receiver variable is changed, the caller of the API might not get the complete library list returned.

The following APIs do not send error messages if the complete library list is not returned.

- Retrieve Spooled File Attributes (QUSRSPLA)
Library list information is returned in the format SPLA0200. The format has a **Number of bytes available** field, which the caller of the API needs to check. The Resource Library array might not contain the complete library list. The last character of this field indicates whether more than 63 libraries are in the library list. The complete library list is returned in the new Library List Entry structure, which should now be used to retrieve the library list.
- Retrieve Job Information (QUSRJOBI)
Library list information is returned in the format JOBI0700. The format has a **Number of bytes available** field, which the caller of the API needs to check. This field can be used to determine if all of the information was returned.
- Retrieve Current Attributes (QWCRTVCA)
Library list information is returned in the format RTVC0200. The format has a **Number of bytes available** field that the caller of the API needs to check. This field can be used to determine if all of the information was returned.
- Retrieve Job Description (QWDRJOB)
The initial library list returned in format JOB0100 now returns up to 250 library names. The format has a **Number of bytes available** field that the caller of the API needs to check. This field can be used to determine if all of the information was returned.

Also, a job description with more than 25 libraries in the library list cannot be saved to a target release earlier than V5R1M0.

Users of the Change Library List (QLICHGLL) API receive error message CPF219A if QTEMP is specified for a product library name.

Only the Job Start (JS) audit record, produced when the job is started, contains the names of the libraries in the job's library search list. Other JS audit records omit this information. Also, a ZR audit record is no longer produced when a library is removed from the job's library search list.

Command and API changes

DMPTRC authority requirements

In V5R1, the Dump Trace (DMPTRC) command requires the user to have *SERVICE special authority or be authorized to the Service trace user capability. You can obtain authorization to the service trace function by using the Application Administration support in Operations Navigator. You can also use the Change Function Usage Information (QSYCHFUI) API to change the list of users that are allowed to perform trace operations.

ADDPFTRG and RMVPFTRG commands

A new escape message (CPF32C6) is sent if errors are found on the Add Physical File Trigger (ADDPFTRG) command or the Remove Physical File Trigger (RMVPFTRG) command. This message is sent instead of CPC3204 and CPC3206, which were previously sent for ADDPFTRG and RMVPFTRG, respectively.

Prior to V5R1, the ADDPFTRG command required that you have *READ authority to the referenced physical file (FILE parameter). In V5R1, you must have *READ and *OBJOPR authorities to the physical file.

Prior to V5R1, the ADDPFTRG command required that you have *ADD, *DLT, or *UPD authority to the physical file, depending on the value you specified for the Trigger event (TRGEVENT) parameter. In V5R1, if ALWREPCHG(*YES) is specified, you need *UPD and *OBJOPR authorities to the file.

QMAXSPLF and WRKSPLF changes

The use of output files QAPTACG4 (field JASPNB), QASYSFJ4 (field SFSNUM), and QSYPOJ4 (field POSPLN) that contain the spooled file number might require application changes. In V5R1, new fields have been added to accommodate a larger spooled file number. If the number is too large for the old field, the old field is set to blank and the new field should be referenced to get the number. To prevent the need for a change to an application, ensure that the system value QMAXSPLF remains set to 9999 (the default value at installation time).

Several messages have changed to include a new 4-byte message data field that contains the spooled file number. The old 2-byte fields that already exist are set to -1 when the spooled file number exceeds 32 767. Once the 2-byte field is set to -1, the spooled file number can be accessed through the 4-byte message field.

If you decide to use the larger fields, applications that use the open feedback area might require code changes. It is recommended that you use the larger fields, but the smaller fields can still be used.

Views 3 and 4 of the Work with Spooled Files (WRKSPLF) display have changed. Previously, view 3 contained the output queue name and library along with the spooled file number. With the increase in the spooled file number, view 3 can no longer contain the output queue name and library as well as the spooled file number and other attributes. Therefore, the output queue name and library are now in view 4.

STRPJ and ENDPJ command error messages

When the Start Prestart Jobs (STRPJ) command is not allowed, error message CPF0921 is sent as an escape message rather than as a completion message. When the End Prestart Jobs (ENDPJ) command is not allowed, error message CPF0922 is sent as an escape message as well.

Programs that issue either of these commands must be modified to handle these messages as escape messages rather than as completion messages.

CHGNWSUSRA default semantic change

With the Change Network Server User Attributes (CHGNWSUSRA) command, the default semantic for the *SAME value on the Propagate group members (PRPGRPMBR) parameter has changed. In V5R1, if the group was not previously enrolled, the default value *SAME is mapped to the *ALL value. This enrolls both the group and the group members to the server and domain.

Prior to V5R1, if the group was not previously enrolled, the default value *SAME was mapped to the *NONE value. This caused the group, but not the group members, to be enrolled to the server and domain.

For groups that have already been enrolled, the *SAME value is mapped to the current value (*NONE, *ALL, or *MBRONLY). However, groups that have not been enrolled yet have no existing value for PRPGRPMBR. Therefore, the *SAME value is mapped to *ALL.

Restoring and re-creating programs

Changes to program observability

The Change Program (CHGPGM) command, Change Service Program (CHGSRVPGM) command, and Change Module (CHGMOD) command support a Remove observability (RMVOBS) parameter. You can use this parameter to remove information from a program (*PGM), service program (*SRVPGM) or module (*MODULE) object, making the resulting object smaller. All creation data observability is removed when you use RMVOBS(*ALL) or RMVOBS(*CRTDTA).

Observability is the full set of data that can be retrieved from an object. The term creation data observability refers to the data needed to re-create the program, service program, or module object, or to bring it to a different hardware technology (such as in the CISC-to-RISC conversion).

In V5R1, removing creation data does not completely remove observability information and, therefore, does not reduce object size as much. If creation data has been removed from a module or program created for V5R1 and later releases, it can no longer be retrieved. However, the affected programs or modules can be retranslated when restored to a system during the restore operation.

If a program validation error is determined to exist at the time the program is restored, the program is re-created to correct the program validation error. The action of re-creating the program at restore time is not new to V5R1. In previous releases, any program validation error that was encountered at restore time resulted in the program being re-created if possible (if observability existed in the program being restored). The difference with V5R1 or later programs is that the information needed to re-create the program remains even after observability has been removed from the program. Thus, any V5R1 or later program for which a validation failure is detected is re-created at restore, and the alteration that caused the validation failure is removed.

Prior to V5R1, a CHGPGM command specifying RMVOBS(*CRTDTA) also removed block order profiling data. Beginning with V5R1, RMVOBS(*CRTDTA) no longer removes block order profiling data. In V5R1, specify RMVOBS(*BLKORD) or RMVOBS(*ALL) to remove block-order profiling data.

QALWOBJRST system value can prevent objects with validation errors from restoring

In V5R1, the **Allow object restore** (QALWOBJRST) system value can be used to prevent restoration of all programs, service programs, modules, and SQL packages that have object validation errors. If you have set the QALWOBJRST system value to anything other than *ALL or *ALWVLDERR, objects with validation errors are not restored onto your system, even though they were restored on a previous release.

Digital signatures of iSeries objects

For V5R1, OS/400 and other IBM licensed programs that contain system-state programs and service programs are digitally signed by IBM. Each digitally-signed program or service program object increases in size approximately 8192 to 16 384 bytes, which increases the size required for QSYS and other IBM libraries.

System-state or inherit-state programs and service programs from previous releases

Programs that are on your server and that are not digitally signed cannot be restored by a V5R1 (or later) server if the QVfyOBJRST system value is set to 2 or above. The shipped default value for QVfyOBJRST is 3.

System-state or inherit-state programs and service programs saved on a release prior to V5R1 can only be restored on a V5R1 (or later) server if system value QVfyRSTOBJ is set to 1.

If you temporarily applied PTFs (from prior releases) to your server, programs from those PTFs may still be on your system and need to be removed. Some of these temporarily applied programs might be in system-state and cause the check object integrity (CHKOBJITG) command to report potential object integrity problems. To remove these programs, use the CLEANUP menu option 3 (Start cleanup immediately) prior to installing V5R1.

Licensed programs from previous releases

You should upgrade all licensed programs supported in V5R1 and delete programs that are not supported by V5R1. If you continue to use unsupported licensed programs after upgrading to V5R1 and do not change the QVfyOBJRST system value to 1, the CHKOBJITG command reports potential object integrity problems.

New QVFYOBJRST system value can limit software installation

The new system value QVFYOBJRST allows you to use digital signature technology to limit the software that can be installed on your server. The default value continues to allow you to install any software that was previously installable, except for software that runs in system state or inherit state. Those two states are reserved for use by OS/400 operations, and should not be used by other software. Allowing such software on your server could expose the integrity of the data on your server. You should be cautious about allowing system-state or inherit-state programs that are not provided by IBM on your system.

If you must restore software that fails to restore because it ran in system or inherit-state and was not supplied by IBM, you can change the QVFYOBJRST system value to allow that program to restore, but you should immediately reset the value to its previous value (the default is 3) to limit the integrity risks to your server.

TGTRLS parameter

Prior to V5R1, the commands Create System/36™ RPG Program (CRTS36RPG), Create System/36 COBOL Program (CRTS36CBL), Create RPG Program (CRTRPGPGM), and Create COBOL Program (CRTCLPGM) stored the value V2R3M0 as the **Earliest release that the program can run** attribute of the generated program. This value was stored regardless of what value was specified on the Target release (TGTRLS) parameter. This allowed OPM RPG and COBOL programs to be saved to prior releases without having to specify a TGTRLS parameter value when the program was created.

In V5R1, the value specified for the TGTRLS parameter on these commands determines the **Earliest release that a program can run** attribute of the generated program. For example, in order to be able to save an OPM COBOL program for V4R5, you must specify TGTRLS (V4R5M0) on the CRTCLPGM command.

TN3270 default screen size

Prior to V5R1, the following PTFs installed a data area switch that was needed to activate the function that allowed a wide screen (27x132) 3270 Telnet session on an S/390® (VM or MVS) server system:

- V4R3 SF62721
- V4R4 SF63017
- V4R5 SF63756

In V5R1, the wide-screen 3278 session is supported by default and is used automatically. However, if an iSeries server with a V5R1 TN3278 session attempts a connection from the S/390 server to a second iSeries server with a prior release, the session is only allowed as a 3277 (24x80) session.

To disable the default 3278 wide-screen function, you must create a data area. Name the data area QTVNO32785 and create it in a library that is part of your library list (*LIBL). The contents of the data area must be 1 (character 1) if you want to turn off the wide-screen function. If the data area does not exist or if the data area contains anything other than 1, the wide-screen function remains active.

In releases prior to V5R1, the data area is QTVCLIENT, which can reside in any library in your library list. If this data area contains a Y, wide-screen display is supported.

| If you have previously used one of the PTFs listed above and have created the
| QTVCLIENT data area to activate the wide-screen support, it will not be
| automatically deleted by the Telnet client nor will it be used any longer to
| determine whether wide-screen support is active.

OptiConnect security changes

An enhancement has been made to the OptiConnect functions to make access between systems using OptiConnect DDM or DRDA[®] more secure. OptiConnect now uses the OptiConnect mode table to manage and control jobs in each of the systems connected using OptiConnect. When upgrading to V5R1 or later from a release prior to V4R5, the OptiConnect Connection Manager automatically creates the OptiConnect mode table if the table does not already exist.

Depending on how the existing modes in the mode table are configured, this creation might result in error message CPF9162 with error code 8403 when OptiConnect is started after the upgrade.

For more information on these changes and information about how to override the new authority arrangement, see "Security considerations using the OptiConnect Mode Table" in *OptiConnect for OS/400*, SC41-5414-02.

AS/400 NetServer support changes

In V5R1, AS/400 NetServer is provided for Windows 95[®], Windows NT 4.0, Windows 98, Windows 2000, and Windows ME. Microsoft Windows 3.11 (Windows for Workgroups) and Windows NT 3.51 are no longer supported by the AS/400 Support for Windows Network Neighborhood (AS/400 NetServer).

Support for Windows 95 may be removed in a future release. Previous releases of OS/400 continue to support Windows NT 3.5 and Windows for Workgroups clients until those OS/400 releases are no longer supported.

With V5R1, user IDs longer than 10 characters are now truncated to 10 characters instead of being rejected when checking for an iSeries user ID. A user ID such as Administrator on Windows is now the same as ADMINISTRATOR on the iSeries server.

Communications trace for a PPP line

With V5R1, the communications trace for a Point-to-Point Protocol (PPP) line description must be ended manually. This change eliminates the requirement to restart a communications trace each time a connection for that line ends. In versions prior to V5R1, the communications trace would automatically terminate when the PPP connection ended or when the PPP line was varied off.

Client connections to the file server during startup

In V5R1, clients are able to connect and use file systems (other than the /QDLS file system) before the recovery for the /QDLS file system is complete. However, any client that wants to use the /QDLS file system must wait until the /QDLS recovery is complete. In previous releases, after an IPL, the file server did not allow clients to connect until the recovery step for the /QDLS file system was complete.

Password behavior and restrictions for some APIs and communication types

Long password support

V5R1 OS/400 allows you to set password levels that allow for passwords longer than 10 characters. When one of these new security levels is set, users who want to map network drives to the integrated file system of the iSeries from PCs running on a Windows 95, Windows 98, or Windows ME operating system need special configurations on their PCs. For more information, refer to Information APAR II12641.

Maximum length of intersystem communications function password

Prior to V5R1, the intersystem communications function file allowed one password literal up to 10 characters. In V5R1, the **Maximum value for password** field has a length of 128 characters. An intersystem communications function file that has a password greater than 10 characters or a program-to-system field for the password cannot be saved to a pre-V5R1 iSeries server.

Maximum length of conversation security password

The CPI-C Set Conversation Security Password (CMSCSP) API has changed in V5R1. The password length parameter can include up to 128 characters. You should not specify a password length greater than 10 characters unless the target system is operating at a password level of 2 or 3. You set this value with the QPWDLVL system value. If QPWDLVL is set to 0 or 1, then the maximum allowable password length is 10 characters. Changes to QPWDLVL take effect at the next IPL.

Maximum length of APPC password

In V5R1, the advanced program-to-program communications (APPC) function allows a maximum password length of 128 characters, and uses a new stronger encryption algorithm. A new bit has been added for session establishment (BIND) to indicate what encryption algorithm is used for both iSeries servers (source and target systems). If the target system does not support the encryption algorithm of the source system, a sense code 080F 6051 is set. You can look for the CPF1269 messages in QSYSOPR message queue to see the reason failure. The encryption algorithm to be used by APPC code takes effect at the evoke operation, and is determined by the system's release and password level (QPWDLVL system value).

In V5R1, APPC also includes 128-character password support, and is the only communications type that supports 128-character passwords.

Maximum length of RMTPWD parameter

The Verify APPC Connection (APING), Run Remote Command (AREXEC), Run Remote Command (RUNRMTCMD), and Verify APPC Connection (VFYAPPCCNN) commands have been changed to increase the **Remote password** (RMTPWD) parameter length up to 128 characters and to allow mixed case characters. For previous releases, the maximum password parameter length was 10 characters. For V5R1, if the QPWDLVL system value is set to 0 or 1, you should use a maximum remote password parameter length of 10 characters. Otherwise, if this value is set to 2 or 3, the maximum remote password parameter length is 128

characters. If your V5R1 system communicates with remote iSeries servers that have pre-V5R1 operating systems installed, the pre-V5R1 systems do not accept the longer passwords.

QSYSUPWD buffer and password restrictions

In V5R1, the Set Encrypted User Password (QSYSUPWD) API enforces the existing restriction on the buffer supplied to QSYSUPWD. The buffer cannot have been altered; it must have the same content as that received from the Retrieve Encrypted User Password (QSYRUPWD) API. If the buffer has been altered or the buffer length is not valid, exception CPF4AB2 is signaled. In V5R1, the 2000-byte buffer returned by the QSYRUPWD API contains additional data.

Authority requirements for QSYCHGDS

The Change Dedicated Service Tools User Profile (QSYCHGDS) API no longer requires *ALLOBJ and *SECADM authority. Instead, the service tools perform authorization checking.

If you are changing a service tools user ID for someone other than yourself, your service tools user ID must have the work with security functional privilege. See “Functional privileges” on page 24 for more information.

CHGDSTPWD behavior

The Change Dedicated Service Tools Password (CHGDSTPWD) command no longer resets the password for all three IBM-supplied service tools user IDs. CHGDSTPWD resets only the password for the IBM-supplied security capability ID (QSECOFR service tools user ID).

Distributed relational database architecture considerations

If the new long and mixed-case password support is enabled on an application server (AS) in an environment with applications requesters (AR) at releases prior to V5R1, those ARs may no longer be able to connect to the application server. IBM recommends that all systems in a distributed relational database architecture (DRDA) mixed-release environment use the same type of password support. Although the use of a server authentication entry may appear to be a viable alternative for application requesters, ARs cannot be used to pass long or mixed-case passwords in a DRDA environment. Although the server authentication entries accept long and mixed-case passwords in previous releases, DRDA can pass only ten character, uppercase passwords prior to V5R1. For more information on problems with the use of long and mixed-case passwords with DRDA, see Information APAR III2667.

Performance monitor and collection services

The performance monitor is not supported in V5R1. The following commands associated with this function are no longer available:

- Start Performance Monitor (STRPFRMON)
- End Performance Monitor (ENDPFRMON)
- Start Performance Collection (STRPFRCOL)
- End Performance Collection (ENDPFRCOL)
- Work with Performance Collection (WRKPFRCOL)
- Add Performance Collection (ADDPFRCOL)
- Change Performance Collection (CHGPFRCOL)


The Collection Services function in Operations Navigator should be used in V5R1 and future releases. If you have subsystem descriptions based on the QBASE or QCTL subsystems, you should remove the autostart job entry (RMVAJE command) for performance collection from those subsystems.

Domain Name System (DNS) configuration

If you are currently using V4R4 or V4R5 DNS, no changes are made to the current DNS when you install V5R1 because V4R4 and V4R5 DNS are still supported. There are no operational differences between V5R1 and the previous V4R4 and V4R5 releases. All configuration file names, formats, and locations remain the same.

When you decide to upgrade to the new DNS, use Operations Navigator to make the migration. After you have upgraded to the new DNS, many of the file names, formats, and locations change in V5R1. Operations Navigator refers to the older server as Version 4 (based on DNS BIND Version 4.9.3) and the new server as Version 8 (based on DNS BIND Version 8).


For more information on the new configuration structure of DNS, see the iSeries Information Center at:

www.ibm.com/eserver/iseries/infocenter 

Click **Networking** → **TCP/IP** → **DNS**.

IBM Development Kit for Java

The V5R1 release includes base support for Version 1.3 of the Java 2 Software Developer Kit (J2SDK), Standard Edition. J2SDK Version 1.3 is now the default version for V5R1 IBM Development Kit for Java, although the iSeries server uses the latest version of the SDK or JDK™ program that you have installed. For information on the difference between Java Development Kit versions see the Sun Microsystems Web site at

<http://java.sun.com/j2se/1.3/compatibility.html> 

Also in this release, the default authorities assigned to files and directories created using Java 2 SDK have been changed to be consistent with other Java platforms. New files created with Java now have public authority of *RW (read and write) instead of *R. New directories created with Java are given public authority of *RWX (read, write, and execute) instead of *RX.

Fields removed from the QAYPESTATS and QAYPETASKI files

The QAYPESTATS and QAYPETASKI database files, which are used by the performance explorer function, contain a number of fields that have been removed because they are no longer used. The majority of these fields contained a 0 in V4R5.

The fields removed from the QAYPETASKI file are: QTSTAO, QTSO, and QTSAGF. The table below lists the other fields that are no longer used.

QAYPESTATS fields no longer used

QCIAGF*	QHWI04	QSWC07
QCIAO*	QIAGF*	QSWC08
QCIPWR*	QIAO*	QSWC09
QCITAO*	QIIPWR*	QSWC10
QCIWRT*	QIITAO*	QSWI05
QHWC02	QIHWRT*	QSWI06
QHWC03	QSTCNT	QSWI07
QHWC04	QSTESZ	QSWI08
QHWI02	QSWC05	QSWI09
QHWI03	QSWC06	QSWI10
* Fields contain unused data.		

The space in the database file records occupied by these unused fields may be reused in a future release. You should remove references to the field names listed above.

IP security, IP filtering, and NAT enhancements

RMVTCPTBL command changes

For V5R1, the Table (TBL) parameter for the Remove TCP/IP Table (RMVTCPTBL) command is now optional and has a default value of *ALL. Previously, TBL was a required parameter on the RMVTCPTBL command. There were three choices for TBL values: *ALL, *IPFTR, and *IPNAT. In V5R1, the TBL command functions as if *ALL were specified, even though *IPFTR and *IPNAT are still allowed as values for TBL.

IP rules

The V4R4 and V4R5 IP rules that are currently loaded must be reloaded after the V5R1 installation. Following the V5R1 installation and IPL, and after TCP/IP has been started, you need to reactivate the IP rules that you want to be loaded. Use Operations Navigator to activate the rules.

Activating existing rules files might result in additional warning messages. After activation in V5R1, IP rules might be formatted differently than in prior releases; however, all of the original rules information is retained.

ICMP datagrams

In V5R1, when the IP filtering or the IPsec function discards a datagram as the result of normal (nonexception) processing, an Internet Control Message Protocol (ICMP) datagram is generated for the sender of the discarded datagram. Prior to V5R1, ICMP datagrams were not generated.

For example, with V5R1, when a user attempting to access is refused because of a deny filter rule, an ICMP datagram with type Unreachable (0) and code Communication administratively prohibited by filtering (13) is generated.

The ICMP type value used for all these datagrams is 0, and the ICMP code values used are 9, 10, and 13, depending on the specific conditions.

IP filtering

The default value for the FRAGMENTS parameter in the FILTER statement is now *, which allows fragments. The previous default value was NONE (allowing only nonfragments). Existing rules that do not contain the FRAGMENTS parameter continue to function but now allow fragments.

Calls to Digital Certificate Management exit programs

With V5R1, the exit program associated with a registered application is called when either of the following occurs:

- Information about the application is changed using the Register Application for Certificate Use (QSYRGAP) API
- A Certificate Authority (CA) certificate is added or removed from the list of trusted CA certificates for an application.

If you have supplied an exit program for an application, you must update the program to handle these new calls.

With previous releases, the exit program associated with an application was called when the application registration was being removed or when the certificate associated with the application was added, changed, or removed.

Changes to MI instructions

MATRMD option 0x13

In V5R1, the **Number of processors configured on the machine** field in MATRMD option 0x13 indicates the maximum number of processors that can become active during the IPL of the partition. Previously, this value displayed the total number of processors assigned to the current partition, including failed ones.

For example, a system has four processors (one of which has failed) and no partitioning. Prior to V5R1, MATRMD option 0x13 would have reported four as the value of **Number of processors configured on the machine** field. In V5R1, the value reported for this field is three.

A system without logical partitions no longer sees failed processors in MATRMD option 0x13.

Number of Configured Processors field value changed

The **Number of configured processors** field returned by option hexadecimal 01DC of the MATMATR MI instruction includes on-demand processors that are installed but not in use, and on-demand processors that are in use but have not been purchased.

Service tools user IDs extended to STRSST and Operations Navigator

Before V5R1, service tools user IDs were only required when you use dedicated service tools (DST). The passwords for these user IDs did not expire and few password composition rules existed. There was no functional privilege checking with respect to each service function. There were only three IBM-supplied service tools user IDs (QSECOFR, 11111111, and 22222222), and these user IDs were not disabled based on incorrect sign-on attempts.

Beginning in V5R1, these service tools user IDs are now required to access system service tools (STRSST command) and to use the Operations Navigator functions for LPAR management and DASD management.

The service tools user IDs are sometimes referred to as DST user profiles, DST user IDs, service tools user profiles, or a variation of these names. Within this topic, service tools user IDs are used to define these users.

Detailed information on the security aspects of service tools is located in the iSeries Information Center at:

www.ibm.com/eserver/series/infocenter 

For Tips and Tools for Securing your iSeries: Click **Security** → **Manuals and Redbooks** → **Tips and Tools for Securing your iSeries** (Chapter 7)

For the iSeries Security Reference manual:
Click **Security** → **Manuals and Redbooks** → **iSeries Security Reference**

For the Backup and Recovery manual:
Click **Systems Management** → **Backup, recovery, and availability** → **Manuals and Redbooks** → **Backup and Recovery**

Changes to service tools user ID passwords and authentication

In V5R1, the following IBM-supplied service tools user IDs are available: 11111111, 22222222, QSRV, and QSECOFR. QSRV is a new IBM-supplied service tools user ID. You can now create additional service tools user IDs; there is a maximum of 100 service tools user IDs (which includes the four IBM-supplied user IDs).

Also new for V5R1, users of system service tools (STRSST) are required to authenticate themselves by using a service tools user ID and password. The passwords for IBM-supplied service tools user IDs (except for 11111111) are initially set as expired. You need to change your service tools user ID passwords as soon as you use the user ID. You can change the passwords for these user IDs either by bringing up DST on the console, by using the Change Dedicated Service Tools Profiles (QSYCHGDS) API, or by selecting F9 from the STRSST sign-on display.

Passwords for service tools user IDs are case sensitive and the passwords for the IBM-supplied user IDs are all initially in uppercase. When changing the password through the QSYCHGDS API or the STRSST command, the minimum length required for passwords is 6 characters. The maximum length of a password ranges from 10 to 128 characters depending on the password level. The last 18 passwords that are used are tracked; therefore, you cannot re-use these passwords when changing a password for a service tools user ID.

Service tools user IDs are disabled based on the number of incorrect sign-on attempts. The user is allowed three failed attempts to sign on. If the user successfully signs on before failing a third time, the failed sign-on count is reset to zero. After the third failed attempt to sign on, the service tools user ID is disabled.

Note: A user who has a disabled QSECOFR service tools user ID can still sign on to DST.

Password level support for service tools user IDs

New in V5R1 is support for a password level for service tools user IDs. The default password level uses Data Encryption Standard (DES) encryption. You can change the password level to use SHA encryption. Once you change to SHA encryption, however, you cannot change back to DES encryption.

When you use DES encryption, service tools user IDs and passwords have the following characteristics:

- 10-digit, uppercase-character user IDs.
- 8-digit, case-sensitive passwords. (Before V5R1, passwords for service tools user IDs were insensitive because the input field was a case-insensitive field.) When you create a user ID and password, the minimum required for the password is 1 digit. When you change a password, the minimum required is 6 digits.
- Passwords for user IDs do not have an expiration date.
- By default, passwords are created as expired unless explicitly set to non-expired by a security administrator.

When you use SHA encryption, service tools user IDs and passwords have the following characteristics:

- 10-digit, uppercase-character user IDs.
- 128-digit case-sensitive passwords. When you create a user ID and password, the minimum required for the password is 1 digit. When you change a password, the minimum required is 6 digits.
- Passwords for user IDs expire in 180 days from the creation date or date last changed.
- By default, passwords are created as expired unless explicitly set to non-expired by a security administrator.

To change to use SHA encryption, go to the Work with DST Environment display. Select option 6 (Service tools security data) and then select option 6 (Password level).

Functional privileges

Functional privileges are new in V5R1. The ability for a service tools user to access individual service functions can be granted or revoked. Before a user is allowed to use or perform a service function from DST, SST, or Operations Navigator; a functional privilege check is performed based on the privileges granted to the service tools user. If a user has insufficient privileges, access to the service function is denied. Also added this release is an audit log to monitor service function usage by service tools users.

The DST menu flow has changed to support the user-created service tools user IDs and the management of their functional privileges.

Service tools server

In V5R1, a new service tools server is used by the logical partitions, disk management, Operations Console, and some cluster graphical interfaces to access service functions. In order to use the service tools server, you must first add a table entry to the service table. The instructions for adding a table entry to the service table are located in the iSeries Information Center:

www.ibm.com/eserver/iseriesseries/infocenter 

Click **Security** —> **Manuals and Redbooks** —> **Tips and Tools for Securing your iSeries**

After adding the table entry, you have the ability to use these graphical user interfaces. However, you are required to sign on to the service tools server by using a service tools user ID. If you have not already changed the password for your user ID, you are asked to change it when you sign on to the service tools server. A change password display automatically appears, and you need to enter your current password and a new password.

Save and restore operations for service tools user IDs

The following information pertains if you currently perform save and restore operations for OS/400 user profiles by using any of these functions:

- SAVE Menu Option 23
- Save Security Data (SAVSECDTA) command
- Restore User Profile (RSTUSRPRF) command

You should save and restore the service tools security data for recovery purposes from DST. To do this, perform these steps:

1. From Work with DST Environment display, select option 6 (Work with service tools security data).
2. From the Work with Service Tools Security Data display, select either option 4 (Restore service tools security data) or option 5 (Save service tools security data).

OS/400 user profile passwords change

Beginning in V5R1, there are four OS/400 password security levels (0, 1, 2, and 3) for user profiles. However, if a user profile is saved in a release prior to V5R1, for example, and the user profile is then restored on a V5R1 server at password level 3, the restored user profile password is reset to *NONE.

For more information on security levels or save and restore functions, see the user profiles sections of the *Backup and Recovery* (SC41–5304) and *iSeries Security Reference* (SC41–5302) manuals in the iSeries Information Center at:

www.ibm.com/eserver/iseries/infocenter 

For the Backup and Recovery manual:
Click **Systems Management** —> **Backup, recovery, and availability** —> **Manuals and Redbooks** —> **Backup and Recovery**

For iSeries Security Reference manual:
Click **Security** —> **Manuals and Redbooks** —> **iSeries Security Reference**

Authority change for the QWDRSBSD and QSPRJOBQ APIs

The authority level required for access to the library that contains the subsystem description (SBSD) for the Retrieve Subsystem Information (QWDRSBSD) API has changed from *READ to *EXECUTE. The authority to the job queue library containing the job queue for the Retrieve Job Queue Information (QSPRJOBQ) API has also changed from *READ to *EXECUTE.

Description for *INTERACT and *SPOOL shared pools now set during installation

In V5R1, the description for the *INTERACT and the *SPOOL shared pools is no longer set during each IPL when the QPFRADJ system value is 1 or 2. The description for the *INTERACT and *SPOOL shared pools is only set during installation, when the QPFRADJ system value is 1 or 2.

Service functions dump viewer

In V5R1, the default main-storage-dump copy action is used to save a subset of main storage dump data. Previous releases saved all of the main storage dump data when a copy was requested. This new function might cause additional displays to appear to help you manage dump copies.

To obtain the full dump trace, in the main storage dump manager service tool, set the Main storage dump copy option Subset to *NO.

SNMP MIB support

For V5R1, two changes have been made to the SNMP Agent Management Information Base (MIB) support. The following media-specific MIBs are no longer supported by SNMP.

- Ethernet-like (RFC 1398)
- Fiber Distributed Data Interface (FDDI) (RFC 1285)
- Frame relay (RFC 1315)
- Token ring (RFC 1231)

Equivalent access to the statistics defined by these MIBs is provided by the Management Central Collection Services.

The set operation is no longer supported for MIB objects in the address translation group of MIB-II, defined in RFC 1213.

Any attempts to either extract media-specific counters or set an address translation table entry using the SNMP SubAgent API is rejected with a status of unsupported object or function.

TCP/IP and server startup changes

TCP/IP autostart changes

The server default in V5R1 is set to automatically start TCP/IP when the server is started. The iSeries server submits the Start TCP/IP (STRTCP) command whenever the iSeries server is restarted or is started from restricted state.

If the server was previously configured to start TCP/IP automatically at IPL time by using the system startup program or another mechanism, the STRTCP and Start TCP/IP Server (STRTCP SVR) commands now fail with the message TCP1A62. IBM recommends that you use the system support for automatically starting TCP/IP.

To change this default setting and prevent the iSeries server from automatically starting TCP/IP, use the Change IPL Attributes (CHGIPLA) command and specify STRTCP(*NO) to set the Start TCP/IP during system IPL attribute to *NO.

In V5R1, the processing for the STRTCP command is performed only when subsystem QSYSWRK is active. If STRTCP is submitted when subsystem QSYSWRK is not active, command processing is terminated with escape message TCP1A61.

Starting or ending all TCP/IP servers interactively

The SERVER default for the STRTCPSVR and the End TCP/IP Server (ENDTCPSVR) commands is *ALL. With V5R1, when an attempt is made in interactive mode to start all servers (STRTCPSVR *ALL) or to end all servers (ENDTCPSVR *ALL), an inquiry message is displayed.

You have the option to continue by replying G to the inquiry message and starting or ending all the servers or replying C to cancel the request to start or end all servers.

In addition to entering these commands from the command line, the commands can be prompted (F4) and *ALL entered for the SERVER parameter. The inquiry message for STRTCPSVR is TCP1A15. The inquiry message for ENDTCPSVR is TCP1A20.

Autostart setting for the DDM server

As of V5R1, Operations Navigator requires the services provided by the distributed data manager (DDM) server. If you install V5R1 over a previous release of OS/400, the autostart setting for the DDM server is not changed. If you used the default value of *NO in a previous release to keep the DDM server from autostarting when TCP/IP was started, you might experience problems when using Operations Navigator in V5R1.

You should change the autostart property of the DDM server to *YES, to have the DDM server start when TCP/IP is started.

DDM and DRDA connection limitations

SQL applications can now access remote data containing large object data types (LOBs) of up to 2 gigabytes. This enhancement has placed a limitation on the number of concurrent Distributed Relational Database Architecture (DRDA) or distributed data management (DDM) connections within a single job. When certain applications are run, you might see message CPF3E0A issued to the job log if the limit has been reached.

The circumvention is to reduce the number of open connections in the job. The job default is to leave connections from iSeries clients to iSeries servers open. The CL command CHGJOB DDMCNV(*DROP) can be used to cause DDM-allocated connections to be dropped when they are no longer used, such as when an application closes a DDM file, or when a DRDA application runs an SQL DISCONNECT statement. The Reclaim Distributed Data Management Conversations (RCLDDMCNV) CL command can also be used to end unused connections.

Printer file attributes and behavior changes

IGCDTA attribute automatically set to *NO for single-byte printing

In V5R1, if a printer file with IGCDTA(*YES) specified is used for printing, but is used to print only single-byte data to spool, the spooled file attribute is set to IGCDTA(*NO).

Failures caused by sending some spooled output to V4R5 and earlier systems

The spooled output produced by an application created under V5R1 causes problems if it is sent to a pre-V5R1 system when both of the following conditions exist:

- The application uses the CCSID data description specification parameter in the printer file.
- The application specifies *NOCONVERT as an optional parameter for the printer file.

Failures occur when displaying these spooled files, or when printing them using host print transform because there was no Unicode print support prior to V5R1.

Authority changes to dump commands

The default *PUBLIC authority for the Dump Tape (DMPTAP) command is now *EXCLUDE instead of *USE.

The QPGMR and QSYSOPR user profiles no longer have private authority to the Dump Object (DMPOBJ) and Dump System Object (DMPSYSOBJ) commands.

QP2TERM and QP2SHELL behavioral changes for OS/400 PASE

QP2TERM and QP2SHELL login shells

Program QP2TERM has changed to run the default OS/400 PASE shell (/QOpenSys/usr/bin/sh) as a login shell. A login shell looks for a file named .profile and runs it as a shell script when the shell starts. OS/400 PASE shells only handle ASCII shell scripts. If you have an EBCDIC .profile file that you created for Qshell, you should convert the file to ASCII. Qshell uses script files that have an ASCII CCSID, so both Qshell and OS/400 PASE shells can use the ASCII .profile.

In V5R1, program QP2SHELL has changed to run a login shell when the OS/400 PASE program name begins with a hyphen (-), and to set only the ILE environment variable PASE_SHELL for a login shell.

Job name changes for QP2TERM and OS/400 PASE run-time functions

Program QP2TERM and OS/400 PASE run-time functions `fork()` and `systemCL()` have changed in V5R1. They now use the same name for the jobs they create as the job that called the API. Jobs that used to be named QP2SHELL, QP2FORK, and QP2CMD now have the same name as the job that submitted them. However, these jobs list QP2SHELL, QP2FORK, or QP2CMD as the name of the running program in the **Function** field of the WRKACTJOB display.

SAVE, RESTORE, and LICPGM menu commands are library qualified

CL commands used by options on the SAVE, RESTORE, and LICPGM menus are library-qualified with *NLVLIBL and *SYSTEM instead of *LIBL or no value. By default, these commands are not referenced from any user library ahead of QSYS.

If you have applications that need to be aware of when (or how) these commands are used, you must register your exit programs for the applicable CL command. If you do not change the affected applications, you can still use specific commands from a library ahead of QSYS. Register those commands with the IBM-supplied exit program QCARPLCM for the QIBM_QCA_CHG_COMMAND exit point. QCARPLCM changes the command to one that is library-qualified with *LIBL.

For example, to register the SAVOBJ command, type the following on the command line:

```
ADDEXITPGM EXITPNT(QIBM_QCA_CHG_COMMAND) FORMAT(CHGC0100) PGMNBR(*LOW)
PGM(QSYS/QCARPLCM) PGMDTA(*JOB 20 'SAVOBJ QSYS')
```

Optical drive API and command changes

When writing to *UDF formatted optical volumes through the integrated file system API or hierarchical file system API, the Volume out of space error can be returned when the file is opened, when the file is written to, when the file size is changed, and when the file is closed.

This is different from the previous release of OS/400, where the Volume out of space error is usually returned only when the file is closed. The error may still be returned when the file is closed. However, the error is typically first returned when the file is written to and may be returned when the file is opened. This represents a change to the operational flow for the following APIs to the QOPT file system when they access *UDF formatted optical volumes.

This table lists the out of space error messages returned for the QOPT file system APIs.

API	Error
open()	ENOSPC
open64()	ENOSPC
creat()	ENOSPC
creat64()	ENOSPC
ftruncate()	ENOSPC
ftruncate64()	ENOSPC
write()	ENOSPC
writv()	ENOSPC
QHFOPNSF	CPF1F61
QHFWRTSF	CPF1F61
QHFSETSZ	CPF1F61

Default values for some CL commands were also changed:

- The default value for the DIR parameter was changed from *YES to *NO for the Add Optical Cartridge (ADDOPTCTG) command.
- The default value for the THRESHOLD parameter was changed from 95 to *CALC for the Initialize Optical (INZOPT) command.
- *MOUNTED is the default value for the VOL parameter for the INZOPT command.

Default value for Format Ethernet Data Only field changes

For the Print Communications Trace (PRTCMNTRC) command, the default value for the **Format Ethernet data only** field has changed from *NO to *YES. The *YES option lists all the data associated with a line trace that uses ETHERNET protocols. The *NO option only gives the 802.3 format.

In V5R1, message CPF39F1 appears instead of message CPF39A6 when both of the following are true:

- Traces on asynchronous or bisynchronous lines are requested with a buffer size greater than 16 MB
- Other traces are requested with a buffer size larger than the allowable maximum storage

Algorithms changing for some math functions

The algorithms used by the iSeries Licensed Internal Code for computing the following math functions have changed in V5R1 to match the algorithms used by the AIX[®] operating system:

- Sine
- Cosine
- Tangent
- Arcsine
- Arccosine
- Arctangent
- Exponent
- Log
- Power

The performance of these functions improved for most operands. Some results in the least significant bits of the mantissa are different from the results computed by previous releases.

Network server description object behavior

***BASE network server description objects no longer supported**

Existing *BASE network server description (NWSD) configuration objects cannot be used in V5R1. You can delete them with the Delete Network Server Description (DLTNWSD) command. This includes *BASE network server descriptions that have IBM Firewall for iSeries installed.

If your iSeries server's only LAN adapter is a *BASE NWSD, with line description, do one of the following:

- Change the hardware configuration to use a stand-alone LAN adapter to replace the File Server Input/Output Processor (FSIOP), Integrated PC Server, or Integrated Netfinity[®] Server. Create a TRN or Ethernet line description for the new adapter.
- Migrate to an Integrated Netfinity Server. This requires a 6617 or 2850-011 or later Integrated PC Server. If you currently use a 6506, 6616 or 2850 001/002 Integrated PC Server for the *BASE NWSD, update this hardware to a more recent Integrated PC Server. After you update the hardware, create a *WINDOWSNT network server description and line description to use as a LAN connection.

Storage space considerations for migrating network server descriptions to V5R1:

- High Performance File System (*HPFS) NWS storage spaces cannot be linked from a *BASE server to a *WINDOWSNT server. Before upgrading to V5R1, copy your data from an HPFS-formatted drive to another storage space formatted as FAT. Following the upgrade, link the FAT storage space to the Windows server, and you should be able to access all copied data.
- *BASE NWSD and *HPFS NWS storage spaces are not usable on V5R1. *BASE NWSD objects saved from a previous release cannot be restored under V5R1.
- *HPFS storage spaces are listed in, and can be deleted from, the WRKNWSSTG display.

The following OS/400 commands are no longer supported:

- Start Network Server Application (STRNWSAPP)
- End Network Server Application (ENDNWSAPP)
- Install Network Server Application (INSNWSAPP)
- Delete Network Server Application (DLTNWSAPP)

The following commands have changed in a way that could cause a control language program to fail or work differently:

- Change Network Server Attributes (CHGNWSA):
 - DFTSVRTYPE(*BASE) is no longer supported.
 - PMTCTL(*BASE) is no longer supported.
- Change Network Server User Attributes (CHGNWSUSRA):
 - DFTSVRTYPE(*BASE) is no longer supported.
 - PMTCTL(*BASE) is no longer supported.
- Create Network Server Storage Space (CRTNWSSTG):
 - FORMAT(*HPFS) is no longer supported.
- Display Network Server Attributes (DSPNWSA):
 - OPTION(*BASE) is no longer supported.
- Display Network Server User Attributes (DSPNWSUSRA):
 - OPTION(*BASE) is no longer supported.
- Submit Network Server Command (SBMNWSCMD):
 - SVRTYPE(*BASE) is no longer supported.
 - CMDTYPE(*OS2) is no longer supported.
- Work with Network Server Status (WRKNWSSTS):
 - SVRTYPE(*BASE) is no longer supported.
- Create Network Server Description (CRTNWSWD):
 - NTB parameter is no longer supported.

- STRNTB parameter is no longer supported.
- STRTCP parameter is no longer supported.
- Change Network Server Description (CHGNWSD):
 - NTB parameter is no longer supported.
 - STRNTB parameter is no longer supported.
 - STRTCP parameter is no longer supported.

Windows network server description object conversion and file size change

*WINDOWSNT network server description (*NWSN) objects require an object conversion. The conversion adds a modify anytime area to the description to support dynamically added storage links. The conversion occurs automatically the first time the network server description is accessed following the upgrade to V5R1.

The modify anytime area increases the size of the network server description from 36 KB to 60 KB.

Vary processing changes at IPL

For V5R1, the vary process at IPL has changed. Most configuration objects are not varied on until their associated hardware resource reports in. This change helps alleviate the potential for communications lines or controllers to vary on before the associated hardware resource is available. When this occurred, the common failure was a Resource not found condition. The changes in V5R1 should correct this timing problem. The vary-on may still fail in cases where the resource does not report in within a time limit or threshold set by the system.

Maximum number of error log entries enforced

When a problem log is generated with an ID of YYDDD99999, no additional problem logs are created that day. Error message CPF392F, Maximum number of problem log entries reached, is sent to the QSYSOPR message queue.

In addition, the Create Problem Log Entry (QsxCreateProblemLogEntry) API was also changed to return the CPF392F error message. Prior to V5R1, no error message was returned. Applications that used this API at V4R5 and earlier releases may generate this error message when deployed on V5R1.

Byte offset granularity enhanced for DosSetFileLocs64() API

The **DosSetFileLocks64()** API has been enhanced so that byte offsets from $(2^{63}) - 1$ to $(2^{64}) - 1$ can be discretely specified. This can impact application programs where a common file is accessed by both the **DosSetFileLocks64()** and **fcntl64()** APIs because **fcntl64()** does not provide this same level of granularity for byte offsets greater than $(2^{63}) - 1$. **fcntl64()** logically treats all offsets greater than $(2^{63}) - 1$ as being $(2^{63}) - 1$ through end of file (EOF).

TCP/IP, SLIP, and PPP communications

TCP/IP Serial Link Internet Protocol (SLIP) profiles that are defined to use a line type of *ASYNC only support older asynchronous communications hardware. These profiles are also limited to speeds of 19 200 bits per second. In V5R1, support for these SLIP profiles has been removed. These profile types only support the older asynchronous communications hardware and are limited to speeds of 19 200 bits per second.

To support TCP/IP point-to-point communications under V5R1, you must have one of the following V.24 communications adapters or internal modem adapters: 2699, 2720, 2721, 2745 (V.24 communications adapters), 2761, 2771, or 2772 (internal modem adapters). Point-to-point profiles are also required to use line descriptions with a line type of *PPP.

If your iSeries server has the required hardware, you can use Operations Navigator to migrate a SLIP over *ASYNC profile to a SLIP or PPP over *PPP profile. However, this migration does not occur automatically. All data that can be copied from the original profile is copied into the new profile model. Data such as authentication information and line description definitions cannot be migrated, and you must re-create this data. IBM recommends that you migrate profiles to PPP (Point-to-Point Protocol) profiles whenever possible because PPP is the protocol most often used for point-to-point communications and offers a much more robust and structured protocol than SLIP. PPP supports authentication (encrypted and unencrypted) and IP address negotiations as part of the protocol and does not require a connection script.

Processing flow change in RIGS program

In V4R5, the inventory collection task ends for an endpoint system if one of the Management Central Registered Inventory Gathering Service (RIGS) system operations on that system fails, or if there is a failure in storing the RIGS data from that endpoint on the central system. In V5R1, the process continues with the next RIGS operation.

pipe() API remapped to return pipe descriptor

Prior to V5R1, the **pipe()** API was not a function, but rather an implicit compile-time mapping of **pipe()** to **Qp0zPipe()**. This mapping and the function prototypes were contained in the `spawn.h` include file. This mapping caused programs that coded the **pipe()** API to bind to service program QP0ZSPWN for function **Qp0zPipe()**. In addition, the **Qp0zPipe()** function returned socket descriptors rather than pipe descriptors. This enabled programs to pass these descriptors as input to several sockets APIs. Now there is a **pipe()** API function that returns pipe descriptors.

This new function is prototyped in the `unistd.h` include file. The implicit mapping of **pipe()** to **Qp0zPipe()** has been removed from the `spawn.h` include file. Existing applications that are not recompiled continue to utilize **Qp0zPipe()** as the implementation of **pipe()**.

You should change any application that uses the **pipe()** API mapping and is dependent on the sockets descriptor semantics and recompile the application. You can make one of the following two changes to the programs that are recompiled:

- Change the programs to explicitly call the `Qp0zPipe()` function to continue to use the socket descriptors.
- Change the programs to only use operations on the descriptors that are valid for pipes. Programs that use this option must include the `unistd.h` file.

Valid SQL package names enforced for applications

Before V5R1, applications that used the Process Extended Dynamic SQL (QSQPRCED) API could create SQL packages that had names that were not valid. For example, an application could create an SQL package named `_NOT_VALID`. This could create problems because the only interface to delete an SQL package was the Delete SQL Package (DLTSQLPKG) command. DLTSQLPKG did not accept a name like `_NOT_VALID`.

In V5R1, the QSQPRCED API has been changed in two ways. First, it no longer allows an application to create an SQL package with a name that is not valid. Instead, it returns an error to the application, and the creation of the SQL package fails. Second, the QSQPRCED API has been modified to support a new option that allows applications to delete SQL packages. This provides applications with the ability to delete any SQL packages that were previously created with names that are not valid.

QSYGETPH API behavioral changes

A change has been made to the way the Get Profile Handle (QSYGETPH) API checks the user's authority to the specified profile when the password is `*NOPWD` or `*NOPWDCHK`. This change may cause some Get Profile Handle requests that completed successfully in V4R5 and earlier to fail under V5R1. If the user profile running the Get Profile Handle request does not have `*ALLOBJ` special authority, and is a member of one or more groups with `*ALLOBJ` special authority, and has an explicit authority less than `*USE` to the profile for which the handle is being requested, the group's or groups' `*ALLOBJ` special authority is no longer sufficient to get the profile handle.

When a group profile is added to a user profile, the user profile is given an explicit authority to the group profile. This authority is less than `*USE`. This is the only situation where a user is routinely granted an explicit authority to another user profile. The additional Get Profile Handle error situation is most likely limited to users that:

- Do not have `*ALLOBJ` special authority
- Have a group profile that has `*ALLOBJ` special authority
- Attempt to get a profile handle for one of their group profiles

OS/400 internal control blocks more secure

In V5R1, integrity protection for some system control blocks was improved. This may cause applications that attempt to directly change these control blocks to fail. Check with your application provider to determine if their applications continue to work correctly on V5R1.

TCP-only option removed from Ethernet commands

For V5R1, the Enable for TCP/IP (TCPONLY) parameter has been removed from the Create Line Description - Ethernet (CRTLINETH) and Change Line Description - Ethernet (CHGLINETH) commands. Control language programs containing these commands no longer run if the command string contains the TCPONLY parameter. Starting in V5R1, hardware is automatically queried to determine if it supports an IP-only function.

In addition, the Retrieve Line Description (QDCRLIND) API now returns blanks for the TCPONLY field if format LIND0500 is requested.

Chapter 3. Options

This chapter describes changes to specific options of the OS/400 operating system.

Example Tools Library (Option 7)

The QUSRTOOL tools Convert Document to Source File (TOFCVTSF) and Convert Source File to Document (TOFCVTDC) have been removed from the Example Tools Library (Option 7) of OS/400.

Host Servers (Option 12)

Host servers part of OS/400

In V5R1, Host Servers (Option 12) are part of OS/400. The following host servers moved from OS/400 Option 12 (library QIWS) to the base OS/400 product (library QSYS):

- Optimized Central Server (both TCP/IP and APPC)
- Optimized Remote Command/Distributed Program Call Server (both TCP/IP and APPC)
- Optimized Database Server (both TCP/IP and APPC)
- Optimized Data Queue Server (TCP/IP only)
- Optimized Network Print Server (both TCP/IP and APPC)
- Optimized Signon Server
- Port Mapper

The following programs remain in OS/400 Option 12:

- In library QIWS - Optimized Data Queue Server (APPC only)
- In library QGYE - All of the Open List APIs used by Operations Navigator

Customizations to prestart job entries

Once you upgrade to V5R1, any customization to pre-V5R1 prestart job entries for the Optimized Host Servers, except for the File Server, are lost. This includes prestart job entries in the QUSRWRK and QSERVER subsystems. If you customized your prestart job entries in these subsystems in a prior release, you must manually update the new prestart job entries (QSYS/Qnnnnnnn QUSRSYS) with your customizations.

Subsystem changes for prestart jobs of the database host server

For V5R1, the default subsystem for the database host server prestart jobs is QUSRWRK instead of QSERVER. The database server prestart jobs that previously ran in the QSERVER subsystem now run in the QUSRWRK subsystem. The IBM-supplied start-up program (QSTRUP in library QSYS) starts this subsystem.

The following prestart jobs used by the database server using TCP/IP no longer run in the QSERVER subsystem, but now run in the QUSRWRK subsystem:

Job Name	Server
----------	--------

QZDASOINIT	Database Server
QZDASSINIT	Database Server for SSL

When you install V5R1, the prestart job entries for the database server job are removed from the QSERVER subsystem description. If you have made any modifications to these prestart job entries, you need to make the same changes to the new prestart job entries that are contained in the QUSRWRK subsystem description.

The QYSMSVRE user index in the QUSRSYS user library has an entry for the database server that lists the subsystem as QSERVER for the server jobs. The index entry for the database server is automatically modified to change the subsystem to QUSRWRK the first time the index is touched after you install V5R1. After installing V5R1, if you restore a QYSMSVRE user index from a previous release, or if you restore a V5R1 version of the user index that has not yet been automatically modified, the subsystem listing reverts to QSERVER and you must manually change the index. To change this, do one of the following:

- Manually reconfigure the QYSMSVRE index by using Operations Navigator.
- Restore a prior V5R1 version of the object. This is the recommended option because it retains the updated V5R1 configuration.
- Restore a pre-V5R1 version of the QYSMSVRE index. Be aware that you lose the V5R1 default configuration of the database server in QUSRWRK. You need to manually reconfigure the object to run the database server jobs in QUSRWRK instead of QSERVER.

Remote SQL Server no longer supported as part of OS/400

As of V5R1, the Remote SQL Server is no longer included as part of OS/400 - Host Servers (Option 12). If you upgrade to V5R1 from a previous release of OS/400, the old Remote SQL Server code remains on the server but is not guaranteed to work. If you install V5R1 of OS/400 on a new iSeries server, any attempt to connect to the Remote SQL Server fails.

ENVY/400 server not supported in V5R1

In V5R1, ENVY/400 is no longer supported as part of OS/400 - Host Servers (Option 12).

CPA Toolkit (Option 15)

The CPA Toolkit option has been withdrawn in V5R1. An application that used the CPA Toolkit Pthreads APIs does not run on V5R1. You must change the source code of the application to use the Pthreads APIs provided by OS/400 and recompile the application. Note that the differences between the CPA Toolkit Pthreads APIs and the OS/400 Pthreads APIs include run-time behavior as well as syntax differences. For more information on converting your application, see the Web page:

www.ibm.com/eserver/iseries/developer/threads/cpa/roadmap.html 

Extended NLS Support (Option 21)

Changes have been made to locale definitions for V5R1 that may affect your applications. The locale definitions have been updated to be consistent with other IBM platforms. You can find specific information on these changes in member `CHANGES` in file `QLOCALESRC` in library `QSYSLOCALE` in Option 21.

Directory Services (Option 32)

Directory Services part of OS/400

Starting with V5R1, Directory Services (LDAP) is part of OS/400, rather than a separately installable option. The Directory Services function that was part of Option 32 of OS/400 is now installed with the operating system in V5R1. Option 32 still exists for compatibility reasons, but will eventually be removed as an option. You no longer need Option 32 installed on your server unless you are using V4R4 Operations Navigator or an application that directly uses APIs in the `QDIRSRV` library.

Programs now reside in library `QSYS` and not `QDIRSRV`. For V5R1, the Directory Services APIs are copied from library `QSYS` to library `QDIRSRV` when Option 32 is installed. IBM recommends that you use the APIs in the `QSYS` library because the `QDIRSRV` library may be removed in a future release. The following is the list of Directory Services APIs that are contained in both the `QSYS` library and the `QDIRSRV` library when Option 32 is installed in V5R1:

- `QgldCfgDirSvr`
- `QgldChgDirSvrA`
- `QgldLstDirSvrA`
- `QgldRtvDirSvrA`
- `QgldExportLdif`
- `QgldImportLdif`
- `QGLDUSTB`
- All LDAP client APIs exported from the `QGLDCLNT` service program

Also, the system binding directory is changed to include the `QGLDCLNT` and the `QGLDUAPI` versions of the APIs in library `QSYS`. Programs and service programs that bind specifically to the `QGLDCLNT` or `QGLDUAPI` service programs in library `QDIRSRV` are not created because of duplicate procedure definitions. You should change your application to not specifically bind to `QGLDCLNT` or `QGLDUAPI` in library `QDIRSRV`.


Library `QUSRSYS` is used for Directory Services configuration data where library `QDIRSRV` was used previously.

Directory Services server default configuration

If all of the following are true, a Directory Services server is automatically started with a default configuration on your system when TCP/IP starts :

- The Directory Services server has not been configured
- Directory Services publishing is not configured
- No Directory Services DNS information can be found

Previously, a Directory Services server did not automatically start with a default configuration when TCP/IP was started. For details on the settings of the default configuration, see the Directory Services (LDAP) topic in the iSeries Information Center at:

www.ibm.com/eserver/iseries/infocenter 

Click **Networking** —> **TCP/IP** —> **Directory Services (LDAP)**.

Digital Certificate Manager (Option 34)

Making digital certificate store available to pre-V4R5 systems

Stashed password files (.STH) that are stored in the integrated file system are not supported in V4R5. This change also affects systems operating at V5R1. If you create a certificate store on a V4R5 system and then copy that certificate store to another system, no stashed password file exists to transfer to the target system. If the target system requires a stashed password, the administrator on the target system must generate the stashed password by using the Digital Certificate Manager (DCM).

On pre-V4R5 systems, you create the stashed password file in the integrated file system by changing the certificate store password in the Digital Certificate Manager, and checking the auto-login option. If the target system is a V4R5 or later system, the stashed password is stored in an internal independent index on the target system by using the Digital Certificate Manager to generate the stashed password.

Recovery of stashed passwords

The change to store stashed passwords in an internal object requires you to change backup procedures. The first time the system uses the .STH file, the stashed password is stored in the new internal object, and the .STH file is deleted from the system. To save the equivalent stashed password information contained in the new internal object, issue the Save Security Data (SAVSECDATA) command as part of the backup procedure. The equivalent information is also saved when you run the Save System (SAVSYS) command.

Chapter 4. Licensed programs

This chapter contains information about individual licensed programs that have been modified or changed for V5R1.

Backup and Recovery (5722–BR1)

The special value *SYSINF is no longer supported for the Print recovery report (PRTRCYRPT) parameter on the Start Maintenance for BRM (STRMNTBRM) command. That value has been replaced with the Print system information (PRTSYSINF) parameter, which has *YES and *NO values. PRTRCYRPT (*ALL) does not include PRTSYSINF data.

iSeries Integration for Windows Server (5722–WSV)

The Install Windows Server (INSWNTSVR) command has a new required parameter for the Install type (INSTYPE). The new INSTYPE parameter has no default value. Any CL programs that use the INSWNTSVR command need to be changed to include the new parameter.

Operations Navigator

Hierarchy changes

The following changes were made to the Operations Navigator interface:

- The Jobs folder has been relocated to the Basic Operations folder.
- The Job Management folder has been renamed Work Management.
- The IP Security folder has been renamed IP Policies.
- The Protocols folder has been renamed TCP/IP Configuration.
- The Database folders have been reordered to reflect the most frequently used functions.
- The Point-to-Point folder has been renamed Remote Access Services.
- The Multimedia folder has been removed from the hierarchy.
- The ODBC Data Sources folder has been removed from the hierarchy.

File system changes

The drag-and-drop function in Operations Navigator file systems now preserves the ownership and permissions for directory objects, such as folders and subdirectories. In previous releases, the ownership and permissions associated with a folder were not preserved, and the user activating the drag and drop became the owner.

Lotus® Domino™ products for iSeries

Minimum supported version of QuickPlace™ for AS/400 (5733-LQP)

Versions prior to QuickPlace for AS/400 R2.0.6 (5733-LQP) are not supported on V5R1. For more information regarding the specific releases of QuickPlace that are supported with V5R1, see the QuickPlace for AS/400 Web site at:

www.ibm.com/eserver/iseries/quickplace 

Minimum supported versions of Domino for AS/400 (5769-LNT)

Minimal versions of the Lotus Domino Server for AS/400 product are supported with V5R1. For more information regarding the specific releases of the Lotus Domino Server R5 that are supported on V5R1, see the Domino for AS/400 Web site at:

www.ibm.com/eserver/iseries/domino 

Integration support with system distribution directory to be removed

The 4.6 and 5.0 releases of the Domino for AS/400 product also provide a directory synchronization feature. This feature allows bidirectional synchronization of directory data between the Domino Directory and the OS/400 System Distribution Directory. Because of the withdrawal of OfficeVision/400™ support coinciding with V5R1, the need for this Domino feature is significantly diminished.

The directory synchronization feature might not be supported in the next major version (Rnext) of Domino for AS/400. However, the directory synchronization feature is still available on the R4.6.x and R5.0.x versions of Domino for AS/400 until those versions of Domino are no longer supported.

Performance Tools for iSeries (5722-PT1)

Collection Services used instead of Performance Monitor

In V5R1, Performance Tools (5722-PT1) uses Collection Services, rather than Performance Monitor, to collect performance data. IBM Performance Tools for AS/400 menu (PERFORM), option 2 (Collect Performance Data) has changed to reflect this. Option 2 now shows the status of collection services, and can be used to start and end collection services. Option 3 on the Collect Performance Data screen (Work with Performance Collection), has been removed.

Note that when you use Collection Services to collect performance data, data is first stored in a *MGTCOL (management collection) object. You must use the Create Performance Data (CRTPFRTA) command to export the data into the performance database files used by Performance Tools. You can configure Collection Services to automatically run this command. To do this, select option 2, (Collect Performance Data) on the PERFORM menu, then select option 1 (Start collecting data), and specify *YES for the Create database files option. The CRTPFRTA command is also available from the IBM Performance Tools for AS/400 menu (PERFORM), option 6 (Configure and Manage Tools).

Performance report printing errors

If any *FC errors occur with V5R1, the affected sections are either not included or are partially included in the output. The PRTxxxRPT commands end with the escape message PFR9806 Performance report partially printed due to errors.

Prior to V5R1, when an unexpected error occurred while printing a performance report, the command failed with a function check (*FC or CPF9999) error and no output was received.

Changes to message PFR9805

With V5R1, the PFR9805 message is only sent as an escape message and it causes the PRTxxxRPT command to end in error if a value other than *ALL is specified for the TYPE parameter and if performance database files cannot be found. If *ALL is specified, but not all of the data is available, no message occurs in the job log. The print output contains as much data as is available.

Previously, whenever any of the PRTxxxRPT commands could not find the appropriate performance database files, the message PFR9805 Performance report partially printed due to missing data was sent as an informational message .

TCP/IP Connectivity Utilities for iSeries (5722-TC1)

SMTP file conversion

After Simple Mail Transfer Protocol (SMTP) has been upgraded to V5R1, the configuration files are converted when one of the following occurs:

- Starting SMTP, for example, by using the Start TCP/IP Server (STRTCPSVR) command.
- Updating SMTP configuration. Configuration can be updated by using Operations Navigator SMTP property pages, or by using the Change SMTP Attributes (CHGSMTPA) command.

Antispam file QTMSADRLST no longer supported

In prior releases, members ACCEPTRLY and REJECTCNN in the QTMSADRLST file of the QUSRSYS library were used to provide antispam function. For V5R1, these members are copied into a new file and the QTMSADRLST file of the QUSRSYS library is deleted.

To update your antispam information after the conversion is complete, you can use either the ADDSMTPLE or RMVSMTPLE command with *ACCEPT or *REJECT specified for the TYPE parameter, or you can use Operations Navigator SMTP property pages.

Data area changes

With prior releases, the QTMSCBNDIP and QTMSBNDIP data areas in the QUSRSYS library provided the IP addresses that the SMTP client or SMTP server were to bind to. With V5R1, the data from these data areas is copied to a new file, and the data areas are deleted. To update these IP addresses after the conversion is complete, you can use either the Add SMTP List Entry (ADDSMTPL) or Remove SMTP List Entry (RMVSMTPLE) commands with *SVRBIND or *CLTBIND specified for the TYPE parameter, or you can use Operations Navigator SMTP property pages.

The block relay data area is no longer supported. Previously, the QTMSNORLY data area in the QUSRSYS library caused mail relaying to be blocked for all sites. With V5R1, if this data area is present, the Allow relayed mail (ALWRLY) parameter in a configuration file is set to *ALL, and the data area is deleted. To make changes to your relay blocking after the conversion is complete, you can use either the ALWRLY parameter on the Change SMTP Attributes (CHGSMTPA) command or the Operations Navigator SMTP property pages.

The QTMSVRSCHK filter list data area in the QUSRSYS library is no longer a necessity. For V5R1 when an older configuration file is detected, a check for this data area is made and the Filter mail for virus (FTRACN) parameter value is set to the value that the data area contains. If the value is not valid, the FTRACN value is set to *NONE.

Any changes to the filtering actions can now be done using the CHGSMTPA command with the FTRACN parameter. After the values in the QTMSVRSCHK data area are converted and stored in the QATMSMTP configuration file in the QUSRSYS library, the filter list data area is deleted by the conversion program.

DIALSCD parameter changes on CHGSMTPA

For V5R1, *NONE is not allowed for the Configuration profile element of the DIALSCD parameter. If *YES is specified for the first element, but a configuration profile has never been specified, message TCP2436, Configuration profile name required, is sent when the CHGSMTPA command is run.

In V4R5, *NONE was allowed as a special value for the Configuration profile element of the DIALSCD parameter. If *YES was specified as the first element of DIALSCD with *NONE for the configuration profile, error message TCP8211, Point-to-point profile *NONE not found, was sent when the Change SMTP Attributes (CHGSMTPA) command was run or when the SMTP server was started.

MIME note storage

Prior to this release, all Multipurpose Internet Mail Extensions (MIME) notes stored on the iSeries server were stored with double periods when a single period was detected after a carriage return line feed (CRLF). This was used to prevent the termination sequence (CRLF.CRLF) from being erroneously detected before the data transfer is complete.

With the introduction of the Send Mail (QtmmSendMail) API and Java Mail classes, this convention introduces unnecessary conversions or causes data integrity problems in custom mail solutions. Therefore, V5R1 no longer stores MIME notes in the compressed-byte format.

If you have modified the generated MIME to include the byte compression in order to send the notes via the QtmmSendMail API, the compression of the MIME note must be removed in your program.

File Transfer Protocol (FTP)

Configuration file conversion

The FTP configuration file is converted to the V5R1 format the first time the file is used. Conversion happens in any of the following situations:

- FTP is started using the Start TCP/IP (STRTCP) or Start TCP/IP Server (STRTCP SVR) commands.

- FTP is changed or prompted with the change FTP attributes (CHGFTPA) command.
- FTP configuration is displayed or changed by using Operations Navigator.

HFS no longer used

In releases prior to V5R1, FTP uses the hierarchical file system (HFS) APIs to provide access to the QDLS and QOPT file systems. Because of the limitations imposed by these APIs with respect to code page support and performance considerations, the V5R1 FTP enhancements include changing to use the integrated file system APIs to access the QDLS and QOPT file systems.

Performance enhancements

In V5R1, the QDLS and QOPT file systems are accessed using the integrated file system Unix-type APIs. With prior releases, these file systems were accessed using HFS APIs. This change improves coded character set identifier (CCSID) support for file data in these file systems. FTP fully supports data conversion of file data for files in the QDLS and QOPT file systems.

FTP now uses full CCSID support for files accessed using the Unix-type integrated file system APIs. Prior to V5R1, these files were opened with a code page tag on the integrated file system `open()` call. In V5R1, integrated file system files are opened using the CCSID option, and allow full CCSID support of data transferred using FTP (including transferring and storing files containing mixed-byte, single-byte, and double-byte character data).

Integrated file system file create and open changes

Because FTP HFS is no longer used, all files, except /QSYS.LIB, that FTP opens or creates by using the Unix-type APIs have the following changes:

- Existing files are write-locked before being cleared. Attempts to write to a file already being written to result in an error response. Prior to V5R1, files being written in an FTP session could be deleted if a second FTP session attempted to write to it.
- Existing files keep their current authorities when being overwritten. Prior to V5R1, existing files were deleted and re-created without the authorities being preserved.
- New files are created with the `O_INHERITMODE` flag set in the flag parameter of the `open()` function. Prior to V5R1, files were created with the permission bits of the parent directory, but other authorities were not inherited. For `root(/)`, `/QOpenSys`, and `/QDLS` file system files, the file is created with the same data authorities as the parent directory. The `/QLANSRV` and `/QOPT` file systems ignore this flag because files in these file systems do not have data authorities. For more information about the `O_INHERITMODE` flag, see the OS/400 APIs in the iSeries Information Center at:

www.ibm.com/eserver/iseries/infocenter 

Click **Programming** → **CL and APIs** → **APIs** → **Alphabetical list of APIs**.

Restriction added to FTP PORT subcommand

A restriction has been added to the FTP PORT subcommand in V5R1 that might cause a problem if you attempt to access the iSeries 400 FTP server using an old TCP/IP implementation. The range of reserved ports was changed by RFC1340 in July, 1992. Any TCP/IP implementation written before that time might try to use ports above 255 as transitory ports, which could be used by an FTP client as the

port for a data connection. In this situation, with V5R1, the resulting PORT subcommand sent by the client is rejected by the iSeries 400 FTP server.

Server job description changes

Job description QTMFTPS in the QTCP library that was used by the FTP server has moved to the QUSRSYS library. If you modified the QTCP job description (*JOBDD) in a prior release, you should make the modification to QTMFTPS *JOBDD in the QUSRSYS library instead.

Pascal API support withdrawn

Prior to V3R1, the only programmable interface to TCP/IP was the TCP and UDP APIs, which were written in Pascal and used primarily by applications written in Pascal. In V3R1, an additional set of APIs known as AS/400 sockets was added, which supported applications written using Integrated Language Environment (ILE) languages.

The sockets APIs support more function than the Pascal APIs, and meet industry standards for Berkeley Software Distribution (BSD) 4.3 sockets. For additional information on these APIs, click **Programming** → **CL and APIs** → **APIs** → **Alphabetical list of APIs**.

Support for the Pascal compiler was withdrawn in V3R7, and only the Pascal API runtime code has been shipped with TCP/IP Connectivity Utilities for iSeries (5722-TC1). Documentation for the Pascal APIs was not provided starting in V4R1.

All new development should now be using the socket APIs. Support is no longer provided for applications using the Pascal APIs, with the exception of AS/400 Telnet client for release V4R5. Beginning with V5R1, the iSeries Telnet client uses the sockets APIs and no longer requires Pascal API runtime code.

The Pascal API runtime code is still shipped for V5R1, but may be withdrawn without notice in a future release.

HTTP Server (5722-DG1) changes

HTTP Server requires JDK 1.2

The HTTP Server administration graphical user interface now requires JDK version 1.2. Option 3 of the AS/400 Developer Kit for Java1.2 product (5769-JV1) must be installed if you plan to start the HTTP Server *ADMIN instance.

The HTTP Server administration and configuration (*ADMIN) interface is now served by the IBM HTTP Server (powered by Apache). A new Apache-based ADMIN configuration file is included in V5R1 that contains HTTP Server (powered by Apache) directives. If you have not changed the ADMIN configuration file on previous releases, no action is necessary. If you have made any customizations or changes to the ADMIN configuration, you must make the equivalent change to the new HTTP Server (powered by Apache) configuration.

HTTP ADMIN configuration file changes

The HTTP Server administration and configuration (*ADMIN) interface is now served by the IBM HTTP Server (powered by Apache). A new Apache-based ADMIN configuration file is included in V5R1 that contains HTTP Server (powered by Apache) directives. If you have not changed the ADMIN configuration file on previous releases, no action is necessary. If you have made any customizations or

changes to the ADMIN configuration, you must make the equivalent change to the new HTTP Server (powered by Apache) configuration.

HTTP Server security audit entry changes

Several changes were made to the IS security audit record of the QAUDJRN journal and the corresponding QASYISJ4 file.

- The following entry types are no longer used:
 - A: Fail
 - C: Normal
 - U: Mobile User
- The following entry types have been added:
 - Internet Key Encryption (IKE) Phase 1 Security Association Negotiation
 - Internet Key Encryption (IKE) Phase 2 Security Association Negotiation
- The **Mobile ID** field (offset 265) is no longer used.

VisualInfo™ (5769-VI1) data files convert to Content Manager (5722-VI1) format

Records for several data files have been changed or added to for V5R1. Programs are provided to help you upgrade from ImagePlus® VisualInfo for AS/400 (last supported at V4R3) to Content Manager. This capability is new to V5R1. These programs convert existing Visual Info for AS/400 data to the new record format, and set the values of new fields to an appropriate default value. These programs run as part of a post-installation command that follows the successful completion of the Restore Licensed Program (RSTLICPGM) command.

See Information APAR II12727 at the following Web site for further information on possible installation problems:

<ftp://ftp.software.ibm.com/as400/products/contentmanager/v510/server/>

Performance Management/400 (5769-PM1)

Performance Management/400 integrated into OS/400

The Performance Management/400 licensed program is no longer a separately installable product. The Performance Management/400 function is installed automatically as part of the operating system in V5R1. The following objects have changed:

- Programs now reside in library QSYS, not QMPGLIB.
- Performance Management/400 data is written to files in library QUSRSYS, not QMPGLIB.
- Performance Management/400 jobs are submitted to, and run under, the QSYSWRK subsystem. The Q1PSCH job operates in delay-wait (DLYW) status while waiting to submit other PM/400 scheduled jobs.
- The Performance Management/400 menu has moved from QMPGLIB to QSYS. To access the Performance Management/400 menu, type GO PM400 instead of GO QMPGLIB/PM400.
- The Performance Management/400 Read (PMREAD) command is no longer available.

- The Performance Management/400 commands and menu now have help information that was previously provided within the PMREAD command. The Performance Management/400 disclaimer information that was also part of PMREAD has now been added as an option on the Performance Manager/400 menu.
- The following commands and their equivalent Performance Management/400 menu options have been removed. The Performance Management/400 menu has been renumbered accordingly.
 - Display PM/400 System Status (DSPPMSYSS) and Work with Historical System Status (option 1)
 - Display PM/400 Active Jobs (DSPPMACTJ) and Work with Historical Active Jobs (option 2)
 - Display PM/400 Disk Status (DSPPMDSKS) and Work with Historical Disk Status (option 3)
- The previous Performance Management/400 messages (MPGxxxx and MPGxxxx) that resided in Q1PMSGF message file in QMPGLIB are no longer available. The messages have been replaced with CPxxxx messages where necessary.
- The Q1PSC1 program is no longer available. This program previously allowed Performance Management/400 scheduled jobs to be changed. Scheduled jobs should not be changed, so the program has been removed. The ability to inactivate or activate jobs is included on the Performance Management/400 menu, Work with Automatically Scheduled Jobs (option 2).
- Any jobs scheduled previously with Performance Management/400 menu option Work with Automatically Scheduled Jobs (option 2) are not maintained after you install V5R1. All required Performance Management/400 jobs and their correct attributes are included with the product. Use the iSeries job scheduler to schedule your own jobs.
- The table below lists commands that may be removed in a future release of OS/400 and the equivalent options available from Performance Management/400 that you should use to perform the same tasks.

Commands	Performance Management/400 Options
Work With Remote Download Schedule (WRKPMRMTS)	Work With Remote AS/400 Systems (option 5 on the PM/400 menu)
Work with Top Ten Omissions (WRKPMRPTO)	Work with Top Ten Omissions (option 4 on the PM/400)
Work with Automatically Scheduled Jobs (WRKPMRSCH)	Work with automatically scheduled jobs (option 2 on the PM/400 menu)
PM/400 Line Control (PMLINMON)	Configure PM/400 (CFGPM400) command

Performance Management/400 data transmitted asynchronously

With V5R1, Performance Management/400 data can be transmitted synchronously through SNA or asynchronously through TCP/IP. At a future release, Performance Management/400 may limit the transmission mechanism to asynchronous connection only.

Performance Management/400 data collected by Management Central

In V5R1, Performance Management/400 still allows you to set up a Performance Management/400 host or remote environment through the Performance

Management/400 (PM400) menu option 5 (Work with Remote AS/400 Systems). This is no longer necessary when Management Central is set up to collect Performance Management/400 data on endpoint systems. Be aware that future releases of Performance Management/400 may remove menu option 5 (Work with Remote AS/400 Systems). This option sets up a host or remote environment specifically for Performance Management/400.

DCE Base Services for AS/400 (5769-DC1) and QKRBGSS service programs contain overlapping GSS API functions

The Distributed Computing Environment Base Services for AS/400 licensed program currently includes a set of Generic Security Services (GSS) APIs. You must use these APIs if you want to use the GSS API technology to authenticate with a DCE security server using a DCE security mechanism. In V5R1, the QKRBGSS service program provides GSS APIs as part of the operating system. The GSS APIs provided by this service program do not support the DCE security mechanism, and they are not compatible with the DCE/400 GSS APIs that are included.

The following applies if you create programs or service programs that use the GSS APIs that are provided by the Licensed Program 5769-DC1 DCE Base Services for iSeries 400:

The system binding directory now contains a new service program object, QKRBGSS in library QSYS, that exports a new GSS API. This GSS API does not support the DCE security mechanism. To continue to create programs using the GSS APIs provided by the DCE Base Services for AS/400 licensed programs, you must do one of the following:

- Issue the command `RMVBNDIRE BNDDIR(QSYS/QUSAPIBD) OBJ((QSYS/QKRBGSS *SRVPGM))` to remove the QKRBGSS service program from the system binding directory.
- Ensure that the `EUVLIBDCE *SRVPGM` object in library `QDCELIB` is explicitly specified when you create your program or service program. You would normally do this by specifying `BNDSRVPGM(QDCELIB/EUVLIBDCE)` on the `CRTPGM` or `CRTSRVPGM` command that you use to create your program or service program.

OnDemand/400 (5722-RD1) clients installed with CD-ROM instead of product options

Prior to V5R1, the OnDemand/400 clients were provided through product options 6, 7, and 8. These options were included on the same CD-ROM as option 5 (OnDemand Server Feature). In V5R1, option 5 and the OnDemand/400 clients do not ship on the same CD-ROM. The CD-ROM that contains option 5 can be installed with Restore License Program (RSTLICPGM) command or by using the Work with Licensed Programs (LICPGM) menu. You can use the *IBM Content Manager OnDemand for Multiplatforms Version 7.1* CD-ROM (Part Number: CV6C6ML, Form Number: LCD4-3794-00) to install the needed client directly on a workstation.

Options 6, 7, and 8 are automatically deleted when you install OnDemand/400 V5R1.

Client Access Express

Service pack required for service

To be able to get IBM Service support for V5R1 Client Access Express, service pack SI01037 or later must be installed. More information on the latest service pack is available at the following Web site:

www.ibm.com/servers/eserver/series/clientaccess

Two Client Access products no longer supported

The Client Access for Windows 95/NT client (5763-XD1) and the Client Access Enhanced Windows 3.1 (5763-XK1) client products have been removed from the Client Access Family. All platforms supported by the 5763-XD1 product are supported by iSeries Client Access Express for Windows (5722-XE1). You must migrate Client Access for Windows 95 /NT clients to iSeries Client Access Express for Windows to connect workstations to an iSeries server operating at the V5R1 level. There is no SNA support in 5722-XE1. Users who cannot move to TCP/IP connectivity have no migration path. There is also no migration path for workstations that use the Windows 3.x operating system.

License key required for Client Access Family

For V5R1, Client Access Express Family (5722-XW1) is controlled by a license key. If you do not have the unique license key entered for 5722-XW1, option 1, Client Access Express operates for a 70 day grace period. However, during the grace period, message CPF9E72 (Usage limit of xx exceeded. Grace period will expire in xx days on xx.) is sent to the job log and the QSYSOPR message queue until you add the license key. After the grace period has expired, you can no longer use any features of 5722-XW1 (such as the 5250 Emulation or Data Transfer components) that require the license key. Message CPF9E71 (Grace period expired. Requesting user not added) is sent to the job log and the QSYSOPR message queue until the license key is entered.

For further information about changes to the Client Access Family, including migration considerations, see the iSeries Client Access Web site:

www.ibm.com/eserver/series/clientaccess 

Client Access user profile not automatically added to system distribution list

When you enroll a Client Access Express for Windows (5722-XE1) user, you must now decide if that profile should be added to the system distribution directory. Prior to V5R1, the profile was automatically added to the system distribution directory. Now, the profile is not added unless you request it to be done.

TCP/IP time-out capability

In V5R1, a 30-second time-out capability has been added to TCP/IP in Client Access, which causes a change to the user environment. In previous releases, if no response was received from the host, the TCP/IP stack could take up to 2 minutes before it would time-out. The new default time-out could cause a connection failure in extremely slow networks.

You can change this default setting to a different value by changing the connection properties for the system through Operations Navigator.

LDAP C APIs removed from Client Access

Previous versions of Client Access Express included LDAP C APIs. These APIs (including header files, library files, and DLL files) have been deleted from Client Access because they could cause applications that used these APIs prior to V5R1 to fail. You can install a later version of the APIs from /QIBM/ProdData/OS400/DirSrv/UserTools/Windows/setup.exe or download them from various IBM Web sites.

Client Access OLE DB provider

The Client Access Object linking and embedding (OLE) database (DB) provider has changed to correctly implement record locking for record-level access functions. If you have written source code to circumvent the original problem with record locking, this might cause a change in the behavior of your program.

Prior to V5R1, the current position was set to the last read record instead of the inserted record. This locked the last read record after the insert of a new record. In V5R1, the current position is to the inserted record, which is then locked, releasing the lock on the previous record.

Also, the lock is now kept on updated records. With releases prior to V5R1, the updated record lock was released as soon as the update operation completed.

With V5R1, the default cursor type for SQL result sets has been changed from dynamic to forward-only to be more consistent with Microsoft® ActiveX Data Object (ADO) and to allow improved performance. Applications that depend on receiving a fully scrollable cursor (such as scroll backwards, which a dynamic cursor provides) without requesting it by setting the ADO cursor type must be modified to request a dynamic cursor.

RESTRICT option enforced for DB2® Query Manager and SQL Development Kit for iSeries (5722-ST1)

Previously, the RESTRICT option on a DROP SCHEMA or a DROP COLLECTION statement was ignored when the DROP statement was issued. The schema or collection was deleted, and there was no error returned, even if the schema or collection contained tables, views, or indexes. For V5R1, the RESTRICT option is processed. If the schema or collection contains any tables, views, or indexes, the DROP statement fails with message SQL0478, Object &1 in &2 of type &3 cannot be dropped.

RUNSQLSTM command moved to library QSYS

The Run SQL Statement (RUNSQLSTM) command has moved from library QSQL to library QSYS. If you coded the call to RUNSQLSTM as QSQL/RUNSQLSTM, you must change your code to QSYS/RUNSQLSTM.

Review Information APAR II12721 before deciding to remove licensed product 57*nn*ST1 (where *nn* is any number).

Removing licensed product 57xx-ST1

Review Information APAR II12721 before deciding to remove licensed product 57*xx*ST1 (where *xx* is any number).

OfficeVision® for AS/400 (5769-WP1) no longer supported

With V5R1, IBM OfficeVision for AS/400 (5769-WP1) is not supported. OfficeVision has not been updated since V4R2 and there are changes in OS/400 V5R1 that cause the products to be incompatible. During the upgrade to V5R1, the OfficeVision product is deleted from the system; however, your data is not deleted. Prior to the upgrade, you should delete the enrollments for your OfficeVision users and delete all mail, calendars, documents, and folders that you no longer need, unless you plan to use replacement products to access that data. Users who reinstall OfficeVision on V5R1 should not expect it to run correctly.

WebSphere Development Studio for iSeries (5722-WDS)

WebSphere Development Studio replaces several products including Application Development ToolSet (5769-PW1)

IBM WebSphere™ Development Studio (5722-WDS) replaces several licensed programs that are no longer available in V5R1. Do not install these products after 5722-WDS has been installed:

- Application Development Toolset Client Server/400 (5769-CL2)
- Application Development Toolset/400 (5769-PW1)
- ILE RPG for AS/400 (5769-RG1)
- ILE COBOL for AS/400 (5769-CB1)
- ILE C for AS/400 (5769-CX2)
- VisualAge® C++ for AS/400 (5769-CX5)
- IBM ILE C++ for AS/400 (5799-GDW)

They have been replaced by a new product, WebSphere Development Studio (5722-WDS). Do not install the pre-V5R1 products after you install 5722-WDS. Automatically installing V5R1 over V4R4 or V4R5 selects and installs the appropriate options of 5722-WDS based on what pre-V5R1 products were installed.

If you manually install 5722-WDS (using either the Work with Licensed Program (LICPGM) menu or the Restore Licensed Program (RSTLICPGM) command), be aware that 5722-WDS does not install if any of the pre-V5R1 products are installed. An install failure message indicates which product you must uninstall.

A full installation of WebSphere Development Studio requires significantly more disk space than one or two of the equivalent application development or compiler products. Installing only the options you plan to use ensures that there is minimal additional space required.

In V5R1, when the *BASE option of 5722-WDS is installed or reinstalled, the old product libraries are cleared. If you install or reinstall the *BASE product option, install or reinstall product options 21 (Tools - Application Development), 22 (Tools - Application Development Manager), and 23 (Tools - Application Dictionary Services).

If a pre-V5R1 product is reinstalled after 5722-WDS is installed, the affected options of 5722-WDS must be reinstalled. If secondary language libraries for this product exist on the system, you must also re-install them.

If your machine has Application Development Manager (57nn-PW1 Option 2) installed, back up your Application Development Manager data before you install

V5R1. Before installing V5R1, read APAR SE00560 for instructions on how to back up this data (including library QUSRSYS).

ILE RPG for iSeries (Option 31)

In the Integrated Language Environment® RPG for iSeries (Option 31) program, the SETLL, SETGT, and CHAIN operations reset %EOF(file) to 0 if the operations are successful. Prior to this release, these operations did not affect the %EOF(file) built-in function. If the file had previously been read to end-of-file, %EOF(file) would still indicate that the file was at end-of-file after a successful file position operation.

The behavior of %EOF with no parameter is not changed; it is not affected by SETLL, SETGT, and CHAIN.

ILE C and C++ for iSeries 400 (Options 51-54)

The Integrated Language Environment (ILE) C and C++ compilers have a new code base in V5R1. Changes to the command, header file, and language might require changes to your build procedures or source code. Targeting V4R4 or V4R5 using the TGTRLS parameter allows you to work around most incompatibilities. However, IBM recommends that you make the appropriate changes to your build procedures or source code to avoid problems in the future, when support for the V4R4 release is discontinued.

Workstation C++ products (5716-CX4 and 5769-CX5) are no longer supported. Installing the V4R4M0 or V4R5M0 compilers (5799-GDW and 5769-CX2) on a V5R1 system is not supported and corrupts Options 53 and 54 of WebSphere Development Studio, 5722-WDS.

The V4R4 and V4R5 C and C++ compilers are invoked when either the V4R4M0 or V4R5M0 target release is specified on the TGTRLS parameter of the command.

Late-breaking information can be found at:

www.ibm.com/software/ad/wds400 

Compiler command changes

Several compiler commands have been changed or deleted to improve usability and compatibility between the C and C++ compilers. C and C++ programs that built successfully in V4R4 and V4R5 might see errors CPD0084 Keyword not valid for this command and CPD0043 Parameter not valid, when using the CRTCMOD, CRTCPPMOD, CRTBNDC, CRTBNDCPP commands.

Your application build process and Application Development Manager (ADM) or Programming Development Manager (PDM) user options should be updated with the appropriate command changes. When a parameter has been removed, TGTRLS(*PRV) passes the V4R4 or V4R5 defaults to the compiler. When TGTRLS(*PRV) is specified, however, new default values for options are still in affect.

CRTCMOD and CRTBNDC commands:

Parameter changes: The MARGINS and SEQCOL parameters have been removed from the compiler command interface. This functionality can now be obtained by using #pragma margins at the start of the source code being compiled.

The SYSINC parameter has also been removed from the C compiler commands. The OPTION parameter and the *STDINC and *NOSTDINC values replace the SYSINC parameter and values. Prior to V5R1, SYSINC(*YES) defined a macro (_IS_QSYSINC_INSTALLED). This macro is not defined in V5R1; therefore, all occurrences of this macro should be removed.

The default value for the LOCALETYPE parameter has changed from *CLD to *LOCALE.

OPTION parameter value changes: The option *USRINCPATH has been changed to *NOSYSINCPATH, which is also the new default.

In a future release, IBM might remove the *PPONLY and *NOPPONLY values of the OPTION parameter. IBM recommends that you use the new PPGENOPT, PPSRCFILE, PPSRCMBR, and PPSRCSTMF command parameters in place of these values.

The default for compilations running in batch mode has changed from OPTION(*NOLOGMSG) to OPTION(*LOGMSG). Specifying OPTION(*NOLOGMSG) helps keep spooled file sizes to a minimum.

Other value changes: The CHECKOUT values *ACCURACY and *NOACCURACY have been changed to *TRUNC and *NOTRUNC, respectively. Values *NONE, *BASIC, and *FULL were removed from the OPTIMIZE parameter. You must use 10, 20, 30, or 40, respectively, in place of these values.

The values *NONE and *ALL have been removed from the SYSIFCOPT parameter. The value *NOIFSIO replaces *NONE as the default, while individual options must be specified instead of *ALL. The *NONE value has also been removed from the ENBPFRCOL parameter.

CRTCPPMOD and CRTBNDCPP commands: The default library for SRCFILE has been changed from *CURLIB to *LIBL. Also, the **Page length** field has been removed from the OUTPUT parameter. LOCALETYPE has replaced LOCALE as the parameter name.

Parameters: The following are changes and additions to parameters:

- The PPOPTION parameter has been removed and replaced with the PPGENOPT, PPSRCFILE, PPSRCMBR, and PPSRCSTMF parameters.
- ALNSTRUC has been replaced by PACKSTRUCT.
- ENUMSIZE parameter has been replaced by ENUM, and the previous values *MAX and *MIN are now *INT and *SMALL.

Parameter values: The table below shows the changes to parameter values from prior releases to V5R1.

Parameter name	Previous value (V4R4 and V4R5)	V5R1 replacement value
TEXT	*BLANK	*SRCMBRTXT
LANGLVL	*COMPAT	*LEGACY
OPTION	*SOURCE	*SHOWSRC
	*NOSOURCE	*NOSHOWSRC
	*DFTINCPATH	*SYSINCPATH
	*NODFTINCPATH	*NOSYSINCPATH

CHECKOUT	*USAGE	*NONE
SYSIFCOPT	*IFSIO	*IFS64IO

Other changes: The following are other various changes to parameters, values, and options for the CRTCPMOD and CRTBNDCPP commands.

- *NONE is no longer accepted as a parameter for the option ENBPFCOL.
- The values for the FLAG parameter now include 0, 10, 20 and 30.
- The INLINE parameter default values for the Threshold and Limit fields have been changed to 250 and 2000, respectively.
- Values *AGR, *NOAGR, *STRUCREF, and *NOSTRUCREF have all been removed from the OPTION parameter.
- The values shown below have been removed from the CHECKOUT parameter:
 - *NOCMP and *CMP
 - *NOCONST and *CONST
 - *NOCNV and *CNV
 - *NOCOPY and *COPY
 - *NOENUM and *ENUM
 - *NOEXTERN and *EXTERN
 - *NOPPCHECK and *PPCHECK
 - *NOPPTRACE and *PPTRACE
 - *NOUNDEF and *UNDEF
 - *NOVFT and *VFT

INCLUDE and INCLUDEPATH environment variables

The INCLUDE environment variable for the ILE C compiler has a different effect on the include search order in V5R1. Prior to V5R1, the INCLUDE path would override the include search path order, and the directories defined by the environment variables path were the only directories searched. The V4R4 and V4R5 ILE C++ compiler used the INCLUDEPATH environment variable for a similar purpose, except the default include path was not overridden, but was appended to the end of the INCLUDEPATH path.

In V5R1, ILE C++ uses the INCLUDE environment variable instead of INCLUDEPATH. The V5R1 C and C++ INCLUDE environment variable has less influence on the include search order for ILE C. The search order can now be described by the following.

#include type	Directory Search Order
#include <file_name>	1. If you specify a directory in the INCDIR parameter, the compiler searches for file_name in that directory first.
	2. If more than one directory is specified, the compiler searches the directories in the order that they appear on the command line.
	3. If the INCLUDE environment variable is defined, the compiler searches the directories in the order they appear in the INCLUDE path.
	4. The compiler searches the directory /QIBM/include.

#include "file_name"	1. The compiler searches the directory where your current root source file resides.
	2. If you specify a directory in the INCDIR parameter, the compiler searches for file_name in that directory first.
	3. If more than one directory is specified, the compiler searches the directories in the order that they appear on the command line.
	4. If the INCLUDE environment variable is defined, the compiler searches the directories in the order they appear in the INCLUDE path.
	5. The compiler searches the directory /QIBM/include.

Header files

The source for the standard C headers from the QCLE library and from the /QIBM/ProdData/ilecppn/include directory has been moved to the QSYSINC library. Correspondingly, the default search paths implied when the SRCSTMF parameter is specified on the compiler commands are now /QIBM/include.

The V4R4 and V4R5 C++ compiler paths also contain the Access Class library, the AT&T class library, the IBM Open Class[®] library and the C++ runtime headers. These directories are also moving to /QIBM/include. Upwardly compatible paths exist as symlinks and are located in /QIBM/ProdData/ilecppn/include.

The H file in QCLE library and its corresponding paths are still supported as part of Option 53 for a limited time. These files contain wrapper headers that include the QSYSINC version of the standard C header files. The original paths and symbolic links are maintained until the QCLE/H file is no longer supported by IBM.

If you include IBM header files by specifying #include <stdio.h>, you do not need to make any changes. However, constructs such as #include <QCLE/H/STDIO> should be changed to #include <stdio.h>, or changed to the following:

```
#ifdef __SRCSTMF__
#include </QIBM/include/stdio.h> /* for stream file source */
#else
#include <QSYSINC/H/stdio>
#endif
```

References in source code or build scripts to paths that contain /QIBM/ProdData/ILEC or /QIBM/ProdData/ilecppn should be removed.

The header files in QCLE/H are:

- assert.h
- locale.h
- regex.h
- u_stdlib.h
- ctype.h
- math.h
- setjmp.h
- wchar.h
- decimal.h
- monetary.h
- signal.h
- wctr.h
- errno.h
- nl_types.h
- stdarg.h
- wctype.h
- except.h
- p_ctype.h
- stddef.h
- xxcvt.h
- float.h
- p_stdlib.h
- stdio.h
- xxdtaa.h
- ifs.h
- p_time.h
- stdlib.h
- xxfdbk.h
- langinfo.h
- pointer.h
- string.h
- limits.h
- recio.h
- time.h

Messages

Programmers might see different diagnostic message identifiers and message text when using the V5R1 compilers. Wrapper messages are still used by the V5R1 C compiler for displaying compiler errors and warnings in the job log. However, instead of referencing the actual message number in the second-level text of the wrapper message, the second-level text of the actual message is displayed as the second-level text of the wrapper message.

The C++ escape message identifiers in CRTCPMOD have changed from CXM0613 to CZS0613. The C++ escape message identifiers in CRTBNDCPP command have changed from CXM1613 to CZS1613. C++ build procedures that monitor for escape messages should be changed accordingly.

C and C++ language levels

Language differences: The ILE C++ compiler, which was available prior to V5R1, was based on the American National Standard Institute and International Standards Organization (ISO) standard draft X3J16/WG21:1992 for the C++ programming language. The V5R1 ILE C++ compiler is based on the finalized version of this standard X3J16/WG21:1998. There are significant differences in the language between the two versions. Some of the main differences in the languages are listed below:

- Name spaces (including the name space and using keywords)
- The spool data type and the true and false keywords
- Casting keywords `static_cast`, `const_cast`, and `reinterpret_cast`
- The `explicit` and `mutable` specifiers
- Variables declared in a `for`-statement are now scoped to the `for`-loop
- Templates, including a syntax for explicit instantiation, partial specialization, and the type name and export parameters

Some of these 98 language differences of the American National Standards Institute might require source code changes.

C compiler changes:

Aggregate initialization: In previous releases, the C compiler allowed arrays of aggregates to initialize their address members to the address of another array element within the original array. This is not allowed with the V5R1 C compiler and results in error message CZM0221(30) Initializer must be a valid constant expression.

```
struct list {
    struct list *prev, *next;
}
```

```
typedef struct list list;
```

```
void main (void) {
    list list1[] =
    {
        {NULL, &list1[1]},
        {&list[0], &list1[2]},
        {&list[1], NULL}
    }
```

```
};
}
```

Expressions in the main scope initializer list for an aggregate object (including the array) or union type must be constant. The address of an automatic object is not a constant (list1 in the above code), which causes the above code example to be invalid with V5R1. However, the code is valid if the declaration is moved from the main scope into the file scope.

C compiler macro expansion within #pragma directives: In V4R4 and V4R5, the pre-defined macros `__SAA__` and `__SAA_L2__` were used in IBM header files `<math.h>`, `<signal.h>`, and `<wctr.h>` to expose extensions to American National Standards Institute C. Specifying `LANGLVL(*SAA)` or `LANGLVL(*SAAL2)` on the command or specifying the equivalent `#pragma langlvl` allowed access to the extensions.

For V5R1, `#pragma langlvl` and language levels `SAA` and `SAA_L2` are no longer supported. The values `*SAA` and `*SAAL2`, along with `*SOURCE` in the ILE have been removed from the `LANGLVL` parameter. These values have all been replaced by the default value `*EXTENDED`. Compiling to a previous target release does not allow you to define the `__SAA__` and `__SAA_L2__` macros.

In V5R1, you must use `LANGLVL(*EXTENDED)` to access any extensions to the C language. If you have existing code dependent on the predefined macros `__SAA__` and `__SAA_L2__`, you should remove this dependency or add `|| __EXTENDED__` to your preprocessor directive code. The `#pragma langlvl` directive should be removed from the code and the desired language level should be specified in the compile option `LANGLVL` on the `CRTCMOD` and `CRTBNDC` commands.

The V5R1 C compiler allows macro expansion to occur throughout the directive, except for the directive `pragma` keyword itself (`#pragma`). Previously, only a few `pragmas` allowed macro expansion within their parameter listing. With V4R4 or V4R5, the example below would issue an error on the `#pragma` argument directive because the macro replacement would not occur.

```
#define argument convert
#pragma argument (0) /* 'argument' replaced by 'convert' in V5. This is
                    exactly the same as doing '#pragma convert (0) */
```

C++ changes: The following are no longer supported for the Language level (`LANGLVL`) parameter for V5R1 C++:

- `#pragma langlvl`
- `*COMPAT` option

#pragma: If you use `#pragma langlvl` directives in source code or build commands, you should change them accordingly. To specify a language level, you must use the Language level (`LANGLVL`) compile option. Specifying `*COMPAT` as the Language level generates a command error. To use the previous `*COMPAT` Language level, specify `*LEGACY` for the `LANGLVL` parameter and a valid target release (`TGTRLS`).

#pragma pack: Compiling C++ source code that made use of the second and third parameters of `#pragma pack` causes an error. If you experience errors with existing source that uses `#pragma pack`, you should note that the syntax for `#pragma pack` has changed. In V5R1, `#pragma pack` only takes a single parameter, the desired packing size (in bytes).

#pragma enumsize: In V5R1, the behavior of the #pragma enumsize has changed to #pragma enum for ILE C. The enumsize pragma is still recognized by the C and C++ compilers, however.

In previous releases, you had the option of specifying that enum values be stored in either 1, 2, or 4 bytes. However, #pragma enumsize would only store enum values as signed types. This allowed the enum to hold the maximum number of elements for the given size. However, if constant values were given that exceeded the maximum signed value for that size, an error would occur and the enum size would have been increased (if possible) to hold the large value.

An inconsistency occurred for enums that were sized to 2 bytes. The enum elements are stored as 2-byte signed integers, just as 1 byte and 4 bytes enums are stored as 1-byte signed integers and 4-byte signed integers, respectively. However, for 2-byte enums, if you gave a constant value greater than the maximum 2-byte signed integer (32 767), an error was not issued.

The constant value was assigned to the 2-byte signed integer. Because values greater than 32 767 that were stored into a signed 2-byte integer had the most significant bit set, a negative number was created when this 2-byte integer was treated as a signed integer.

In previous versions of both C and C++, if a given value of an enum exceeded the capacity of the specified size of the enum, the warning message CZM0618, (The enum cannot be packed to the requested size of...) was issued, and the smallest possible sized enum was used.

In V5R1, for example, if you specify a 1-byte enum and then give a constant value in the enum declaration greater than 255, the error message CZM00387, (The enum cannot be packed to the requested size. Change the enumeration value or change the #pragma enum(.)) is sent and the compilation is stopped. A 1-byte enum can store only values between -128 and 127 for signed values, and 0 to 255 for unsigned values.

The option of using empty brackets in the #pragma enum directive is no longer available. Using the empty brackets with #pragma enum now causes the compiler to send an error message and the pragma is ignored. You must either use the deprecated enumsize pragma, or remove the #pragma enum directive.

Pointer differences: When targeting V5R1, open pointers (_OPENPTR) and ILE space pointers (_SPCPTR) are no longer allowed to be used in conjunction with arithmetic operators, and now result in a severe compile-time error.

For example, the source below now fails to compile, issuing these error messages: Operand of increment or decrement operator not valid. Operand has type open pointer.

```
#include <pointer.h>
void main (void) {
    _OPENPTR openptr1;
}
```

Previously, the C compiler allowed implicit conversion between pointers with unequal qualifiers. This is not American National Standards Institute behavior and is not allowed in the V5R1 compiler.

For example, the source below fails with a compiler error in V5R1:

```

int F( void * );
volatile char buf [100];

int foo( int i )
{
    return F( &buf [i] );
}

```

***COMPAT option changes:** The following features supplied by *COMPAT are no longer available and result in an error or in different behavior. Specifying *LEGACY for the Language level (LANGLVL) and V4RxMx for the Target release (TGTRLS) parameter is a temporary circumvention for these changes. IBM recommends that you make changes to your source code and build commands to reflect the V5R1 changes.

- Previously, classes declared or defined within classes, or declared within argument lists were given the scope of the closest nonclass. In V5R1, classes declared or defined within classes have class scope. They can only be referenced within the class they are contained in. Classes declared within argument lists have function scope. They can only be referenced within the function that was called. You might see error message CZP0040(30), Class Name is ambiguous.
- Prior to V5R1, type definition and enumerated types declared within a class were given the scope of the closest nonclass. In V5R1, type definitions and enumerated types declared within classes have class scope. You might encounter the error message CZP0040(30), Typedef or enumerated type is ambiguous.
- The overload parameter was previously recognized and ignored. In V5R1, you see error message CZP0040(30), Overload may be undeclared or ambiguous.
- An expression showing the dimension in a delete expression was previously parsed and ignored. With V5R1, you see error CZP0064(30), Syntax error: "]" was expected.
- Conversions from const void* and volatile void* to void* were previously allowed without an explicit cast. In V5R1, you see error CZP0216(30) Expression cannot be converted to "void *".
- Previously, where a conversion to a reference type used a compiler temporary type, the reference did not need to be a const type. In V5R1, the reference must be to a const type. You see error CZP0257(30), An object or reference cannot be initialized with an expression of type X.
- Prior to V5R1, you could bypass initializations as long as they were not constructor initializations. In V5R1, you see error message CZP0242(30), Bypassed the initialization of X.
- Previously, you could return a void expression from a function that returns void. In V5R1, you might see various error messages when performing this return.
- Previously, operator++ and operator-- without the second zero argument were matched with both prefix and ending operators ++ and --. In V5R1, operator++ and operator-- without the second zero argument are matched with the prefix operators ++ and -- only. You might see error message CZP0218(30), The call does not match any parameter list for "operator++".
- Previously, you could use the dollar (\$) character in identifiers. In V5R1, you see the warning message CZP0825(10), The character "\$" is not allowed. If the dollar character is not at the end of the identifier name, you also see error message CZP0063(30), Text is unexpected.
- In a cast expression, the type to which you were casting could include a storage class specifier, function-type specifier (inline or virtual), template specifier, or type definition. In V5R1, you see a type conversion error message.

- Previously, you could use the comma operator in a constant expression. In V5R1, you see various error messages, depending on the context of the constant expression containing the comma.
- Prior to V5R1, no error was generated if a function declared to return a nonvoid type did not contain at least one return statement. Such a function could also contain return statements with no value without generating an error. In V5R1, you see error message CZP0223(30), A return value is expected, if the function contains a return statement with no value. You see warning message CZP1101(10), A return value is expected, if the function does not contain at least one return statement.
- Previously, if two pointers to functions differed only in their linkage types, they were considered to be compatible types. In V5R1, you see error message CZP0216(30), Type conversion error.

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